DETERMINANTS OF GIRLS' PERFORMANCE IN MATHEMATICS IN PUBLIC SECONDARY SCHOOLS IN TRANS NZOIA COUNTY, KENYA

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DECLARATION

This research study is my own work, and I have not submitted it for certification to any other university or organization. Referenced works have been acknowledged as part of the project. Whenever text, data (including spoken words), images, photos, or tables are borrowed from other works, such as the internet, the sources are given explicit citations in compliance with anti-plagiarism guidelines.

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This project has been submitted with our appraisal as the university supervisors

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DEDICATION

This work is dedicated to; my late father Dan Anguche who inspired me to further my studies, my mother Hellen Anguche for her prayers my brothers and sisters for their encouragement.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

ASEI	Activity, Student, Experiment and Improvisation
CEMASTEA	Centre for Mathematics, Science and Technology Education in Africa
CSO	Curriculum Support Officer
EMIS	Education Management Information System
FEMSA	Female Education in Mathematics and Science Association
IPI	Integrated Programmed Instruction
KCSE	Kenya Certificate of Secondary Education
MOE	Ministry of Education
MOEST	Ministry of Education Science and Technology
NCCS	National Council for Children's Services
PDSI	Plan, See, Do and Improve
SACMED	Southern and Eastern Africa Consortium for Monitoring Educational Quality
SCEO	Sub-County Education Officer
STEM	Science, Technology, Engineering and Mathematics
UNESCO	United Nations Education and Scientific Cultural Organization
USA	United States of America
UPE	Universal Primary Education

ABSTRACT

Mathematics is one of the core and compulsory subjects in the Kenyan education system, both in primary and secondary schools, and is examined at both levels. However, according to the Kenya National Examinations Council (KNEC) females do not do well in mathematics, particularly in the Kenya Certificate of Secondary Education (KCSE). As a result, the goal of this research was to determine the factors that contribute to girls' low math performance and to devise strategies for improving math performance among girls in secondary schools in Kenya's Trans-Nzoia County. The study's objectives were to determine the impact of community beliefs, practices, and attitudes on girls' mathematics performance, determine the impact of role models on girls' mathematics performance, investigate the impact of parental economic status on girls' mathematics performance, and determine the various strategies that can be used to improve girls' mathematics performance. This study was carried out using a descriptive research approach. The target population was 1041 comprising of secondary school girls, teachers, principals as well as the Sub County Education Officer (SCEO).From this population 200 girls were selected by random sampling while ten principals, 19 teachers of mathematics and one (SCEO) were purposively selected as respondents. Data collection was done using questionnaire and interview schedule. A pilot study was done in two schools within the county. These schools were not included in this study. Reliability of the instruments was checked using Test-retest technique resulting to a correlation coefficient of 0.8 by using the Spearman rank order correlation coefficient. Quantitative data were analyzed using percentages and frequency tables while qualitative data were categorized according to themes and objectives in relation to the views, perceptions and opinions of the respondents. This research found that cultural beliefs, attitudes and practices have an influence on girls' performance in mathematics. Low socio-economic status was found to have a negative influence on girls' performance in mathematics. Role models play a significant role in helping girls improve in mathematics performance. Strategies to improve girls' performance in mathematics were identified such as demystifying mathematics concepts and involving all the stakeholders in matters which concern girls' performance in mathematics. The study recommended that parents should be sensitized on the influence of cultural beliefs, attitudes and practices on girls' performance in mathematics and the crucial role they play in provision of basic requirements for the girls, parents especially from low socio-economic backgrounds to engage in economic activities to enable them provide for the girls. Female role models who have excelled in various fields especially mathematics should be encouraged to give back to the society by offering motivational talks to girls. The findings of this study may be useful to stakeholders in education such as teachers, parents and the ministry of education especially in improving performance of girls in mathematics.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This chapter covers background to the study, the problem statement, purpose of the study, objectives of the study, research questions, and the significance of the study, as well as limitations and delimitations of the study, assumptions of the study, theoretical and conceptual frameworks, and operational definitions of terms.

1.2 Background to the Study

Education is essential for both personal and economic development. It is a crucial tool for both economic and social growth (World Bank, 2002). It is a key component of the World Bank's strategy for assisting nations in reducing poverty and raising living standards through long-term growth and human capital investment. Women's education enables them to better manage their households, adopt better nutritional practices, maintain adequate hygiene, and make good use of a variety of accessible services, such as family planning, among other things (World Bank, 1998).

Women who are educated become better administrators of their families, are more likely to employ better nutritional practices, maintain adequate hygiene, and are more likely to use a variety of accessible services such as family planning. These women have more job prospects and can participate in governance and decision-making processes. Better educated women, according to UNESCO (2002), are more likely to postpone marriage and childbearing. Every year, education stakeholders continue to invest extensively in the education of young Kenyans in the hopes that the input will match, if not exceed, the output and that examination results will be

satisfactory. Unfortunately, especially in mathematics, the performance continues to be poor. Furthermore, there is overwhelming evidence that fewer girls than boys pass mathematics in the KCSE. Males are also more likely than females to pursue mathematics-related courses beyond secondary school. Female poor performance in mathematics, as well as their under-representation in mathematics-related disciplines after secondary school, is a cause of inequality that denies girls numerous educational and employment possibilities and denies society the advantages of their capabilities.

According to Burton (1996), Cockcroft (1982), and Earnest (1993), one of the causes for girls' underachievement is that mathematics is perceived as a male area. Other factors could include a dearth of female mathematical role models in classrooms, unconscious sexism among teachers, individualistic rather than cooperative teaching techniques, differing cognitive processes (Clinn & Ashcroft, 1993), and students' mathematical self-concept (Marsh, 1989 & 1991). These factors may have an impact on how well girls succeed in arithmetic. Girls' underachievement and underrepresentation in mathematics are attributed to attitudes rather than aptitude, according to Eshiwani's research findings (Eshiwani, 1975 &1984). In comparison to other disciplines, yearly reports of KCSE examination results posted on school notice boards portray girls as complete failures in mathematics.

Parental economic status may also influence the performance of girls in mathematics. Studies have shown that some girls come from homes where parents are struggling economically and therefore they lack support because their parents are

unable to provide basic school requirements for learning mathematics as well as other basic needs such as provision of sanitary pads to their girls. This has a negative impact on girl's achievement in mathematics. Other parents are uneducated and as a result they may not offer the necessary help to their children for instance when it comes to doing homework. Furthermore, these parents may have low interest in the education of their children especially girls and may easily fall prey to cultural beliefs and practices which are detrimental to a girl's education specifically learning of mathematics.

Some girls lack the commitment in learning because of ineffective instruction. Skills obtained in learning mathematics last a lifetime and require great commitment for one to be successful. The vast majority of leaders are unsure of how to assist teachers in preparing kids to be successful in mathematics classes (Wagner, 2003). School achievement is likely to be judged when all students regardless of their gender or socio economic status are taught successfully.

Despite the importance of mathematics in any country's technological growth, poor performance by secondary school girls in mathematics remains a recurrent problem in many of the country's schools. This has major consequences because the rate of industrialization and the adoption of relevant technologies is a positive measure of society's mathematical attainment. Girls' mathematics performance has been bad in Trans-Nzoia County for the past year. In order to determine the reasons behind girls' under-achievement in mathematics in the region, this study solicited input from the SCEO, teachers, principals, and students (girls).

1.3 Statement of the Problem

Mathematics is critical in influencing career choice and courses to pursue after secondary education. These careers include medicine, engineering and architecture among others. Poor performance among girls in secondary schools is likely to exclude them from pursuing these careers to help them earn a living in future. Various factors determine girls' performance in mathematics as revealed in findings across the world. The factors differ from place to place and furthermore poor performance in mathematics among girls is prevalent in other regions as compared to the rest. In Trans - Nzoia County, the performance of girls in mathematics is poor as observed by the Kenya Certificate of Secondary Education (KCSE) mean scores over a number of years. The researcher sought to find out the reasons for this performance among girls in secondary schools in the region. Table 1.1 shows results of girls mean scores which reveal the poor performance in mathematics

Table 1.1: K.C.S.E mathematics mean scores of secondary school girls in Trans- Nzoia County in the years 2012-2016

		YEARS				
	SCHOOL	**2012**	**2013**	**2014**	**2015**	**2016**
	LUKESI	1.500	2.000	2.000	2.177	2.647
MEAN	IMMACULATE	2.580	3.409	2.900	2.930	1.828
SCORES	KOYKOY	3.833	6.167	4.800	4.600	2.652
	NAKAMI	3.222	3.895	1.973	3.212	1.895
	CHEMICHEMI	1.285	2.250	1.621	2.134	1.500
	TUUYOKONY	2.000	2.563	1.621	2.134	1.500
	MACHEWA	3.667	2.400	4.571	2.875	2.833
	SIKINWA	2.333	2.210	1.690	2.165	2.314
	BONDENI	3.667	3.281	1.654	2.236	1.876
	MUROKI	1.900	2.010	2.400	1.840	1.236

Source: Trans-Nzoia County Education Office, (2016)

As shown in the table the performance of girls at KCSE in Trans-Nzoia County is generally low. The general trend of mean scores for the previous year's (2012-2016) is below 5.0. This study therefore sought to identify some factors which may be impacting negatively on the performance of girls in mathematics in Trans- Nzoia County so that measures can be put in place to improve girl performance in mathematics.

1.4 Purpose of the Study

The purpose of this study was to assess the determinants of girls' performance in mathematics in secondary schools in Trans-Nzoia County, Kenya.

1.5 Objectives of the Study

The following objectives acted as a guide to the study:

i To assess the effect of community beliefs, practices and attitudes on girls' performance in mathematics in secondary schools in Trans-Nzoia County.

ii To determine the effect of parental economic status on girls' performance in mathematics in secondary schools in Trans- Nzoia County.

iii To ascertain the effect of female role models on performance of girls in mathematics in secondary schools in Trans- Nzoia County.

iv To assess strategies that can be adopted to improve girl achievement in mathematics in secondary schools in Trans- Nzoia County.

1.6 Research Questions

i To what extent do the community beliefs, practices and attitudes influence girls' performance in mathematics in secondary schools in Trans-Nzoia County?

ii To what extent has parental economic status influenced girls' performance in mathematics in secondary schools in Trans- Nzoia County?

iii To what extent has female role models influenced girls' performance in mathematics in secondary schools in Trans- Nzoia County?

iv What are some of the strategies employed to improve girls' performance in mathematics in secondary schools in Trans-Nzoia County?

1.7 Significance of the Study

The factors which impact on girls' performance in mathematics may be unique, differing from region to region. Addressing these factors may have a positive impact on performance of girls in mathematics bearing in mind that the subject is key to technological advancement and industrialization in the year 2030.

It is expected that the results of this research may serve as a platform for educational planners in the area, as well as for other education stakeholders, to develop more realistic ways to improve the mathematics performance of secondary school girls in Trans-Nzoia County. It is also hoped that the findings may influence policy makers in the region to support girl education so that more girls from the region can pursue courses of their choice and undertake careers to empower them economically thus break the cycle of poverty in the community.

1.8 Limitations of the Study

The study was carried out in Trans –Nzoia County where the researcher is a teacher of mathematics. This may have caused bias but the researcher ensured that control measures were put in place to avoid such bias by involving other educational stakeholders outside the county.

1.9 Delimitations of the Study

Only 21 public secondary schools were considered in this study. However there are also private schools in the region and making a comparison of girls performance would have provided a better perspective in this research. Due to limited time and financial resources this was not done. The study focused on public secondary schools which are easily accessible. It also centered on girls performance in

mathematics. The performance of boys was also left out to avoid crowding information and to maintain a focus on girls' performance in mathematics. The findings were therefore generalized with cautions.

In addition there were many factors which impacted on performance in mathematics by secondary school girls as observed by other researchers. However, this study intended to focus on, community beliefs practices and attitudes, parental economic status and lack of role models as factors which impacted on performance in mathematics among girls in secondary schools in Trans Nzoia County.

1.10 Assumptions of the Study

It was assumed that the respondents were truthful and provided accurate information in their responses. It was also believed that males outperform girls in mathematics in the Kenya Certificate of Secondary Education in Trans-Nzoia County, and that the variables identified as contributing to low performance among girls in public secondary schools in Trans-Nzoia County are the most significant.

