IMPACTS OF SAND HARVESTING ON EDUCATION IN
KATHIANI DIVISION, KATHIANI DISTRICT, MACHAKOS
COUNTY, KENYA

MUTISO VERONICAH NTHAMBI
E55/CE/11810/08

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DECLARATION

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

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This research project is dedicated to my dear husband Kioko Mutiso, daughter Matilda Mumbua and son Wycliffe Wambua; for their understanding, inspiration and support throughout the course period. I treasure you.

God Bless you.
ACKNOWLEDGMENT

My acknowledgment go to all those individuals and organizations that in one way or another, made it possible for me to access valuable information necessary for organizing and processing this research project. It may not be possible to mention each one of them individually; however, I wish to mention a few of them. Firstly I wish to thank my supervisor’s Prof. Bunyi Grace and Dr. Libese Levi for the necessary guidance during the preparation of the research project. Secondly I wish to acknowledge dear lectures in the school of Education for equipping me with the skills and necessary knowledge during my course period. The newly acquired skills have enabled me to prepare and formulate this Research project.

I acknowledge Masii Girls management and staff for being supportive and allowing me to access their I.T devices. Library staff has also been supportive during the many times I used the library services. I also want to recognize M.ED mates for the encouraging academic atmosphere which was characterized by many class discussions, presentations and experience sharing.
ABSTRACT
The purpose of this study was to investigate the impact of sand harvesting on education development in public primary schools in Kathiani Division. The objectives of the study included finding out the extent to which sand harvesting affects school participation, performance, the environment which indirectly supports learning of boys and girls, and establishing ways through which sand harvesting activities can be carried out to promote education development. Public primary schools in Kathiani Division have been recording declining education standards in terms of poor performance, low enrolment and retention rates and therefore it was necessary to carry out a study to establish whether sand harvesting is also a contributor to this trend. The study was based on the classical liberal theory of equal opportunity and adopted a survey design to investigate ways in which sand harvesting (dependent variable) impacts on participation rates and performance (dependent variables). The study targeted 2 education zones with 43 primary schools, 17,094 pupils, 2 local administrators, 2 education officers, 10 head teachers and 20 class teachers from which a sample of 10 head teachers, 10 class teachers, 80 pupils, 2 local administration officer and 2 education officer was selected. Data collection instruments were questionnaires and interview guides. A pilot study was conducted whose findings were used to determine the validity and reliability of the instruments. Content validity of the instruments was established through consultation with supervisors. The Pearsons Correlation Coefficient formula was used to calculate reliability of the instruments. Data were analyzed mainly through use of descriptive statistics. In regard to the impacts of sand harvesting on participation rates the findings revealed that 93.8% of public primary schools in Kathiani Division are faced with high rates of school dropout where more boys than girls are dropping out of school. 70.0% of head teachers said this was due to sand harvesting. On the extent to which sand harvesting influences pupils performance 70.0% of head teachers said sand harvesting is contributing to a large extent to poor performance in addition to other vices such as drug abuse as cited by 50.0% of head teachers and indiscipline as indicated by 40.0% of head teachers. All head teachers (100.0%) indicated that pupils who are involved in sand harvesting recorded lower grades in examinations. In view of the impact of sand harvesting on the learning environment the results revealed that it has profound negative effects on the environment ranging from destruction of water sources to soil erosion, and the infrastructure. The study showed that majority of head teachers (71.2%) said that it caused water shortage followed by 55.0% who said it caused sudden drying of rivers and 51.2% said it causes soil erosion. The study finally established that sand harvesting has a number of positive effects on education in terms of enabling parents and pupils to acquire basic needs as cited by 80.0% of head teachers and help in payment of educational levies as well as purchasing educational materials as cited by 62.5% of head teachers. The study recommends that the government and other stakeholder ought to provide bursaries to needy pupils to minimise cases of pupils having to engage in sand harvesting, ensure that under-age children are not used as labourers and ensuring environmental protection by legislating and regulating sand harvesting activities. The study was confined to Kathiani Division of Machakos County leaving out other parts of the country where pupils are also involved in sand harvesting. A similar study should therefore be carried out in other parts of the country.
<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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<tr>
<td>ARR</td>
<td>Apparent Repetition Rate</td>
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<tr>
<td>CDTF</td>
<td>Community Development Trust Fund</td>
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<tr>
<td>ECCDE</td>
<td>Early childhood care and Development</td>
</tr>
<tr>
<td>EMCA</td>
<td>Environmental Management and Co-ordination Act</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>FPE</td>
<td>Free Primary Education</td>
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<tr>
<td>GNP</td>
<td>Gross National Product</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>HRD</td>
<td>Human Resource Development</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organization</td>
</tr>
<tr>
<td>IPEC</td>
<td>International Programme on the Elimination of Child Labour</td>
</tr>
<tr>
<td>IPS</td>
<td>Inter Press Third World News Agency</td>
</tr>
<tr>
<td>K.C.S.E</td>
<td>Kenya Certificate of Secondary Education</td>
</tr>
<tr>
<td>K.I.E</td>
<td>Kenya Institute of Education</td>
</tr>
<tr>
<td>LEAs</td>
<td>Local Education Authority</td>
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<tr>
<td>LDCs</td>
<td>Less Developed Countries</td>
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<tr>
<td>MDGs</td>
<td>Millennium Development Goals</td>
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<tr>
<td>MLA</td>
<td>Monitoring Learning Achievements</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>NCES</td>
<td>National Centre for Education Statistics.</td>
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<td>NYGC</td>
<td>National Youth Gang Centre</td>
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NAEP : National Assessment of Education Progress
NEMA : National Environmental Management Authority
PEN : Poverty Eradication Network
PRSP : Poverty Reduction Strategy Paper
SRB : School Refusal Behaviour
UNICEF : United Nation Children Fund
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGMENT</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>ABBREVIATIONS</td>
<td>vi</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xiii</td>
</tr>
</tbody>
</table>

CHAPTER ONE ........................................... 1

INTRODUCTION ........................................... 1

1.1 Background to the Study .................................. 1
1.2 Statement of the Problem ................................... 5
1.3 Purpose of the Study ....................................... 5
1.4 Specific Objectives ....................................... 5
1.5 Research Questions ....................................... 6
1.6 Significance of the Study .................................. 6
1.7 Scope of the Study ........................................ 7
1.8 Limitations of the Study ................................... 7
1.9 Assumptions of the study .................................. 7
1.10 Theoretical Framework .................................... 8
1.11 Conceptual Framework ..................................... 9
1.12 Definition of Terms ..................................... 10
# CHAPTER TWO

**LITERATURE REVIEW**

2.1 Introduction to Literature Review ........................................... 11
2.2 Concept of child Labour ....................................................... 11
2.3 Sand Harvesting and School Participation ................................. 14
2.4 Sand Harvesting and Performance ........................................... 20
2.5 Sand harvesting and the school learning environment .................. 27
2.6 Summary of the literature review ............................................ 36

