An Analysis of The Geospatial Distribution of Secondary School Teacher Qualifications and Their Impacts on Educational Quality in Mubi Metropolis, Adamawa State Nigeria

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ABSTRACT

This research explores the geospatial distribution of secondary school teacher qualifications and their impacts on educational quality in Mubi Metropolis. Education is recognized as a fundamental human right with significant implications for social and economic development. However, in underdeveloped nations, the distribution of schools and qualified teachers tends to be uneven, affecting educational access and quality. This study employs geographic information systems (GIS) to map the distribution of qualified and unqualified teachers in the region, identifying potential disparities and geographic clusters. The research sheds light on the implications of teacher qualifications for academic performance, student engagement, classroom management, and overall educational outcomes. The findings can inform targeted interventions to enhance educational quality and create a conducive learning environment for students in the Mubi Metropolis.

1. INTRODUCTION

Since the dawn of human civilization, education has been the primary driver of economic, social, and political transformation (Islam et al., 2016; UNICEF, 2014). Education is a fundamental human right that plays a critical role in bringing about greater social, economic, and cultural advantages (Tarc, 2013). In this sense, wealthy countries have made significant efforts to ensure high-quality education (Biggart et al., 2015). However, educational system development in poor nations has lagged behind that in rich countries (Birchler and Michaelowa, 2016). Empirical data has clearly demonstrated that education quality in underdeveloped nations is depressing (Jones, 2016). In other words, the basic spatial elements that determine education access and quality are school location, service area coverage, and school accessibility (Ogunyemi et al., 2014). In poor nations, the geographical location and spatial distribution of primary schools are characterized by uneven distribution, which usually limits the level of accessibility, affecting education quality (Fabiyi and Ogunyemi, 2015). Uneven school distribution has an impact not only on education access but also on education quality (Oluwadare and Olujimi, 2011).

Professionalism in education has been a topic of discussion for decades. Scholars claimed that skilled teachers are required for optimal learning. According to Ngada in Fajonyomi (2007), the success or failure of any educational program is heavily dependent on the availability of qualified (professional), competent, and dedicated teachers. According to Seweje and Jegede (2005), a teacher's capacity to teach is based not just on one's academic background, but also on great pedagogical abilities. By employing geographic information systems (GIS), we aim to visualize the distribution of qualified and unqualified teachers in each school, explore potential disparities, and identify geographical clusters. Understanding the implications of these findings can inform targeted interventions to improve educational quality and create a conducive learning environment for students.

MATERIALS AND METHODS

Mubi metropolis, a geo-political area comprising of two local government areas; Mubi North and Mubi South. The metropolis is located between latitudes 10° 05' and 10° 30'N of the equator and between longitude 13° 12' and 13° 19'E of the Greenwich meridian.

