

Teacher Demand and Supply Projection from 2018 to 2027: A Case Study of Zamfara State Upper Basic Schools, Nigeria

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Abstract: Teachers' availability (demand and supply) in quantity and quality determine effectiveness in upper basic schools in term of academic performance. Despite various measures taken by the government in the past to supply more qualified teachers, there is a gap in the demand and supply of qualified teachers and this hinders academic performance of upper basic schools. This study investigated teacher demand projection and students' academic performance of upper basic school in Zamfara State, Nigeria. The objectives of the study were to examine the teacher demand in terms of prescribed teacher-students ratio of 1:40; determine the gap between teacher demand and teacher supply; investigate the trend of students' academic performance from 2011-2015; and determine the projection of teacher demand in upper basic schools in Zamfara State, Nigeria (2018 - 2028). A descriptive research design of survey type was employed for the study. A sample of 513 out of 1,526 principals and Zamfara State Ministry of Education, Nigeria was selected through purposive sampling technique. Two researcher designed instruments entitled "Teacher Demand and School Enrolment Inventory" (TDSEI) were validated by five experts in the area of Educational Management and Educational Research, Measurement and Evaluation. The findings of the study were that: upper basic schools in Zamfara State, Nigeria was adequately staffed with 11,245 teachers between 2013 and 2017 academic sessions; there was a close gap between teacher demand and supply in Zamfara State upper basic schools. There was a positive margin of 1,857 teachers in terms of ratio 1:40 benchmark; while the projected teacher demand in Zamfara State, Nigeria would be 27,281 teachers between 2018 and 2027 in her upper basic schools. The study concluded that there was adequate supply to teacher demand but may not necessarily be in core subject areas. The study recommended that by the year 2027, 27, 281 more teachers should be supplied into upper basic schools by the government.

Keywords: Demand, Projection, Supply, Teacher

1. Introduction

Education is an important tool for human growth and development in all the countries of the world. Following the 1948 Universal Declaration of Human Rights, education became a fundamental right. Nigeria is a signatory to many international educational agreements on basic education

including the 1990 Jomtien declaration and framework for action on basic education for all [1] the 1991 New Delhi declaration on the 2-9 countries (that is the nine countries with the largest concentration of illiterates) together with those held in Recife, Brazil in January 2000 on a massive

reduction of illiteracy in those countries. Consequent upon this, the Federal Government of Nigeria [1] recognized education as the greatest investment that the nation can make to bring about civilization, modernization, development and socio-economic progress. It is a preparatory ground for human development, where career abilities are groomed and potentials and talents discovered and energized.

The Universal Basic Education scheme in Nigeria was launched in Sokoto on Thursday 30th September, 1999. The aims of the programme as stated in the implementation guidelines include the developing a strong consciousness for education and strong commitment to its vigorous promotion in the entire citizenry. It is to cover the first nine years of schooling, that is; six years in the primary schools and three years in the Junior Secondary Schools. The intention of the Universal Basic Education in Nigeria is to provide free and compulsory education to all Nigerian children. It's make a child accessible to positive learning experience that will help him earn a living after the Junior Secondary School. It aims at providing the child with basic skills in reading, writing and arithmetic skills within the first nine years of schooling. These skills would make them to live a meaningful life and contribute to the development of their society at the end of their education.

The situation of increase in enrolment seriously calls for more teachers in junior secondary schools in Nigeria. There is no educational system that can rise above the quality of its teachers and that no nation can rise above the level of its teaching staff [1]. This statement has proven the key role teachers play in any progressive society. Hence, teachers play very significant roles in the attainment of the objectives of any educational system. Teachers are the most important input in the school system coupled with the material resources. The efforts of teachers guarantee the attainment of the school objectives. [2] noted that teachers are the group of people that hold the key to the door of modernization. They are responsible for implementing the curriculum. Thus, they are the determinants of the survival of the nation's educational system. [3] observed that without inspiring and well-informed teachers, there cannot be hope for long, to meet successfully, the challenges of a changing world. This assertion affirms the laudable roles of teachers in any school system.

