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Determinants of Sub-Optimal Academic Achievement in Agricultural Science: Disparities between Northern and Southern Zones of Kaduna State, Nigeria

Martin Royal Okechukwu Onwunali, Ahmed Adebayo Omodara, Paul Dogo, Daniel Ayeni

Department of Agricultural Education, Faculty of Vocational and Technical Education, Federal University of Education, Zaria, Nigeria
Email: martinroyal2002@yahoo.com

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Abstract

The study examined the systemic determinants of poor academic performance in Agricultural Science among senior secondary school students in Kaduna State, Nigeria, with emphasis on regional disparities between the Northern (Zone 1) and Southern (Zone 3) Senatorial Zones. A descriptive survey design was adopted, involving 400 students and teachers from 40 purposively selected schools, 20 in each zone. Data were collected on environmental, teacher-related, parental, and student-related factors and analyzed using mean scores, standard deviations, and t-tests ($p \leq 0.05$). Results showed that Zone 3 consistently recorded higher mean scores and lower standard deviations across all variables, indicating both greater severity and stronger consensus regarding the challenges experienced. Environmental constraints included dilapidated school infrastructure, lack of functional laboratories, and limited access to conducive learning spaces. Teacher-related challenges comprised insufficient pedagogical competence, weak lesson planning, and the deployment of unqualified teachers from non-agricultural disciplines. Parental factors, notably low involvement in schooling, inadequate academic support at home, and negative disciplinary practices, were found to diminish students' motivation and engagement. Student-related issues such as absenteeism, inadequate examination preparation, social media distractions, and adverse peer influence further exacerbated low achievement. The t-test values of 13.68, 12.64, 14.42 and 17.93 for environment, teacher, parent, and students' constraints revealed significant differences ($p \leq 0.05$) between the two zones, with Zone 3 being more adversely affected. The study therefore rejects the null hypotheses and concludes that location-based factors substantially shape academic outcomes in Agricultural Science. It recommends

context-specific interventions, including infrastructure improvement, teacher capacity building, parental sensitization, and student-centered guidance services to promote more equitable learning outcomes.

Keywords

Academic Performance, Agricultural Science Education, Regional Disparities, Systemic Factors, Teacher Effectiveness, Kaduna State, Nigeria

1. Introduction

Student academic performance in Nigeria, particularly in Kaduna State, remains a critical concern due to its far-reaching effects on regional development and socioeconomic advancement. Recent data highlight persistent under-performance in national examinations such as the West African Examinations Council (WAEC), National Examinations Council (NECO), and Joint Admissions and Matriculation Board (JAMB) tests, with notable disparities between Kaduna State's Southern and Northern senatorial zones. This underachievement stems from a complex interplay of factors, including school infrastructure, teacher quality, socioeconomic conditions, home environments, and systemic issues (Onwunali & Muhammad, 2025). Contextual analysis within Kaduna State's senatorial districts is essential to unpack these influences effectively.

Research consistently shows that inadequate school facilities and learning environments hinder academic success. In Kaduna State, substandard classrooms, outdated instructional materials, and poor ventilation have been strongly linked to student poor performance. The availability of libraries, laboratories, and other resources directly shapes teaching effectiveness and, in turn, student outcomes (Omodara et al., 2024).

Teacher competence, subject expertise, and pedagogical skills are equally vital. Studies in Kaduna State point to shortages of qualified educators, weak classroom management, and limited professional development as key contributors to poor results (Onwunali & Muhammad, 2025). While teacher training and digital evaluation methods, such as computer-based testing preparation, have yielded modest gains in the Southern zones (Punch NG, 2024), uneven teaching quality persists, especially in rural areas staffed by under qualified personnel.

Socioeconomic divides between the zones exacerbate these challenges. In the Northern zones, elevated poverty, family disruptions, and parental illiteracy restrict access to learning resources and erode student motivation (Chindo, 2015; Fakolade et al., 2025). Cultural elements, including parental views on education and early marriage practices, further disadvantage female students (Chindo, 2015; Onwunali et al., 2022).

Student-internal factors, such as health issues, low motivation, anxiety, negative attitude and disinterest, compound the problem. Low self-efficacy, absenteeism,

and behavioral challenges often lead to sub-optimal performance, worsened by limited English proficiency as the medium of instruction (Chindo, 2015; Fakolade et al., 2025). The high prevalence of out-of-school children, especially in the North, undermines educational equity across Kaduna State (The Guardian NG, 2024). Despite government efforts to improve access, infrastructure, and digital literacy, gaps in teacher deployment, monitoring, and policy execution remain (The Guardian NG, 2024). Proposed solutions include prioritizing teacher recruitment and training, upgrading school facilities and materials, promoting digital literacy and examination readiness, enforcing policies to curb out-of-school children and gender disparities, and strengthening supervision and management.

