

## **The trend analysis of “O”-level Statistics uptake and an assessment of the perceptions of students on Statistics education in Zimbabwe**

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### **Abstract**

*This paper investigated the trend in the uptake of secondary school Ordinary level Statistics from 2009 to 2012 in Zimbabwe and the awareness and perceptions of students on Statistics education. A general upward trend in the uptake of the subject was observed though its uptake compared to the overall ordinary level candidature was quite low, exemplified by 0.10% for the year 2012. The awareness level was at 40.9% and most students mainly knew about it from outside sources. This study concluded that though there was an upward trend in the uptake of Statistics, a vigorous awareness campaign would further stimulate its visibility and uptake. Significant associations were observed between gender and the students' perceptions on both the importance of statistics in decision making and the importance of career guidance in assisting students in the selection of ordinary level subjects for careers requiring Statistics, with male students agreeing more than their female counterparts on both opinions.*

**Key Words:** *Ordinary level Statistics, stand alone, trend, perception, association*

## 1. Introduction

In Statistics, the subject is data, not just data as numbers studied by Mathematics but data in context (Schield, 1999). Statistics holds a central position in every educational field like Commerce, Physics, Chemistry, Economics, Mathematics, Biology, Botany, Psychology, Medicine and Astronomy. These days, we encounter the use of statistics in everything ranging from news reports, sports reports, weather, elections, business reports, stocks, advertisements, and economic conditions. Reforms on the mathematics curriculum in many countries from about 1990 brought topics related to statistics and probability into school curricula and provided a starting point for consideration of Statistics literacy (Watson, 2003). Despite the widespread emphasis on the reforms in the teaching of Statistics, today Statistics education is still viewed as a new and emerging discipline, when compared to other areas of study and inquiry (Garfield and Ben-Zvi, 2007). In Zimbabwe, Statistics elements have been embedded in the current Mathematics syllabus. However, in 2005, the Zimbabwe Schools Examination Council (ZIMSEC) started offering examinations for Statistics as a stand alone Ordinary (O') Level subject. The subject is currently being sat for during the November examinations period. However since the inception of Statistics as a stand alone subject, the subject have been registering low uptake. The main objective of this study is to look at the trend of students sitting for Statistics and to determine students' awareness and perceptions of the subject.

## 2. Statistics Literacy

For students to be able to exercise their full rights of citizenship, they have to be able to read and write in order to face the needs of their social context and to use their abilities to keep learning and developing throughout their lifetime, (IPM, 2005). To do so, it is not enough to have school knowledge; it is also necessary to know how to mobilize this knowledge in order to solve daily life problems (Carvalho, 2006). Out-of-school experiences place basic Statistics ideas in many and varied contexts which need to be comprehended and applied.

Many curriculum frameworks and national and international educational initiatives stress the need for all people to function effectively in an information-laden society (Gal, 2002). However, statistical literacy, critical to becoming more informed citizens and employees, is often neglected. Gal(2002) defined statistical literacy broadly as two interrelated components, primarily (a) people's ability to interpret and critically evaluate statistical information, data-related arguments, or stochastic phenomena, which they may encounter in diverse contexts, and when relevant (b) their ability to discuss or communicate their reactions to such statistical information, such as their understanding of the meaning of the information, their opinions about the implications of this information, or their concerns regarding the acceptability of given conclusions.

Several factors contribute to the importance of students developing statistical literacy skills at the high school level (Watson, 2003). Firstly, it is the expectation for participation as citizens in the information and data driven age where decision-making is likely to be based on critical skills from the realms of statistical literacy. It is widely recognized that Statistics is one of the most important quantitative subjects in a university curriculum (Watson, 1997), but it is also acknowledged that

teaching Statistics courses is challenging because institutions serve students with varying backgrounds and abilities, many of whom have had negative experiences with Statistics and Mathematics. Thus doing this subject at secondary school level will greatly assist students in their future careers.

