

## SCHOOL MAPPING AND EDUCATIONAL RESOURCE DISTRIBUTION IN PUBLIC SENIOR SECONDARY SCHOOLS IN DUTSIN-MA LOCAL GOVERNMENT AREA, KATSINA STATE

**Dr. ADAMU, RABI DALHA**  
**Department of Educational Management,**  
**Federal University Dutsin-Ma, Katsina State, Nigeria**

### **Abstract**

This study investigated school mapping and educational resource distribution across public senior secondary schools in Dutsin-Ma Local Government Area (LGA), Katsina State, Nigeria. The study adopted a descriptive survey research design. The target population comprised all principals and public senior secondary school teachers under the Katsina Zonal Education Quality Assurance. A sample of 180 respondents was drawn using a proportionate stratified random sampling technique. Two self-designed instruments the School Spatial Mapping Checklist (SSMC) and the Educational Resource Distribution Questionnaire (ERDQ) were utilised for data collection. The instruments were validated by experts, and a reliability coefficient of 0.81 was obtained using Cronbach's alpha. Research questions were answered using descriptive statistics (mean and standard deviation), while the null hypotheses were tested using Pearson Product-Moment Correlation (PPMC) and Independent Samples t-test at a 0.05 level of significance. Findings revealed significant disparities in the spatial allocation of physical infrastructure and human resources, with schools located in closer proximity to the urban center of Dutsin-Ma enjoying better resource allocation than peripheral rural institutions. Based on these findings, it is recommended that the Katsina State Ministry of Education adopt geographic information system (GIS) school mapping technologies to ensure data-driven, equitable resource distribution that mitigates the rural-urban educational divide.

Keywords: School Mapping, Educational Resources, Resource Distribution, Public Senior Secondary Schools.

### **Introduction**

Education remains the vital vehicle for socio-economic transformation, human capital development, and structural modernization within any contemporary society. In the Nigerian context, secondary education serves as the essential bridge linking foundational primary instruction with advanced tertiary specialization. The Federal Government of Nigeria explicitly notes that secondary education aims to prepare individuals for useful living within society and for higher education. However, the capacity of public secondary education systems to actualise these structural mandates is fundamentally contingent upon the availability, structural adequacy, and equitable distribution of educational resources.

Educational resources encompass three distinct categories: physical infrastructure (classrooms, laboratories, libraries, and administrative blocks), material components (textbooks, instructional aids, and technological equipment), and human capital (qualified teaching and non-teaching personnel). Empirical evidence indicates that when educational resources are distributed systematically based on accurate demographic data and school-specific needs, student learning environments become highly conducive, thereby driving institutional efficacy (Busa, 2024). Regrettably, infrastructural deficits, overcrowded classrooms, and severe disparities in the deployment of essential facilities remain persistent features within public secondary institutions across sub-Saharan Africa.

To resolve these systemic inequities, educational planners rely on school mapping. School mapping is a dynamic, data-driven planning technique used to evaluate the spatial distribution of existing educational facilities and plan for future allocations. It checks for geographic, demographic, and socioeconomic factors to ensure that schools are established and resourced in locations that optimise accessibility and cost-effectiveness. In Northern Nigeria, and specifically within Katsina State, the lack of rigorous spatial planning frameworks has historically produced visible resource imbalances between urbanised administrative capitals and outlying rural communities (Danzaria, 2017; Hussaini, 2020).

In Dutsin-Ma Local Government Area, schools face localized challenges that affect resource distribution. These include rapid population expansion, shifting rural-urban migration patterns, and unique socioeconomic conditions (Atalabi et al., 2017). While the Katsina State Government and various non-governmental organizations (NGOs) have continuously executed interventions to improve the state's educational landscape, severe structural imbalances persist. Classrooms remain unevenly congested, specialized science laboratories are frequently unequipped or entirely absent in some peripheral locations, and qualified subject teachers show a strong preference for urban assignments (Aliyu Said & Garba, 2024; Usman & Muhammad, 2025).

While past studies have examined general school resource management and teacher job motivation within the broader Katsina Zonal Quality Assurance Framework (Usman & Muhammad, 2025), there is a distinct gap in empirical literature regarding the explicit spatial analysis of resource distribution within Dutsin-Ma LGA using school mapping parameters. This structural imbalance directly hinders the uniform implementation of the curriculum. Therefore, this study empirically investigates the relationship between school mapping parameters and educational resource distribution in public senior secondary schools within Dutsin-Ma LGA, Katsina State.