1.1. Statement of the Problem

Poor student performance in agricultural science across Kaduna State's Southern and Northern senatorial zones arises from interconnected factors, including school quality, teacher effectiveness, socioeconomic contexts, home backgrounds, and systemic barriers. While some issues span both zones, the Northern zone grapples with more acute challenges in educational access, security, and gender inclusion, probably due to parental illiteracy, culture and religion, particularly in Zaria Local Government Area (Onwunali et al., 2022). Although evidence of location specific reports is available, there has not been comparative work done between the two important zones in Kaduna State. Governmental and community initiatives address these to varying degrees of success. This study therefore seeks to identify the causes of poor performance in agricultural science in these zones.

Interventions by stakeholders and school managers are designed without context-specific evidence on whether the most critical reasons lie in the environment, teachers, parents, or students, resulting in fragmented or unsustainable efforts. By systematically identifying and analysing these constraints, and by capturing teachers' and students' perceptions, this study provides grounded, actionable evidence. Such evidence can guide state and local governments, school administrators, and development partners in prioritizing and sequencing interventions that can genuinely strengthen performance in Agricultural Science for secondary school students in Kaduna State.

1.2. Specific Objectives

The study pursues the following objectives:

1) To identify environmental factors associated with poor student performance in agricultural science.

2) To assess teacher attributes influencing poor student performance in agricultural science.

3) To determine parental factors linked to poor student performance in agricultural science.

4) To evaluate student attitudes associated with poor performance in agricultural science.

1.3. Research Questions

The study is guided by these research questions:

1) What environmental factors contribute to poor student performance in agricultural science in the Northern and Southern senatorial zones?

2) What teacher factors lead to poor student performance in agricultural science in the Northern and Southern senatorial zones?

3) What parental attributes and influences are associated with poor student performance in agricultural science in the Northern and Southern senatorial zones?

4) What student attitudes impede performance in agricultural science in the Northern and Southern senatorial zones?

1.4. Research Hypotheses

The study tests the following null hypotheses at $p \leq 0.05$:

1) There is no significant difference in the influence of environmental factors on poor performance in agricultural science between the Northern and Southern senatorial zones of Kaduna State.

2) There is no significant difference in teaching factors influencing poor student performance in agricultural science between the Northern and Southern senatorial zones of Kaduna State.

3) There is no significant difference in parental factors affecting poor student performance in agricultural science between the Northern and Southern senatorial zones of Kaduna State.

4) There is no significant difference in student attitudes related to poor performance in agricultural science between the Northern and Southern senatorial zones of Kaduna State.

2. Materials and Method

2.1. Study Area

This study was conducted in Kaduna State, located in the North-West geopolitical zone of Nigeria. Geographically, the state lies between latitudes 9˚02'N and 11˚32'N and longitudes 6˚15'E and 8˚50'E**,** covering an area of approximately 46,053 km**²** (NPC, 2006). Administratively, Kaduna State is divided into three senatorial zones: Northern, Central and Southern. The present study focused on the Northern Senatorial Zone (Zone 1) and the Southern Senatorial Zone (Zone 3). Zone 1 comprises Local Government Areas (LGAs) such as Zaria, Sabon Gari, Kudan, Soba, Makarfi, Kubau and Ikara. It is predominantly inhabited by Hausa and Fulani ethnic groups and is characterized by extensive agricultural activities and major educational institutions, including Ahmadu Bello University, Zaria (Kaduna State Government, 2020). Zone 3 includes LGAs such as Jaba, Jema'a, Kagarko, Kaura, Kachia, Sanga and Zangon Kataf. The zone has a diverse ethnic composition, is largely agrarian, and contains important urban centers such as Kafanchan (Adeyemi & Ojo, 2019).

2.2. Experimental Procedure

A descriptive survey design was adopted to investigate factors associated with poor academic performance in Agricultural Science. The target population comprised all senior secondary school students in Kaduna State. The accessible population consisted of 400, comprising of teachers and senior secondary students (SS 11 and 111), drawn from 40 public senior secondary schools located in Zones 1 and 3. Out of the 40 schools, 20 were purposively selected to ensure feasibility and balanced geographical representation across the North, South, East, West, and Central parts of the zones. Field observations confirmed one agricultural science teacher per school, so all 40 teachers (20 per zone) participated in the study. Likewise, 360 students at 180 per zone and nine students per school, were randomly selected from senior classes, as they demonstrated the ability to read, interpret the instrument, and comprehend its more challenging items.