# CHAPTER THREE

**RESEARCH METHODOLOGY**

3.1 Introduction ............................................................................. 38
3.2 Research Design ................................................................. 38
  3.2.1 Variables ........................................................................... 39
3.3 Location of the study ............................................................ 39
3.4 Target population ................................................................. 39
3.5 Sample size and Sampling techniques ...................................... 40
  3.5.1 Sample size ....................................................................... 40
  3.5.2 Sampling Techniques ......................................................... 40
3.6 Research Instruments ............................................................ 41
  3.6.1 Head teachers Questionnaire .............................................. 41
  3.6.2 Class Teachers’ Questionnaire ........................................... 41
  3.6.3 pupils’ Questionnaire ....................................................... 41
  3.6.4 Interview Guides .............................................................. 42
3.7 Validity of Instruments .......................................................... 42
3.8 Reliability of Instruments ....................................................... 43
3.9 Pilot study .............................................................................. 44
  3.10 Data collection Techniques ................................................... 44
  3.11 Data Analysis ..................................................................... 45
LIST OF TABLES

Table 4.1: Dropout trends from 2009 to 2011 according to head teachers

Table 4.2: Rate of dropout by gender from 2009 to 2011 according to head teachers

Table 4.3: Head teachers’ views on the causes of drop out

Table 4.4: Pupils’ views on the causes of drop out

Table 4.5: Time of the day they do sand harvesting

Table 4.6: Ways of balancing harvesting and school attendance

Table 4.7: Factors influencing performance

Table 4.8: Comparison in performance

Table 4.9: Negative Effects of sand harvesting on the school environment according to pupils

Table 4.10: Negative Effects of sand harvesting on the school environment according to Class teachers

Table 4.11: Negative Effects of sand harvesting on the school environment according to Head teachers

Table 4.12: Ways through which environmental impact of sand harvesting affects education according to Head teachers

Table 4.13: Positive effect of sand harvesting on education according to class teachers

Table 4.14: Positive effect of sand harvesting on education according to pupils

Table 4.15: Negative effects of sand harvesting on education according to Class Teachers

Table 4.16: Negative effects of sand harvesting on education according to pupils

Table 4.17: Solutions to mitigate negative impacts of sand harvesting according to head teachers

Table 4.18: Solutions to mitigate negative impacts of sand harvesting according to class teachers

Table 4.19: Solutions to mitigate negative impacts of sand harvesting according to pupils
LIST OF FIGURES

Figure 1: Schematic Diagram Showing the Relationships of Independent and Dependent Variables .......................................................... 9

Figure 2: Head teachers experience in years......................................................... 47

Figure 3: Pupils' opinion about dropout cases in schools .................................. 48

Figure 4: Pupils opinion on fellow pupils involved in sand harvesting .............. 53

Figure 5: Number of boys and girls involved in sand harvesting ..................... 54

Figure 6: Number of Pupils involved in sand harvesting according to teachers .... 55

Figure 7: Number of times in a week pupils are involved in sand harvesting ..... 56

Figure 8: Impact of environmental destruction to education according to pupils .... 66
CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Education is a critical child right. Both International community and National legislation seek to promote and protect this fundamental right. However, a number of obstacles come in the way to undermine achievement of universal literacy. One such inhibitor is child labour. In Kathiani Division, it has been shown that child labour takes the form of sand harvesting. Investigation into the impacts of sand harvesting on education is crucial to full understanding of the slow pace of the journey towards universality of primary education in Kenya.

The International Labour Organization (2002), blamed the poor participation in education to child labour since children who are working full time cannot go to school. In addition, the academic achievement of children who combine work and school often suffers. There is a strong tendency for these children to drop out of school and enter into full-time employment. According to Kaunga (2008), reports that the phenomenon of child labour is not new in Kenya and the world over. In most societies it is widely and largely accepted and recognized as the means of mentoring and enabling children to develop certain skills, to prepare them for certain roles in society and learn to be independent. The scenario and circumstances in which child labour happens has changed leading to the demand by World Nations to interrogate and define different notions or facets of child labour. Kaunga (2008) notes that there are now three accepted facets of child labour: child labour, child work and the Worst Forms of Child Labour. Child work is work done by children for purposes of socialisation and normal development under supervision as long as it does not deprive them of their education and other rights.
labour is generally defined as work undertaken by children in the age group of 5-17 that prevents them from attending school and inhibits their general growth and/or development. The worst forms of child labour is labour which takes the form of slavery or bondage, prostitution or pornographic performance, drug trafficking or work which is likely to harm the health, safety or morals of the child (Kaunga, 2008). Generally, the legal and policy environment for enabling children to access and advance their rights has been improved by a number of high-level policies and actions by the Government of Kenya. These include the recent enactment of the Children Act 2001. The Act dictates compulsory education for all children. This has been strengthened by the pronouncement for free primary education in 2003. However, there is no comprehensive strategy to address the question of relevance of the curriculum and the entire education system to indigenous people’s lifestyles. This has to a large extent contributed to low level of participation by indigenous children in the formal education and will continue to hinder their participation and retention in the formal education system. Indigenous child labourers are not, necessarily, benefiting from the free education policy, as the mainstream thinking and policy makers at the national level otherwise assume (Kaunga, 2008).

Sub-Saharan Africa has a large number of working children. United Nations Children's Emergency Fund (UNICEF) estimates approximately 37% of children 5 to 14 years are actively involved in the labour market (UNICEF, 2007). The proportion of children working has continued to rise in the region. Child labour participation rates are highest in East Africa, followed by Central Africa and West Africa. Child labour is characterized by low wages, long hours, and in many cases, physical and sexual abuse (Admassie, 2002; Bass, 2004).
United Nations Children's Fund (UNICEF) (2007), records that 75 million children in Africa were not in school in 2005-2006 period and as many as 90 million children were without access to education. Asia is second with 21 percent followed by Latin America with 17 percent. In Africa, Mali has the highest percentage of working children with 54.4 percent, Burkina Faso with 51.1 percent, Burundi 49 percent, Uganda 45.3 percent and Niger 45.2 percent while Kenya ranks sixth with 41.3 percent. Kaunga (2008) records that the 1998/99 child labour Report estimates that there are about 1.9 million child labourers in Kenya of whom 34% are in commercial agriculture and fisheries, and 23.6% in subsistence agriculture and 17.9% in the domestic sector. The traditional occupations are not well defined and documented that means that child labour among Kenyan pastoralists and hunter-gatherers still remains “invisible” in national records.

The growing number of working children in sub-Saharan Africa had been linked to many factors including, economic stagnation, poverty, war, famine, orphan hood, and the rapid spread of HIV/AIDS (Admassie, 2002; Andvig et al., 2001; Bass, 2004; Bhalotra, 2003; Manda et al., 2003). Many researchers argue that poverty is the main reason children work (Admassie, 2002; Andvig et al., 2001; Baland and Robinson, 2000; Grootaert and Patrinos, 1999; Jensen and Nielsen, 1997; Manda et al., 2003; Patrinos and Psacharopoulos, 1997).

