DETERMINANTS OF MATHEMATICS AND SCIENCE CAREER CHOICES AMONG SECONDARY SCHOOL FEMALE STUDENTS IN ILALA DISTRICT DAR ES SALAAM REGION

MARY JOSEPH CHUWA

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION IN ADMINISTRATION, PLANNING AND POLICY STUDIES OF THE OPEN UNIVERSITY OF TANZANIA

2014

CERTIFICATION

The undersigned certifies that she has read and hereby recommends for acceptance by The Open University of Tanzania a dissertation titled *"Determinants of Mathematics and Science Career Choices Among Secondary School Female Students in Ilala District Dar es Salaam Region"* in partial fulfillment of the requirements for the Degree of Master of Education in Administration, Planning and Policy Studies (MED –APPS) of the Open University of Tanzania.

.....

Dr. Elinami Veraeli Swai (PhD)

(Supervisor)

.....

Date

COPYRIGHT

DECLARATION

I, **Mary Joseph Chuwa,** do hereby declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other relevant Master's degree award.

……

Signature

……..

Date

DEDICATION

This work is dedicated to my lovely children - Joyce, Jackson, and Johnson for tolerating my absence - when I used to come late home during my studies - and my beloved husband, Joseph Martin Chuwa, for his full support, understanding and for tolerating my busy academic schedule during the whole period of my studies. This work is also dedicated to my late – father - Vincent Bernard Ottaru and to my mother Catherine John Makimaro. Through their good care and support, I got a good education foundation that has brought me to this level.

ACKNOWLEDGEMENT

Conducting research is a difficult task that one cannot do alone without the assistance of others. A number of people have contributed - in one way or another, in accomplishing the task of writing this study. I thank them all.

My sincere gratitude are directed to my supervisor - Dr. Elinami Veraeli Swai of The Open University of Tanzania (OUT), for devoting a lot of her time in offering counseling, scholarly criticism, encouragement, comments and reading initial drafts up to this final version. I wish to express my special thanks to the management of the UNFPA for their sponsorship which has enabled me to successfully complete my post-graduate studies at The Open University of Tanzania. I also wish to express my gratitude to the District Educational Officer Ms Mlowosa of Ilala for granting the permission for data collection. I also wish to highly acknowledge secondary school management, students, parents, academic staff and other workers for providing me with all necessary data and relevant documents during my study. Their support has enabled me to complete this work quite successfully. I also express my sincere gratitude to Edwin Bingireki for data coding, cleaning and entering into the computer.

My appreciation to my supportive husband Joseph Chuwa for being patient and understanding. He provided the support and encouragement that enabled me to finish the study. Special thanks go to my children, Joyce, Jackson and Johnson, who provided me with words of encouragement when I felt tired. Their encouragement really provided the fuel that powered me to complete this study.

Finally, I highly appreciate Mr. Justine Kimaro of the Open University Tanzania for editing this work. However, I would like to point out that, I remain solely responsible and accountable for any shortfalls in this dissertation.

ABSTRACT

This study aimed to assess what determines career choices in mathematics and science among secondary school female students focusing on home environment, the quality of school, and the ways of teaching of mathematics and science related subjects in ten secondary schools in Ilala district, Dar es Salaam Region. The design used was descriptive cross-sectional, whereby data was collected in a single place at a time. Questionnaires, interviews and observation-checklists were used to collect data from 160 respondents. The participants were clustered in the groups of students, teachers and parents, from each cluster, the sample was taken. The major findings revealed that although the majority of parents assist their female students in mathematics and science in doing their homework - thus encouraging them to do science and mathematics subjects, the home environments continue to follow the traditional gender roles that leave household duties to females hence impeding them from concentrating on school work. Furthermore, the findings revealed that quality of schools in promoting science and mathematics related subjects was poor due to lack of laboratories and laboratory supplies and inadequate number of qualified science and mathematics teachers. **Conclusion:** The desire of the female students to take up science and mathematics subjects and later related carriers has been very low and thus attracting the attention of the learned community to think on what is really going wrong on this and thus the respondents were able to give their views without any hesitation. The study recommended that the government and school managers should invest in constructing and equipping the laboratories to attract more female students to do science subjects.

TABLE OF CONTENTS

LIST OF TABLES

FIGURE

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ARMT	Alabama Reading and Math Test
ETP	Education Training Policy
MoEVT	Ministry of Education Vocational Training
MED –APPS	Masters of Education in Educational Administration, Planning and Policy Studies
OUT	Open University of Tanzania
SMT	Science, Mathematics and Technology
STEM	Science, Technology, Engineering, and Mathematics
SPSS	Software Package for Social Sciences
TCU	Tanzania Commission for Universities
TDHS	Tanzania Demographic Health Survey
URT	United Republic of Tanzania
WEGSA	Women Engineers and Girl Scientists in Africa
UNESCO	United Nations Education, Science and Cultural Organization
YWSE Africa	Young Women Scientists and Engineers in Africa

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Problem

Career development of both men and women consists of two areas: career choice and career adjustment (Betz, 1994). Career choice refers to subjective context of individual's preferences, aspirations, images and intentions. Career adjustment on the other hand, refers to objective context of societal and economic conditions and sociological factors such as family and education. Both, subjective and objective contexts determine an individual career choice (Schreunder and Theron, 1997). This means that career choice is influenced by multiple factors including individual and society. According to Bandura et al. (2001) the individual undertaking the process of career choice is influenced by the context in which they live in.

This entails that career choice does not emanate only from individual, but is also a social phenomenon. Therefore to have the female student going into science, technology, engineering and mathematics is shaped by individual aptitude, but most importantly can be shaped by teachers who may take a role of counseling and to monitor her progress towards undertaking science related subjects and later lead her to science careers.

Historically, men were expected to work while women were expected to be homemakers. Work was considered to be a career while homemaking was not, and therefore a carrier to women was not an issue of concern to anybody. However, with the societal changes, even women became important players in the world of work

and therefore the issue of career choice among them gained more strength, although it was to be developed basing on the side of men that had already been recognized as workers and career holders (Brown, Brook and Associates, 1990).

Carrier development normally starts in schools where students learn about their interests, abilities, values, and aspirations. These interests and abilities are developed through subjects and fields choice. In secondary schools - in particular, students explore subjects and field options, and develop educational and career plan that outlines the occupational preparation required to pursue their career choice (Pezry and VanZandt, 2006).

On the side of female students, career development has been focused on art subjects such as language, history, music, which sometimes lead to clerical careers, while on the side of males, career development has been focused on mathematics and science related subjects such as basic and advance mathematics, Biology, Chemistry, Physics and technology leading to management, engineering and medicine careers. This career divide has raised the concerns of female students' interest in other fields such as science based and mathematics (Osborne et al., 2003), as well as males' interest in arts and humanity fields. Thus the investigation of female students' attitudes towards studying science has been a substantive feature of the work of the science education research community for a time (Osborne et al., 2003).

In Sub-Saharan African (SSA) countries, statistics show that women continue to lag behind men in education in general and specifically in science, mathematics and technology (SMT) education, with women and girls tending to study programmes

related to so-called “women’s” occupations such as nursing, secretarial jobs and social work. Programmes in engineering, physics and the so-called “hard sciences” continue to be dominated by men and boys (Masanja and Butare, 2010).

Female students’ increasing reluctance to choose science courses, and physical science courses in particular, in their final years of secondary education - has important implications - not only for the continuity of scientific endeavor, but also for the scientific literacy of future generations, as fields such as nursing and midwifery tend to have large proportions of women, even up to (95%). If females fail to take science subjects, these fields will lack potential females and one can, but imagine, what will happen to the reproduction part of society.

This under-representation is evident from primary through tertiary education to employment in different sectors. The dearth of women scientists and engineers is often considered a ‘pipeline’ problem, which implies that a solution should be to train more girls and women in science and technology that requires special programs to encourage the female students to opt the science based and mathematics fields (Schiebinger, 2010).

At primary school level, mathematics and science are seen as difficult subjects and teachers consistently encourage boys than girls to master these subjects. Studies by Mboya (2000) and Swai (2006) found that teachers reinforced stereotype behavior and gender roles among school children. Mushi (2006) has similar views that some teachers would tend to encourage girls to conform to feminine subjects such as Domestic Science or languages. Teachers were also reported to treat boys and girls

differently in which case boys receive more attention than girls regardless of the teacher's sex Mbilinyi (2002*).* Boys are said to persist with mastering science and engineering subjects and girls who take them are considered to be unfeminine and therefore those taking the subjects may be seen as not being normal females. This situation, as Abbott (2010) observed may be the cause for the underperformance of the girls in these subjects.

The constitution of the United Republic of Tanzania endorses gender equality and equity and guarantees full participation of women and men in social, economic and political life. The Government is also implementing international commitments as enshrined in the United Nations Charter and on the Human Rights Declaration (1948), the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) (1979), the Convention on the Rights of the Child (CRC) (1989), Beijing Declaration and Plat form for Action (1995), AU Solemn Declaration on Gender Equality and the Protocol to the African Charter on Human and Peoples Rights on the Rights of Women (2003) World Summit 2005 Resolution on Gender Equality and Empowerment of Women, Policy on Women and Gender ,Development (2000), SADC Declaration on Gender and Development (1998)Addendum on Prevention and Elimination of Violence Against Women and Children (1998), and the East African Community (EAC) Treaty (1998). Despite efforts to implement these declarations and conventions, gender imbalances still exist in various aspects.

Science based subjects and mathematics are keys to socio-economic development and future industrial competitiveness (URT, 1996) This is what drives the Government to participate fully in supporting the science related programs and at

University level with Tanzania Commission for Universities (TCU), setting the gold standard of full sponsorship for students who do science related subjects.

Science and mathematics subjects are identified as being ‘critical’ to the future supply of qualified scientific workforce and are of strategic importance to the nation because of the increased competition from rapidly advancing economies around the world (HMSO, 2004).

Efforts to boost female education have been made by governments, international organizations and NGOs. However, there is still a gender disparity in education. Females still have low access to education, low participation and poor performance in many subjects, especially Mathematics and Science based. Many factors have been associated with this situation. Some have associated it with home environment, community expectations and school based. All these contexts have been seen as restrictive to developments in female education. (Masanja and Butare, 2010).

In the United State of America for example, the Office of Science and Technology Policy, in collaboration with the White House Council on Women and Girls, is dedicated to increasing the participation of women and girls in the fields of science, engineering, and mathematics.

These initiatives also encourage mentoring to support women throughout their academic and professional experiences, and supporting efforts to retain women in the science workforce (Office of Science and Technology Policy, 2013).

While the United Kingdom is not producing enough female science, technology, engineering and mathematics (STEM) professionals, it has not thought of supporting females to take these subjects. According to the UK Resource Centre only (5.3%), or one in twenty, of all working women are employed in any science, engineering and technology occupations compared to (31.3%), or one in three, of men. Other countries, such as China, have a much more balanced gender mix of science professionals in the workforce. Young women are sometimes steered to follow opportunities and careers in traditional areas, which mean they overlook the opportunities in engineering, but still in China, there is a wide gap between males and females in science (Judge, 2013).

Women in Kenya constitute (50.3%) of the population so ideally women should be able to take up opportunities equal to their male counterparts but sadly this is not the case. Mathematics and science related careers still suffer from a minimal engagement by women. During the 19th Engineers International Conference in 2012, the issue of Gender imbalance in the Engineering Sector was highlighted. The statistics on women engineers revealed that the registered consulting engineers were (1.8%), registered engineers were (3.2%), and registered graduate engineers were (7.7%) while registered technicians were (1.5%) (Ogut, 2012).

The above statistics tell the grim story of the situation in Kenya and the picture is not so different elsewhere. Percentage of female professionals in Engineering in Latvia is (30%), Cyprus (28.6%) Turkey stands at (21%) and, Ireland (14.3%) lastly not even the United Kingdom are spared with only (8.7%) *(*UK Resource Centre analysis of the European labour force survey, 2007)

Kenya is struggling to end the under-representation of females in Mathematics and science has introduced and is implementing several initiatives targeting women scientists and engineers such as WEGSA-Women Engineers and Girl Scientists in Africa initiative with UNESCO, YWSE Africa – Young Women Scientists and Engineers in Africa by STEM Africa: which provides role models for Young Women Engineers (*Ogut*, 2012).

In Tanzania that girls' performance in mathematics and science based on national examinations during the past five years has, in most cases, been below that of boys, whereby in Ordinary level examinations girls' pass rates trail those of boys by (15%) to (20%), in all science subjects and in mathematics in particular (Hamilton et al., 2010).

At the university the level, females being admitted at the university of Dar es salaam taking the engineering courses has shown that the admission have been increasing although they are still far behind the record of males who are admitted in the same courses. For instance in 2002/03, girls in the engineering courses were (6%) of the admitted students in the engineering courses while in 2008/09 academic year there at least rose to (15%) Hamilton at el, (2010).