Data were collected using a structured questionnaire developed on a 5-point Likert scale with response options: Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D) and Strongly Disagree (SD), assigned values of 5, 4, 3, 2 and 1, respectively. The instrument captured environmental, teacher-related, parental and student-related factors presumed to influence academic performance.

Content validity was established through expert review by specialists in agricultural education and educational measurement. The questionnaire was pilot tested with a sample of students outside the main study area. Reliability analysis using Cronbach's alpha yielded a coefficient of 0.858, indicating good internal consistency. Questionnaires were administered in person by the first author's students with support from trained research assistants. Participation was voluntary, and respondents were assured of anonymity and confidentiality.

Descriptive statistics (frequencies, percentages, means) and standard deviations were used to summarize the data. To quantify the contribution of each factor domain to poor academic performance, mathematical technique was used to compute the means for environmental, teacher-related, parental and student-related factors following Onwunali et al. (2024). Standard deviation values were examined to assess the level of consensus among respondents. Low standard deviation (<0.49) indicated strong agreement regarding the importance of a factor, whereas high standard deviation (≥0.5) suggested heterogeneous opinions and relatively lower perceived importance. A mean score threshold of ≥3.0 was used to classify factors as significant.

All statistical analyses were performed using IBM SPSS Statistics, version 23 (IBM Corp., Armonk, NY, USA). Independent-samples t-tests were used to test hypotheses on differences between zones at a significance level of $p \leq 0.05$.

3. Results and Discussion

Results in **Table 1** indicate that the 27 environmental factors collectively contributed substantially to students' low achievement in Agricultural Science, with grand means of 3.29 (Zone 1) and 4.14 (Zone 3), respectively. These values showed

that respondents in both zones generally agreed that environmental conditions negatively influenced performance, with the magnitude of concern higher in Zone 3. The relatively small standard deviations (0.23 in Zone 1; 0.09 in Zone 3) further suggest a strong consensus among respondents regarding the adverse role of these factors in both contexts.

Table 1. Environmental factors responsible for students' poor performance in Agricultural Science.

		Zone 1		Zone 3	
S/N	Environmental Factors	$\overline{x}$	S^2	$\overline{x}$	S^2
1	Inadequate School Infrastructure classrooms.	3.97	1.27	4.24	1.00
2	Absence of well-equipped laboratories for practical subjects.	3.65	1.19	4.21	0.99
3	Absence of quiet, resourceful spaces for studying and research.	3.93	1.05	3.98	1.13
4	Poor ventilation through doors and windows	3.39	1.31	3.92	1.24
5	Long distance to school.	3.42	1.33	3.87	1.32
6	Inadequate school farms or practical tools learning.	3.62	1.30	3.96	1.25
7	Lack of computers, internet access, or multimedia tools for modern learning.	3.63	1.19	3.91	1.30
8	Unstable power supply causing hindrance to the use of ICT tools	3.54	1.20	4.00	1.15
9	Inadequate facilities and damage like broken furniture and leaking roofs	3.72	1.18	3.97	1.24
10	Insecure school environment	3.49	1.19	3.99	1.23
11	Ineffective school administration and policies leading to poor organization	3.55	1.19	3.98	1.14
12	Disruptions from noisy surroundings or other activities near the school premises.	3.51	1.22	4.01	1.16
13	Inadequate sports facilities	3.48	1.25	4.02	1.23
14	Lack of a quiet study space at home makes it hard for students to focus.	3.58	1.30	4.12	1.11
15	Inadequate access to books and internet, etc., at home	3.56	1.19	4.11	1.07
16	Parents are unable to assist with homework or academic activities.	3.53	1.22	4.11	1.00
17	No dedicated area for studying at home.	3.24	1.39	3.88	1.22
18	Too many people in the house are making it difficult for students to concentrate.	3.53	1.22	4.09	1.12
19	Students are burdened with caring for younger siblings, leaving little time for studies.	3.47	1.19	4.03	1.12
20	One or both parents being absent, leading to lack of guidance and support.	3.33	1.28	4.04	1.12
21	Frequent relocation or homelessness disrupts education.	3.43	1.25	3.88	1.21
22	Traditional or cultural practices like early marriages	3.39	1.28	3.99	1.17
23	Students are forced to work to support the family, reducing study time.	3.34	1.36	4.13	1.10