In a 1998 policy paper, the World Bank described child labour as “one of the most devastating consequences of persistent poverty” (Fallon and Tzannatos, 1998). Others blame deficient economic and educational policies for child labor (Hiraoka, 1997; Post, 2002; Weiner, 1991). Despite a growing body of research, there are still many unanswered questions. For example,
what factors account for the wide variation in child labour rates in sub-Saharan Africa? To better understand child labor, more country studies will be needed; Bass (2004) argues, “it is vital to consider how the work of children in one part of Africa is similar to the work of children in another, and to find similarities in their varied contexts that allow us to understand them as a whole” (p. 6).

In Kenya, despite government efforts, poverty has continued to rise, especially in the last 18 years. The government of Kenya estimates that the population living in poverty has risen from about 48.8% in 1990 to about 55.4% in 2001 (Republic of Kenya 2004). Other child labourers who may not be in national records are the sand harvesters in Kathiani Division. Sand harvesting in Kathiani is a practice that affects education both directly and indirectly. In comparison to other Divisions a case in point Iveti Division where sand harvesting is not practiced performance in Kenya Certificate of Primary Education (K.C.P.E) and enrolment in Kathiani Division in the last 5 years consecutively seems to have registered a decline. The researcher therefore sought to establish whether this kind of variation may be associated with impact of sand harvesting in Kathiani Division. PEN, (2009) observes that sand harvesting business is booming due to the growing demand in construction industry, as a result; streams around Machakos, Kangundo, Kathiani, and Mwala are badly affected and the damage done has implication. School going children are forced to trek long distances in search of water for domestic use and their livestock. This could be a major cause of absenteeism and gradual school dropout in the area.
1.2 Statement of the Problem

Schools in Kathiani Division have been recording declining education standards in terms of poor performance and low enrolment and retention rates. According to the Kathiani Education Office KCPE Results analysis, the Division recorded a mean mark of 256.5 in 2006 and 2007, it dropped to 255.9 in 2008, then to 234.23 in 2009 and dropped drastically to 205.3 in 2010. Enrolment rates have also been recording significant decline. In 2006, enrolment rates stood at 2,087 then dropped to 2,077 in 2007, then 2,056 in 2008, 2,044 in 2009 and drastically dropped to 1,929 in 2010. It is against this background that this study investigated whether sand harvesting is a major contributor to this performance and enrolment trends in public primary schools in Kathiani Division.

1.3 Purpose of the Study

The purpose of the study was to investigate the impacts of sand harvesting on education development in Kathiani Division.

1.4 Specific Objectives

The study sought to achieve the following objectives:

1. To find out ways in which sand harvesting affects school participation of boys and girls in Kathiani Division.

2. To determine how sand harvesting affects performance of boys and girls in national examinations in Kathiani Division.

3. To find out how sand harvesting is affecting the school learning environment in Kathiani Division.
4. To identify ways through which sand harvesting activities can be carried out in order to minimize their negative impact on education development.

1.5 Research Questions

The study sought to answer the following research questions:

1. In which ways does sand harvesting affect school participation of boys and girls in Kathiani Division?

2. In what ways does sand harvesting affect performance of boys and girls in national examinations in Kathiani Division?

3. In what ways does sand harvesting affect the school learning environment in Kathiani Division?

4. In which ways can sand harvesting activities be carried out in order to minimize their negative impact on education development in Kathiani Division?

1.6 Significance of the Study

The findings of this study and accompanying recommendations may be useful to diverse stakeholders including; the Ministry of Education who may use it for policy development to curb the menace and pave way for sustainable solution to support educational growth and development; Parents, who may know the dangers of allowing their school going children to indulge in child labour and specifically sand harvesting practice; residents, who may also know the impact of uncontrolled sand harvesting practice on the environment and consequently on their sources of livelihoods; children, who may realize that diverted attention affects their academic work and excellence. The study would also contribute
significantly to professionals and educationists who wish to carryout research on the impact of sand harvesting on education by providing relevant literature.

1.7 Scope of the Study

The scope of this study was on the impact of sand harvesting practice on education development in Kathiani Division, Kathiani District Machakos County. The study focused on schools within the sand harvesting zones; school going children in class seven (7) and eight (8), feasible impact on environment and the community concerns on the sand harvesting practice.

1.8 Limitations of the Study

The limitations of this study were inadequate time to traverse the vast division. Kathiani District is hilly so the rough terrain and limited public transport posed a challenge. The study was limited by the fact that sand harvesting is just one of the factors which influence education development and therefore it was not possible to establish the exact extent to which sand harvesting impact on education in the division. Lack of adequate resources and especially funds was a limitation as the researcher was not able to get a sponsor. However, the researcher did her best to minimize the obstacles posed by these limitations.

1.9 Assumptions of the study

It was assumed that sand harvesting was still going on within Kathiani Division and child labour was in practice and particularly in sand harvesting industry in Kathiani Division. The study also assumed that respondents are knowledgeable of ways in which sand harvesting
impacts on education development. It was lastly assumed that respondents were truthful and gave objective responses to the items in the instruments.

1.10 Theoretical Framework

A theoretical framework brings order, unity and simplicity to what is being investigated (Orodho, 2009). The orientation of this study was on participation rates that should be brought about by equal opportunity in education which is in turn determined by access of and retention in primary education. The study therefore adopts its theoretical framework from classical liberal theory of equal opportunity advanced by Horace Mann (Coombs, 1988).

Classical liberal theory of equal opportunity asserts that each person is born with a given amount of capacity, which to a large extent is inherited and cannot be substantially changed. Thus education system should be designed so as to remove barriers of any nature (socio-economic, gender, geographical and policy) that prevent learners from taking advantage of inborn talents. The theory demands for further going through the education system whose participation would be determined on the basis of individual merits and not socio-economic background, gender, geographical barriers and policies (Coombs, 1988).

According to Coombs (1988), the theory emphasises that through education, every citizen should be given the social status which his/her inborn talents entitles him/her to. The theory further observes that the provision of equity to participation in education guarantees that the run is a fair and just one and that achievements in class are determined by inherited capabilities and the will to use them and not by gender and socio-economic status of the student. This theory is found relevant for this study because by removing barriers that hinder
participation rates in public primary schools, ideal conditions could be created to implement the vision of equal opportunity where everybody has access to the kind and amount of education that suits his/her inherited capacity. This would in return reduce the incidence of dropouts, absenteeism and repetition which impacts negatively on education (Coombs, 1988).

1.11 Conceptual Framework

A conceptual framework refers to a system that provides relationships amongst variables that indicate a logical view of the research problem. The relationship between the variables is summarized in Figure 1.1.

