SPATIAL ANALYSIS OF REPORTED KIDNAPPING EVENTS IN NIGERIA USING MORAN'S I

by

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Spatial Analysis of Reported Kidnapping Events in Nigeria Using Moran’s I

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DEDICATION

This thesis is dedicated to my nieces and nephews, with the hope that they each find a passion for learning in life.
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I would like to thank my family, friends, and academic advisors who have helped me achieve this goal. My parents, Rodney and Diane Larsen, for recognizing my love for learning about the world as a child, and helping me to foster that love as I grew. My brother Scott for encouraging me to go outside my comfort zone and take a GIS class during my undergraduate studies, which led to me recognizing that I enjoyed the subject. My brother Tim for understanding the demands of graduate school and providing me with encouragement, support, and enthusiasm. My coworkers who supported me in my studies and helped me brainstorm different ideas and approaches for my thesis. I would like to thank Drs. Cervone, Medina, and Rice for each helping me as a director of my thesis committee. Each seamlessly handed the baton as director to the other, enabling me to continue my studies.
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ABSTRACT

SPATIAL ANALYSIS OF REPORTED KIDNAPPING EVENTS IN NIGERIA USING MORAN’S I

Aubrey Larsen, M.S.
George Mason University, 2014
Thesis Director: Dr. Matthew T. Rice

Nigeria has long garnered international attention for the rate of kidnappings that occur within its borders. At the same time, Nigeria is one of the world’s largest oil producers, which results in billions of dollars in revenue for the country each year. Despite Nigeria’s vast oil wealth, its kidnapping rates are making some multinational companies question their activities in Nigeria and look instead to operating in safer countries. The Nigerian economy is dependent on its oil sales, and a drawback in multinational oil companies could devastate the national economy. While the oil extraction earns billions for the country annually, little of that money has trickled down to the local Nigerians. As a result, many hypothesize that this disparity in wealth motivated many of the known kidnapping events.
Data for this thesis was acquired through the Armed Conflict and Location Event Data (ACLED) program. Kidnapping events were cataloged and analyzed using Global Moran’s I and Local Moran’s I in ArcGIS to determine the presence of significant spatial clusters, as well as the location of such clusters. In addition, an ordinal analysis of the data was conducted to identify the visual patterns of incidence of the three categories of kidnapping: economic, political, and ritual and religious. These three categories are identified as the motivators behind each kidnapping event. The strongest ordinal patterns are seen in northern Nigeria where ritual and religious kidnappings are more common, and southern Nigeria, where economically-motivated kidnappings are the most prevalent.

The three key elements of kidnapping quantitatively analyzed in this thesis are: ransoms, kidnapped foreigners, and fatalities. Each of these elements was analyzed to determine if there were spatial patterns related to the element. Global Moran’s I and Anselin’s Local Moran’s I identified several spatial patterns in the data. The most significant spatial clusters were seen with the clustering of kidnappings in southern Nigeria, where the majority of the oil extraction occurs. This region saw the most significant clusters of kidnapped foreigners, kidnappings for ransom, and total fatalities. The presence of foreigners and the requests for ransom are likely a manifestation of the economic disparity in the region. Also of interest was the high proportion of fatalities in northern Nigeria, though the data for that region is not as robust as the kidnapping event data for the rest of the country. Ritual and religious kidnapping, most frequently occurring in the
north, is not motivated by economic or political desires, which may explain the higher rates of fatalities in that region.

It is also important to note the limitations in the ACLED dataset. This dataset relies primarily on information reported in the media. As a result, data from recent years is likely more robust than the earlier years in the timeframe, such as 1987. Additionally, it is estimated that many of the local and small-scale kidnappings of Nigerians are not reported, because the stories are not as sensational as the kidnapping of a foreigner or the mass kidnapping of Nigerians. The dataset had glaring gaps of data in large cities in Nigeria, which also likely indicates that crime is underreported in those areas. Other sources of data could be used to bolster the ACLED data, or to compare the kidnapping data from various sources.

Outside the span of the research timeframe, 1987-2013, kidnapping events in Nigeria have attracted even more international media attention. In April 2014, approximately 276 local schoolgirls were taken captive by Boko Haram in northeastern Nigeria. In October 2014, an additional 60 women and girls were reported as kidnapped from two towns in northeastern Nigeria. Future opportunities for expanding this research could include focusing on kidnapping specifically conducted by Islamist groups and the targeting of females in kidnapping events.
CHAPTER ONE: INTRODUCTION

An Introduction to Kidnapping in Nigeria

Nigeria is the seventh largest producer of oil in the world and, as of 2005, supplied a fifth of the United States’ oil imports (Ikelegbe, 2005, p. 208). However, oil production is not the only title Nigeria holds for being the seventh largest. Nigeria’s population, as of 2013, is estimated to be over 177,000,000, and is also currently the seventh largest in the world. Nigeria’s population, combined with its current fertility rate of 5.3, puts the country on a trajectory to reach a population of 230,000,000 people by 2025 (US Census International Data Base). Even with their present population level, Nigeria is struggling to support its population with adequate economic opportunities, because the vast oil wealth has not translated to increased wealth for average Nigerians. The disparity between population and the number of jobs is expected to increase if the population continues to rise at such a sharp rate. This is cause for concern.

With such a large population and few economic opportunities, many Nigerians have turned to alternate sources of income. Many of these individuals are youths with college educations, yet they are unable to find sufficient work commensurate with their education level. Contrasted against the dire issues of unemployment in the country, is the presence of Multi-National Corporations (MNCs) in Nigeria, which annually funnel millions of dollars out of the country. This money is largely derived from the extraction
of Nigerian natural resources. This dichotomy has proved to be a fertile feeding ground for recruitment into criminal or rebel groups. More recently, the use of ransom as a lucrative economic initiative with a quick payoff has only increased the interest of young “have-nots” in kidnapping.

While kidnapping may prove lucrative for some youths today, the current culture of kidnapping is likely to only further disadvantage Nigeria in the long-term, if allowed to continue at such rampant levels. Current kidnapping rates have already led to many MNCs becoming disinterested in conducting business in Nigeria, for fear of the safety for their employees and potential lost profits as a result of such frequent kidnappings. With increasing numbers of MNCs no longer interested in conducting business in Nigeria, the Nigerian economy will become further disadvantaged. This situation could be alarmingly exacerbated by the predicted population growth of the country. The negative outcomes of an out-of-control population in a state ill-equipped to address their concerns can become a significant problem for both regional neighbors and worldwide partners.

While many studies analyze the political, economic, and social drivers that result in kidnapping in Nigeria, few mention geographic clustering or the spatial attributes of kidnapping factors. This thesis is the first comprehensive geographic clustering study of kidnapping in Nigeria. By examining the various factors contributing to kidnapping, as well as the outcomes of such events, in conjunction with spatial analysis, additional information about the current status of kidnapping in Nigeria may be derived. This can enable better predictions about risk factors for residents, as well as the tendencies of certain militant groups now operating in Nigeria. Additionally, more robust predictions
about the future of kidnapping in Nigeria may also be developed from the data in this thesis.

Scientific Questions to be Answered

This thesis aims to answer these critical questions:

- Are there spatial variations in political, economic, and ritual kidnapping in Nigeria?
- Is there a spatial aspect to the results of kidnapping, such as ransoms or fatalities?
- Is there a spatial pattern to the kidnapping of foreigners in Nigeria?

Review of Literature on Kidnapping in Nigeria

Defining Kidnapping

The exact definition of kidnapping varies across the international community, though most definitions point to the same overall concepts. Nwadiaro and Nkwocha (2011, p. 3) define kidnapping as the “means to seize and detain unlawfully a person by force and fraud and to remove a person to an undisclosed location against their will and usually for use as a hostage or to extract ransom” (Nwadiaro and Nkwocha, 2011, pg.3). Another definition, provided by Inyang and Abraham (2013, p. 532) focuses more on the basis of the crime. Kidnapping is identified as the “forcible seizure, taking away and unlawful detention of a person against his/her will” (Inyang and Abraham, 2013, p. 532). For the purposes of this thesis, it is accepted that the action of forcibly seizing an individual is an unwanted action by that same individual. Inyang and Abraham (2013, p. 532) incorporated the end objective of kidnapping by expanding their definition as “an act of seizing, taking away and keeping a person in custody either by force or fraud… it
includes snatching and seizing of a person in order to collect a ransom in return or settle some scores of disagreement among people.” Similarly, Nwadiaro and Nkwocha (2011, p. 3) highlight a definition of kidnapping as the “illegal abduction and detention of a person for the purpose of using his/her captivity to demand for ransom or make other demands” (Nwadiaro & Nkwocha, 2011, p.1). Academic definitions also periodically tie kidnapping to terrorism, because kidnapping uses acts or threats of violence to achieve an objective.