Continued

24	Inadequate meals leading to malnutrition and low energy levels for learning	3.31	1.31	4.16	1.07
25	Substance Abuse in the Family: Exposure to alcohol or drug abuse affecting emotional and psychological health.	3.44	1.30	4.11	1.16
26	Excessive domestic responsibility	3.24	1.28	4.11	1.11
27	Peers or neighbors influencing negatively like smoking & drugs	3.26	1.47	4.12	1.20
	Grand Mean	3.29 ± 0.23		4.14 ± 0.09	

t-value = 13.68 > 0.05**, df = 52, Criti. value. = 2.007, $\bar{x}$ = mean, zone 1 = northern senatorial zone, zone 3 = southern senatorial zone of Kaduna State.

In Zone 1, inadequate school infrastructure and classrooms (mean = 3.97) and the absence of quiet, resourceful spaces for studying and research (mean = 3.93) ranked highest, underscoring how overcrowded, poorly maintained, and academically unconducive and unstimulating school environments can undermine sustained engagement and effective learning. In Zone 3, inadequate school infrastructure and classrooms (mean = 4.24) and the absence of well-equipped laboratories for practical subjects (mean = 4.21) were the dominant constraints, highlighting how weak support for practical, hands-on agricultural learning limits skill acquisition and application.

The inferential statistics reinforce these descriptive trends. The reported value of 13.68, in relation to a probability level set at $p > 0.05$, indicates a statistically significant difference between the two zones in the perceived influence of environmental factors on students' poor performance, leading to the rejection of the null hypothesis of no significant difference. In practical terms, this result implies that environmental constraints, particularly those associated with infrastructural decay and adverse home conditions, are significantly more pronounced and thus more detrimental to learning outcomes in Zone 3 than in Zone 1.

Results in Table 2 show that, overall, the 18 teacher-related factors were rated high as contributors to students' poor performance in Agricultural Science, with grand mean scores of 3.30 in Zone 1 and 4.07 in Zone 3, respectively. The relatively low standard deviations (0.24 for Zone 1 and 0.096 for Zone 3) indicate a strong consensus among students and teachers that these factors substantially hinder academic achievement, even though the magnitude of the means varied across items and zones. Improper teaching methods and poor communication of concepts emerged as the most critical teacher factors in both zones. In Zone 1, "use of improper teaching methods and strategies" and "poor communication skills on concepts and clarity" recorded mean scores of 4.04 and 3.57, while in Zone 3 the corresponding means were even higher at 4.20 and 4.18, respectively, underscoring their dominant influence on students' poor performance.

Across the remaining items, Zone 3 consistently recorded higher mean ratings than Zone 1 on factors such as limited subject-matter knowledge (4.11 vs. 3.55), inadequate student motivation (4.07 vs. 3.50), frequent missing of classes (4.19 vs.

3.19), poor teacher–student relationships (4.04 vs. 3.26), poor ICT integration (4.07 vs. 3.26), and non-utilization of instructional materials (4.05 vs. 3.22).

Table 2. Teacher factors responsible for poor student performance in Agricultural Science.

		Zone 1		Zone 3	
S/N	Teachers' Factors	$\bar{x}$	S^2	$\bar{x}$	S^2
1	Use of improper teaching methods and strategies	4.04	1.18	4.20	1.06
2	Poor communication skills on concepts and clarity.	3.57	1.21	4.18	1.06
3	Limited knowledge of the subject matter.	3.55	1.15	4.11	1.11
4	Inadequate students' motivation	3.50	1.19	4.07	1.16
5	Inadequate classroom management	3.34	1.29	4.08	1.15
6	I frequently miss classes.	3.19	1.33	4.19	1.14
7	Poor teacher-student relationships	3.26	1.11	4.04	1.09
8	Inability to understand the diverse individual needs	3.33	1.18	4.13	1.10
9	Entering the classroom without proper lesson planning.	3.29	1.26	4.13	1.10
10	Poor knowledge of ICT resources in teaching.	3.26	1.21	4.07	1.09
11	Poor teachers' upgrading and updating of knowledge.	3.20	1.27	3.85	1.22
12	Inadequate evaluation style and systems.	3.08	1.30	3.87	1.18
13	Teachers' insincerity in assessing students' performance.	3.22	1.23	4.04	1.10
14	Failure to foster a supportive environment.	3.19	1.27	3.97	1.12
15	Ignoring feedback from students that could help improve teaching effectiveness.	3.21	1.26	4.18	1.13
16	Non utilization of instructional material in teaching.	3.22	1.33	4.05	1.11
17	Lack of teacher interest in the job.	3.16	1.25	4.07	1.13
18	Teacher incompetence.	2.85	1.47	4.03	1.25
	Grand Mean	3.30 ± 0.24		4.07 ± 0.096	

