

# Assessing the Performance of Junior High Students in the Obuasi Municipality of the Ashanti Region of Ghana

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## Abstract

Education has been one of the top most priorities of most developing countries. Students of the junior high schools are examined by the West Africa Examination Council (WAEC) under the examination title Basic Education Certificate Examination (BECE) at the end of the three year program. It is in this light that we assess the performance of junior high secondary students in Obuasi Municipality using their aggregates of the BECE from 2009 to 2012. Non parametric statistical methods (Kruskal Wallis test and Mann Whitney test) were used to analyze the data since the normality assumption was violated. Result from Kruskal Wallis test indicated that there were significant differences in the performance of the students from 2009 to 2012. Mann Whitney specifically showed significant differences in student's performance between (2009 and 2010, 2010 and 2012, 2011 and 2012) and no significant difference in performance between (2009 and 2012, 2010 and 2011). Again Mann Whitney test showed no significant difference in the performances of males and females. It is recommended that there should be an effective supervision from the stakeholders as well as parents to enhance effective teaching and learning.

**Keywords:** Basic Education Certificate Examination, Aggregate, Kruskal Wallis test and Mann Whitney test

## 1. 0 Introduction/Background

### 1.1 Background

Examination has been the greatest challenge to most students as academic achievements are concerned. Most great men and women who have achieved greater height in the educational ladder (academic excellence) were in one way or the other treated by examination.

The success of any academic program is usually measured by the performance of its products (students) at the end of the program. The basic education program with duration of three years which started in 1987 is no exception. According to Mankoe (2002), performance refers to the extent to which a worker or a student contributes to achieving the goals of his or her institution, and an individual with weak motivation might perform well owing to some chance factor that boosts performance.

The basic education consists of nine years of schooling, which is free and universal for all children normally with ages ranging from 6 to 15 years. Basic education is the minimum formal education to which every Ghanaian child is entitled to as a right, to equip him/her to function effectively in the society. This serves as a transitional point for further studies (Ministry of Education, 1986).

Basic education connotes the attainment of certain minimum levels of educational goals – the mastery of some basic knowledge and skills. The emphasis on junior secondary education in the early part of the reform was therefore to ensure every child is equipped with the essential knowledge and skills that can make him/her develop the ability to function effectively in the society. Basic education concept therefore embodies a philosophy that has implications for assessment, grading and certification of junior secondary school graduates (Akplu, 1999).

Subjects taught at the junior secondary school level are Ghanaian Language and Culture, English, Mathematics, Integrated Science, Basic Design and Technology, French (optional for schools), Religious and Moral Education, Information and Communication Technology and Social Studies.

The students write exams usually referred to as Basic Education Certificate Examination (BECE) on these subjects at the end of the three years. The students are graded on a scale of 1 to 9 for each subject and their aggregate score is computed for the best six subjects.

### 1.2 Problem statement

Currently the Ghana Education Service (G.E.S.) has introduced a new computer selection program which assigns students into various Senior High Schools (S.H.S.) based on their performance in the WAEC organized Basic Education Certificate Examination (BECE). Most districts and municipalities are mapping strategies to improve the performance of students in the Basic Education Certificate Examination and Obuasi Municipality is no exception. It is in this light that we assess the performance of junior high secondary students in the Obuasi municipality using their aggregate scores of the BECE from 2009 to 2012.

### 1.3 Objectives

- Generally, this research seeks to find out if the average performance of students is the same or not over the years (2009 to 2012).
- To find out if the average performance of males and females are the same or not over the years (2009 to 2012).
- To make sustainable policy recommendations to concerned stakeholders on student performances in the B.E.C.E.

### 2.0 Materials and Methods

The source of data for this study is a secondary data from the Education office of the Obuasi Municipal Assembly in the Ashanti region of Ghana. The municipality is located in the southern part of the Ashanti region and has the population of 233,248 according to 2010 population and housing census. The major occupation in the municipality is mining and other services. The data mainly consist of students' aggregate of the Basic Education Certificate Examination (B.E.C.E.) from 2009 to 2012.