Osumah and Aghedo (2011, p 279) outline three types of kidnapping, which will be used in the data analysis portion of this thesis. First, there is ritual kidnapping. This is identified as the “oldest form of kidnap.” The targets of ritual kidnapping are often children, the developmentally disabled, and the physically disabled. The victims of this form of kidnapping are most often killed, as the desire of the kidnappers is usually to harvest organs or other body parts for sacrifice or money-making rituals. This form of kidnapping is the least reported in the press. The second form of kidnapping is identified as political. Political actors in Nigeria place a “high premium on power and employ any means to acquire power for self-regarding gains” (Osumah and Aghedo, 2011, p.279). Political kidnapping is reported to be the highest in areas with large amounts of disenfranchised youth. The youth provide the politicians with a pool of available individuals ready to be dispatched for kidnapping missions by desperate politicians. The third type of kidnapping is business-oriented, or economic. Originally, this form of kidnapping was done to threaten rivals or curb competition, but today it has morphed into
more of the money-making and ransom motivated kidnapping events (Osumah & Aghedo, 2011, p.279).

**A Historical Trend of Kidnapping in the World**

Worldwide, kidnapping has occurred as long as societies have existed. Yun (2007, p. 136) attributes the global increase in kidnapping during the last twenty years to the end of the Cold War. He further adds that kidnapping is one of the “unintended” consequences of globalization (Yun, 2007, p. 136). As the world continues to globalize at a swift pace, kidnapping trends are expected to correspond, becoming an increasing concern to people worldwide.

In Nigeria, specifically, the crime of kidnapping has increased significantly during the last 40-50 years, but it is an issue that has long-plagued the country. Rivalries between slave traders in the nineteenth century resulted in raids, kidnapping, and piracy (Osumah & Aghedo, 2011, p. 277). However, the Cold War is still implicated as a root cause of the modern issues of kidnapping in Nigeria. According to Yun (2007, p. 136),

“As many experts correctly point out, transnational organized crime, international terrorism, illegal immigration, drug trafficking, human trafficking for sexual purposes, arms trafficking, and money laundering are all matters closely related to the end of the Cold War and the advancement of globalization.”

He then explains that as the world becomes more globalized, more people travel for pleasure and work, and more people live abroad. As a result, there is a growing target population for kidnappers. Additionally, it is pointed out that “globally integrated capitalism has produced more numbers of people who are alienated and disenfranchised from the prosperity of a globalized economy” (Yun, 2007, p. 136).
Some academics identify the Nigerian Civil War of the 1970s as a catalyst for the increase in kidnappings in Nigeria. During this civil war, many Nigerian youths gained military experience, in conjunction with interactions or engagement in criminal activity for their first time. It is also noted in the same study that the breakdown of traditional Nigerian communities, as the country became increasingly urbanized, also contributed to the kidnapping culture in Nigeria. In this hypothesis, it is believed that the breakdown of the traditional way of life led to a breakdown in the social controls that are often associated with tight-knit rural villages. With little or no social controls, crime was allowed to take root throughout the country with little interference (Nwadiaro & Nkwocha, 2011, p. 3).

Current Status of Kidnapping in Nigeria

Post-2000 patterns of kidnapping in Nigeria are primarily credited as starting with the February 2006 kidnapping oil workers by Nigerian militants. It is widely accepted that this particular kidnapping was conducted to draw international media attention to the disparity of wealth in the Niger Delta (Inyang & Abraham, 2013, p. 531). From then, a total of 24 incidents, involving 118 hostages, were documented in the Niger Delta (Ibaba, 2009, p. 22). At the same time, kidnapping began to spread to other parts of the country, particularly to the southeastern states (Osumah & Aghedo, 2011, p. 281). Overall, a major reason for this initial increase of kidnapping in Nigeria is because of its utility in gaining international press and media attention (Inyang & Abraham, 2013, p. 531).
However, kidnapping in Nigeria has evolved substantially from those initial occurrences and now encompasses more motivations and drivers.

In Nigeria today, some kidnappers are educated young adults, and many even possess college degrees. This is a somewhat unique element with respect to the situation in Nigeria. A significant problem throughout Nigeria is that the country has a large cadre of educated, yet jobless, youth. Inyang & Abraham (2013, p. 533) state that a “graduate who is unable to secure a job is psychologically bereft of other means of survival.” This situation can lead to the youth developing a negative attitude towards society and then attributing his or her failure to society at large.

Venatus and Agnes (2010, p. 232) state the issue similarly, “Given the lack of employment opportunities and consequently the uncertain future, young Nigerians are forced to engage in unorthodox livelihoods sources while others engage in casual work which is highly irregular.” They also explain that a significant factor in Nigeria’s youth unemployment is population growth. The growth of the labor pool has outpaced the growth of the labor market. Many youths move to urban areas, in search of better economic opportunities, but do not find them. This is why some will resort to the “unorthodox livelihoods” (Venatus & Agnes, 2010, p. 232). Because the living standards in Nigeria have drastically decreased since the 1980s, resulting from the government’s Structural Adjustment Programme, a large portion of Nigerian youths seek an exit from their existing economic status in Nigeria. Popular ways Nigerian youths exit include: illegal immigration, prostitution, armed robbery, internet fraud, human and drug trafficking, fake-document production, smuggling, and piracy. Kidnapping is only one of
the exit strategies for the youth, signaling there is a much greater issue in Nigerian society than just concerns about kidnapping (Osumah & Aghedo, 2011, p. 279).

Another common factor ultimately feeding into the rise of kidnapping in Nigeria is the recruitment of youth to help elect local and national politicians. These youth comprise a significant share of the personnel for these election campaigns, and it should be noted that most of these youths work very hard to support the causes they have chosen. During the election process, this work gives the youth a sense of inclusion while perceiving that they are working to improve society and bring about positive changes for Nigeria. However, many of the youth supporters are promptly abandoned by the politicians after elections. The youth often work on these campaigns with an expectation of long-term employment with the politicians. As might be envisioned, many of the youth then develop a strong negative opinion towards these politicians because of their abandonment by these politicians. Some of these youths then turn to alternative methods, such as kidnapping, to retaliate (Inyang & Abraham, 2013, p. 533).

A major contributing factor to the current situation in Nigeria is the drastic income gap in the country. Extravagant images of wealth are flashed before the eyes of the educated, but jobless, youth. Subsequently, some of these youths then desire a method, by any means necessary, to obtain that same level of wealth (Inyang & Abraham, 2013, p. 533). Inyang & Abraham (2013, p. 533) point out that this side of the issue is partially aided by the culture in Nigeria, in which no one questions how others acquire their wealth. This lack of economic transparency in Nigeria leads to many youths
misunderstanding the economy and instead craving the fastest possible path to riches.

Inyang & Abraham (2013, p. 533) clearly outline this problem by stating:

“A poor person today can show up with an expensive car tomorrow and nobody dare [sic] to question the sudden wealth. Also, people who have donated money to develop their communities are rewarded with chieftancy titles thereby creating a wrong impression in the minds of Nigerian youths who thereafter take to kidnapping. The inconsistency between economic transparency and accountability in the running of normal government affairs and the desire to amass wealth among public office holders at different levels of government often also contribute to the leverage by kidnappers.”

This inconsistency between economic transparency and accountability, compounded with the issue of “moral decadence” and the “quest to get rich quick”, is believed to exacerbate the kidnap for ransom crimes in Nigeria (Inyang & Abraham, 2013, p. 533).

As a result of the prevalence of this crime throughout the country, kidnapping has created a state of panic in much of Nigeria. The culture has swiftly changed to one of distrust and fear. Osumah and Aghedo (2011, p. 277) describe this as a “palpable apprehension among the people who are unsure of whom [sic] the next victim will be.” Even something as simple as night travel has become a very dangerous activity. Inyang and Abraham (2013, p. 535) state that some Nigerians have been indirectly forced out of their new homes by kidnappers. Some residents now go to extreme measures to make themselves appear less wealthy, to lessen the probability of becoming a kidnapping target. When it comes to personal cars, many Nigerians are no longer interested in purchasing new vehicles, because they could attract the attention of kidnappers. In Rivers State, it has been reported that the wealthy are now riding in taxis and taxi motorcycles, because those methods of transportation do not attract attention from would-be kidnap
pers and hostage-takers (Inyang & Abraham, 2013, p. 535). Despite the lavish possessions the wealthy can afford, few in Nigeria want to portray that image anymore (Inyang & Abraham, 2013, p. 535). The rich are targeted by kidnappers because of the immediate payoff of kidnapping them, causing them to rethink the appearance of their lifestyle to remove the societal label of “rich” from themselves (Inyang and Abraham, 2013, p. 535).

It is also important to discuss kidnappings conducted by radical Islamist groups, a growing issue in Nigeria. For these groups, kidnapping is purposefully used as a weapon. Due to Nigerian military efforts to combat the Islamist groups, Yun (2007, p. 137) asserts that radical Islamist terrorist groups “have adopted alternative ways to continue their fight and exact revenge based on the understanding that their conventional fighting capabilities are no match for the combined coalition forces.” As a result, Yun (2007, p. 137) states that hostage-taking and kidnapping have “become two of the most valued weapons in the modern terrorist’s arsenal.” It is both the success of the terrorist groups in conducting kidnappings, as well as the recent increase of radical Islamic groups operating in Nigeria, that gives cause for concern about the future of this crime in certain parts of Nigeria. Of particular interest is the April 2014 kidnapping of over 250 school girls in Nigeria by the Islamist group Boko Haram (Economist, 2014). Since the mass kidnapping, the group has continued to kidnap additional women and girls in northeastern Nigeria.