t-value = 12.64 > 0.05*, df = 34, crit. value. = 2.032, $\bar{x}$ = mean, zone 1 = northern senatorial zone, zone 3 = southern senatorial zone of Kaduna State.

The inferential results support these descriptive patterns. The computed t value of 12.64 exceeded the critical value at the $p > 0.05$ level of significance, indicating a statistically significant difference in the contribution of teacher factors to students' poor performance between Zone 1 and Zone 3. This implies that teacher-related constraints weigh more heavily on student outcomes in Zone 3 than in Zone 1, suggesting a location effect on teaching quality and effectiveness in Agricultural Science. Consequently, the null hypothesis that there is no significant difference in teacher factors between the two zones was rejected.

Results in Table 3 indicated that parental factors were rated as important contributors to students' poor academic achievement in Agricultural Science in both zones, with grand mean scores of 3.29 in Zone 1 and 4.14 in Zone 3. The relatively low standard deviations (0.23 for Zone 1 and 0.098 for Zone 3) suggested a high level of agreement among respondents that the 18 identified parental factors ad-

versely affect achievement, with the problem perceived as more acute in Zone 3. Results also showed that, across both zones, the most critical parental constraints were parents' limited interest in their children's studies, failure to assist with homework, and negative influence on children's study and career choices. In Zone 1, parents' lack of interest in children's studies (mean = 3.88) and failure to help with homework or assignments (mean = 3.50) were especially prominent, whereas in Zone 3, parental lack of interest in studies (mean = 4.37) and undue influence on children's study career (mean = 4.27) emerged as the dominant barriers. These results evidently implied that both emotional support (interest, encouragement) and instructional support (homework assistance, provision of learning resources) are central to students' success in Agricultural Science.

Table 3. Parental factors that cause poor student performance in Agricultural Science.

		Zone 1		Zone 3	
S/N	Parental Factors	$\bar{x}$	S^2	$\bar{x}$	S^2
1	Parent showing little interest in their Child's studies.	3.88	1.35	4.37	1.00
2	High performance without considering the child's abilities.	3.37	1.22	4.15	0.99
3	Not helping with homework/assignment.	3.50	1.26	4.16	1.14
4	Lack of learning resources at home.	3.48	1.24	4.11	1.13
5	Avoiding teachers-parent interaction.	3.30	1.32	4.06	1.16
6	Condemning and punishing rather than encouraging learning effort.	3.43	1.18	4.22	1.13
7	Influencing children's study career.	3.34	1.23	4.27	1.03
8	Lateness/Failure to pay school fees.	3.27	1.22	4.14	1.18
9	Allowing excess time for children's curricular activities at home (TV, games social media etc)	3.34	1.16	4.14	1.16
10	Poor/lack of education of parents	3.14	1.34	4.06	1.18
11	Frequent family conflicts and divorce.	3.08	1.32	3.88	1.35
12	Shielding children from living independent life	2.87	1.44	4.09	1.09
13	Poor motivation of efforts or achievements of the children	3.58	1.40	4.15	1.04
14	Allowing children to skip school is unnecessary.	2.98	1.17	4.19	1.25
15	Prioritizing education for one child over another based on traditions or gender roles.	3.31	1.29	4.11	1.18
16	Poor parental attention to children's educational needs due their work	3.12	1.38	4.19	1.09
17	Failure to recognize and address learning disabilities, which leads to struggles in school.	3.16	1.37	4.23	1.00
18	Parents discouraging questioning, curiosity or problem solving	3.13	1.37	4.09	1.17
	Grand Mean	3.29 ± 0.23		4.14 ± 0.098	

t-value = 14.42 > 0.05**, df = 34, crit. Value = 2.032, $\bar{x}$ = mean, zone 1 = northern senatorial zone, zone 3 = southern senatorial zone of Kaduna State.