According to John W. Tukey (1977), exploratory data analysis can never be the whole story but nothing else can serve as a foundation stone- as the first step. Frequency tables and summary statistics were used to explore the data. Test of normality was carried out informally using QQ plots and formally using **Kolmogorov-**

**Smirnov test**. The hypothesis of interest is  $H_0$ : The observations (data) are normally distributed against  $H_1$ : The observations (data) are not normally distributed. We reject  $H_0$  if the p-value is  $\leq$  level of significance ( $\alpha$ ) otherwise we fail to reject  $H_0$ .

Non parametric version of Anova (Kruskal Wallis test also known as H test) was used to test if the average performance is the same or not over the years (2009 to 2012). Test Statistic for H is given as

$$H = \frac{12}{n(n+1)} \sum_{i=1}^k \frac{R_i^2}{n_i} - 3(n+1) \quad (1)$$

Where  $R_i$  is the sum of the ranks of the values of the  $i$ -th sample (2009, 2010, 2011 and 2012),  $n = n_1 + n_2 + \dots + n_k$  and  $k$  is the number of populations sampled. The p-value of H was computed. The hypothesis of interest is;

$$H_0 : \mu_1 = \mu_2 = \dots = \mu_k \quad \text{against} \quad H_1 : \mu_i \neq \mu_j \quad \text{for some } i \neq j.$$

If the p-value is  $\leq$  level of significance ( $\alpha$ ), we reject  $H_0$  and claim that the average performance is not the same over the years otherwise we fail to reject  $H_0$  and conclude that the average performance is the same over the years. Post Hoc procedure for non parametric Anova was carried out with Mann Whitney test to show if there are differences in the performances of the students between two respective years. The hypothesis of interest is

$$H_0 : \mu_i = \mu_j \quad \text{against} \quad H_1 : \mu_i \neq \mu_j \quad \text{for some } i \neq j.$$

We reject  $H_0$  if the p-value is  $\leq$  level of significance ( $\alpha$ ), otherwise we fail to reject  $H_0$ .

All statistical tests were controlled at 5% level of significance ( $\alpha$ ).

### 3.0 Results and Discussion

#### 3.1 Descriptive Analysis

Table 1: **Distribution** of Aggregates and Gender

Variable	Total	Percent	Mean	StDev	Median
Aggregates	17742	100	13.613	6.025	13.000
Female	8462	47.7	13.668	6.001	13.000
Male	9280	52.3	13.562	6.046	13.000

Source: The Authors

A total of 17742 students wrote the B.E.C.E. from 2009 to 2012 in the Obuasi Municipality.

The average aggregate of students of the years under review is 13.61 with a standard deviation of 6.03 and a median of aggregate 13. The number of males who wrote the examination were more than the number of females who wrote the exams.

Table 2: Distribution of aggregates

Aggregate	Frequency	Percent
6-10	6411	36.1
11-20	8938	50.4
21-25	1783	10.1
26 and above	610	3.4

Source: The Authors

A total of 17130 (96.6%) students obtained aggregates (6-25). From the Ghana Education Service (G.E.S.), aggregates 25 and below qualifies a student to the Senior High School. From Table 2, it is evident that only 3.4% of the total students presented over the years under review could not proceed to Senior High School.

Table 3: The number of students presented for years (2009-2012)

Variable	Years	Total	Percent	Mean	StDev	Variance	Median
Aggregates	2009	4347	24.5012	14.132	6.301	39.705	13.000
	2010	4380	24.6872	13.113	5.637	31.770	13.000
	2011	4580	25.8145	13.122	6.027	36.329	12.000
	2012	4435	24.9972	14.105	6.034	36.415	14.000
Total		17742	100				

Source: The Authors

Approximately the same number of candidates took the exams for the years under review. The median suggest that the candidates performed better in 2011 than in 2009, 2010 and 2012.