The shortage of teachers in public secondary schools is one of the significant policy issues confronting every nation of the World as qualified teachers both in the developed and developing countries are rapidly becoming the hardest segment of the teaching profession to attract and retain. It is therefore, a global phenomenon. The UNESCO Report of 1997 states that as at 1980, the world with total population of 5.5 billion only had 40 million teachers engaged in its teaching profession which gave the ratio of one teacher to 112 inhabitants. In 1965, there was one secondary school teacher for 10,000 people in Europe and one for 150,000 people in Africa [4].

Teacher shortage in Nigeria is an age-long challenge right from the beginning of education activities (establishment of schools) by the Missions. Many authors such as [5] and [6]

reported the shortage of teachers as the missions began to establish schools; as well as during the era of colonial government control of education; and during the period of self-government. It must however be noted that, the Missions did not go into establishment of schools because they saw education as good in itself, but because they found that they could not succeed in their evangelism without giving their adherents, and especially their clergymen, much of the formal learning required for the study of the sacred writings and for the performance of their religious duties [7]. Be that as it may, the expansion and the interest of the populace to be educated especially in the South-west led to a significant shortage in the supply of qualified teachers, which prevented the Missions from using their certificated teachers during the period especially by the year 1940 [6].

The quantity and quality of teachers put in place will have a great influence on the kind of school products released to the society. Teachers determine the involvement and contribution of individuals to the growth and development of society in which they live. In order to accomplish the educational goals, practical steps have been taken by educational planners to design instructional programmes that run in schools where teachers and learners (students) are the focus. The realization of these goals is academic achievement. [8] described academic achievement as representing performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in schools, colleges, and universities. It is a multifaceted construct embracing a wide range of learning outcomes, one of which is students' academic performance (SAP) in standardized Junior Secondary School Certificate Examinations (JSSCE). Many factors ranging from teacher, student, family and society related factors affect students' academic performance. For teacher-related factors, [9] identified the need to assess the characteristics of the secondary school teachers in terms of qualification, experience and teaching methodology in order to ensure the quality of education given to the youths.

To transit from the ninth year of the basic education to the senior secondary, the Junior School Certificate Examination (JSCE) is conducted for candidates in their final year of the Basic education. The JSCE is being administered by the various state Ministries of Education for all the state-owned schools, while National Examinations Council (NECO) conducts the examination for Federal Unity Colleges, Armed Forces Secondary Schools and other Federal establishments operating secondary schools across the country. Private-owned schools field their candidates for both NECO/JSCE on the approval of the state Ministries of Education. A candidate is expected to sit for a minimum of ten subjects and a maximum of thirteen out of the 22 subjects that are offered at the upper Basic level. For a candidate to transit to senior secondary school level, he/she is expected to pass at credit level in six subjects which must include English and Mathematics. However, the grading system includes A – Distinction, C – Credit, P – Pass and F – Fail. Learning

achievement is very high at upper basic school but low in Senior Secondary Schools. From 2001-2005, 79%-91% of the candidates were successful in JSCE core subjects [10].

2. The Problem

Unprecedented increase in students' enrollment as a result of the introduction Universal Basic Education (UBE) with acute shortage of teachers in Nigeria especially in Zamfara State has created a serious personnel gap in the implementation of the programme. There is a gap in the supply and demand for qualified teachers in basic schools across Local Government Areas in the State. Based on the survey conducted by the researchers of this study, it was reported that there was no recruitment of teachers from 2011 to 2018 due to lack of political goodwill.

Afolabi [11], Iliasu [12], Tomori [13], Tijani [14], Muritala [15] and Adebayo [16] conducted various studies on teacher demand and supply without quantifying the gap between the two variables. Although, Adedeji [17] conducted a study on teacher demand and supply in Zamfara State but none of the researchers carried any study on teachers and students' enrollment projection in Upper Basic Schools in Zamfara State, Nigeria.