Compounding the issue in Nigeria, according to Essien and Ben (2013, p. 276) is that the government of Nigeria seems to have not taken this issue seriously enough. The government’s “attitude of using the military option to suppress the people’s demand
[sic],” has led to the people’s choice of hostage taking, hijacking, and kidnapping of oil workers as their response. As a result, the “crime of kidnapping, in particular, degenerated from targeting oil workers and multinationals to targeting politicians, clergy, entrepreneurs, and business owners” (Essien & Ben, 2013, p. 276).

**Laws and Law Enforcement: Unable to Deter Kidnappers**

Little in the way of law enforcement or the penal code has impacted the kidnapping trend in Nigeria. According to current Nigerian law, kidnapping is a crime that can be punishable up to ten years in prison. Some Nigerian states have even passed a law titled the “Prohibition of Hostage Taking and Related Offences Law,” which stipulates the death penalty as punishment for kidnappers. Despite those legal measures, the safety of people in Nigeria and their property cannot be guaranteed. Nigerian bills with capital punishment for kidnapping are currently under review by the National Assembly, though the outcome is unlikely to affect the kidnapping rate (Inyang & Abraham, 2013, p. 532).

The country also suffers from a lack of resources and training for its police forces to successfully combat kidnapping. Worsening the issue, there is rampant corruption within Nigerian law enforcement entities, which disables police units from operating efficiently to address the growing kidnapping issue in the country (Inyang & Abraham, 2013, p. 533-534). Between legal inefficiency and underequipped and corrupt police forces, Nigeria has failed to either slow or stop kidnapping within its borders.
Osumah & Aghedo (2011, p. 283), on the other hand, reported a more robust security posture in Nigeria. They noted that security is increasing in kidnapping-prone regions of the country. Checkpoints have been established in many cities, police surveillance has increased, and some states now have anti-terrorist units. Yet, these efforts do not address the root causes of kidnapping and are likely to have only a marginal impact until those root causes are addressed (Osumah & Aghedo, 2011, p. 283). Ikelegbe (2005, p. 224) stresses that the presence of these military units has resulted in actions of recklessness and indiscriminate brutality. These responses further disenfranchise the population.

In addition to the lack of a precedent in court cases, Yun (2007, p. 137) laments that there is very little academic research on this topic. Of the research that has been conducted, they state most of the studies do not include the newer trend of terrorist hostage-taking and kidnapping post September 11, 2001. A frequent reason for the dearth in information is that it is often hard to collect systematic data about this topic (Yun, 2007, p. 137-138).

The Niger Delta

While kidnapping discussions often conjure up dialogues of security countermeasures and possible legal approaches, in Nigeria, kidnapping would not be properly discussed if no mention of the economy is made. Kidnapping in Nigeria is a double-edged sword, as it is both, as it is both motivated by the economy and also results in a negative impact on the economy.
The prominent economic issues, as they relate to kidnapping in Nigeria, can mostly be attributed to the Niger Delta, its oil wealth, and the local residents who have not benefitted from this oil wealth. The Niger Delta, in southwestern Nigeria, has a population of approximately twenty-five million people, with over forty ethnolinguistic groups. Kimiebi (2010) notes that this region is “rich in both renewable and non-renewable resources such as oil, gas, bitumen, etc, accounting for 95% of the total revenue for the Nigerian government, generated from oil and gas exploration and 80% of national wealth.” The wealth derived from the Niger Delta is considered the “lifeblood of the Nigerian economy,” as described by Kimiebi, yet it has not resulted in wealth for the people of the Niger Delta. Instead of receiving any monetary wealth, the region has conversely experienced severe environmental degradation and political ostracism (Kimiebi, 2010).

Many residents in the Niger Delta are subsistence farmers, working and living off small plots of land for their existence. Oil extraction has severely disrupted the ecosystems in the Niger Delta, making it increasingly hard for subsistence farmers to farm an adequate crop to survive, while they also receive no monetary benefit for the millions of dollars of oil extracted from their lands (Kimiebi, 2010). Oil spills result in the loss of fish and farmed crops. Gas flares are noted for decreasing crop yields within 200 meters by 100%, and those within 600 meters lose an estimated 45% of their yield. Crop losses are experienced up to 1 kilometer away from the gas flares (Ibaba, 2009, p. 16). Between oil spills, gas flares, and industrial waste, the lands in the Niger Delta have been noticeably damaged (Kimiebi, 2010). Ibaba accurately summarizes the issue in the
Niger Delta by stating, “no matter how hard peasants work, they remain at the same point, and sometimes their situation gets worse”…”conflicts are a response to the frustration which occurs as a result of obstacles against the actualization of set goals” (Ibaba, 2009, p. 16). Additionally, as Kimiebi argues, it is very interesting that there is currently no comprehensive study of oil exploration in the Niger Delta and how this exploration impacts the local environment.

This problem in the Niger Delta is referred to as “natural resource nationalism” by Essien & Ben (2013, p. 275). This concept includes a tendency for local populations to want a bigger share of the returns from natural resources extracted from their land. The people of the Niger Delta are interested in a larger share of the millions that are made from the resources taken from their land. Akpan (2010, p. 35) similarly refers to the problem in the Niger Delta as “accumulation politics.” These Niger Delta residents live without even basic utilities such as running water and electricity, while government leaders and multi-national companies are profiting (Essien & Ben, 2013, p. 275).

Initially, oil wealth was distributed more evenly to the regions from which it was extracted. But currently, Nigerian oil wealth is primarily benefitting the oil companies and Nigerian government officials (Kimiebi, 2010). According to Kimiebi (2010), “In 1960, the allocation (of oil profits) was 50%, then down to 45% in 1970, declining to 20% in 1982, down to 3% in 1992.” It was then raised back up to 13%, but only after continuous protests from the residents of the Niger Delta.

Foreign investments in Nigeria are suffering as a result of the current security situation, of which kidnapping is a large factor. Between 2007 and 2010, foreign direct
investment (FDI) in Nigeria dropped from about 20 million to 6.1 million dollars. In just three years, the country alarmingly experienced a nearly 70% decrease in foreign investments (Kimiebi, 2010). Osumah and Aghedo (2011, p. 284) discuss this insecurity amongst investors and expatriates by describing them as a commodity with a high economic value to kidnapers and refers to them as “white gold.” As noted by Kimiebi (2010), FDI is “getting leaner” because many international oil companies and investors are changing their extraction plans in Nigeria in lieu of extracting oil in either cheaper or safer areas of the world. This change ultimately denies the Niger Delta additional options for investments or jobs that might be able to help the local economy.

Many academic studies have identified a “causal link between natural resource abundance and civil conflict” (Oyefusi, 2008, p. 539). Ikelegbe (2005, p. 213) also supports this notion by affirming that mineral wealth is associated with conflict, though it is not the resources themselves that lead to the conflicts, but “rather the hegemonic struggles between superordinated and subordinated groups and the nature of management and appropriation of resources that engender conflicts” (Ikelegbe, 2005, p. 230). In the Niger Delta, unemployment levels and poverty is higher than the national average for Nigeria. Meanwhile, social services and government services provided to the same region are lower than many other places in the country. The physical geography of the Niger Delta, a large swampland, makes it an area that is difficult to develop for other economic activities. Any development in the region would be very costly. One of the few actions the locals feel they can take against the oil companies and the government is to disrupt
the oil processing and transportation in the region, since the oil installations are spread apart and vulnerable to such disruption (Oyefusi, 2008, p. 540).

Economic impacts from kidnapping result in more than just a loss of FDI. According to Inyang and Abraham (2013, p. 535), the costs can be divided into direct and indirect costs. For an individual, the cost could be the money that is lost in paying ransom to kidnappers. The indirect cost of that same issue is the expense one then pays for additional security to prevent such kidnappings from happening again. At a macro government level, economic impacts of kidnapping can be the amount of money spent annually on government security, including government agencies tasked with security. For example, in 2009, the Nigerian government budgeted 195 billion naira (1.19 billion USD) for its police force. More specifically, in Lagos state, the state government alone spent 3 billion naira in two years (Inyang & Abraham, 2013, p. 535). Another issue from kidnapping affects local and country-wide businesses. For example, when an entrepreneur is kidnapped, it may result in his or her business being closed, causing their employees to go without paychecks. This ultimately creates even more unemployment, especially among the youth. High unemployment can then lead to even more violent crimes (Essien & Ben, 2013, p. 274).

Ransom payments also hurt the economy. A former Inspector General in Nigeria, Sir Mike Okipo, stated that 15 billion naira were paid as ransoms in Nigeria between 2006 and 2009. It is believed that such a large amount of money going towards ransoms affects the state economy, as much of that money could have been used towards more “meaningful economic development” (Inyang & Abraham, 2013, p. 535).
Why Kidnapping?