This poor performance and reluctance in choosing Mathematics and science related subjects may lead to underdevelopment in the nation as the science related subjects are keys to socio-economic development in an increasingly interconnected world. It is therefore imperative that developing countries like Tanzania embrace Mathematics

and science as a vital tool for accelerating the country's socio-economic development URT, (1996).

In dealing with the reluctance of the girls to choose the mathematics and science based, the Tanzania government has set different strategies to increase access to science and mathematics subjects. The efforts have ranged from changing the attitude of girls to science subjects from the family level, increasing the female staffs in education institutions that could rise the interests of girls by acting as counselors to fellow girls (Masanja and Butare, 2010). Moreover the Government has introduced the system of the awards and scholarships to female students who do better in the science subjects (Hamilton at el (2010).

1.2 Statement of the Problem

In the literature, scholars have only reporting a bleak picture of female in science (Office of Science and Technology Policy, 2013; Hamilton at el (2010); and Ogutu, (2012). Some have explored government efforts toward gender balance in science Hamilton *at el* (2010). There are also studies that have reported the efforts to financially support female students interested in science subjects. None of these scholars have dwelt on how female students are psychologically prepared and supported to take science subjects in primary or secondary schools.

Despite the low enrolment of the female students on Mathematics and science subjects, there are few studies that have examined the causes of this, tracing it back to the family, school and classrooms. This study will fills this gap in the literature by assessing the determinants of carrier choices in mathematics and science based

among secondary schools in Dar es Salaam and the challenges that face the students in opting for the mathematics and science related subjects.

1.3 Objectives of the Study

1.3.1 General Objective

The broad objective of this study was to assess determinants of Mathematics and science career choices among secondary school female students in Ilala district Dar es Salaam region.

1.3.2 Specific Objective

The specific objectives of this study were to:

1. Examine the home environment in promoting mathematics and science related activities for girls
2. Assess the quality of secondary school in promoting mathematics and science related subjects
3. Assess the ways the teaching of mathematics and science related subjects in secondary schools encourage girls.

1.4 Research questions

1. In what ways do home environment promote mathematics and science related activities for girls?
2. How do the quality of secondary school promote mathematics and science related subjects?

3. How does teaching of mathematics and science relate subjects in secondary schools encourage girls?

1.5 Significance of the Study

Studying Mathematics and science subjects is necessary as the engineering and science industries are a vital element of the overall Tanzania economy and as per international research which indicated that (75%) of the fastest growing occupations require science skills and knowledge Becker and Park, (2011). Therefore, this study will help in guiding the academia and act as an incentive for conducting further research in the field.

This research will also bring in knowledge needed for the institutions concerned to start thinking on how to set strategies for increasing the female mathematics and science students in secondary schools through colleges and universities.

1.6 Definition of terms

(i) Career choice refers to subjective context of individual's preferences, aspirations, images and intentions.

(ii) Career adjustment refers to objective context of societal and economic conditions and sociological factors such as family and education. (Psychology Dictionary, 2013).

1.6 Summary of the Chapter

The chapter presented a background to the study of the determinants of carrier choices in Mathematics and science-related subjects among secondary school female

students. This background traced the history of career choice for men and women and schools as a context where students learn about their interests, abilities, values, and aspirations. It also highlights the broader concept of determinants of carrier choices and the difficulties and constraints faced by girls in studying mathematics and science subjects.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This Chapter reviews and discusses literature related to this study. Literature review is central to the research process because it provides a general understanding of the research problem as well as serves as a benchmark against which the researcher can compare and contrast the research results (Aina (2002a); Gray (2004).

The following sections review and discuss literature on issues around scholarly communication with a focus on open access. Specifically, the Chapter addresses the following research areas which are based on the study objectives: the home environment in promoting mathematics and science related activities for girls; the quality of secondary school in promoting mathematics and science related subjects; and the ways the teaching of mathematics and science related subjects in secondary schools encourage girls.

Theories play a critical role in a research process because they are keys in planning, data collection and explanation of the emerging findings. According to Whitworth (2007), theories propose and connect abstract constructs/variables, and transform them into the physical data. As Neuman (2006) observes, researchers who proceed "without a theory or model rarely conduct top-quality research and frequently find themselves in quandary (p. 77)." Theories therefore are important in helping the research focus on an issue at hand. The following section describes the three theories that will frame this study.

2.2 Self Efficacy Theory

Self Efficacy Theory was developed by Hackett and Betz in 1981 and explains how beliefs about self influence the carrier development of an individual. The theory asserts that gender socialization influences the cognitive processes particularly expectations of self efficacy, which in turn influences career decision making process Fitzgerald, Fassinger and Betz, (1995). Self-efficacy beliefs can lead to avoidance of or motivation toward career behaviors Betz & Taylor, (2001). Low self-efficacy can cause people to procrastinate making career decisions, and may delay them from following through with a decision once it has been made (Betz, 1992).

The theory relates to the study in the sense that to take a mathematics and science stream one is to decide and therefore if the female students have no that sense of deciding and fear to decide may abandon the stream even when they have talents and capable of doing and passing the science subjects. The theory was used by Nasta (2007) in the study of influence of self efficacy beliefs on career exploration behaviors, in which the career self efficacy was measured by using the career self efficacy sources scale and the results revealed that past performance accomplishment, vicarious learning, verbal persuasion, emotional arousal all influenced the career choices among the students.

Additionally, self-efficacy is considered essential to successful job performance, and can greatly influence work behaviors regardless of knowledge and skill (Bandura, 1977; 1986); Dawes, et al.; Giles & Rea (1999); Niles & Sowa, (1992). Nesdale and Pinter (2000) found that across diverse cultures self-efficacy was a significant predictor of an individual’s ability to continually find employment. Self-efficacy has

also been found to be one of the best predictors of many beginning career behaviors, such as job searching (Niles & Sowa, 1992). Past research has found that self-efficacy beliefs do indeed have a strong influence on career exploration. This theory is useful in this study because it will help explain how the home and school environments influence the career choices for girls in secondary schools.

2.3 Social Cognitive Career Theory

Social Cognitive Career Theory was developed by Lent, Brown and Hackett (1994) as an attempt to explain how carrier and academic interests develop, how career related choices are made and enacted, and how performance outcome are achieved in terms of construct of personal agency.

This theory was built on Bandura's general Social Cognitive theory (1986) which emphasizes triadic reciprocal causality and focuses on self efficacy, expected outcomes and goal mechanism. The triadic reciprocity occurs between the external environment, overt behavior and personal attributes (example feelings, attributes, gender and aptitude). Gibbons (2004) examines how school and career counselors can assist prospective college students prior to college entrance through the use of Social Cognitive Career Theory.

Gibbons (2004) found that individuals develop their sense of self-efficacy from personal performance, learning by example, social interactions, and how they feel in a situation. Outcome expectations are formed thorough past experiences, either direct or vicarious, and the perceived results of these experiences. Behavior is organized or sustained based on previous set goals.

According to De Bruin (1999), the social cognitive theory is the very useful model as it takes into consideration of the social cultural context in which the career development takes place and further does not assumes that everyone has only one developmental route to follow and it postulates that environment has the influence on the career development. Lent et al. (2002), asserts that even though the theory considers the influence of gender, ethnicity and social economic status on carrier development and choice, it needs to be clearer on these issues. The theory relates to the study given the influence of self efficacy and expected outcomes in subject selection, and thus the doubts of whether one will fail or pass if she takes on the mathematics and science subjects influences the choice of those subjects among the female students. This theory relates to the study given the fact that as it has put forward the role of the environment in directing the person to choose a career and therefore highlighting the need to use the environment to instill the love to mathematics and science subjects to the female students.

This study used this theory to explain how the quality of the school learning environment may influence students to do science.

2.4 Gottfredson's Theory of Circumscription and Compromise

This theory was developed in 1981 by Linda Gottfredson and focuses on how occupational aspirations develop from childhood to adolescent stage. The theory is primarily on social class, gender and intelligence and secondarily on aspects like values, personality and plans for family and how they affect career choice (Foster, 2005). The theory is built on four major building concepts of self concept, images of occupation, cognitive map of occupations and occupational preferences.

The self concept is the view that an individual holds about himself or herself or one understands of one's abilities, interests, personality, gender, values and place in society. Thus the occupational aspiration is the reflection of one's effort to implement one's self-concept. This mainly influences the female students' selection of the stream to be in and the occupation to choose in the future Gottfredson, (1996).

Occupation images refers to occupational stereotypes about personalities of persons in specific occupations, the kind of work they do, their life styles, the rewards and conditions of work they are in and the appropriateness of work for those particular people Gottfredson, (1996). And therefore, the female students may be looking at an engineer for instance as the field person someone always moving in sites of construction and thus may decline to choose such subjects because she wants a job which is more clerical.

As regards the cognitive map occupations, the individuals tends to make sense of occupational images by putting them into a map of social standing of the particular occupations along the dimensions of sex type (masculinity and femininity), prestige level and field of work. Individuals then identify the occupations they most prefer by assessing the compatibility of different occupations with the images they have developed about such occupations. Therefore, if a person has already selected the certain type of occupation, then the subjects chosen in her study will always reflect her choice Gottfredson, (1996).

According to Handerson et al. (1988), the Gottfredson's cognitive map of occupations (sex type, level of work and field of work) concept can be a useful tool

for teaching adolescents how sex typing and prestige levels can influence one's career aspirations. Further Handerson et al. (1988) conducted a study on occupational preferences are narrowed by sex typing before being narrowed by social background and whether this circumscription occurred at the ages suggested by Gottfredson, the result of this study revealed that the narrowing by sex type occurred at an earlier age than that proposed by Gottfredson and according to Taylor and Pryor (1985) the girls sex type was more flexible than boys. Stead and Watson (1999) concluded that the theory gives inadequate explanation on why some people broaden rather than narrow their options while others appear not to stereotype and choose occupations that are not sex typed.

The theory is relevant as it deals with things that influence the career choices and therefore can help to explain the influences of career choices among the females in Mathematics and science related subjects.

2.5 Empirical Literature Review

This section examines the literature related to this study. This literature is in line with the objectives of the study.

2.5.1 Home Environment in Promoting Mathematics and Science Related Activities for Girls

Willms, (2000) examined the standards of care to improve children's educational outcomes in Latin America. He administered questionnaires to students, parents, teachers and school administrators to test more than 50,000 students in grade 3 and 4 taking language and mathematics. Willms found that children whose parents had

primary school education or less were more than three times as likely to have their children getting low test scores or grade repetition than children whose parents had at least some secondary schooling. Willms suggested that parental education not only influences parent-child interactions related to learning, but also affects parents' income and need for help in the home or field.

Willms' study is useful to the current study because of the insight about the role of the education of the parents in improving the performance of children. This study goes beyond Willms' and looks at the role of home and parents in influencing the female students to study mathematics and science related subjects.

Hari, (2001) determined that parental attitude and support has a great deal of influence on girls' participation and level of success attained in SMT education. The focus group discussions and interviews were conducted with students; parents and head teachers from Tanzania, Uganda, Ghana and Cameroon. The study found out that parents and community attitudes are mainly influenced the female students to take science and mathematics subjects as in African tradition and culture, women are expected to exclusively assume the roles of mothers and wives and therefore were trained to assume those roles by performing a lot of domestic works after school and given little time to do class works.

Hari suggested that parents should be more involved in the academic activities of their children and be given more sensitization on the importance of female students involvement in science, mathematics and technology (SMT) subjects. The study is relevant to the study has it encourages the community and family to create the

environment that will necessitate the female students involvement in science and mathematics subjects.

Bisanz et al. (2009) examined home numeracy experiences and children's Mathematics performance in the early school years, the data were collected through the questionnaire to the students and the parents, in which the students were 258 and the parents were 160. The study found out that the children's numerical competence in kindergarten is highly predictive of their acquisition of mathematics suggesting that experiences at home before schooling are important in understanding how numeracy develops. In this study, the mathematical skills of 146 children in Kindergarten were correlated with the frequency with which parents reported informal activities that have quantitative components such as board and card games, shopping, or cooking and revealed the strong correlation. The study suggests that the parents at home in order to develop their children's interest in mathematics should talk the mathematics language at home in their normal daily conversations with their children. This study is important to the research as it gives the way to develop the interests of females in mathematics.

Chinn, (2002) examined the influence of female students to take science and mathematics subjects. Using narrative interviews as way of eliciting how individuals make meaning of their personal and social group identities. Chinn reported that many female students were discouraged by their families from pursuing an engineering or science career because it was seen as masculine and lessened their chances of finding a husband. Chinn suggested that for females to do science it is important to deal with

the home environment by educating the family members that getting the husband does not depend on doing the science and mathematics related subjects. The study was able to put forward that even family members are stumbling blocks when it comes for females to opt for science related subjects. This study will go further than Chinn's and looks at the range of causes that discourage the secondary school females from taking mathematics and science subjects.