The students' academic performance of students in Junior Secondary School Examination (JSCE) in upper basic schools has not been consistent over the years in North-west, Nigeria. [11] submitted that the performance of students in JSCE reduced from 86% to 60% between 2007 and 2008 in Zamfara State schools. This, therefore, necessitated the call for this study to investigate teacher demand projection and students' academic performance in Zamfara State upper basic schools, Nigeria.

2.1. Purpose of the Study

The main purpose of this study was to investigate teacher demand projection and students' academic performance in Zamfara State upper basic schools, Nigeria. Specifically, the study was to:

- i. examine the teacher demand in terms of prescribed teacher-students ratio of 1:35 in upper basic schools, Zamfara State, Nigeria (2011-2015);
- ii. examine the number of teacher supply in upper basic schools in Zamfara State, Nigeria from 2013 to 2017;
- iii. determine the gap between teacher demand and teacher supply in upper basic schools in Zamfara State, Nigeria (2011-2015);
- iv. determine the projection of students' enrolment in upper basic schools in Zamfara State, Nigeria (2018 - 2028) and;
- v. determine the projection of teacher demand in upper basic schools in Zamfara State, Nigeria (2018 - 2028);

2.2. Research Questions

This study focused on the teacher demand projection and students' academic performance in Zamfara State upper basic

schools, Nigeria. The following research questions were raised to guide the study:

- i. What is teacher demand in terms of prescribed teacher-students ratio of 1:40 in upperbasic schools in Zamfara State, Nigeria (2011-2015)?
- ii. What is the number of teacher supply in upper basic schools in Zamfara State, Nigeria from 2013 to 2017?
- iii. What is the gap between teacher demand and teacher supply in upper basic schools in Zamfara State, Nigeria (2011-2015)?
- iv. What is the trend of students' academic performance in Upper Basic schools in Zamfara State, Nigeria (2013-2017)?
- v. What is the projection of students' enrolment in upper basic schools in Zamfara State, Nigeria for the years 2018-2028?
- vi. What is the projection of teacher demand in upper basic schools in Zamfara State, Nigeria for the years 2015-2027?

3. Materials and Methods

This study was a descriptive research design of survey type. It required a systematic collection of data from a sampled population, using the identified instrument (proforma). This method was considered appropriate in this study because it allowed the researcher to make careful and accurate correlation of teachers needed and those actually made available to teach in upper basic schools in Zamfara State, Nigeria.

The population for this study comprised all the upper basic schools in Zamfara State, Nigeria. The population was 1,513 principals [1] from basic schools in Zamfara State, Nigeria. The principals and SUBEB officials were selected because they could provide relevant data for the conduct of the study.

The research instruments that were used in this study were two sets of inventories: 'Teacher Demand and School Enrolment Inventory' (TDSEI) and 'Students Academic Performance Inventory' (SAPI) filled by officials of SUBEB. Teacher Demand and School Enrolment Inventory sought information on teacher demand and students' enrolment in basic schools in Zamfara State, Nigeria between year 2011 and 2015.

In order to ascertain the validity of the instruments used in this study, copies of the draft instruments were given to five experts who were Senior Lecturers and Professor in the fields of Management and Educational Test and Measurement at the University of Ilorin, to look at the suitability of the instruments' items. The criticism and corrections made were incorporated into the final draft of the instruments. The reliability of the instruments was not carried out because the data collected for this study were secondary data.

The researchers administered the instruments to the respondents in the officials in SUBEB office at the Zamfara State headquarters, Gusau, Nigeria. All procedures in this research were adhered to strictly and conformed to the principles of research.

The data collected were analysed using descriptive statistic (percentage). Percentage score and projection formula $P_n = P_o \times (1 + r)^x$ were used to project teacher demand and supply.

4. Results

Research Question 1: What is teacher demand in terms of prescribed teacher-students ratio of 1:40 in upper basic schools in Zamfara State, Nigeria (2011-2015)?

