

**INSTITUTIONAL FACTORS INFLUENCING PUPILS'  
PERFORMANCE IN MATHEMATICS AT KENYA CERTIFICATE  
OF PRIMARY EDUCATION IN KATHONZWENI SUB COUNTY,  
MAKUENI COUNTY, KENYA**

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**A Project Report Submitted In Partial Fulfillment of the Requirement for  
the Degree of Master of Education in Educational Administration**

**University of Nairobi**

**2016**

**DECLARATION**

This research project is my original work and has not been presented for a degree in any other university.

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## **DEDICATION**

This research project is dedicated to my beloved wife Annastacia N. Mutuku and my children Emmaculate Wavinya and Patrick Mumo.

## **ACKNOWLEDGEMENT**

I am indebted to many individuals, institutions and organizations for their support and contribution towards the successful completion of this research work. It may not be possible to mention all by name. Please accept my sincere appreciation and gratitude.

My first acknowledgement goes to the Teachers Service Commission for allowing me to undertake this study while still in the job. Special appreciation is extended to the head teacher Kaiani Primary School for not delegating duties to me over the vacations since 2011 to allow me time to attend to my studies at the University of Nairobi.

My special appreciation is extended to my lecturers and supervisors: Dr. Daisy P. Matula and Dr. Jeremiah M. Kalai for their professional support and guidance throughout the study. I would also like to thank the lecturers in the Department of Educational Administration and Planning, University of Nairobi for their support. I am grateful to all my friends without whose help and inspiration I would not have come this far.

My appreciation is extended to the Commission for Science Technology and Innovation for granting me permit to undertake the research, the Sub-County Director of Education Kathonzi Sub-County for his assistance. I cannot forget to thank all head teachers, mathematic teachers and pupils of the schools under study for their cooperation during the period of the study.

My heartfelt gratitude and appreciation also goes to my late father and mother, my beloved wife, Annastacia, children, Emmaculate and Patrick, sisters, brothers and friends for their continued moral support and encouragement throughout the study.

Finally, I do express my deep gratitude to God for blessing me with good health, clarity of mind and focus which enabled me to undertake this study successfully. Praise be to His name forever.

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## **ACRONYMS AND ABBREVIATIONS**

|               |   |
|---------------|---|
| <b>AEO</b>    | Area Education Officer  |
| <b>ASAL</b>   | Arid and Semi-Arid Lands  |
| <b>CDF</b>    | Constituency Development Fund   |
| <b>CSO</b>    | Curriculum Support Officer  |
| <b>KCPE</b>   | Kenya Certificate of Primary Education                                  |
| <b>KCSE</b>   | Kenya Certificate of Secondary Education                                |
| <b>NGOs</b>   | Non-Governmental Organizations  |
| <b>SMASSE</b> | Strengthening Mathematics and science education in<br>Secondary Schools |
| <b>UNESCO</b> | United Nation Education Scientific and Cultural Organization            |
| <b>UNICEF</b> | United Nation International Children Education Fund                     |
| <b>WASSCE</b> | West African Senior School Certificate Examination                      |

## ABSTRACT

Scholars have stated that performance in Mathematics depends on improvement of quality of classroom practices. Other factors include adequacy of resources and the number of learners. The purpose of this study was to investigate the institutional factors influencing pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzwani Sub County, Makueni County, Kenya. The study used a descriptive research design. The target population comprised of 90 head teachers, 420 teachers and 1342 pupils from class 8 in Kathonzwani Sub County, Makueni County. A sample of 30 head teachers, 73 teachers and 232 pupils was taken. The study used Head teachers, teachers' questionnaires, and pupils' focus group discussion guide for the purpose of data collection. The quantitative data was analyzed using descriptive statistics such as percentages, frequencies, mean and standard deviation assisted by Statistical Package for Social Sciences. The qualitative data from the open-ended questions in the questionnaire was analyzed using content analysis. The study found that majority of head teachers (76%) indicated that the number of mathematics teachers in their schools was not adequate. In addition, the study observed that subject knowledge, teaching ability and experience affect performance in mathematics to a very great extent. The study also found that revision papers and mathematics main textbooks help improve performance in mathematics to a very great extent. Majority of the head teachers (68%) indicated that the learning resources provided by the government are not adequate given the curriculum the learners are supposed to cover. The study found that majority (48%) of primary schools in Kathonzwani Sub-County, had a teacher-pupil ratio of above 1:40. The study concludes that, adequacy of mathematics teachers affect performance in mathematics. The study also concludes that, provision of learning resources affects performance in mathematics to a very great extent. Finally, the study concludes that, professional support influence pupils' performance in mathematics. The study recommends that, the government should ensure that there are adequate mathematics teachers in all primary schools by employing more teachers that are qualified. The head teacher should ensure that their schools have adequate teachers as well as leaning resources such as classrooms, textbooks and exercise books, mock papers from different counties, financial resource for mathematics contests and monthly tests. The study also recommends that, teachers and pupils should be given professional support so as to improve performance in mathematics in the sub-County.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background to the Study**

Education is one of the most important aspects of human resource development. It is widely seen as one of the most promising paths for individuals to realize better, more productive lives and as one of the primary drivers of national economic development. In this era of globalization and technological revolution, education is considered as a first step for every human activity. It plays a vital role in the development of human capital and is linked with an individuals' well-being and opportunities for better living (Battle & Lewis, 2012). It ensures the acquisition of knowledge and skills that enable individuals to increase their productivity and improve their quality of life. This increase in productivity also leads towards new sources of earning which enhances the economic growth of a country (Saxton, 2012).

Studies have found that there is a relationship between teacher effectiveness and their years of experience (Murnane & Phillip, 2011). Battle and Lewis (2012) states that a new teacher (0-5 years of experience aged 20-29) may have the following positive personal attributes; enthusiasm, creativity, energy and optimism while a mid-career teacher (6-20 years of experience aged 30-39) may possess the following personal attributes; experience, confidence and loyalty. These differences may affect learning and teaching differently hence student academic performance. According to Agyeman (2013), a teacher who does not have both academic and professional qualification would

undoubtedly have a negative influence on the teaching and learning of his or her subject. However, he further stated that a teacher who is academically and professionally qualified but works under unfavourable conditions of service would be less dedicated to his or her work and thus be less productive than a teacher who is unqualified but works under favourable conditions of service.

Developed countries like USA and Japan have a large pool of highly skilled human resources. This has enabled them to not only exploit local natural resources but also to identify and negotiate for other countries resources (Battle & Lewis, 2012). In the United States, skilled human resources has been more important than increased capital in accounting for work productivity and US economic growth (Smith, 2013). It is unfortunate that globally in most of the third world countries the tertiary academic institutions are not accessible. The limitation to accessibility may be due to lack of equity in the placement of the schools, insecurity, poor weather conditions or even ignorance in some of the communities (Battle & Lewis, 2012).

According to Uwadiae (2011), pupils' performance in the West African Senior School Certificate Examination (WASSCE) from 2006 and 2010 has declined with mass failure recorded in the two basic subjects (English and Mathematics) that form the foundation for good academic achievement in tertiary institutions. Uwadiae (2011) attributed the performance of pupils in WASSCE to pupil's adequate preparation, adequacy of mathematics teachers, availability of teaching materials, good school environment and infrastructural facilities. In addition to this, studies carried out by Onwioduokit (2011) and

Olarewaju (2007) showed that insufficient work force, lack of concentration during lessons, lack of commitment and motivation to work, lack of equipment, poor attitudes of pupils, poor understanding of concepts, inability to study well, neglect of assignment and pleasure sought attitude contribute to low academic achievement.

A pupil's academic performance in primary school examination is dependent on many factors. Such factors range from availability of physical facilities, provision of instructional materials, teachers' characteristics, adequate supervision and appropriate pupil personnel service (UNESCO, 2012). Duignan (2006) identifies the factors that may influence pupil's performance as leadership style and decision-making, school culture and climate, teacher and pupil behaviour. Eshiwani (1993) considers three determinants of academic achievement in the third world countries namely, school resources such as textbooks, library and laboratory services, school administration and teacher characteristics which includes teacher qualification, training and experience.

In Kenya, pupil's academic performance is usually gauged through annual examinations, which are timed, written tests under controlled conditions. The primary examination is Kenya Certificate of Primary Education (KCPE) and it is administered at the end of eighth year. This mode of regular and routine evaluations encourages the process of teaching and learning as well as measuring its outcome. Mathematics is the subject that is recognized as the

mother of all learning with other subjects deriving their concepts from it, in both arts and sciences (Kathuri, 2014). It is also an international language and is essential in almost every field, such as handling money, measurements in fashion and carpentry and technical economics (Ngware, Oketch and Ezeh, 2008).

Improving performance in Mathematics depends on improvement of quality of classroom practices. There are cases where there are qualified teachers and adequate materials but pupils' achievement is not high (Adegoroye, 2004). However, there are poorly endowed schools in terms of facilities and scholarly materials, yet they post relatively better examination results owing it to effective teaching and management of learning environment. Data obtained from sub-county education officer (CSO) (2015) indicates that pupils' performance in KCPE in mathematics in public primary schools in Kathonzwi sub-county has been dismal in most schools though some have been performing fairly compared to other sub-counties. However, the poor performance is as shown in Table 1.1.



**Table 1.1 Makueni County KCPE Mathematics Performance in Nine Sub-Counties from 2009 – 2015 in Mean Scores**

| Sub-County  | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Average |
|-------------|------|------|------|------|------|------|------|---------|
| Makueni     | 49.6 | 48.9 | 52.4 | 48.7 | 54.7 | 53.9 | 54.9 | 51.9    |
| Makindu     | 41.8 | 45.3 | 47.2 | 49.8 | 46.9 | 50.6 | 52.1 | 47.7    |
| Nzau        | 50.2 | 47.5 | 48.3 | 56.3 | 53.4 | 55.7 | 57.2 | 52.7    |
| Kibwezi     | 50.6 | 52.8 | 49.7 | 47.8 | 51.8 | 49.8 | 49.5 | 50.3    |
| Kathonzweni | 40.9 | 47.0 | 42.8 | 46.9 | 47.8 | 47.2 | 49.5 | 46.0    |
| Mukaa       | 42.5 | 48.6 | 50.6 | 49.4 | 47.3 | 50.8 | 51.8 | 48.7    |
| Mbooni W    | 51.6 | 49.6 | 53.6 | 50.3 | 49.2 | 49.6 | 50.2 | 50.6    |
| Kilungu     | 45.7 | 48.6 | 43.2 | 48.6 | 45.8 | 46.4 | 46.5 | 46.9    |
| Mbooni E    | 49.8 | 50.7 | 52.8 | 49.3 | 47.6 | 49.8 | 51.7 | 50.2    |

**Source: Makueni County website (2016)**

The table shows that the average mathematics performance in Kathonzweni is poor for the last seven years compared to other Sub-Counties in Makueni County. It is against the poor performance in mathematics that this study sought to establish the institutional factors influencing pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County, Kenya.

## **1.2 Statement of the Problem**

Mathematics as one of the subjects taught in primary schools plays an important role in scientific and technological development of a nation (UNICEF, 2009). The fundamental role of mathematics lies in its day-to-day application in most social sciences, business, economics, and medicine and

management studies. To improve pupils' performance in Mathematics in primary schools, Primary Teachers' Colleges have been urged to prepare high quality and sufficient teachers to provide quality education in primary schools (Ballon & Podgursky, 1997). Despite this, pupils' performance has been persistently and alarmingly low in Makueni County. This is more so in Kathonzwani division as shown in Table 1.2.

**Table 1.2 K.C.P.E Mathematics Performance in 4 Divisions of Kathonzwani Sub-County from 2009 to 2013 in percentages**

| <b>YEAR</b>             | <b>2009</b> | <b>2010</b> | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Kathonzwani<br>division | 38.3        | 41.9        | 39.6        | 40.2        | 39.1        | 39.8        | 39.6        |
| Kitise Division         | 59          | 60.6        | 70.5        | 49.5        | 60.2        | 57.4        | 56.5        |
| Kithuki<br>Division     | 60.4        | 58.5        | 60.7        | 78.9        | 79.6        | 75.3        | 71.1        |
| Mavindini<br>Division   | 55.4        | 59.9        | 60.3        | 62.4        | 56.7        | 60.5        | 61.0        |

**Source: KNEC, 2015**

The table shows that performance in Kathonzwani has been persistently low as compared to the other sub counties. The study therefore sought to investigate the institutional factors such as adequacy of teachers, provision of teaching resource, teacher-pupil ratio and professional support and the effect they have on pupils' performance in mathematics at KCPE in Kathonzwani Sub County.