Huang et al. (2000) identified several factors contributing to the likelihood of female students in choosing Science Technology Engineering Mathematics. They interviewed 200 college women in engineering and found out that family environment, mother's level of education, and parental expectation after college completion influence the female students to take science and mathematics subjects. The study was able to put forward the factors influencing the females in taking the science and mathematics subjects and further suggested the need to draw the policy to address the concern the problems facing the female students in their wish to take science and mathematics subjects. The framework by Omari, (1995) recognizes the importance of the out school environment in the improvement of the quality of the school and therefore this study will look on how the quality of school encourage the female students to choose the mathematics and science related subjects.

2.5.2 Quality of Secondary School in Promoting Mathematics and Science Related Subjects

The issues of quality on the school have different facets. The tradition theoretician focuses on the output and the education system. For the purpose of this study, focus

is on quality of secondary education teaching and learning materials; teacher's qualification; and relevance of the content to students. While the contemporary theorists, however argue that quality can be better understood and measured accurately, if there is conceptualization of all the attributes of high or low quality schools, institutions and education system Osaki (2000). In order for a school to provide quality education in science, it must have appropriate and safe physical facilities (buildings and infrastructure) that are well furnished and resourced in order to support effective teaching. Omari (1995) developed the conceptual framework for quality assurance based on the necessary external inputs - family and child characteristics that eventually impact the school climate and attempt to promote intended outcomes with skills acceptable in the society.

Richardson (2008) did a study on an examination of teacher qualifications and student achievement in Mathematics using quantitative method. The sample included twenty full time mathematics teachers from 7 of the 8 traditional (non-traditional magnet) middle or junior high schools located in the Montgomery Public School (MPS) District. Richardson examined the relationship between teacher preparation, certification, and teaching experience with the mathematics achievement of their students. He found there was significant relationship between teacher qualifications and the student achievement. Richardson suggested that the schools ought to recruit teachers with higher qualifications in their areas of specialization. This study relates to the current study in sense that for the students to be motivated to learn, we need teachers who are professionals and highly qualified.

Msegeya (2009) used qualitative research approach to study the factors affecting female students' enrollment in science subjects at advanced secondary education in selected schools in Kilimanjaro region. He collected data from four secondary schools in Kilimanjaro and Ministry of Education in Dar-es-salaam involving 95 respondents. Findings revealed that most of science lessons in the sampled schools were taught through the lecture method. Practical work, which was crucial for understanding scientific concepts, was rarely done. Msegeya suggested that inadequate practical work made science learning difficult, which he related to negative effects on female students' enrollment in science subjects. The study is important to this research as it reflects on how the quality of teaching may affect the enrollment of the female students in the science and mathematics subjects.

Kagi (2009) investigated the causes of female students in avoiding physical science subjects at Ordinary level (secondary schools) in which the teaching of Chemistry subject was used as a case study. The study was conducted at nine secondary schools in five districts of Tanga region whereby the participants of the study were form three secondary school girls and chemistry subject teachers. Data were collected through interview to both students and subject teachers. Classroom as well as laboratory practical sessions were respectively used. The findings from the study revealed that teaching methods were not in favors of female students such that they were not self-propelled to carry out practical activities and dependent on the boys to perform the practical while they watched. Kagi suggested that girls' schools should be increased due to their significance in confidence building among female students and also that the government should emphasize on building and equipping school

science laboratories. This study is important for this research as it gives out the way of building confidence on the females to do science and mathematics but also on the need for the females to take part in the learning process.

William (2008) explored the contribution of activity-based teaching and learning in the understanding of Physics concepts for advanced level students in Tanzanian secondary schools. The study was qualitative and a total of 52 respondents were involved in the study that included three teachers and 49 students in Morogoro at Kilakala Secondary School, Mzumbe Secondary School and Lutheran Junior seminary. The study found out that there are some situations where teachers allow students to perform activities using local available materials like desks, chairs, chalks, tables and even students exercise books and further that there is inadequacy of the science teaching and learning materials, teachers having many classes to teach and syllabus which force them to cover a lot of content before students sit for national examinations. William suggested that there is a need for the teachers to teach science by the use of the local available teaching aids that could help students to understand the concepts easily. The study is relevant to the study as it gives the way forward for students to easily understand the science concepts need to be involved therefore involving the female students will make it easy for the females to take on science and mathematics subjects.

Osaki (2000) carried out a study on the quality of education in Tanzania focusing on curriculum, standards and accountability in schools and used documentary reviews. Osaki identified some characteristics of school that may lead to increased quality of the schools in Tanzania and these included effective leadership, capable and effective

teachers with sufficient knowledge, skills, the right attitude, experience and motivation to carry out their duties diligently and who are interested in their learners and their development, the open ways of working, clear objectives and high staff-student time in school meaning that both teachers and students have to have good attendance at school and in class. The study found out that the school leadership sometimes lacks commitment in making supervision and following up so as to have the quality schools in Tanzania. Osaki suggested that there should be constant follow-ups from the school inspectors. The study pointed out the necessary pre-requisites for having the quality in education and this study looked at the qualities and further examined how they helped the female students in choosing mathematics and science streams.

2.5.3 Ways of Teaching of Mathematics and Science Related Subjects in Secondary Schools

Samwel (2009) investigated the potential of interactive teaching method in promoting meaningful mathematics learning in primary schools. The study employed mainly qualitative approach in which fifteen (15) pupils were interviewed, 469 pupils appeared for classroom observation and 80 pupils participated in tryout of diagnostic teaching techniques, one District Education Officer, one District inspector of schools, five head teachers and ten mathematics teachers appeared for interview. The study found out that implementation of interactive teaching method was not effective. Samwel suggested that for proper utilization of interactive teaching method, the Tanzania Institute of Education should emphasize the use of diagnostic teaching techniques to equip and promote understanding of mathematics literacy

components among pupils. The study is relevant to this research as it introduces the basic methodologies of teaching mathematics and therefore by adopting these female students can easily learn mathematics and science subjects.

Maina (2009) analyzed the teaching of chemistry in ordinary level secondary school for performance improvement using both qualitative and quantitative research designs in which 127 respondents who were 3 Heads of chemistry departments, 3 chemistry teachers, 120 learners and 1 librarian from NECTA. The findings revealed that the characteristics of instructional theory were not implemented in the classroom and among the factors which contributed to this were: teachers' poor methodology; lack of teaching aids; inadequate number of books; language and different ability of learners. Maina suggested that there was a need to strengthen teachers teaching colleges and demonstration schools in term of facilities, to improve teachers' motivation, to employ laboratory technicians and also the revision of the current syllabus

Lihaya (2009) investigated the perceived influence of the pre-service short-term trained teachers (PSSTT) on students' interest in science subjects in selected community secondary schools (CSS). The study applied the case study design and data were gathered through interviews, focus group discussions, questionnaires, document reviews as well as observations from six community secondary schools in Mufindi. The study found that majority of students in CSSs had positive attitudes and interests towards science subjects when they joined secondary schools but in the course of learning they lost interest. Lihaya suggested that the government has to draw a clear policy on professional support to PSSTT that will focus on follow-up

school inspections to establish means to support PSSTT for science teaching and devising school-based plans of conducting in-service training.

Hackett (1992) examined the gender, ethnicity, and social cognitive factors predicting the academic achievement of students in engineering. He interviewed 197 students who responded to scales measuring their interest in science subjects. Hackett found that the female students were treated like outsiders by male peers and faculty. Many reported that male peers and faculty treated them as incapable of doing science. These women encountered sexism from peers and faculty, were excluded from informal social and academic interactions with their male peers, and were discouraged by faculty in their pursuit of mathematics and science majors and careers. Hackett suggested that the faculty support to the females by setting the environment that will motivate the learning. This study resembles that of Hackett in many ways. But unlike Hacket, the current study was fore ground a range of factors, from the family, school environment and classroom interactions.

Kira (2009) explored teachers questioning techniques during chemistry teaching at advanced level secondary schools a total of 179 respondents out of whom 10 were teachers and 169 were students, the study was conducted through classroom observation, questionnaires, reviewing written materials and unstructured interview. The findings revealed that teachers interacted frequently with active students and bothered less with the least active ones and had the problems of promoting students thinking by maintaining a balance between open ended and close ended questions or between convergent and divergent questions and also in guiding classroom discussion through effective questioning due to low ability to probe questions and to

use various techniques in asking questions. Kira suggested that teachers should plan for both oral and written questions well in advance as a means of motivating both active and less active students in order to improve their learning behavior. The study is relevant to the study as it gives the right and the guide to the teachers on how they have to prepare the questions to ask the students prior to the learning session begins.

2.4 Conceptual Framework

A conceptual framework is the general idea inferred or derived from specific instances. It is the representation of the variables of interest in the study and relationship between them (Kombo and Tromp, 2006).

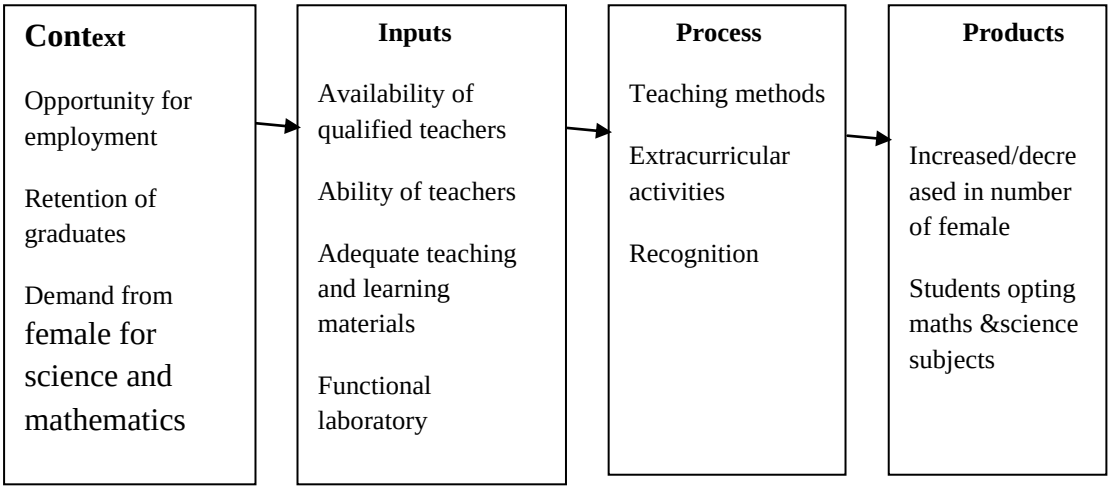

Figure 2.1: Determinants of Mathematics and Science Based Among Secondary School Female

Source: Researcher, (2013)

The conceptual framework of this study was derived from analysis of home environment, the quality of secondary school in promoting mathematics and science related activities for girls and the ways the teaching of mathematics and science

related subjects in secondary schools to encourage girls which are conducive for career choice. Figure 2.1 represents the summary of the literature reviewed on determinants of mathematics and science career choices among secondary school female students. The choice of mathematics and science subjects by female students is determined by the home environment, quality of schools, and the ways the teaching of mathematics and science related subjects. All of which, if taken into consideration will help to determine the female students taking science and mathematics subjects.

2.5 The Literature Gap

The purpose of the literature review in this Chapter was to review related literature to establish a benchmark against which the researcher could make a comparison and find a gap that could be filled by the current study.

The reviewed literature shows that studies on female students in science report a bleak picture (Office of Science and Technology Policy, 2013; Hamilton, Mahera, Mateng'e and Machumu 2010; and Ogutu, 2012). Some have reported on the government efforts towards gender balance in science Hamilton at el. (2010). However, none of these scholars have dwelt on how female students are supported in primary or secondary schools in choosing science subjects – specifically, they have not focused on the quality of school, family environment and the real practice of science teaching in the classroom in secondary schools. Therefore the need for this study to fill the gap is found to be prudent and is expected to come out with the determinants of mathematics and science career choices among secondary school female students in Ilala District.

2.6 Summary of the Chapter

Chapter two presents the review of literature related to determinants of mathematics and science subjects. The purpose of this review is to position the study within similar works as well as explore the available knowledge in the study discipline. The Chapter addresses the following research areas which are based on the study objectives: the home environment in promoting mathematics and science related activities for girls; the quality of secondary school in promoting mathematics and science related subjects; and the ways the teaching of mathematics and science related subjects in secondary schools encourage girls.

The first part of the Chapter dwells on theoretical framework, while the second part examines the empirical literature related to this study. The last part deals with conceptual framework for this study.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter covered the research methodology, study setting, study paradigm, research design, study population, sample of the study, sampling design, instrument of the study, quality of instruments, data management and analysis, ethical considerations and the scope and limitation of the study. According to Kothari (2014), research methodology refers to a systematic way applied to solve the research problem.

3.2 Research Paradigm

A paradigm is a broad view or perspective of something (Taylor et al, 2007). A paradigm in research reveals how research could be effected and guided by a certain perspective because it helps one to see the frames and processes through which investigation is accomplished (Weaver and Olson, 2007). This research employed both quantitative and the qualitative paradigms because the study involved the aspects of personal narrative and measurements of variables.