### **Objectives of the Study**

The primary objective of this study is to examine the school mapping and educational resource distribution in public senior secondary schools in Dutsin-Ma Local Government Area, Katsina State specifically, the study seeks to:

1. Assess the spatial distribution of physical infrastructural resources (classrooms, laboratories, and libraries) across public senior secondary schools in urban and rural areas of Dutsin-Ma LGA.
2. Determine the relationship between school location mapping indices and the allocation of human resources (qualified teaching personnel) within public senior secondary schools in Dutsin-Ma LGA.

### **Research Questions**

To guide this investigation, the following research questions were formulated:

1. What is the status of the spatial distribution of physical infrastructural resources across public senior secondary schools in urban and rural areas of Dutsin-Ma LGA?
2. What is the nature of the relationship between school location mapping indices and the allocation of human resources within public senior secondary schools in Dutsin-Ma LGA?

### **Hypotheses**

The following null hypotheses were formulated and tested at a 0.05 level of significance:

H01. There is no significant difference in the spatial distribution of physical infrastructural resources between urban and rural public senior secondary schools in Dutsin-Ma LGA.

H02. There is no significant relationship between school location mapping indices and the allocation of human resources within public senior secondary schools in Dutsin-Ma LGA.

## Literature Review

The spatial organization of educational facilities is heavily supported by the Location-Allocation Theory, originally introduced by operational researchers and geographers to optimize the placement of public facilities relative to the target population. Within educational planning, this theoretical framework posits that schools must be situated within accessible geographic vectors to minimize travel friction for students while ensuring that internal instructional resources are allocated efficiently relative to localized student density.

Empirical investigations globally and regionally consistently point to a strong link between geographic location, resource equity, and institutional performance indicators. In an extensive regional assessment, Busa, and Muktar, (2025) observed that when resource allocation ignores objective spatial data and instead responds to ad-hoc political considerations, notable disparities emerge. This leaves remote institutions structurally isolated and starved of critical instructional tools. Within the Nigerian educational landscape, these spatial imbalances present a major challenge. The historical concentration of developmental infrastructure within urban zones has created an environment where rural schools struggle with acute resource deficits. Danzaria (2017) conducted an empirical survey of school libraries and curriculum implementation within the Katsina Education Zone. The findings revealed that a vast majority of public secondary schools lacked functional, well-stocked libraries. The few facilities deemed moderately operational were concentrated primarily within urban administrative axes, leaving rural learners without essential textbooks and modern reference materials. This directly undermines the principles of egalitarian educational access.

Furthermore, the distribution of human resources across public secondary schools remains highly skewed. Aliyu Said and Garba (2024) evaluated the impact of non-governmental interventions across secondary schools in Katsina State. They noted that despite significant material and financial injections from international partners, public schools face continuous challenges with overcrowded classrooms. In some documented instances, student-teacher ratios soared past the national policy recommendation of 35:1 to nearly 200:1 due to poor spatial tracking and deployment policies.

Teachers also demonstrate a strong resistance to rural deployments due to inadequate rural infrastructure, safety anxieties, and a lack of basic socio-amenities in outlying areas. Usman and Muhammad (2025) note that the availability of adequate institutional resources serves as a vital management motivation strategy that directly governs teacher job performance and retention. When schools in peripheral sectors lack basic instructional tools, teacher attrition increases, which leads to severe under-staffing in rural communities.

Consequently, modern educational planners increasingly call for the institutionalization of school mapping protocols. By integrating geographic information systems (GIS) and macro-demographic data, school mapping allows administrative bodies to identify zones of infrastructural deficit, track real-time teacher-student ratios, and transition from politically motivated distribution patterns to an equitable, data-backed approach (Bello, 2020; Ibrahim, 2025). This study addresses these issues by providing a localized, empirical analysis of these spatial dynamics within Dutsin-Ma LGA.

## Methodology

This study adopted a descriptive survey research design to collect objective data regarding the spatial layout and resource characteristics of the target institutions. The target population consisted of all school principals and public senior secondary school teachers under the Katsina Zonal Education Quality Assurance framework stationed within Dutsin-Ma LGA. A sample of 180 respondents (including 12 principals and 168 senior secondary school teachers) was selected using a proportionate stratified random sampling technique. Stratification was based on the geographic location of the

institutions (Urban = 5 schools; Rural = 7 schools) across the distinct communities of Dutsin-Ma LGA to ensure fair representation (Atalabi et al., 2017).

