



## Analysis of Students' Performances in Mathematics in West-African Senior School Certificate Examinations in North-West Geo-Political Zone, Nigeria (2016 - 2020)

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### Abstract

*The study analysed students' performances in Mathematics in West-African Senior School Certificate Examinations in North-West Geo-Political Zone, Nigeria from 2016-2020. The study was carried out with three objectives which were to analyse the academic performances in Mathematics between male and female secondary schools, compare the students' academic performances in Mathematics between private and public secondary schools and examine the students' academic performances in Mathematics between urban and rural secondary schools. Also, three hypotheses were formulated which are: there is no significant relationship in the academic performances between male and female secondary school students in Mathematics, there is no significant relationship in the academic performances between private and public secondary school students in Mathematics and there is no significant relationship in the academic performances between urban rural secondary school students in Mathematics. The three hypotheses were tested at 0.05 significance level. The population of the study was 1,264, 436. A sample size of 18,571 students comprising 10,649 male students and 7,922 female students SSCE results from seven private and public secondary schools purposively selected was used for analysis. The study adopted ex-post facto research design. An instrument titled Senior Secondary Students Academic Performance Inventory (SSSAPI) used for the study was pilot-tested and reliability coefficient was determined using Cronbach Alpha technique which revealed a reliability index of 0.78. The data collected was analysed using percentages and chi-square statistics. The three hypotheses were retained. The finding shows significant relationship existed in the performances in Mathematics between male and female students, private and public and urban and rural schools in WASSCE in North-West Geo-Political Zone, Nigeria. It was recommended among others the ministry of education in the seven states should develop policies and strategies such as provision of textbooks, facilities and regular visit to the schools in order to monitor performance standards. In addition, state ministry of education should employ qualified teachers and sponsor them to attend seminars and workshops in Mathematics so as to remove the misconception that this subject is difficult.*

### 1.1 Introduction

Education, which is the fundamental instrument for development in all countries, is not fulfilling the objective set down in the National Policy on Education. These objectives include, the inculcation of national consciousness and unity; the inculcation of the right type of values and attitudes for the survival of the individual and Nigeria society; the training of the mind in the understanding of the world around; and acquisition of appropriate skills and the development of mental, physical and social abilities and competencies as equipment for the individual to live in and contribute to the development of his society (FRN, 2014). The hopes of every country of the world to the development of human capital for effective functioning of the society are hinged on education, being an instrument of change. Education in Nigeria is an invaluable instrument of political, social, economic, scientific and technological development.

Among the levels of education in Nigeria, secondary education which is the pivot of the entire educational system is fast losing its relevance which among other factors is due to unsatisfactory and poor performance of students in Mathematics in West African Certificate Examinations. The broad aims of secondary school education in Nigeria, as stated in the National Policy on Education (FME, 2005), are to prepare the individual child for (i) Useful living in the society's; and (ii) For higher education. In reality these aims are very often defeated as most secondary school graduates fail to adapt adequately to society and fail to succeed in post-secondary education. For some time now, there has been increasingly vocal and widespread criticism of the examination system in Nigeria. West African Senior School Certificate Examinations (WASSCE), which determines the placement of Nigeria students in higher learning and for employment, is of particular concern.

In Nigeria, public discussions frequently focus on educational standards. The public's unhappiness becomes more prominent following the



annual release of the West African Senior School Certificate Examination results. Student outcomes do not match the government and parental investment. All stakeholders are concerned about why the system is turning out graduates with poor results especially in Mathematics. To them, it is questionable whether or not teachers in the secondary schools, the most important factors in the effectiveness of schools and in the quality of a child's education is competent to teach effectively. The National Policy on Education states, no education system can rise above the quality of teachers in the system (FME, 2005). Ogunsaju (2004) states that the academic standard in all Nigerian educational institutions has fallen considerably below societal expectations. Datt Pandey (2017) corroborated this view when he reported that the decline in the performance of students in Mathematics cannot be ignored by anyone who is aware of the significant role played by the subject in the advancement of students to higher institutions.

Apart from the reasons stated above, other reasons outlined as causes of mass failure in Mathematics include non-chalant attitude of pupils, youth disillusion and uncared attitude of parents about their children (Bello, and Osagie, 2013). Others are dilapidated infrastructure, lack of teaching and learning facilities, poor teacher's motivation, abysmal funding and in-competent teachers (The Guardian 8<sup>th</sup> July, 2011). Ajayi (2011) mentioned some problems as parents' failure to pay attention to the needs of their children and lack of value orientation, corruption and less emphasis on hard work, television viewing and unregulated internet, face-book surfing and abuse of mobile telephone use. In addition, Adesola (2013) said dying culture of reading amongst the children also contributed to the problem of mass failure especially in Mathematics. Similarly, a number of researchers have independently outlined some factors they considered responsible, or at least contributed to this trend (Okeke, 2007, Sule, Akinsolu, Olatoun, Chukwu & Peace, 2013). These factors include:

- i. Dissatisfaction with the syllabus;
- ii. Lack of functional counseling unit;
- iii. Lack of appropriate Mathematics textbooks;
- iv. Mathematics teachers' attitude to work;
- v. Teachers/students relationship;
- vi. Motivation and interest in learning Mathematics; and
- vii. Students' previous experiences/knowledge of instruction.

Researchers and stakeholders in education industry have in the recent past identified several factors as the causes of poor performance of students

in Mathematics in SSCE examinations. Among such factors identified are poor location of the school, incessant changes in government policies, closure of schools, which is contingent upon teachers' strike action, home-school distance, high student teacher ratio, lack of supervision, monitoring and evaluation machinery, insufficient facilities, poor content and context of instruction, poor and non-conducive environment, inadequacy of professional qualified teachers among others (Odesola, 2001, Adeboyeje, & Olaniyi 2003).

Released results by the West African Examination Council for the May/June 2014 Senior School Certificate Examination (SSCE) according Leadership Newspaper (August 12, 2014) indicates that a total of 1,705,976 candidates registered for the examination out of which 529,425 candidates representing 31.28% obtained credits in 5 subject and above including Mathematics indicating that 68.72% of the students failed.

Given the above varying positions and given the fact that the failure rate in Mathematics has been rising with each successive year a trend that has been found not only in the North-West Zone, Nigeria but in the entire country. This present study on the Analysis of Students' Performances in Mathematics in West African Senior School Certificate Examinations in North-West Geo-Political Zone, Nigeria (2016-2020) has become quite necessary and urgent based on current trend that might become a greater problem if urgent attention and solution is not given by all stakeholders in the education industry. This is the thrust of the study.

## 1.2 Statement of the Problem

For quite some time, there has been growing concern about the mass failure in Mathematics in May/June Senior Secondary School Certificate Examinations (SSCE) conducted by the West African Examinations Council (WAEC). The FME, Nigeria Digest of Education Statistics 2018, shows the trend of failure rate in Mathematics in the WASSCE results from 2012-2016. The statistics reveals that 61.19% of the students failed Mathematics in May/June 2012, while 64.26% failed in 2013. Also 69.98% failed in 2014 while 61.60% failed in 2015. According to the statistics, a total of 45.80% failure was recorded in Mathematics in 2016.