3.3 Research Design

Research design is defined as a framework or plan for a study. A research design is a blue print that is normally followed as one engage in research process from the beginning to the completion of a study and is normally used to guide in collecting and analyzing data. Kothari (2014) defines research design as the arrangement of the conditions for collection and analysis of data in a manner that aims at combining

relevance to research purpose with economy in practice. A research design can be regarded as an arrangement of conditions for collection and analysis of data in a manner that aims at combining relevance with research purpose (Kombo and Tromp, 2006). This study employed descriptive research design because its main purpose was to describe the home, quality of school and classroom environments with a goal to report what is going on to shape mathematics and science career choices among secondary school female students.

3.4 Area of Study

The study was conducted at Ilala municipality whereby the schools, parents and teachers located in Ilala were contacted for the purpose of obtaining information. Ilala municipality is one of Dar es Salaam three municipalities of Temeke, Kinondoni. Temeke District is the southernmost of three districts in Dar es Salaam, Tanzania, with Kinondoni located to the far North of the city, and Ilala being located in the downtown of Dar es Salaam. Administratively, Ilala municipality is divided into 3 divisions, (Ilala, Ukonga and Kariakoo), 26 wards, 65 sub-wards, 9 villages, and 37 hamlets. According to the 2012 National Census, the Ilala municipality had a population of 777,364 projected Population and Housing Census (2012).

Ilala is among Tanzania's most important municipalities for both business and hosts the government’s main offices. The district contains high concentrations of trade and other services and manufacturing compared to other parts of Tanzania, which has about 80 percent of its population in rural areas. Downtown Dar es Salaam includes many small businesses, many of which are run by traders and proprietors whose families originated from the Middle East and Indian sub-continent — areas of the

world with which the settlements of the Tanzanian coast have had long-standing trading relations.

The area was chosen because is among the three municipalities of Dar es Salam Region with old schools for instance, Forodhani secondary school National Bureau of Statistics, (2011) and the people in the region have the source of income that originate from the businesses and working in different offices hence able to take children to school therefore it is important to evaluate its contribution in assisting girls in secondary schools to take on science related subjects.

There are 85 secondary schools of which 49 are government schools and 36 privately owned. The total students for secondary schools are 39,103 among of them 18,145 are girls and boys are 20,103. There are 220 male teachers and 738 female teachers; 386 classrooms with 449 desks (URT, 2012).

3.5 Population

According to Babie (1992), population is the theoretically specified aggregation of study elements, a group to be studied from which the element of study was drawn. The target populations of the index study were all girls in Ilala secondary schools, mathematics and science teachers and parents.

3.6 Sample of the Study

The sample size refers to the number of items to be selected from the universe to constitute a sample (Dryden, 1995). The size of the sample should be optimum (Kothari, 2014) and an optimum sample is the one that fulfills the requirements of

efficiency, representativeness; reliability and flexibility (Dryden, 1995). This study drew information from the targeted sample of 160, the population involved were from ten schools in Ilala district 5 from private and 5 from public whereby 4 were from Kariakoo 4 from Ukonga wards and 2 from Ilala., The researcher decided to take 4 schools from Kariakoo and Ukonga wards because the settings has many wards and secondary schools compared to other ward and from the ten schools.

3.7 Sampling Procedures

This refers to the part of the research plan that indicates how the cases are selected for observation and it's divided into probability and non-probability designs. In the case of probability sampling designs, people, places or things are randomly selected and each unit in a population has equal chance of being included in the study (Kombo and Tromp, 2006) while with non probability sampling design the researcher is interested in the representativeness of the concepts in their varying forms. This study will use cluster sampling procedures. Clustering is a sampling technique used when "natural" groupings are evident in a statistical population. This procedure is the most important in this study because of different characteristics of respondents involved in this study.

The participants were clustered in the groups of students, teachers and parents, from each cluster, the sample was taken. For the students cluster, 14 students was taken from each school, in each school the respondents were selected randomly, from form three and four in each class 7 students were selected randomly from those with the bias to mathematics and science subjects (making a total of 140 students for 10 schools). To get 10 teachers, the cluster of teachers was sub-clustered to get science and

mathematics' teachers and from the science teachers 1 teacher was selected randomly in each school. In the ten schools, from five schools five female science teachers was interviewed and from the other five schools five male science teachers were interviewed (making a total of 10 teachers in 10 schools). Likewise in ten parents, five females and five males were interviewed to provide the information on home environment.

The information of different types was collected from the respondents depending on the need. Teachers and students provided information on quality of school and the ways of teaching mathematics and science subjects. Parents provided the information on home environment and students provided information on home, school environment as well as ways used by teachers in teaching science and mathematics subjects. Further the observation checklist was used to collect the information on quality of school and the ways of teaching mathematics and science subjects.

Table 3.1: Interviewed Respondents

Respondents	**Number of respondents**	**Male**	**Female**
Students	140	0	14
Teachers	10	5	5
Parents	10	5	5
Total	**160**	**10**	**24**

Source: Field Data (2014)

3.8 Data Sources and Collection Methods

The success of any study depends on the source and quality of information or data collected which are determined by the research instruments. In this study both primary and secondary sources of data was used.

3.8.1 Primary Data

The primary data was used to collect data in the field directly through questionnaire, interviews, and classroom observations. The questionnaire was used to solicit information from students on home environment, quality of the school environment and ways used in teaching mathematics and science subjects while interview was employed to teachers and parents to solicit information on home environment, quality of the school environment and ways used in teaching mathematics and science subjects. Classroom observation was done through the checklist to focus on quality of the school environment and teaching methods used in mathematics and science subjects.

3.8.2 Secondary Data

Secondary data refers to all the data that has been collected by other researchers but is available for someone else to use for further research. Normally secondary data is found in written documents such as organizational records and academics' notes or journals, textbooks, publications and reports (Quinton et al., 2006). This study used secondary data from various sources such as ministry of education, schools and journals to help in constructing the concise arguments on the determinants of mathematics and science career choices among secondary school female students, and help some comparison with the counterpart.

3.9 Data Collection Methods

The desired primary information was collected directly from the respondents by using a questionnaire. According to Churchill (1996) a questionnaire is among the communication methods a researcher can use to secure data and is to decide on the

kind of questionnaire that will best serve the purpose. The questionnaire that was used in this research was structured with the closed and open-ended questions. The questionnaire was chosen because was easy to administer and relatively inexpensive.

The interview was also used to collect data from teachers of science and mathematics subjects; this was used to capture the assumptions of the teachers when selecting students into certain streams. Observation checklist was used to collect the information on quality of school and the ways of teaching mathematics and science subjects.

Secondary data was obtained through the documentary review that is from the already existing sources that was included in the books, reports and journals and dissertations.

3.10 Data Management and Analysis Procedure

Data was collected over a period of four weeks. Every evening the researcher was checking the filled tools to find out whether they had been filled in correctly and coded prior to final tabulations so as to check all internal inconsistency in preparation for analysis. Corrections for minor mistakes were made. Computer data entry was done at The Open University of Tanzania immediately after coming back from the field.

Qualitative data from the interviews and observation was manually sorted by response type and theme to clarify the content of responses and reactions, and acceptability of mathematics and science among secondary female students. In the process of conducting interview respondents were asked questions about home environment, quality of the school environment and ways used in teaching

mathematics and science subjects. Respondents were asked to draw upon their personal experiences and opinions and to put forward as many ideas as possible. All the data were then triangulated and tested for reliability and validity by the use of the Software Package for Social Sciences (SPSS). Descriptive analysis was done where frequencies and proportion was used to summaries results, and cross- tabulation was used to assess significant associations between variables. Findings from quantitative data was used for triangulation and to broaden understanding of the perception and experiences of female students on mathematics and science subjects and qualitative information was subjected into content analysis and presented as narratives.

3.10 Qualities of Instruments

3.10.1 Validity

Validity refers to the extent to which a test measures what was actually intended to be measuring. To ensure the validity of the data questionnaire was created from literature review and the questionnaires was administered to 10 students at Jitegemee Secondary School in Temeke district. The aim of piloting was to test the feasibility of the study. In the process, problematic areas of the research instrument were identified and the necessary modifications were made before embarking to the actual study.

3.10.2 Reliability

Data reliability is concerned with the estimation of the degree to which a measurement is free of random or unstable error. It refers to the relative level of consistency, stability, dependability and accuracy of construct. The reliability of the

data was checked by Cronbach's Alpha. Cronbach's Alpha generally increases as the inter correlations among test items increase, and is thus known as an internal consistency estimate of reliability of test scores. Because inter correlations among test items are maximized when all items measure the same construct.

The cronbach's alpha result was obtained by using the SPSS whereby from choosing the analysis the scale was selected and reliability after that the variables were entered in the dialogue box and analysis commanded to produce the cronbach's alpha of 0.794 as shown in Table 3.2 and indicates that there is a degree of internal consistency of the variables used in the study.

Table 3.2: Reliability Statistics

Cronbach's Alpha	Number of Items
.794	23

Source: Field Data (2014)

3.11 Ethical Considerations

In an attempt to produce a quality and reliable study, the researcher asked permission from The Open University of Tanzania. After being granted ethical clearance, institutional permission was sought before starting data collection. Participants were consented and given information about the study individually and they were provided with a two copies written consent which they signed where as one copy remained with the principle investigator while the other copy remains with the participant. (See appendix iii informed consent form). Participation volunteers to participate in this study. Participants who agreed to participate in the study were

recruited. The study will be anonymous; participants will be identified using number to maximize confidentiality.

The study proposal was submitted for review and clearance to the ethical research committee of the OUT. Permission to carry out the study in Ilala District was sought from the district education officer of the district. The eligible participants for the study were informed individually about the purpose of the study and explained that their participation was on voluntary basis. In addition, the participants were assured of anonymity and confidentiality with the information they shared. They also gave oral consent.

3.12 Scope and Limitation of the Study

To cover all the districts in the entire Dar es Salaam region was impossible because of the limited time frame and amount of funds for this research. For this reason, the research covered one district of Dar es Salaam region, which is Ilala. The choice of the district was due to the fact that the regions has large number of secondary schools and high concentration of students taking science subjects and also the districts within the region is well distributed therefore these district provided good source of data for the study. Despite this limitation, the study provides useful information that will inform the implementation of curricula for secondary school in a wider nation.

3.13 Dissemination of the Results

It is anticipated that findings from this study was of interest and touch every individual from the scientific community, international, and national levels, non-government organizations and the community at large. The results would be

presented to all stakeholders and policy makers for policy and programme implementation. Public presentations will be made at professional conferences, meetings, seminars and workshops. Also results would be published through relevant regional and international scientific journals.

3.14 Summary of the Chapter

This Chapter presented and discussed the research methodology of the study. The Chapter presented the research process followed in conducting the study before addressing the research purpose, approach and design aspects of the study. The purpose of the study was to assess the determinants of mathematics and science career choices among secondary school female students. A total of 160 respondents were involved in the study comprising students, science teaching staff and parents. The research design included discussions regarding target population and sampling procedures, the research strategy, pre-testing of research instruments, pilot study, and data analysis techniques. Data was collected through questionnaire, interview and observation. A quantitative data analysis technique using descriptive methods was adopted in this study. Finally, a number of ethical issues were applied by the researcher during the research process.

CHAPTER FOUR

4.0 DATA PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter presents results derived from the primary information that were obtained from the field. The data from questionnaires are presented in tables and those from interview are presented in narrative form.

4.2 Characteristics of the Respondents

Table 4.1: Age Group of the Student Respondents

Response	Frequency	Percent	Cumulative Percent
13-16	78	55.7	55.7
17-19	61	43.6	99.3
20-23	1	7	100.0
Total	**140**	**100.0**	

Source: Field data (2014)

The respondent's age was between 13 and 23 years old. The highest occurrence was age range 13-16 year old, (55.7 %), (43.6 %) were in the 17-19, (0.7 %) were in the 20-23 as shown in Table 4.1.

4.3 The Home Environment in Promoting Mathematics and Science in Girls

The first objective aimed to find the ways in which home environment promote mathematics and science related activities for girls. Questionnaires and interviews were used to solicit information from students, teachers and parents. In which 140 students were asked to fill in the questionnaires, 10 teachers were interviewed and also an interview was conducted to 10 parents.