Data collection relied on two distinct, researcher-developed instruments. School Spatial Mapping Checklist (SSMC), An inventory tool used to document the physical counts of classrooms, science laboratories, and library facilities relative to total student enrollment. Educational Resource Distribution Questionnaire (ERDQ), A 15-item instrument structured on a 4-point Likert scale (Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1) designed to gather perceptions on personnel distribution equity and geographic accessibility mapping. The instruments were face and content validated by two experts from the Faculty of Education, Umaru Musa Yar'adua University, Katsina. To establish reliability, the instruments were pilot-tested on a small cohort of secondary school teachers in the adjacent Rimi Education Zone. An internal consistency reliability coefficient of 0.81 was obtained using Cronbach's alpha, confirming the instruments' suitability for empirical field administration. Descriptive statistics specifically arithmetic mean and standard deviation were used to answer the research questions. A mean threshold of 2.50 served as the baseline decision point for the Likert scale items. The null hypotheses were tested using inferential statistical tools: Independent Samples t-test and Pearson Product-Moment Correlation (PPMC). All computations were run via SPSS Version 26.0 at a 0.05 significance level.

## Results

Research Question 1: What is the status of the spatial distribution of physical infrastructural resources across public senior secondary schools in urban and rural areas of Dutsin-Ma LGA?

To answer Research Question 1, physical asset data collected via the SSMC checklist was aggregated alongside descriptive items from the ERDQ. The descriptive analysis detailing infrastructural adequacy across the rural-urban divide is presented below.

Location Category	Number of Schools Surveyed	Total Classrooms Available	Average Student-Classroom Ratio	Functional Laboratories Available	Functional Libraries Available	Status Assessment
Urban Schools	5	84	48:1	12	4	Moderately Adequate
Rural Schools	7	62	82:1	3	1	Severely Inadequate

The descriptive configuration clearly indicates a stark imbalance in the spatial distribution of physical assets. Urban secondary institutions within Dutsin-Ma LGA possess a higher volume of structural facilities, maintaining an average student-to-classroom ratio of 48:1. Conversely, rural secondary schools show severe structural congestion, with the average student-to-classroom ratio climbing to 82:1. Furthermore, functional science laboratories and school libraries are heavily concentrated within the urbanized center of the LGA, while rural institutions operate with virtually non-existent or unequipped facilities.

Research Question 2: What is the nature of the relationship between school location mapping indices and the allocation of human resources within public senior secondary schools in Dutsin-Ma LGA?

To address this question, responses regarding spatial accessibility mapping (distance from the urban center, accessibility of roads) were cross-tabulated against indices of human resource deployment (the concentration of qualified, subject-specific teachers).

S/N	Human Resource Allocation Perceptions	Mean (X̄)	SD	Decisional Remark
1.	Qualified core subject teachers prefer urban school postings within the LGA due to spatial accessibility.	3.42	0.68	Agree
2.	Rural public senior secondary schools face continuous under-staffing in key science and mathematics fields.	3.28	0.71	Agree
3.	The current deployment policy of the education board utilizes GIS spatial mapping to distribute personnel equitably.	1.84	0.92	Disagree
4.	Schools located closer to major transport routes attract and retain higher numbers of non-teaching support staff.	3.06	0.79	Agree
Pooled Weighted Metrics		2.90	0.78	Agree

The pooled weighted mean of 2.90 indicates that respondents strongly agree that school location mapping parameters dictate the distribution of human resources within the LGA. The data reveals a systemic concentration of qualified personnel within highly accessible urban centers, whereas peripheral locations experience severe deficits in specialized instructional staff.

#### Testing of Hypotheses

Hypothesis One: There is no significant difference in the spatial distribution of physical infrastructural resources between urban and rural public senior secondary schools in Dutsin-Ma LGA. An Independent Samples t-test was conducted to compare infrastructural asset distribution scores between urban and rural cohorts. The statistical output is structured in the table below:

Location Cohort	N	Mean (X̄)	SD	Df	t-value	p-value	Decision
Urban Schools	78	24.85	3.62	178	5.84	0.001	Reject
Rural Schools	102	16.12	4.18				(Significant)

t-test analysis indicates that the calculated t-value is 5.84, with an associated p-value of 0.001. Because the p-value is less than the designated significance level, the null hypothesis is rejected. This indicates a statistically significant difference in the spatial distribution of physical infrastructure. Urban schools maintain a significantly higher volume of functional structural resources than their rural counterparts.

Hypothesis Two: There is no significant relationship between school location mapping indices and the allocation of human resources within public senior secondary schools in Dutsin-Ma LGA.

Pearson Product-Moment Correlation analysis was applied to determine the statistical relationship between spatial mapping indices (distance/accessibility scores) and human resource allocation metrics.

Statistical Variables Crossed	N	Correlation Coefficient (r)	p-value	Decision
School Location Mapping Indices vs. Human	180	0.642*	0.000	Reject

## Resource Allocation

---

Correlation is significant at the 0.01 level

The correlation analysis reveals a strong positive coefficient ( $r = 0.642$ ) between school location mapping indices and human resource allocation. The p-value of 0.000 is lower than the Alpha threshold ( $p < 0.05$ ), resulting in the rejection of the null hypothesis. This statistical outcome proves that geographic positioning and school mapping accessibility metrics heavily influence the deployment and concentration of qualified teachers within Dutsin-Ma LGA.