1.11 Theoretical Framework

This research was led by Miller and Donald's (1941) social learning and imitation theory, which proposed that for imitative learning to occur, viewers must be motivated to act, given an example of the desired action, and their imitative actions must be positively rewarded. Better performance in mathematics by girls could be viewed as the desirable behavior in this case, whereas the examples are those significant others such as the teachers who give instruction and examples to be followed as well as parents who offer support in terms of providing basic requirements. On the other hand women who have excelled in mathematics provide

necessary positive reinforcement in terms of building positive attitudes among girls in question. The community beliefs, practices and attitudes, parental economic status as well as existence of female role models could act as reinforcement that may enable achievement of the desired behavior either positively or negatively.

“A person can acquire, retain, and possess the capacity for skilled execution of modeled behavior,” according to Bandura (1965), “but learning may seldom be converted into overt performance if it is adversely sanctioned or otherwise poorly received.” When positive incentives are introduced, previously unexpressed observational learning is quickly converted into action. In this scenario, parents' and the entire community's actions are critical to the girls' learning since they are so important in their lives.

The socio economic status of the parent may dictate the extent of support to the girls’ learning of mathematics thus influencing performance in the subject. Parents are charged with the responsibility of providing all the basic requirements to the girl child including sanitary towel, geometrical set, calculator and mathematics table. The community may address the factors that militate against the child’s achievement and promote those that support her success.

1.12 Conceptual Framework

As shown in figure 1.1 the independent variables of the study are community beliefs, practices and attitudes, socio-economic status of parents, few female role models and strategies to improve mathematics performance among girls in secondary schools. The dependent variable is girl performance in mathematics.

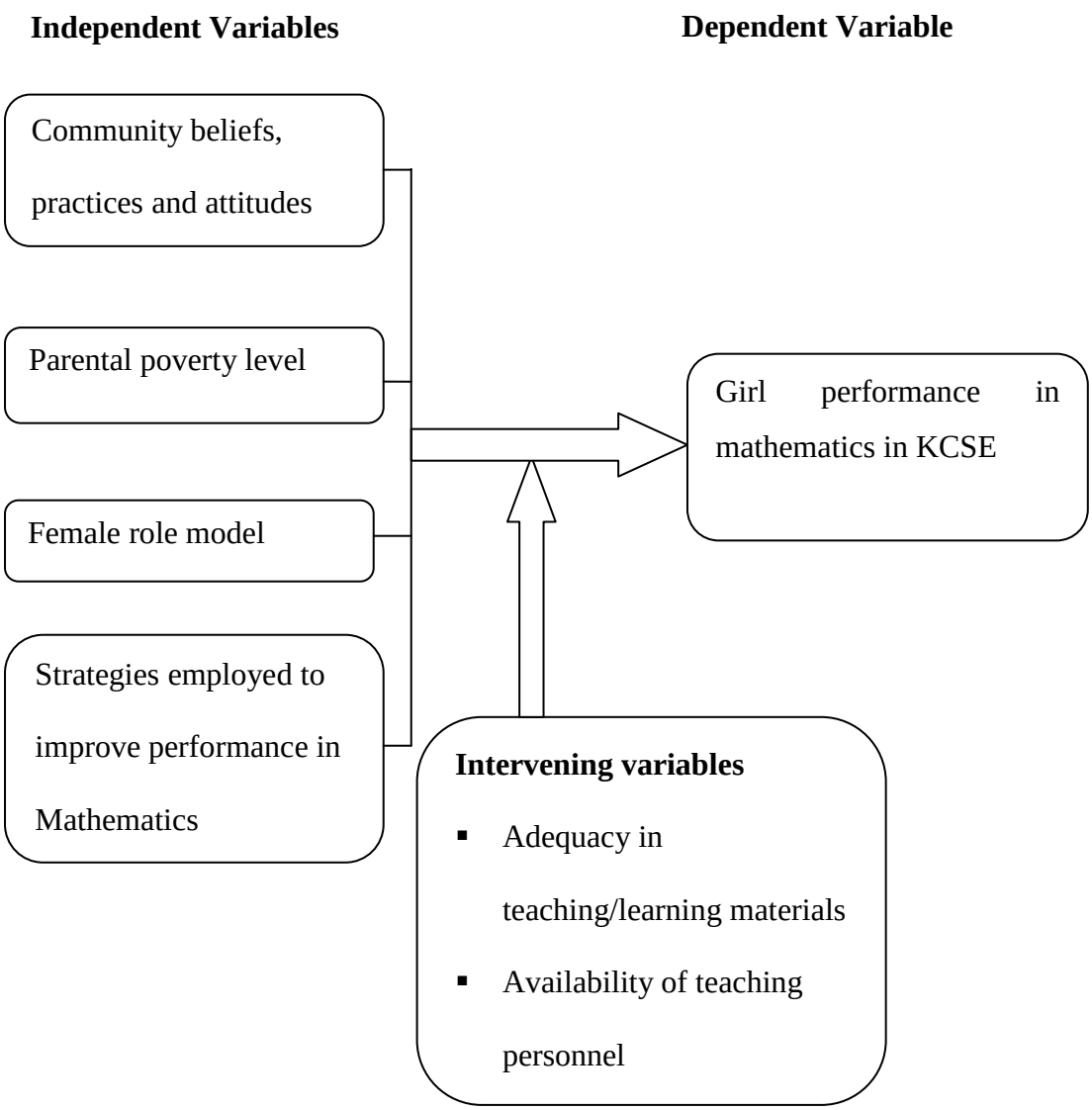

Figure 1.1: Conceptual Framework

These variables were expected to influence girls' performance in mathematics subject either positively or negatively. It was expected that in cases where community beliefs, practices and attitudes promote girl education, then performance in mathematics is enhanced. On the other hand, discriminative and unsupportive beliefs, practices and attitudes will hamper better performance by girls in mathematics. Another variable which is parental economic status has a direct influence on the performance in mathematics. Economic status determines girl involvement and performance in mathematics (Ayal, 2015). Girls from poor families

may lack basic requirements and motivation since parents cannot provide for them For example a girl who lacks sanitary towel may miss school during her menses every month and this may have negative effect on her performance in mathematics. Basic tools for learning mathematics which are calculator, geometrical set and mathematical table help in working out difficult mathematical problems. A girl whose parents are unable to provide these tools may be discouraged from attempting such questions leading to poor performance in mathematics. This affects the classroom learning of mathematics and consequently performance in mathematics. Role models may inspire and motivate learners to work hard since they are examples themselves. Thus provide reinforcement on the girl's attitude and behavior when it comes to learning of mathematics. The effectiveness of the strategies employed will determine the performance in mathematics by girls in secondary school. Effective strategies translate into better performance while non-effective strategies may result to stagnation in performance or even poor results. The effectiveness of strategies employed to enhance learning of mathematics determine performance in that subject.

The attitude of a student (personal attitude) towards mathematics also matters. When a girl has negative attitude towards mathematics, she will not understand the subject and even ends up having negative attitude towards the mathematics teachers. The result is poor performance in the subject. However when a girl has positive attitude towards mathematics, she will work hard to pass the subject.

Household activities especially in rural areas may affect girl performance in mathematics especially in day schools. In most cases, girls are the ones responsible for the performance of the household activities such as washing, cooking and taking

care of young ones thus such preoccupation may take up valuable time for revision of mathematics hence negatively affecting their performance in mathematics.

Role models who are females may inspire girls to work hard in mathematics especially if they themselves have excelled in the subject. Females undertaking careers in Science, Technology, Engineering and Mathematics (STEM)can play a crucial role in mentoring girls and as a result girls' attitude toward the subject may change leading to better performance in mathematics. Parents who have also excelled in mathematics and are in careers related to mathematics may serve as examples to their children. They are more likely to assist girls in their homework thereby improving in mathematics.

On the other hand teachers also play a crucial role in shaping the learners' attitudes as well as designing methods of instruction which cater for individual needs of learners. This may help improve the outcome in mathematics subject among girl students.

1.13 Operational Definition of Terms

High achievement-refers to girls' performance which is above average in terms of mean score

Effective strategies- refers to activities which improve learning of mathematics and give positive results, in this case a mean score of 5.0 and above

Poor performance- refers to girls' mean score in mathematics at KCSE level which is below 5.0.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

The focus of this chapter was on contributing factors to girls' low achievement in mathematics subject as recorded in available literature globally, in Africa and more specifically in Kenya. It focused on community beliefs practices and attitudes, parental economic status, and role models as factors which have an influence on girl performance in mathematics. Consideration was also made of the various strategies employed in addressing the mentioned factors and their effectiveness in enhancing the performance of girls in mathematics in secondary schools.

2.2 Community Beliefs, Practices and Attitudes

Boys are born with a better aptitude for mathematics than girls, according to socio cultural influences (Amelink, 2012). Such attitudes are echoed by students' parents, who express them verbally. Some parents assume that females are less academically proficient than boys in their societies. This may deter females from putting out effort in mathematics not just in primary school but also in secondary school. "Environments like mathematics classrooms and homes that are significantly impacted by notions that girls may be genetically disadvantaged when it comes to mathematics aptitude can have a major detrimental effect on mathematics interests among girls," Dweck (2007) writes. Especially for parents, have an important influence in molding how pupils perceive mathematical aptitude and performance. If parents think that mathematical aptitude is inborn and that success is determined by genetic predisposition, kids, particularly girls, who get such messages and then face difficulty may interpret such issues as evidence that they lack natural mathematical

aptitude (Dweck & Legget, 1988). As a result, girls confidence and enthusiasm for mathematics has waned. Girls who see mathematical ability as a gift, on the other hand, lose interest in mathematics more quickly than girls who see mathematical skill as something that can be developed or fostered.

Learning mathematics was traditionally thought to be a male-dominated subject, as evidenced by career choices and occupations. Gender intensification throughout middle and late adolescence, characterized by decreased flexibility and stereotyping, is supported by studies on stereotyping and adolescent development. This leads to gendered responsibilities and gendered interests, which may explain why females in secondary school have a negative attitude toward mathematics. According to (Shumow, Vandell, & Posner, 1998), "negative parental attitudes about school merit consideration since they also predict academic failures," and "their productive value is bigger than the family's poverty level." Many parents regard their sons' mathematical accomplishments as proof of natural talent, but many regard their girls' achievements as the result of hard effort compensating for a lack of intrinsic talent (Eccles, 1989, Yee & Eccles, 1988).

In his research, Spelke (2005) discovered that socio-cultural elements have a significant impact on students' assessments of how competent girls and boys are in mathematics and how they apply the subject in real life. When important individuals, such as parents, teachers, and community members, hold unfavorable ideas about mathematics, the messages are absorbed by girls, resulting in a negative attitude toward mathematics and a lack of interest in it. According to Spencer and Steel (1994), when girls are irritated by the complexity of arithmetic problems they

correlate their unhappiness with the assumption that girls are not meant to be able to perform arithmetic.

Overall female success in mathematics, according to Usher (2009), is more likely to be ascribed to hard work than to intrinsic talent. Parents and instructors in a survey of eighth graders ascribed male math achievement to intrinsic talent and mentioned conscientiousness in mathematics as playing an important influence in female arithmetic achievement. This kind of action might send the message to females that they don't have the capacity to do arithmetic and must compensate by working hard. This has a detrimental influence on female attitudes because females perceive mathematics as a topic in which they would have limited success and hence avoid further study (Usher, 2009). Anxiety develops as a result, and performance suffers as a result.

Girls are typically seen as inferior, according to White (2007), and are so discriminated against from the moment they are born. It's worth mentioning that female genital mutilation continues to be practiced in some groups (FGM) Children, particularly girls, from such homes, where socio cultural norms like as early marriages and FGM are still prevalent, exhibit emotional issues in school, lack focus in class, and lack confidence in whatever work they are assigned (Durojaiye, 1976, Nkonke, 2012). Early marriage and motherhood might make a lady feel humiliated in front of her classmates, leading to her dropping out. When a girl like her is given the chance to return to school, the stigma of being a child mother may cause her to do poorly in math. According to Mwiti (2006), “girls in rural regions are more likely than their contemporaries in urban areas to be married by the time they become 18

years old.” Some communities, due to their tradition and cultural orientation, are enthusiastic supporters of this practice. Girls' math achievement suffers as a result of this. Because of the consequence of schooling, some parents are concerned about losing respect, status, and bride price. Others believe that if their daughters do well in math and science, they will enroll in male-oriented courses and so be unable to find spouses. After high school, such parents may discourage their daughters from pursuing math-related courses and occupations. A girl's arithmetic performance has been found to be influenced by her attitude as a student.