Fig. 1: Schematic Diagram Showing the Relationships of Independent and Dependent Variables

Source: Research 2012
## 1.12 Definition of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Absenteeism</td>
<td>Absence or non attendance</td>
</tr>
<tr>
<td>Academic Performance</td>
<td>Educational presentation or output</td>
</tr>
<tr>
<td>Attrition</td>
<td>Slow destruction, eating away</td>
</tr>
<tr>
<td>Child Labour</td>
<td>Employment of a minor</td>
</tr>
<tr>
<td>Completion</td>
<td>Conclusion or getting to finishing point</td>
</tr>
<tr>
<td>Dependent Variable</td>
<td>Reliant changeable or inconsistent</td>
</tr>
<tr>
<td>Discipline</td>
<td>Obedience or control</td>
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<tr>
<td>Dropout</td>
<td>Withdraw or abandon</td>
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<tr>
<td>Education for All</td>
<td>Schooling intended for everyone:</td>
</tr>
<tr>
<td>Enrolment</td>
<td>Registration or joining</td>
</tr>
<tr>
<td>Environment</td>
<td>Surrounding or neighbouring</td>
</tr>
<tr>
<td>Environmental Degradation</td>
<td>Ecological dilapidation</td>
</tr>
<tr>
<td>Independent Variable</td>
<td>Autonomous, influences other variables</td>
</tr>
<tr>
<td>Participation</td>
<td>Partaking, involvement</td>
</tr>
<tr>
<td>Pedagogy</td>
<td>Instruction</td>
</tr>
<tr>
<td>Plethora</td>
<td>Over abundance or surplus</td>
</tr>
<tr>
<td>Poverty</td>
<td>Deficiency or lack</td>
</tr>
<tr>
<td>Retention</td>
<td>Maintenance or withholding</td>
</tr>
<tr>
<td>Sand harvesting</td>
<td>Scooping of gravel from river basins or ocean</td>
</tr>
<tr>
<td>Truancy</td>
<td>Child does not want to learn</td>
</tr>
</tbody>
</table>
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction to Literature Review
This chapter contains a brief review of literature on the subject proposed for study and is organized under the following sub-headings; concept of child labour, rationale of development of education, critical review and summary of gaps that need to be filled by the study.

2.2 Concept of child Labour
Amma, Baghdellah, Kiondo, Madhi, Mwandayi and Soko (2000) have tried specifically to look at child work in a more detailed way. To them child work covers tasks and activities that are undertaken by children to assist their parents. In particular, such jobs as cooking, washing dishes, weeding, planting, harvesting crops, fetching water and firewood, herding cattle, and babysitting. In this case child work simply aims at tasks and activities which are geared towards the socialization process. Child work is therefore taken and viewed as part of the upbringing process.

However, the meaning of child labour would appear to deviate from that of child work. According to ILO Convention, child labour is as stipulated hereunder: “Children prematurely leading adult lives, normally working long hours for low wages under conditions damaging to their health and to their physical and mental development, sometimes separated from their families, frequently deprived of meaningful educational training opportunities that could open up for them a better future. ILO/IPEC (2001), in a study entitled ‘Focusing on the Worst Forms of Child Labour’ in the Tanzanian context clearly differentiates child labour from child
work. On the one hand, child labour refers to ‘work carried out to the detriment and endangerment of the child, mentally, physically, socially and morally’. To this effect, child labour is characterized by denial of the right of children to education and other opportunities; children’s separation from their families; and poor working conditions that include among others long working hours, poor working environment, heavy work regardless of age and sex; and so on (Lanjouw, and Feder, 2002).

According to Dachi (2000) on the other hand, child work means ‘children’s participation in various types of light work such as helping parents care for the home and the family or working for a few hours after school or during holidays’. In this context, the activities carried out by children do not necessarily deny them their basic rights. More specifically, child work has something to do with making children confident, and contribute to their own wellbeing and that of their families in their respective households. What is difficult to determine is the border line between these two concepts and where acceptable work becomes unacceptable labour (Dachi, 2000). This is often blurred and indistinct. From the afore conceptualization of child labour it is evident that Asia, Africa and Latin America have large number of children whose wellbeing is jeopardized due to hazardous working conditions. This can be evidenced by Tungesvik (2000) whose findings indicate that about 61% of the children who labour are found in Asia, while 32% live in Africa and 7% in Latin-America.

There are a number of explanations regarding the determinants of the supply of child labour at household level. The Survey by ILO/IPEC Tanzania (2001: 12) revealed that:
Declining household income that has made it difficult for parents to meet the basic needs of their children including school requirements; due to economic hardships people are prompted to take care of the nuclear family only, a departure from traditional norms and values which bound the extended family and clan members together; abandoned and neglected children ultimately run away from their homes and end up in different work-sites as labourers’.

Findings by ILO/IPEC Tanzania find support from the study by Masudi, Ishumi and Sambo (2001). The study found economic hardships at household level as the possible explanation underlying child labour in different parts of the country. This implies that, had families wherever they are able to provide their children with all basic needs and beyond, none of the children who suffer from the consequences of child labour today would have jeopardised their physical, moral, mental health and future in general. In search for survival many children find their way into labour markets, which are actually detrimental and dangerous to their wellbeing. To this end, child labour has been continuously depriving children their rights to a number of opportunities including social services such as basic education.

Similarly, Amma, et al (2000), found that the micro-economic factors, which contribute to child labour, and that force households to be suppliers of child labourers include family related factors and household needs. This is very common, for example, in households where parents have died of HIV/AIDS related diseases and where children live with a single parent or guardians who depend on the products of working children. Consequently, this situation forces children to work for money for the survival of the family. In this context, therefore, a child frequently is a breadwinner for the all family. This finds support from the findings by
Tungesvik (2000) which indicate that working children contribute about 40% of the household income that is geared to basic food items. Amma et al (2000) found, that in Kenya children were regarded as a source of livelihood for poor families.

According to Amma et al (2000): ‘...inability of households to meet the basic needs of children (education, food, shelter, and clothes) in most cases forces children to engage in employment in their endeavor to improve their conditions and livelihood’. From this, it is rational to argue that there is a significant relationship between child labour and poverty in most places especially rural areas. Children work because they want, and need, to fill social and economic gaps that exist in their households. Likewise, Tungesvik (2000) also notes that sending children to work can be a survival strategy employed by either parents or guardians in the course of trying to reduce risk of interruption of the income stream within the households. This is very common when households that are normally relatively prosperous, are exposed to diseases, natural disaster and outbreak of wars.

2.3 Sand Harvesting and School Participation

A major factor in the non-participation of children in schooling was found to be the need to prioritise educational investment in a few children, with the subsequent earnings of those not enrolled in school contributing to the household finances. But even for those children enrolled in school, their frequent failure to complete primary education was due to an inability of the children successfully to combine income generation, partly to finance their education, with that of school attendance. The lack of a common terminology has been noted by Baker et al
as one problem when trying to assess and synthesize studies of working children with such terms as 'work' and even 'child' not being agreed upon.