As noted by Oyefusi (2008, p. 541), “greed and grievance are symbiotic.” For kidnapping to occur, there must first be a grievance, some of which have already been identified and discussed. Further, “rebellion needs grievance to mobilize and overcome the severe constraints on entry” (Oyefusi, 2008, p. 541). Despite the personal or societal grievances, there are also logistical necessities to conduct kidnapping, the most prominent being cash flow. Criminal groups or kidnapping rings need revenue to finance their operations. It is possible, Oyefusi (2008, p. 541) asserts, that this need for money may make greed desirable and sometimes required.

In most countries, increased education results in a reduced risk of political violence and higher incomes. This converse relationship between the two variables is believed to mostly occur because higher levels of education translate to citizens more interested in solving problems through “institutional pathways” (Oyefusi, 2008, p. 541). However, this is not the case in Nigeria. Nigeria has a surplus of educated youth when compared to the availability of jobs.

Those who join criminal groups or rebel organizations must perceive a benefit in doing so. Oyefusi (2008, p. 542) identifies these benefits as pecuniary and non-pecuniary. Pecuniary awards are identified as wages and other tangible items, which result from the revenue of the group. Non-pecuniary awards are identified as satisfaction and identifying with a cause. Some recruits may also want to satisfy a desire to fight “for the cause of
their people” (Oyefusi, 2008, p. 542). Oyefusi (2008, p. 542) states that the discussed benefits will often increase with personal grievance, and can be affected by a lack of gainful occupation, lack of economic and social access, environmental damage by oil companies, and the costs of past experiences of violent conflicts.

The three states of Bayelsa, Delta, and Rivers account for the majority of Nigeria’s oil production. Those same three states have some of the highest numbers of violent conflict events during the last decade (Oyefusi, 2008, p. 544). Oyefusi (2008, p. 553) concluded in his study that civil peace is tied to the amount of oil wealth in a region. More specifically, the sample indicated that the greater the availability of oil, the more likely the region is to experience unrest. It is stated “thus, oil availability appears to have a corrupting influence on the disposition to civil peace among youths—an influence that grows with the size of endowment. It was determined, in this study, that a unit increase in oil size, defined by Oyefusi as the discovery of a new oil well, increased the odds of willingness to join a rebel group by a factor of 1.18 (18%). However, a unit increase in income level will decrease the odds of joining a rebel group by 37%. The study showed that a unit increase in education would also reduce those same odds by 36% (Oyefusi, 2008, p. 552). However, to be a true deterrent, education level would need to be tied to gainful employment. The same study analyzed the effect of grievances against the government as a contributing factor to joining a rebel group, but this was then found to be statistically insignificant. Personal grievances such as income and basic needs were actually more strongly linked to the decision to join rebel groups because of the opportunities presented by the groups, not because of the grievances themselves.
Unemployment did not represent a statistically significant grievance level and did not help explain the probability of joining a rebel group. Oyefusi concludes, “Asset immobility, rather than asset possession, appears to matter more for rebel participation.” A key argument is, “while further studies using alternative datasets would be required to get a clearer understanding of how grievance and its determining factors may influence rebel participation in the Niger Delta, the findings from this article suggest that strategies to achieve long-lasting civil peace must go beyond grievance, to address individual-level factors that determine the opportunity cost of participation in violence and community-level factors that create an opportunity to profit from extreme forms of civil disobedience (Oyefusi, 2008, p. 553).

**Motivations for Kidnapping**

If kidnapping were adequately deterred by legal and security measure, or even deterred by a lack of operational success in Nigeria, it would likely not be at the levels of activity that are seen today. Gaibulloev and Sandler (2009, p. 4-8), who refer to kidnappers and hostage-takers as terrorists, identified two types of success for kidnapping operations: logistical success and negotiation success. Logistical success indicates that the kidnappers completed their mission as planned. Negotiation success indicates that the kidnappers received some of their initial demands as a result of the operation. Gaibulloev and Sandler (2009, p. 2) state that kidnappers “are drawn to such events provided that the expected payoffs—accounting for risks—equal or exceed expected costs. A high expected payoff may result owing to publicity, recruitment benefits, concessions, or
induced society-wide anxiety.” They identify money as a strong positive indicator of negotiation success in kidnappings. Osumah and Aghedo (2011, p. 277) state that kidnapping is now a multi-million naira business in Nigeria. The lucrative aspects of kidnapping have now led to collusion with bank employees and state security agencies participating in the kidnapping in order to earn money (Osumah and Aghedo (2011, p. 280).

Yun (2007, p. 161) asserts that the relationship between the majority of kidnapping cases in Nigeria and efforts to obtain material gain from kidnapping has a low casualty rate, when compared to other types of kidnapping. Additionally, Yun (2007, p. 162) suggests that further understanding of the kidnapping problem in Nigeria can lead to determinations of when the probability of hostage execution is high, which would signal the need for the involvement of hostage negotiators. The focus of the negotiator could be to negotiate the release of the victim(s), or even just to buy time to enable a rescue attempt. Additional studies about the outcomes of kidnapping events in Nigeria may be able to identify and develop tailored responses to these events, in order to increase the success of responses to hostage situations.
CHAPTER TWO: METHODOLOGY

This chapter describes the methodology required to conduct a spatial analysis of the variables of interest in regards to kidnapping events in Nigeria. To determine spatial patterns amongst the Nigeria kidnapping data, two versions of the Moran’s I tool were employed within ArcGIS. First, Global Moran’s Index was calculated to determine if there were statistically significant clusters in the data. Then, the data was analyzed with the Local Moran’s I tool to determine the location of the clusters. Both of these processes helped to bring quantitative meaning to the dataset. Variables that were tested for spatial patterns include: the use of a ransom, whether or not the kidnap victims were foreign, the motivation for the kidnapping, and the existence of fatalities as a result of the kidnapping.

Region and Topic of Interest

The region selected for study in this thesis is the country of Nigeria, located in western Africa, bordered by Benin, Mali, Chad, and Cameroon. During the first half of 2013, it was reported that Nigeria had the highest number of kidnapping attempts in the world at 26% of the world count (Economist, 2013). In annual world rankings, Nigeria frequently ranks in the top ten of countries with the highest kidnapping rates. Because of Nigeria’s natural resource wealth, many foreign countries are already engaged or interested in conducting business in Nigeria, yet have safety concerns about operating in
the country because of the kidnapping rates. This issue is largely why international media attention has focused on Nigeria, because there are many foreigners working in the country and they are often the target of kidnapping attempts. If Nigeria was able to curtail the kidnapping issues within its borders, it may be able to open itself up to additional economic opportunities. Kidnapping events that occur within Nigeria, from January 1997-December 2013, will be analyzed in this thesis in an attempt to determine patterns and trends of activities.
Figure 1. Political Map of Nigeria (Central Intelligence Agency, n.d.)
Data Overview

The data used for the analyses in this thesis were obtained from the Armed Conflict Location & Event Data Project (Raleigh, et al, 2010). ACLED bills itself as the “most comprehensive public collection of political violence data for developing states.” The program is associated with the International Peace Research Institute (PRIO). The collected data in ACLED is specifically designed for “disaggregated conflict analysis and crisis mapping” (Raleigh, et al, 2010).

ACLED reports over 80,000 individual events since 1997, with 79,000 of those events from African states. Recorded data includes dates and locations, enabling spatial and temporal analysis of the data. Additionally, the data includes information about the categorical type of event, the actors involved, and fatalities. Examples of recorded events include “battles, killings, riots, and recruitment activities of rebels, governments, militias, armed groups, protesters and civilians.” The actual data points are gathered from many sources, such as: local media, humanitarian groups, reports from the countries themselves, and research publications. The date range for ACLED data is January 1997-Present. The data collected by ACLED is available to the public for downloading. Downloads are available in both Excel and Geographic Information Systems (GIS) formats. In addition, ACLED produces their own publication, Conflict Trends, on a monthly basis in order to highlight analyses of new patterns and trends in the data (Raleigh, et al, 2010).
**Limitations in the Data**

While the data collected by ACLED is extensive, it cannot be considered a complete dataset. There are still many events that are likely absent from the data. One key limitation, as indicated by ACLED, is that:

“recorded increases in conflict event levels correspond in part to increased digitization of media sources, access and coverage of conflict and human rights violations by civil society and international organisations from which event data is drawn, and improvements in data collection and coding within the ACLED project” (Raleigh, et al, 2010). This statement indicates that the more recent years of collected data may be more robust, because of the increase in digital media sources and reporting in Nigeria. Another source of increased information during the last few years, according to ACLED, is from international organizations that now have increased access to cover conflict.

Another likely limitation, highlighted by Osumah and Aghedo (2011, p. 279), is that ritual kidnapping is often underreported. This type of kidnapping often occurs in small villages and typically only has one victim. It is much less likely that a child captured from a rural village in Nigeria would result in a news report than would a prominent political leader in a large city. It can also be expected that small kidnapping events in which a Nigerian citizen is the victim may also be unreported or underreported. These types of events are not as sensational as the kidnappings of foreigners, which easily garner international media attention.