Girls' lack of time to study was shown to be due to societal obligations allocated to them. The females are more involved with household tasks, which takes away significant time from their education in terms of homework and math assignments. Girls are given chores that take up a lot of time, such as cooking and washing, cleaning the house, and caring for younger siblings. According to Wamahiu (2006), girls begin helping their moms at a young age and eventually internalize their duties. Female genital mutilation is performed in more than half of Kenyan districts, according to Gachiri (2001), including tribes such as the Samburu, Kenya Somalis, and Gabra. In Kenya, female genital mutilation (FGM) is still a serious gender issue. To solve the problem, steps must be done (Mwiti, 2006). It is also highlighted that cultural practices like as early marriages, cattle rustling, and female genital mutilation (FGM) have a negative influence on female students' academic progress (Chiuri & Kiumi, 2005).

Marriage or cohabitation with a kid, or any agreement for such marriage or cohabitation, is considered early marriage (NCCS, 2007). This practice has a variety

of consequences for girls, according to UNICEF (2005), and child brides are frequent in Kenya. The kid bride is denied her family's affection and care. The girl kid in this condition is subjected to traumatic sexual encounters and the child brides end up impoverished on the streets or as barmaids or potentially sex workers once the marriage comes to an end.

From an early age, females are inundated with explicit and implicit social, cultural, and historical signals that mathematics is not beneficial to women, that mathematics occupations are masculine, and that women are more interested in social subjects (Barnett, 2004). Parents, for example, tend to regard mathematics as a more male discipline and purchase more math-related items for their sons than for their girls (Bleeker& Jacobs, 2004; Nosek et al, 2002). Although scientifically unjustified, these messages begin with prominent adults such as parents and teachers, are picked up and spread by peers, and are reinforced by media such as periodicals, television (TV), and school textbooks. Other research has found strong links between attitudes and performance. Students with a good mindset are more likely to succeed. Students' attitudes, not their ability to learn Mwamwenda, influence their academic success in a topic (1995). According to Haimowitz (1989), “the reason of most school failures may not be insufficient or poor education, but intentional resistance by the learners.” This argument implies that in order to increase arithmetic proficiency, positive attitudes about the subject should be cultivated. Patterson et al. (2003) discovered that student attitudes toward mathematics are gender-related, and that these variations can impair mathematics performance.

Males tend to have higher mean scores on mathematics content and attitudes, according to Amunga and Musasia (2011). A research in Ivory Coast found that there is a link between math attitude and ability, and that this link is dynamic and interactive. Learners in the high-achieving group reported less fear and more positive attitudes about persistence and problem solving as a result of their attitudes. High achievers showed a more favorable view regarding mathematics' utility than their poor achiever colleagues (Frazier, 1999). According to Onyango (2014), negative attitude towards mathematics was due to poor teaching methods, lack of teaching resources and non-existent role models.

At the secondary school level, there was no significant difference in male and female students' confidence in mathematics; rather, students' performance in mathematics was determined by their approach toward the subject. Girls were viewed as weak in self-confidence and having crippling causal attribution habits, as well as seeing mathematics as a male realm and being fearful of it.

According to a House of Commons committee study (April 2009), there is a gender disparity in math achievement, with males outperforming girls in the only core subject where the difference is widening. Because of the gender gap in science, mathematics, and technology (SMT) topics, fewer girls than boys qualify for science and technology-related courses (Wambua, 2007). According to statistics, just 4% of engineering students enrolling at Kenyan institutions in the 2003/2004 academic year were female (Sifuna, 2006). In the 2004/2005 academic year, just 5% of women enrolled in science engineering degrees at national polytechnics (Republic of Kenya, 2005; UNESCO, 2006). Mbugua et al (2012) discovered that boys

outperformed girls in science, mathematics, and technological (SMT) disciplines in the Koibatek region of Baringo County. Furthermore, research has indicated that at all educational levels in Kenya, women involvement and performance in SMT topics and associated courses is lower than that of men.

2.3 Parental Economic Status

The socio economic status of parents is important in determining the education of a child. Parents who are stable economically are more likely to support the education of their children by providing the learning requirements for example in mathematics a calculator, mathematics tables as well as geometric sets are required during the learning process. Girls from unstable economic backgrounds may lack support from parents because they cannot afford to buy these items for their children.

Many impoverished children, regardless of race, come from households where there is a lack of stability, continuity of care, proper nourishment, and medical treatment, resulting in a degree of environmental stress that can negatively impact the development of a young kid. As a result, these students arrive at school with a lower level of word knowledge, which might affect their language abilities, their reading experiences, and their views and expectations in the classroom (Hill & Duncan, 1987). Mathematics is taught in English therefore a lack of language skill in this subject may result to poor performance because the student will not understand what is being asked especially in examination. Furthermore the language of instruction being English further complicates the matter because the learners would not concentrate in class and fail to complete the assignment given especially in mathematics.

According to Ayal (2015) family size and economic status determines girls' performance in mathematics. Girls from low economic status lack basic requirements and motivation. The basic requirements among others include sanitary towels as well as mathematics basic learning tools which are a calculator, mathematics table and geometric set. Sanitary towel is a necessity for a girl in secondary school since lack of this important garment leads to absenteeism which affects continuity in the learning of mathematics by the secondary school girl. Majority of girls in secondary schools are already experiencing menses. The situation is worsened if the parent cannot afford sanitary towel for the daughter. Tools for learning mathematics are necessary if girls have to acquire mathematical skills. Such tools include calculators, geometrical set and mathematics table.

Learning mathematics was traditionally thought to be a male-dominated subject, as evidenced by career choices and occupations. Gender intensification throughout middle and late adolescence, characterized by decreased flexibility and stereotyping, is supported by studies on stereotyping and adolescent development. This leads to gendered responsibilities and gendered interests, which may explain why females in secondary school have a negative attitude toward mathematics. Negative parental attitudes about school merit consideration since they also predict academic failures and their productive value may be bigger than the family's poverty level. Many parents regard their sons' mathematical accomplishments as proof of natural talent, but many regard their girls' achievements as the result of hard effort compensating for a lack of intrinsic talent (Eccles, 1989, Yee & Eccles, 1988).

When high-achieving females have trouble executing a task, they have been found to lose confidence and effectiveness, despite the fact that they do as well as or better than their male counterparts on other activities. According to one research, when high-achieving females were given new, complex material, they were less likely to deal better than males. Scientific calculators, according to Odera and Ochanda (2011), have become valuable instruments for mathematical operations and manipulations.

It is worth noting that students who use a calculator for mathematics education have a better attitude toward mathematics than students who do not use a calculator."The Ministry of Education (MOE) from the year 2005 has approved the use of scientific calculators in the classroom as well as during KCSE examination. The use of a calculator provides efficiency, accuracy and the speed required in carrying out lengthy calculations both for the teacher and the student. It is of particular importance to the girls because some studies have shown that when girls are faced with difficulty mathematical problems which require a lot of computation they tend to shy away but with a calculator they can tackle the problem. Their efficiency, accuracy and speed in carrying out lengthy calculations provide students and teachers with new opportunities to refocus mathematics lesson time and attention. Calculators facilitate more explorative approaches in learning mathematical concepts, some of which require repeated computations involving large or very small numbers. When technology tools are accessible, students may concentrate on making choices, thinking, reasoning, and problem solving rather than on memorizing facts and figures (Noraini, 2004).Since girls were perceived to get easily frustrated by the tedious computation in mathematics, the use of calculators

could help alleviate this problem and further help them develop a positive attitude towards mathematics. Due to low economic status some parents may not provide this important tool to their children. Inability of parents to provide basic school requirements is an indication of the level of poverty in a region. This study therefore sought to find out whether girls in Saboti have the necessary tools for learning mathematics and whether parents provide other basic needs such as sanitary towel which enhance retention of girls in school as well as discourage absenteeism.

When it comes to student success, Dessarollo (2007) found that the degree to which parents or other family members are actively involved in the student's education has a favorable impact on the student's performance. However parents can only be actively involved if they are literate. Literacy is also linked to economic level of a parent. According to the findings of a study conducted by Gegbe in Sierra Leone, illiteracy among parents may have a detrimental effect on a child's academic achievement since they may not be suitable role models for their children in terms of academic issues. Illiteracy is linked with poor socioeconomic position, and this has a spillover effect on the next generation. Furthermore, poor socioeconomic position is linked with a lack of resources, which contributes to lower levels of academic performance. This is due to the fact that the amount of learning materials available will be determined by the income of the parents. The purpose of this study was to determine the economic condition of parents who had children enrolled in secondary schools in the sub county in order to establish a connection between parental economic status and girls' mathematics performances in order to help them better understand their children.

2.4 Role Models

Some study has shown that exposing girls to a diligent female role model may help them do better in mathematics in the future (Bages & Martinot, 2011; Marx et al 2005). In accordance with other studies, the message sent by the role model is more significant than his or her gender identity. Some information might render a female role model useless, such as when she shows uncertainty about her math abilities or projects existing prejudices about the area. As a result, the role model should be enthusiastic about math accomplishment in order to instill that enthusiasm in the students. Stout et al (2011) discovered that women's self efficacy in engineering was predicted by their affiliation with female engineers. “When the malleability of the role models math ability was emphasized,” Lockwood and Kaunda (1997) write, “students connected with the industrious role model, maybe because the achievement looked more attainable.” Males do outperform girls in mathematical achievement, according to the overall opinion in related studies, although this difference does not develop until puberty. When it comes to problem solving, the disparity is much more noticeable (Hyde, Fennema, Ryan, Frost, & Hopp, 1990). Females, interestingly, receive greater grades on report cards than boys (Hyde et al, 1990). This might be because teachers give females higher test grades than they deserve because they believe that girls put in more effort than boys and have less behavioral issues than guys (Ross et al, 2012). So, what is it that causes males to outperform girls on standardized performance tests?

The reason could partly be a lack of or few female role models for the girls. According to Social learning scientists, most of the learning which occurs during a child’s development is acquired through observation and imitation. Children imitate

those they admire usually the older ones who become their role models. The absence of such role models in the community may have negative influence on the performance of girls in mathematics as majority of them seem to hold to the traditions and beliefs of their communities. A female role model especially one who is a teacher may influence girls to have confidence and positive attitude towards mathematics. This will help remove anxiety associated with tackling mathematics problems since the teacher guides the learner in solving mathematics problems.

Females are more apprehensive about mathematics than guys (Ganley and Vasilyeva, 2013). Because of the link between anxiety and working memory, several studies have found that anxiety can affect mathematical ability. In their study, Ganley and Vasilyeva (2013) looked at two forms of working memory: visual spatial working memory and verbal working memory. Visual-spatial working memory, rather than verbal working memory, was shown to be more significantly associated to both mathematics performance and gender.

Adults' attitudes about mathematics may be traced back to childhood, and younger age groups are more favorable than older age groups. People with unfavorable attitudes about mathematics are thought to shun the topic altogether and become quickly upset when doing so. People who have a favorable attitude toward mathematics, on the other hand, are more likely to be motivated and like performing mathematics than those who have a negative perspective.

“Females have more unfavorable attitudes regarding s mathematics than males,” according to Gunderson, Ramirez, Levire, and Beilock (2012). This might be due to the fact that they have few or no role models to look up to. Negative arithmetic

attitudes in early children, particularly females, lay the foundation for lifetime behavioral and attitudinal patterns like arithmetic fear and avoidance. As a result, it's critical to learn more about the elements that influence a child's attitude toward mathematics.

A number of things influence one's sense of belonging to a specific domain. A lot of it has to do with one's intelligence hypothesis. One hypothesis of intelligence holds that intellect is fixed, and that you either have innate ability and skill or you don't. Others think that intellect is flexible, and that it may expand and develop as a person's education progresses. Students who believe ability is a flexible attribute, according to Good et al (2012), are less concerned with testing and showing their talents and more concerned with learning. Furthermore, when students have a set perspective of intellect or are surrounded by others who believe in it, they may doubt their talents and, as a result, wonder if they belong in that group.