Table 4.2: The Home Environment in Promoting Mathematics and Science in Girl

	Alternatives	Frequency	Percentage	Cumulative Percentage
Parents assist in mathematics and science homework	Strongly Disagree	13	9.3	9.3
	Disagree	20	14.3	23.6
	Neither agree nor disagree	23	16.4	40.0
	Agree	55	39.3	79.3
	Strongly Agree	29	20.7	100.0
Parents see the importance of learning mathematics and science	Strongly Disagree	1	0.7	0.7
	Neither agree nor disagree	8	5.7	5.7
	Agree	48	34.3	40.7
	Strongly Agree	83	59.3	100.0
Parents encourage you to learn mathematics and science	Strongly Disagree	3	2.1	2.1
	Disagree	9	6.4	8.5
	Neither agree nor disagree	11	7.9	16.4
	Agree	53	37.9	54.3
	Strongly Agree	64	45.7	100
Parents buy science books	Strongly Disagree	4	2.9	2.9
	Disagree	11	7.9	10.8
	Neither agree nor disagree	14	10	20.8
	Agree	58	41.4	62.2
	Strongly Agree	53	37.9	100.0
Likes to be like someone who works in the	Strongly Disagree	2	1.4	1.4
	Disagree	4	2.9	4.3
	Neither agree nor disagree	5	3.6	7.9
	Agree	31	22.1	30.0
	Strongly Agree	98	70.0	100.0
Girls have more household duties	Strongly Disagree	26	18.6	18.6
	Disagree	23	16.4	35.0
	Neither agree nor disagree	25	17.9	52.9
	Agree	37	26.4	17.3
	Strongly Agree	29	20.7	100

Source: Field data (2014)

The first question required the students to agree or disagree with the statement with regards to parents assisting their daughters in doing the mathematics and science homework. The findings show that (60%) agreed, (16.4%) neither agreed nor disagreed and (23.6%) disagreed as shown in Table 4.2. The results indicated that the

parents also take part in guiding their children to do science subjects especially by being involved in their course of learning.

Besides the parents assisting in doing the homework, parents also see the importance of science to their daughters. This was supported by (93.6%) agreed while (5.7%) neither agreed nor disagreed as shown in Table 4.2. This shows that parents do not only send their daughters to school, but also insist them to do science and mathematics subjects. This is also reflected in the home where parents encourage their daughters to learn mathematics and science at home, as the results revealed (45.7%) agreeing and only (9%) disagreeing. Furthermore, as the findings of this study indicate, parents also buy science books to use for learning as the results revealed that (79.3%) this implies that the parents are committed to make sure the study environment of their children is conducive by preparing them the necessary resources to use in their studies. If this is true, then it implies that parents create conducive environment at home to encourage daughters to learn science.

Besides the encouragement from the parents, also female students got encouragement from other females who work in the field of science as revealed in the questionnaire results, where (92.1%) agreed to the statement. This implies that role models are also important in providing inspiration to the female students.

However, as indicated in the findings, girls are given more household duties than boys as indicated by (46%) agreeing to the statement and only (35%) disagreeing with the statement. This imply that although parents may want their daughters to take science subjects, may buy books for them and create conducive environment for them, the fact

that girls spend more time in household chores, they may fail to engage in science related activities, which in most cases take time or they may even fail to do assignments at home. All in all, parents in this study support their daughter to take science subjects.

The question that was asked to the parents was:

> "*How do you prepare the home environment for the female students to learn science and mathematics?"*

The following were the responses:

> *"I need to create an environment at home that lends support for science and mathematics learning by providing books and send my child for extra tuition to enhance students' achievement in science subjects and mathematics"* (Guardian Benjamin Mkapa secondary school).

> *Sometimes my child comes home very late. It is hard for me to assist her with her homework (parent Buyuni secondary schools)*

> "*I pay for extra classes, I encourage our daughters to read what they learn in class, the study rooms have been established at home and the household works have been reduced*" (Parent Mchikichini secondary)

4.3 The Quality of Secondary School in Promoting Mathematics and Science Related Subjects

The second objective aimed to find out whether the quality of secondary school play any role in promoting mathematics and science related subjects for girls. Questionnaire and interview were used to solicit information from students and teachers' One Hundred and forty (140) students were asked to fill in the questionnaires. Ten science teachers were interviewed on whether the school had well equipped laboratory for supporting students for science and mathematics. Furthermore teachers were interviewed on whether the school's laboratory technician

effectively supported students in learning science subjects, and whether the school had enough teaching materials in supporting mathematics and science related subjects such as text books and science equipments, the school has enough classroom buildings, teachers encourage girls to perform in mathematics and science and the results are as shown Table 4.3.

Table 4.3: The quality of Secondary School in Promoting Mathematics and Science Related Subjects

	Alternatives	**Frequency**	**Percentage**	**Cumulative Percentage**
The school has well equipped laboratory in supporting students learning of science and mathematics	Strongly Disagree	31	22.1	22.1
	Disagree	37	26.4	48.5
	Neither agree nor disagree	14	10.0	58.5
	Agree	33	23.6	82.1
	Strongly Agree	25	17.9	100
The school's laboratory technician effectively supports students in learning science subjects	Strongly Disagree	34	24.3	24.3
	Disagree	14	10.0	34.3
	Neither agree nor disagree	11	7.9	42.1
	Agree	42	30.0	72.1
	Strongly Agree	39	27.9	100
The school has enough teaching materials in supporting mathematics and science related subjects	Strongly Disagree	22	15.7	15.7
	Disagree	32	22.9	38.6
	Neither agree nor disagree	18	12.9	51.4
	Agree	42	30.0	81.4
	Strongly Agree	26	18.6	100

Source: Field data (2014)

About half (48.5%) of the respondents disagreed with the statement that the schools had well equipped laboratories while (41.5%) agreed.

Although the schools had no well-equipped laboratories, most of them had employed laboratory technician hoping that one day their laboratories would be well equipped. The results revealed that (57%) of the respondents agreed with the statement that the school had a laboratory technician, while (34.3%) disagreed as shown in Table 4.3. With regards to the availability of the teaching materials for science and mathematics the results revealed that (48.6%) agreed while (38.6%) of the respondents disagreed while (12.9%) neither agreed nor disagreed as shown in Table 4.3.

The interview with the teachers posed the question on whether the school environment promotes teaching and learning of mathematics and science related subjects. The question posed was: *Does the school environment promote teaching and learning of mathematics and science related subjects?* In response to this the question, several teachers responded.

A teacher from Kisutu seconday had this to say:

> *"The school environment promote mathematics and science subjects as the school has laboratories although sometimes teaching materials and reagents are not available also the large number of the students in a single laboratory is a problem"*

And a teacher at Al-Haramain Secondary School said:

> *"The school has the laboratory for physics, chemistry and biology and has the text books for science and mathematics"*

Teacher at Shaban Robert:

> *"The school has the well equipped laboratories for all the subjects" and functional laboratory technician who supports the students during practical sessions"*

4.4 Ways the Teaching of Mathematics and Science Related Subjects Encourage Girls

This part presents the data for objective 3. This objective aimed to solicit information on the ways the teaching of mathematics and science related subjects in secondary schools encourage girls. Questionnaire and interview were used to gather the data for this objective. Participants were provided with several issues to show the extent to which they agreed or disagreed. These issues were on whether class environment encourage active student participation, teacher encourages questions and discussion during teaching and learning of mathematics and science. In addition teachers were asked whether gives weekly homework, and that students participate in practical work and teaching approaches to teach mathematics and science, and whether girls are encouraged to share their experiences as Table 4.4 shows.

The respondents were of the view that class environment allows active student participation in which case (64.2%) agreed while (15%) neither agreed nor disagreed as shown in the Table 4.4.

Most (82.9%) of the respondents agreed, (17.1%) neither agreed nor disagreed that the teachers encourage questions and discussion as shown in Table 4.4. The respondents also agreed by (67.9%) that the teachers give weekly assignments although (12.9%) disagreed with the statement that the teachers give the weekly assignment shown in Table 4.4. The results revealed that most (67.9%) of the schools encourage assignments as the way of teaching that keeps students in the concept of learning by doing.

Table 4.4: Ways the Teaching of Mathematics and Science Related Subjects Encourage Girls

	Alternatives	Frequency	Percentage	Cumulative Percentage
Class environment allow active participation	Strongly Disagree	8	5.7	5.7
	Disagree	21	15.0	20.7
	Neither agree nor disagree	21	15.0	35.7
	Agree	59	42.1	77.9
	Strongly Agree	31	22.1	100
Teachers encourage questions and discussion	Strongly Disagree	0	0	0
	Disagree	0	0	0
	Neither agree nor disagree	14	10.0	17.1
	Agree	62	44.3	61.4
	Strongly Agree	54	38.6	100
Teachers give weekly homework	Strongly Disagree	9	6.4	6.4
	Disagree	18	12.9	19.3
	Neither agree nor disagree	18	12.9	32.1
	Agree	69	49.3	81.4
	Strongly Agree	26	18.6	100
Students participate in practical work	Strongly Disagree	15	10.7	10.7
	Disagree	18	12.9	23.6
	Neither agree nor disagree	25	17.9	41.4
	Agree	62	44.3	85.7
	Strongly agree	20	14.3	100.0
Teaching approaches in Mathematics and science are participatory	Strongly Disagree	6	4.3	4.3
	Disagree	7	5.0	9.3
	Neither agree nor disagree	32	22.9	32.1
	Agree	61	43.6	75.7
	Strongly agree	34	24.3	100.0

Source: Field data (2014)

The teachers were also of the view that the students participated in the practical work. The results revealed that (58.6%) agreed while (17.9%) neither agreed nor disagreed and (12.9%) disagreed as shown in Table 4.4.

The results revealed that the ways of teaching were in line with the statement that the methods used in teaching science subjects were participatory. The results revealed

that (67.9%) agreed while (22.9%) neither disagreed nor agreed as shown in Table 4.4.

A follow-up interview question stated:

> *"In what ways do you teach mathematics and science related subjects to encourage girls*

A teacher from Buyuni secondary school responded thus:

> *"Due to large number of students and limited number of science teachers, I argue to the government to put in place a teleconference as an option to reduce the workload for few science teachers."*

The researcher had a chance to observe the quality of the schools and classroom teaching and learning. In examining the quality of schools and the ways of teaching mathematics and science subjects, a checklist was used to capture information on quality of schools.

The focus was on the size of class, availability of functional laboratory, availability of reagents, presence of laboratory which can accommodate 45 students, availability of laboratory technician, adequate equipment and supplies for teaching and learning, adequate numbers of qualified teachers for mathematics and science subject.

In relation to the way of teaching science and mathematics the following were examined, class type/methodology, discipline (mathematics or science) and topic of the class session, place in sequence of unit, description of students and makeup of the class, whether demonstration used to present the subject matter, students hands on activities and whether the students were allowed to collaborate in mathematics and science classes.

As regards to the size of the class, (70%) of the rooms observed could accommodate 45-60 students, while (30%) of the observed classrooms were small. Therefore the results imply that the classrooms were big enough to accommodate the students during the teaching and learning.

Most of the schools visited and observed (90%) had laboratories, while (10%) of the schools had no laboratories. This implies that the schools had converted the rooms to be used as laboratories, although when observing the availability of reagents and other supplies it was revealed that (50%) of the observed schools had reagents for Physics, Biology and Chemistry and other supplies while the other (50%) had no reagents nor supplies.

Besides having laboratories - and seemingly having no reagents, the schools had employed laboratory technicians. The results revealed that (70%) of the schools had laboratory technicians while only (30%) of the schools had no laboratory technicians.
The science and mathematics teaching need to be resourced from the laboratories to the human resources and as regards to the adequate numbers of teachers in science and mathematics the results revealed that 60% of the schools had no qualified teachers to teach science and mathematics while (40%) of the schools had enough teachers for science and mathematics teaching and learning.

On the ways of teaching and learning the science and mathematics subjects on class type or methodology as whether the lecture or demonstration were used the results revealed that (100%) of the schools observed were using the lecture and few demonstration as the method of teaching and learning science and mathematics subjects.

Table 4.5: Observation Checklist

Item to Observe	Status
Teaching methodologies generally	Majority were using Lecture discussion and few demonstration methods for practical skills
Quality of classroom interaction	For the private schools were in good quality and environment allows active participation compare to government in which some needs renovation or expansion
Time /percentage in which students are left to use science laboratories	Most of the schools visited and observed (90%) had laboratories while (10%) had no laboratories, Students instructed As per schedule in private schools, whereas for community and some of government schools during the practical examinations due to large number of students and limited number of science teachers
Teacher encouraging girls	In private school teacher encourages questions and discussion during teaching and learning mathematics and science, teacher gives weekly homework, students participate in practical work and teaching approaches to teach mathematics and science are very participatory and girls are encouraged to share their experiences
Quality of Laboratories and equipments	For private schools were having well equipped laboratories for quality science subjects teaching in schools compare to government schools

Source: Field data, (2014)

As regards to whether the students were participating in the practical work in the laboratories, half of the schools (50%) of the students were found hands on activities in the laboratories whereas the other half (50%) were not found hands on activities

on the laboratories due to large number of students and the schools with scarce resources like reagents and other laboratory equipment.