Going by the trend above, it is clear that there has been persistent poor performance of secondary school students in Mathematics examinations conducted by West African Senior Secondary School Certificate Examinations (WASSCE) in Nigeria. Efforts by all stakeholders,



including the government towards finding lasting solution yielded no result. Secondary education is the basic requirement for selection into tertiary institutions and further skills training (FME, 2005). Bamidele (2019) was of the opinion that students' academic performance is a measure of school output which enables the students to make progression into higher institutions.

Therefore, the poor performances of the secondary schools undermine students' chances of joining institutions of higher learning and jeopardizes opportunity for placement, and in most cases reduces an individual's active participation in national development. Considering that, teachers and other factors play a major role in teaching and learning process, there is need to examine the factors that are responsible for the consistent failure rate which has been a major problem to all stakeholders in the education industry. This research work therefore sought to analyze the Students' Performances in Mathematics in West African Senior School Certificate Examinations in North-West Geo-Political Zone, Nigeria (2016-2020) with a view to salvage the situation.

### 1.3 Objectives of the Study

The following objectives were formulated:

- (1) Analyze the students' academic performances in Mathematics between male and female secondary schools in the North-West Zone, Nigeria (2016-2020).
- (2) Compare the students' academic performances in Mathematics between private and public secondary schools in the North-West Zone, Nigeria (2016-2020).
- (3) Examine the students' academic performances in Mathematics between urban and rural secondary schools in the North-West Zone, Nigeria (2016-2020).

### Research Questions

The following research questions guided the study:

- (1) What is the relationship between academic performances of male and female secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020)?
- (2) What is the relationship between academic performances of private and public secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020)?
- (3) What is the relationship between academic performances of urban and rural secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020)?

### Research Hypotheses

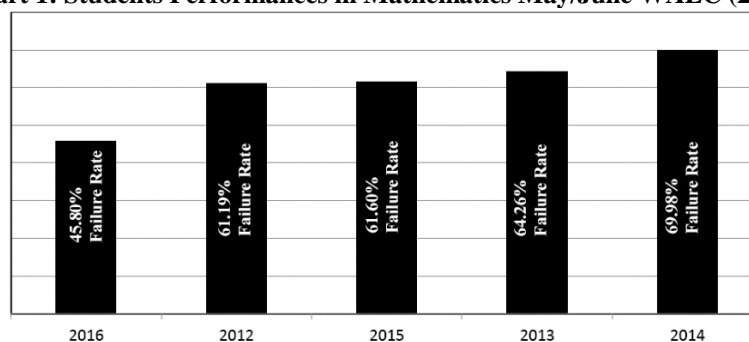
The following null hypotheses were generated and tested at 0.05 level of significance:

- $H_{01}$  There is no significant relationship in the academic performances between male and female secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020).
- $H_{02}$  There is no significant relationship in the academic performances between private and public secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020).
- $H_{03}$  There is no significant relationship in the academic performances between urban and rural secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020).

### 2.1 Literature Review

A comparative analysis of these results released by West African Examination Council (WAEC) each year revealed students' abysmal performance in all subjects especially in Mathematics. FME (2018) reports as recorded showed that in 2012, 2013, 2014, 2015 and 2016, only 39.81%, 34.74%, 30.02%, 38.40% and 54.20% of the students had 5 credits and above including Mathematics. The failure rate is represented in a chart below:

Bar Chart 1: Students Performances in Mathematics May/June WAEC (2012-2016)



Source: FME (2018)

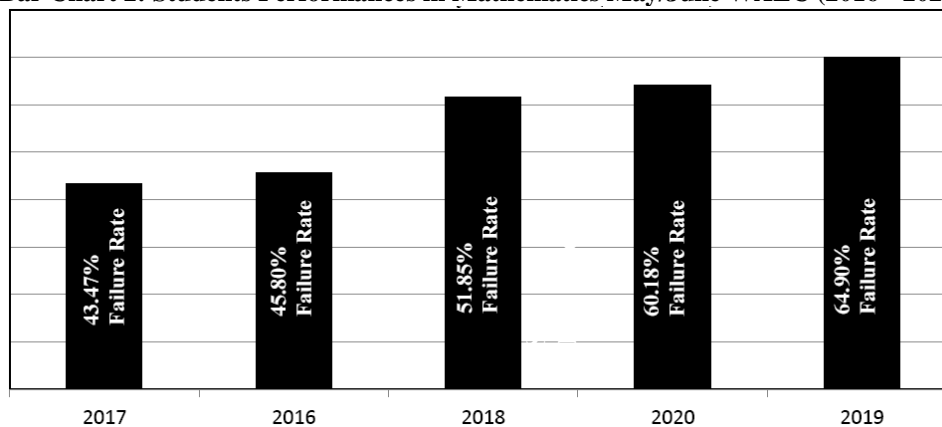


The bar chart 1 reveals that 61.19% of the students failed Mathematics in 2012, while 64.26% failure rate was recorded in 2013. In the same vein, 69.98%, 61.60% and 45.80% failure rate were recorded in 2014, 2015, and 2016 respectively in Mathematics.

To compare this period (2012 - 2016) with the years (2016 - 2020) under review further shows a

consistent decline in the performances of the students in Mathematics in May/June examinations. Going by this publication, it is disheartening to note that Nigeria recorded 45.80.19% failure rate and 43.47% failure rate in 2016 and 2017. Also, the failure rate was 51.85.98% in 2018 while 64.90% and 60.18% was recorded for 2019 and 2020 respectively.

**Bar Chart 2: Students Performances in Mathematics May/June WAEC (2016 - 2020)**



Source: NBS(2022)

The bar chart 2 shows that in 2016, 45.80% failure rate was recorded in Mathematics, 43.47% failure rate was recorded in 2017, while 51.85% was recorded as failure rate in 2018. Also, a total of 64.90% and 60.18% failure were recorded in 2019 and 2020 respectively.

## 2.2 Variables

### Gender (Male and Female)

Gender is a cultural construct that distinguishes the roles, behaviour, mental and emotional characteristics between males and females developed by a society. Umoh (2003) defines gender as a psychological term used in describing behaviours and attributes expected of individuals on the basis of being born as either male or female. Also, Nwobia (2007) sees sex as a biological distribution between male and female while gender is a social construct involving differences between male and female, that is, the societal role assignment on the male and female sexes.

According to Okeke (2003) the study of gender is not just mere identification of male and female sexes. Scholars have gone further to identify responsibilities assigned to opposite sexes and to analyze the conditions under which those responsibilities are assigned. Similarly, Haig (2004) sees gender as the range of physical, biological, mental and behavioural characteristics pertaining to

and differentiating between masculinity and femininity. Depending on the context, the term may refer to biological sex (i.e the state of been male and female or intersex).

Furthermore, Okeke (2003) specifically notes that the study of gender means the analysis of the relationship of men and women including the division of labour, access to resources and other factors which are determined by society as opposed to being determined by sex. It further involves the study of the socio-cultural environment under which responsibilities are assigned and the relationship emanating from it. Thus, gender equally projects the properties that distinguish and, classify organisms on the basis of their reproductive and cultural expectant roles. It relates to the cultural and psychological attributes of men and women through their socio-economic contributions, expectations and limitations.

Thus, the concept of gender does not support or suggest the dominance of male over female or vice versa in academics and other human resource development areas but it stresses equality and equity in enhancing effective recognition, development and utilization of competencies and efficient and endowed capabilities of both sexes.