### **1.3 Purpose of the Study**

The purpose of this study was to investigate the institutional factors influencing pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County, Kenya.

### **1.4 Objectives of the Study**

The study was guided by the following objectives:

- i. To determine the extent to which adequacy of trained teachers influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Makueni County
- ii. To establish the extent to which provision of learning resources influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Makueni County
- iii. To assess the extent to which teachers professional support influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County
- iv. To establish the extent to which teacher-pupil ratio influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County

## **1.5 Research Questions**

The study sought to answer the following research questions:

- i. To what extent does adequacy of teachers influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County?
- ii. What is the influence of provision of learning resources on pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County?
- iii. How does teachers professional support influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County?
- iv. To what extent does teacher-pupil ratio influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County?

## **1.6 Significance of the Study**

To the stakeholders in the Ministry of Education and policy makers, this study will act as a source of information on how to improve pupils' performance in mathematics. The findings of this study will also benefit the schools administration in Kathonzweni Sub County, Makueni County. By using analysed results, teachers and head teachers will clearly understand the factors influencing pupils' performance in mathematics at KCPE and be informed on the best solutions in regards to performance in mathematics.

The study findings were expected to be of great importance to various researchers who was involved in policy making. The report of this study was easily acquired in the library and it may equip the learners with more knowledge and relevant information on factors influencing pupils' performance in mathematics at KCPE in Kenya. The study may also make a myriad contribution to the literature on factors influencing pupils' performance in mathematics at KCPE in Kenya which was part of articles that may be helpful the researchers who want to further on their study in the same field.

The findings of the study may also assist in providing data and information for proper planning and decision making in the Ministry of Education and local leadership. Other researchers may apply the recommendations of this study in pursuit of adding new knowledge in the area of study area. The head teachers and the school committees may use the findings in the schools strategic plans which may help improve on the performance in mathematics in their schools.

### **1.7 Limitation of the Study**

The findings of this study were limited to Kathonzwani Sub County, Makueni County. The study therefore, suffers from generalizability since the study may only be inferred to counties and sub counties with similar characteristics. The availability of some of the teachers was difficult since they were busy in their daily teaching schedule. To mitigate this, the questionnaires were issued during break times when they had a resting break.

Some of the respondents targeted in this study were also reluctant in giving information fearing that the information being sought might be used to intimidate them or print a negative image about them or the school. The researcher handled this by carrying an introduction letter from the University to assure them that the information they give was treated with confidentiality and was used purely for academic purposes.

### **1.8 Delimitation of the Study**

This study focused on institutional factors influencing pupils' performance in mathematics at KCPE in public primary schools within Kathonzwani Sub County, Makueni County since Kathonzwani Sub County has recorded the lowest average performance over the last seven years. The study was confined to public primary school pupils and teachers since they are the ones conversant with the subject matter of the study. The target population for this study was teachers, pupils and head teachers within Kathonzwani Sub County, Makueni County. The study utilized data for a period of seven years from 2009 to 2015 which was enough to establish a conclusive trend. The study adopted a descriptive research design while data was collected using question and focus discussion guide.

### **1.9 Basic Assumptions of the Study**

The study made the assumption that;

- i. The respondents would be readily available to respond to research instruments and that they would be honest, cooperative, factual

(objectivity) and trustworthy in their response to the research instruments.

- ii. There would be no serious changes in the composition of the target population that may affect the effectiveness of the study.
- iii. The researcher would be allowed to access pupil's academic records.

### **1.10 Definition of Significant Terms**

The following terms are used in the study:

**Academic performance** refers to grades or marks scored out of 100 percent representing the sample of pupils' achievement with respect to attained academic skills or knowledge for instance KCPE.

**Adequacy of trained teachers** refers to the availability of sufficient number of professionally trained mathematic teachers in relation to pupils enrolment

**Motivation** refers to arousal of the tendency to act to produce one or more effects.

**Performance** refers to the academic achievement of the individual pupil through examinations taken at the end of the academic year.

**Public Primary School** refers to government maintained schools by paying teachers' salaries, administration and funding school facilities.

**Teacher-pupil ratio** refers to the ratio between teachers and students per class room.

**Teachers professional support** refers to the professional relations and support of teachers including professional development and involvement in framing, conveying and sustaining school goals

**Teaching and learning resources** refers to items like text books and equipment which facilitates teaching and learning.

### **1.11 Organization of the study**

The research study is organized in five chapters. Chapter one is introduction and focus on background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, limitations of the study, delimitation of the study, basic assumptions and definition of significant terms.

Chapter two is literature review and includes concept of academic performance, adequacy of teachers and pupils' performance, provision of learning resources, professional support and teacher-pupil ratio, theoretical framework, summary of the literature review and conceptual framework.

Chapter three explores research design, target population, sample size and sampling techniques, research instruments, instrument validity, instrument reliability, data collection procedure and data analysis techniques. Chapter four includes data presentation, analysis and interpretation. Chapter five presents summary, conclusions and recommendations.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In this chapter, literature information that is related and consistent with the objectives of the study is reviewed. Important issues and practical problems are brought out and critically examined so as to determine the current facts. This chapter is vital as it determines the information that links the current study with past studies and what future studies will still need to be explored so as to improve knowledge. The chapter reviews relevant literature on factors influencing pupils' performance in mathematics at KCPE. The chapter covers theoretical review and conceptual framework that was used in the study in regard to each variable in the study.

#### **2.2 Concept of Academic Achievement**

Terrence and Peterson (2010), note that the definition of academic achievement or performance as the outcome of education. Stolp and Smith (2013) further states that academic achievement is the extent to which a pupil, teacher or institution has achieved their educational goals. Academic achievement is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspects are most important (Kuenzi, 2008). It can be predicated with confidence that pupils performance in mathematics is higher when the organizational factors help in determining organizational success. The knowledge of input factors prevailing in a school as a whole help in better

harnessing of human resources, enabling their effective development and utilization which is key in improving the pupils performance in mathematics (Thompson & Luthans, 2010). For the purpose of this study, pupils performance in mathematics was based on scores in percentages between 0-100.

### **2.3 Adequacy of Mathematics Teachers and Performance in Mathematics**

Teacher quality is the most important school resource input because it predicts pupil achievement. Ferguson and Gilpin (2009) argue that teacher quality is a broad category, which includes dimensions such as experience, subject knowledge, scholastic aptitudes, and their teaching ability. Several researchers studying the relationship between teachers' and pupil performance show that teachers with high-test scores or highly selective educational backgrounds are more likely to produce gains in pupil achievement. It is common knowledge that academically qualified teacher has more authentic knowledge about the relevant subject than the academically less qualified teacher does.

Muhammad and Rashid (2011) demonstrate that academic qualification, professional qualification, refresher courses or trainings and teacher experience are the most important qualities of a teacher. The qualities like academic qualification and knowledge of the subject matter, competencies, skills, and the commitment of a teacher have an impact on teaching and learning process.

According to Newstrom and Davis (2012), a study on quality and teacher training and pupil achievement indicated that trained teachers do make a difference and in particular teacher qualification, experience and amount of education and knowledge were positively related to pupil achievement. It's worth noting that it's the teacher who translates the broad general curriculum goals into learning experiences and the method of presenting content. They do most of the evaluation. Therefore, the teacher initiates, develops and directs pupil learning so as to realize good results in the national exams.

Sanders and Rivers (2011) are of the view that pupils who are assigned to several ineffective teachers in a row have significantly lower achievement and gains in achievement than those who are assigned to several highly effective teachers in a sequence. Kuenzi (2008) argues that certain teacher attributes like verbal ability, subject matter knowledge, pedagogical knowledge, years of experience and certification status influence pupil achievement. According to Coleman et al., (2011), teachers' verbal ability is related to pupil achievement and that the relationship may be differentially strong for teachers of different types of pupils.

Research in developing countries clearly shows that teacher expertise is the most significant school-based influence on pupil learning (Saracologlu, 2010). School improvement always calls for enhancing the knowledge, skills, and dispositions of teachers. Whatever course of action a school adopts, success usually hinges on providing support and resources for teachers to strengthen

existing expertise or to learn new practices. Hanushek (2007) estimated that the difference between having a good teacher and having a bad teacher did exceed one grade level equivalent in annual achievement growth. It is therefore important that both pre-service and in-service training are essential for the quality professional development of the teacher.

Olembo (1992) observes that in the Kenyan education system, the term in-service education has at various times been referred to as refresher courses, orientation courses, updating courses and similar terms have been used. They conclude that in-service training is a life-long process in which the teacher is constantly learning and adopting the new challenges of his job.

Okumbe (2007) argues that the quality of doctors, teachers, lawyers, accountants, engineers and other professionals depends on how well they have been prepared for their various roles in society by their teachers. Further, he postulates that there is a strong indication that most teachers in both primary and secondary schools in developing countries are conscripted into teaching professions.

Kombo (2014) observes that the learners regard the teacher as a source of power, resources (knowledge and skills) as well as personal satisfaction (such as recognition, approval and acceptance). In the classroom, the teacher is expected to play multiple roles, which include teaching, guidance and administration. Olembo, Wanga and Karugu (2014) acknowledge that the demands on the teacher change considerably during their career. In view of the

continuous renovation and development of teaching knowledge and of the constant change taking place within educational systems, it does not seem possible to equip the teacher trainee with all knowledge and skills required for an entire professional life. Shiundu and Omulando (1992) observe that given their vital role in curriculum implementation, teachers need appropriate and relevant training to be able to teach. In addition, they need encouragement alongside a continuous training process to update their skills.

### **2.5 Provision of Learning resources and Performance in Mathematics**

The availability, provision and the use of teaching and learning materials go a long way to improve quality teaching which enhances academic performance. Evidence suggests that textbooks are a central part of classroom life in much of the world, although more so in some subjects like Languages and Mathematics than in like Physical education (Webster, 2010). Their availability thus is a great factor that impacts on pupil performance as documented in several studies in Africa on positive effects of text books on learning achievements (UNESCO, 2014). National and international research has established the overall educational importance of textbooks and instructional materials. In California, textbooks and instructional materials are particularly important because they are the primary means through which pupils gain access to the knowledge and skills specified in the State Content Standards that are at the heart of California's K-12 education system. In the US, for example, teachers spend 70 to 90 percent of the total instructional time delivering content in text books (Ampiah, 2008).

Cheng (2013) in addressing the relationship between school based factors and school effectiveness, performed a cross-sectional survey of Hong Kong secondary schools. He noted that the availability and adequacy of teaching / learning resources were very much related to perceive organizational effectiveness in terms of academic performance. In schools with teaching /learning resources, members expressed that their school was highly effective in terms of productivity, adaptability and flexibility.

Gaziel (2007) studied the influence of teaching / learning resources on the effectiveness of primary schools with disadvantaged state in Israel. The aim of the study was to determine to what extent the provision of learning resources influenced academic performance. His findings indicated that academic performance was greatly influenced by teaching / learning resources and were relevant to the mean score of pupils in mathematics, English and Hebrew over two subsequent years.

Adedjei and Owoeye (2012) found a significant relationship between the use of recommended textbooks and academic performance. According to Douglass and Kristin (2010), in a comprehensive review of activity based learning in mathematics in kindergarten through grade eight, concluded that using manipulative materials produces greater achievement than not using them. They also note that the long term use of concert instructional materials by teachers' knowledge in their use improves pupils' achievement and attitudes.

Lockhead (2011) notices that appropriate budgetary allocation for teaching and learning materials like classrooms, workshops and laboratories can highly influence performance of the school. Davces (2007) suggested in his study that motivational strategies which include a happy and secure emotional climate created through a satisfying consistent harmonious relationships and interesting meaningful projects enhances performance for the learners. Heynemann and Loxley (2013) states that, the presence of a school library related significantly to the achievement in Brazil, China, Botswana and Uganda. This was concluded after carrying a study on the effects of availability of physical facilities in learning. Miske and Dowd (2009) referred to the physical environment of the classroom as the 'silent curriculum', meaning that the space in the classroom has power to facilitate and enhance the learning process in ways similar to those of the overt curriculum.