The two Local government areas occupy a land area of 192,307 Km2 and support a total population 260,009 people (National Population Census 2006). The area shares boundary with Maiha L.G.A in the South, Hong L.G.A in the West, Michika L.G.A and Cameroon Republic in the East (Figure 1). Mubi has a tropical climate which is determined by the movement of the Inter Tropical Convergence Zone (ITCZ), as well as the effect of relief (Ray, 2007). Rainfall begins in April, progressing and reaching its peak in July/August and stops most of the time in October. Average annual rainfall ranges between 998 mm and 1262 mm. The areas just below the Mandara Mountains record the highest rains. Rainfall intensity is high with rainy days making up to 87 % of the days with more than 20 mm of rainfall alongside air and water soil is another vital resource that provides the basis for human living (Adebayo, 2004). The soil is composed of weathered rock materials (parent material), organic matter, moisture content, and dissolved minerals in the air. Thus, it forms a very important medium for plant growth. However, soils vary in their texture, structure, colour, mineral content and moisture holding capacity. Some of these physical properties collectively form the basis for their classification. The soil of Mubi regions therefore, fall under the category of ferruginous tropical soils of Nigeria based on the genetic classification made by the Food and Agricultural Organization of the United Nations (Adebayo, 2004). Mubi region falls within the Sudan Savanna belt of Nigeria's vegetation zones.
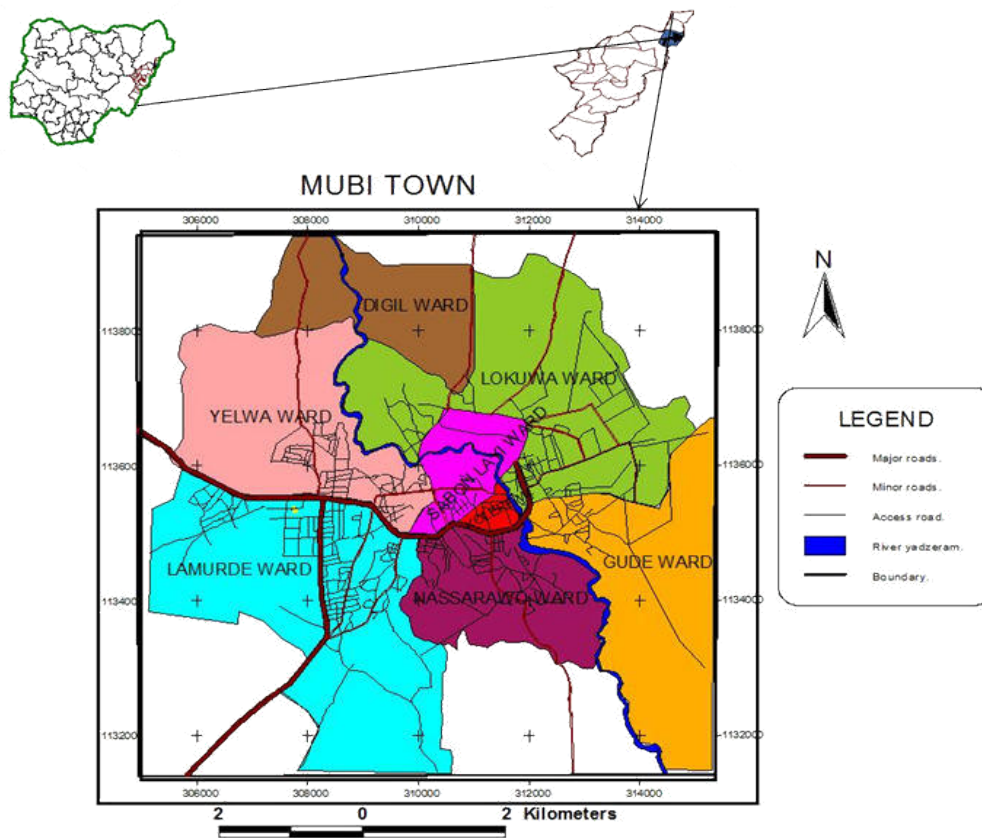

FIGURE 1: The Study Area.
Source: GIS Lab. Adamawa State University, Mubi.

This research is based on the seven political wards in Mubi metropolis which comprises four (4) wards (Sabon layi, Kolere,Yelwa and Lokuwa wards) in Mubi North while two wards (Lamorde, Gude and Nasarawo wards) in Mubi south local government area. The Germin etrex 20 hand-held Global Positioning System (GPS) was used to capture the locational coordinate points of thirty-five (35) private and public primary schools in the study area; in Universal Transverse Mercator (UTM) format, population figures of teaching staff, names and address of the public and private primary schools in Mubi Metropolis were directly obtained from the administrative office of the Education Authority and the schools. The based map which was sourced from the Ministry of Land and Survey, Yola was georeferenced and all features on the map were digitized in ArcGIS 10.5 using the add control tool and editor tool respectively in the ArcGIS 10.5 software. The data base using the X and Y coordinate, population figures of teaching staff, names and address of the public and private primary schools were created in Microsoft Excel format and exported using Text Tab-Delimited so as the software can recognize it.

Data Validation and Quality Control: To ensure the accuracy and reliability of the data, various measures of data validation and quality control have been employed. These include cross-referencing data from multiple sources, conducting site visits to verify information, and eliminating any outliers or inconsistencies in the dataset.