### 2.3 Rural Location of Schools

Rural areas are characterized with low population, subsistence mode of life, monotonous





and burden. Usually, rural areas are without basic social amenities such as good roads, water, electricity etc. TDK (2023) defines rural areas as places where production based on natural resources is more common economically, where the average income level is generally lower than the cities, where there is a unique cultural structure and where social life is determined within the framework of traditions. Therefore, rural schools are schools located in villages or remote areas. Onah (2011) indicated that schools in the rural areas are usually without electricity, pipe borne water, few and less qualified teachers, less learning facilities and infrastructure. They admitted that the absence of basic social amenities has negatively affected the students' academic performance in public examination.

#### **2.4 Urban Location of Schools**

Urban consist of people living in a city or town. That is, it relates to cities and the people who live in them. It is characterized by high population density, social amenities such as good roads, electricity, water etc and high variety and beauty. Therefore, urban schools are schools located in the cities or metropolis. Akpan (2008) indicated that schools in urban areas have electricity, water supply, more teachers, more learning facilities and infrastructure.

Edem (2022) supported this argument and reported that a good administrator (principal) must develop policy and strategy that will bring about better performance in examination. According to the author, such policy and strategy includes:

- Determine the problem associated with poor performance of students.
- Examine the detailed make-up of the problem in existing situation.
- Decide on the criteria for resolving the problem
- Develop a plan for action for solving the problem.

#### **2.5 Students' Academic Performance in Mathematics**

Mathematics is enshrined in the National Policy on Education (NPE) as a core and compulsory subject for all primary and post primary school students in Nigeria (FRN, 2014). This is largely because of the indispensable role it plays in the advancement of science and technology of any nation (Azuka, 2016). This has led to its inclusion as a pre-requisite for admission to science-based courses in the institutions of higher learning in Nigeria. The mathematics syllabus at the secondary school level is aimed at preparing and equipping students with adequate mathematical knowledge that will enhance

their learning of Mathematics in their early year of undergraduate programme. According to Yusuf and Adigun (2010), Mathematics is not only considered as important in its own right as a field of study and research, but also essential to almost every field of endeavour. This maintains harmony with the view of Bature (2012) who posited that Mathematics has an important role in the progress of civilization whereby through Mathematics man raised from primitive stage when he finds it extremely difficult to even count to such an advanced stage of development.

Mathematics has generally been accepted as the foundation of science and technology and it is a very important subject in the secondary school curriculum. Therefore, every nation needs it for sustained scientific and technological development. It is also considered a service tool for the study of sciences. It is ideal for the understanding and application of science and technology, and the discipline plays the vital role of a precursor harbinger to the much needed technological and of course development, which has become an imperative in Nigeria.

Despite the relevance of Mathematics, students still perform abysmally in the subject. This is evident as can be observed in students' performance in the subject in Senior School Certificate Examination (SSCE) conducted by the West Africa Examination Council (WAEC). WAEC reports of (2000-2004) as recorded by Matawal (2012) showed that in 2000, 2001, 2002, 2003 and 2004, only 34%, 37%, 35%, 18% and 34% of the students passed Mathematics at credit level and above respectively. The Head of the Nigeria National office of WAEC corroborated this in the 2011 report, where only 38.93% of the candidates that sat for Mathematics obtained credit and above (Vanguard Newspaper, Tuesday 10<sup>th</sup> 2011). Furthermore, reports of the Head of National Office of WAEC, in 2011 in the same newspaper shows that only 38.95% of the 1,526, 248 candidates that sat for the examination obtained credit and above in Mathematics with a failure rate of over 56.54% with 5.29% reported for various of alleged involvement in examination malpractice.

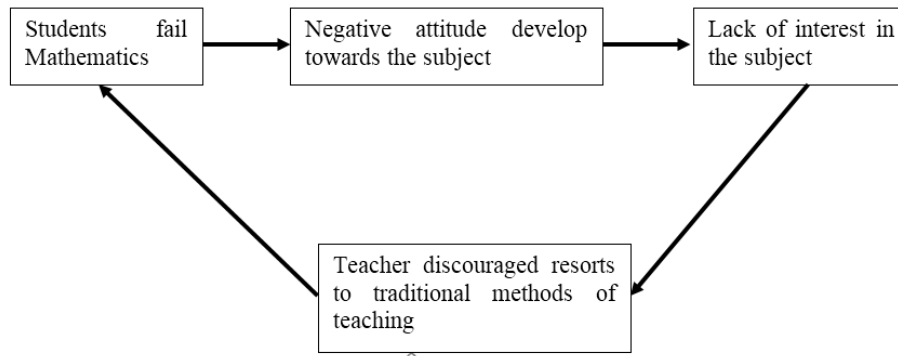
Various factors have been adduced for poor academic performance of students in Mathematics. The interest of students in Mathematics have been related to the volume of work completed, students task orientation and skill acquisition, student personality and self-concept (Adeyemi, 2008), feeling of inadequacy and anxiety (Nulifer, 2004), shortage of qualified Mathematics teachers, (Oyedeki, 2002) poor facilities, equipment and instructional materials for effective teaching



(Ekundayo,&Alomge, 2012) use of traditional chalk and talk methods (Ekundayo&Arogundade, 2007), large pupils to teacher ratio (Adeyemo,Oladipupo&Omisore,2013)) and so on.

All the above stated reasons for persistent failure in Mathematics, which have been proffered bear relevant in one way or the other to the poor performance of students in Mathematics. This has led to a cycle of events that could be illustrated thus:

**Figure 1: Illustration of Factors Affecting Teaching and Learning of Mathematics**



Source:Aremu (1998)

When explaining the illustration above, Aremu (1998) explained that when students express lack of interest in the subject, it affects the way they react or listen to the teacher. Also, many of the students believe that they cannot pass, the teacher is also affected. This is because aside of this negative response from the students, he/she as well is already being confronted by a lot of other factors like low income, low status in the society, large teacher-students ratio and so on. These may cause him or her to resorts to the easiest way of disseminating knowledge that is 'chalk and talk' without the use of instructional materials. He may not also bother to vary his teaching styles to suit individuals; therefore, the cycle goes on.

One fortunate outcome of this is that, the negative attitude towards the subject is passed down from one generation of students to another and therefore the cycle keeps enlarging. What then could be done to break such a cycle of failure? This has been the question by many Mathematics educators and researchers (Williams, 2005 &Akpan, 2008). A lot of new modified old methodologies have been proposed to improve performance in the subject (Seyi,& Clement, 2015). Instructional materials have also been designed and developed to aid Mathematics teaching and learning (Abe,&Gbenro,2014). All these are to help break this cycle of poor performance of the students in Mathematics.

Based on the foregoing, research on Mathematics performance should be considered a continuous process until there is evidence of improvement in interest and performance of the

students in the subject particularly at the secondary school level.

## 2.6 Academic Performance and Influence of Type of School

There have been contentions that a type of school is one factor that affects learning activities which in turn affect performance of students. Type of school can be viewed from two main perspectives, public and private. A public school is any school controlled and/or supported by the State or Federal Government. A private school, on the other hand, is a school supported and controlled by religious/social organizations or other private groups/individuals.

There is a widely-held view that students who attend private schools perform better than those who attend public schools in different parts of the world. Adomako (2005) and Asante (2005) opine that performance of private schools in Nigeria has continued to be far better than that of the public schools. Sato (2005) argued that there is more chance of a better academic achievement in private schools, just as Chukwuemeka (2006) was of the view that public schools in the present day were simply not up to the mark. Similarly, available statistics on schools in the United States of America (USA) between 1993 and 2002 by the National center for Education statistics indicated that performance on standardized tests was higher in private schools than in public schools (Council for American Private Education, 2004).