The math-gender stereotype may have a direct impact on women who study mathematics. Women in particular may feel less welcomed as members of the mathematical community as a result of gender stereotypes, and hence have a poorer sense of belonging to mathematics. Krendl, Richeson, Kelley, and Heatherton (2008) employed functional magnetic resonance imaging to uncover the brain processes involved in challenging mathematics tasks performed by women in the presence and absence of stereotype threat. They compared the results of a math exam given to two groups of girls. Before the exam, one group was reminded of the stereotype, while the other was not. They discovered that those who were reminded of the gender gap fared worse than those who were not. Finally, while attempting to

close the success gap between males and girls in mathematics, female instructors play a critical role in reducing gender stereotypes and must include all emotional and psychological elements. They must also be cautious not to perpetuate the math-gender stereotype, because these emotional and psychological aspects have been found to have a negative impact on women's math performance, as well as their future course work and professions. As a result, the goal of this study was to determine the impact role models had on females' arithmetic ability.

2.5 Strategies to Improve Mathematics Performance among Girls

Practitioners have an important role in fostering interest in mathematics and countering sociocultural pressures that discourage female participation and achievement in the subject. Teachers and parents may assist kids enhance their mathematics interest and performance by supporting them and encouraging them to feel that their mathematical abilities can be improved with constant work (Schunk & Zimmerman, 2007).

Sponsoring activities aimed at female high school students, according to Amelink (2012), may boost female interest in mathematics. Women who have graduated with a degree in mathematics will function as role models for the girls, therefore events that include hands-on activities and interactive laboratories, as well as opportunities to network with women who have graduated with a degree in mathematics, would be of tremendous help to the girls.

Furthermore introducing female students to strong female models in Science, Technology, Engineering and Mathematics (STEM) careers has been shown to increase female interest in mathematics. This can be done by organizing mentorship

programs where such models can interact and inspire female students. Programmes such as Strengthening Mathematics and Science (SMASE) provide an opportunity for females to carry out hands on activities thus enhancing their scientific skills especially in mathematics. Girls need to be exposed to female role models in math and science, where they may witness capable, energetic women who have achieved success in these subjects. Schools may give field visits to areas where women work in science, technology, engineering, and mathematics (STEM) jobs, or opportunity to meet women in math-related occupations.

Negative perceptions regarding women's ability must be countered. Girls, parents, and schools must be taught about the impact gender stereotypes have on girls' math ability. Negative gender stereotypes regarding female interest in arithmetic, according to Dweck (2007), act in tandem to discourage females from pursuing math abilities.

Following the retention strategy, it is critical to have policies in place that encourage school advancement and decrease the number of children who drop out of school. Universal Primary Education (UPE) cannot be achieved without such policies in place. Although more children are enrolling in primary school than ever before, dropout rates remain high, resulting in poor primary school completion rates in many nations. In Benin, for example, the primary school completion rate was 62 percent in 2005, after progressively increasing from 38 percent in 2000. The primary school completion rate in the Democratic Republic of Congo was 51 percent in 2007, which was the same as the country's completion rate in the early 1990s (UNESCO, 2009).

United Nations Children's Fund (UNICEF) reported in 2003 that the number of girls who drop out of school each year in Sub-Saharan Africa has risen from 20 million in 1990 to 24 million in 2002.Girls who stay in school are more likely to have a consistent learning experience. Math and scientific knowledge and abilities are gained like building bricks, with one notion being applied to another. As a result, strategies aimed at improving school advancement should be prioritized. With the advent of Free Secondary Education (FSE), an increasing number of students are enrolling in school, but unfortunately, dropout rates among girls are high. Every year in Sub-Saharan Africa, the number of girls who drop out of school has risen from 20 million in 1990 to 24 million in 2002, according to the United Nations Development Programme. UNICEF (United Nations Children's Fund) (UNICEF, 2003).

Despite their relevance, elementary school retention and advancement techniques have gotten comparatively little attention. Typically, national education plans presume that as a result of initiatives aimed at improving initial access and educational quality, primary school progression will improve on its own. Forbidding students from repeating lessons is one example of such an intervention. However, improving the quality of teaching in elementary schools may not necessarily be the most effective method of advancing student development. The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) reports, for example, that math test scores (which are a poor indicator of teaching outcomes) and Grade 5 life expectancies are very variable (mainly determined by the cumulative dropout rates).Namibia has a fairly low average mathematics proficiency, yet an 87 percent survival rate to Standard 5. Mozambique, on the other hand, has a

reasonably good average accomplishment in mathematics exam scores, but its Grade 5 survival rate is just over 40%. (UNESCO, 2008).

Girls, their education, and development are disadvantaged and susceptible in rural regions due to social and cultural norms paired with generally inadequate schooling quality. Girls are the first to drop out of school because they suffer the brunt of family chores, such as caring for ailing parents and siblings. This may have a detrimental influence on their math skills.

The Jomtien Conference of 1990 introduced the Education for All programs, which intended to get children into school within 10 years and emphasized that ensuring access to and improving the quality of education for girls and women was a top priority. Many governments devised plans to make the proposals more easily implemented. Nigeria began the process of implementing Universal Basic Education. All of this is being done in order to reach the second Millennium Development Goal, which is to establish Universal Basic Education. The question is, what level of education is provided to girls that will enable them to adapt to the knowledge-based economy of the twenty-first century? Examining what occurs in today's classrooms may provide some insight into the solution to this issue.

When done effectively, teaching may be one of the most enjoyable and thrilling of all human occupations, but when done poorly, it can also be one of the most degrading and tiresome. As a result, in-service seminars and retraining for teachers may keep them up to speed on the most current and successful methods of teaching mathematics to students, particularly ladies. The instructor has a significant impact on student achievement. Teachers' qualifications were found to be relevant in a

research conducted by Wanjohi and Yara (2011), and may potentially be used to predict students' mathematical achievement. This is consistent with Kaur (2004)'s findings, who stated that the problem of teaching mathematics and sciences in According to Singapore's Ministry of Education (MOEST), competent teachers and educators were needed, and in-service courses in mathematics were suggested to equip instructors with the essential abilities. The majority of instructors did not effectively awaken learners' interest and curiosity through innovative and real-life scenarios, according to the Training Needs Assessment (TNA) study (CEMASTEA, 2015), nor did they involve learners in producing creative ideas. In addition, many professors seldom create tasks that allow students to understand, analyze, and evaluate new material. The utilization of Activity, Student, Experiment, and Improvisation is emphasized in CEMASTEA, which is compulsory for teacher capacity development (ASEI). The Plan, Do, See, and Improve (PDSI) method may be applied to mathematics and science teaching and learning to improve the learning process through well-planned instructional activities.

IBL (inquiry-based learning) is a teaching method that empowers students to take charge of their own education (Carin & Bass, 2001). Learners' capacity to acquire a number of abilities such as inquiring, anticipating, observing, manipulating, inferring, and critical thinking is strengthened when they are given the chance to acquire information in the school curriculum through Inquiry Based Learning.

2.6 Knowledge Gap

Other researchers have looked into factors such as inadequate resources, non-girl friendly learning environments, and negative attitude towards the subject, cultural beliefs, and practices as well as gender biased learning material. It is worth noting from the literature review that there is scarcely any literature on factors which may contribute negatively to the performance in mathematics by girls in secondary schools in Trans- Nzoia County. Due to this scarcity the researcher sought to carry out this study in order to gain valuable information on determinants of girls' performance in mathematics in Trans-Nzoia County.

2.7 Summary

This chapter reviewed relevant literature on factors which result to girls' poor performance in mathematics globally, in Africa as well as in Kenya. The specific factors included community beliefs, practices and attitudes, parental economic status, and few female role models. It also described some strategies which may enhance the performance of girls in mathematics.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter dealt with the research methodologies that were used in this study. The subtopics which were discussed in this chapter included ; research design, location of the study, target population, sampling procedure, data collection methods and procedures, reliability and validity of data collection instruments, methods of data analysis, and finally logical and ethical considerations.

3.2 Research Design

Descriptive research design was selected because of its versatility in accepting both quantitative and qualitative data as well as its acceptance of all data kinds,. Participants were provided all the tools for both quantitative and qualitative data at the same time. This included contemporaneous data collection, but separate quantitative and qualitative data analysis was performed so that the researcher is better familiar with all relevant information. The researcher combined the two sets of data and analyzed them simultaneously (Morse, 1991). Questionnaires were used to gather data from principals, teachers, and students, while an interview schedule was used to obtain data from the SCEO. The study's aim was to learn more about how different variables in Trans Nzoia County influence girls' mathematics performance.

3.3 Location of the Study

The research was conducted in Saboti region of Trans-Nzoia County. Saboti is about 23 km from Kitale town. It is a rural area in which community beliefs, practices and

attitudes are rampant. Majority of the households who have their children in public secondary schools are of low socio-economic status whose main economic activity is farming. The area is characterized by deplorable road network which makes accessibility especially to interior schools almost impossible during rainy season. The choice of the area is based on the researcher's familiarity with the locality. This familiarity enabled the researcher develop immediate rapport with the study subjects making data collection less cumbersome. The area was also considered due to the continuous low girls' performance in mathematics in the Kenya Certificate of Secondary Education (KCSE) mathematics subject (Trans-Nzoia county Education Office, 2016)

3.4 Target Population

The targeted population for the study included 400 girls in public secondary school, 10 principals, 20 teachers of mathematics and one SCEO. The total population for this study was 1041. The study was carried out in girls' homogenous and mixed secondary schools in Trans- Nzoia County.

3.5 Sampling Procedure and Sample Size

The sampling method and sample size used in the research were explained in detail in this section. A sample was taken from the specified target demographic (Orodho, 2008: Creswell, 2008). A sample, according to Fraenkel and Wallen (2000), is a group from which information is gathered. Furthermore, according to Kombo and Tromp (2006), a good population sample is one that tries to be as diverse as possible and employs a large sample size so that any prediction about the whole population

may be made with confidence. Choosing part or all of the aggregate on the basis of which a judgment or conclusion is made is referred to as sampling (Kothari, 2006). Random sampling was used to select girl students while purposive sampling was used to select principals, mathematics teachers and the SCEO. Sample size was determined using Slovin's formulae (GaleroTegero, 2011), as shown

$$n = \frac{N}{1 + (e)^2}$$

Where:

N=Target Population

n=Sample size

e=Margin of Error (e=0.05)

1= Constant value

$$n = \frac{232}{1 + (0.05)^2}$$

$$n = \frac{232}{1.0025}$$

n=231

3.6 Sample Size

In this study ten schools were selected based on previous poor performance in KCSE from which 20 girls were randomly sampled, five from each class. This gave a sample of 200 girl students. Then ten, teachers, ten principals and one SCEO were purposively sampled. This gave a sample size of 231respondents who participated in this study.

Table 3.1 shows the distribution of the sample size:

Table 3.1: Sample distribution of principals, teachers and girls

Category	Target population (N)	Sample size (n)	Percentage
Girl students	400	200	86.7
Teachers	20	20	8.6
Principals	10	10	4.3
SCEO	1	1	0.4
Total	**431**	**231**	**100**

Source: Researcher (2016)

3.7 Research Instruments

The SCEO data was collected using an interview schedule, whereas data from principals, mathematics instructors, and school girls was collected using questionnaires. A questionnaire, according to the Oxford English dictionary, is a series of printed or written questions with multiple choices created for the purposes of a survey or statistical research. An interview, on the other hand, is a face-to-face encounter of persons, usually for consultation, or a dialogue between two persons with a prominent figure that is used as the foundation of a broadcast or publishing. The correctness, completeness, and consistency of replies on the questionnaires to be administered were checked. This was done to eliminate mistakes and ambiguous remarks.

Questionnaires have a variety of advantages in terms of delivery and provide an equal stimulus to large groups of people at the same time, making data collection relatively simple for the investigator.(Walker, 2006). The researcher administered questionnaires to the students to gain information concerning the various cultural

beliefs, practices and attitudes harbored by the community which are detrimental to their performance in mathematics, the parental occupation, their role models and strategies which may be employed to improve mathematics performance among girls.

Questionnaires to the teachers of mathematics focused on factors which influence girls' performance in mathematics and the strategies which may be employed to improve mathematics performance among girls in the schools, while the questionnaires to the principals and interview for SCEO were centered on strategies to improve mathematics and factors which influence girls' performance in mathematics in the region. The questionnaires were divided into two categories: open-ended questions and closed-ended questions. Respondents were given the chance to share their opinions, experiences, and recommendations in response to open-ended questions. The answers to the closed-ended questions were simpler to code and analyze than the open-ended ones. They also made numerical comparison very simple while allowing for a high degree of impartiality on the part of the responders.