RESULTS AND DISCUSSION

Using geospatial analysis, the coordinates of the schools were plotted on a map of Mubi Metropolis. The size of the marker was proportional to the number of qualified teachers in each school. The map showed that schools in the central and southern parts of the metropolis generally had a higher concentration of qualified teachers (MSC, PGDE, and NCE) compared to the northern region as depicted in Figure 2. The data collected from 35 secondary schools in Mubi Metropolis provided valuable insights into the distribution of teacher qualifications among the teaching staff. The qualifications were categorized into four main groups: Master of Science (MSC), Postgraduate Diploma in Education (PGDE), National Certificate in Education (NCE), and diploma/grade II/SSCE qualifications.
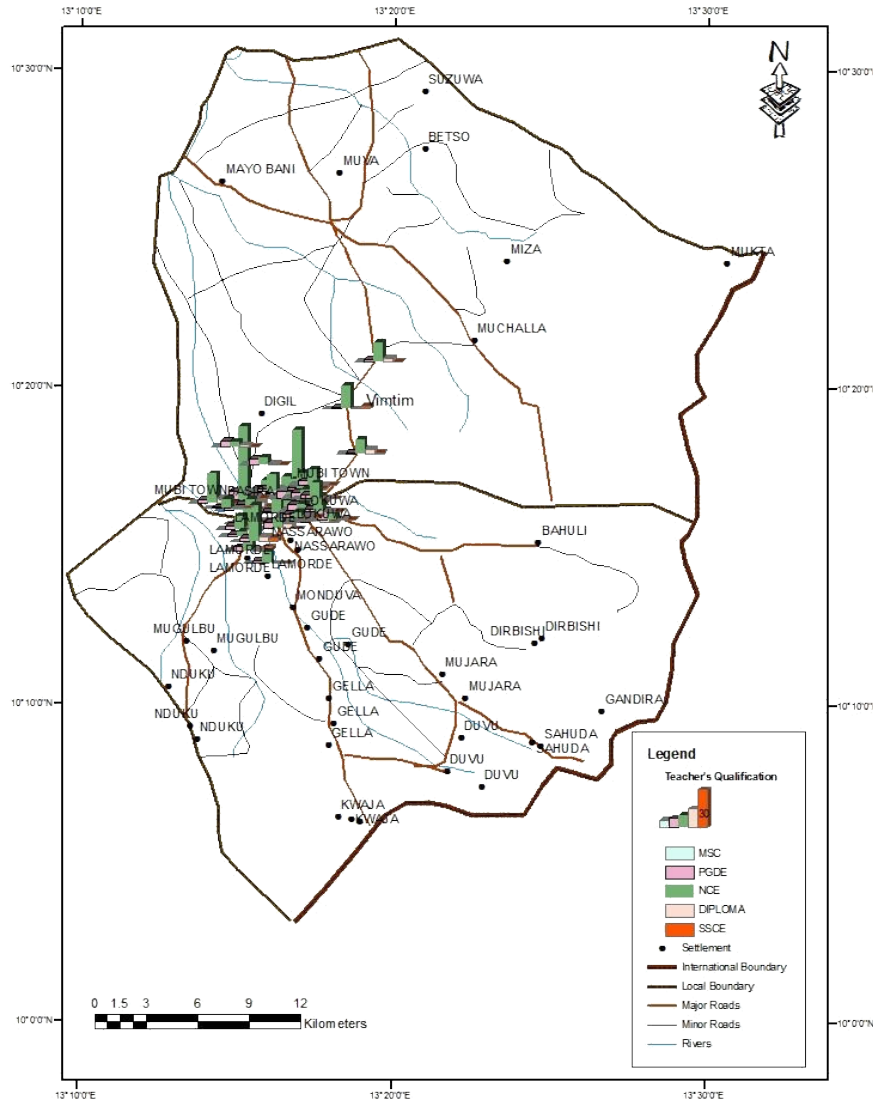

FIGURE 2: Distribution of teacher's qualification in each private and public primary schools in Mubi metropolis.