Nevertheless, the belief that private schools are inherently better in academic performance than public schools has been questioned by the findings of

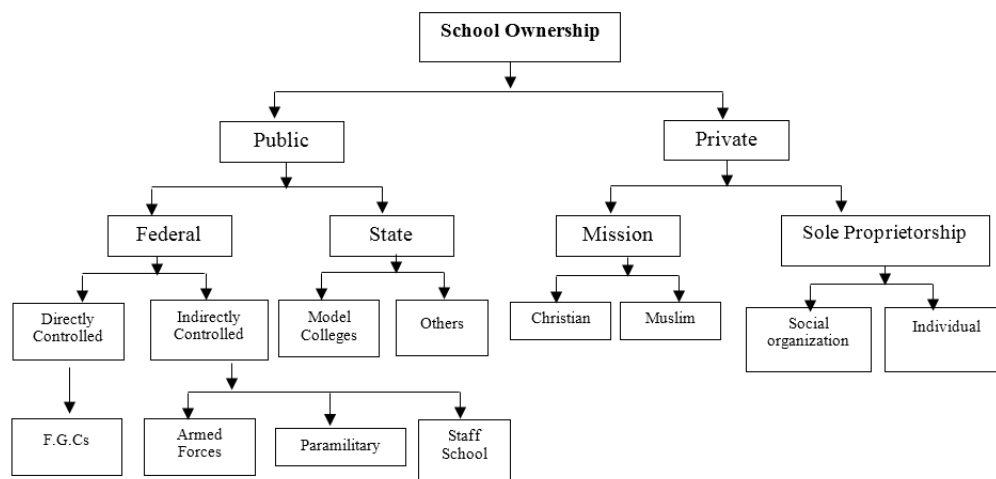


(Lubienski&Lubienski, 2005). They analyzed standardized Mathematics test scores in more than 1,300 public and private schools. They found that “If you look at kids of equal socio-economic class, the kids in public schools are outperforming the equivalent kids in private schools”. They therefore

emphasized the importance of carefully considering socio-economic differences in comparison to schools’ achievement.

In Nigeria, type of school can be diagrammatically represented as follow

Figure 2: Type of School



Source: Oke and Malik (2009)

In the last decade, Nigeria has witnessed subtle but lasting changes in its educational system and management. One of these was the return of schools to their original owners. These owners include the missions and private proprietors. The return of schools thereafter witnessed proposal and implementation of changes, including advertisement on improved teaching facilities, well-qualified teachers, improved teaching techniques and teacher/students’ interaction. These schools, along with those owned by individuals are believed to provide a better environment for studying than public schools and thus record a better performance.

## 2.7 Academic Performance and Human/Instructional Facilities

The availability of human and material resources is very important because of its role in the attainment of educational objectives. The teacher’s unique educational input is necessary for the overall development of skill acquisition and literacy of the students. Human resources within the educational system can be classified into teaching and non-teaching staff. Availability of these classes of resources are needed to achieve excellence in the system.

However, it has been observed that secondary schools in Nigeria do not have the required number of teachers (both in terms of quantity and

quality). This is evident in high student/teacher ratio in the schools.

Personal observation has also shown that material resources are in short supply in the schools. The poor status of material facilities in the schools is not unconnected with the dearth of fund in the system. A close look at the schools and what goes on there shows that nothing good can come out of most public secondary schools as they do not have adequate facilities and appropriate human resources to prepare candidate for West African Examination Council (WAEC) examinations (Owoeye& Yara, 2011).

The precarious situation of lack of human and material resources is more evident in public secondary schools than in the private secondary schools and this shows why the private secondary schools tend to perform better than the public secondary schools in WAEC examinations. Ekundayo (2009) in a study conducted in Ekiti State submitted that private secondary schools had educational materials better than the public schools.

Studies on the relationship between availability of human resources and academic performance have shown that human resources enhance academic performance of students, Adewuyi (2002), and Okandeji (2007), had in their various researches submitted that teachers constitute a very significant factor to students’ success.



In a similar dimension, Ajayi (2002), Owoye (2002) and Akomolafe (2005) also submitted a positive relationship between material resources in the schools and students' academic performance. According to Ekundayo and Alonge (2012), the material resources that contribute to students' performance include: classrooms, accommodation, libraries, furniture, apparatus and other instructional materials. The author emphasized that the availability, relevance and adequacy of these facilities contribute to students' achievement.

## **2.8 Factors Responsible for Poor Academic Performance**

The causes of low level of academic performance of students in recent years have been a subject of concern to all stakeholders. In Nigeria, studies have sought to explain the trend of students' performance in the West African Senior School Certificate Examinations (WASSCE). Some have attributed the low level of performance to factors inherent in the students and in the syllabuses.

The years (2016-2020) under review shows consistent decline in the performance of the students. Going by the publication of Leadership Newspaper of Tuesday, August 12, 2014, it is disheartening to note that in 2010 Nigeria recorded 75.06% failure rate and 44.66% failure rate in 2011. Also, the failure rate was 61.19% in 2012 while 35.74% and 68.72 was recorded for 2013 and 2014 respectively. This was collaborated by Daily Newswatch Newspaper of Tuesday August 12, 2014 which recorded that only 31% pass SSCE / WAEC in May/June 2014 examinations.

Adeyemi (2008), Ajao and Awogbemi (2008) and Asikhia (2010) are of the opinion that the downward trend in the academic performance of students can be attributed to a number of factors which are: the principal's leadership style, teachers' quality, home factors, government factors and non-provision of educational resources (human, material, financial, and physical resources).

In addition, there have been contentions that the type of school affects learning activities which in turn affect performance of students. The type of school can be viewed from two main perspectives: Private and public. A private school is a school supported and controlled by religious/social organizations or other private/groups/individuals. On the other hand, a public school is any school controlled and/or supported by the State or Federal Government.

According to Adomako (2005) and Asante (2005) students who attend private schools perform better than those who attend public schools. They

attributed this to the fact that the class size is small and there is adequate attention for close learning. Similarly, available statistics on schools in the United States of American (USA) between 1993-2002 by the National Center for Education statistics indicated that performance on standardized tests was higher in private schools than public schools (Council for American Private Education, 2004). Among the reasons adduced for the relatively lower performance in public secondary schools are ineffective supervision, low parental support and differences in the school climate including indiscipline and insecurity. Others are differences in infrastructural facilities, motivation of teachers, differences in enrolment and student/teacher ratio.

Also, Machebe (2012) stressed that student performance is very much dependent on socio-economic background and high school students' level of performance had statistically significant difference if linked to their gender, grade level, school location, school type, student type and socio-economic background. In the same vein, Craig and Ronald (2003) posited that differences in students' socio-economic background explained much of the variation in student performance. George (2001) found that weak students do better when grouped with other weak students. While Laosa (2005) findings were somewhat contradicting to George (2001) findings that student's performance depends on number of different factors and that when weak students are paired with brilliant students the weak paired might reduce the grades of other students.