The division between work and labour however is difficult to draw. Working and its impact on access to schooling is also complex. There is the positive side that the working child provides funds that go directly towards his or her schooling costs. Waged work can also be positive in that earnings go into the family budget to enable a sibling to access education according to a family's prioritizing of resources, although this is not necessarily positive for the individual concerned and may well have a built in gender bias. The negative side to the working child and access to education may be that the work done is of such a heavy load or at times that clash with the school timetable that they may not be able to take full advantage of the schooling offered, by being frequently absent, missing parts of the day or being too tired to participate fully in classes and other work (Baker et al, 2001).

According to Baker et al (2001) the distinction between acceptable work and unacceptable labour is that the latter is inappropriate work undertaken by a child that exposes them to physical and/or mental situations hazardous to their health both physical and mental, and to their moral well-being. Work of such a duration that it denies the child their rights to relaxation, play, access to friends and education was also considered to be unacceptable labour.

Lanjouw and Feder (2002), point out that due to social and economic changes over the past 20 years, students have been forced to rethink the value of pursuing education as there are likely to be future disadvantages for students who do not maximize their educational opportunities.
Research suggests that boys and girls who decide to leave school early form an 'exposed' category of young people and that non-completers are likely to become the most vulnerable to economic and social change.

Edmonds (2003) found that boys who are more likely to be 'at risk' of early school leaving demonstrated low school achievement, live in rural or remote areas with a low socio-economic status. The costs of dropping out of high school can have a profound effect on a young person's life. The relative earnings of high school dropouts are lower than for those students who complete high school and/or college. Similarly, high school dropouts experience more unemployment during their work careers. Young women who drop out of high school are more likely to become pregnant at young ages and more likely to become single parents (Shafiq, 2007).

Despite efforts by the Government and NGOs to address primary education there are problems which still persist, and consequently deny some children their basic right to education in some areas countries in Africa. URT (2000), reveals that in Africa, 22.2% of children liable to go to school have not been enrolled, and 34% of the enrolled drop out before completing primary schooling. Likewise, findings by the World Bank (2007) indicate that in Tanzania, although entry rates in primary schools are relatively high, survival rates at the end of the cycle are low. Drop-out is one of the underlying problems that face primary schools. Children also take an average of 9.4 years to finish primary education instead of seven years. Failure to complete primary education is attributed to dropouts and repetition, especially at standard four and only
50% manage to complete grade 7. The reasons for such a poor record of completion are, of course, complex.

Some indications as to what these might be come from other parts of the world, thus according to Carron and Chau (1996), there were two specific factors, which make school attendance irregular in China, Guinea, and Mexico. The factors included children having to help with work inside and away from the house and health problems among pupils, all of which are attributable to poor living conditions within the households. Similarly, Okojie, and Okpokunu (1996), report that in Nigeria school children get engaged in independent work in order to earn money. Although not clearly indicated it could be argued that the money is for personal use and the household survival.

It is evident then that there is a link between children involvement in labour and non-enrolment, dropout, absenteeism and health. In Tanzania too such factors have been noted at the highest level, as The African (2001: 1), quoting president Mkapa, puts it: "...The figure had been established by preliminary data from the first round of the 2000-2001 Child Labour surveys, which suggested that 4.1 million out of 10.2 children of that age were not attending school. Instead, the president said, the children were engaged in economic activities or in housekeeping, a clear indication of rampant child labour in the country.

A number of other recent studies by Kanbargi and Kulkarni (1991), Grootaert and Patrinos (1998), and Nielsen (1998) have looked at the relationship between child work and schooling. However, of these, only Kanbargi and Kulkarni draw any inferences about the effect of work on schooling, concluding that children in Karnataka who work are less likely to attend school
than those who do not work. The other studies simply report them as data that they use to estimate models of the simultaneous decisions about work and schooling, a methodology that is also used by Akabayashi and Psacharopoulos (1999). Such studies tend to show that factors encouraging work generally discourage schooling, which is consistent with a conflict between work and school attendance.

Despite their different approach, it is still possible to describe the basic features of the data they use. Nielsen's (1998) study of Zambia reports a rate of school attendance that is similar to that for Ghana, but a substantially lower rate of child work. However, this low rate of child work is probably due to the design of the survey, which only records a child's work if the child spends more time working than attending school. It is therefore not surprising that few children are shown to combine work and schooling.

Grootaert and Patrinos (1998) report the patterns of child work and school attendance for Côte d'Ivoire, Colombia, urban Bolivia and Philippines. In each case, the surveys are similar to those reported above for Ghana and Pakistan and report child work even if it is not the child's main activity. In Côte d'Ivoire, about 25 per cent of the children attend school without working, about 35 per cent combine work with school, and about 20 per cent concentrated on work. This leaves just over 20 per cent who neither work nor attend. The latter do not provide simple tables relating work to school attendance, but do provide interesting graphs of the negative relationship between hours of work and hours of study at home. Children in urban areas are more likely to concentrate on schooling, and slightly more likely to combine work and schooling, with the consequence that many fewer concentrate on work. Girls are less
likely to concentrate on schooling and more likely to devote themselves to housework. In Colombia, about 80 per cent of urban children concentrate on schooling, 5 per cent combine schooling with work, 5 per cent concentrate on work and 10 per cent do neither.

Education in rural areas is substantially lower, and this is matched by increases in work participation and in those doing neither. Girls are more likely to attend school and less likely to work. They are also more likely to do neither. In urban Bolivia, full-time school attendance is over 90 per cent until the age of 13 years. After that, child work becomes significant, with somewhat more children working full-time than combining work with school. Only about 3 per cent neither work nor attend school, and this is more common for girls. There is little difference between girls and boys in their labour force participation (Grootaert and Patrinos, 1998).

These results confirm the gender aspects of the results from Ghana, Pakistan and Bangladesh. However, they also reinforce the extent of diversity in the patterns of work and school attendance across countries. Côte d'Ivoire appears fairly similar to Ghana in having a substantial number of children combining work and schooling, although it is surprising that urban children (who are, presumably, more likely to work outside the household) are slightly more likely to combine work and schooling. However, Latin America has a higher school enrolment rate and lower work participation than either the African or the Asian countries. This is probably partly due to higher levels of income and partly greater urbanization, with fewer opportunities to work within the household.
Nonetheless, a fair proportion of those who work are also able to attend school (Dustmann, Micklewright, Rajah and Smith, 1996).

Joyce Wagithi Kiruma (2010) in a study investigated factors contributing to school dropout in public primary schools in Mukurueini Division, Nyeri District. The researcher used the ex-post facto design to collect the data. The target population included head teachers, teachers and pupils. The study revealed among factors influencing dropout as most pupils being involved in coffee harvesting activities and failing to turn up in school. This study however did not examine ways in which child labour influences participation in school which the current study has addressed.