### **3. Methodology**

The data for investigating the students' uptake of 'O'-Level Statistics trend was obtained from ZIMSEC. This covered the period from 2009 to 2012 only due to the unavailability of data for the preceding years. A survey was carried among five schools in Harare/Chitungwiza districts to determine the subject awareness levels and the perceptions of students about the subject. Schools were conveniently selected and Form Three and Four students were randomly picked to participate in the survey. A sample of size one hundred and twelve (112) was collected and used for this investigation. A questionnaire was used to solicit information from the students. A time series trend plot was constructed using Excel spreadsheet for the uptake trend investigation. The data was analyzed using the statistical package SPSS version 16.

### **4. Results and Discussion**

Figure 1 is a trend line showing the uptake of Ordinary Level Statistics from 2009 to 2012. Though there seems to be an upward trend, the numbers are still disturbingly low. Of the 172 698 students who sat for the November 2012 examinations, only 180 students sat for the Statistics paper. Thus the subject uptake was at merely 0.10% for the November 2012 entrants. Much has to be done to improve the uptake of Statistics as a stand alone subject.

The awareness and perceptions about the subject analysis revealed the following findings. Most of the students (59.1%) were not aware that Statistics is a stand alone subject at 'O'- level.

The students, who were aware of Statistics being a stand alone subject (40.9%), got the information about the subject from friends from other schools (44.2%), school authorities (30.2%), relatives (20.9%) and ZIMSEC (4.7%) as shown in figure 2 above. Also of those who were aware, only 47.6% were taking Statistics as a subject at 'O'- level. Most of the students (89.2%) felt that Statistics knowledge would be required in their future careers.

Table 1 has ten items addressing student's perceptions about Statistics education. The Cronbach's alpha for the ten items was 0.815, implying that the questions were good on addressing the issue of students perceptions.

Most students (83.8%) felt that Statistics was an important subject in life, with 11.8 % not sure whether it was important or not. 79.8% of the students agreed that Statistics is an interesting subject. Most students (73.8%) agreed that Statistics is useful in learning other subjects. A considerable number of the students also agreed (79.8%) that Statistics helps in decision making. Most students (72.7%) agreed that Statistics is a pure stand alone subject in relation to Mathematics. However, 23.4% of the students were not sure on whether Statistics is a pure stand-alone subject in relation to Mathematics. Actually this is mainly due to students' unawareness of the subject. Students (63.9%) agreed that Statistics taught at ordinary level is sufficient to pursue careers that require statistical

calculations. Also most students (68.9%) agreed that there is a need to orient the public to quantitative thinking through the study of Statistics at high school. Students (84.6%) also agreed that career guidance is essential in assisting them to select ordinary level subjects for careers requiring Statistics. On a good note, 88.3% of the students agreed that they would recommend other students to take ordinary level Statistics as a subject.

There was a significant association ( $p\text{-value}=0.020$ ) between gender and the students' perception on whether Statistics helps in decision making. Most male students (91.1%) agreed that Statistics helps in decision making compared to 68% of female students who agreed. Also there was a significant association ( $p\text{-value}=0.013$ ) between gender and the students' perception on whether career guidance is essential in assisting students in their selection of ordinary level subjects for careers requiring Statistics. More male students (87.3%) agreed that career guidance is essential in assisting students to select ordinary level subjects for careers requiring Statistics as compared to female students. Insignificant associations were revealed between other demographic features of the students and the varied opinions on Statistics as a stand alone subject.

## 5. Conclusion

Ordinary level Statistics uptake is quite low though there is an upward trend. The low uptake of the subject is mainly due to student's unawareness of the subject. Therefore we recommend more publicity of the subject to the students in the schools.

Student's perceptions about the subject were quite positive. Most graduate and post graduate curricula in Zimbabwe include research aspects, thus increasing the subject uptake at ordinary level will greatly assist students in their future careers.

We recommend that a special consideration be given in the awareness and conscientization of female students on the importance of Statistics in decision making as well as that career guidance be effected just before the students enroll for their Ordinary level studies to influence the selection of subjects to study by the students especially for careers that have a statistical requirement.