Findings of this study revealed that parents took part in guiding their children to do science subjects - especially by getting involved in their childrens' course of learning and this appeared to be similar to a previous same report by Hari (2001) who argue that parents should be more involved in the academic activities of their children and be more sensitized on the importance of female students involvement in science, mathematics and technology (SMT) subjects. This literature is in line with the findings of this study which found that parents were involved in the education of the parents by creating an enabling environment for the female students to learn science and mathematics related subjects.

In the interview with the parents with regards to the creating conducive learning environment for their children at home, responses reflected that the parents made arrangements for extra classes, encourage their daughters to read what they had learnt in the class, have established the study room at home and further they have tried to reduce the household works.

The results indicated that the parents are doing a lot to ensure that their daughters are successful in doing the science subjects and this will encourage the students to do science and mathematics related courses the vice versa of which may cause the female students to drop the science related courses. The findings of this study are contrary to those of Chinn (2002), who noted that many female students were discouraged by their families from pursuing engineering or science career because

they were considered to be masculine subjects which would lessen their chances of finding a husband and the parents were not taking necessary step to improve the environment for the females to learn science. Therefore if there is such a discouragement it is difficult for the females to do science subjects but if the parents are interested on what the female students are doing it is very easy even to assist in doing the assignments. The literature is in line with the findings that if the females are not encouraged and supported to do science subjects they will never make it through.

The results indicated that respondent's parents understand the importance of taking the female children to school and more relevantly they insist them to do science and mathematics subjects and thus it reflects their understanding of the importance of science in the normal daily life.

Furthermore, results revealed that respondent were being encouraged by their parents to study hard and sometimes they referred them to professionals who would inspire them to do science subjects. Findings of this study appear to be in agreement with those reported by Gibbons (2004) that individuals develop their sense of self-efficacy from personal performance, learning by example, social interactions, and how they feel in a situation. Therefore through the interactions from the professionals in the field they become motivated to do science and mathematics.

Furthermore, the findings of index study indicated that the parents encourage their female students to do science and mathematics subjects as they create the environment at home that encourage them to learn science. These findings are

supported by those of Hari (2001) where it was noted that the parents' involvement and encouragement leads to the female students to do science and mathematics subjects. This literature is in line with the findings as noted that the parents encourage the female students to do science and mathematics subjects.

In the interview with the parents it was noted that they bought books for their children, encourage them to do self-studies and study hard, inspect their books and they also referred them to professionals for advice. Hari (2001), noted that the parents should be more involved in the academic activities of their children and be given more sensitization on the importance of female students involvement in science, mathematics and technology (SMT) subjects.

Therefore, this kind of involvement is the one that has motivated more female students to do mathematics and science subjects. In this case, the parents focused more on encouragement - example in buying books. However, encouragement to learn Science and Mathematics is not based on material things but also on the cognitive encourage whereby parents encourage their female by settling their minds in order to learn science and mathematics subjects.

The finding of this study indicated that a majority of the respondents didn't get enough time to prepare for homework or even for studying on their own as most of the time was spent on doing household chores compared to their male counterpart who are likely to spend all their day doing school-related activities. This was also reflected by the respondents in the questionnaires as follows: "Males are more free and do not carry out household duties". These findings are supported by those of

Hari (2001) which indicated that parents and community attitudes mainly discourage female students from taking science and mathematics subjects because - as per African traditions and culture, girls are expected to exclusively assume the roles of their mothers by performing a lot of domestic works after school and given little time to do class works. This makes it difficult for women to excel in science subjects as they don't get much time for their studies.

These findings imply that parents are committed to ensure that study environment of their children is conducive by preparing the necessary resources for use in their studies.

In the interview with the parents, it was noted that parents buy books for their children and showing that the parents are ready to be involved in their childrens' mathematics and science learning process. These findings are supported by those obtained by Hari, (2001) which showed that the parents should be involved in the education of their children - and buying them books is one aspect of being involved and shows high involvement. But because the female students do not get enough time to study when at home, there is a need to reduce the duties so that they become more active in reading the books that are being bought by the parents.

These findings also showed that role models can inspire female students' .For example, in environments where there are many female engineers, children will be inspired to take same subjects. This can be supported by the cognitive map occupations; the individuals tend to make sense of occupational images by putting them into a map of social standing of the particular occupations along the dimensions

of sex type (masculinity and femininity), prestige level and field of work. Individuals then identify the occupations they most prefer by assessing the compatibility of different occupations with the images they have developed about such occupations. Therefore, if a person has already selected the certain type of occupation, then the subjects chosen in her study will always reflect her choice (Gottfredson, 1996). Therefore this will automatically sort students accordingly and then if there are a lot of female role models who did science and are very successful then most of the female students will opt science and mathematics.

The findings of this study also showed that the schools had no well-equipped laboratories for teaching and learning of science subjects. This finding were also in agreement with the findings done by Msegeya (2009) which showed that in most of the schools, science lessons were taught through the lecture method, and practical work which was crucial for understanding scientific concepts, was rarely done.

And also during the observation and the interview with the teachers, it appeared that most of the public schools were lacking laboratories for the science practical and most of them had only one laboratory for both Chemistry, Biology and Physics and that one was not equipped, but to some extent the private schools were more equipped compared to the public schools most of them had two to three laboratories for teaching and learning science subjects for instance Shaban Robert Secondary school had three laboratories for biology, physics and chemistry. Osaki (2000), the good school to provide the quality education in science must have appropriate and safe physical facilities (buildings) that (are well furnished and resourced in order to support effective teaching. This suggests the availability of good laboratories to support learning and

when there are good resources it is possible that the interest of the students on science subjects will be high too.

The result implies that most of the schools wanted to maintain the standard requirements of having the well-equipped laboratories and the technicians to take care of the chemicals and equipments. During the observation and interview in the schools the researcher managed to see and discuss with the laboratory technicians and most of them stressed the need of the well-equipped laboratories for quality science subjects teaching in schools.

Furthermore, in the interview with the teachers, they noted that many of the schools had one laboratory for the three subjects - that is, biology, chemistry and physics and also that there were no enough chemicals and other necessary supplies. Their suggestion match those of Maina, (2009) who suggested that there is a need to strengthen learning environment of science in secondary schools by improving teachers' motivation and employing laboratory technicians. Therefore, the results suggested that he efforts are being made to improve science and mathematics learning and that schools are set to improve the quality of the schools by having the resources used in teaching and learning also this was seen during the observation many schools had the libraries and some books of science and mathematics that are relevant for teaching and learning. Although there were some of the schools that had problems in having these materials and thus being in line with the findings of William (2008) who found out that schools have inadequate science teaching and learning materials and therefore recommended the government to invest more in the

teaching materials for the science subjects which will further motivate students to do science and mathematics related subjects.

This showed that class teaching and learning environments are conducive as it allows the interaction of the learners and their teachers. This finding goes in line with the suggestion by Samwel (2009) that there is a need for the proper utilization of interactive teaching method that will promote understanding of mathematics literacy components among pupils. Therefore it is important for the class environment to be conducive and interactive for the learning of science as it will allow more understanding of the concepts of science and mathematics. The teachers were interviewed on the ways of teaching and learning takes place and noted that the class environment has allow active participation of the students and further by stating the ways in which the active learning can be enhanced by making student seating comfortable. They also were developing a strong friendly relationship with the learners so that students feel free to participate in the learning process through making eye contact with them individually, move around the room, or sit in different locations. Samwel, (2009) noted that there is a need for the proper utilization of interactive teaching method that will promote understanding of mathematics literacy components among pupils. The findings above are in line with the cited literature as they encourage the learning process to take place in the learning environment that allows active participation.

The results indicated that the teachers have the highest level of interaction with the students, the character that attracts many of the students to do science and mathematics subjects and further selects the science related carriers. In the interview

with the teachers it was noted that they use the demonstration, experimentation and the group works all of which allow the interaction between the students and the teachers.

Kira, (2009) suggested that teachers should plan for both oral and written questions well in advance as a means of motivating both active and less active students in order to improve their learning behavior. The questioning in the classroom encourages the active participation for both active and less active students and therefore will lead to the students liking the subjects being taught in the interactive and more participatory way.

The teachers were interviewed on the ways of teaching was and noted that the teachers encourage the questions and discussions while in the classroom by encouraging the range of ideas from the students and listening to them and then speaking from the experience and literature what is the right argument to be taken on board and then avoiding to dominate the discussions.

This shows that during the discussions the teachers act as inspire or the referee by looking at the perspectives from the learners and then saying what is to be taken on board and therefore this type of learning makes the learners feel that the class is theirs and it brings more comfort ability and understanding of the concepts taught. As suggested in Kira (2009) this type of learning by encouraging questions and discussions motivates the learners to change their behavior towards learning and therefore the findings is in line with the literature as the they stipulate that allowing the interaction through questions and discussions motivates the learners to learn.

In the interview with the teachers on the ways of teaching it was noted that many of the teachers stressed the importance of the homework in the student learning especially for students who initially perform poorly in the process of learning. According to Grodner and Rupp, (2011) the homework motivates slow learners to learn and therefore it is very basic for the teachers to give homework in order to assist the learners to improve.

This finding indicated that students were participating in the learning as they performed practical with regards to science subjects. In contract, in a study done by Msegeya, (2009) noted that inadequate practical work made science learning difficult, and therefore this leads to the small number of the students taking up science subjects. This literature points out the importance of practical work in the learning of science and mathematics and this was also noted in the findings as they revealed that the participation of the students in the practical work makes it easy for them to easily conceptualize, the theoretical concepts learned in class.

In the interview with the teachers it was revealed that mostly the students were involved in practical during the national examinations sessions and therefore this could explain why the students did not perform well in the science subjects and as noted by Msegeya, (2009) that inadequate practical work made science learning difficult, and therefore this leads to the small number of the students taking up science subjects.

Majority of the teachers interviewed revealed that most of the schools especially public ones had insufficient infrastructure for teaching the science subjects although the teachers are trying to involve them in the process of learning.

In the interview with the teachers it was found that the teachers encouraged the teaching techniques that allowed the students to interact through group discussions, group assignments and presentations. The findings were supported by Samwel, (2009) who use the interactive method to encourage the learning and teaching of science subjects.

Furthermore, through observation, it was found that there were schools that had laboratories that had no reagents and therefore one can wonder how the laboratories without reagents can be motivate science learning.

However, results obtained from this study differ much from those obtained from a study done by Osaki (2000) which indicated that in order for a school to provide quality education in science, it must have appropriate and safe physical facilities (buildings) that (are well furnished and resourced in order to support effective teaching. This result imposes many questions with relation to the quality of the students that can be produced in science and mathematics as the learning environment is not supportive Finding of the current study differ from those obtained from study done by Osaki, (2000) which revealed that in order school to provide the quality education in science must have qualified teachers to teach science and mathematics and thus short of that science and mathematics teaching and learning cannot be at required quality.

The finding of this study implies that the methodology used was not participatory and thus could be in one way discouraging the science and mathematics learning although it was backed by demonstration that may help to cement the concepts

learned in class. The findings are in contrast with those of Samwel (2009) who suggested the use of the interactive methods to encourage the learning and teaching of science subjects. Similarly, a study done by Msegeya (2009), noted that inadequate practical work made science learning difficult, and therefore this leads to the small number of the students taking up science subjects.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the summary, conclusion and recommendations on determinants of mathematics and science career choices among secondary school female students.

5.2 Summary of the Findings

The study covered the determinants of mathematics and science career choices among secondary school female students in Ilala district Dar es Salaam region, three objectives were examined that is the home environment in promoting mathematics and science related activities for girls, the quality of secondary school in promoting mathematics and science related subjects and the ways the teaching of mathematics and science related subjects in secondary schools encourage girls. The background of the study covered different perspectives with regards to the determinants of mathematics and science choices among female students. Theory of self efficacy, social cognitive theory and the Gottfredson's Theory of Circumscription and Compromise were used to frame this study, while the empirical literature covered the issues of related literature to establish a benchmark against which the researcher could make a comparison and find a gap that could be filled by the current study.

This study employed descriptive research design to describe the home, school and classroom environments for teaching science and mathematics to female students.

The study involved more than half of the respondents whose ages are expected to be within the range according to the government policy with regards to secondary education in Tanzania.

5.3 Conclusion

The government is keen to promote mathematics and science subjects and careers, and school managers play a vital role in ensuring that female students are equipped with the relevant, high quality science vocational skills required to ensure government businesses are productive and competitive.

On the whole, it is expected that demand from female for science and mathematics provision will increase as these career choice and skills are perceived to be in demand by employers and lead to employment.

The desire of the female students to take up science and mathematics subjects and later related carriers has been very low and thus attracting the attention of the learned community to think on what is really going wrong on this and thus the respondents were able to give their views without any hesitation.

5.4 Recommendations

Based on this findings it is recommended that

(i) The government and the school managers should invest in constructing and equipping the laboratories so as to attract more female students and especially females to do science subjects.

(ii) Mass media such as radio, television and newspapers should be used to sensitize parents and communities about the importance of science and mathematics to females and their daughters.