2.4 Sand Harvesting and Performance

According to Akabayashi and Psacharopoulos (1999), the possible importance of reduced learning achievement is well recognized as one of the major harmful effects of child work, and this has been reflected in a number of projects around the world that are designed to mitigate this effect. Although child work has a number of other possible harmful effects, including damage to health and psychological development, particular attention has been paid to its educational impact for two reasons. First, education is seen as fundamental to improving the quality of life in developing countries, by lifting the people who are educated out of poverty and by improving the quality of human resources that are available for national economic development. Second, the impact of child work on education is both easily believable (a child that is working cannot be at school or doing homework at the same time) and has been readily quantifiable from household survey data, at least as measured by school attendance.
However, the use of school attendance as a measure of learning achievement is not ideal for estimating the harm that child work causes. On the one hand, it might over estimate the harm of child work, neglecting the part played by poor quality education in many schools in developing countries and the fact that some children may receive an informal education (from work or just daily experiences). On the other hand, it might under-estimate the harm of child work, because children that work as well as go to school may find themselves less able to learn, as a result of exhaustion or insufficient time to complete homework. Therefore, there is a strong case for measuring the effects of child work directly on what children are able to do, instead of simply on how long they spend in school (Akabayashi and Psacharopoulos, 1999).

These problems have led researchers to look for indicators of school achievement that go beyond simple attendance. Thus, Patrinos and Psacharopoulos (1995) found that several factors that contribute to child labour (age, gender, language and number of siblings) reduce school attendance and increase the chances of grade repetition in Paraguay. This was followed, in Patrinos and Psacharopoulos (1997), by the inclusion of a child work variable in equations that were used to estimate the chances of age-grade distortion in Peru. While the estimated coefficient on this variable was positive, indicating that it increased the chances of the child being too old for his/her grade, it was statistically insignificant. However, grade repetition and age-grade distortion are not perfect indicators of learning achievement, as schools may not apply uniform standards in enforcing grade repetition. What is needed is some measure of actual competence.
Akabayashi and Psacharopoulos (1999) used measures of reading ability (being able to read a newspaper) and mathematics (being able to do written calculations) in Tanzania. They find that predicted 4 hours of work reduce ability, while predicted school attendance and hours of study increase ability. However, the coefficients were often insignificant, perhaps because of the small sample size and the poor fit of the predicting equations. More seriously, the authors recognized the possible unreliability of the ability measures, as they were based on parental judgment. The present study used teachers' assessment to determine impact of sand harvesting of achievement.

Shafiq, (2007), measurement of the effects of child work on learning achievement can make several contributions. First, it will help in an understanding of the decisions that households make as to whether or not their children should work. Second, it will provide an idea of the educational interventions (perhaps through schooling at more convenient times or less formal education) that might be desirable to mitigate the effects of work on education. Third, it will provide a better idea of one of the benefits of policies and projects to reduce child work, and so lead to the better design of such interventions.

In half the sampling clusters of GLSS2, individuals between the ages of 9 and 55 were asked to take educational tests. These included a test of 'innate ability' (Raven Test), an easy reading test, an easy mathematics test, an advanced reading test, and an advanced mathematics test. Children only took the advanced tests if they achieved above a minimum score (4 out of 8) in the corresponding easy test. The Raven test is a coloured progressive matrices test (Raven (1956) and Raven, Court and Raven (1977), which was used by Knight and Sabot (1990) and
much of the subsequent literature. The advanced reading and mathematics tests are also the same as those used by Knight and Sabot (1990). The easy reading and mathematics tests were devised for the GLSS2 and are presented in Glewwe (1999).

There were 1,848 children between the ages of 9 and 18 in the sampling clusters where the tests were administered. Of these, 1,563 took the Raven Test, 1,024 took the easy mathematics test and 585 took the easy reading test. Children did not take the Raven Test for a variety of reasons, including illness, travelling and outright refusal. They did not take any of the other tests. A large part of the reduction in numbers from the Raven test to the easy mathematics test was due to the fact that the latter test was only supposed to be administered to those who had completed three years of schooling. The much reduced participation in the easy reading test was probably due to the fact that the test was in English, and some schools do not introduce English language instruction until the fourth year. Less than half (269) of those taking the easy reading test did well enough to qualify for the advanced reading test and 253 actually took it. A similar pattern applied with mathematics: 500 scored more than 4 in the easy test and 453 took the advanced test (Shafiq, 2007).

The results of these tests were given with each test has its own grading scheme and no significance can be attached to comparisons of scores between tests. The relevant comparisons are those between entries in the same column. The results compared the mean scores in each test of all working children and all non-working children. The scores for Raven, Easy Maths and Advanced Reading were higher for non-workers. The scores for Advanced Maths are the same for workers and non-workers, while the workers obtained a higher mean score for Easy
Reading. The results for Easy Maths and Advanced Reading support the view that child work harms educational achievement, but the results for Advanced Maths and Easy Reading do not. However, the comparison was distorted by the difference in age composition between the working and non-working children: working children are older and older children do better in the tests, thus making working children appear to do better. This provides strong support for the view that child work harms educational achievement (Delap, 1998).

The results show that work has a substantial effect on learning achievement in the key areas of reading and mathematics. It is worth noting that the significance of the work variable is substantially higher than that obtained by either Patrinos and Psacharopoulos (1997) or Akabayashi and Psacharopoulos (1999). This may well be the result of using more accurate measures of achievement, and controlling for innate ability, although there were also differences in sample characteristics and statistical methodology. This suggests that our understanding of this important topic could be furthered by the collection of data of this sort from other countries. Despite the demonstrated importance of work, its omission was not found to substantially bias estimates of returns to schooling.

Although these results confirm the accepted wisdom of the effects of work on learning achievement, they introduce a new view of how that arises. First, these effects are substantial even though some findings showed that work had relatively little impact on school attendance. Second, the findings show that a substantial proportion of the effect is direct rather than indirect, via schooling. This is important because much of the work on the educational harm of child work has focused on its effects on schooling. The direct link between work and learning
achievement, holding education constant, could be because of exhaustion or because of a
diversion of interest away from academic concerns. However, it could also be caused by those
children who work being innately less interested in academic achievement. This latter
possibility needs further investigation, as it would imply that it is not work that harms
educational achievement, but a lack of motivation that affects both work and learning. It is
also worth noting the way that working for the family eliminated the harmful effect of work
on the easy mathematics score. This has important implications for judging the relative harm
of work for the family and work elsewhere. As far as gender is concerned, girls were found to
do worse in all the tests, even allowing for their lower Raven scores. Girls also carry out more
housework, which was shown to reduce the easy mathematics score (Shafiq, 2007).