The UNICEF statement in education in Kenya revealed that critical shortage of textbooks and physical facilities in many schools contributed greatly to poor performance in examinations. Okumbe (2007) asserts that all school projects should meet the needs of the curriculum and must be adequately managed. Diligent sitting of school plant and faculties should be the concern and responsibility of head teacher. Other school facilities include land, vehicles, school hall, and learning resources, all of which require proper utilization.

The main concerns of the physical classroom space include safety and accessibility to learning, furniture arrangement and the teachers' use of

physical resources. Adequate space allows teacher and pupil to plan a display of work, and facilitate group work (Ngware, Oketch & Ezech, 2008). Research has shown that a well-organized classroom permits more positive interactions between teachers and children, reducing the probability that challenging behaviors will occur (Michaelowa, 2009).

Okumbe (2007) notes that head teachers are responsible for the management and maintenance of school plant equipment. This area is concerned with maintenance and repair of school plant and facilities, enhancing order and cleanliness in classrooms, dormitories, halls, eating areas and within surrounding environment. Organized school plant gives good appearance of the school and this act as an important source of inspiration and motivators for the members of the school, the community and other stakeholders.

## **2.6 Teacher-pupil Ratio and Performance in Mathematics**

Bassi (2009) conducted a study on pupils under achievement in schools and colleges and found that overpopulated classes, institutional materials for teaching and learning and teachers' pedagogy are significantly related to pupils' academic achievement. The researcher observed that lack of teaching aids in most schools and inadequate preparation of most teachers on the effective use of teaching or instructional aids create serious learning barriers that can result to under achievement or poor performance in subjects taught in schools.

The findings of Rivera-Batiz and Martin (2005) also agree with the previous researchers. Rivera-Batiz and Martin carried out a study on the consequences



of overcrowding. They surveyed 599 pupils and 213 teachers in overcrowded schools and discovered that 75% of the teachers noted that overcrowding negatively affected both classroom activities and instructional techniques. The study further revealed that teachers in overcrowded schools have little time at their disposal to cover the basic materials and could not have any time for further exploration.

In a study conducted in Nairobi at the secondary schools (Team of Mathematics Teachers, 2013), the major findings indicated that variation in mathematics performance was found to be significantly influenced by the type of teaching method. The interactive teaching method was found to be superior to the traditional approach, especially with respect to achieving higher order cognitive skills. The study also found that there was no significant difference in performance when the availability of textbooks was at the pupil/textbook ratio level 1:1 and 1:2. However, ratio levels beyond 1:3 were found to have a negative effect on performance.

Although, pupils' gender was found not to directly affect the performance of mathematics, the performance in mathematics in this study favoured girls, albeit not significantly. Class size was found not to have a significant and direct influence on achievement in assignments. However, the amount of time that pupils spent on mathematics tasks was found to be minimum. The study indicated that a pupil's attitude was a major predictor of his/her performance.

## **2.7 Professional Support and Performance in Mathematics**

A study on school based factors and performance was done by Marcoulides (2011) who studied organization values in Singapore secondary schools. Marcoulides found that in schools where positive social and professional relations and support among staff members were developed higher pupil achievement was reported. Furthermore, his findings indicate that organizational norms and values were only indirectly related to higher pupil's outcomes and more specifically, schools that foster innovation and risk taking encourage to participation in decision making and provide time for collaboration were more effective.

The quality of leadership makes the difference between the success and failure of a school (Griffin, 2013). Griffin further explains that research and inspection clarify the extent to which the quality of leadership is crucial to improvement. In explaining the leadership role of a head teacher and his professional support to teachers, Redalen (2007) asserts that what seems to be emerging is the need for leaders, at any level, to combine clear aspirations of what organization is trying to become, with skills and dispositions to energize a productive staff and constant attention on meeting or exceeding of the pupils and the parents / community.

According to Mingat (cited in Chitavi, 2012), the inputs like effective teaching, adequate materials and good physical facilities are crucial in the academic performance of a school. This is applicable when the head teacher is keen on academic achievement and is prepared to provide effective leadership and support.

Several studies demonstrate the crucial influence of school head teachers on teachers' professional development in African countries and other developing nations which in turn influences teacher's functioning and well-being. The head teacher's involvement in framing, conveying and sustaining school goals represents an important domain of influence on pupil's outcomes (Griffin, 2013). It is therefore evident that a head teacher who properly exercises his/her leadership responsibility will enable his/her school to realize good academic performance.

Kathuri (2014) states that changing a toxic school, culture into a healthy school culture that inspires lifelong learning among pupils is the greatest challenges of instructional leadership. High commitment and high performance among pupils seem to be distinguishing features of schools with a healthy organizational culture and high staff well-being (Sergiovani, 2008). Therefore, the head teacher needs to know a lot about how children learn, about instructional practice and curriculum and how he/she can assess outcome data, monitor instruction, study the research, and network with instructional leaders outside of the school.

According to Ngware, Oketch and Ezeh (2008), principals are therefore in advantageous position to strongly influence the outcome of an effective and efficient school. However, it is observable that while there is great deal of theory on how organization can be led, there is little discussion on the relationship between leadership and pupils' performance. Therefore the study analyzed the effects of leadership as one element of school based factors on pupil's performance of mathematics at KCPE in Kathonzi sub-county

## **2.8 Summary of Related Literature Review**

The reviewed literature has shown that pupils' performance in mathematics at national examinations are heavily influenced by various school factors such as, adequacy of mathematics teachers, provision of learning resources teacher and pupil attitudes towards math and pupil teacher ratio. It is disheartening that the performance of mathematics has been dismal despite the fact that it is a language and is essential in almost every fields, such as handling money, measurements in fashion and carpentry and technical economics From the review of literature, the following gaps were identified; Most studies have underscored the importance of mathematics at the national level, and have not fully addressed the same at the county level. The government through the Ministry of Education has been deploying teachers in all schools but the teacher shortage still persists. It is, however, not clear how schools which were to not given staff from TSC teachers coped especially in mathematics teaching and learning. Finally, the study, therefore, aims at filling the gaps identified above in an attempt to address the factors influencing pupils' performance in mathematics

## **2.9 Theoretical Framework**

This study was hinged on the System's Theory. The theory was derived from the System's theory input-output model developed by Ludwig Von Bertalanffy in 1956. The theory, according to Koontz and Weihrich (1988), assumes that an organized enterprise does not exist in a vacuum; it is dependent on its environment in which it is established. They add that the

inputs from the environment are received by the organization, which then transforms them into outputs.

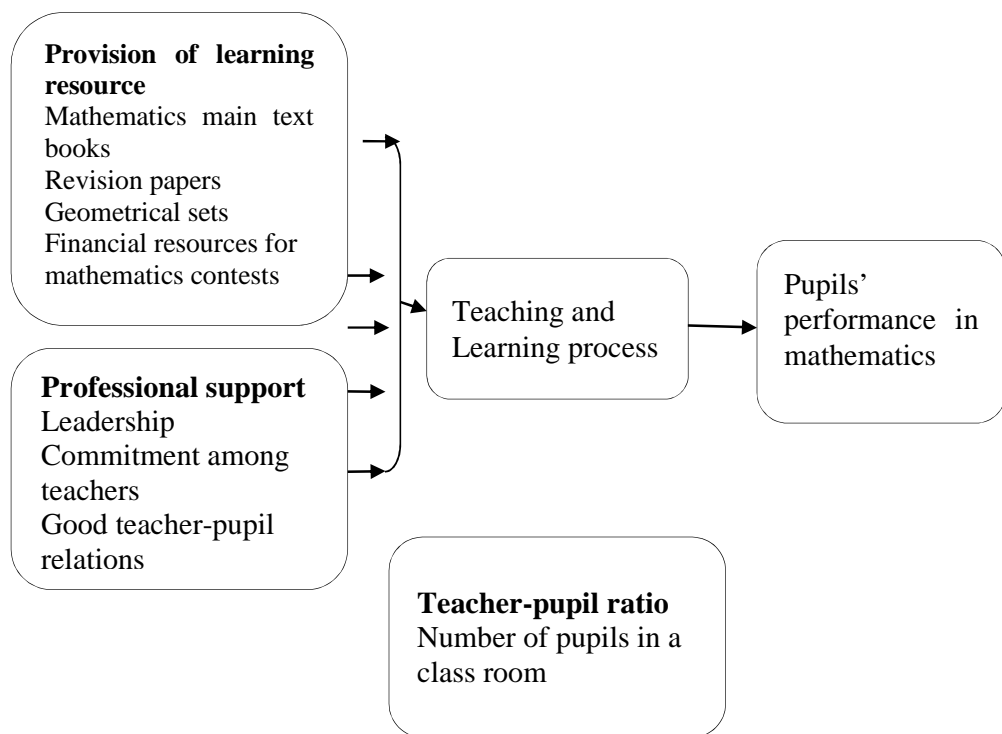
Robbins (1980) argued that organizations were increasingly described as absorbers, processors and generators and that the organizational system could be envisioned as made up of several interdependent factors. System advocates, according to Robbins (1980) have recognized that a change in any factor within the organization has an impact on all other organizational or subsystem components. Thus the inputs, the processors and the generators should function well in order to achieve the desired outcome. Saleemi (2007) in agreement with Robbins (1980) argued that all systems must work in harmony in order to achieve the overall goals. According to the input-output model, it is assumed that the pupils who demonstrate high level of intelligence in mathematics and high social economic background will perform well if the school facilities are good, the teachers and the management of the school is good which may not always be the case and this is the shortcoming of this theory. According to Oso and Onen (2014), the interrelationships among parts of a system have to be understood by all parties involved. One of the major limitations of this theory is that the theory doesn't offer specific tools and technique for practicing managers (Koontz and Wehrich, 1988).

As adapted in this study, the pupils (Inputs) are admitted into the school for the management of the school to transform them through the process of teaching and learning and the pupils output is seen through their academic performance specifically in mathematics. This theory requires a shared vision so that all people in the school have an idea of what they are trying to achieve

from all parties involved, a task that is not easy to achieve. This theory highlights the need for teacher-pupil relation to achieve the desired academic results. By proper understanding of this theory, teachers can voluntarily offer their full professional support to pupils so as to improve pupils' performance in Mathematics.

### 2.10 Conceptual Framework

Figure 2.1 is a conceptual framework on the interplay between variables on institutional factors influencing pupils' performance in mathematics.



**Figure 2.1: Conceptual Framework**

The study operationalized adequacy of mathematics teachers into teachers' qualification, experience, subject knowledge, scholastic aptitudes and teaching ability. On the other hand, availability of resources is measured using provision of teaching and learning facilities, textbooks availability, well-equipped library facilities and adequate desks and general furniture. The study also operationalized professional support into leadership and support, commitment and high performance among pupils, good teacher-pupil relations, vision in management of school and head teacher's involvement in framing, conveying and sustaining school goals.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter presents the methodology that was adopted in the operationalization of the research and achievement of the study objectives. It involves a blueprint for the collection, measurement and analysis of data. This chapter outlines the research design, the target population, sample size and sampling procedures, research instruments, validity of the instruments and reliability of the instruments, data collection procedures and data analysis techniques and ethical considerations.

#### **3.2 Research Design**

The study used a descriptive research design. According to Cooper and Schindler (2003) descriptive study is concerned with finding out who, what, where and how of the variables, which is the concern of this research. The design was preferred since the study intended to collect comprehensive information on institutional factors influencing pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County, Kenya through descriptions, which was helpful for making sure that there is minimum bias in the collection of data and to reduce errors in interpreting the data collected.



### 3.3 Target Population

According to Mugenda and Mugenda (2003) population refers to a complete census of all items or people in a researcher's area of study. The target population comprised of 90 head teachers, 420 mathematic teachers and 1342 pupils from class 8 in Kathonzweni Sub County, Makueni County (Sub-county directors, Kathonzweni Sub County, 2016).