Fabunmi, Peter, and Isaiah (2007) examined class factor as a determinant of secondary school students' academic performance in Akwa Ibom state between 1997 and 2002. The researchers used multiple regression and One Way Analysis of Variances (ANOVA) to test the two hypotheses at 0.05% level of significance. The findings revealed that the three-class factor (class size, students' classroom, and class utilization rate) when taken together, contributed significantly to secondary school students' academic performance. These factors when taken separately, determined significantly secondary school student academic performance.

Shodimu (2009) conducted a study on the relationship between resources (teacher quality, availability of classrooms, well equipped laboratories, libraries, workshops and academic learning time) and students' academic performance in the secondary school examination in 2008 in both private and public schools in Lagos State. The researcher used stratified random sampling to select 35 public schools and 3 private schools. He found





that public secondary schools' resources were over-utilized while private secondary schools were under-utilized their resources. He found a significant relationship between student/teacher ratio and school's productivity in term of students' academic performance. He further found a statistically significant relationship between the qualities of teachers, laboratories, workshops and academic learning time provided in the school and school's productivity.

Benjamin (2008) conducted research on school mapping and resources supply as related to students' performance in Kwara State secondary schools. The study involved 3,614 students, 55 teachers and 50 principals. The researcher used T-test and Chi-Square statistics to test the hypotheses. The researcher found that students' academic performance in English Language and Mathematics was significantly related to geographical location of the schools. Factors such as community influence, journey to school, physical facilities, instructional materials and teacher manpower significantly influenced students' academic performance in English Language and Mathematics except physical facilities, which was not significantly related to student; academic performance in English Language.

Akanle (2007) studied socio-economic factors influencing students' academic performance in Nigeria using some explanation from a local survey. The major instrument used in the collection of data for the study was the self-developed instrument tagged "socio-economic and academic performance rating scale of the student". The data collected were analyzed using T-test. A total of 120 questionnaires were administered to participants. The study revealed that insufficient parental income, family type and lack of funding by governments are factors influencing students' academic performance.

## **2.9 Review of Related Empirical Studies**

The following relevant empirical studies were reviewed in relation to the present study so as to ascertain the performances of students in West African Senior School Certificate Examinations in North-West Zone, Nigeria.

Ezeudu and Obi (2013) examined the effect of gender and location on students' performance in Mathematics in Secondary Schools in Nsukka Local Government Area of Enugu State, Nigeria. The study was guided by 3 research questions and 3 hypotheses. The sample of the study was made up of 827 students comprising 493 males and 354 females. Eight secondary schools were sampled using simple random sampling techniques. A proforma was instrument which enable the researchers to copy

results from the school past records in the respective schools through the help of the school principals. Mean and standard deviations were used to answer the research questions and t-test statistic was used to analyze the hypotheses. The findings showed that male students; achieved significantly better than the female students in both urban and rural schools. Also, there was no significant difference in the academic performance of student in urban and rural schools. The study recommended among others that adequate incentives from federal government, parents and stakeholders of education should be provided to female students to encourage them to perform better.

This study is very important and relevant to the present study though conducted in Enugu State. However, the present study covers all the States in the North-West Zone of Nigeria and is wider in scope as it embraces variable on private/public secondary schools.

Also, Nematullah, Yousaf, Gulshan, and Dad (2015) conducted a study on the academic performance of male and female students in Mathematics in urban and rural schools. It was observed that urban male students have a better mathematical approach to understanding the subject than urban female students and in comparison, urban males have a better mathematical approach than rural female students. Furthermore, rural males outperform rural females proportionally. However, there is no strong correlation between the performance of rural males and urban females. Finally, male students were considered to perform better in Mathematics and related sciences in general than female students.

This study is relevant to the present study as it examines the relationship between male/female students and urban/rural schools in Mathematics which is being measured in the present study in relation to performance. Unfortunately, the study is limited to two variables. Thus, the present study includes other variables like type (private and public) of school and seven states in North-West Zone, Nigeria.

Hooda and Devi (2017) conducted a study on mathematical achievement among secondary school students in relation to type of school together with demography and gender and they found that the major effect of type of school (public vs. private), location (rural vs. urban), and gender (male vs female) on mathematical achievement among secondary school students differs significantly. Also, there is a substantial difference in mathematical achievement among secondary school students when the double interaction effect of locality (rural and urban), gender (male and female) and type of school



(public and private) and gender (male and female) is considered. In addition, the triple interaction impact of type of school (public vs. private), location (rural vs. urban), and gender (male vs. female) on mathematical achievement among secondary school students had no statistical significance.

The study above is relevant and similar in scope with the present study. Variables such as school type (public/private), sex (male/female) and location (urban/Rural) were adequately addressed in this study and in the present study.

Kaur and Kaur. (2021) investigated the impact of cooperative learning practices on mathematical performance and problem-solving skills. They discovered that students (male and female) with cooperative learning approach group outscored the students (male and female) with the standard teaching strategy group by a large margin. In addition, students (male and female) with various levels of problem-solving abilities performed significantly worse in mathematics. Furthermore, instructional strategies and problem-solving skills had a significant interaction effect on students (male and female) performances in mathematics.

This study is relevant to the present study as it examines the performances between male/female students in Mathematics which is being measured in the present study. Unfortunately, the study is limited to one variable (male and female). Thus, the present study includes other variables like type (private and public) and location (rural and urban) of school.

All the empirical studies reviewed are relevant to the present study because the studies deal

with predictor variables such as gender (male and female), public, private, urban and rural schools which are measured in the present study as intervening variables in the application of students' academic performances in WASC examination. Some of the designs and methodologies of such studies reviewed will be applied in the present study. Besides, the findings of the studies will provide clue and direction for the current study.

### III. Research Methodology

#### 3.1 Research Design

The research design that was adopted for this study was the ex-post facto research design. This design is chosen because the researchers have no control over certain factors or variables, or why differences exist - (WASSCE results). An attempt can only be made to find the cause or reason.

#### 3.2 Population of the Study

The population for this study consisted of all private/public schools and all senior secondary students that sat for Mathematics May/June senior secondary certificate examination conducted by WAEC in the states that constitute the North West Zone, Nigeria (2016 – 2020). Therefore, a total of 1,264,436 of male students and female students from public/private and urban/rural constitute the entire population. The population distribution is represented on Table 1.

**Table 1: Population Distribution of Senior Secondary School Students that Sat for Mathematics in North West Zone (2016-2020)**

States	2016	2017	2018	2019	2020	Total
Kaduna	90,614	92,596	81,312	75,008	78,742	418,272
Kano	49,829	38,766	30,003	32,906	62,380	312,884
Katsina	20,404	21,717	23,916	22,415	24,746	113,198
Kebbi	27,052	27,134	30,122	29,542	26,206	140,056
Jigawa	23,028	17,218	20,424	23,328	22,274	108,272
Sokoto	25,774	27,673	26,084	29,483	33,643	142,657
Zamfara	17,421	28,196	28,481	28,236	25,763	128,097
<b>Total = 7</b>	<b>254,122</b>	<b>253,300</b>	<b>242,342</b>	<b>240,918</b>	<b>273,754</b>	<b>1,264,436</b>

Source: NBS (2022)

#### 3.3 Sample and Sampling Technique

Due to the large population of the secondary schools for the study, a purposive sampling technique was adopted to select fourteen (14) schools so as to ensure a representative of the population. Therefore, a total of two (2) schools were randomly selected

from each state comprising one (1) private, male and female, urban or rural school and one (1) public, male and female and urban or rural school. This is in line with Yusuf (2013) who opined that purposive sampling is ideal when seeking or considering one or more specific predefined groups that are capable of



providing the required data. The sample size for this study was 18,571 students comprising 10,649 males and 7,922 females respectively that sat for May/June Senior School Certificate Examinations (SSCE) in North-West Zone, Nigeria (2012-2016). One (1) senior school certificate (SSC) subjects were

selected. The subject selected was Mathematics. The choice of the subject was as a result of its relevant status to all other subjects and for the fact that Mathematics is a compulsory subject at secondary school level.