### 3.2 Test of Normality

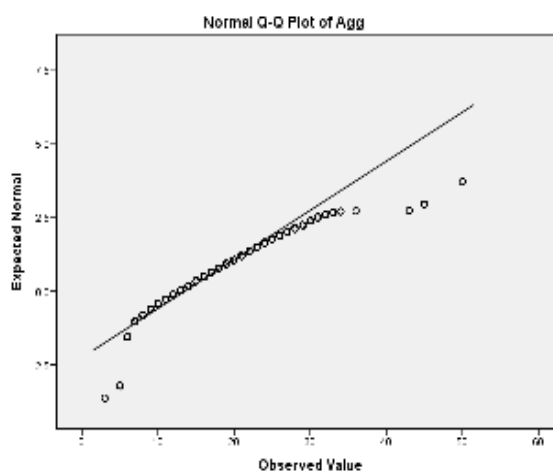


Figure 1: QQ plot for test of normality

A data is said to be normal when almost all the data points lie on the normality line. Figure 1 suggests that the observations are not normally distributed.

### 3.3 Formal test for normality using Kolmogorov-Smirnov test

Table 4: **Kolmogorov-Smirnov test for Normality**

Variable	N	Percent	Statistic	Df	P
Aggregates	17742	100	0.102	17742	0.000

Source: The Authors

From table 4, since the p-value (0.000) is less than the  $\alpha$ -value (0.05), the null hypothesis ( $H_0$ ) is rejected. Hence the data is not normal. Non-parametric methods were used to answer the research objectives.

### 3.4 Kruskal-Wallis Test

Table 5: Kruskal-Wallis Test for testing the difference in aggregates over the **years**

Years	N	Median	H	P	DF
2009	4347	13.00	116.25	0.000	3
2010	4380	13.00			
2011	4580	12.00			
2012	4435	14.00			
Overall	17742				

The p-value (0.000) is less than the  $\alpha$ -value (0.05), hence the null hypothesis ( $H_0$ ) is rejected. Hence we conclude that there is a significant difference in students' performance over the years.

### 3.5 Mann-Whitney Test

Table 6: Mann-Whitney Test for testing the differences in performance between two respective years

Years	p-value	Years	p-value
2009 and 2010	0.0000	2010 and 2011	0.2806
2009 and 2011	0.0000	2010 and 2012	0.0000
2009 and 2012	0.3882	2011 and 2012	0.0000

Source: The Authors

The p-value (0.0000) for comparing the years 2009 and 2010, 2009 and 2011, 2010 and 2012 and 2011 and 2012 is less than the  $\alpha$ -value (0.05), hence the null hypothesis ( $H_0$ ) is rejected. We therefore conclude that there are significant differences in the students' performance between the years 2009 and 2010, 2009 and 2011, 2010 and 2012 and 2011 and 2012. Also from the table, the p-value (0.3882) for comparing the year 2009 and 2012 (0.3882) is greater than the  $\alpha$ -value (0.05), hence the null hypothesis ( $H_0$ ) cannot be rejected. We therefore conclude that there is no significant difference in the students' performance between the year 2009 and 2012. The p-value (0.2806) for comparing the year 2010 and 2011 is greater than the  $\alpha$ -value (0.05), hence the null hypothesis ( $H_0$ ) cannot be rejected. We therefore conclude that there is no significant difference in students' performance between the year 2010 and 2011.

### 3.6 Mann-Whitney Test for testing the difference in gender performance

Table 7: Testing for the differences in aggregates between gender

Gender	N	Median	P
Male	9280	13.000	0.1509
Female	8462	13.000	

Source: The Authors

The p-value (0.1509) is greater than the  $\alpha$ -value (0.05), we therefore fail to reject the null hypothesis hence there is no significant difference in the performance of males and females. Hence, statistically the performance of the females is as good as that of the males.

### 4.0 Conclusion

From our analysis we found out that there were significant differences in the performance of the students for the years under review. Specifically, there were significant differences in student's performance between (2009 and 2010, 2009 and 2011, 2010 and 2012 and 2011 and 2012) and no significant difference in the performance between (2009 and 2012 and 2010 and 2011). There was no significant difference in the performances of males and females as well.

### 5.0 Recommendations

The following recommendations are made for the improvement of students' performance in the municipality.

- There should be an effective supervision from the stakeholders as well as parents to enhance effective teaching and learning.
- Also, teachers should be well motivated since they are the key players as far as student performance is concern.

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