Interview on the other hand provided a one on one interaction with the interviewee. Through that interaction, the respondent expressed his opinions, views and ideas in a social manner while the researcher probed for responses. Interview with the SCEO sought to establish the factors influencing girls' performance in mathematics as well as the strategies currently put in place to address girls' poor performance in mathematics within Trans-Nzoia County.

3.8 Pilot Study

A piloting of the research tools was required for the purpose of developing and authenticating the instruments for the massive investigation and determining whether or not the expected findings was achieved. A pilot test is critical in the research process, according to Mugenda and Mugenda (1999). This is because it serves as a trial run for the methods and instruments that are to be used, as well as a practice run for the researcher. To resolve any ambiguity, detect incorrectly worded items, and instances of inadequate space to write answers, as well as to identify clustering of questions, it was necessary to conduct piloting sessions.

A pilot research was carried out in two schools in the county that were not included in the research. This aided in determining the instruments' validity and reliability. It also aided in the questionnaire's rapid administration, ease of eliciting replies, and completeness as well as the diversity of data acquired (Sommer & Sommer, 1971).

3.9 Validity

It is stated that the validity of instruments is determined by the degree to which they quantify what they were meant to measure. The findings should be consistent from one session to the next. This may be used to verify the instruments used in any research (Denscombe, 2007). The kind of data collected by data collection devices must be such that it may be used to answer the questions posed by the researcher. Mugenda and Mugenda (2003) highlight the importance of obtaining data that is relevant to the study hypothesis while also maximizing reliability and validity of the data. According to Cooper and Schindler, a valid instrument is one that properly assesses the subject under consideration (2005). When the questionnaire was

validated using the features of self-evident measures, the validity of the questionnaire was confirmed. These measurements demonstrate the degree to which instruments measure what they are intended to assess, which is categorized as validity of face and validity of content, respectively.

Validity helps to check if the instruments are doing what they are intended to do. The items constituting the instruments were carefully examined and inspected in order to determine content validity. The supervisors on request went through the instruments and gave the expert advice.

3.10 Reliability

After the instruments were given to a group of individuals, the reliability of the instruments was evaluated using the test-retest technique. Afterward, the researcher provided the same equipment to the same set of participants for a week, and the findings of the first and second tests were documented. The consistency of the responses between the two tests was used to assess the reliability of the test equipment. In order to compute a correlation coefficient, the spearman rank order correlation coefficient was employed. The correlation coefficient was found to be 0.8. A correlation coefficient(r) of roughly 0.75 and higher, according to Orodho (2005), should be deemed high enough to rate an instrument as dependable. As a result, the study equipment were deemed to be trustworthy.

3.11 Credibility

The use of suitable, well-established research techniques, as well as random selection of people who served as informants, were all implemented. However,

objective measures such as proven dependability were used to assess trustworthiness, which was mostly determined by subjective criteria.

3.12 Dependability

Using a sample of the same respondents and the same instruments at two separate times, the researcher was able to verify the dependability (qualitative) of the instruments used.

3.13 Data Collection Procedure

The study used secondary and primary data as its major sources of information. Secondary data included an assessment of relevant literature on community beliefs, practices, and attitudes, family economic position, role model effects on girls' mathematics achievement, and initiatives used to increase arithmetic performance. The administration of questionnaires and an interview schedule provided primary data. After describing the goal of the study and seeking their participation in making it a success, the questionnaires were given to respondents who were principals, teachers, and secondary school girls.

3.14 Data Analysis

It was decided to conduct a qualitative and quantitative analysis of the information collected. In order to code and analyze the quantitative data obtained from the closed-ended questions in a descriptive manner, the researchers utilized the Statistical Package for Social Science (SPSS) software. The data was then represented visually via the use of percentages and frequency tables. This enabled the data to be simplified to the point where the general trend could be seen. The qualitative data from open-ended questions, on the other hand, was categorized

according to themes and goals in relation to the respondents' views, attitudes, and perceptions, as well as their responses. It was necessary to analyze the qualitative data in an entirely unbiased way in order to eliminate any possibility of prejudice or subjectivity.

3.15 Logistical and Ethical Considerations

Since the researcher was dealing with human beings as respondents, the following considerations were taken into account;

High level of confidentiality was exercised when dealing with information solicited from respondents in the questionnaires and interview schedule. The personal names of the respondents were not included in the report. This enhanced more privacy and protection of the rights of the respondents. The researcher did not use intimidating language or force when collecting data from respondents and the students were not coerced into giving responses in favor of the interest of the researcher. She also conducted herself professionally at all times when dealing with respondents and the law of the land was not violated at all. Finally, errors that originated from non-response of some respondents were not used by researcher to create enmity or develop personal differences with those who failed to respond to the questionnaires or interviews.

Before taking part in the study procedure, the participants were required to read, comprehend, and sign a permission form. All the participants were 18 years old or older based on the information on their national identity cards. It was only after they had completed a permission form that information about them was gathered.

CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the findings, interpretation and discussion of the study. The researcher endeavored to investigate the determinants of girls' performance in mathematics in Trans Nzoia County, Kenya.

The Statistical Package for Social Sciences (SPSS) was used to organize data collected in this research. Frequency distribution tables, and percentages were used to present the findings upon which interpretation were made. The analyzed data consisted of two hundred (200) questionnaire results from the girls, twenty (20) questionnaire results from the mathematics teachers, ten (10) questionnaire results from the principals and one interview schedule administered to the Sub County Education Officer (SCEO). The objectives of the study were to:

i Assess the effect of community beliefs, practices and attitudes on girls' performance in mathematics in Trans Nzoia County.

ii Determine the effect of parental economic status on performance of girls in mathematics in Trans Nzoia County.

iii Ascertain the effect of female role models on performance of girls in mathematics in Trans Nzoia County.

iv Examine the various strategies put in place to improve girls' achievement in mathematics in Trans Nzoia County.

4.2 Response rate

One interview was conducted with the SCEO and a total of 230 questionnaires were dully filled and returned. The response rate for the questionnaires was as indicated in Table 4.1.

Table 4.1: Response rate

Respondents	No. issued	No. returned	Response rate
Principals	10	10	100%
Mathematics Teachers	20	20	100%
Girls	200	200	100%
SCEO	1	1	100%
TOTAL	**231**	**231**	**100%**

Source: Field data (2017)

From Table 4.1, it can be noted that all the questionnaires issued were returned. This was possible due to the strict measures put in place by the researcher such as conducting the research in person and convincing the respondents on the importance of the study being undertaken.

4.2.1 Gender of Respondents

The research sought to identify the gender of the respondents in each of the five categories. The results are presented in Table 4.2.

Table 4.2: Gender of respondents

Respondents	Male (f)	Percentage (%)	Female (f)	Percentage (%)	Total (f)	Percentage (%)
Principals	9	90	1	10	10	100
Math Teachers	18	90	2	10	20	100
Girl Students	-	-	200	100	200	100
SCEO	1	100	-	-	1	100
Total	**28**	**12.12**	**203**	**87.87**	**231**	**100**

Source: Field Data (2017)

Table 4.2 shows that 90% (n=9) of the principals were male while 10% (n=1) were females. The SCEO was also male. This data shows there is gender inequality in school administration since majority of the principals were males as compared to their female counterparts. Daoust (2015) observed that women are significantly out-numbered by men among primary and secondary school head teachers and principals, as well as at the Ministry of Education level in many African countries, Cameroon included. He further said that there is no education policy that refers specifically to the recruitment of female managers. This, it seems, is a regional problem and therefore there is need to develop a policy to check on this gender inequality among the school management and proper mechanisms put in place to enforce the same policy.

Men dominate access and control of household resources, assets, and decision-making patterns in Kenya, according to Sang (2012), whereas women control just minimal resources and assets. Women are particularly sensitive to the effects of a

gender ideology that subordinates women at the household level. Unfortunately, this pattern is repeated in the country's secondary school administration, where males continue to dominate school leadership posts. Sang went on to say that the Ministry of Education (MoE) has to take a step toward achieving fair gender representation in secondary school management.

For the mathematics teachers, 90% (n=18) of them were males while 10% (n=2) were females. One hundred percent (n=200) of the students were girls. There were more male mathematics teachers than female mathematics teachers. This finding agrees with Nkonke (2012) finding that there were more male teachers who taught mathematics than female teachers. This may be a contributing factor to the attitude girls have towards mathematics, enhancing the stereotype that mathematics is a reserve for males.

The study also sought to determine the ages of the girls. The results are presented in Table 4.3.

Table 4.3: Ages of school girls

Age	**Frequency (f)**	**Percentage (%)**
12	7	3.5
13	11	5.5
14	18	9
15	28	14
16	34	17
≥17	102	51
TOTAL	**200**	**100**

Source: Field Notes (2017)

Majority of the girls in secondary schools were above 17 years as shown in table 4.3. This accounted for over half the population of the girls. These results are within the norm since in Kenya, pupils join standard one at age six, and primary education is eight years and secondary education four years (Mbugua, 2012)

4.2.2 Academic qualification of the principals and Mathematics teachers

The study also sought to determine the academic qualifications of the school principals and mathematics teachers. The results are presented in Table 4.4.

Table 4.4: Academic qualifications of the principals and Mathematics teachers

	Principals		**Mathematics Teachers**		**Total**	
	Frequency (f)	**Percentage (%)**	**Frequency (f)**	**Percentage (f)**	**Frequency (f)**	**Percentage (%)**
Phd	1	10	-	-	1	3.3
Masters	3	30	2	10	5	16.7
Degree	6	60	18	90	24	80
Diploma	-	-	-	-	-	-
Totals	**10**	**100**	**20**	**100**	**30**	**100**

Source: Field Notes (2017)

Table 4.4 reveals that one principal was a PhD holder, and that 30% (n=3) had master's degree while 60% (n=6) had a bachelor's degree. The data shows that majority of the principals were graduates and therefore were well versed with the needs of the secondary school students. Academic qualification was necessary in this study as it accounts for the ability of the individuals in handling challenges facing the teachers and the students. An educated person can be a source of inspiration to the students and his/her workmates.

Analysis of data further reveals that 10% (n=2) of mathematics teachers had master's degree whereas 90% (n=18) of them had the first degree. Secondary school students learn mathematics from teachers with degrees or significant coursework in mathematics.

Majority of the secondary school mathematics teachers were graduates, hence were well trained in mathematics and could handle the students in mathematics. This finding agrees with the findings of Nkonke (2012) and Wayne and Young (2000) who observed that most mathematics teachers were Bachelor of Education (B.Ed) trained and therefore their output was expected to be good.

4.2.3 Number of years the Principal has served

The study also sought to find out the number of years the principals had served in the various institutions. The result is presented in Table 4.5.

Table 4.5: Number of years principals had served

Years	Frequency (f)	Percentage (%)
1-3 years	3	30
4-6 years	2	20
7-9 years	4	40
≥ 9 years	1	10
Totals	**10**	**100**

Source: Field Notes (2017)

Table 4.5 shows that 30% (n=3) of the principals had one to three years experience, 20% (n=2) had four to six years experience, 40% (n=4) had seven to nine years experience while 10% (n=1) had over nine years experience.

Majority of the principals had experience of between 7-9 years. Experience matters in the running of the institutions. It enables an administrator to solve emerging issues and to manage well institutional affairs. This finding is consistent with Kaur's (2004) findings, which stated that the problem of teaching mathematics and sciences in Singapore required not only qualified but also experienced educators, and that the Ministry of Education (MoE) should provide educators with the necessary skills through in-service courses.

The SCEO had an experience of two years in the region. This could mean that he was familiar with community's beliefs, practices and attitudes which influenced girls' performance in mathematics. Mwiti (2006) laments the fact that data show that girls in rural regions are more likely to be married before the age of 18 than their urban counterparts. Because of their history and cultural orientation, she believes that certain cultures totally embrace this practice.

4.2.4 Teaching Experience of Mathematics Teachers

The study also sought to find out the teaching experience of the mathematics teachers. The results are presented in Table 4.6.