Some attempted kidnappings result in the death of the original target(s), resulting in no official kidnapping event, though kidnapping was the original objective. Some of these events may be coded as murders, instead of kidnapping in the dataset. Similarly, some events are referenced as the seizure or seizing of a facility. Many of these events do
not include information about whether or not humans were also seized with the facility, which precludes these events from being included in the dataset. In such a large dataset, it is often hard to account for these nuances in individual events.

The reporting of kidnapping in Nigeria depends on the journalists who report them. As in most countries, other events, such as natural disasters, political upheaval, or international events can pull media attention away from constant issues in order to produce reports on the more current topics. This is an inherent limitation when analyzing data from news sources, and this limitation is applicable to ACLED data.

The analysis of the data also introduces bias. Each event was manually categorized as economic, political, or ritual/religious. These categories were used to indicate what caused the kidnapping. Some of the events, especially in the Niger Delta, can involve both political and economic connections. The assignment of categories to each piece of data is also done with no personal information about each event, and relies on the news report. It is unlikely that every news report accurately and completely captures the motivations or causes of the kidnapping.

**Data Acquisition**

Data points extracted from ACLED and used in this study were selected based on matching keywords. To find the relevant data, the entire ACLED Africa dataset from January 1, 1997 to December 31, 2013 was downloaded as an Excel file from http://www.acledda.com/data/version-4-data-1997-2013/. This dataset contained 79,788 rows of data. Immediately, all data recorded in countries other than Nigeria were
eliminated, resulting in 5,171 reports for events in Nigeria. From that smaller dataset, it was further refined to only include kidnapping events. Keywords were used to identify the events relevant to kidnapping. The keywords used are: kidnap*, hostage*, abduct*, captive*, ransom*, and h*ld (held/hold). The root words are used with a * in order to find all related words in the dataset, such as kidnappers, kidnapped, and kidnapping. Initially, searches for the words “hold” and “held” were left out, but a manual review of the data identified several kidnapping events that only used one of those words to indicate it was a kidnapping. The word h*ld was incorporated in the search in order to receive a better result.

Once these keywords were searched, the matching data was exported into a separate spreadsheet. Duplicate rows of data were then deleted to result in 366 events that could be analyzed for this thesis. These events were then read through, in order to verify that each event was indeed relevant to kidnapping analysis. The manual review of the data resulted in 285 points for analysis.

**Data Processing and Preparation**

Once all ACLED data for Nigeria were collected, organized, and categorized in Excel, a few modifications to the spreadsheet were required to facilitate spatial analysis in ArcGIS. ArcGIS requires a numerical value column in a spreadsheet to represent the geographic area that is tested to determine clusters. Because this thesis is testing the clusters within the states of Nigeria, each state was assigned a numerical code. Those numerical codes were entered into a new column in the original spreadsheet. Also, data
entered in Excel is often attributed a default format of “text.” For best use in ArcGIS, the “Latitude” and “Longitude” columns were updated specifically to the “Number” cell format.

Once the Excel data were formatted properly, the spreadsheet was imported into a new ArcGIS map document. The point data from the spreadsheet were displayed on top of an administrative boundary map of Nigeria by selecting the option to display the “XY” from the spreadsheet within ArcGIS. This process of displaying the XY locations is designed solely to illustrate the geographic locations of the data, and only results in a temporary rendering of the point data that cannot be analyzed with Esri tools. In order to facilitate the necessary spatial analysis, the XY data was exported into a shapefile and saved.

Data points from any spreadsheet data that are added into ArcGIS are automatically assigned a default coordinate system of “WGS 84.” Data projected in WGS84 is not compatible with spatial analysis, so the data were reprojected. WGS 84 is a geographic coordinate system and the data needs to be in a projected coordinate system in order to successfully run spatial analysis tools in ArcGIS. Both the Nigeria administrative boundary shapefile and the Nigeria kidnapping shapefile were assigned new projections within ArcCatalog. Because this thesis is interested in spatial clusters, distance was the key property that needed to be maintained when selecting a new coordinate system. In order to preserve that property as much as possible, both shapefiles were reprojected in the Azimuthal Equidistant projection.
Analysis of Clustering with Moran’s I

Patrick Alfred Pierce Moran is credited with introducing the “first measure of spatial autocorrelation in order to study stochastic phenomena which are distributed in space in two or more dimensions.” Subsequently, Moran’s I has been employed by almost every study analyzing spatial correlation (Sawada, 2009). Two forms of Moran’s I were employed in this thesis: Spatial Autocorrelation (Global Moran’s I) and Cluster and Outlier Analysis (Anselin’s Local Moran’s I). Global Moran’s I was executed to determine if variables in the dataset were significant. Anselin’s Local Moran’s I was executed to determine where the clusters of data were located (Esri, 2012).

Global Moran’s I

Global Moran’s I “measures spatial autocorrelation based on both feature locations and feature values simultaneously.” When analyzing a group of features and a related attribute, Moran’s I can determine if there is a clustered, dispersed, or random pattern in the data. A Moran’s I value is given as the result of the process, as well as a z-score and p-value. When either the z-score or the p-value indicates statistical significance, in combination with a positive Moran’s I index value, the data is assessed to be spatially clustered. When the Moran’s I value is negative, the data are assessed to be dispersed. The z-score and p-value are calculated in order to determine if the null hypothesis can be rejected, and the null hypothesis for Moran’s I is that the features are randomly distributed. The Moran’s I spatial autocorrelation tool in ArcGIS calculates
Moran’s Index value, the Expected Index, variance, the p-value, and a z-score (Esri, 2012).

**Processing Moran’s I**

The Moran’s I tool first calculates the mean and variance for the attribute category of interest. After that is completed, it subtracts the mean from each feature value, which then results in a deviation from the mean. The deviation values for all neighboring features are multiplied together in order to create a value for the “cross-product.” The cross-product can be either positive or negative (Figure 1). When the values for neighboring features are “either both larger than the mean or both smaller than the mean,” the cross-product result will be a positive value. Conversely, when “one value is smaller than the mean and the other is larger than the mean,” the cross-product value will be a negative number. For all spatial autocorrelation analyses, the larger the deviation from the mean, the larger the cross-product value will be. (Esri, 2012)
The Moran’s $I$ statistic for spatial autocorrelation is given as:

$$I = \frac{n \sum_{i=1}^{n} \sum_{j=1}^{n} w_{i,j} z_i z_j}{S_0 \sum_{i=1}^{n} z_i^2}$$  \hspace{1cm} (1)

where $z_i$ is the deviation of an attribute for feature $i$ from its mean ($x_i - \bar{X}$), $w_{i,j}$ is the spatial weight between feature $i$ and $j$, $n$ is equal to the total number of features, and $S_0$ is the aggregate of all the spatial weights:

$$S_0 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{i,j}$$  \hspace{1cm} (2)

The $z_I$-score for the statistic is computed as:

$$z_I = \frac{I - E[I]}{\sqrt{V[I]}}$$  \hspace{1cm} (3)

where:

$$E[I] = -1/(n - 1)$$ \hspace{1cm} (4)

$$V[I] = E[I^2] - E[I]^2$$ \hspace{1cm} (5)

**Equation 1.** The Global Moran’s I, or spatial autocorrelation tool, as executed by ArcGIS software (Esri, 2012).

If the values in the dataset are clustered, meaning that like values are near like values, the Moran’s Index value will be positive. If like values are near values that are differ greatly, the Moran’s Index will be negative. In the formula for the Moran’s Index, the denominator acts as a normalizer in order to facilitate Index values from a range of -
1.0 to +1.0. A visual representation of dispersed and clustered data can be seen in Figure 2 (Esri, 2012).

![Figure 2. A visual example of data on a spectrum from dispersed to clustered (Esri, 2012).](image)

**Results in ArcGIS**

After the spatial autocorrelation tool has completed the process to determine the Index value, it then begins the process to determine the “Expected Index” value. Once this is completed, the new Expected Index value is compared against the actual observed values. The tool will also compute the z-score and p-value for the dataset, which help to indicate whether the difference between the two values is statistically significant. It is important to note that Index values are not values that can be interpreted independently. The value is only meant to be interpreted within the sphere of the null hypothesis. This is because Moran’s I is an inferential statistic, which means “the results of the analysis are
always interpreted within the context of the null hypothesis.” When using Moran’s I, the null hypothesis will always state that the attribute of interest is randomly distributed among the other features in the area of focus. This means that the spatial layout of the data occurs purely from random chance. (ESRI, 2012)

**Are the Results Significant?**

When the p-value returned by the Moran’s I tool in Arc is statistically significant, the null hypothesis can be rejected. According to ESRI, these are the possible results of the process:

<table>
<thead>
<tr>
<th>Result</th>
<th>What it Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value is not statistically significant</td>
<td>“You cannot reject the null hypothesis. It is quite possible that the spatial distribution of feature values is the result of random spatial processes. The observed spatial pattern of feature values could very well be one of the many, many possible versions of complete spatial randomness (CSR).”</td>
</tr>
<tr>
<td>P-value is statistically significant and z-score is positive</td>
<td>“You may reject the null hypothesis. The spatial distribution of high values and/or low values in the dataset is more spatially clustered than would be expected if underlying spatial processes were random.”</td>
</tr>
</tbody>
</table>

**Table 1.** The range of possible results from running the Global Moran’s I tool to determine statistical significance (Esri, 2012).
P-value is statistically significant, and z-score is negative

“You may reject the null hypothesis. The spatial distribution of high values and low values in the dataset is more spatially dispersed than would be expected if underlying spatial processes were random. A dispersed spatial pattern often reflects some type of competitive process—a feature with a high value repels other features with high values; similarly, a feature with a low value repels other features with low values.”