Table 1: Teacher Demand in Terms of Prescribed Teacher-students Ratio of 1:40 in Upper Basic Schools in Zamfara State, Nigeria (2013-2017).

To arrive at the teacher demand in terms of government prescribed ratio 1:40 in upper basic school, students' enrolments were obtained from the upper basic schools in each LGAs and divided by 40 (government prescribed ratio) as shown in Table 1.

Table 1. Number of Teacher Demand for Upper Basic Schools in Zamfara State, Nigeria.

S/N	Years	Students' Enrolment	Teacher Demand
1	2013	83,054	2,076
2	2014	92,092	2,302
3	2015	93,605	2,340
4	2016	88,548	2,214
5	2017	92,491	2,313
TOTAL		449,788	11,245

Source: Field Work.

Table 1 shows the number of teacher demand for upper basic schools in Zamfara State, Nigeria from 2013 to 2017. The Table indicated that the number of teacher demand in 2013 was 2,076, while it was 2,302 in 2014. In 2015, the number of teacher demand was 2,340, 2,214 in 2016 and 2,313 in 2017.

This is graphically presented in Figure 2.

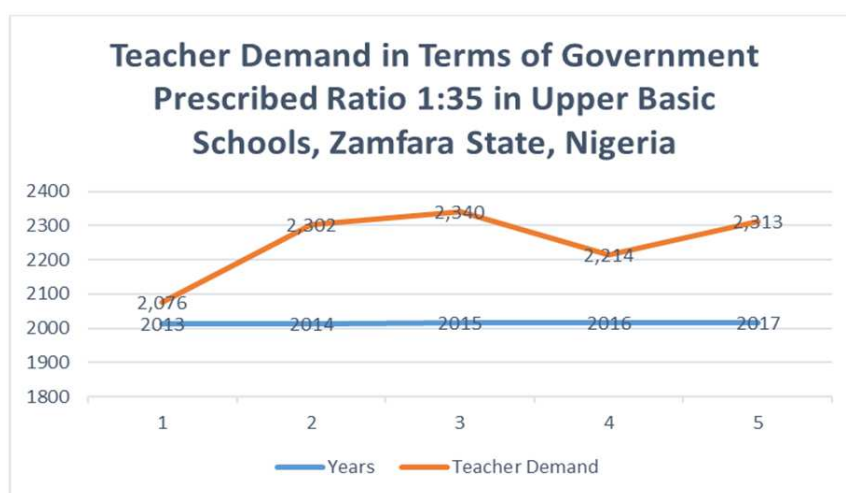


Figure 1. Teacher demand in terms of Government prescribed ratio 1:35 in upper basic school, Zamfara State, Nigeria.

Figure 2 shows the number of teacher demand based on prescribed government ratio of 1:40 in upper basic schools in Zamfara State, Nigeria. As revealed from this table, the total number of teacher demand between 2013 and 2017 was 11,245.

Research Question 2: What is the number of teacher supply in upper basic schools in Zamfara State, Nigeria from 2013 to 2017?

In order to answer this research question, a total number of teachers available in the sampled upper basic schools in Zamfara State, Nigeria was obtained as shown in Table 2.

Table 2. Teacher supply into basic schools in Zamfara State Nigeria from 2011-2015.

Years	Numbers of Teacher Supply	
	Frequency	%
2013	NA	NA
2014	3,419	-
2015	2,649	12.5%
2016	2,488	6%
2017	2,470	1%
Total	11,026	100

Source: Field Work (2018).

Table 3 shows the quantity of teacher supply into basic schools in Zamfara State, Nigeria from 2011 to 2015. It was shown in the table that in 2011, 9806 teachers were supplied into upper basic schools and 12,881 in 2012. Also, in 2013, 5,783 teachers were supplied; in 2014, 7,321 teachers were supplied and in 2015, 9,363 teachers were supplied to upper basic schools in Zamfara State, Nigeria. The total number of teachers supplied at the end of 2015 was 45154. Furthermore, the quantity of teacher supply in Zamfara State, Nigeria is presented in Figure 3.