Ng‘ang’a (2010) carried out a study on the effects of child labour on girl child educational
performance and reconstruction in Kakuzi Division, Thika District. Literature review was
done on the various aspects of the child labour - and girl child labourers such as their
educational rights and children rights, labour laws, past efforts towards improving the girl
child educational performances, and reconstruction of child labourers who had previously
dropped out of school, etc. In addition, the study reviewed literature on Radical and Marxist
feminist theories, as utilized by the study. The study findings were collected through
questionnaires and interviews from a random sample of hundred (100) girl victims of child
labour between 10 and 17 years of age (forming the general respondents) and twenty (20) key
respondents that included teachers, local education officials, provincial administration
officials, parents, guardians, and Human Rights Activists, who were purposively selected.
They were then analyzed using SPSS, statistical software, and reported through sets of
percentages, distribution tables, pie charts, bar and line graphs, scheme, as confined by the limited number of girl child labourers who had previously dropped out of school going back (Ng'ang'a, 2010).

The study found out that the educational performance of the girls in child labour are poorer than those not in child labour. The participation of girls in child labour, the low educational performance of these girls and the high school dropout rate (42%) were largely due to poverty. Most of the girl child labourers have not adequately utilized the free primary education. Finally, the study recommends sensitization campaigns, policy formulation, educational awareness of local Provincial Administration on the education of the girl child labourer, and urgent need to curb cases of invisible! Hidden child labour as practiced at the individual households. In addition, financial support to girl child labourers through sponsorships or bursaries, tuition waiver or free secondary education, especially for the poor, and continuing free primary education with introduction of school uniforms is required to control absenteeism (Ng'ang’a, 2010).

The study revealed that child labour has negative impact on the educational performance of the girl child, but not much research has been done on the extent of this influence. There was also need to ascertain the impact of the family characteristics of the girl child labourer, the community's educational initiatives towards the girl child labourer, the performance of the girl child labourer in school and the extent of their educational reconstruction, especially after the introduction of the free primary education scheme in Kenya in 2003. This was addressed by the current study.
Kisanya (2009) conducted a study on factors influencing performance in public primary schools in Kangundo District in Eastern Province of Kenya. The target population of the study was all principals, teachers and pupils of public primary schools in Kangundo District and District Education Officer. The study used the systematic sampling design to select the primary schools. Content validity of the research instrument was done by carrying out a pilot study. The split half technique was used to test the reliability of the research instruments. The research established that one of the factors behind poor performance in KCPE was pupils being absent from school to be involved child labour. The study however, did not examine ways in which child labour influences performance which was dealt with in the current study. The researcher also proposed that further studies be carried out to investigate the impact of sand harvesting which was done in the current study.

2.5 Sand harvesting and the school learning environment

Collins (1990), states that the effects of sand and gravel harvesting is; extraction of bed material in excess of replenishment by transport from upstream which causes the bed to lower (degrade) upstream and downstream of the site of removal, bed degradation can undermine bridge supports, pipe lines or other structures, degradation may change the morphology of the river bed, which constitutes one aspect of the aquatic habitat, degradation can deplete the entire depth of gravelly bed material, exposing other substrates that may underlie the gravel, which could in turn, affect the quality of aquatic habitat. If a floodplain aquifer drains to the stream, groundwater levels can be lowered as a result of bed degradation. Lowering of the water table can destroy riparian vegetation. Sand harvesting is causing a serious threat to the environment. All humans need a healthy environment for their livelihood. Most people from
the less developed countries depend on agriculture for their survival. If their environment is degraded, they will be challenged in terms of resources to support educational activities. The rivers will dry up, their farms will be eroded and crop yields will go down. This automatically may lead to mass school drop out in the affected areas due to the environmental degradation effects on their livelihoods (Collins, 2009).

Bruce (2009), observes that river system is replaced with an unstable, difficult to restore and relatively unproductive ecosystem, often with vastly different characteristics from the natural river. The loss of this ecosystem affects the overall environment in many and far reaching ways. Food sources are obviously impacted. The basic result of in-stream mining is the removal of the natural river system. They naturally rely directly, or in part, on food sources in the river to survive. Depriving these fauna of their food sources not only drives them to other areas to attempt to feed, but places a greater amount of stress on other fauna that may be more dependent on those other places for their food. The riverbanks are a special ecosystem that develops, with the extra water and extra sunshine found on the rivers edge, in ways that cannot be replicated elsewhere. When the banks collapse from increased sideways erosion of the river channel, these ecosystems are lost. When the riverbed is deepened, less sediment accumulates on riverbanks in floods so the natural rebuilding of the banks is decreased. The riverbanks are not only a unique habitat, but they supply wildlife with a road to the river to reach food and water. Many species find it difficult to cross open areas because of the risk of predation. Those that do cross are in danger of greater predation because of this increased risk. In-stream mining also impacts diversity. When the in-stream mining removes or alters the river and
riverbank habitat, the number of individual species that once lived in those habitats declines (Bruce, 2009).

In Malaysia, the main source of sand is from in-stream mining. In-stream sand mining is a common practice because the mining locations are usually near the “markets” or along the transportation route, hence reducing transportation costs. In-stream sand mining can damage private and public properties as well as aquatic habitats. Excessive removal of sand may significantly distort the natural equilibrium of a stream channel. By removing sediment from the active channel bed, in-stream mines interrupt the continuity of sediment transport through the river system, disrupting the sediment mass balance in the river downstream and inducing channel adjustments (usually incision) extending considerable distances (commonly 1 km or more) beyond the extraction site itself. The magnitude of the impact basically depends on the magnitudes of the extraction relative to bed load sediment supply and transport through the reach (Kondolf, 2001).

In Nigeria, most rural people engage in agricultural activities as means of livelihood. They cultivate and harvest crops and by so doing, removes some of the nutrients from the soil without replenishment. They make land to suffer nutrient depletion and become unusable for further farming. At least 12 million rural dwellers engaged also in other livelihood activities that rely heavily on natural resources for parts of their livelihood which include animal rearing, mining of sand, gravel, rock mining and tree felling. Through these activities, over-cultivation, overgrazing, deforestation and over excavation occurred over time (IFAD, 2002).
Mining of sand and gravel on agricultural land is one of the alternative livelihood activities of the rural people in Nigeria which is now becoming an environmental issue. There is increase in demand for sand for construction and other purpose as communities grow because construction at present requires less wood and more concrete, which sprout a demand for low-cost sand. Mining of sand on farms and fallow agricultural land is becoming common and this is having noticeable impacts on the soil structure, vegetation and local wildlife in the rural areas. Viswanathan (2002) reports that the possible ecological impact of the indiscriminate sand mining and threats to the livelihoods of local communities include the depletion of groundwater; lesser availability of water for industrial, agricultural and drinking purposes; destruction of agricultural land; loss of employment to farm workers, and damage to farm roads and bridges.

Sand mining is widespread, highly unregulated, uncontrolled and is being carried out at an alarming rate. The gravity of the situation beyond the affected communities and the region at large is enormous and poses a threat not only to the environment but also to food security. Chiefs and land owners gave out land for monetary gains and caring less about the effects of the mining activities on the people and the environment. (Imoru, 2010) Although sand mining contributes to the construction of buildings and development, its negative effects include the permanent loss of sand in areas, as well as major habitat destruction. Sand mining is regulated by law in many places, but is still often done illegally (Wikipedia, 2011).