Analysis of Kidnapping Data with Global Moran’s I

Global Moran’s I was the first spatial analysis tool run on the Nigeria kidnapping data. The Spatial Autocorrelation tool, or Global Moran’s I, in Arc is found in the Spatial Statistics portion of the Arc Toolbox. The features of the kidnapping data, now represented as a single shapefile, were entered in the “Input Feature Class” section of the Moran’s I tool (Figure 3). The geographic region of interest, in this case the Nigerian states, was entered in the “Input Field” section. Defaults for Inverse Distance, Euclidian Distance, and the Distance Band were maintained (Esri, 2012).
Figure 3. The Spatial Autocorrelation start screen in ArcGIS. Applicable data is entered into the Input Feature Class and the Input Field prior to running the tool (Esri, 2012).

Once the proper fields were entered, the Spatial Autocorrelation (Moran’s I) tool was run. The following result screen is then displayed. The tool returns values for Moran’s Index, Expected Index, Variance, p-value, and z-score (Figure 5). These values are then compared to determine if the variable of interest has spatially significant patterns (Esri, 2012).
Figure 4. The result screen from running the Global Moran’s I tool on a dataset in ArcGIS (ESRI, 2012).

**Anselin’s Moran’s I**

The Local Moran’s I tool, also known as the Cluster and Outlier Analysis tool, identifies where similar values cluster when given a set of weighted features. As the name implies, this tool can also identify outliers in the data. A successful completion of the Local Moran’s I tool on a dataset returns values for Moran’s I, z-score, p-value, and a code representing the cluster type. The cluster code can be one of the following: HH (cluster of high values), LL (cluster of low values), a high value outlier in a cluster of low
values (HL), or a low value outlier surrounded by a high value cluster (LH). Positive values for the Local Moran’s I indicates a cluster. The formula enabling Local Moran’s I and the identification of clusters in spatial data is illustrated in Figure 6 (Esri, 2012).

The Local Moran’s I statistic of spatial association is given as:

\[ I_i = \frac{x_i - \bar{X}}{S_i^2} \sum_{j=1,j \neq i}^{n} w_{i,j} (x_j - \bar{X}) \]  

where \( x_i \) is an attribute for feature \( i \), \( \bar{X} \) is the mean of the corresponding attribute, \( w_{i,j} \) is the spatial weight between feature \( i \) and \( j \), and:

\[ S_i^2 = \frac{\sum_{j=1,j \neq i}^{n} w_{i,j}}{n - 1} - \bar{X}^2 \]

with \( n \) equating to the total number of features.

The \( z_{I_i} \)-score for the statistics are computed as:

\[ z_{I_i} = \frac{I_i - E[I_i]}{\sqrt{V[I_i]}} \]

where:

\[ E[I_i] = \frac{\sum_{j=1,j \neq i}^{n} w_{i,j}}{n - 1} \]

\[ V[I_i] = E[I_i^2] - E[I_i]^2 \]

**Equation 2.** The formula for Anselin’s Local Moran’s I as executed by the tool in ArcGIS (Esri, 2012).
Initiating the process of running the Local Moran’s I in ArcGIS is similar to that of Global Moran’s I. The start window (Figure 5) includes the same two input requirements as Global Moran’s I, but then includes an area to save the output feature class. This is because Global Moran’s I returns statistical figures, but Local Moran’s I returns both statistical figures and a visual representation of the data as a shapefile (Figure 6).

![Cluster and Outlier Analysis (Anselin Local Morans I)](image)

**Figure 5.** The start window for running Anselin’s Local Moran’s I tool in ArcGIS (Esri, 2012).
Figure 6. A preliminary output of Anselin Local Moran’s I in ArcGIS. The colored points and associated shapefile represent clusters of kidnapping events with ransoms (Esri, 2012).

Ordinal Analysis of Numerical Data

Ordinal analysis employed in this thesis is based on the visual outputs of the Moran’s I data, as displayed within ArcGIS. Such qualitative analysis enables the viewer to distinguish between areas of clustered data by assigned colors representing the high or low values, as well as the areas of unclustered, random data. These maps provide an easy avenue to interpret the research’s data and results, primarily for those who are unable to
review the expanse of the dataset and employed statistical processes. The maps are included in Chapter 4.

**Quantitative Analysis**

As discussed, the first process of quantitative analysis run on the dataset was Global Moran’s I. This identified if certain variables, such as kidnappings with ransom, were statistically significant. This process was run on each variable for the topic, and then recorded for later use. The four variables tested in this thesis are: ransom, nationality of the kidnap victim, type of kidnapping (Economic, Political, or Ritual/Religious), and the presence of fatalities. Once the determination of statistical significance was made, the dataset and variables were then tested again with Local Moran’s I. Local Moran’s I takes the analysis a step further by identifying where the clusters of data are located, and it also identifies if the clusters contain high values, low values, or if there is an outlier within a spatial cluster. The results from both Moran’s I processes, as well as maps of the data, are included in Chapter Three.
CHAPTER THREE: ANALYSIS

Kidnapping event data for Nigeria was analyzed both qualitatively and quantitatively to test and illustrate the existence of spatial patterns within the dataset. Qualitative assessments were completed by analyzing the visual output of the dataset from ArcGIS. Quantitative assessments were completed by using the Global Moran’s I and the Local Moran’s I spatial statistic tools.

Spatial Clustering Analysis

This section outlines the analyses conducted to determine statistical significance of spatial data clusters, as well as the analyses conducted to locate such clusters. First, an ordinal analysis of the dataset is also presented and discussed, the basis of which formed from the data illustration in map form. Then, datasets were tested to determine statistical significance through the Global Moran’s I tool. Lastly, the spatial clusters were located by employing the Local Moran’s I tool. Results of both are discussed in this section.

Categorical Data Analysis

A categorical data analysis of the kidnapping data for Nigeria displays the four categorized motivations for kidnapping. The categories are: Economic, Ritual and Religious, Political, and Unidentified. The Unidentified categories represent the reported kidnapping events that did not contain enough descriptive information to categorize the motivation of the event.
Figure 7. Kidnappings in Nigeria by motivation, as a proportion of all kidnappings in each state.

This map illustrates that a higher number of economically-motivated kidnappings occur in the same area of Nigeria that experiences the highest number of kidnappings in the country. This area, the oil-rich southern states, likely experiences a high number of economically-motivated kidnapping events because of the disparity of wealth between the oil companies and the locals. The oil companies have generated billions of dollars in revenue, yet the local Nigerians are struggling to get by.
Also notable from the qualitative data is the small percentage of the kidnappings in southern Nigeria that are motivated for ritual or religious reasons. Ritual and religious kidnappings, while much more rarely reported to news outlets, appear to occur more often in the northern states of Nigeria. These northern states are sparsely populated, and are also home to many of the animist tribal groups and radical Islamic groups, which are likely the source of the ritual or religious kidnappings. With the increasing activity of Boko Haram in northern Nigeria recently, future analyses of the same dataset may see a sharp spike in ritual and religious kidnappings in northern Nigeria. Though active for a few years, recent events such as the kidnapping of over 200 school girls in April 2014 have brought Boko Haram to the forefront of international media attention. This media attention will likely increase the probability of reporting Boko Haram-related kidnappings in the future.

While the politically-motivated kidnappings appear to occur in the central and southern portions of Nigeria, there is not a strong pattern of incidence that can be identified through qualitative analysis. Though there is not a strong spatial pattern within the political events, most of the political kidnappings in Nigeria target locals and not foreigners. As a result, it can be assumed that political kidnappings are of low threat to foreigners visiting or living in Nigeria.

**Categorical Data Assessment**

Figure 8 illustrates all known kidnappings and attempted kidnappings in Nigeria during the timeframe studied. Prior to running the dataset through the two Moran’s I equations to determine significance and patterns, the raw data was mapped to display
events by province. The data is displayed with graduated symbols broken into five categories. The majority of the states in Nigeria reported five or fewer kidnapping events during the timeframe studied. The states with the highest reported kidnappings were Delta, with 73, and Rivers, with 54. While no quantitative assessment can be made from the data in this format, the area highlighted with the largest incidences of kidnapping are coincidentally the states in the oil rich region of southeastern Nigeria.