Table 4.6: Teaching experience of mathematics teachers

Teaching Experience	Frequency (f)	Percentage (%)
1 ≤	6	30
1-3	4	20
4-6	5	25
7-8	2	10
≥ 9	3	15
Totals	**20**	**100**

Source: Field Notes (2017)

From table 4.6, it can be noted that half of the mathematics teachers had less than four years teaching experience. This implies that they were likely to be struggling with the challenges that girls face. Another half of the mathematics teachers had more than four years teaching experience. Teachers with many years experience therefore were expected to perform better in their schools.

4.3 Influence of Community beliefs, practices and attitudes on girls' performance in mathematics

The first task of this study was to assess the influence of community beliefs, practices and attitudes on girls' performance in mathematics in Trans Nzoia County. The Principals, mathematics teachers and school girls were asked to rate the reasons why girls perform poorly in mathematics. The results are indicated in Table 4.7.

Table 4.7: Frequency of factors influencing girls' performance in mathematics

Statement		Strongly agree (5)		Agree (4)		Neutral (3)		Disagree (2)		Strongly disagree (1)		Total Score
		F	%	F	%	F	%	F	%	F	%	
Cultural beliefs, attitudes and practices and how it influences girls' performance in mathematics	Principals	5	50	5	50	0	0	0	0	0	0	10
	Math teachers	12	60	6	30	0	0	1	5	1	5	20
	School girls	40	20	85	42.5	10	5	45	22.5	20	10	200
Socio-economic status	Principals	3	30	3	30	0	0	2	20	2	20	10
	Math teachers	3	15	3	15	6	30	6	30	2	10	20
	School girls	30	15	30	15	15	7.5	65	32.5	60	30	200
Inadequate female role models	Principals	5	50	2	20	2	20	1	10	0	0	10
	Math teachers	5	25	12	60	1	5	1	5	1	5	20
	School girls	26	13	21	10.5	36	18	75	37.5	42	21	200

Source: Field Notes (2017)

Table 4.7 shows that half of the principals agree that cultural beliefs, attitudes and practices were the reasons why girls perform poorly in mathematics. Sixty per cent (n=12) of the mathematics teachers strongly agreed that cultural beliefs, attitudes and practices were the reasons why girls perform poorly in mathematics. More than half of the school girls agreed that cultural beliefs, attitudes and practices were the reasons why girls perform poorly in mathematics, 42.5% (n=85) agreed, five percent (n=10) were neutral, 22.5% (n=45) disagreed while 10% (n=20) strongly disagreed.

Principals, mathematics teachers and the girls agreed that cultural beliefs, attitudes and practices had an influence on girls' performance in mathematics. An interview with the SCEO confirmed this when he said:

> *Parents in this region generally have a negative attitude towards education of their children, especially girls. They think educating a girl is a waste of resources since soon she will be married off and the boy already has an inheritance which is land.*

Negative parental attitudes toward school, according to Shumow, Vandell, and Posner (1998), should be taken into account since they predict academic failures. Cultural limitations have a detrimental influence on kids' success levels. Children who grow up in unstable situations as a result of socio-cultural practices like early marriage have emotional difficulties in school. These kids are also unable to concentrate in class and lack confidence in their ability to complete any work they are assigned (Durojaiye, 1976, Nkonke, 2012). Mwamwenda (1995) argues that students' attitudes, rather than their capacity to study, influence their academic success.

According to Haimowitz (1989), most school failures are caused by active resistance by the students rather than limited or poor education. This argument implies that in order to increase arithmetic proficiency, positive attitudes about the subject should be cultivated. According to Spelke (2005), socio-cultural influences play a significant effect in students' opinions of how excellent girls and boys are in mathematics and the value of studying the subject.

Table 4.7 shows that two thirds of the principals agreed that low economic status influenced performance in mathematics. Fifteen per cent (n=3) of the mathematics teachers strongly agreed that low economic status influenced mathematics performance, 15% (n=3) agreed, 30% (n=6) were neutral, 30% (n=6) disagreed, 10% (n=2) strongly disagreed.

On the other hand, some of the girls agreed that low economic status influenced mathematics performance while others disagreed. The SCEO agreed that economic status of a parent had an influence on girls' performance since it determined provision of basic requirements. Majority of the principals were of the opinion that low socio-economic status influenced girls' performance in mathematics. This was evident in the way the girls struggled to pay their fees and in acquisition of mathematics tools such as a calculator and their personal effects.

This result is consistent with that of Nkonke (2012) and Conger (1992), who believed that poor parental socioeconomic position was linked with reduced resources, which in turn contributed to lower academic standards. In this study, most girls did not have a calculator because their parents could not afford to buy for them one. This agrees with a study by Ayal (2015) who observed that girls from low

socio-economic status lack basic requirements and motivation. These basic requirements include sanitary towels as well as tools for learning mathematics like the calculator, mathematics table and geometrical set. This affects the classroom learning of mathematics and consequently performance in mathematics.

Some studies have shown that there is a relationship between use of a calculator and attitude towards mathematics. Students who used a calculator for mathematics education had a better attitude toward mathematics than students who did not use a calculator. According to one research, when high-achieving females were given new, complex material, they were less likely to deal better than males. A calculator would, therefore, help increase confidence level of the girls in mathematics.

Girls were likely to miss school due to parents' inability to provide sanitary towels as shown in this study. As found by the girl-Child Network (2010) in a research on needs assessment in the areas of gender, equity, and equality, a girl is away from school four days out of every 28 days because of menstruation. Sanitary towels are a necessity for a girl in secondary school since lack of this important garment may lead to absenteeism which affects continuity in the learning of mathematics, thereby leading to low achievement.

The mathematics teachers and girls likewise acknowledged the influence of socio-economic status on girls' performance in mathematics. Availability of tools for learning mathematics such as a calculator, geometrical set and mathematical tables were important to success in mathematics according to this study. This finding agrees with the finding of Noraini (2004) who observed that calculators facilitate more explorative approaches in learning mathematical concepts, some of which

require repeated computations involving large or very small numbers. When technology resources are accessible, students may concentrate on making choices, reflecting, thinking, and problem solving rather than on completing assignments or completing tests. Some teachers and girls disagreed that parental economic status influenced girls' performance in mathematics. This means, therefore, that there could be other factors contributing to low girls' performance in mathematics.

The analysis of data revealed that over half of the principals agreed that inadequate female role models influenced mathematics performance. One quarter of the mathematics teachers strongly agreed that inadequate female role models affected mathematics performance, nearly two thirds agreed. Thirteen per cent (n=26) of the girls strongly agreed that inadequate female role models affected mathematics performance, 10.5% (n=21) agreed, 18% (n=36) were neutral, 37.5% (n=75) disagreed while 21% (n=42) strongly disagreed. The SCEO strongly agreed that inadequate role models had an influence on girls' performance in mathematics. He noted that those who excelled in the region left to other areas while those from other regions were not willing to stay long due to the environmental challenges in the region.

Majority of the principals and mathematics teachers were of the opinion that lack of female role models had an influence on girls' performance in mathematics. This finding agrees with the findings of Burton (1996) who observed that the reasons currently advanced from research findings in Britain, United States of America (USA) and Australia for the under-achievement and under representation between boys and girls include lack of female mathematics role models.

Lack of role models in one's life can hamper individual development. This seemed to be the case in this study. It is worth noting, from this study, that it was not just exposing girls to a female role model passé that was likely to positively influence the girls' performance but rather exposure to a hardworking role model.

Further, the foregoing finding, agrees with some studies which have shown that exposure to a hardworking role model of the same gender is more likely to improve girls' mathematics performance(Bages & Martinot, 2011; Marx, 2005).Other studies (Marx 2013) suggest that the message communicated by the role model might be important than the role model's gender.

During the interview with the SCEO, he said:

> *Members of the community, who have excelled, including women, usually leave the region to seek work elsewhere. They will rarely come back home as they settle in other parts of the country leading to inadequate role models in the region.*

The departure from the region by professional females deprives the community of female role models.

The first objective of the research sought to assess the influence of community beliefs, practices and attitudes on girls' performance in mathematics.

The Principals, mathematics teachers and school girls were asked to rate whether the community beliefs, attitudes and practices influence girls' performance in mathematics. Their responses are presented in Table 4.8.

Table 4.8: Response on various community beliefs, attitudes and practices influencing girls' mathematics performance

Statement		Strongly agree (5)		Agree (4)		Neutral (3)		Disagree (2)		Strongly disagree (1)		Total Score
		F	%	F	%	F	%	F	%	f	%	
Mathematics is difficult	Principals	8	80	2	20	0	0	0	0	0	0	10
	Math teachers	8	40	10	50	0	0	1	5	1	5	20
	School girls	25	12.5	50	25	10	5	75	37.5	40	20	200
Boys can do math better than girls	Principals	4	40	4	40	2	20	0	0	0	0	10
	Math teachers	0	0	10	50	3	15	5	25	2	10	20
	School girls	20	10	40	20	5	2.5	55	27.5	80	40	200
Girls perform poorly due to inadequate time to study due to family chores	Principals	2	20	3	30	2	20	2	20	1	10	10
	Math teachers	10	50	6	30	2	10	1	5	1	5	20
	School girls	40	20	35	17.5	45	22.5	30	15	50	25	200
Mathematics is perceived that it may not have future benefits to girls.	Principals	0	0	1	10	1	10	3	30	5	50	10
	Math teachers	33	15	2	10	1	5	10	50	4	20	20
	School girls	15	7.5	5	2.5	5	2.5	35	17.5	140	70	200

Source: Field Notes (2017)

Table 4.8 shows that majority of the principals agreed that the notion of mathematics being difficult influenced girls' performance in mathematics. Forty per cent (n=4) strongly agreed that the notion that boys can do mathematics better than girls influenced girls' performance in mathematics while another 40% (n=4) agreed. As Steven Spencer and Claude Steel (1994) found, when female students feel upset by the difficulties of mathematics, they connect their dissatisfaction with the notion that females are not meant to be able to perform mathematics. This result is consistent with their findings.

Inadequate study time due to family chores also seems to play a role in underachievement by girls in mathematics according to this study. Over half of the mathematics teachers, principals and girls agreed from the tabulated results. Wamahiu (2006) argues that girls begin to assist their moms at a young age, allowing them to progressively internalize their responsibilities as caregivers. Majority of the principals, teachers and girls disagreed that mathematics had no future benefits to girls. They were of the opinion that performing well in mathematics provides lots of opportunities in form of courses and careers to choose from after completion of secondary education.

On the notion that mathematics was difficult, the SCEO agreed that most girls thought this could be a reason for under-achievement. When interviewed he said:

> *Girls in this region think that mathematics is difficult and they may not do well in mathematics because of previous poor performance.*

It is also clear from the table that majority of the mathematics teachers agreed that the notion that mathematics is viewed as being difficult influenced girls' mathematics performance.

Fifty per cent (n=10) agreed that the notion that boys can do mathematics better than girls influenced girls' performance, 15% (n=3) were neutral, 25% (n=5) disagreed, while 10% (n=2) strongly disagreed. Fifty per cent (n=10) strongly agreed that the notion that girls perform poorly due to inadequate time to study due to family chores influenced girls' performance in mathematics, 30% (n=6) agreed. Fifteen per cent (n=3) strongly agreed that the notion that mathematics is perceived to have no future benefits to girls influenced mathematics performance amongst girls while50% (n=10) disagreed.

Table 4.8 also shows that 12.5% (n=25) of the girls' strongly agreed that the notion that mathematics is difficult influenced girls' mathematics performance, 25% (n=50) agreed, five percent (n=10) were neutral, 37.5% (n=75) disagreed, while 20% (n=40) strongly disagreed. Ten per cent (n=20) strongly agreed that the notion that boys can do mathematics better than girls influenced girls' performance, 20% (n=40) agreed, two point five percent (n=5) were neutral, 27.5% (n=55) disagreed, while 40% (n=80) strongly disagreed. 20% (n=40) strongly agreed that the notion that girls perform poorly due to inadequate time to study due to family chores influenced girls' performance in mathematics, 17.5% (n=35) agreed, 22.5% (n=45) were neutral, 15% (n=30) disagreed while 25% (n=50) strongly disagreed.

Majority of the girls disagreed with the notion that mathematics had no future benefits to them. From an early age, females are inundated with explicit and implicit social, cultural, and historical signals that mathematics is not beneficial to women, that mathematics occupations are masculine, and that women are more interested in social subjects (Barnett, 2004). Parents, for example, tend to regard mathematics as a more male discipline and purchase more math-related things for their sons than for their girls. (Bleeker & Jacobs, 2004; Nosek, 2002). This should be reversed since mathematics affects human daily activities.