### 3.4 Sample Size and Sampling Procedure

Out of the target population of 90 head teachers, 420 teachers and 1342 pupils in Kathonzweni Sub-County, a sample of 30 head teachers, 73 teachers and 232 pupils was sampled using formula suggested by Cooper and Emory (2011) as shown below. The sample size was 335 respondents. Where:

$$n = \frac{z^2 PQ}{\alpha^2}$$

Where: z is the z- value = 1.96

P -Population proportion 0.50

Q = 1-P

= level of significance = 5%

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

$$n = 384$$

Adjusted sample size if  $N > 10,000$  ( $N_f = n / (1 + (n)/N)$ )

$$N_f = 384 / (1 + (384) / 1842)$$

$$N_f = 318$$

According to the above formula:

$n_f$ = desired sample size when the population is less than 10,000,

$n$ = desired sample when the population is more than 10,000,

$N$ = estimate of the population size. The sample size was 335 respondents.

Sampling ratio is given by dividing the sample size with the target population  
=  $318/1842$

**Table 3.1: Sample Frame**

| Category      | Number      | Ratio | Sample size |
|---------------|-------------|-------|-------------|
| Head teachers | 90          | 0.17  | 30          |
| Teachers      | 420         | 0.17  | 73          |
| Pupils        | 1342        | 0.17  | 232         |
| <b>Total</b>  | <b>1842</b> |       | <b>335</b>  |

### 3.5 Research Instruments

The study used two instruments for the purpose of data collection. These were Head teachers and teachers' questionnaires and pupils' focus group discussion guide. The questionnaires included closed and open-ended questions. Closed ended questions were used in an effort to conserve time and money as well as to facilitate analysis as they are in immediate usable form; while the open ended questions were used as they encourage the respondent to give an in-depth and fill response without feeling held back in revealing of any information.

The questionnaire was subdivided into three sections. Section A was on the demographic data, Section B was on the study variables while Section C focused on the KCPE mathematics performance for the last 5 years. The questionnaires was administered to the respondents, and then collected immediately after they are filled in.

### **3.6 Validity of the Instruments**

The researcher measured content validity, which according to Mugenda and Mugenda (2003) is measured by making use of professionals or experts. The researcher sought assistance from the supervisor, peers and other university lecturers, who are experts in research to ensure the validity of the instruments. Modifications of themes were made with the guidance of the supervisor where necessary. This helped to improve the content validity of the data that collected. Through piloting, the ambiguous questions was rectified to help come up with good reliable instruments and also to ensure credibility of the results.

### **3.7 Reliability of the Instruments**

According to Cooper and Schindler (2003) construct reliability is a measure of the degree to which research instrument yield consistent results or data after repeated trials. In this study, a pilot study was conducted to ensure reliability with 18 respondents from the two primary schools, which were not included in the final target population. This was arrived by taking 1% of the target population as prescribed by Mugenda and Mugenda (2003).

In order to test the reliability of the instruments, internal consistency techniques was applied using Cronbach's Alpha ( ) which is computed as follows:

$$=k/k-1 \times [1 - (S^2) / S^2_{sum}]$$

Where:

= Cronbach's alpha

k = Number of responses

(S<sup>2</sup>) = Variance of individual items summed up

S<sup>2</sup><sub>sum</sub> = Variance of summed up scores

Coefficient of 0.7 indicates acceptable reliability (Kothari, 2004). For this study, coefficient of 0.7 or more was accepted. The findings indicate that teachers professional support had the highest coefficient (0.821) followed by adequacy of trained teachers (0.763) then provision of learning resources(0.749) while teacher-pupil ratio had a reliability coefficient of 0.736.

### **3.8 Data Collection Procedures**

Before collecting data, the researcher obtained an introduction letter from the university of Nairobi then a permit from National Commission of Science, Technology and Innovation. The researcher also sought permeation from Sub-County Director's office, Kathonzwani Sub- County to proceed with the research study. The researcher booked appointments with sampled schools through the head teachers. The researcher administered questionnaires to the respondents in person through a drop and pick later method.

### **3.9 Data Analysis Techniques**

Before analysis, data were cleaned by checking for logical consistency. The quantitative data was analyzed using descriptive statistics such as percentages, frequencies, mean and standard deviation using Statistical Package for Social Sciences (SPSS). Qualitative data from the open-ended questions in the questionnaire were analyzed using content analysis.

### **3.10 Ethical Considerations**

Considering that the research subjects in qualitative research interviewing are human beings, Fontana and Frey (2013) suggest that great care must be taken to prevent harm to these people. In this research, consent was obtained, firstly, by talking to the school head masters, to gain their trust, support and permission to conduct the research in the schools. The nature of the research was explained to them and several questions on anonymity and confidentiality were answered and the participants reassured that their identities as well as the information would remain confidential.

## **CHAPTER FOUR**

### **DATA ANALYSIS, PRESENTATION AND INTERPRETATION**

#### **4.1 Introduction**

This chapter presents analysis and findings of the study as set out in the research methodology. The results were presented on the institutional factors influencing pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County, Kenya. The data was gathered through questionnaires and focus group discussion. The quantitative data was analyzed using descriptive statistics while the qualitative data was analyzed using content analysis.

#### **4.2 Response Rate**

The sample population for this study comprised of 30 head teachers, 73 teachers, and 232 pupils. However, only 25 head teachers and 68 teachers responded and returned their questionnaires. 200 pupils were engaged in 20 focus group discussions. The response rate for head teachers was 83%, 93% for teachers and 86% for pupils. According to Mugenda and Mugenda (2003) a response rate of 50% is adequate for analysis and reporting. The response rate in this study was therefore excellent and reliable for data analysis. This is presented in Table 4.1.

**Table 4.1 Response Rate**

|                 | <b>Head<br/>teachers</b> | <b>Teachers</b> | <b>Pupils</b> | <b>Total</b> | <b>Percentage</b> |
|-----------------|--------------------------|-----------------|---------------|--------------|-------------------|
| Respondents     | 25                       | 68              | 200           | 293          | 87.5              |
| Non-respondents | 5                        | 5               | 32            | 42           | 12.5              |
| <b>Total</b>    | <b>30</b>                | <b>73</b>       | <b>232</b>    | <b>335</b>   | <b>100.0</b>      |

### **4.3 Demographic Information**

Demographics are the characteristics of the population of interest in a study that provide a background used to assess the suitability of the respondents in giving reliable information. They include gender, age, experience, number of mathematics teachers in the school and the professional qualifications of mathematics teachers.

#### **4.3.1 Gender of the of the Teachers and Head teachers**

Gender refers to the sex orientation of the respondent being male or female (Melby, 2005). The researcher asked the teachers and head teachers to state their gender in order to ascertain the gender distribution and the existence of gender parity in the teaching fraternity. The results are summarized in Table 4.2.

**Table 4.2 Distribution of Teachers and Head teachers by Gender**

| Gender       | Head teachers |              | Teachers  |              |
|--------------|---------------|--------------|-----------|--------------|
|              | Frequency     | Percentage   | Frequency | Percentage   |
| Male         | 18            | 72.0         | 31        | 45.6         |
| Female       | 7             | 28.0         | 37        | 54.4         |
| <b>Total</b> | <b>25</b>     | <b>100.0</b> | <b>68</b> | <b>100.0</b> |

From Table 4.2, majority of the head teachers (72.0%) were male while female form 28% of the head teachers in the sub-County. This indicates there is a great disparity in the distribution of male and female head teachers in the sub-County. In addition, the study established that majority of teachers (54.4%)were female while the male teachers formed the minority at (45.6%). The study observed that the proportion of male and female teachers is not as dispersed as that of the head teachers. This could be because mathematic was originally deemed as a hard subject and many females pursued it in their college education but the pattern has been changing as depicted in the data. The difference in the head teachers could be because there were more responsive male head teachers and more boys schools in the sub county.

#### **4.3.2 Teaching Experience for Teachers and Head Teachers**

Teaching experience refers to the number of years one has been a teacher or head teacher. The researcher asked the head teachers and the teachers to



indicate the number of years they had served head teachers to establish their level of experience in leadership. This was asked so as to establish their level of understanding of the subject matter based on their years of experience. The results are summarized in Table 4.3.

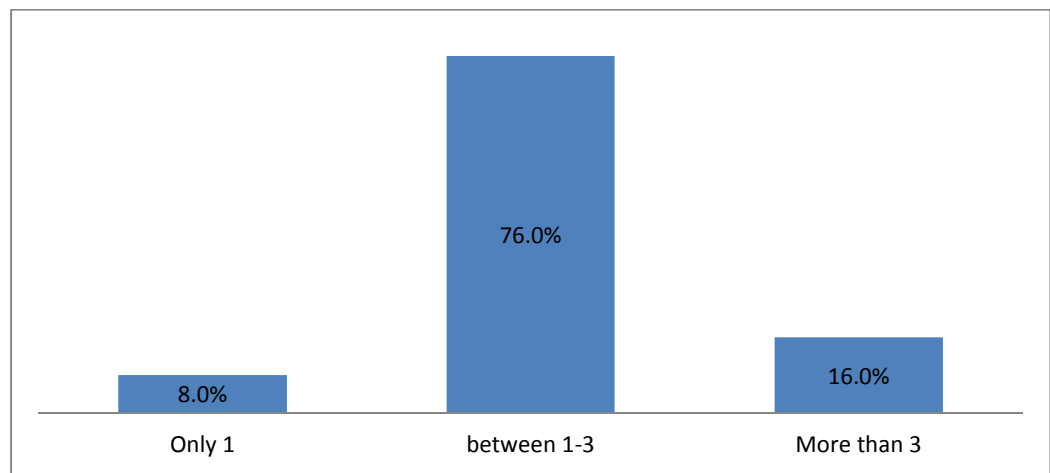
**Table 4.3 Distribution of Teachers and Head teachers by Teaching Experience**

| Experience        | Head Teachers |              | teachers  |              |
|-------------------|---------------|--------------|-----------|--------------|
|                   | Frequency     | Percentage   | Frequency | Percentage   |
| Less than 1 years | 5             | 20.0         | 12        | 17.6         |
| 1- 5 years        | 6             | 24.0         | 17        | 25.0         |
| Over 5 years      | 14            | 56.0         | 39        | 57.4         |
| <b>Total</b>      | <b>25</b>     | <b>100.0</b> | <b>68</b> | <b>100.0</b> |

From Table 4.3, the study found that majority of head teachers (56.0%) had over five years of experience as head teachers while majority of the teachers (57.4%) had over five years of experience. This shows that the teachers and the head teachers had enough experience to give credible information on the subject matter.

### 4.3.3 Number of mathematics Teachers in the School

The study sought to determine from the head teachers the number of teachers who teach mathematics in the school in order to establish their adequacy in the school relative to the pupils enrolment and the results are as summarized in Figure 4.1.



**Figure 4. 1: Number of Mathematics Teachers in the School**

From Figure 4.1, majority of primary schools in the sub-County (76%) had between one and three mathematics teachers, 16% have more than three while 8% have only one mathematics teacher. This depicts that there is a deficit in the number of mathematic teachers in most of the schools in the sub-County.

### 4.3.4 Professional Qualifications of Mathematics Teachers

Professional qualification is possession of the general training and knowledge of essential pedagogical skills that help a teacher to deliver on the subjects. The study sought to determine the professional qualification of mathematics

teachers in the schools in a bid to establish their competence in their job. The findings are as summarized in Table 4.4.

**Table 4. 4 Professional Qualifications of Mathematics Teachers**

| <b>Professional Qualifications</b> | <b>Frequency</b> | <b>Percentage</b> |
|------------------------------------|------------------|-------------------|
| Plcertificate                      | 23               | 36.0              |
| Diploma                            | 28               | 44.0              |
| Degree                             | 13               | 20.0              |
| <b>Total</b>                       | <b>63</b>        | <b>100.0</b>      |

From Table 4.4 over 50% of mathematics teachers had either a diploma or a certificate as the highest level of qualification.

#### **4.4 KCPE Mathematics Performance for 2010 - 2015**

Performance refers to the average marks scored by the students in the examination. The study sought to determine how the pupils had been performing in mathematics in the last five years with a maximum score of 100%. The results of the study are summarized in Table 4.5.