The independent t-test produced a t-value of 14.42 at the $p \leq 0.05$ level, indi-

cating a statistically significant difference in parental factors between the two locations in favour of Zone 3 (Southern Senatorial Zone), where the mean ratings were consistently higher. This result implies that parental practices and home conditions undermining Agricultural Science achievement are more severe or more frequently reported in Zone 3 than in Zone 1, leading to the rejection of the null hypothesis of no significant difference in parental contributions across the two zones.

Table 4. Student factors responsible for their poor performance in Agricultural Science.

		Zone 1		Zone 3	
S/N	Student Factors	$\bar{x}$	S^2	$\bar{x}$	S^2
1	Absenteeism from school	3.84	1.35	4.37	1.04
2	Missing/Irregular class attendance.	3.49	1.27	4.27	1.07
3	Wasting time on other activities instead of studying books	3.53	1.27	4.24	1.03
4	Poor foundation educational background	3.35	1.26	4.20	1.08
5	Negative influence of bad peer group and friends.	3.33	1.38	4.19	1.15
6	Consistent late coming to class.	3.41	1.21	4.14	1.22
7	Difficulty in understanding English language.	3.22	1.31	4.19	1.10
8	Disobedience to school rules and regulations.	3.20	1.32	4.25	1.13
9	Reliability in social media (Facebook, TikTok, WhatsApp etc.).	3.25	1.35	4.09	1.18
10	Drug and substance abuse.	3.12	1.36	4.21	1.20
11	Poor level of preparedness for tests and exams.	3.20	1.35	4.28	0.97
12	Poor/Lack of taking recognized notes during lesson/classes.	3.18	1.35	4.22	1.07
13	Failure to do/summit homework/ assignments.	3.14	1.39	4.20	1.09
14	Distracted mindedness of students during lesson.	3.09	1.24	4.24	1.00
15	Overconfidence: assuming you know enough without reviewing or practicing.	3.23	1.30	4.27	1.05
16	Poor teacher student interaction/ relationship.	3.01	1.37	4.15	1.12
	Grand Mean	3.28 ± 0.20		4.22 ± 0.06	

t-value = 17.93 > 0.05**, df = 30, crit. value. =2.042, $\bar{x}$ = mean, zone 1 = northern senatorial zone, zone 3 = southern senatorial zone of Kaduna State.

Results in Table 4 showed that student-related attributes were rated as important contributors to poor performance in Agricultural Science in both zones, with grand mean scores of 3.28 in Zone 1 and 4.22 in Zone 3. The relatively small standard deviations (0.20 for Zone 1; 0.06 for Zone 3) indicate a high level of consensus among respondents that the 16 identified student factors negatively affect achievement, with the problem perceived as more severe in Zone 3. Generally, absenteeism from school emerged as the most critical student factor, with mean ratings of 3.84 in Zone 1 and 4.37 in Zone 3, followed by behaviours linked to poor

study habits, such as nonchalant attitude to study (3.35) in Zone 1 and poor preparedness for tests and examinations (4.28) in Zone s3. Other highly rated constraints included irregular class attendance, wasting time on non-academic activities, negative peer influence, reliance on social media, and difficulty understanding English, which together point to patterns of disengagement, distraction, and weak academic foundations among students.

The independent t-test yielded a t-value of 17.93 at the $p \leq 0.05$ level, indicating a statistically significant difference in student-related factors between the two zones, with students in Zone 3 reporting higher levels of negative attributes. Consequently, the null hypothesis that there is no significant difference in students' attributes contributing to poor performance between the two locations was rejected, suggesting that the intensity of maladaptive behaviours and poor study practices is greater in the Southern (Zone 3) than in the Northern (Zone 1) senatorial zone.

4. Discussion

Infrastructural constraints emerged as the most critical cluster of determinants across the two zones (Uwimana & Andala, 2020; Hassan, 2024). Infrastructure and several school-level and home-based environmental conditions also exerted considerable negative influence on students' performance (Ekezie, 2020). Factors such as unstable power supply, lack of ICT facilities, insecure school environments, and disruptive noise within or around the school recorded consistently high mean scores in both zones, indicating that learners operate in settings that are not conducive to concentration, motivation, or modern pedagogical approaches. Home-related conditions, such as including lack of quiet study space, limited access to books and internet, excessive domestic responsibilities, economic pressure to work, inadequate meals, and exposure to substance abuse were also rated highly, suggesting that many students face a double burden of disadvantage both at school and at home (Egunsola, 2014; Hamilton-Ekeke & Dorgu, 2014; Elujekwute et al., 2021). The pattern of means shows that although specific factors vary slightly in their ranking across the zones, environmental challenges are more acute in Zone 3, where virtually all items attracted higher mean scores than in Zone 1. The results align with the grand mean difference (3.29 vs. 4.14), indicating that the learning environment in Zone 3 is perceived as more hostile to effective teaching and learning in Agricultural Science. Such disparities may reflect unequal governmental investment, insecurity, differential school governance, or broader socio-economic disadvantages that concentrate infrastructural decay and household stressors in certain locations. The elevated severity of environmental factors in Zone 3 (Southern senatorial zone) compared to Zone 1 (Northern senatorial zone) underscores a critical regional disparity in the challenges impeding Agricultural Science performance among secondary school students in Kaduna State. This reflects compounded pressures from denser rural populations, intensified household dynamics, and socioeconomic vulnerabilities that more acutely disrupt learning en-