**Table 2: Distribution of Sample of Students that Sat for Mathematics in North-West Zone (2016-2020)**

S/NO	States/Name of School	Private Schools	Public Schools	Urban School	Rural School	Selected Secondary Private Schools		Selected Secondary Public Schools		Total	
						Male	Female	Male	Female	Male	Female
<b>Kaduna State</b>											
1	Godwill Schools Angwa Yelwa, Kaduna.	1		1		1,250	1,102			2,025	1,732
2	Government secondary School GanGoraZonkwa		1		1			775	630		
<b>Kano State</b>											
1	Kingskids College, along Bukabu Barracks	1			1	854	551			1,783	1,591
2	Federal Government College Zaria Road along Aminu Kano T/Hospital		1					929	1,040		
<b>Katsina State</b>											
1	Government Secondary School Barde Bakori		1		1			943	629	1,643	1,130
2	Salama Int' School Layout Bindawa Street	1		1		700	501				
<b>Kebbi State</b>											
1	Joda Nursery, Primary & Secondary School Burnin-Kebbi	1		1		628	366			1,506	966
2	Federal Government College BininYauri		1		1			878	600		
<b>Jigawa State</b>											
1	Government Day secondary School Sabu-war		1	1				317	211	752	577
2	Al-Iman Secondary School Jalingo, Yauri Road	1			1	435	366				
<b>Sokoto State</b>											
1	Brilliant Footstep Int' Academy, along Western bye pass, Sokoto	1			1	654	490			1,671	1,159
2	Government Day Senior Secondary School (GDSSS), Illela		1		1			1,017	669		
<b>Zamfara State</b>											
1	Government Day Senior Secondary School, (GDSS)Rawiyya Area		1		1			730	433		
2	Prince College, along Zaria Road Gusau	1		1		539	334			1,269	767
<b>Total</b>		<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>5,060</b>	<b>3,710</b>	<b>5,589</b>	<b>4,212</b>	<b>10,649</b>	<b>7,922</b>

Source: Authors' field work (2024)

Table 2 shows the distribution sample of male and female students based on type of school and location of school by state in the North-West Zone, Nigeria 2016-2020. Kaduna state have a total sample of male (2,025) and female (1,732), while Kano State have a total sample of male (1,783) and female (1,591). Also, Katsina State have sample size of male (1,643) and female (1,130), Kebbi State with a male sample (1,506) and female sample (960) and Jigawa State with a male sample (752) and female sample (577). In the same vein, Sokoto State with a male sample (1,671) and female sample (1,159) and Zamfara State with male sample (1,269) and female sample (767).

### 3.4 Instrumentation

The study used May/June WAEC Senior Secondary Certificate examination results from 2016 – 2020 obtained from the sampled schools based on private, public, urban, rural and male and female. Also, the researchers adopted a proforma titled the “Senior Secondary Students Academic Performances” (SSSAP) for data collection. The proforma include among other things, data on sex

(male and female) of student, type of school, (private and public), location of school (urban and rural), and number of students that either pass or fail in Mathematics in SSS III WAEC examinations from 2016 – 2020.

### 3.5 Reliability of the Instrument

The reliability of the instrument is not tested because the instrument is a tested result. This is because the instrument is already a prepared record. However, a proforma called the Senior Secondary Students' Academic Performances Inventory (SSSPI) was pilot tested in two public and private schools in Lagos State in order to ascertain its psychometric properties. In the reliability analysis of the instrument, the Cronach Alpha coefficient of 0.78 shows that good interrelationship among the items that formed the instrument, hence the positive correlation. Also, that results obtained using the instrument was reliable. Therefore, the instrument was adopted by the researchers to solicit information for data gathering.



### 3.6 Administration of the Instrument

No administration of the questionnaire was conducted. However, a proforma - Senior Secondary Students' Academic Performance Inventory (SSSAPI) adopted by researchers was used to solicit information for data gathering.

### 3.7 Method of Data Analysis

The data collected were analyzed using descriptive and inferential statistics. The statistical techniques are summarized as follows:

1. Frequency counts and simple percentages were used to determine the data collected.
2. Simple percentages contingency coefficient value was used to analyse the data based on the research questions.

3. Chi-Square test for independence was used to test the six null hypotheses in order to analyse the performances of the students based on the variables.
4. All the hypotheses were tested at 0.05 level of significance.

### 4.1 Results and Discussion of Findings

#### 4.2 Data Analysis on Mathematics Academic Performances

In analysing the performances of male and female secondary students in Mathematics, the results of the students in West African Senior School Certificate Examinations were collected and analysed from the secondary schools under study in the North-West Zone, Nigeria (2016-2020). The result is shown in table 3.

**Table 3: Performances (pass/fail) in Mathematics between Gender (Male/Female) of Students (WASSCE) in North-West Zone (2012-2016)**

North-West Zone (States)	PASSED MATHS		FAILED MATHS	
	Male	Female	Male	Female
JIGAWA	421	306	331	271
KADUNA	1134	918	891	814
KANO	998	843	785	748
KATSINA	920	599	723	531
KEBBI	843	512	663	454
SOKOTO	936	614	735	545
ZAMFARA	711	407	558	360
<b>TOTAL</b>	<b>5963</b>	<b>4199</b>	<b>4686</b>	<b>3723</b>

Source: Authors' field work (2024)

Table 3 reveals the distribution of male and female students' academic performances in Mathematics in West African Senior School Certificate Examination in North-West Zone, Nigeria (2012-2016). The total

number of male and female students that passed Mathematics is 4,868 and 3,284 while the total number of male and female students that failed Mathematics is 1,399 and 936.

**Table 4: Performances (pass/fail) in Mathematics between Type (Private/Public) of Students (WASSCE) in North-West Zone (2016-2020)**

North-West Zone (States)	PRIVATE		PUBLIC	
	PASSED	FAILED	PASSED	FAILED
JIGAWA	465	247	262	355
KADUNA	1313	699	739	1006
KANO	1179	628	663	904
KATSINA	972	514	547	740
KEBBI	867	458	488	659
SOKOTO	992	525	558	755
ZAMFARA	715	377	402	542
<b>TOTAL</b>	<b>6504</b>	<b>3448</b>	<b>3658</b>	<b>4961</b>

Source: Authors' field work (2024)





Table 4 shows the academic performances in Mathematics between private and public secondary schools in West African Senior School Certificate Examination in North-West Zone, Nigeria

(2016-2020). The total number of private and public schools' students that passed Mathematics is 6,504 and 3,658 while the total failed is 3,448 and 4,961 respectively.