(iii) The Local government should instruct all the primary and secondary schools to form Parents Teachers Associations to discuss ways to socialize females to science related subject. Moreover, local government should see to it that communities to form mothers unions and support female role models who had succeeded in science and mathematics based careers to address and sensitize parents and communities on the importance of girls' education and their participation in science and mathematics related subjects and career.

5.6 Areas of Further Study

The study covered only the female students. Therefore the same study can be conducted looking at the factors that favour the male students to dominate in the science and mathematics related subjects and carriers. Another study can be done on the same subject by doing the comparative analysis between the females in the rural areas and those in urban centers and their motivation to do the science and mathematics subjects.

5.7 Implication for Research

Since both the parents and teachers were positive about the capabilities of females to pursue science, further studies should be undertaken in order to illuminate the question of whether home environment and teachers' attitudes towards the potentials of female students to pursue science subjects have changed or not.

In education, further studies are required to look at the factors that favors the male students to dominate in the science and mathematics related subjects and careers but also another study can be done on the same subject but doing the comparative analysis between the females in the rural areas and those in urban centers and their motivation to do the science and mathematics subjects.

REFERENCES

Abbott, P. (2010). Girls into Science and Technology, Kigali, Kigali Institute of Education.

Australian Government (2013) Career Development, accessed from http://deewr.gov.au/career-development on 18/07/2013.

Babbie E (1992) the practice of social research (6th ed), London, Wadsworth Publishers.

Baker Y (2013) Open letter to science, technology, engineering and maths teachers: what's next for Stem? http://www.theguardian.com/teacher-network/advertisement-features/stem-open-letter-science-technology-engineering-maths-teacher. On 18th October 2013.

Bandura A (1986). Social Foundations of Thought and Action: A social cognitive Approach, Englewood Cliffs, Prentice- Hall Inc.

Bandura, A. Barbaranelli, C., Caprara, G.,& Pastorelli, C. (2001). Self-efficacy beliefs as Aspirations and Carrier trajectories. Child Development, 72 187-206.

Becker, K. and Park, K.; (2011). Effects of integrative approaches among STEM subjects on students' learning, Journal of STEM Education 12, July – September Childhood Development" sponsored by the World Bank, Washington, D.C., April, 2000.

Bisanz et al (2009). Home Numeracy Experiences and Children's Math Performance in the Early School Years, *Canadian Journal of Behavioural Science*, Vol. 41, No. 2, 55–66, Canadian Psychological Association, Canada.

Chinn, P. W. U. (2002). Asian and Pacific Islander women scientists and engineers: A narrative exploration of model minority, gender, and racial stereotypes. *Journal of Research in Science Teaching, 39,* 302-323.

Churchhill G.A (1996). The Marketing Research: Methodological foundations, The Dryden Press International Edition.

Cohen C, Patterson D.G , Kovarik D. N and Chowning J.T (2012), Fostering STEM Career Awareness: Emerging Opportunities for Teachers, Cohen Research and Evaluation LL.C, University of Washington.

Collins, J (2012) Supporting Women in Science and Technology Subjects, http://www.topuniversities.com/courses/engineering/supporting-women-science-technology-subjects at 1037hours on 30th September, 2013.

De Bruin G.P (1999) Social Cognitive career theory as an explanatory model for career counseling in South Africa. In Stead G.B and Watson M.B (Eds) Career Psychology in South African Context, Pretoria: Van Schaik.

Dugger, W.E (2011). Evolution of STEM in the United States, International Technology and Engineering Educators Association edition, Boston: Pearson Education, Inc.

Elliot, R., Strenta, A. C., Adair, R., Matier, M., & Scott, J. (1996). The role of ethnicity in choosing and leaving science in highly selective institutions. *Research in Higher Education, 37,* 681-709 Engineering: Implications for teachers, school counselors, and parents. Teachers College Record, 108(2), 246-266.

Fitzgerald L.F, Fassinger R.E and Betz N.E (1995). Theoretical Advances in the Study of women's carer development, New Jersey, Erlbaum Associates Inc Publishers.

Foster V.X.N (2005). Career aspirations of female engineering students at FET institution, M.A Dissertation, University of South Africa.

Gibbons, M.M. (2004). Prospective first-generation college students: Meeting their expectations.

Gottfredson L.S (1996) Gottfredson's theory of circumscription and compromise. In Brown D, Brooks L and Associates (4th Ed) Career Choice and Development, San Fransisco Jossey- Bass Inc Publishers.

Grandy, J. (1998). Persistence in science of high-ability minority students: Results of a longitudinal study. *The Journal of Higher Education, 69*, 589-620.

Hackett, G., Betz, N., Cases, J. M., & Rocha-Singh, I. A. (1992). Gender, ethnicity, and socialcognitive factors predicting the academic achievement of students in engineering [Electronic version]. *Journal of Counseling Psychology, 39*, 527-538.

Haderson S, Hesketh B and Tuffin K (1988). A test of Gottfredson's theory of circumscription, Journal of Vocational Behaviuor 32, 37-48.

Hamilton M, Mahera W, Mateng'e F and Machumu M (2010). A Study on Needs Assessment of Tanzania Science Education, Dar es Salaam, ESRF

HarrisonT G and White E L (2012). in the study in UK Schools Students' attitudes towards science and potential science based careers, Acta Didactica Napocensia vol 5 no.4 2012.

Hewitt, J. (2010). Factors influencing career choice.Cited from www.ehow.com

HMSO, (2004). 'Science and Innovation Investment Framework 2004-2014', July, ISBN: 1-84532-031-X

Huang, G., Taddese, N., Walter, E., & Peng, S. S. (2000). *Entry and persistence of women and minorities in college science and engineering education* (NCES 2000-601). Washington, DC: National Center for Education Statistics.

Johnson, A. (2001). Women, race, and science: The academic experiences of twenty women of color with a passion for science. Dissertation Abstracts International, 62 (02), 428. (UMI No. 3005063).

Jugde E (2013). We need a collective effort to help women stick with Stem, http://careers.theguardian.com/collective-effort-women-stick-stem at 1100hours on 30th September, 2013.

Kagi A.K (2009). A Study On Girls' Participation In Science Education In Tanzania: A Focus On The Teaching Of Chemistry In Selected Secondary Schools In Tanga Region Master Of Arts (Education) Dissertation, University Of Dar es Salaam.

Kerka, S. (2000). Career development, gender, race and class. Eric clearing house on Adult Careed and Vocational Education Columbus. ED 421641.

Kerlinger F.N (1969). Foundation of Behavioural Research, New York, Holt, Renehart and Winston.

Grodner A and Rupp N (2011). the Role of Homework on Student Learning Outcomes: Evidence from a Field Experiment, East Carolina University, New York.

Kira E.S (2009). Study on Teachers' Questioning Techniques in Advanced Level Chemistry Lessons Master of Science Education (2nd Ed) Dissertation, University of Dar Es Salaam.

Kombo D.S and Tromp (2006). Proposal and Thesis Writing: An introduction, Paulines Publications Africa, Nairobi.

Kothari, C. R (2014), Research Methodology, Methods and Techniques. (3rd Revised Ed) New Delhi: K.K.

Lent R.W, Brown S.D and Hacket G (1994). Towards a Unifying Social Cognitive Theory of Career and Academic Interests, Choice and Performance (Monograph). Journal of Vocational Behaviour 45.

Lent RW, Brown SD and Hackett G (2002). Social Cognitive Career theory. In Duane Brown and Associates. Career choice and Development (4th ed). San Francisco: Jersey- Bass.

Leslie, L. L., McClure, G. T., & Oaxaca, R. L. (1998). Women and minorities in science and engineering: A life sequence analysis [Electronic version]. The Journal of Higher Education, 69, 239-276.

Lihaya H.S.J (2009). the Perceived Influence of Pre-Service –Short Term Trained Teachers on Students' Interest In Science Subjects: A Case Study of Selected Community Secondary Schools in Mufindi District Iringa Region MED (Science) Dissertation, University ef Dar es Salaam.

Maarifa ni Ufunguo (2002). Financing Education in Kilimanjaro: The Story Continues.

Maina K.A (2009). The Analysis of Teaching Chemistry In Ordinary Level Secondary schools For Performance Improvement A Case Study In Coast Region, Master of Education (Science Education) Dissertation, University of Dar es Salaam.

Masanja V and Butare H (2010). Increasing Women's Participation in Science, Mathematics and Technology Education and Employment in Africa, Expert group meeting in Gender, science and technology, 28 September - 1 October 2010, Paris.

Msegeya S (2009). Factors Affecting Female Students' Enrollment in Science Subjects at Advanced Secondary Education in Selected Schools in Kilimanjaro Region, Tanzania, Master of Arts (Education), Dissertation, University Of Dar Es Salaam.

Mushi P (1996) Tanzania Secondary School Science Teachers Perception and Reaction to Gender Difference in Performance in Science, UTAFTTI (New Series) Vol. 3 NQ. 2, 1996:91-130.

Mvungi, F (2009). School Based Factors Influencing Science Students' Choice of teaching Science as a Career: The Case of Government Secondary Schools in Ilala District, Dar es Salaam Region, Master of Education (Science), Dissertation, University of Dar es Salaam.

Nasta K. A (2007). Influence of Career Self efficacy Beliefs on Career Exploration Behaviors, Master of Science In Mental Health Counseling. The State University of New York At New Paltz.

NBS (2011). Tanzania Demographic and Health Survey 2010", National Bureau of Statistics, Dar es Salaam, published April 2011. needs through social cognitive career theory. Professional School Counseling, 8,

Neuman, WL. (2006). Social research methods: qualitative and quantitative approaches. 6th.

Neuman, WL. 2007. Basics of social research: qualitative and quantitative approaches. 2nd.

Office of Science and Technology Policy, (2013), Women in Science, http://www.whitehouse.gov/administration/eop/ostp/women at 1016hours on 30th September, 2013.

Orodho A.J (2003), Essentials of education and social sciences Research Methods,Nairobi, Masola Publishers.

Orodho A.J and Kombo (2002), Research Methods, Nairobi, Kenyatta University Institute of Open Learning.

Osaki K.M (2000). Quality of education in Tanzania: A focus on curriculum, Standards and accountability in schools, Headmsters conference on education 11-12 October, 2000 at Arusha International Conference Centre.

Osborne,J., Simon, S.& Collins, S. (2003). Attitude towards science: a review of the literature and its implications. International Journal of Science Education, 25 (9), 1049-1079.outcomes in Latin America. Paper presented at the "Year 2000 Conference of Early.

Perry N and VanZandt Z (2006). Focus on the Future: A Career Development Curriculum for Secondary School Students, University of Southern Maine Lewisto.

Psychology Dictionary (2013). World's Most Comprehensive Online Psychology Dictionary: http://psychologydictionary.org/career-choice/#ixzz2hs2RMMXy.

Richardson A. R (2008). an Examination of Teacher Qualifications and Student Achievement in Mathematics, A dissertation submitted for the award of the Doctorate Degree, Alabama State University.

Schiebinger L (2010). Gender, Science and Technology Expert group meeting in Gender, science and technology, 28 September - 1 October 2010, Paris.

Sebastian M (2009). Motivation for Girls to Study Physics at Advanced Secondary School Level in Tanzania: The Case of Dar Es Salaam and Coast Regions, Master of Education (Science Education) Dissertation, University of Dar es Salaam.

Swai, E. V. (2006). Gender, Feminism and Lifelong Learning in Africa. In Moses Oketch and Maurice Amutabi (eds.), Studies in Lifelong Learning In Africa: From Ethnic Traditions to Technological Innovations Mellen Press, 978-0-7734-4757-8.

Hari P (2001). parents' and community attitudes towards girls' participation in and access to education and science, mathematics and technology (SMT) subjects, FAWE, Nairobi.

Stead G.B and Watson M.B (1999). Introduction to career education and information technology. In Stead G.B and Watson M.B (Eds) Career Psychology in South African Context, Pretoria: Van Schaik.

Taylor N.B and R.G.L (1985). Exploring the process of compromise in career decision making, Journal of Vocational Behaviuor 27, 171-190.

Taylor, B, Kermode, S & Roberts, K (2007). (3rd ed) Research in nursing and health care: evidence for practice Australia, Thompson.

URT (1996) the National Science and Technology Policy for Tanzania United Republic of Tanzania, Dar es Salaam, Government Printers.

Vogt, K. E. (2005). Asian American women in science, engineering, and mathematics: Background contextual and college environment influences on self-efficacy and academic achievement. Dissertation Abstracts International, 66 (12), 4324. (UMI No. 3202039).

Weaver, K. & Olson, J.K. (2007). Understanding paradigms used for nursing research (a reprint from Journal of Advanced Nursing, Perspectives on Nursing Theory (5th Edition) PA: Lippincott Williams & Wilkins, Philadelphia

William U (2008). Activity Based Teaching And Learning and Its Contribution to Understanding of Physics Concepts in Tanzania Secondary Schools a Case of Advanced Level Physics, Master of Education (Science Education) Dissertation, University of Dar es Salaam.