**Table 4.5 KCPE Mathematics Performance for the last 5 years**

| <b>Year</b>  | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> |
|--------------|-------------|-------------|-------------|-------------|-------------|
| <b>Entry</b> | 37%         | 43%         | 35%         | 38%         | 34%         |
| <b>KCPE</b>  | 42.81%      | 46.90%      | 47.77%      | 43.80%      | 40.97%      |

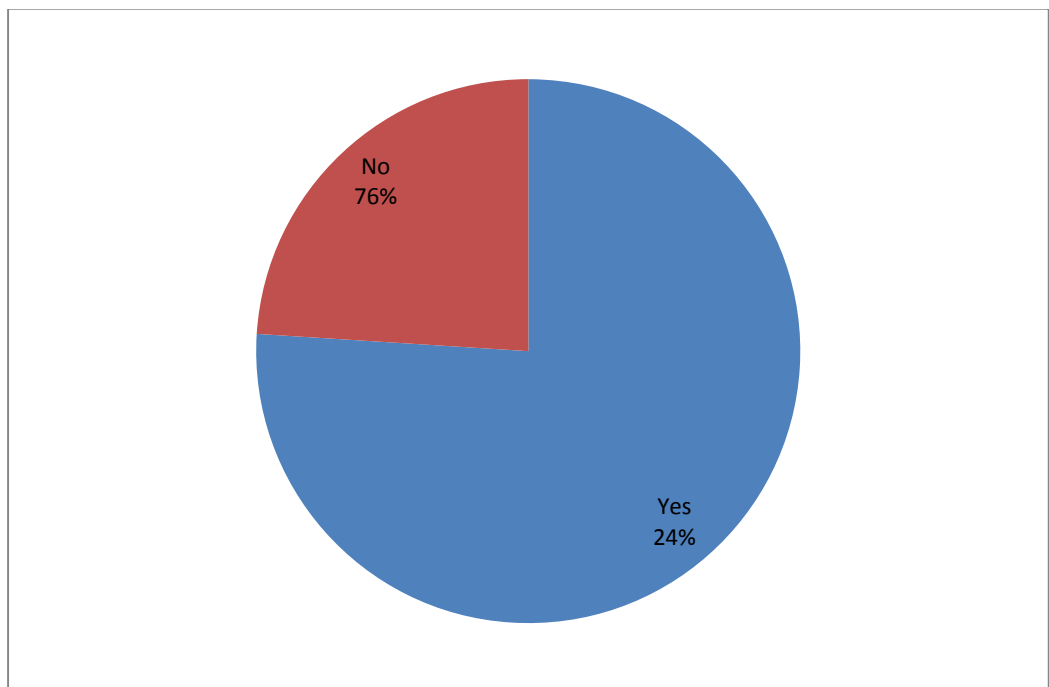
From Table 4.5, the study found that, performance in mathematics in the KCPE was below half mark in all the years. The study observed that the performance in mathematics has not been consistent in the last five years. The performance in mathematics improved from 2011 to 2013 before declining in 2013 and further decline in 2014. However, the study notes that there was an improvement on the performance in KCPE as compared to the entry marks in all the years. The poor performance was attributed to such factors as inadequacy of qualified mathematics teachers and lack of enough resources especially varied mathematics books, revision books as well as in adequate evaluation tests. This was consistent among head teachers, teachers and pupils. UNESCO (2012) also noted that, a pupil's academic performance in primary school examination is dependent on many factors. Such factors range from availability of resources, provision of instructional materials, teachers' characteristics, adequate supervision and appropriate pupil personnel service.

#### **4.4 Adequacy of Mathematics Teachers**

Adequacy of teachers means that there is an adequate number of teachers in the school relative to the number of students.

#### 4.4.1 Adequacy of Mathematics Teachers

The study sought to determine the adequacy of mathematics teachers in the schools by asking the head teachers to state if the number of mathematics teachers in their schools was adequate. This was in a bid to establish whether the adequacy of the teachers was contributing to the pupils performance in mathematics. The results are shown in Figure 4.2.



**Figure 4. 2: Adequacy of Mathematics Teachers**

From Figure 4.2, majority of head teachers (76%) indicated that the number of mathematics teachers in their schools was not adequate. Similar observations were made by teachers where majority (81%) indicated that the number of mathematics teachers was not adequate. In addition, pupils also observed that their mathematics teachers were teaching several other classes.

The study further computed a cross tabulation between adequacy of mathematics teachers and performance in a bit to establish how the various levels of adequacy affected performance. The findings are presented in Table 4.6.

**Table 4.6 Cross-tabulation of Adequacy of Mathematics Teachers and performance**

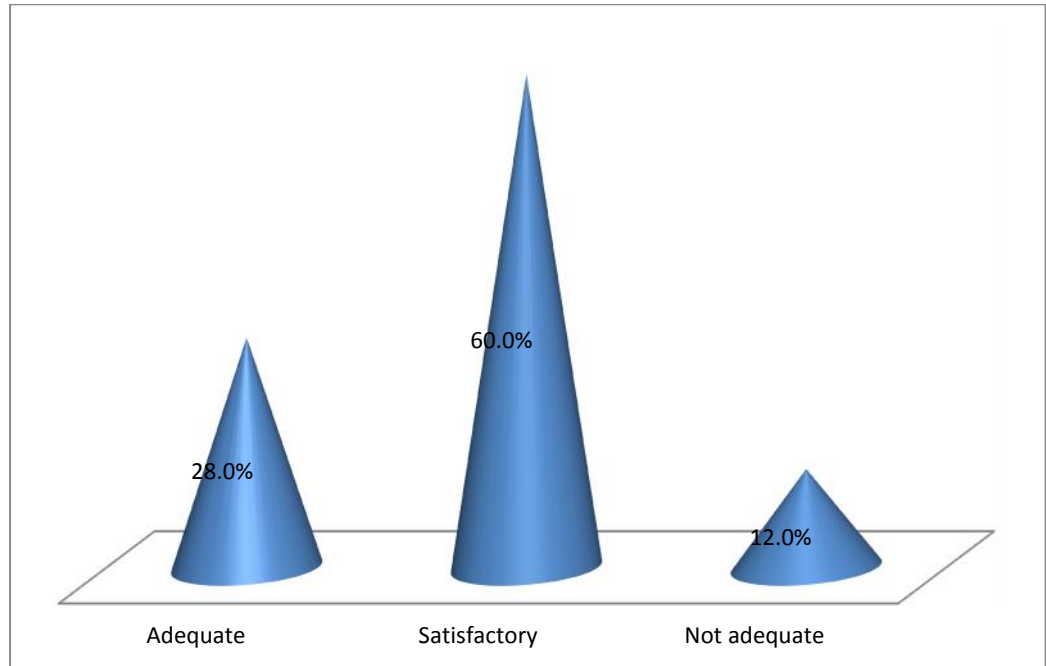
| Level of adequacy of mathematics teachers | KCPE mathematics performance |            |            |              | Total       |
|---|------------------------------|------------|------------|--------------|-------------|
|   | Below 50                     | 50-59      | 60-69      | 70 and above |             |
| Adequate                                  | 1%                           | 3%         | 6%         | 14%          | 24%         |
| Fairly adequate                           | 1%                           | 1%         | 2%         | 7%           | 11%         |
| Inadequate                                | 32%                          | 25%        | 5%         | 3%           | 65%         |
| <b>Total</b>                              | <b>34%</b>                   | <b>29%</b> | <b>13%</b> | <b>24%</b>   | <b>100%</b> |

From the findings, it was clear that the schools that had adequate number of mathematic teachers performed relatively better than the ones with fairly adequate or inadequate teachers. This therefore implies that adequacy of teachers had a significant effect on the pupils performance.

#### **4.4.2 Professional Adequacy of Mathematics Teachers**

Professional adequacy refers to the professional qualification of the teachers relating to how well trained they are. The researcher asked the head teachers to

state the professional adequacy of the mathematics teachers in their schools and the results are as summarized in Figure 4.3.



**Figure 4. 3: Professional Adequacy of Mathematics Teachers**

From Figure 4.3, majority of the head teachers (60%) indicated that the professional adequacy of the mathematics teachers in their schools was satisfactory. This shows that the mathematic teachers had satisfactory professional qualification. These results are in line with Karugu (2014) who acknowledge that the demands on the teacher change considerably during their career and therefore there is need for teachers to equip themselves regularly with the modern skills, which rarely happen in Kenya. Similarly, Shiundu and Omulando (1992) observe that given their vital role in curriculum implementation, teachers need appropriate and relevant training to be able to teach. In addition, they need encouragement alongside a continuous training process to update their skills.

#### 4.4.3 Adequacy of Teachers and Performance in Mathematics

Performance in mathematics refers to the mean score attained by the students in a class. The study sought to determine from the head teachers and teachers the effects of adequacy of teachers on performance in mathematics in the various schools in a bid to establish whether it affects pupils performance in mathematics. This was through the use of a scale of 1-5 where 5=Very great extent, 4=Great extent, 3=Moderate extent, 2=Low extent, 1=Very low extent. The results were as summarized in Table 4.7.

**Table 4.7 Effects Aspects of Teachers Adequacy on Performance in Mathematics (Head Teachers)**

| Aspect                  | Head Teachers |           | Teachers |           |
|-------------------------|---------------|-----------|----------|-----------|
|                         | Mean          | Std. Dev. | Mean     | Std. Dev. |
| Teachers' qualification | 4.375         | .532      | 4.562    | .072      |
| Experience              | 4.518         | .679      | 4.723    | .137      |
| Subject knowledge       | 4.764         | .795      | 4.819    | .203      |
| Scholastic aptitudes    | 3.290         | .107      | 3.054    | .058      |
| Teaching ability        | 4.601         | .285      | 4.538    | .149      |

From Table 4.7, the study found that subject knowledge (M = 4.764; SD = 0.795) and teaching ability (M=4.601; SD =0.285) affect performance in



mathematics to a very great extent. When the same question was posed to the teachers, the following results were observed. From Table 4.5 subject knowledge ( $M = 4.819$ ;  $SD = 0.203$ ) and experience ( $M = 4.723$ ,  $SD = 0.137$ ) affect performance in mathematics to a very great extent. This shows that subject knowledge, teaching ability and experience had a very great effect on mathematics performance. These findings were in agreement with Ferguson and Gilpin (2009) who argue that teacher quality is a broad category, which includes dimensions such as experience, subject knowledge, scholastic aptitudes, and their teaching ability. In addition, they stated that experienced and academically qualified teacher has more authentic knowledge about the relevant subject than the academically less qualified teacher does.

On how adequacy of teachers affects performance in Mathematics, the respondents indicated that qualified teachers have pedagogical skills, which are necessary for delivery if the teacher, the teacher is able to understand the psychological development of the learner and the teacher will better understand the subject area. It will be easy to attend to every pupil, teachers are able to assign and correct pupils work and teachers are able to attend to slow learners and assist them. In addition, when the school has adequate teachers they will share the workload so that the teacher is not over loaded. The study also sought to determine the ways in which the teachers engaged with the students in classroom. The researcher found that there were a number of strategies used by the teachers, which include illustration on the black board, class discussions, question and answer sessions, group discussions and role-plays.

#### 4.4.4 Test for Difference between Means for Adequacy of Teachers

The study sought to determine if there is any significant difference in the mean-score of mathematics in KCPE between schools that had adequate trained teachers and schools with no adequate trained teachers. The Levene's Test for Equality of Variances gave the following results as shown in Table 4.8.

**Table 4. 8 Independent Samples t- Test for Adequacy of Teachers**

|                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |    |      |                 |                       |   |          |
|-----------------------------|---|------|------------------------------|----|------|-----------------|-----------------------|---|----------|
|                             | F                                       | Sig. | t                            | df | Sig. | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |          |
|                             |   |      |                              |    |      |                 |                       | Lower                                     | Upper    |
| Equal variances assumed     | 2.0523                                  | .048 | 2.194                        | 54 | .033 | 22.17944        | 10.10954              | 1.91103                                   | 42.44784 |
| Equal variances not assumed |   |      | 2.20                         | 54 | .032 | 22.17944        | 10.08288              | 1.96449                                   | 42.39439 |

**H<sub>1</sub>** There is no significant relationship between adequacy of trained teachers and pupils' performance in mathematics at Kenya Certificate of Primary Education in Makueni County

The Levene's Test for Equality of Variances indicates whether an assumption of the t-test has been met. From the findings, the significance (p value) is 0.048, which is smaller than the significance level of 0.05, and therefore we

reject the null hypothesis. We therefore assume that the variances are not equal. Assuming unequal variances, the calculated  $t$  value is  $t$  at 54 degrees of freedom = 2.20. This value is greater than the table value (2.000) implying that there is sufficient evidence to conclude that schools with adequate trained teachers and schools without adequate trained teachers have different variability. Therefore, unequal variances  $t$  test reveal a statistically reliable difference between performance of schools with adequate trained teachers and schools without adequate trained teachers.