**Table 5: Performances (pass/fail) in Mathematics between Location (Urban/Rural) of Students (WASSCE) in North-West Zone (2016-2020)**

North-West Zone (States)	URBAN		RURAL	
	PASSED	FAILED	PASSED	FAILED
JIGAWA	487	163	240	440
KADUNA	1375	460	677	1245
KANO	1234	414	608	1119
KATSINA	1018	339	501	915
KEBBI	908	301	447	815
SOKOTO	1039	346	512	934
ZAMFARA	748	248	369	671
<b>TOTAL</b>	<b>6809</b>	<b>2270</b>	<b>3353</b>	<b>6138</b>

Source: Authors' field work (2024)

Table 5 reveals the academic performances in Mathematics between urban and rural secondary schools' students in West African Senior School Certificate Examination in North-West Zone, Nigeria (2016-2020). The total number of urban and rural schools' students that passed Mathematics is 6809 and 3,353 while the total number of urban and rural schools' students that failed Mathematics is 2,270 and 6,138.

**Research Question 1:** What is the number of pass and fail in Mathematics between male and female students in North-West Zone, Nigeria (2016-2020)?

To answer this question, the results of the male and female secondary school students in Mathematics in West African Senior School Certificate Examination in North-West Zone, Nigeria (2016-2020) were computed and analysed using percentages and contingency coefficient value. The result is shown in table 9.

#### 4.3 Answering the Research Questions

**Table 6: Cross Tabulation of Performances (pass/fail) between Male and Female in Mathematics (WASSCE) in North-West Zone (2016-2020)**

**Gender \* Candidate Status Crosstabulation**

Gender	Female	Count	Candidate Status		Total
			Failed	Passed	
			3723	4199	7922
		Expected Count	3587.1	4334.9	7922.0
		% within Gender	<b>47.0%</b>	<b>53.0%</b>	<b>100.0%</b>
	Male	Count	4686	5963	10649
		Expected Count	4821.9	5827.1	10649.0
		% within Gender	<b>44.0%</b>	<b>56.0%</b>	<b>100.0%</b>
Total		Count	8409	10162	18571
		Expected Count	8409.0	10162.0	18571.0
		% within Gender	<b>45.3%</b>	<b>54.7%</b>	<b>100.0%</b>

Source: Authors' field work (2024)



Table 6 revealed that out of the 18571 male and female, 54.7% (10162) are the total of the students that passed Mathematics while 45.3% (8409) are the total of students that failed Mathematics. A breakdown shows that 53.0% (4199) of the female passed Mathematics and 56.0% (5963) of the male also passed Mathematics. Also 47.0% (3723) of the female students failed Mathematics and 44.0% (4686) of the male students failed Mathematics.

**Research Question 2:** What is the number of pass/fail in Mathematics between private and public students in North-West Zone, Nigeria (2016-2020)?

To answer this question, the results of the private and public secondary school in Mathematics in West African Senior School Certificate Examination in North-West Zone, Nigeria (2016-2020) were computed and analysed using percentages and contingency coefficient value. The result is shown in table 10

**Table 7: Cross Tabulation of Performances (pass/fail) in Mathematics between Private and Public Students (WASSCE) in North-West Zone (2016-2020)**  
 Candidate Status \* Type Crosstabulation

Candidate Status			Type		Total
			Private	Public	
	Failed	Count	3448	4961	8409
		Expected Count	4506.3	3902.7	8409.0
		% within Candidate Status	<b>41.0%</b>	<b>59.0%</b>	<b>100.0%</b>
	Passed	Count	6504	3658	10162
		Expected Count	5445.7	4716.3	10162.0
		% within Candidate Status	<b>64.0%</b>	<b>36.0%</b>	<b>100.0%</b>
Total	Count	9952	8619	18571	
	Expected Count	9952.0	8619.0	18571.0	
	% within Candidate Status	<b>53.6%</b>	<b>46.4%</b>	<b>100.0%</b>	

Source: Authors' field work (2024)

Out of the 18571 students from private and public schools, 53.6% (9952) are the total number of students from private schools for Mathematics and 46.4% (8619) are the number of students from public schools for Mathematics. A breakdown shows that 64.0% (6504) of the students from private schools passed Mathematics and 36.0% (3658) of the students from public schools passed Mathematics. Also 41.0% (3448) of the students failed Mathematics from private schools and 59.0% (4961) of the students failed Mathematics from the public schools.

**Research Question 3:** What is the number of pass/fail in Mathematics between urban and rural students in North-West Zone, Nigeria (2016-2020)?

To answer this question, the results of the urban and rural secondary school students in Mathematics in West African Senior School Certificate Examination in North-West Zone, Nigeria (2016-2020) were computed and analysed using percentages and contingency coefficient value. The result is shown in table 11.

**Table 8: Cross tabulation of Performances (pass/fail) in Mathematics between Urban and Rural students in (WASSCE) in North-West Zone (2016-2020)**  
 Candidate Status \* Area Crosstabulation

Candidate Status			Area		Total
			Urban	Rural	
	Failed	Count	2270	6138	8408
		Expected Count	4110.7	4297.3	8408.0
		% within Candidate Status	<b>27.0%</b>	<b>73.0%</b>	<b>100.0%</b>
	Passed	Count	6809	3353	10162
		Expected Count	4968.3	5193.7	10162.0
		% within Candidate Status	<b>67.0%</b>	<b>33.0%</b>	<b>100.0%</b>
Total	Count	9079	9491	18571	
	Expected Count	9079.0	9491.0	18571.0	



% within Candidate Status	48.9%	51.1%	100.0%
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Source: Authors' field work (2024)

Table 8 revealed that out of the 18571 students from urban and rural schools, 48.9% (9079) are the students from urban schools for Mathematics and 51.1% (9491) are the students from rural schools that passed Mathematics. A breakdown shows that 67.0% (6809) of the students from urban schools passed Mathematics and 33.0% (3353) of the students from rural schools also passed Mathematics. Also, 27.0% (2270) of the students failed Mathematics from the urban schools and 73.0% (6138) of the students failed Mathematics from the rural schools.

#### 4.4 Hypotheses Testing

This section presents the result from the test of the hypotheses generated for the study. Chi-Square statistic was used to analyse the data.

**Hypothesis 1:** There is no significant relationship between performances (pass/fail) in Mathematics and gender (male/female) of students in North-West Zone, Nigeria (2016-2020).

To test this hypothesis, the results of male and female secondary school students in Mathematics from 2016-2020 were analysed using chi-square statistic at (0.05) level of significance. The result is shown in table 9

**Table 9: Chi-Square Tests of Performances (pass/fail) in Mathematics between Male and Female Secondary School Students**  
**Chi-Square Tests**

	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	16.408 <sup>a</sup>	1	.000		
Continuity Correction <sup>b</sup>	16.287	1	.000		
Likelihood Ratio	16.402	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	16.407	1	.000		
N of Valid Cases	18571				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 3587.10.

b. Computed only for a 2x2 table

Source: Authors' field work (2024)

The chi-square test yielded the results as presented in table 9. On one degrees of freedom, the chi-square statistic (16.408) with a (p-value; 0.000) is less than the level of significance (0.05), hence the null hypothesis is rejected. Therefore, there is a

significance relationship between male and female academic performances in secondary schools in Mathematics in North-West Zone, Nigeria (2016-2020) in the West African Senior School Certificate examination (WASSCE).

#### Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.30	.000
	Cramer's V	.30	.000
N of Valid Cases		18571	

However, the Cramer's V (0.3) with a (p-value =0.000) indicates that there is positive significant relationship between academic performances and student gender in secondary school students in

Mathematics in the North West Zone, Nigeria (2016-2020).