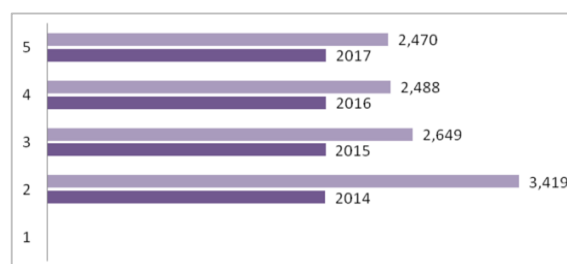


Figure 2. The number of teacher demand based on prescribed government ratio of 1:40 in upper basic schools in Zamfara State, Nigeria.

As shown in figure 3, the highest supply of teachers was in year 2014 with 28%, while lowest supply of teachers was made in 2013. From this figure, it was shown that between 2011 and 2015, a total number of 45154 teachers were supplied to upper basic schools in Zamfara State, Nigeria.

Research Question 3: What is the gap between ideal teacher demand and actual teacher supply in upper basic schools in Zamfara State, Nigeria (2013-2017)?

Table 3. Gap between teacher demand and supply in upper basic education in Zamfara State from 2013-2017.

Years	Teacher Demand	Teacher Supply	Gap	
			Difference	%
2013	NA	NA	-	-
2014	2,302	3,419	1,117	-
2015	2,340	2,649	309	28
2016	2,214	2,488	274	11
2017	2,313	2,470	157	43
	9,169	11,026	1857	100

Table 3 reveals the gap between teacher demand and supply by ascertaining the number of teacher demand and number of teacher supply in Zamfara State, Nigeria from 2011 to 2015. The table presented further that the data for teacher demand in 2013 was not available. Also, in 2014, the teacher demand was 2,302 and the teacher supply was 3,419 while the gap between the teacher demand and the supply in 2014 was 1,117. Furthermore, the teacher demand in 2015 was 2,649 and the teacher supply was 2,340, while the gap between teacher demand and supply in 2015 was 309 (28%). In 2016, the teacher demand was 2,214 and the teacher supply was 2,488, while the gap between the teacher demand and supply was 274 (11%). In 2017, the teacher demand was 2,213 and the teacher supply was 2,470, while the gap between teacher demand and supply was 157 (43%). The gap between teacher demand and teacher supply was presented further by graphic illustration in figure 3.

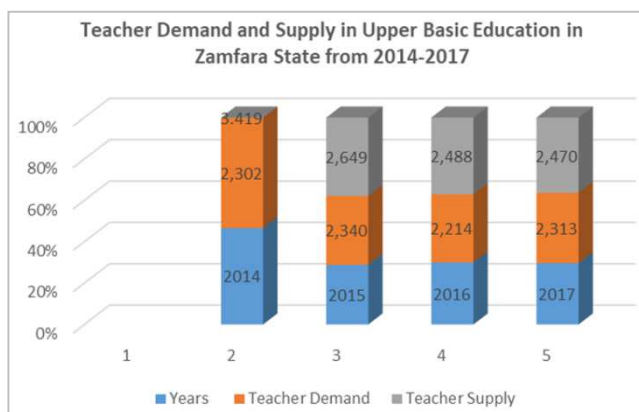


Figure 3. The total number of teacher demand and supply in upper basic education in Zamfara State.

Figure 3 shows that the total number of teacher demand was 9,169 and the teacher supply was 11,026 while the total gap was 1,857 teachers. This, therefore, revealed that as at the end of 2017, the Zamfara State upper basic schools,

Nigeria was over-supplied with 1,857 teachers.

Research Question 4: What is the projection of teacher demand in upper basic schools in Zamfara State, Nigeria for the years 2018-2027?