### Discussion of Findings

The empirical results of this investigation reveal significant spatial inequities in resource distribution across public secondary education in Dutsin-Ma LGA. The rejection of the first null hypothesis proves that physical infrastructure is unevenly distributed across the rural-urban divide. Urban schools enjoy relatively stable infrastructural conditions, whereas rural secondary schools suffer from overcrowded classrooms ( $X = 82$  students per room) and unequipped science laboratories. This outcome aligns with the observations of Danzaria (2017) regarding the Katsina Education Zone, which found that essential teaching support facilities are disproportionately located within central urban communities. This structural pattern leaves remote schools in a state of infrastructural deficit, directly hindering effective implementation of the senior secondary curriculum.

The rejection of the second null hypothesis 0.2 highlights a strong relationship between spatial location indices and human resource distribution ( $r = 0.642$ ). This means that the geographic placement of a school dictates its capacity to attract and retain qualified subject instructors. Teachers display a strong preference for highly accessible urban schools over remote institutions. This confirms the assertions of Usman and Muhammad (2025), who noted that school resource adequacy and favorable environmental conditions serve as key motivational drivers for educational personnel. Without objective spatial data mapping from the State Post-Primary Schools Management Board, human capital allocation remains vulnerable to individual preferences and administrative biases, leaving rural students at a severe educational disadvantage (Aliyu Said & Garba, 2024).

### Conclusion

This study demonstrates that the spatial layout of public senior secondary schools in Dutsin-Ma LGA, Katsina State, displays significant structural imbalances. The allocation of both physical infrastructure and human capital heavily favors urban settings, leaving rural institutions under-resourced and overcrowded. The current distribution framework does not utilize objective school mapping indices, which perpetuates an inequitable system that undermines uniform educational development.

### Recommendation

To establish a more balanced and effective public secondary school framework, the following actions are recommended:

The Katsina State Ministry of Education, in partnership with the Zonal Quality Assurance Centre, should transition from traditional allocation models to Geographic Information System (GIS) mapping. This will allow authorities to monitor institutional needs and track demographic densities accurately before distributing infrastructural interventions.

To address the severe human resource deficit in peripheral areas, the state government should implement a specialized rural deployment allowance. Providing financial incentives and structural

welfare support will encourage qualified science, technology, and mathematics teachers to accept and remain in rural postings.

Educational policymakers should prioritize rural schools for capital development budgets. Immediate interventions are needed to construct additional classrooms, equip unfunctional laboratories, and establish operational libraries, thereby reducing high student-to-classroom ratios in outlying communities.

### References

Aliyu Said, Y., & Garba, G. (2024). Bridging gaps in educational development: Investigating the impact of NGOs on secondary education in Katsina State. *International Journal of Management Studies and Social Science Research*, 6(1), 100–113.

Atalabi, T. E., Adubi, T. O., & Lawal, U. (2017). Rapid mapping of urinary schistosomiasis: An appraisal of the diagnostic efficacy of some questionnaire-based indices among high school students in Katsina State, northwestern Nigeria. *PLOS Neglected Tropical Diseases*, 11(4), e0005518. <https://doi.org/10.1371/journal.pntd.0005518>

Bello, S. (2020). Mechanisms for effective planning and organization of resources in secondary school administration. *Cenresin Journal of Educational Research*, 22(1), 16–26.

Busa, A. Muktar, S. (2025). Intelligent Decision Support Systems (IDSS) For Strategic Educational Resource Allocation in Public Secondary Schools in The Central Geopolitical Zone of Nigeria. *Algerian Journal of Psychological and Educational Research*, 1(3) 125-138

Danzaria, N. (2017). Curriculum implementation through availability and utilization of school libraries: Implications for corruption-free secondary education in Katsina Education Zone, Katsina State. *Nigerian Journal of Climate Studies*, 27(1), 138–145.

Hussaini, K. (2020). Spatial imbalances and academic disparities in northern Nigerian public secondary school systems. *Journal of Educational Trends and Practice*, 4(2), 89–101.

Ibrahim, T. A. (2025). Teachers' perception on the implementation of upper basic education curriculum frameworks in Rimi Education Zone, Katsina State, Nigeria. *International Journal of Educational Assessment*, 7(2), 204–215.

Usman, M., & Muhammad, D. (2025). School resources as management motivation strategies on teacher's job performance in secondary schools in Katsina Zonal Education Quality Assurance Katsina State, Nigeria. *UMYU Journal of Educational Research*, 13(1), 41–47. <https://doi.org/10.70886/ujer.25131.007>