Qualified Teachers: The prevalence of teachers with National Certificate in Education (NCE) qualifications in Mubi schools is consistent with the broader trend in many regions. NCE is a standard teaching qualification that provides foundational pedagogical training. With 542 teachers holding this qualification, it indicates that the region recognizes the significance of formal teacher training, which can positively impact students' learning experiences. The presence of 125 teachers with a Postgraduate Diploma in Education (PGDE) is encouraging. PGDE holders have undergone specialized training in education after obtaining their bachelor's degrees, which can lead to enhanced teaching expertise. These teachers may bring innovative teaching methods and a deeper understanding of educational principles to the classroom. While the number is relatively small, the two teachers with a Master's degree (MSC) possess advanced subject knowledge and research skills.

These teachers can play a vital role in enriching the educational environment by providing a more in-depth understanding of specific subjects and encouraging a culture of research and critical thinking among students. Schools with a higher number of qualified teachers, such as Mubi 1 and Yelwa, may enjoy certain advantages in terms of providing quality education. With 62 and 63 qualified teachers, respectively, including a mix of NCE, PGDE, and MSC holders, these schools likely have a diverse pool of teaching expertise. This diversity can lead to a well-rounded educational experience for their students, exposing them to various teaching styles and perspectives. This is in agreement with the assertion of Aladejana and Odejobi (2006) which corroborated this view stating that the professional qualification of teachers is related to students' achievement and that a teacher's qualification impacts directly on the quality of education imparted to the learners (Waseka et al., 2016).

Unqualified Teachers
The presence of unqualified teachers in some schools in Mubi raises concerns about the quality of education provided. Unqualified teachers, indicated by Diploma, Grade II, and Senior Secondary Certificate Examination (SSCE) qualifications, may lack the necessary pedagogical training and subject expertise required to effectively teach students. Schools with a higher number of unqualified teachers, such as Sabon Pegi and Army Ch'ren, may face challenges in ensuring that students receive the necessary education and support. The lack of formal teaching qualifications can potentially lead to gaps in knowledge delivery and hinder students' learning outcomes. On the other hand, schools like Evangel and Gerewol, with only 4 and 1 unqualified teachers, respectively, have taken measures to prioritize qualified staff. These schools' efforts to maintain a majority of qualified teachers can positively influence the overall educational outcomes. Having a well-qualified teaching staff can lead to better classroom management, improved student engagement, and higher academic achievement. This is in agreement with a study done by Adaramola and Obomanu (2011) in Nigeria which found out that the lack of qualified teachers led to the consistently poor performance of students. Also, in agreement with the educational analysis carried out in Nigeria by the National Economic Empowerment and Development Strategy (National Economic Empowerment and Development Strategies, 2005), which indicated that more than 49 per cent of the teachers in Nigeria are unqualified.

Disparities in Teacher Qualifications
The analysis revealed evident disparities in the distribution of teacher qualifications across schools. Some schools exhibited a higher concentration of teachers with advanced qualifications, such as MSC, PGDE, and NCE. Conversely, other schools predominantly employed teachers with lower qualifications, including Diplomas, Grade II certificates, and SSCE. For instance, schools like Sabon Pegi, Army ch'ren, and Dazala showcased a mix of qualified teachers, with a substantial number holding NCE qualifications. These schools might benefit from a higher level of formal training in education, potentially leading to better educational quality. In contrast, schools like Yelwa, Wurobulude, and Halibarth had a higher number of unqualified teachers, indicating potential challenges in maintaining the same level of educational standards in these institutions.

Geographic Clustering: The geospatial analysis identified distinct geographic clusters of schools with similar teacher qualification patterns. Schools located in urban or more developed areas tended to form clusters with a higher proportion of qualified teachers. In contrast, schools in remote and underserved regions tended to exhibit clusters with a higher number of unqualified teachers. For example, schools like Mubi 1, Mubi high school, Wurobarka, and Wuro Harde were part of a cluster with a significant number of teachers holding NCE qualifications. This clustering suggests a higher potential for educational quality in this region due to the prevalence of qualified teachers. Conversely, the cluster comprising Kwaccam, Wuropatuji, and New Era schools revealed a lack of qualified teachers, emphasizing the need for targeted interventions to enhance educational quality.