Willms, J. D. (2000). Standards of care: Investments to improve children's educational.

APPENDICES

Appendix 1: Questionnaire for Secondary School Students

Instructions

1. Please do not write your name in this questionnaire
2. Indicate your response by a tick (√) or provide the information required in the space provided.
3. Kindly answer all questions

Introduction

The purpose of this questionnaire is to seek your opinions on Determinants of Mathematics and science choices among secondary school female students**.** The questionnaire has two sections. This report is for the completion of my Master Degree in Educational Administration, Planning and Policy Studies: (Med –Apps). The information being gathered will be confidential and used solely for academic purpose and not otherwise. There will be no compensation for participation. Please respond to enable the researcher to attain the intended objectives. You are begged to sign before responding to verify your consent.

Section 1: Demographic data

1. Name of the school……..(to be filled by the researcher)

2. Your sex: (Tick one)

    1. Female
    2. Male

3. Ownership of the school

    1. Public
    2. Private

4. Age group of the respondent in years

    a) 13-16

b) 17-19

d) 20-23

e)Above 24

6. Which Class are you?

1. Form III
2. Form IV

8. What do you desire to be in future (occupation) ……

9. Level of education of your father……..

10. Level of education of your mother……..

11. Occupation of your father……..

12. Occupation of your mother……

Section 2: Specific Data on Determinants of Mathematics and science choices among secondary school female students

Kindly tick the appropriate response on how the home environment is promoting mathematics and science related activities for girls

1-Strongly Disagree, 2- Disagree, 3- Neither Disagree nor Agree, 4-Agree and 5-Strongly Agree

No.	Responses	1	2	3	4	5
a	Parents can assist in doing the mathematics and science homework					
b	Parents think that it is important to learn mathematics and science subjects					
c	Parents encourage to learn mathematics and science at home					
d	Because of household duties girls do not have enough time for homework					
e	Parents buy science and mathematics books					
f	Parents want me do mathematics and science subjects					

g	I like to be like someone who works in the field related to mathematics and science					
h	Parents influenced me to join mathematics and science subjects					
i	Parents can pay for the school fees					
j	The society supports the girls to choose mathematics and science					

Kindly tick the appropriate response on the following about quality of secondary school in promoting mathematics and science related subjects

1-Strongly Disagree, 2- Disagree, 3- Neither Disagree nor Agree, 4-Agree and 5-Strongly Agreed.

No.	**Responses**	**1**	**2**	**3**	**4**	**5**
a	The school has enough science teachers					
b	The school has well equipped laboratory in supporting students learning of science and mathematics					
c	The school's laboratory technician effectively supports students in learning science subjects					
d	Every student gets a desk to seat on during teaching and learning					
e	The school has enough teaching materials for example text books and science equipments					
f	The school has enough classroom buildings					
g	The school has enough teaching materials in supporting mathematics and science related subjects					
h	There are enough female science teachers who are role models					

Ways the teaching of mathematics and science related subjects in secondary schools encourage girls.

No	Responses	1	2	3	4	5
a	Class environment allow active participation during teaching and learning					
b	Teacher encourages questions and discussion during teaching and learning mathematics and science					
c	Teacher gives weekly homework					
d	Students participate in practical work					
e	Teaching approaches to teach mathematics and science are very participatory and girls are encouraged to share their experiences					

Thank you for participation

Appendix 2: Questionnaire for Secondary School Teachers

Instructions

1. Please do not write your name in this questionnaire
2. Indicate your response by a tick (√) or provide the information required in the space provided.
3. Kindly answer all questions

Introduction

The purpose of this questionnaire is to seek your opinions on determinants of mathematics and science choices among secondary school female students**.** The questionnaire has two sections. This report is for the completion of my Master Degree in Educational Administration, Planning and Policy Studies: (Med –Apps). The information being gathered will be confidential and used solely for academic purpose and not otherwise. There will be no compensation for participation. Please respond to enable the researcher to attain the intended objectives. You are begged to sign before responding to verify your consent.

Section 1: Demographic Data

1. Name of school.....
2. Your sex: (Tick one)
    1. Female
    2. Male
3. Number of years in teaching
    1. 0-1 year

2. 2-5 years
3. 6-10 years
4. More than 10 years

4. Your academic qualifications: (Tick the appropriate number)

1. Diploma
2. Degree
3. Postgraduate Diploma
4. Master degree
5. Other (Specify).....

6. Name of institution where you obtained this qualification.....

7. What classes do you teach?

3. Form III
4. Form IV

8. What subjects do you teach?

1. Chemistry
2. Physics
3. Mathematics
4. Biology

9. Teaching load per week

1. Chemistry…….
2. Physics…….
3. Mathematics……..
4. Biology……..

Section 2: Specific data on determinants of mathematics and science career choices among secondary school female students

1. How can the school environment promote mathematics and science related subjects for girls in secondary schools

……

……

2. Does the school have adequate environment that promote teaching and learning of mathematics and science related subjects……
……
……

3. What ways do you use in teaching of mathematics and science related subjects in secondary schools to encourage girls……
……
……
……
……

Thank you for your participation

Appendix 3: Questionnaire for Secondary School Parents

Instructions

1. Please do not write your name in this questionnaire
2. Indicate your response by a tick (√) or provide the information required in the space provided.
3. Kindly answer all questions

Introduction

The purpose of this questionnaire is to seek your opinions on Determinants of Mathematics and science choices among secondary school female students**.** The questionnaire has two sections. This report is for the completion of my Master Degree in Educational Administration, Planning and Policy Studies: (Med –Apps). The information being gathered will be confidential and used solely for academic purpose and not otherwise. There will be no compensation for participation. Please respond to enable the researcher to attain the intended objectives. You are begged to sign before responding to verify your consent.

Section 1: Demographic data

1. Which school does your child study.....

2. Your sex: (Tick one)
    1. Female
    2. Male

4. Your academic qualifications: (Tick the appropriate number)
    1. Diploma
    2. Degree

3. Postgraduate Diploma

4. Master degree

5. Other (Specify).....

6. Age in years……

7. How do you prepare the home environment for the female students to learn science and mathematics……
……
……
……
……

Thank you for your participation

Appendix 4: Observation Checklist

Date _____Time_____ school_____

Listed below are observable characteristics of effective teaching and learning mathematics and science. The observer should check the appropriate blank: YES, NO, NI (needs improvement), NA (not applicable).

	OBSERVABLE CHARACTERISTICS	**YES**	**NO**	**NI**	**NA**
	Quality of the school				
	Size of class: Public vs. private institution Important constraints (e.g., room size, seating arrangement, equipment limitations)				
	Availability of functional laboratory				
	Availability of reagents/chemical				
	Presence of laboratory to accommodate 45 students				
	Availability of laboratory technician				
	Adequate equipment and supplies for teaching and learning				
	Adequate numbers of qualified teachers for mathematics and science subject				
	Ways of teaching mathematics and science subjects				
	Class type/methodology (e.g. lecture, lab, demonstration)				
	Discipline (mathematics/science) and topic of the class session				

	Place in sequence of unit (e.g. introduction, ongoing, review)				
	Description of students and makeup of the class (e.g., school majors)				
	Demonstration used to represent the subject matter				
	Students hands on activities				
	Allows students to collaborate in mathematics and science classes, shared points of view, and were encouraged to evaluate their own thinking.				

COMMENTS:

Areas of strength and originality:

_____

_____

_____

Areas for further development:

_____

_____

_____

Observer Date_____

Instructor's Signature Date_____

Appendix 5: Permission Letter

THE OPEN UNIVERSITY OF TANZANIA
FACULTY OF EDUCATION

Mary Chuwa
School of Nurse Teachers
P.O.Box 65004
Dar es Salaam
E-mail: mchuwaus@yahoo.com
December, 2013

The Director of Postgraduate Studies
Faculty of Education
The Open University of Tanzania

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH ON ASSESSING THE DETERMINANTS OF MATHEMATICS AND SCIENCE CAREER CHOICES AMONG SECONDARY SCHOOL FEMALE STUDENTS IN ILALA DISTRICT DAR ES SALAAM REGION

Dear Sir/ Madam

Kindly refer the above caption.

I am student registered number HD/E/975/T.13, undertaking Master of Education, Administration, Planning and Policy Studies(MED APPS) evening program at Open University Tanzania.

I am writing to request a permission to conduct a research titled "Determinants of Mathematics and Science Career Choices among Secondary School Female Students in Ilala District"

I am intending to start data collection from February 2014 in Ilala district in random selected secondary schools.

I will appreciate your co operation.

Sincerely,

Mary J. Chuwa

Appendix 6: Consent Form for Both Students and Teachers

DETERMINANTS OF MATHEMATICS AND SCIENCE CAREER CHOICES AMONG SECONDARY SCHOOL FEMALE STUDENTS IN ILALA DISTRICT- DAR ES SALAAM REGION

Consent Form

Dear Participant,

I would like to inform you that I am the researcher from the Open University of Tanzania (OUT) conducting a study to assess the determinants of mathematics and science career choices among secondary school female students in ilala district.

Mathematics and science subjects are keys to socio-economic development and future industrial competitiveness (URT, 1996); this is what drives the government to participate fully in supporting the science related programs and at University level with Tanzania Commission for Universities (TCU), setting the gold standard of full sponsorship for students who do science related subjects.

Mathematics and science subjects are identified as being 'critical' to the future supply of qualified scientific workforce and are of strategic importance to the nation because of the increased competition from rapidly advancing economies around the world (HMSO, 2004).

Besides this effort for both males and females, the criteria for females to join such professions have been setting renitent requirements or setting the pre-entry requirements for instance at the University of Dar es Salaam, the gender related program that was established to assist women to join the engineering courses (Masanja and Butare, 2010).

Despite the efforts that have been made at the secondary to University level to increases the number of female students in mathematics and science and the role of science in development, the number of female students in these courses has remained very little comparing to that of boys, therefore the study will provide knowledge and find out why the uptake of girls in these subjects has not been substantial.

I believe by encouraging and counseling female students among secondary school to join the career in mathematics and science will consequently increasing numbers of female choosing mathematics and science in Tanzania.

How long will the questionnaire and interviews take?

The interview will take about 30 minutes to an hour; for questionnaire and interviews.

Are there advantages or disadvantages involved in taking part?

There are no individual benefits to taking part, but in participating to the joint meetings of secondary school experts in Tanzania, you will help researcher obtain information on the mathematics and science among secondary school female students in the region.

Who will have access to the information I give?

The information you give will be for research purpose only. I will not disclose your identity or use your name in any reports/ publications of the work.

What will happen if I refuse to participate?

Participation to this study is voluntary. You are free to decide if you want to take part or not. If you do agree, you can change your mind at any time. You can refuse to answer and specific questions, or stop the interview at any time. If you choose not to answer a question, stop the interview or even not participate at all in the study, there will not be any adverse consequences for you or your school.

What if I have any question?

If you have any questions, you can ask them during the joint meeting. If you wish to ask question later, you may contact the Principal Investigator Mary Chuwa through the following address.

Muhimbili School of Nurse Teachers

P.O.Box 65004 Dar es Salaam, Tanzania

Tel: +255 22 2151130 or +255 754 469 689

Email address; mchuwaus@yahoo.com

Sharing the results

Findings from this study will be shared with you through another joint meeting and/or in any relevant national level school meetings. After analysis, i shall publish the results in order that other interested people may learn from our experience.

Interviewee's Consent

I have read and understood the a bove information. I have been able to ask questions about it and questions that I have asked have been answered to my satisfaction. I consent voluntarily agree to participate in this study.

Signature of the respondent:……

Respondent's desiignation:……..

Date of signature for consent to participate ……../…….2014

Appendix 7: Research Permit Letter

ILALA MUNICIPAL COUNCIL

ALL LETTERS SHOULD DIRECT TO MUNICIPAL DIRECTOR

P. O. Box 20950
TEL. No: 2128800
2128805
FAX NO. 2121486

Director's office
Ilala Municipal

Ref. No. IMC/LV.3/1/24

06/02/2014

The Head of Schools
Kipata Secondary School
Jangwani Secondary School
Shaban Robert Secondary School
Kisutu Secondary School
zanaki Secondary School
Mchikichini Secondary School
Mvuti Secondary School
B.W. Mkapa Secondary School
Tusiime Secondary School
Al Madasatus Secondary School
DAR ES SALAAM

RE: RESEARCH PERMIT

Refer the above heading.

The aim of this project is to improve female adolescents knowledge about Determinants of Mathematics and Science Career Choices topics.

Kindly assist them to accomplish their objectives by providing them with the information they requires.

T. Mwingwa
For: MUNICIPAL DIRECTOR
ILALA MUNICIPAL

FOR: MUNICIPAL DIRECTOR
ILALA MUNICIPAL COUNCIL

Copy : The Director
Ilala Municipal Council

: The Open University of Tanzania