vironments in the South. Infrastructure limitations, cultural practices, and nutritional insecurities further exacerbate these barriers, creating a less conducive social environment for academic success.

Although both zones significantly showed high severity in teachers contributing poor academic achievement, Zone 3's higher grand mean for teachers' factors (4.07 ± 0.096 and Zone 1's 3.30 ± 0.24) stems primarily from systemic resource shortages and heavier workloads in Southern Kaduna's peri-urban and rural contexts. These pressures exacerbate improper teaching methods, frequent absences, poor lesson planning, inadequate ICT proficiency, limited subject expertise, and motivational deficits, fostering weaker classroom management, strained student relationships, and unprofessional assessment practices that undermine Agricultural Science instruction more acutely than in the relatively stable Northern zone. These findings align with studies that link ineffective pedagogy, inadequate explanation of concepts, and low use of learner-center strategies to weak outcomes in Agricultural Science (Adeboyejo et al., 2023). Field observations further revealed that shortages of specialists in Agricultural Science teachers had led schools, particularly in Zone 3, to engage teachers from related disciplines such as Geography, Integrated Science, and Biology, which exacerbated gaps in pedagogical content knowledge and practical orientation (Onwunali et al., 2022; Adeboyejo et al., 2023). The low values of standard deviation in both zones confirm the agreement that teacher factors constituted a significant barrier (ENOCH, 2022). These results supported recent evidence that teacher variables, such as qualification, teaching methods, classroom management, and absenteeism are strongly associated with students' achievement in Agricultural Science. They also corroborate findings that teachers' quality and deployment patterns vary across locations, with understaffed or rural zones often experiencing more acute negative effects on students' performance (Zhang et al., 2018; Eluowa et al., 2023).

Parents exhibited greater disinterest in children's studies, neglected homework support, withheld learning resources, avoided teacher interactions, and favoured punishment over encouragement. Career influences, fee payment delays, excessive curricular distractions, low parental education, family conflicts, overprotection, poor motivation, school skipping tolerance, gender biases in prioritization, and discouragement of curiosity further intensified these shortcomings, likely stemming from deeper socioeconomic strains and cultural norms in Zone 3. Reports have shown that, parental involvement and home background strongly shape secondary school students' academic outcomes in Nigeria. For example, Ambali (2018) reported that parents' level of education and provision of educational facilities significantly influenced students' performance in Agricultural Science. Similarly, Nwachukwu et al. (2024) also reported that parental education, home discussions about school, family structure, and parental occupation collectively exerted powerful effects on students' achievement, confirming that home background remains a critical determinant of academic performance. Globally, empirical evidence has shown positive association between parental involvement and academic achieve-

ment across subjects and grade levels, with parental expectations and encouragement often exerting stronger effects than mere homework supervision. However, Musengamana (2023) cautioned that parental pressure, such as overly high expectations, harsh punishment, or controlling attitudes inflict negative or mixed effects on performance, suggesting that the quality and style of involvement matter as much as its frequency. As such, condemnation rather than encouraging learning efforts and prioritizing some children's education over others implied that certain parental behaviours may depress, rather than enhance, students' motivation in Agricultural Science. Contrary to the findings of study, reports have shown that the relationship between parental involvement and achievement is often indirect and mediated by school relationships and student characteristics. For instance, David et al. (2010) reported that adequate quality control in student-teacher relationship diminishes the direct predictive effect of parent involvement on classroom performance. Implying that supportive teacher interactions can buffer or amplify home influences. Furthermore, they were also of the view that age, gender, and socioeconomic status may mediate the impact of parental practices, resulting in different outcomes for different student groups even under similar home conditions.