**Hypothesis 2:** There is no significant relationship between performances (pass/fail) in Mathematics and



type (private/public) of students in North-West Zone, Nigeria (2016-2020). To test this hypothesis, the results of the private and public secondary school students in Mathematics

from 2016-2020 were analysed using chi-square statistics at 0.05 level of significance. The result is shown in table 10.

**Table 10: Chi-Square Tests of Performances (pass/fail) in Mathematics between Private and Public Students**

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	978.649 <sup>a</sup>	1	.000		
Continuity Correction <sup>b</sup>	977.724	1	.000		
Likelihood Ratio	985.774	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	978.596	1	.000		
N of Valid Cases	18571				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 3902.71.

b. Computed only for a 2x2 table

Source: Authors' field work (2024)

The chi-square test yielded the results as presented in table 10. On one degrees of freedom, with a high chi-square statistic (978.649) and a corresponding significance value (p-value; 0.000) which is less than level of significance (0.05), hence

the null hypothesis is rejected. Therefore, there is a significance relationship in the academic performances in Mathematics between the private and public secondary school students in the North-West Zone,

#### Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.230	.000
	Cramer's V	.230	.000
N of Valid Cases		18571	

Furthermore, the phi and crammers value (0.23) also show that there is a strong positive significant relationship in the academic performances in Mathematics between the private and public secondary school students in the North-West Zone Nigeria in the West African Senior School Certificate Examination (WASSCE).

**Hypothesis 3:** There is no significant relationship between performances (pass/fail) in Mathematics and location (urban/rural) of students in North-West Zone, Nigeria (2016-2020).

To test this hypothesis, the results of the urban and rural secondary school students in Mathematics from 2012-2016 were analysed using chi-square statistic at 0.05 level of significance. The result is shown in table 11.

**Table 11: Chi-Square Tests of Performances (pass/fail) in Mathematics between Urban and Rural Students**





	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2947.090 <sup>a</sup>	1	.000		
Continuity Correction <sup>b</sup>	2945.489	1	.000		
Likelihood Ratio	3038.187	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	2946.931	1	.000		
N of Valid Cases	18570				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 4110.73.

b. Computed only for a 2x2 table

Source: Authors' fieldwork (2024)

The chi-square test yielded the results as presented in tables 11. On one degrees of freedom, with a high chi-square statistic (2947.09) and a corresponding significance value (p – value; 0.000) which is less than level of significance (0.05), hence the null hypothesis is rejected. Therefore, there is a significance relationship in the academic performances in Mathematics between the urban and rural secondary schools in the North–West Zone.

#### Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.398	.000
	Cramer's V	.398	.000
N of Valid Cases		18570	

Furthermore, the phi and crammers value (0.398) also show that there is a strong positive significant relationship in the academic performances in Mathematics between the urban and rural secondary school students in North-West Zone, Nigeria (2016 – 2020) in the West African Senior School Certificate Examination (WASSCE).

#### 4.5 Discussions of Major Findings

The main objective of the study was to analyse students' performances in Mathematics in West African Senior School Certificate Examinations (WASSCE) in North-West Zone, Nigeria between 2016-2020. The discussion of findings of this study is based on the results emanating from the test of hypotheses and the relationship between the present results and the findings of previous related studies.

The outcome of hypothesis 1 shows that there was significant relationship in the academic performances between the male and female secondary school students in Mathematics in West African Senior Certificate Examination (WASSCE). The findings reveals that the performances of both male and female students in Mathematics in the North-West Zone, Nigeria (2016-2020) were closely related. This submission is not surprising as it is a good thing for both male and female students to strive hard to compete with each other in Mathematics. This

finding was in consonance with the findings of Roy-Chowdhury (2016) that there was a significant relationship in the male and female academic performances in WASSCE in Mathematics. The low level of performances in the subject in the North-West Zone, Nigeria might perhaps be attributed to what Hooda and Devi (2017) described as poor staffing in schools, frequent withdrawal of children from schools, laziness on the account of many students and poor preparation of work in respect of many teachers in the schools.

Hypothesis 2 of this study also reveals that significant relationship existed in the academic performances between the private and public secondary school of students in Mathematics. The result showed a significant relationship in favour of male and female students in the private schools as against male and female students in the public schools. The finding shows that male and female students from private secondary schools performed better in Mathematics than their counterpart from the public secondary schools in 2016, 2017, 2018, 2019 and 2020 respectively. This is also in conformity with the result of the study conducted by Eze (2004) on the academic performance of students in WASSCE and NECO in private and public schools in Enugu State. In a similar study, Wushishi and Usman (2013) found a huge positive relationship in male and female students' academic performances in the private



schools as against the male and female students' academic performances in the public schools in English Language and Mathematics as a result of provision of facilities such as textbooks, laboratories, equipment and conducive classrooms. Also, a study conducted by Ofoegbu (2014) on teacher motivation: a factor for classroom effectiveness and school improvement in Nigeria revealed that poor academic performances in public schools can be attributed to poor teachers' performance in terms of accomplishing the task, negative attitude to work and poor teaching habits.

Based on the outcome of hypothesis 3, the study found out that there was significant relationship in the academic performances between the urban and rural secondary school students in Mathematics. The study revealed that urban schools had better performances than the rural schools. The finding of the study shows that students from urban secondary schools performed better in Mathematics than the students from the rural secondary schools in 2016, 2017, 2018, 2019 and 2020 respectively. This study corroborates Oyeromi, Omiyale, Lato and Oyebamii (2018) and Ahmed, Banerjee, Sen, and Chatterjee (2020) that causes of mass failure in the rural schools includes nonchalant attitude of students, dilapidated infrastructure, lack of teaching and learning facilities and incompetent teachers. This finding does not come by chance as there are provisions of social amenities such as electricity, water, good roads, conducive learning environment etc in the urban areas to justify the better academic performance hence better results are expected from students from the urban areas as against their counterparts from the rural areas.

### 5.1 Conclusions

Based on the result of the study, it is concluded as follows:

- i) Gender (male and female) does not affect the academic performance of secondary school students in Mathematics in North-West Zone, Nigeria (2016-2020);
- i) Type of school (private and public) affect the academic performance of secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020);
- ii) Location of school (urban and rural) affect the academic performance secondary school students in Mathematics in the North-West Zone, Nigeria (2016-2020).

### 5.2 Recommendations

The following recommendations are made based on the findings of the study:

1. Since the performance of male and female students are not impressive, efforts should be made by officials of the ministries in the seven states to regularly carry out routine supervision of instructions and monitor performance standards in Mathematics with a view to improving the quality of delivery.
2. Since the pass rate in private schools are higher than the public schools in Mathematics, the principals and teachers in the seven states should organize extra lessons and subject the students to regular homework. Doing this, will enhance better performance of the public schools' students in WASSCE and help bridge the gap with the students from the private secondary schools.
3. The State Ministry of Education in the seven states should encourage and motivate teachers from the rural schools by sponsoring them to attend seminars and workshops in Mathematics in order to broaden their knowledge of the subject and reduce the failure rate of the students and help bridge the gap with students from the urban schools.
4. A remedial mechanism should be developed and built into the school system by the government in the seven states, educational administrators, educational planners and other stakeholders in education industry. Government should always be conscious of the implication of its policies and positions on schooling and the multiplier effect on academic performance of students and teachers' productivity.

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