To arrive at the projection for students' enrolment, the following formula was used:

$$P_n = P_o \times (1 + r)^x$$

where: P_o = Population (Number of students) in the base year ... (2017);

P_n = Population (Number of students) in the 10th year ... (2027);

r = Growth Rate... (3%);

x = Number of time interval = (10 years);

Source: [5].

As presented in this study, Table 4 shows the projected students' enrolment for upper basic schools in Zamfara State, Nigeria from 2018 to 2027. The table shows that the projected students' enrolment in Zamfara State, Nigeria in 2018 was 95,266 and 98,133 in 2019. It was also shown in the table that the projected students' enrolment in Zamfara State upper basic schools in 2020 would be above 101,093, in 2021, 104,145, in 2022, 107,197, in 2023, 110,434 and in 2024, 112,764. The projected students' enrolment in 2025 would be 117,186, in 2026, 120,701 and 124,308 in 2027.

Table 4. Projection of Students' Enrolment in upper basic school in Zamfara State, Nigeria from 2018 – 2027.

Years	Projected Students' Enrolment
2018	95,266
2019	98,133
2020	101,093
2021	104,145
2022	107,197
2023	110,434
2024	112,764
2025	117,186
2026	120,701
2027	124,308

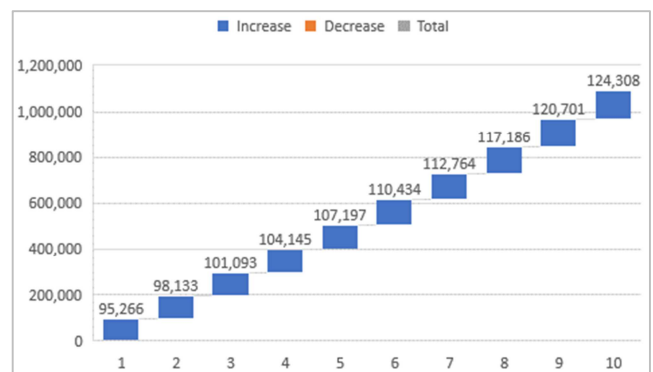


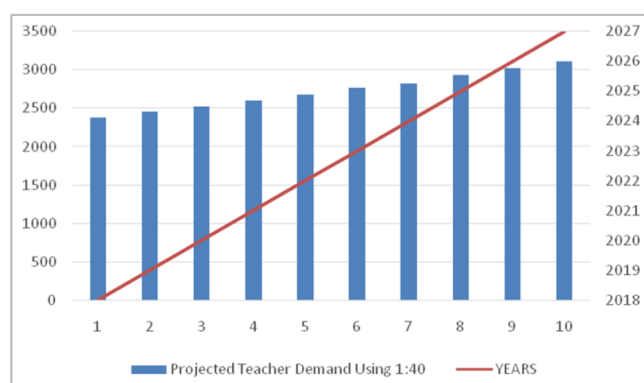
Figure 4. Projection of Students' Enrolment in upper basic school in Zamfara State, Nigeria from 2018 – 2027.

Research Question 5: What is the projection of teacher demand in upper basic schools in Zamfara State, Nigeria for the years 2018-2027?

Table 5. Projection of Teacher Demand in Upper Basic Schools in Zamfara State, Nigeria for the Years 2018-2027.

Years	Projected Students' Enrolment	Projected Teacher Demand using 1:40	Additional Teacher Required Annually
2018	95,266	2382	-
2019	98,133	2453	71
2020	101,093	2527	74
2021	104,145	2604	77
2022	107,197	2680	76
2023	110,434	2761	81
2024	112,764	2819	58
2025	117,186,	2929	110
2026	120,701	3018	89
2027	124,308	3108	90
Total		27281	726