Impact on Educational Quality
The distribution of teacher qualifications plays a crucial role in determining the overall educational quality within schools. The impact of teacher qualifications on educational quality can be observed in various aspects, including academic performance, student engagement, classroom management, and overall learning outcomes. The geospatial analysis of teacher qualifications in schools has provided insights into the potential impact on educational quality, which can be elaborated as follows:

Academic Performance:
Teacher qualifications significantly influence students' academic performance. Qualified teachers, particularly those with advanced degrees such as Master's degrees (MSC) and Postgraduate Diplomas in Education (PGDE), possess specialized knowledge and advanced teaching skills. They are better equipped to deliver subject matter effectively, implement innovative teaching techniques, and adapt their instruction to cater to individual learning styles. As a result, students taught by qualified teachers are more likely to perform better in examinations, achieve higher grades, and demonstrate improved subject mastery.

In contrast, unqualified teachers may lack the necessary training and expertise to effectively impart knowledge and facilitate learning. This can lead to gaps in understanding and lower academic achievement among students.

Student Engagement and Motivation: Qualified teachers are adept at creating engaging and interactive learning experiences for their students. They can design lessons that capture students' interest and foster curiosity in the subject matter. Such teachers employ a variety of teaching strategies, including hands-on activities, group discussions, and multimedia resources, to keep students engaged and motivated to learn. Conversely, unqualified teachers may struggle to maintain student interest and may rely on traditional teaching methods, leading to passive learning and reduced student enthusiasm.

Classroom Management: Qualified teachers generally possess strong classroom management skills, which are essential for maintaining an orderly and conducive learning environment. They can effectively manage student behavior, address disciplinary issues, and promote positive classroom dynamics. A well-managed classroom enables students to focus on their studies and enhances the overall learning experience. In schools with a higher number of unqualified teachers, classroom management may be less effective, leading to disruptions and distractions that can impede the teaching and learning process.

Quality of Instruction: Qualified teachers are better equipped to meet the diverse learning needs of students. They can tailor their instruction to accommodate different learning styles and provide additional support to struggling students. This individualized approach to instruction fosters a deeper understanding of the subject matter and helps students reach their full potential. In contrast, unqualified teachers may face challenges in addressing the individual needs of students, leading to variations in the quality of instruction and potentially leaving some students at a disadvantage.

CONCLUSION

The analysis of the geospatial distribution of secondary school teacher qualifications in Mubi Metropolis has provided valuable insights into the state of educational quality in the region. The findings highlight significant disparities in the qualifications of teachers across schools, with some institutions benefiting from a higher concentration of qualified teachers, while others face challenges in maintaining educational standards due to a prevalence of unqualified teachers. The impact of teacher qualifications on educational quality is evident, with qualified teachers showing positive effects on academic performance, student engagement, classroom management, and overall learning outcomes. The presence of a considerable number of teachers holding National Certificate in Education (NCE) qualifications signifies the region's recognition of the importance of formal teacher training. This foundational pedagogical training has the potential to positively impact students' learning experiences. Encouragingly, some schools have prioritized qualified staff, such as teachers with Postgraduate Diplomas in Education (PGDE) and Master of Science (MSC) degrees, which can enrich the educational environment and foster critical thinking among students. However, the prevalence of unqualified teachers in certain schools raises concerns about the quality of education provided to students. Unqualified teachers may lack the necessary pedagogical training and subject expertise, leading to gaps in knowledge delivery and hindering students' academic achievement.

RECOMMENDATIONS

Based on the findings of this research, several recommendations can be made to improve educational quality in Mubi Metropolis:

1. Targeted Teacher Training: Prioritize focused teacher training programs to upgrade qualifications in schools with unqualified teachers. Provide incentives and professional development opportunities to enhance teaching expertise.

2. Equitable Distribution of Qualified Teachers: Ensure a fair allocation of qualified teachers across all schools in Mubi Metropolis. Implement strategies to attract qualified educators to remote and underserved areas.

3. Strengthen Teacher Recruitment: Improve teacher recruitment processes to prioritize qualified candidates. Conduct rigorous screening and evaluations to hire teachers with the necessary qualifications and pedagogical abilities.

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