#### **4.5 Availability of Resources and Performance in Mathematics**

Resources refer to the materials require for effective delivery of content by the teacher in class. The study sought to determine whether availability of resources affect performance in mathematics.

##### **4.5.1 Provision of Resources and Improved Performance in Mathematics**

The study sought to determine from the teachers whether the provision of resources help improve performance in mathematics. This was through the use of a scale of 1-5 where 5=Very great extent, 4=Great extent, 3=Moderate extent, 2=Low extent, 1=Very low extent. The results are as shown in Table 4.9.

**Table 4.9 Provision of Resources and Performance in Mathematics**

| Aspect                                       | Teachers |           | Head Teachers |           |
|--|----------|-----------|---------------|-----------|
|  | Mean     | Std. Dev. | Mean          | Std. Dev. |
| Mathematics main text books                  | 4.512    | .390      | 4.636         | .028      |
| Revision papers                              | 4.651    | .643      | 4.725         | .431      |
| Mock papers from different counties          | 4.179    | .077      | 3.978         | 1.072     |
| Geometrical sets                             | 3.450    | .281      | 2.165         | .391      |
| Financial resources for mathematics contests | 4.482    | .509      | 4.513         | 1.029     |
| Others (exercise books, monthly tests)       | 4.445    | .328      | 4.402         | .173      |

From Table 4.9, the teachers indicated that revision papers (M= 4.651; SD = 0.643) and mathematics main textbooks (M= 4.512; SD = 0.390) help improve performance in mathematics to a very great extent. From the focus group discussion it was established that pupils mainly use Primary Mathematics and Learning Mathematics as their main class text books. However, it was noted that the books are not adequate and the pupils are forced to share. The pupils also indicated that the schools do not have adequate teachers, teachers do not have enough time with them and sometimes their teachers do not attend classes, which make it difficult to complete the syllabus. In line with this, Webster (2010) concluded that learning resources are paramount in any learning process and their availability thus is a great factor that impacts on pupil performance as documented in several studies in Africa on positive

effects of text books and revision materials on learning achievements. UNESCO (2014) also established the overall educational importance of textbooks and instructional materials.

#### **4.5.2: Provision of Resources by the Government**

Provision refers to the act of making resources available to the schools. The study sought to determine from the head teachers whether the government provides learning resources. From the findings, all the head teachers unanimously agreed that the government provide learning resources to their schools.

#### **4.5.3 Adequacy of Resources**

Adequacy of resources refers to availability of resources to meet all the needs or a significant proportion of the needs. This study sought to determine from the head teachers whether the resources provided by the government are enough to meet the students needs. The results are as shown in Table 4.10.

**Table 4. 10 Adequacy of Resources**

| <b>Response</b> | <b>Frequency</b> | <b>Percentage</b> |
|-----------------|------------------|-------------------|
| Yes             | 8                | 32.0              |
| No              | 17               | 68.0              |
| <b>Total</b>    | <b>25</b>        | <b>100.0</b>      |

From Table 4.10, majority of the head teachers (68%) indicated that the learning resources provided by the government were not adequate given the

curriculum the learners are supposed to cover. This shows that the resources provided by the government are not enough to meet the students' needs. The respondents unanimously agreed that the resources were inadequate as guided by the curriculum and international requirements. Similar findings were observed by Lockheed (2011) who concluded that appropriate budgetary allocation for teaching and learning materials like classrooms, workshops and laboratories are usually limited in African countries though they can highly influence performance of the school. UNESCO (2014) also noted that there is need to increase funding in the education sector in Kenya.

#### **4.5.4 How Availability of Resources Affect Performance in Mathematics**

The study also sought to determine from the head teachers how availability of resources affects performance in mathematics. The study found that resources such as textbooks and exercise books enable students to revise on their own in the absence of the teacher, participation in symposium and mathematics contests broaden the learners understanding in addition to discussing with their peers. Further, monthly tests, mock papers and pilot tests make the students to constantly revise and practice. In addition, awarding of prizes to winners in tests motivate the learners to do better in subsequent tests. This in totality positively influences the performance of pupils in their final examinations in Mathematics. From the focus group discussion pupils concurred with their head teachers that constantly revising for monthly tests helps the student understand better and improve on their performance.

#### 4.5.5 Test for Difference between Means for Availability of Resources

The study sought to determine if there is any significant difference in the mean-score of mathematics in KCPE between schools that had adequate learning resources and schools with no adequate learning resources. The Levene's Test for Equality of Variances gave the following results as shown in the Table 4.11.

**Table 4. 11 Independent Samples t- Test for Availability of Resources**

| Levene's Test for Equality of Variances |  | t-test for Equality of Means |      |       |            |                 |                       |   |        |         |
|---|--|------------------------------|------|-------|------------|-----------------|-----------------------|---|--------|---------|
|   |  | F                            |      | Sig.  |            | t               |                       | 95% Confidence Interval of the Difference |        |         |
|   |  |                              |      |       | (2-tailed) | Mean Difference | Std. Error Difference | Lower                                     | Upper  |         |
| Equal variances assumed                 |  | 2.217                        | .012 | 1.517 | 54         | .139            | 23.4478               | 9.05104                                   | 2.5674 | 41.8916 |
| Equal variances not assumed             |  |                              |      | 1.738 | 54         | .147            | 23.10776              | 9.23487                                   | 1.9263 | 41.3341 |

**H<sub>2</sub>** There is no significant relationship between provision of learning resources and pupils' performance in mathematics at Kenya Certificate of Primary Education in Makueni County

From the Table 4.12, the p value (0.012) is less than the significance level of 0.05. Therefore, we reject the null hypothesis meaning that there is no

significant difference in the mean score achieved by pupils in schools with adequate trained teachers and schools without adequate trained teachers in Kathonzwi Sub County, Makueni County. Assuming unequal variances, the calculated t value is  $t = 1.738$ , which is greater than the tabulated t value (2.000) implying that there is a significant difference between mean scores for schools that had adequate learning resources and schools without adequate learning resources in Kathonzwi Sub County, Makueni County.

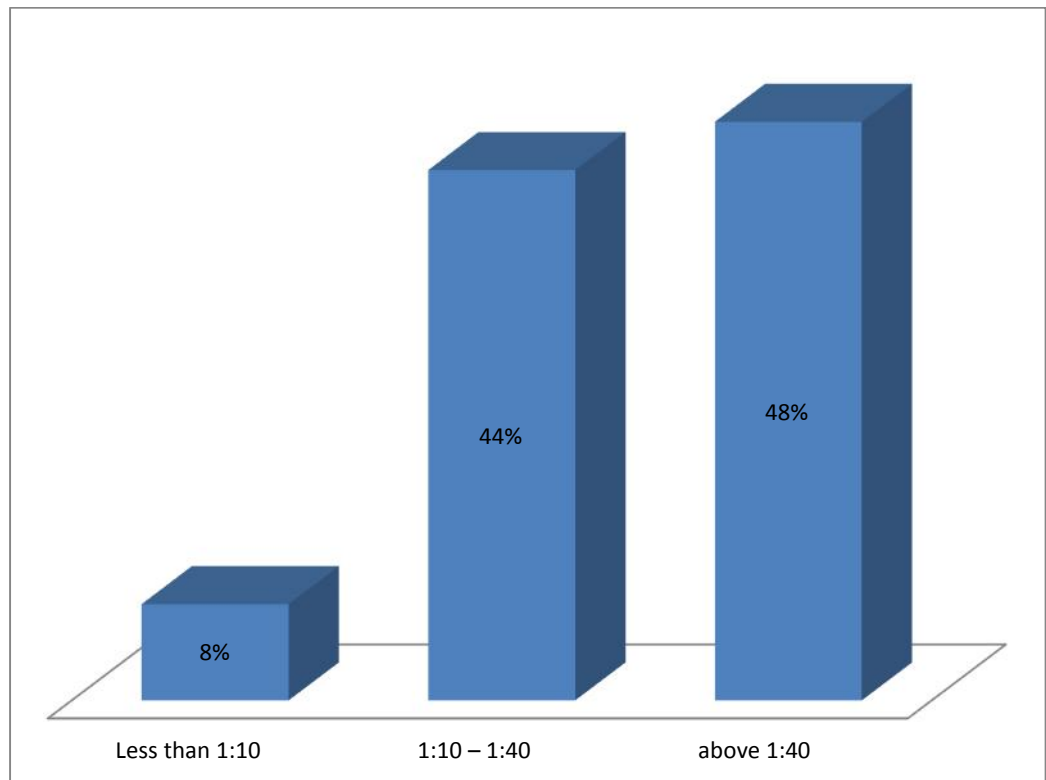
#### **4.6 Teacher Pupil Ratio**

Teacher-pupil ratio refers to the average number of pupils handled by one teacher at any given time. The study sought to determine whether

##### **4.6.1 The Current Teacher-Pupil Ratio**

The study sought to determine the current teacher-pupil ratio from the head teachers and the results are as shown in Figure 4.4.





**Figure 4. 4: The Current Teacher-Pupil Ratio**

From Figure 4.4, the study finds that majority (48%) of primary schools in Kathonzwani Sub-County, had a teacher-pupil ratio of above 1:40. This shows that majority of the teachers in the sub-county are over loaded since they had to deal with more than 40 pupils in a class. This may significantly affect performance in mathematics. When asked if the ratio was reasonable most of the head teachers (78%) said that it was not and that majority of the teachers felt overloaded. Moreover, 77% of the head teachers indicated that the teacher- pupil ratio affects the performance of the learners. The study found that when the ratio is high the teacher would have adequate time to go through learners work and address the pupils individually. Rivera-Batiz and Martin (2005) discovered that 75% of the teachers reported overcrowding in their

classes, which negatively affected both classroom activities and instructional techniques. The study further revealed that teachers in overcrowded schools have little time at their disposal to cover the basic materials and could not have any time for further exploration.

#### 4.6.2 Average Number of Pupils per Class

Average number of pupils refers to the number of pupils in a given class. The researcher asked the teachers to state the average number of pupils they have per class and the results are as shown in Table 4.12.

**Table 4.12 Average Number of Pupils per Class**

| <b>Response</b> | <b>Frequency</b> | <b>Percentage</b> |
|-----------------|------------------|-------------------|
| Less than 10    | 8                | 11.8              |
| 10 - 20         | 11               | 16.2              |
| 20- 50          | 23               | 33.8              |
| Over 50         | 26               | 38.2              |
| <b>Total</b>    | <b>68</b>        | <b>100.0</b>      |

From Table 4.12, the study found that majority of classes (38.2%) had over 50 pupils. This conforms to the head teachers observation that majority of the classes are overcrowded. The findings are also consistent with Rivera-Batiz and Martin (2005) findings.

### 4.6.3 Class Size and Performance in Mathematics

The study also sought to determine from the teachers if the class size affected the performance of the pupils and the results are as shown in Table 4.13.

**Table 4.13 Class Size and Performance in Mathematics**

| <b>Response</b> | <b>Frequency</b> | <b>Percentage</b> |
|-----------------|------------------|-------------------|
| Yes             | 52               | 76.5              |
| No              | 16               | 23.5              |
| <b>Total</b>    | <b>68</b>        | <b>100</b>        |

From Table 4.13, majority of the teachers (76.5%) indicated that the class size affects performance in mathematics. The study also established that the performance in mathematics has been generally poor because there are so many pupils in a class, which makes it difficult for the teacher to be effective. In addition, due to shortage of teachers, each teacher has so many classes to attend which also reduces their effectiveness. Similar findings were observed by UNESCO (2014) who noted that overcrowding in classes highly affect performance of learners. In addition, Rivera-Batiz and Martin (2005) noted that overcrowding in classes negatively affect both classroom activities and instructional techniques.