Students in Zone 3 exhibited more acute behavioural and attitudinal barriers by displaying elevated absenteeism, irregular attendance, time wastage on non-academic pursuits and weak educational foundations. Negative peer influences, consistent lateness, English comprehension difficulties, disobedience, social media addiction, drug abuse, examination unpreparedness, poor notetaking also influenced their performance. Field experience equally showed that negligence to homework, classroom distractions, overconfidence, and strained teacher interactions intensified by Zone 3's socioeconomic pressures and cultural dynamics increased the challenges. These findings align with Nigerian and African studies that identify absenteeism, truancy, poor attitude, and weak study habits as major predictors of low achievement in Agricultural Science and related subjects. For instance, studies on mass failure in Agricultural Science have shown that truancy, poor reading habits, lack of concentration, and negative attitudes to the subject significantly contributed to students' poor performance (Onwunali et al., 2022). Similarly, research on truancy in Nigerian secondary schools has documented that irregular attendance and internal truancy (skipping lessons, evading assignments) are closely linked to declining academic outcomes and increased risk of examination failure (Okafor et al., 2025; Samphina Academy, 2025). Evidence on study habits further supports the emphasis on poor preparation for tests and examinations, showing that time allocation to study, homework completion, reading and note-taking, and test-taking strategies are significant predictors of science achievement. Ola & Morakinyo (2010) demonstrate that strengthening students' time management, consistent class attendance, and test-preparation routines can yield meaningful gains in achievement, especially in resource-constrained settings. Implying that students' behaviours such as attendance, engagement, and discipline are very crucial in improving performance in Agricultural Science.

However, it has been argued that student misbehaviour and poor study habits often reflect deeper structural constraints, such as inadequate school facilities, ineffective teaching, and weak guidance and counselling services (Onwunali et al., 2022). Implying that, high rates of absenteeism and disengagement may be symptoms of broader systemic problems rather than purely individual failings, and suggesting that interventions should combine student-focused strategies such as study skills, counselling, and behavioral support, with improvements in school quality and learning environments (Project Reserve, 2023)

5. Conclusion

The study revealed that multiple interrelated environmental, teacher-related, parental, and student-specific factors significantly contributed to the poor performance of students in Agricultural Science across the two zones of Kaduna State. While these factors were present in both zones, their impact was more pronounced in Zone 3 (southern senatorial zone), as evidenced by higher mean scores and statistically significant differences. The findings revealed infrastructural decay, ineffective teaching practices, parental disengagement, and student indiscipline as the dominant contributors to poor performance. The rejection of the null hypotheses across the study implied the need for targeted interventions tailored to the unique challenges of each zone.

6. Recommendations

1) There is a need for government and school management to engage in environmental reform through rehabilitation of school infrastructure. This can be achieved via renovation of damaged classrooms, libraries, and laboratories to ensure availability of essential learning tools. Furthermore, access to ICT facilities through the provision of solar powered electricity, internet connectivity, and multimedia devices should be enabled to modernize instruction. There should also be needed to establish quiet learning spaces by setting up community study hubs for students lacking conducive environments at home.

2) There is also a need to prioritize hiring Agricultural Science specialists through the recruitment of qualified teachers rather than reassigning teachers from unrelated fields. Continuous capacity building through regular training on pedagogical skills, lesson planning, ICT integration, and differentiated learning is necessary for upgrading teachers, while implementing teachers' evaluation models to monitor lesson delivery, absenteeism, and professional conduct is imperative.

3) Community sensitization through educating parents on the importance of active involvement in their children's education, as well as schools' parent partnership initiatives, will go a long way in solving negative parental influence on students' performance and promoting consistent communication via parent-teacher forums, open days, and feedback systems. Parents, through support services like workshops that focus on academic encouragement, career guidance, and emotional support, are a *sine qua non* for improved performance.

4) The government should also encourage attendance by providing student-centered interventions, such as the use of digital check-in systems to reduce absenteeism and track engagement. There is also a need for academic enrichment programs for students by launching after-school clubs and mentorship schemes. Such a programme improves students' behaviour and provides emotional support. Provision of school-based counseling and peer mentorship will also mitigate drug abuse, peer pressure, and poor study habits, and subsequently enhance performance.

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Ethical Considerations

Ethical clearance was obtained from the relevant educational authorities in Kaduna State prior to data collection. Informed consent was obtained from all participating students; for minors, consent was provided through school authorities in line with institutional and state guidelines.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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