Table 5 revealed the projected teacher demand at upper basic schools in Zamfara State, Nigeria from 2018-2027. The year 2017 serves as the base year with the demand of 2,470 teachers. The table indicated that projected teacher demand for 2018 is 2,382, the projected teacher demand for 2019, 2020 and 2021 are 2453, 2527 and 2,604 teachers respectively. Also, the table shows further that in 2022, 2023 and 2024 the projected teacher demand are 2,680, 2761 and 2819. The projected teacher demand for year 2025 is 2,929, the projected teacher demand for year 2026 is 3018 and in 2027, the projected teacher demand is 3,108. The graph also shows that, to achieve optimum efficiency and effectiveness in upper basic schools, 71 teachers would be required for 98,133 students by year 2019. An additional 74 teachers plus the available number of teachers in the year 2020 and 77 will be required for the year 2021. 76, 81, 58 additional teachers would be required annually from 2022 to 2024 respectively. Also, additional 110, 89 and 90 teachers would be employed for 2025, 2026 and 2027 respectively. This is further graphically presented as follows:

**Figure 5.** Teacher Demand Projection in Upper Basic Schools in Zamfara State, Nigeria from the Years 2018-2027.

5. Discussion of Findings

The explanations and discussions of the findings were carried out as findings on the teacher demand in terms of government prescribed ratio of 1:40, teacher supply, gap between teacher demand and teacher supply, projection of students' enrolment and teacher demand from 2018 to 2027;

and trend of student academic achievement in upper basic schools, Zamfara State, Nigeria.

One of the specific purposes of this study was to examine the teacher demand in terms of benchmark of 1:40 in upper basic schools Zamfara State, Nigeria. The finding to this purpose revealed that the teacher demand was on the arithmetic increase on yearly basis from 2013-2017. The findings further revealed that upper basic schools in Zamfara State, Nigeria were adequately staffed with 11,245 teachers between 2013 and 2017. The finding of this study contradicted the assertions of [18, 19] that demand for teachers in all educational system and in secondary schools in particular is always higher than the supply.

The finding of this study also revealed that the gap between teacher demand and supply was on positive margin of 1,857 teachers. This implied that teachers were adequate in terms of benchmark of 1:40 in upper basic schools Zamfara State, Nigeria but in terms of subject areas there could be shortage. Based on this, [16] asserted that many teachers are needed in UBE schools to teach core subjects like Mathematics, English Language, Introductory Technology and Science Subjects. The supply of teachers in these core areas is highly limited. This creates a shortage of teachers in our UBE schools.

The finding of this study indicated that the projected teacher demand in Zamfara State, Nigeria would be 27, 281 teachers between 2018 and 2027 in her upper basic schools. This implies that the government in Zamfara State, Nigeria would be expected to supply minimum of 27, 281 teachers in to upper basic schools in other to bring about effectiveness. The findings of this study revealed that there was effectiveness in the trend of academic achievement of upper basic schools in Zamfara State, Nigeria from 2013 to 2017 was on the average. This could be as a result of the qualities of teachers recruited to teach in the upper basic schools. This is because the quality of teachers determines the quality of product that is produced because the teacher has a unique influence on student's academic performance. This finding agreed with [6] that the teacher demand, supply and utilization have significant roles to play in ensuring a successful implementation of effective educational planning programme.

6. Conclusion

Teachers are very important in the implementation of school curriculum. When they are recruited in the required quantity and quality with periodic training, it is believed that students' academic performance will improve and the overall goals of education at basic level will be effectively achieved for a sustainable national development.

7. Recommendations

Based on the conclusions from this study, the following recommendations were made that;

1. 27, 281 more teachers should be supplied into the upper basic schools in Zamfara State between 2018 and 2027. This will enable the upper basic schools have adequate teachers and enhance more effectiveness.
2. Necessary facilities such as classrooms, staff rooms, laboratories among others should also be made available in required quality and quantity to meet up with these projections.

Authors' Contributions

1. ADEDEJI, Israel Olusegun Ph.D. – Data Analysis, Interpretation and Discussion of Findings (Lead Researcher);
2. OKONKWO, Onyekachi Ihuoma – Original Draft Preparation;
3. ADEGBILE-NNAEDOZIE, Oluchi- Review and Editing;
4. YAKUBU, Dauda – Data Administration and Collection.

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