The societal roles assigned to girls were found to be the reason for lack of time to study by the girls. In this study, girls said that they were more involved with domestic chores which deprived them of valuable time to undertake their studies in terms of homework and mathematics assignments. This was especially so for girls in day schools. This finding agreed with the finding of Wamahiu (2006) who asserted that girls become helpers to their mothers at an early age to gradually internalize their roles.

When the SCEO was asked to comment on poor performance in mathematics by girls in Saboti region he had this to say;

> *Some of the girls have inferiority complex whereby they compare themselves with boys as well as girls from other regions and feel that others are better or more advantaged than themselves.*

4.4 The Influence of parental socio economic status on the performance of girls in mathematics

The second objective sought to establish the influence of parental socio economic status on the performance of girls in mathematics.

The principals, mathematics teachers and the girls were asked to rate whether the parental socio economic status influenced the performance of girls in mathematics. Their responses are presented in Table 4.9.

Table 4.9: Response rate on influence of parental socio-economic status on girls' performance in mathematics

Statement		**Strongly agree (5)**		**Agree (4)**		**Neutral (3)**		**Disagree (2)**		**Strongly disagree (1)**		**Total Score**
		F	%	F	%	F	%	F	%	F	%	
Parents are unable to provide calculator, geometrical set and tables	Principals	3	30	7	70	0	0	0	0	0	0	10
	Math teachers	10	50	8	40	2	10	0	0	0	0	20
	School girls	110	55	30	15	15	7.5	35	17.5	10	5	200
Girls lack sanitary towels thus fail to attend school affecting math performance.	Principals	5	50	4	40	1	10	0	0	0	0	10
	Math teachers	10	50	7	35	1	5	0	0	2	10	20
	School girls	85	42.	45	22.5	15	7.5	20	10	35	17.5	200

Source: Field Notes 2017

Table 4.9 shows that 30% (n=3) of the principals strongly agreed that parents were unable to provide calculators, geometrical sets and mathematical tables while more than half agreed. Half of the principals strongly agreed that girls lack of sanitary

towels made them fail to attend school affecting mathematics performance, 40% (n=4) agreed while 10% (n=1) were neutral.

The analysis of the results reveals that half of the mathematics teachers strongly agreed that parents struggle to provide calculators, geometrical sets and mathematical tables. Forty per cent (n=8) agreed while 10% (n=2) were neutral. Half of the principals strongly agreed that girls' lack of sanitary towels could be one of the reasons why girls missed school and this could influence their performance in mathematics.

Majority of the girls of the girls agreed that parents were unable to provide calculators, geometrical sets and mathematical tables. This hampered their full participation in learning mathematics since they could not perform tasks which require the use of these tools. Over half of the girls agreed that girls' lack of sanitary towels could influence their performance in mathematics since majority would be absent from school during their menses.

The responses in Table 4.9 indicate that participants in this study seemed to agree that poverty was the major problem why girls were performing poorly in mathematics. Inability of parents to provide basic school requirements was an indication of the level of poverty in the region. According to Ayal (2015), family size and economic status determines girls' performance in mathematics. Girls from low economic status lack basic requirements and motivation. The basic requirements include sanitary towels as well as mathematics basic learning tools which are a calculator, mathematics table and geometric set.

According to the principals, poverty was evident in the way the girls struggled to pay their fees, in acquisition of mathematics tools such as a calculator and their personal effects. This finding agrees with some studies which show that there is a relationship between use of a calculator and attitude toward mathematics. According to Hembree & Dessart (1986), students who used a calculator for mathematics education had a better attitude toward mathematics than students who did not use a calculator.

From the interview with the SCEO, he made the following observation:

> *The region is an agricultural zone but there seems to be a general negative attitude towards education in the region in that priority is not given to the education of children because parents believe boys already have an inheritance and girls will soon be married off.*

4.5 Influence of female role models on performance of girls in mathematics

The third objective sought to establish the influence of female role models on performance of girls in mathematics. The principals, mathematics teachers and the schools girls were asked to rate whether female role models may inspire girls to do better in mathematics. Their responses are provided in Table 4.10.

Table 4.10: Principals, mathematics teachers and school girls' responses on influence of female role models on girls' performance in mathematics

Statement	**Strongly agree (5)**		**Agree (4)**		**Neutral (3)**		**Disagree (2)**		**Strongly disagree (1)**		**Total Score**
	F	%	F	%	F	%	f	%	F	%	
Principals	8	80	2	20	0	0	0	0	0	0	10
Mathematics teachers	8	40	10	50	0	0	0	0	2	10	20
School girls	60	30	95	47.5	20	10	25	12.5	5	2.5	200

Source: Field Notes (2017)

Table 4.10 shows that 80% of the principals, 40% teachers of mathematics as well as 30% of the girls agreed that role models had an influence on girls' performance in mathematics.

Most of the respondents in this study agreed that role models influenced girls' performance in mathematics. This finding appears to agree with Burton (1996), Cockcroft (1982), and Earnest (1993), who observed that one of the reasons currently advanced from research findings in the United Kingdom, the United States, and Australia for the under-achievement and under-representation of boys and girls in mathematics classrooms was a lack of female role models.

The majority of learning that happens throughout a child's growth is learned through observation and imitation, according to social learning specialists. Imitative learning, according to Miller and Donald (1941), requires that spectators be motivated to act, that they be given an example of the desired action, that they conduct responses that match the example, and that their imitative actions be favorably rewarded.

Children usually learn from role models and those that they admire. The absence of role models in the community had influence on the performance of girls in mathematics as majority of them seemed to hold onto the traditions and beliefs of their communities.

When asked about some of the other reasons why girls performed poorly in mathematics, the SCEO's response was that girls had inferiority complex. When girls compared themselves with others from other regions, they thought that they

were disadvantaged and that other girls were better than them. They also felt that boys were better when it came to learning of mathematics.

4.6 Strategies put in place to improve mathematics performance among girls

The fourth objective sought to indicate the various strategies that could be put in place to improve girls' performance in mathematics.

The Principals were asked to state strategies that could be employed to improve girls' performance in mathematics. The strategies identified are presented in Table 4.11.

Table 4.11: Strategies identified by principals for improvement of girls' performance in mathematics

Strategy	Frequency (f)	Percentage (%)
Curriculum review	9	25
Improvement on method of content delivery	7	19.4
Symposiums and math contest	6	16.7
Reward system for improved math performance	6	16.7
Provision of mathematics tools and text books	5	13.9
Giving girls motivation talks	3	8.3
Total	**36**	**100**

Source: Field Notes (2017)

The analysis of multiple data reveals that 25% (n=9) of the principals indicated curriculum review as the strategy that can be used to improve performance in mathematics by girls, 19.4% (n=7) identified improvements on method of content delivery, 16.7% (n=6) identified symposiums and mathematics contest and reward

systems for improved mathematics performance, 13.9% (n=5) identified provision of mathematics tools and text books while eight point three percent (n=3) identified giving girls motivation talks.

From Table 4.11, it is clear that most factors determining girls' performance are institutional factors rather than economic and social factors. Principals' responses seem to suggest that the greater effects are institutional factors rather than home factors. Most strategies related to the provision of learning materials necessary for mathematics improvement.

The strategies looked at the curriculum review. This should take care of learners' interests and their abilities. Methods of content delivery are one of the highly rated methods needed to be employed so as to improve the girls' performance in mathematics. Rewards have been used for the improvement of performance of human activities.

Mathematics teachers were asked to state strategies that could be employed to improve girls' mathematics performance. The strategies identified are presented in Table 4.12.

Table 4.12: Strategies identified by mathematics teachers for improvement of girls' performance in mathematics

Strategy	Frequency (f)	Percentage (%)
Curriculum review	13	27.7
Motivational talks by role models and examiners	7	14.9
Change of attitude	7	14.9
Diversify strategies for teaching and revision	6	12.8
Integration of ICT	6	12.8
Provision of math tools and text books	5	10.5
Staffing of adequate math teachers	3	6,4
Total	**47**	**100**

Source: Field Notes (2017)

Table 4.12 shows that 27.7% (n=13) of the mathematics teachers identified curriculum review as the main strategy to be used to improve girls' performance in mathematics, 14.9% (n=7) identified motivational talks by role models and change of attitude by girls, 12.8% (n=6) identified diversification of strategies for teaching and learning and integration of ICT in teaching of mathematics. Ten point five per cent (n=5) identified provision of mathematics tools and text books while six point four percent (n=3) identified staffing of schools with adequate mathematics teachers. Practitioners have an important role in fostering interest in mathematics and countering socio cultural pressures that discourage female participation and achievement in the subject. Teachers and parents may assist kids enhance their mathematics interest and performance by supporting them and encouraging them to feel that their mathematical abilities can be improved with constant work (Schunk& Zimmerman, 2007).Mathematics teachers stated curriculum review as a strategy. This was likely to benefit certain categories of learners such as the slow learners, those with limited resources and other challenges.

Motivational talks and role models were also seen to be strategies lacking in the improvement of mathematics. Many children look up to teachers as key role models. Teachers, on the other hand, are not the only people who are competent to be beneficial influences in the lives of pupils. It might be anyone who interacts with students on a daily basis and is concerned about their well-being. Positive role models in a young person's life, according to most people, may have a significant influence. These role models can assist kids in making healthy decisions that will boost their chances of having a successful life, such as excelling in mathematics, which would boost the students' overall performance.

Sponsoring activities aimed at female high school students, according to Amelink (2012), may boost female interest in mathematics. Women who have graduated with a degree in mathematics will function as role models for the girls, therefore events that include hands-on activities and interactive laboratories, as well as opportunities to network with women who have graduated with a degree in mathematics, would be of tremendous help to the girls.

The School girls were asked to state strategies that could be employed to improve girls' mathematics performance. The strategies identified were presented in Table 4.13

Table 4.13: Strategies identified by school girls for improvement of performance in mathematics

Strategy	Frequency (f)	Percentage (%)
Improvement of academic background	67	21.4
Diversification of teaching/ learning and revision strategies	59	18.8
Motivation talks by role models and examiners	45	14.4
Cultivation of positive attitude towards teachers and the mathematics subject	45	14.4
Math contests and symposiums	40	12.8
Avoiding bad company	37	11.8
Provision of basic needs	20	6.4
Total	**313**	**100**

Source: Field Notes (2017)

From Table 4.13, 21.4% (n=67) of the school girls identified improvement of academic background as a strategy which can lead to improvement of mathematics performance by school girls, 18.8% (n=59) identified diversification of teaching and learning and revision strategies, 14.4% (n=45) identified motivation talks by role models and examiners and cultivation of positive attitudes towards teachers and the mathematics subject, 12.8% (n=40) identified mathematics contests and symposiums, 11.8% (n=37) identified avoiding bad company while six point four percent (n=20) identified provision of basic needs.

In this study, girls believed that their background in mathematics was to blame for the poor performance in mathematics. There is always need to check the learners' entry behavior in every subject so as not to apportion blame on inabilities or their personalities. Poor mathematics background and lack of mathematics concepts could be the main reason why learners were performing poorly in the study area. Teachers seemed to be using fewer strategies as per the results of the study. This calls for the mathematics teachers to assess the needs of the girls and vary teaching methods so as to cater for the individual needs of the girls.

Role models improvement of attitudes towards mathematics occupies a central point in the concerns of the students. Teacher objectives have been demonstrated in certain studies to affect student motivation and attitudes not just via their instructional techniques and the tasks they assign to students, but also via the signals they transmit about learning in general. Other strategies like use of mathematics contests as well as symposia handled by mathematics teachers and school administrations may assist learners to tackle simple mathematics problems.

During the interview with the SCEO, he stated that:

> *Girls need to be encouraged right from home that they can make it in their education and the teachers to be at the forefront in performing their duty so as to boost girls' self esteem and develop positive attitude towards mathematics.*

4.7 Summary of the Chapter

This chapter dealt with presentation of data which was done using tables and discussions. The data was discussed according to the responses provided as well as the objectives of the study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the research findings based on the four key objectives of the study. Conclusions of the findings are also presented as well as the recommendations for action.

The objectives of the study were: to assess the influence of community beliefs, practices and attitudes on girls' performance in mathematics in secondary schools; to establish the influence of parental socio-economic status on girls' performance in mathematics in secondary schools; to ascertain the influence of female role models on girls performance in mathematics in secondary schools; and to examine the various strategies that could be put in place to improve girls' mathematics performance in secondary schools in Trans- Nzoia County.