Figure 8. Total reported kidnappings by state.
Ransom

The Global Moran’s I and Local Moran’s I tools were used to analyze the subset of the dataset that is kidnappings with an associated ransom. Kidnappings for ransom are seen as a quick way to earn a large amount of money in Nigeria, so spatial clusters could be of interest to multinational companies, political figures, and tourists in Nigeria. It is important to note that not all of the kidnapping event data points mentioned whether there was or was not a ransom, therefore, the data analyzed was only from those events that expressly identified ransom as present in the kidnapping. Only 23 of the kidnapping reports specifically identified ransom as an element of the crime. Mapping the raw data for ransom kidnappings, it can be seen that the kidnappings only occurred in southern Nigeria. Surprisingly, there were no reported kidnappings for ransom in the rest of the country. The highest reported numbers of ransom requests were in Delta and Akwa Ibom states. These states also correspond with the locations of Nigeria’s oil wealth and the primary areas of Nigeria’s oil extraction.
Running the total kidnappings for ransom data through the Global Moran’s I, or spatial autocorrelation tool, in ArcGIS, results in the data provided in Figure 10. Adhering to a desired confidence level of 90%, the z-score of 3.535323 and the small p-value of 0.000407 provide the basis to reject the null hypothesis that the ransom events are distributed randomly. This provides reasonable enough evidence to state that the
clustering of the data is statistically significant. The 90% confidence interval is used in this analysis, because this is an exploratory study on a topic with which there is no prior research. This confidence interval is more liberal than the 95% confidence level typically used in social science research, owing to the budding nature of this topic (Hurlburt & Lombardi, 2009, p. 311-349).

Table 2. Statistical outputs from the Global Moran’s I tool for total kidnapping for ransom events.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran’s Index</td>
<td>0.271325</td>
</tr>
<tr>
<td>Expected Index</td>
<td>-0.027027</td>
</tr>
<tr>
<td>Variance</td>
<td>0.007122</td>
</tr>
<tr>
<td>z-score</td>
<td>3.535323</td>
</tr>
<tr>
<td>p-value</td>
<td>0.000407</td>
</tr>
</tbody>
</table>

After completing the analysis of the data using Global Moran’s I to determine statistical significance, the data were run through the Local Moran’s I tool to determine the locations of the clusters. Upon completion of the analysis, only four states of high clusters (“HH”) were identified. The four states are: Delta, Rivers, Abia and Akwa Ibom.
These four states were identified with the HH code, because they are states with high levels of kidnapping, near other states with high levels of kidnapping. These four states are located in the oil-rich region of Nigeria, supporting the statements in several academic journals identifying ransom as a tool of the locals in the region to try to earn money, because they have not benefitted from the oil extraction. Many of the academic researchers highlighted in the Chapter One: Literary Review state that locals are probably engaging in kidnapping because of desperation, since they are unable to earn money or secure gainful employment in Nigeria’s oil industry.
After conducting the analysis of the total ransom data, a similar analysis was conducted on the data’s proportion of kidnappings for ransom by state. This separate analysis was conducted to determine if the proportion of kidnappings for ransom provides a different result than the total kidnappings for ransom. This analysis still resulted in a statistically significant outcome, though not as strong as the outcome yielded by the test for the total number of kidnappings for ransom. The Global Moran’s I test for the
proportion of kidnappings for ransom resulted in a z-score of 1.870485 and a p-value of 0.061416 (Table 2), which still falls within the required threshold to state with 90% confidence that the null hypothesis can be rejected.

Table 3. The statistical output from Global Moran’s I with the data for proportion of kidnappings for ransom.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran’s Index</td>
<td>0.139286</td>
</tr>
<tr>
<td>Expected Index</td>
<td>-0.027027</td>
</tr>
<tr>
<td>Variance</td>
<td>0.007906</td>
</tr>
<tr>
<td>z-score</td>
<td>1.870485</td>
</tr>
<tr>
<td>p-value</td>
<td>0.061416</td>
</tr>
</tbody>
</table>
This separate analysis indicates that Abia, Akwa Ibom, and Cross River are the states that are clustered with the highest ratio of kidnappings to kidnappings for ransom. These three states are still in the oil-rich region of Nigeria. Additionally, Abia and Akwa Ibom were identified in the spatial clusters of high total rates of kidnapping for ransom.
Foreigners

Another element of interest in this study was the presence of foreigners in a kidnapping event. In the last few years, multinational companies have expressed concern about the kidnapping threat in Nigeria, causing some to opt to focus on operations in other countries with a much smaller threat. The oil industry is critical to Nigeria’s economy, so understanding the kidnapping threat against foreigners may provide helpful information to the Nigerian government. If the threat can be understood, provisions to curb the threat could be implemented. Additionally, the threat against foreigners can result in travel advisories and restrictions to Nigeria. Such advisories and restrictions would hurt any portion of Nigeria’s economy that depends on international business travel or general tourism. Of the subsets of the total dataset that were analyzed, kidnapping reports more frequently mentioned the nationality of the victims that they provided other portions of information. This is likely because the kidnappings of foreigners in Nigeria are more likely to garner media attention than other issues and topics involved with kidnapping. However, some reports still lacked any information about the nationality of the victims, causing the dataset for kidnapped foreigners to be smaller than the original dataset of all kidnappings in Nigeria.

Mapping the raw data of kidnapping in Nigeria displays higher numbers of foreign kidnappings in the oil-rich southern region of Nigeria. However, the proportion of total kidnappings to kidnapped foreigners is much higher in the north. These states with high proportions of foreigners kidnapped, yet low numbers of reported kidnappings overall, likely display the inherent bias of the dataset that the kidnappings of foreigners
are more likely to be reported than the kidnappings of locals. Northern Nigeria is sparsely populated, rural, and less developed than the rest of the country. Foreigners kidnapped in this region easily result in international media attention, while it is likely that many other kidnappings of locals have never been reported to a news source. Additionally, the data mapped are only the data that specifically identify foreigners. Some data may not identify the nationality of the victim at all.
Figure 12. An illustration of the raw data of the proportion of kidnapped foreigners in each state, overlaid by the raw data for total kidnapped foreigners in each state.

Processing the dataset through the Global Moran’s I tool yields a z-score of 3.187981 and a p-value of 0.001433 providing the foundation needed to reject the null hypothesis with at least a 90% confidence level (Table 4). Because of the z-score and p-value, it can be comfortably said that the data of kidnapped foreigners in Nigeria does contain statistically significant clusters.
Table 4. The statistical output from running the Global Moran’s I tool on data for total foreigners kidnapped.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran’s Index</td>
<td>0.209466</td>
</tr>
<tr>
<td>Expected Index</td>
<td>-0.027027</td>
</tr>
<tr>
<td>Variance</td>
<td>0.005503</td>
</tr>
<tr>
<td>z-score</td>
<td>3.187981</td>
</tr>
<tr>
<td>p-value</td>
<td>0.001433</td>
</tr>
</tbody>
</table>

Processing the data through the Local Moran’s I tool identifies a cluster of three states with the “HH” designation, indicating that those states have high numbers of kidnapped foreigners, in an area with high rates of kidnapped foreigners. The three states identified by the tool are: Delta, Bayelsa, and Rivers. Because these three states are located in the area of Nigeria where most multinational oil companies are working, it is likely that there are more foreign workers in those states, and the other states in southern Nigeria, than there would be in the rest of Nigeria. Northern Nigeria is still very rural and tribal, which does not attract as many total foreign workers as the states that are producing billions of dollars in oil.
As with the previous data subset, the proportion of kidnappings to the number of kidnapped foreigners was also analyzed by the two Moran’s I tools. Testing for statistical significance, the z-score resulted in 0.717383 and the p-value resulted in 0.473138. Because the z-score is so high and the p-value is so low, we fail to reject the null hypothesis. The null hypothesis that the data is distributed randomly still stands. This statistical result likely occurs because of the states with low total numbers of kidnappings.
and high proportions of foreigners kidnapped. This is likely to be more a reflection of the media attention for kidnappings, as opposed to an indication of spatial clustering. There are no data about other possible kidnappings occurring in various states of Nigeria; therefore, the data are likely skewed.

Table 5. The statistical output from running the Global Moran’s I tool on the proportion of foreigners kidnapped.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran’s Index</td>
<td>0.040406</td>
</tr>
<tr>
<td>Expected Index</td>
<td>-0.027027</td>
</tr>
<tr>
<td>Variance</td>
<td>0.008836</td>
</tr>
<tr>
<td>z-score</td>
<td>0.717383</td>
</tr>
<tr>
<td>p-value</td>
<td>0.473138</td>
</tr>
</tbody>
</table>

Processing the same dataset with the Local Moran’s I identifies a small cluster in northern Nigeria with the states of Katsina and Kano. However, this result should also not be considered for deeper analysis, because there were so few data points supporting this result. Given the dataset used for this thesis, there can be no true spatially significant clusters identified. A larger data sample would be needed to make a meaningful
assessment. Each of the two states contained a proportion of 100%, which resulted because the two states recorded so few kidnappings.