The study also sought to determine the key elements for better performance in Mathematics and the study found that, numerous tests, completion of syllabus in time and continuous practice by the pupils as key factors affecting performance. In addition, teachers and pupils indicated that participating in

math contests, and having few pupils in a class affects the performance of the learners.

#### 4.6.4 Test for Difference between Means for Teacher Pupil Ratio

The study sought to determine if there is any significant difference in the mean-score of mathematics in KCPE between schools that had high teacher-pupil ratio and schools with low teacher-pupil ratio. The Levene's Test for Equality of Variances gave the following results as shown in the Table 4.14.

**Table 4. 14 Independent Samples t- Test for Teacher Pupil Ratio**

|                             | Levene's Test for Equality of Variances |       | t-test for Equality of Means |      |                 |                 |                       |   |          |
|-----------------------------|---|-------|------------------------------|------|-----------------|-----------------|-----------------------|---|----------|
|                             | F                                       | Sig.  | t                            | df   | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |          |
|                             |   |       |                              |      |                 |                 |                       | Lower                                     | Upper    |
| Equal variances assumed     | 2.368                                   | .0154 | 3.096                        | 54   | .183            | 21.8154         | 10.4678               | 3.34783                                   | 44.84674 |
| Equal variances not assumed |   |       | 2.9352                       | 54.0 | .09182          | 22.5342         | 11.4582               | 2.9362                                    | 43.84655 |

**H<sub>3</sub>** There is no significant relationship between teacher-pupil ratio and pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzwi Sub County, Makueni County

From the Table 4.14, the p value is 0.0154, which is smaller than the significance level of 0.05, and therefore we reject the null hypothesis meaning that there is no significant difference in the mean score achieved by pupils in schools that had high teacher-pupil ratio and schools with low teacher-pupil ratio in Kathonzwi Sub County, Makueni County. We therefore assume that the variances are not equal. Assuming unequal variances, the calculated t value is t at 54 degrees of freedom = 2.9352. This value is greater than the table value (2.000) implying that there is a significant difference between mean scores for schools that had high teacher-pupil ratio and schools with low teacher-pupil ratio in Kathonzwi Sub County, Makueni County.

#### **4.7 Professional Support and Pupil's Performance**

Professional support relates to the support accorded to the teaching staff to enable them deliver in class. The study sought to determine extent to which professional support influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzwi Sub County, Makueni County. The study concluded that there is minimal support given to teachers to enable them effectively deliver, majority of the teachers (74%) observed that they were rarely involved in decision making, there are no motivational programs or training programs offered to the teachers either by the school or by the government. The head teachers also concurred that there is little professional support offered to them and the teachers. However, the study also found that there is a professional relationship between the teachers and the student.

#### 4.7.1 How professional support affect pupils performance in Mathematics

The study sought to determine head teachers and teachers how professional support affects pupils' performance in mathematics. This was through the use of a scale of 1-5 where 5=Very great extent, 4=Great extent, 3=Moderate extent, 2=Low extent, 1=Very low extent. The results are as shown in Table 4.15.

**Table 4.15 How professional support affect pupils' performance in Mathematics (Head Teachers)**

| Aspect   | Head Teachers |           | Teachers |           |
|--|---------------|-----------|----------|-----------|
|  | Mean          | Std. Dev. | Mean     | Std. Dev. |
| Leadership   | 4.577         | .375      | 4.923    | .984      |
| Commitment among teachers  | 4.922         | .318      | 4.793    | .886      |
| Good teacher-pupil relations   | 4.571         | .450      | 4.553    | .223      |
| Head teacher's involvement in framing, conveying and sustaining school goals | 3.344         | 1.029     | 3.388    | .952      |
| Visionary management of school   | 4.219         | .362      | 4.507    | 1.224     |

From table 4.15, the study finds that majority of the head teachers indicated that commitment among teachers (M=4.922;SD =0.318), leadership (M=4.577;SD =0.375) and good teacher-pupil relations(M=4.571;SD =0.450) affect pupils' performance in mathematics to a very great extent. Majority of

the teachers indicated that leadership (M= 4.923; SD = 0.984) and commitment among teachers (M= 4.793; SD = 0.886) affect pupils' performance in mathematics to a very great extent. This implies that commitment among teachers and leadership have a great effect on pupils' performance in mathematics. These findings are consistent with Marcoulides (2011) who found that in schools where positive social and professional relations and support among staff members are developed higher pupil achievement was reported.

#### 4.5.5 Test for Difference between Means for Professional support

The study also sought to determine if there is any significant difference in pupil's performance in mathematics in KCPE between schools that received professional support and schools with no professional support. The Levene's Test for Equality of Variances gave the following results as shown in the Table 4.16.

**Table 4.16 Independent Samples t- Testfor Professional support**

|                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |      |                 |                 |                       |   |          |
|-----------------------------|---|------|------------------------------|------|-----------------|-----------------|-----------------------|---|----------|
|                             | F                                       | Sig. | t                            | df   | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |          |
|                             |   |      |                              |      |                 |                 |                       | Lower                                     | Upper    |
| Equal variances assumed     | 2.217                                   | .003 | 1.973                        | 54   | .0517           | 20.3476         | 10.2345               | 4.0797                                    | 40.32784 |
| Equal variances not assumed |   |      | 2.649                        | 54.0 | .017            | 21.6107         | 10.7910               | 2.8634                                    | 41.23504 |

**H<sub>4</sub>** There is no significant relationship between teachers professional support and pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County.

From the Table 4.17, the p value (0.003) is less than the significance level of 0.05. Therefore, we reject the null hypothesis that there is no significant difference in pupil's performance in mathematics in KCPE between schools that received professional support and schools with no professional support in Kathonzweni Sub County, Makueni County. Assuming unequal variances, the calculated t value is 2.649, which is greater than the tabulated t value (2.000) implying that there is a significant difference between mean scores for schools that received professional support and schools with no professional support in Kathonzweni Sub-County, Makueni County.



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary of the study, conclusion drawn from the findings, recommendations and finally suggestions for further research.

#### **5.2 Summary of the Study**

Education is often viewed as one of the primary drivers of economic development since it has an impact on individual productivity, employment economic growth and social equity when looked at as an investment. Public primary schools in Makueni County, like in most parts of the country have witnessed a steady increase in pupil enrollment. However, performance in mathematics in the County has been poor. Several factors such as shortage of trained teachers, physical facilities, learning resources, professional support, textbooks, teacher-pupil ratio, instructional materials and learning space have been noted as some of the major challenges in performance in mathematics by pupils in the national examination.

This study was hinged on the System's Theory derived from the System's theory input-output model developed by Ludwig Von Bertalanffy in 1956. The descriptive research design was used in this study, which is concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation. The design is concerned with finding out who, what, where and how of the variables, which was the concern of this research.

The target population comprised of 90 head teachers, 420 teachers and 1342 pupils from class 8 in Kathonzi Sub County, Makueni County. A sample of 30 head teachers, 73 teachers and 232 pupils were sampled. The study used questionnaires to collect data from the head teachers and teachers as well as focus group discussion guide for pupils.

In the study, majority of head teachers (76%) indicated that the number of mathematics teachers in their schools was not adequate. Similar observations were made by teachers where majority (81%) indicated that the number of mathematics teachers was not adequate. The study further found that, majority of the head teachers (60%) indicated that the professional adequacy of the mathematics teachers in their schools was satisfactory. In addition, the study observed that subject knowledge, teaching ability and experience affect performance in mathematics to a very great extent.

The study also observed that qualified teachers have pedagogical skills, which are necessary for delivery if the teacher, the teacher is able to understand the psychological development of the learner and the teacher had better understanding of the subject area. The study also found that there were a number of strategies used by the teachers, which include, class discussions, question and answer sessions, group discussions and role-plays.

The study found that revision papers, mathematics main textbooks financial resources for mathematics contests and Others resources such as exercise

books, monthly tests help improve performance in mathematics to a very great extent. It was clear that the learning resources provided by the government to the schools were not adequate given the curriculum the learners are supposed to cover. The study further established that resources such as textbooks and exercise books enable students to revise on their own in the absence of the teacher, participation in symposium and mathematics contests broaden the learners understanding in addition to discussing with their peers. Further, monthly tests, mock papers and pilot tests make the students to constantly revise and practice. In addition, awarding of prizes to winners in tests motivate the learners to do better in subsequent tests.

The study also revealed that majority (48%) of primary schools in Kathonzwi Sub-County, had a teacher-pupil ratio of above 1:40. This shows that majority of the teachers in the sub-county are over loaded since they have to deal with more than 40 pupils in a class. This may significantly affect performance in Mathematics. The study also found that when the ratio is high the teacher would have adequate time to go through learners work and address the pupils individually. The study further revealed that teachers in overcrowded schools have little time at their disposal to cover the basic materials and could not have any time for further exploration.

On the average number of pupils per class, the study found that majority of classes (38.2%) had over 50 pupils. This conforms to the head teachers observation that majority of the classes are overcrowded. Further the study

established that, majority of the teachers (76.5%) indicated that the class size affects performance in mathematics. On the key elements for better performance in Mathematics, the study found that numerous tests, completion of syllabus in time and continuous practice by the pupils as key factors affecting performance. In addition, teachers and pupils indicated that participating in math contests, and having few pupils in a class affects the performance of the learners.

The study deduced that there is minimal support given to teachers to enable them effectively deliver as majority of the teachers (74%) were rarely involved in decision making, there are no motivational programs or training programs offered to the teachers either by the school or by the government. The study found that majority of the head teachers indicated that commitment among teachers, leadership and good teacher-pupil relations affect pupils' performance in mathematics to a very great extent.

The study further found that performance in mathematics in the KCPE was below half mark in all the years. The performance in mathematics improved from 2011 to 2013 before declining in 2013 and further decline in 2014. However, the study notes that there was an improvement on the performance in KCPE as compared to the entry marks in all the years. The poor performance was attributed to such factors as inadequacy of qualified mathematics teachers and lack of enough resources especially varied

mathematics books, revision books as well as in adequate evaluation tests. This was consistent among head teachers, teachers and pupils.

### **5.3 Conclusions**

Based on the findings, the study concludes that, adequacy of mathematics teachers affect performance in mathematics because subject knowledge mainly through teaching ability, experience and teachers' qualification. In addition, when the school has adequate teachers they will share the workload so that the teacher is not over loaded. The study also concluded that the number of mathematics teachers in Kathonzweni Sub County, Makueni County is not adequate.

The study also concludes that provision of learning resources such as revision papers, mathematics main textbooks and financial resources for mathematics contests affects performance in mathematics. On teacher-pupil ratio, the study concludes that the ratio affects performance in mathematics. When the ratio is high the teacher would have adequate time to go through learners work and address the pupils individually. The study further revealed that teachers in overcrowded schools have little time at their disposal to cover the basic materials and could not have any time for further exploration.

Finally, the study concludes that professional support influence pupils' performance in mathematics though commitment among teachers, leadership and good teacher-pupil relations. Visionary management of school also affects

pupils' performance in mathematics. In addition, the study concluded that adequacy of trained teachers, provision of learning resources, professional support and teacher-pupil ratio influence pupils' performance in mathematics at Kenya Certificate of Primary Education in Kathonzi Sub County, Makueni County.

### **5.5 Recommendations for Policy and Practice**

The study recommends that TSC should ensure that there are adequate mathematics teachers in all primary schools by employing more teachers that are qualified. This will increase the teacher-pupil ratio to the required standards. The government through the ministry of education and in conjunction with universities and other teacher trainers should ensure that teachers are equipped with the necessary skills that will enable them deliver effectively. In addition, the teachers should be equipped with management skills to enable them handle pupils professionally.

The head teacher should ensure that their schools have adequate teachers as well as leaning resources such as classrooms, textbooks and exercise books, mock papers from different counties, financial resource for mathematics contests and monthly tests. This will help improve performance in mathematics. Teachers should ensure that they are committed to their work and have a cordial relationship with students as this also affects performance.