5.2 Summary

The findings are summarized according to the objectives as presented in chapter four of this study.

i. The principals, mathematics teachers and the girls' agreed that cultural beliefs, attitudes and practices have an influence on girls' performance in mathematics. Cultural limitations have a detrimental impact on student success. Children who grew up in insecure surroundings as a result of socio cultural norms like early marriages had emotional issues in school, lacked focus in class, and lacked confidence in whatever work they were assigned.

ii. There was a great agreement among these stakeholders that parental socio economic status influenced girls' performance in mathematics. Inability of parents to provide basic school requirements such as mathematics tables, calculators, geometrical sets as well as personal effects to girls had a negative influence on the performance of girls in mathematics.

iii. Majority of the principals and the mathematics teachers were of the opinion that inadequate female role models influenced girls' performance in mathematics. Lack of female role models in particular seems to reinforce the stereotype that mathematics is for boys. This seemed to be the case in this study.

iv. On strategies for teaching and learning mathematics, principals' responses seemed to suggest that the greater effects were institutional factors rather than home factors. Most strategies related to the provision of learning materials necessary for mathematics improvement. The strategies looked at the curriculum review which could take care of learners' interest and their abilities. Methods of content delivery were highly rated methods needed to improve girls' performance in mathematics.

5.3 Conclusion

i. Cultural constraints negatively influence achievement level among students, especially girls. The girls are more involved with family and household chores which deprive them of adequate study time.

ii. Low socio-economic status negatively influences girls' performance in mathematics as observed in this study. Economic challenges facing parents

spill over to girls since parents are not able to pay fees on time, provide tools for learning mathematics as well as provide sanitary wear for the girls.

iii. Lack of role models has negative influence on girls' perception about mathematics. Role models play a significant role in enhancing performance of girls in mathematics since they inspire and motivate learners.

Lack of role models in one's life can hamper individual development.

iv. Teachers play a significant role in shaping learners' attitude toward mathematics especially for the girls.

v. Teachers seem to be using fewer strategies during teaching and learning of mathematics according to this study.

5.4 Recommendations

Based on the findings the following recommendations were made:

i. There is need to address cultural beliefs, attitudes and practices that influence girls' performance in mathematics including early pregnancy and early marriages. The community can be enlightened through public forums.

ii. There is need for girls especially from low socio-cultural backgrounds to be supported by the government through provision of learning tools such as geometrical sets and calculators and in addition enhance provision of sanitary towel to these girls.

iii. Female role models who have excelled in various fields especially mathematics may be encouraged to give back to the society by offering motivational talks to girls.

iv. On strategies teachers of mathematics may organize remediation programmes especially for girls who underperform as well as organize workshops, symposia and mentorship for girls through bodies such as STEM.

5.5 Suggestion for Further Research

On the basis of the findings, the following suggestions were made for further research:

1. Further research can be done to determine the influence of some of these factors on boys' achievement in schools.
2. Research may be carried out to determine impact of girls' performance in mathematics on placement into tertiary institutions.

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APPENDICES

APPENDIX I: INTERVIEW SCHEDULE FOR THE SCEO

The purpose of this interview is to collect information that will be utilized to evaluate the variables that have an effect on the mathematics performance of secondary school girls in Trans-Nzoia West Sub County. To the best of your ability, please answer to the questions that have been given. Thank you for your cooperation. The information you give will be kept in strict confidence and will only be used for the purposes of this research.

PART A: General information

1. Gender: Male [ ] Female [ ]

2. How long have you served as a sub county education officer in Saboti?

   1-3years [ ] 3-6 years [ ]

   6-9years [ ] Over 10 years [ ]

3. Do you live in Trans- Nzoia West Sub County?

   Yes [ ] No [ ]

PART B: Information about determinants to low achievement in math by girls in Trans- Nzoia West Sub County (please circle the number that best describes your opinion) 1-strongly agree, 2-agree, 3-neutral, 4-disagree, 5-strongly disagree

4. Girls poor performance in mathematics is influenced by the following:

   (a) Cultural beliefs, attitudes and practices 1 2 3 4 5

   (b) Low economic status of parent or guardian 1 2 3 4 5

   (c) Inadequate female role models 1 2 3 4 5

5. The following cultural beliefs, attitudes and practices have negative impact on the performance of girls in mathematics

   (a) Some parents /guardians do not perceive the education of girls as having future benefits. 1 2 3 4 5

   (b) Early pregnancy has negative impact on the performance of girls in mathematics 1 2 3 4 5

   (c) Mathematics is viewed as a difficult subject by many girls

   1 2 3 4 5

   (d) Boys can do better in mathematics than girls

   1 2 3 4 5

   (e) Girls perform poorly in mathematics due to inadequate study time since after school they engage in family chores like cooking and fetching water among others. 1 2 3 4 5

6. If parents are unable to provide a calculator, geometrical set and mathematics table to the girls they may end up performing poorly in mathematics

   1 2 3 4 5

7. When girls lack sanitary towel they may fail to attend school and this may have **a** negative impact on their performance in mathematics

   1 2 3 4 5

8. Female role models may inspire girls to do well in mathematics

   1 2 3 4 5

PART C: Strategies to improve math performance

9. In your opinion and basing on your experience as the SEO in this region identify some practical strategies which may be employed to address factors hindering better performance among secondary school girls in this region.

.....

.....

APPENDIX II: PRINCIPALS' QUESTIONNAIRE

The purpose of this questionnaire is to collect information on the socio-cultural variables that contribute to low performance of female secondary school students in mathematics in Trans-Nzoia West Sub County. Please take a moment to complete the following questions. The information you give will be handled with strict secrecy by the company. Please check the relevant boxes or fill in the necessary information in the areas given when applicable.

PART A: General information

1. Gender: Male [ ] Female [ ]

2. Education level

   PHD [ ] Masters [ ]

   Degree [ ] Diploma [ ]

   Any other.....

3. How long have you served in the current station?

   1-3 years [ ] 4-9 years [ ]

   Over 10 years [ ]

PART B: Information on factors which impact on performance in math by secondary school girls.

Please circle the number that best describes your opinion

1. Strongly agree 2.Agree 3.Neutral 4.Disagree 5.Strongly disagree

4. Girls may perform poorly in mathematic due to the fooling reasons.

(a) Cultural beliefs, attitudes and practices.	1	2	3	4	5
(b) Low economic status of parent or guardian	1	2	3	4	5
(c) Inadequate female role models	1	2	3	4	5

(d) Any other .....

5. The following cultural beliefs, attitudes and practices have negative impact on girls' performance in mathematics in your school

(a) Mathematics is viewed as a difficult subject by most girls

1 2 3 4 5

(b) Boys can do better in Mathematics

1 2 3 4 5

(c) Girls perform poorly in mathematics due to inadequate study time especially when they go back at home after school.

1 2 3 4 5

(d) Mathematics is perceived as a subject that may not have future benefits to a girl.

1 2 3 4 5

6. If parents are unable to provide calculator, geometrical set and Mathematical table to the girls they may end up performing poorly in mathematics.

   1 2 3 4 5

7. When girls lack sanitary towel they may fail to attend school and this has a negative impact on performance in mathematics

   1 2 3 4 5

8. Female role models may inspire girls to do better in Mathematics

   1 2 3 4 5

9. What do you think are some of the other reasons why girls perform poorly in Mathematics in your school/ Saboti region?.....

   .....

10. Identify some practical strategies which may help improve girls' performance in mathematics in your school/Saboti region.....

    .....

11. In your opinion what other practical strategies may be employed to improve the performance of math in your school?.....

    .....

APPENDIX III: QUESTIONNAIRE FOR TEACHERS

It is the purpose of this questionnaire to collect information that will be used to determine the variables that contribute to low performance among females attending secondary school in Trans-Nzoia West Sub County. If possible, please complete the necessary information by checking the relevant boxes. The information you give will be handled with strict secrecy by the company.

PART A: General information

1. Gender: Male [ ] Female [ ]

2. Education level: PHD [ ] Masters [ ]
   Degree [ ] Diploma [ ]

3. How long have you taught in the current station?
   Years [ ] 4-6 Years [ ]
   7-10 Years [ ] Above 10 Years [ ]

4. Do you live within Trans- Nzoia West Sub County?
   Yes [ ] No [ ]

PART B: Information about poor performance in math by girls

Please circle the number that best describes your opinion

1. Strongly agree 2.Agree 3.Neutral 4.Disagree 5.Disagree

5. Girls' poor performance is influenced by the following:-

(a) Cultural beliefs, attitudes and practices	1	2	3	4	5
(b) Low economic status of parent/guardian	1	2	3	4	5
(c) Inadequate female role models	1	2	3	4	5

6. The following cultural beliefs attitudes and practices have negative impact on the performance of girls in mathematics.

   (a) Mathematics is viewed by girls as a difficult subject

   1 2 3 4 5

   (b) Boys can do better in mathematics than boys

   1 2 3 4 5

   (c) Girls perform poorly in mathematics due to inadequate study time especially when they are at home because they engage in family chores

   1 2 3 4 5

   (d) Some parents feel that mathematics may not have future benefits to a girl

   1 2 3 4 5

7. If parents are not able to provide calculator, geometrical set and mathematics table, girls end up performing poorly in mathematics

   1 2 3 4 5

8. When girls lack sanitary towel they may fail to attend school and this has a negative impact on performance in mathematics 1 2 3 4 5

9. Female role models may inspire girls to do well in mathematics

   1 2 3 4 5

10. What do you think are some of the other reasons why girls perform poorly in mathematics in your school/Saboti region?.....

    .....

PART C

Strategies to improve girl's performance in mathematics subject

11. Identify some practical strategies which may help improve girls' performance in mathematics in your school. .....

.....

APPENDIX IV: QUESTIONNAIRE FOR THE GIRLS

Kindly read the questionnaire and respond to each question to the best of your knowledge. The information given may provide useful data for the purpose of improving performance in mathematics subject in Trans- Nzoia County .the information provided will be treated with confidentiality.

PART A

General information

Age..... Your class..... Name of school.....

PART B

Factors impacting on the performance of girls in Trans-Nzoia West Sub County

Please circle the number that best describes your opinion

1. Strongly agree 2.Agree 3.Neutral 4.Dissagree 5.Strongly disagree

1. Girls poor performance in Mathematics is influenced by the following:-

   (a) Cultural beliefs, attitudes and practices 1 2 3 4 5

   (b) Low economic status of parent or guardian 1 2 3 4 5

   (c) Inadequate female role models 1 2 3 4 5

   Any other.....

2. The following cultural beliefs, attitudes and practices have negative impact on performance of girls in mathematics

   (a) Mathematics is difficult 1 2 3 4 5

   (b) Boys can do better in mathematics than girls 1 2 3 4 5

(c) Girls perform poorly in mathematics due to inadequate study time; they help take care of the young, cook, fetch water and help with other family chores

1 2 3 4 5

(d) Mathematics is perceived that it may not have future benefit to a girl

1 2 3 4 5

3. If parents are unable to provide calculator, geometrical set and mathematic tables, girls may end up performing poorly in mathematics

1 2 3 4 5

4. When girls lack sanitary towel they may fail to attend school and this has negative impact on performance of mathematics 1 2 3 4 5

5. Female role models may inspire girls to do better I mathematics

1 2 3 4 5

6. What are some of the reasons why girls perform poorly in mathematics in your school?.....

.....

7. Identify some strategies which may improve girl's performance in mathematics in Trans- Nzoia West Sub County.....

.....

.....

APPENDIX V: NACOSTI AUTHORIZATION

THIS IS TO CERTIFY THAT:
MS. JULIANA MIYA ANGUCHE
of KENYATTA UNIVERSITY, 3913-30200
KITALE,has been permitted to conduct
research in *Transnzoia County*

on the topic: *DETERMINANTS OF GIRLS' PERFORMANCE IN MATHEMATICS IN SECONDARY SCHOOLS IN TRANS-NZOIA WEST SUBCOUNTY, TRANS NZOIA COUNTY KENYA.*

for the period ending:
23rd April,2019

Applicant's
Signature

Permit No : NACOSTI/P/19/38312/23296
Date Of Issue : 24th April,2019
Fee Recieved :Ksh 1000

Director General
National Commission for Science,
Technology & Innovation

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