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### Tables and Figures

Fig 1: Number of Students Sitting for Ordinary level Statistics

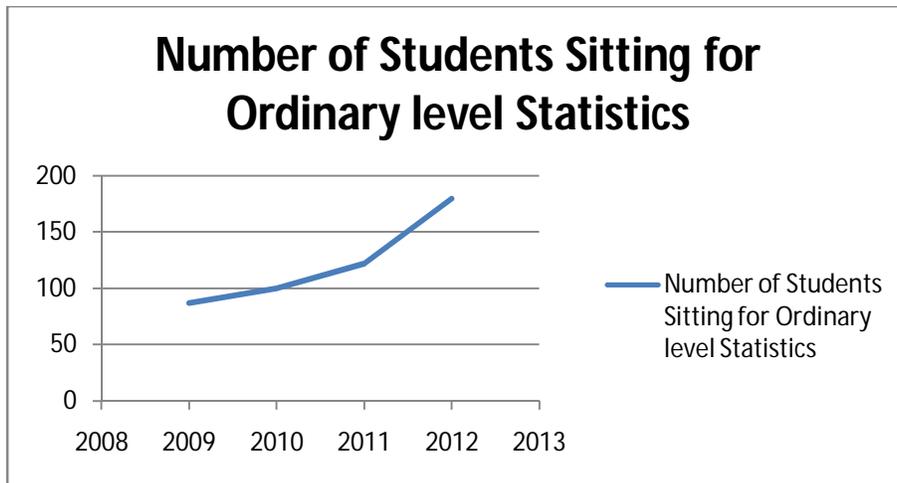


Fig 2: Where students get information about the subject

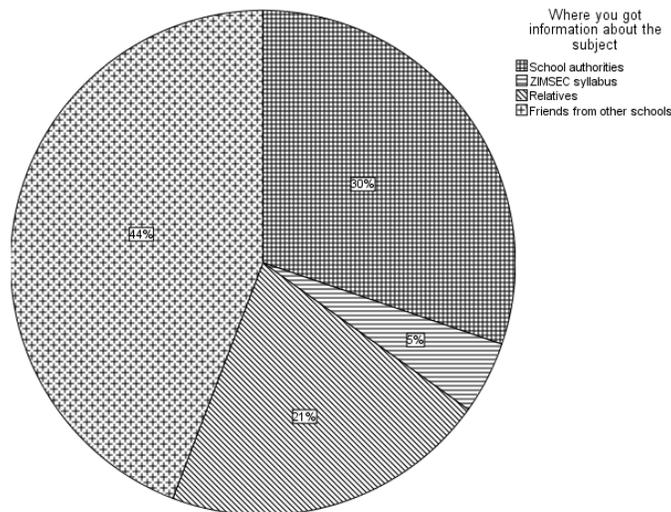


Table 1: Students Perceptions about Statistics.

Perception	Strongly agree (%)	Agree (%)	Not sure (%)	Disagree (%)	Strongly disagree (%)
Statistics is an important subject in life.	40.9	42.9	11.8	3.6	0.9
Statistics is an interesting subject.	32.1	47.7	19.3	0.9	0.0
Statistics is useful in learning other subjects'.	37.4	36.4	19.6	3.7	2.8
Statistics helps in decision making	31.2	48.6	11.9	6.4	1.8
Statistics helps people understand systems of life and industry.	39.3	36.4	20.6	2.8	0.9
Statistics is a pure stand-alone subject in relation to Mathematics.	38.7	34.2	23.4	2.7	0.9
The Statistics taught at "O"-level is sufficient to pursue careers that require statistical calculations.	30.6	33.3	24.3	2.7	0.9
There is a need to orient the public to quantitative thinking through the study of Statistics in high school.	35.3	33.6	22.7	5.5	2.7
Career guidance is essential in assisting students to select "O"-level subjects for careers requiring Statistics.	36.4	48.2	7.3	7.3	0.9
Given a choice I would recommend other students to take "O"-level Statistics as a subject.	58.6	29.7	7.2	2.7	1.8