The study also recommends that, teachers and pupils should be given professional support so as to improve performance in mathematics in the sub-

County. The head teachers in liaison with the government officials should ensure that there is professional support for the students as well as the teachers. The head teachers should also provide leadership in the schools and involve teachers in decision making

The Kenyan government should also build more primary schools to cater for the high pupils' enrolment and in addition employ more teachers to handle the large number of pupils in primary schools. This will improve the teacher-pupil ratio which is currently very high and as a result the quality of education will improve. The government, parents and the local community should mobilize resources to put more classrooms and furniture to be used by pupils in schools. Finally, supervision of schools by head teachers should be encouraged as this provides an opportunity for internal criticism and improvement and improvement by teachers.

### **5.6 Suggestions for Further Research**

This study recommends that another in-depth study be carried out to determine the institutional factors influencing pupils' performance in languages especially English and Kiswahili in the county, which were also adversely affected.

The study also recommends that another study be carried out trough out the country to determine the institutional factors influencing pupils' performance in mathematics.

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## APPENDICES

### APPENDIX1: LETTER OF INTRODUCTION

Mweki Paul Mutuku,  
University of Nairobi,  
Department of Educational  
Administration and Planning,  
P.O. BOX 92,  
Kikuyu  
4<sup>th</sup> /04/2016

The head teacher,

Dear Sir/Madam,

**RE: PARTICIPATION IN RESEARCH.**

I am a postgraduate pupil at the Nairobi University pursuing a Master of Education in the Department of Educational Administration and Planning. I am currently undertaking a research on: **Institutional Factors Influencing Pupils' Performance in Mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County, Kenya.** I am pleased to inform you that your school has been selected to participate in the study. The identity of respondents was treated with utmost confidence and the data provided was used for academic purposes only.

Yours faithfully,

Mweki Paul Mutuku

E55/66048/2011

## APPENDIX II: QUESTIONNAIRE FOR HEAD TEACHERS

### INSTRUCTION

Kindly respond to the following questions by ticking ( ) in the appropriate box or filling the space provided. Do not indicate your name anywhere on this instrument.

### Demographic data

1) What is your gender

Male [ ]

Female [ ]

2) For how long have you been a head teacher? Tick appropriately.

Less than 1 years [ ]      1- 5 years [ ]      Over 5 years [ ]

3) How many mathematics teachers do you have in your school?

Only1 [ ]

1- 3 [ ]

More than 3 [ ]

4) What are the professional qualifications of your Mathematics teachers?

P1 [ ] Diploma [ ] Degree [ ] Others(specify).....

### Adequacy of mathematics teachers

5) Do you think the number of Mathematics teachers in your school is adequate?

Yes [ ]

No [ ]

6) How do you rate the professional adequacy of mathematics teachers in your school?

Adequate [ ]

Satisfactory [ ]

Not adequate [ ]

- 7) Use a scale of 1-5 where 5=Very great extent, 4=Great extent, 3=Moderate extent, 2=Low extent, 1=Very low extent to indicate the extent to which the following aspects of adequacy of teachers could affect performance in Mathematics in your school?

| Teachers' qualifications | 1 | 2 | 3 | 4 | 5 |
|--------------------------|---|---|---|---|---|
| Adequacy of teachers     |   |   |   |   |   |
| Teachers Experience      |   |   |   |   |   |
| Subject knowledge        |   |   |   |   |   |
| Scholastic aptitudes     |   |   |   |   |   |
| Teaching ability         |   |   |   |   |   |

- 12) In your own opinion, in what ways can adequacy of teachers influence pupils' performance in Mathematics in your school?

.....

.....

....

**Availability of Resources and performance in Mathematics**

- 8) Use a scale of 1-5 where 5=Very great extent, 4=Great extent, 3=Moderate extent, 2=Low extent, 1=Very low extent to indicate the extent to which your teachers use the following resources in preparation and during mathematics lessons?

| <b>Resources</b>                             | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
| Mathematics main text books                  |   |   |   |   |   |
| Revision papers                              |   |   |   |   |   |
| Mock papers from different counties          |   |   |   |   |   |
| Geometrical sets                             |   |   |   |   |   |
| Financial resources for mathematics contests |   |   |   |   |   |
| Others (specify)<br>.....                    |   |   |   |   |   |

9) Does the government through the ministry of education provide any of these resources? .....

10) Do you think these resources are adequate as guided by the curriculum and international requirements?  
.....  
.....  
.....

11) In your own words, in what ways does availability of resources affect performance in Mathematics?  
.....  
.....  
.....  
.....

**Teacher Pupil Ratio**

12) What is the current teacher-pupil ratio in your school?

Less than 1:10 [ ]

1:10 – 1:40 [ ]

Above 1:40 [ ]

13) In your opinion, do you think the teacher pupil ratio is reasonable?.....

14) Do you think the teacher pupil ratio affects your school performance in mathematics? Explain.....  
 .....

**Professional support and pupil's performance**

15) Is there any professional support given to assist student performance in your school?.....  
 .....

16) Do you think the professional support is adequate?  
 .....

17) How does the following professional support affect pupils performance in Mathematics in your school

|  | Very Great | Great | Moderate | Low Extent | No Extent |
|--|------------|-------|----------|------------|-----------|
| Leadership                             |            |       |          |            |           |
| Support                                |            |       |          |            |           |
| Commitment among teachers              |            |       |          |            |           |
| Good teacher-pupil relations           |            |       |          |            |           |
| Head teacher's involvement in framing, |            |       |          |            |           |



|                                       |  |  |  |  |  |
|---------------------------------------|--|--|--|--|--|
| conveying and sustaining school goals |  |  |  |  |  |
| Visionary management of school        |  |  |  |  |  |

18) In your own opinion, how do you think professional support affect pupils performance in Mathematics in their KCPE in your school?.....  
 .....  
 .....

**KCPE mathematics performance for the last 5 years**

19) Kindly indicate the performance of KCPE Mathematics for the last 5 years in your school in terms of the subject mean score

| Year  | 2011 | 2012 | 2013 | 2014 | 2015 |
|-------|------|------|------|------|------|
| Entry |      |      |      |      |      |
| mean  |      |      |      |      |      |

20) What are some of the challenges facing your school in the quest for better performance in mathematics?

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**THANK YOU VERY MUCH FOR YOUR COOPERATION**

### APPENDIX III: QUESTIONNAIRE FOR TEACHERS

#### INSTRUCTION

Kindly answer the following questions by ticking in the appropriate box or filling the space provided. Do not indicate your name anywhere on the paper.

#### Demographic data

- 1) What is your gender            Male [  ]            Female [  ]
- 2) For how long have you been a teacher? Tick appropriately.
- Less than 2 years [  ]            3-4 years [  ]            Over 4 years [  ]

#### Adequacy of mathematics teachers

- 3) Do you think the number of Mathematics teachers in your school is adequate?
- Yes [  ]            No [  ]
- 4) In what ways do you engage with pupils in the classroom?
- .....
- 5) To what extent do the following aspects of adequacy of teachers affect performance in Mathematics in your school? use a scale of 1-5 where 5=Very great extent, 4=Great extent, 3=Moderate extent, 2=Low extent, 1=Very low extent

| Teachers' qualification | 1 | 2 | 3 | 4 | 5 |
|-------------------------|---|---|---|---|---|
| Experience              |   |   |   |   |   |
| Subject knowledge       |   |   |   |   |   |
| Scholastic aptitudes    |   |   |   |   |   |
| Teaching ability        |   |   |   |   |   |

6) In your own opinion, how do you think adequacy of teachers affect performance in Mathematics in your school?

.....

.....

.....

**Availability of Resources and performance in Mathematics**

7) To what extent does the provision of the mentioned resources help improve performance in Mathematics? use a scale of 1-5 where 5=Very great extent, 4=Great extent, 3=Moderate extent, 2=Low extent, 1=Very low extent

| Provision of teaching and learning facilities | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Textbooks availability                        |   |   |   |   |   |
| Well-equipped library facilities              |   |   |   |   |   |
| Adequate desks and general furniture          |   |   |   |   |   |
| Revision papers                               |   |   |   |   |   |
| Mock papers from different counties           |   |   |   |   |   |
| Geometrical sets                              |   |   |   |   |   |
| Financial resources for mathematics contests  |   |   |   |   |   |

**Teacher Pupil Ratio**

8) How many pupils do you have per class?

Less than 10 [ ]

10 - 20 [ ]

20- 50 [ ]

Over 50 [ ]

9) In your opinion do you think class size affects performance in Mathematics in your school?

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10) In your opinion, what do you consider key to better performance of Mathematics in your school

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**Professional support and pupil's performance**

11) Is there any professional support given to assist student performance in your school?

Yes [ ]

No [ ]

12) How does the following professional support affect pupils performance in Mathematics in your school

|  | Very Great Extent | Great Extent | Moderate Extent | Low Extent | No Extent |
|--|-------------------|--------------|-----------------|------------|-----------|
| Leadership   |                   |              |                 |            |           |
| Support  |                   |              |                 |            |           |
| Commitment among teachers  |                   |              |                 |            |           |
| Good teacher-pupil relations   |                   |              |                 |            |           |
| Head teacher's involvement in framing, conveying and sustaining school goals |                   |              |                 |            |           |
| Visionary management of school   |                   |              |                 |            |           |

13) In your own opinion, how do you think professional support affect pupils performance in Mathematics in their KCPE in your school?

.....

.....

.....

**THANK YOU VERY MUCH FOR YOUR COOPERATION**

## APPENDIX IV: FOCUS GROUP DISCUSSION GUIDE FOR PUPILS

### Introduction

This guide is meant to collect data to enable the researcher to determine **Institutional Factors Influencing Pupils' Performance in Mathematics at Kenya Certificate of Primary Education in Kathonzweni Sub County, Makueni County, Kenya.**

- 1) In what category does this school fall in of school: Girls only ( ) Boys only ( ) Mixed ( )
- 2) How many teachers of mathematics are in your school?.....
- 3) In what ways do your teachers engage you in the classroom?  
.....  
.....
- 4) There are enough mathematic text books in the school?.....
- 5) Are there revision books for mathematics?.....
- 6) Which books do you use in your mathematics class?.....  
.....
- 7) How many pupils are there in any class in your school (average)?.....
- 8) Do you think The school have adequate mathematic Teachers  
Yes ( ) No ( )
- 9) Do your teachers explain the concepts well? Yes ( ) No ( )
- 10) Have you experienced hard topics? Which topics hard?  
.....  
.....
- 11) Do your mathematic teachers cover the syllabus in time? Yes ( ) No ( )
- 12) How often do you continuous assessment tests (CATs).....
- 13) Is your library well equipped?.....


- 14) How do you relate with the teachers? .....
- .....
- 15) How would you rate the performance of your school in mathematics in comparison with other neighboring schools?
- .....
- 16) What are some of the challenges facing your school in the quest for better performance?.....
- 17) What do you think should be done to improve performance of Mathematics in your school?.....
- .....

**THANK YOU VERY MUCH FOR YOUR COOPERATION**

## APPENDIX V: RESEARCH PERMIT


**THIS IS TO CERTIFY THAT:**  
**MR. PAUL MUTUKU MWEKI**  
**OF UNIVERSITY OF NAIROBI, 0-90302**  
**Kathonzweni, has been permitted to**  
**conduct research in Makueni County**  
**on the topic: 'INSTITUTIONAL FACTORS**  
**INFLUENCING PUPILS' PERFORMANCE IN**  
**MATHEMATICS AT KENYA CERTIFICATE**  
**OF PRIMARY EDUCATION IN**  
**KATHONZWENI SUB-COUNTY, MAKUENI**  
**COUNTY, KENYA**  
**for the period ending:**  
**23rd June, 2017**

**Permit No. : NACOSTI/P/16/57762/11832**  
**Date Of Issue : 23rd June, 2016**  
**Fee Received : ksh 1000**



**Applicant's Signature**  
**Director General**  
**National Commission for Science, Technology & Innovation**

**CONDITIONS**  
**1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit**  
**2. Government Officers will not be interviewed without prior appointment.**  
**3. No questionnaire will be used unless it has been approved.**  
**4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.**  
**5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.**  
**6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice**



**REPUBLIC OF KENYA**  
**NACOSTI**  
**National Commission for Science, Technology and Innovation**

**RESEARCH CLEARANCE PERMIT**  
**Serial No. A 9748**  
**CONDITIONS: see back page**



# APPENDIX VI: MAP OF KATHONZWENI SUB COUNTY, MAKUENI

## COUNTY