Figure 14. Spatial clusters of high proportion of kidnapped foreigners by state.
**Fatalities**

The highest reported number of fatalities from kidnapping events occurred in Delta State with 13, and the second highest occurred in Rivers state with 12. However, as the choropleth map illustrates, neither of those totals constitutes a large percentage of the total kidnapping events that occurred in those states during the timeframe of interest. Delta and Rivers state are the two states with the highest reported kidnappings overall, making the percentage of kidnappings that result in fatalities approximately 20% or less than the total reported events. States in northern Nigeria indicate higher rates of fatalities, though the reported kidnappings in those states are fewer overall. However, the fatality rate in the north does support the notion by many academics that ritual and religious kidnappings are the most likely to result in fatalities. This is also why the category may be underreported, because the kidnapping and killing of one individual in a rural, tribal area is less likely to be reported to national or international press.
To bring additional meaning to the fatality data for Nigeria, the total fatality data was also analyzed with Global and Local Moran’s I. Running the Global Moran’s I tool yielded a $z$-score of 3.081409 and a $p$-value of 0.002060 (Table 6), indicating that the null hypothesis can be rejected. Spatial patterns in the dataset of fatalities resulting from kidnappings are considered to be statistically significant.
Table 6. The statistical output for running Global Moran’s I on the dataset for total fatalities from kidnapping.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran’s Index</td>
<td>0.222964</td>
</tr>
<tr>
<td>Expected Index</td>
<td>-0.027027</td>
</tr>
<tr>
<td>Variance</td>
<td>0.006582</td>
</tr>
<tr>
<td>z-score</td>
<td>3.081409</td>
</tr>
<tr>
<td>p-value</td>
<td>0.002060</td>
</tr>
</tbody>
</table>

Running the Local Moran’s I tool then identifies the location of the spatial clusters of fatalities resulting from kidnappings in Nigeria. The three states identified as high values of kidnappings resulting in fatalities are Delta, Bayesla, and Rivers (Figure 16).
Analyzing the data by percentage of fatalities per kidnapping yields a far different result. The Global Moran’s I tool returned a z-score of 0.34001 and a p-value of 0.733856 (Table 7), meaning that we fail to reject the null hypothesis that the data is distributed randomly. As with the similar data for the percentage of kidnapped foreigners, some of the states in Nigeria reported only 1 or 2 kidnappings along with 1 or 2 fatality events, which skewed the dataset for those states. Because of the small data size for each of those
states, there is not a true spatial pattern to the fatality dataset when measured by proportion.

Table 7. The statistical output from Global Moran’s I and the proportion of fatalities from kidnappings.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran’s Index</td>
<td>0.005012</td>
</tr>
<tr>
<td>Expected Index</td>
<td>-0.027027</td>
</tr>
<tr>
<td>Variance</td>
<td>0.008880</td>
</tr>
<tr>
<td>z-score</td>
<td>0.340001</td>
</tr>
<tr>
<td>p-value</td>
<td>0.733856</td>
</tr>
</tbody>
</table>

The map resulting from the Local Moran’s I identifies the states of Katsina and Nassarawa as “HL,” or states of high rates of fatalities surrounded by states of low rates of fatalities. Additionally, Plateau state was identified as “LH,” or a state with a low number of fatalities clustered around by states with high rates of fatalities (Figure 17).
Figure 17. The clusters identified by the Local Moran’s I tool.
Understanding kidnapping in Nigeria is of international importance. Economically, many countries are engaged in business relationships with Nigeria because of its oil resources. Beyond economics, Nigeria is also one of the world’s largest countries, and it is expected to continue to grow even as other large nations begin to decline in population during the next twenty years. Recently, many countries and companies have become fearful of operating in Nigeria, because of the high kidnapping rates. While the overall kidnapping trends are well known for Nigeria, this thesis aimed to investigate some of the motivations and results of the specific kidnapping events in Nigeria. Overall kidnapping rates for Nigeria do not explain the subtle trends that occur geographically in the country, which is what this thesis sought to identify and highlight. By understanding the spatial variations of kidnapping events, individuals can make more informed decisions about conducting business or travel in Nigeria. Additionally, the Nigerian government and military could hone their attention and security reactions to more specific areas.

In regards to the three categories of kidnapping (political, economic, and ritual and religious), are there spatial variations of these categories in Nigeria?

Analyzing the ACLED data revealed unique patterns to the categories of kidnappings in Nigeria. These three categories represent the primary motivations of the
kidnappings. Some reports did not provide enough information for the events to be categorized, but all events with enough information were designated in one of the three categories. The southern, oil-rich portions of Nigeria experienced the highest proportion and totals of economically-motivated kidnappings in Nigeria. This is likely a result of the presence of multinational corporations extracting oil from those areas and earning billions of dollars, all while the locals residing in the same area are struggling to make ends meet each day. Ritual and religious kidnappings were most prevalent in northern Nigeria. While the data indicated increased rates of ritual and religious kidnappings in northern Nigeria, it is believed that the numbers are likely much higher. The ACLED data is based on reported kidnappings, which skews the data towards events that would be of national or international interest. According to academic research, the ritual and religious kidnappings have historically targeted smaller groups of people, often only one person, and the victim is typically local. If one Nigerian is kidnapped in northern Nigeria for ritual purposes, it is much less likely to be reported to the press than if 3 Chinese workers were kidnapped from the oil fields. Political kidnappings in Nigeria did not show a strong spatial pattern, but the data did reveal that the primary target for politically-motivated kidnappings are local Nigerians.

Is there a spatial aspect to results of the kidnappings, such as ransoms or fatalities?

Ransoms displayed strong spatial patterns when analyzed with the Global and Local Moran’s I tools. Kidnappings requesting ransom occurred most often in southern Nigeria, the location of Nigeria’s oil wealth. As with the higher frequency of economically-motivated kidnappings in that area, it is likely that the disparity of wealth
between the oil companies and foreigners versus the locals is what motivates the kidnappings for ransom in the south. Often, the motivations for ritual and religious kidnappings are not tied to the desire for monetary gain, so ransoms occurred much less often in the North.

As for fatalities, the highest numbers were also reported in southern Nigeria. This is partially because the highest raw numbers of kidnapping occurred in southern Nigeria. The largest proportions of kidnappings to fatalities, however, occurred in the northern states of Nigeria. Despite many fewer data points to derive the analysis from, kidnapping in Nigeria is likely to be more fatal than kidnapping elsewhere. Ritual kidnapping almost assuredly results in death, as the primary motivation is typically to harvest organs or other body parts for conducting rituals. Religious kidnapping has been more fatal because the ideological force behind it in Nigeria, usually radical Islamic groups, finds kidnapping and killing to be a powerful media tool. Such groups are often not as interested in collecting a ransom and setting their hostages free, because they are more interested in making a statement. Fatalities were also the least prevalent in central Nigeria, surrounding Abuja. This information may provide additional comfort to those traveling to Nigeria for business, politics, or other reasons.

Is there a spatial pattern to the kidnapping of foreigners in Nigeria?

The highest rates of kidnapped foreigners also occurred in southern Nigeria, around the oil-rich southern states. This is likely because of the presence of foreign workers in those regions, and the frustration that locals often feel towards the foreigners that are earning money from the resource wealth of the locals’ homeland. Additionally,
foreign kidnap victims are much more likely to be reported in the press, so this category may have been disproportionately represented overall. The kidnapped foreigners in the northern states were often aid workers or others attempting to provide assistance to the most rural portion of Nigeria. Northern Nigeria is home to more traditional tribes as well as tight-knit religious groups that are often skeptical of outsiders. Such sentiments and lack of interactions with other foreigners may have resulted in the targeting of the aid workers in those regions. On the positive side, the analyzed ACLED data did not reveal any large threats to foreigners in central Nigeria, specifically in the capital of Abuja. Armed with this information, it may be more beneficial for representatives of multinational companies to conduct as much of their business in Abuja as they can, because the threat of kidnapping is much smaller there. Additionally, any other foreigners visiting Nigeria for other reasons should find Abuja to be a safer location for conducting activities.

**Suggested Future Research**

Because the ACLED reporting data for northern Nigeria was so sparse, a manual collection of media reports and other data sources to identify kidnapping events may yield a more robust analysis. A more robust analysis of the data could identify more specific spatial variations than were identified in this study. Also, acquiring more specific information about each kidnapping event would allow for larger numbers of events to be categorized and analyzed. If more specific data is acquired for the kidnapping events, another interesting idea to explore would be if there are patterns in the oil companies that
experience violence and kidnappings in southern Nigeria in order to determine if certain companies are targeted more frequently than others. Because many of the areas for future research result from limitations in the ACLED dataset, opportunities for additional research could focus on analyzing data from alternate sources.

Currently, Boko Haram events in Nigeria are on the rise. A future analysis of kidnapping data for Nigeria could address the advent and rise of Boko Haram in Nigeria. Such an analysis could display spatial and seasonal patterns of activities, as well as possible changes in tactics and methods. This type of analysis would be of interest to both world leaders and local Nigerian politicians. The recent kidnapping of over 200 schoolgirls in Nigeria by Boko Haram has garnered unprecedented media coverage of the kidnapping issue in Nigeria. Often, media coverage motivates public opinion, which then leads to international intervention of events, whether justified or not.
REFERENCES


BIOGRAPHY

Aubrey Larsen graduated from North Cobb High School, Kennesaw, Georgia, in 2004. She received her Bachelor of Science from Brigham Young University in 2008. She was employed as a geographer for the Department of Defense for six years and received her Master of Science in Geographic and Cartographic Sciences from George Mason University in 2014.