Compared to the number of studies on child labor and education, there are relatively only a few existing studies on child labor and child health. International Labour Organization (ILO) (1998) indicates that worldwide, children are being exposed to hazards in their work
environments, such as coming into contact with toxic pesticides, lifting heavy loads, operating machinery without appropriate training, being exposed to strong sunlight, dealing with lack of water and sanitation facilities, etc. (Guarcello, Lyon and Rosati (2004) studied the cases of Bangladesh, Cambodia, and Brazil, where the causal link between hours of work and ill health indicates that the number of working hours exerts a significant effect on the probability of negative health outcomes.

Satyanarayananan et al. (1986); Kassaouf et al. (2001); Guiffrida et al. (2001); and Rosati and Straub (2007) conducted studies in India, Brazil, and Guatemala, respectively; they found that child labor has negative effects on child laborers when they grow through adulthood, due to injury or illness. According to Guarcello et al. (2004), it is possible that child labor is at the expense of education and the lower level of educational attainment could negatively impact on health through the lower life time earnings and the lower knowledge about health production. However, as mentioned above, in conditions of poverty, child labor may have a positive or neutral impact on education attainment. Therefore it may also have a positive impact on health due to the improved standards of living for the children themselves and their families.

The findings of Cigno and Rosati (2001) do not support those of Satyanarayananan et al. (1986) for the case in India. Fentiman et al. (2001) reported no growth differences between children enrolled in schools and children working, in the case of Ghana. O'Donnell et al. (2005) have found little evidence of the contemporaneous impact of child labor on health in the case of Vietnam's agricultural child labor, although the work undertaken during childhood raises the risk of illness up to five years later and the risk increases with the duration of work.
Han (2007) suggested a contemporaneous inverse U-shaped relationship between child labor and child health in rural Cambodia. As mentioned above, these investigations are not sufficient to confirm the relevance of the trade-off between child labor and child human capital formation. On reviewing the existing literature on this subject, we can conclude that the effects of child labor on child human capital largely depend on the type of child labor. Undoubtedly, any hazardous forms of child labor should be prohibited at all costs.

Aside from forcing them out of their farms, quarrying has other negative impacts such as noise pollution, air pollution, damage to biodiversity and habitat destruction, amongst others, which obviously made the rural people to rank it as ‘severe’ among those activities affecting their agricultural land. The finding of this study agrees with Okafor (2006) who opines that quarrying activities cause significant impact on the environment like many other man-made activities. It also corroborates with Anand (2006) and Mabounje (2008) who opines that the biggest negative impacts of quarrying on the environment is the damage to biodiversity and quarry carries the potential of destroying habitats and plant species. Air pollution generally and especially dust from quarry sites are known to be responsible for vegetation injury and crop yield loss and thus become a threat to the survival of plants (Iqbal and Shafig, 2001).

Sand dust production was another land-related livelihood activity, which the respondents ranked to be ‘severe’. The dust from this activity does not only affect the agricultural activity of the rural people, it pollutes air as well as affects their health. Guach (2001) reported that dust from mining sites is a major source of air pollution, although the severity will depend on factors like the local microclimate conditions, the concentration of dust particles in the
ambient air, the size of the dust particles and their chemistry. The air pollution is not only a
nuisance (in terms of deposition on surfaces) and possible effects on health, in particular for
those with respiratory problems, but dust can also have physical effects on the surrounding
plants, such as blocking and damaging their internal structures and abrasion of leaves and
cuticles, as well as chemical effects which may affect long-term survival.

Most (73.4%) of the respondents agreed that the severity of sand dust production was high,
corroborating Osha’s assertion that discharge dust settles not only on land, plants and trees but
also on surface waters used for drinking and other domestic chores by the community (Osha,
2006). The findings revealed that 72.2% observed that there was low yield from sites where
sand mining were being practiced. 78.8 percent of the respondents pointed out that there was
decline in soil nutrient in such sites, while 50.4 percent indicated that the physical structure of
the soil is destroyed due to sand mining activities. This concurs with Rosenberg (2007) who
posited that loss of productive land obviously affects farming and rural communities. As the
land degrades, more fertilizer, machinery and supplementary feeds are needed and the cost of
production increases. Small-scale, subsistence farmers are often unable to meet the extra costs
and even large-scale, commercial farmers can find that farming becomes impossible. Majority
(66.7%) of the respondents noticed that vegetation cover had diminished and 36.7 % observed
that there was loss of forest trees. This implies that during the process of excavating sand and
gravel from the mining sites, they deforest the location to create space for mining activities.

Since the soil surface is cleared and dug, it further encourages erosion.

About 40.8 percent of respondents indicated that erosion occurrence was one of the changes
observed due to sand mining activity of rural people. This agrees with Charlier and De Meyer
who reported that erosion has increased in many locations as a consequence of human activity which encouraged increased frequency of flooding and deterioration of ecosystems. Most (74.2%) of the respondents observed that there was increase in relative farm-homestead distance. Farm lands were now far away from the village centers since the nearby agricultural lands have been degraded and can no longer adequately support agricultural production. The farms have thus been shifted to fallow grounds for better production. This poses difficulty in the movement of farm produce to the village or market centre, thereby increasing the price of farm produce in the market, because of the extra transportation cost incurred this increases the prices of foodstuffs bought by schools. Aside the reduction in the size of land available for agricultural purposes (as indicated by 67.1 percent of the respondents), the sales value of such lands at the mining sites declined drastically. This makes it difficult either to use such land for farming activities, or dispose it in order to acquire fertile land or finance education. The cumulative effect of the sand mining activities does not only affect the agricultural activities on the land, but also has severe impacts on the construction of roads, bridges and school buildings. Large tracts of revenue land is rapidly getting cleaned up, besides innumerable trees are facing the axe and the land which was used for sand mining is becoming futile now which was once used for cultivation, (Hedge, 2011).

In the Northern Region of Ghana and the East Gonja District (EGD) in particular, commercial gravel extraction to supply aggregate to the construction industry has been on the increase in recent years. This has to a large extent contributed to land degradation and desertification through the destruction of economically important trees, mostly indigenous in nature. This practice leaves behind bare soil and a large expanse of gullies which can collect water during
rainy seasons. This can result not only in health-related problems for neighbourhood communities, but can cause negative impacts on the environment as well (Heath, Merefield & Paithankar, 1993; Veiga & Beinhoff, 1997; Warhurst, 1994, 1999).

According to Mutisya (2006), in Kenya, rapidly growing populations in urban areas have contributed to an unprecedented demand for sand to meet the ever-rising needs of the building and construction industry. To meet this demand, sand harvesters have invaded seasonal rivers in Kenya’s arid and semi-arid areas, particularly those neighbouring the big cities, in search of this ‘precious’ commodity. The result has been unsustainable harvesting of sand beyond replenishment levels. The paper demonstrates that sand harvesting has had some severe environmental and socioeconomic effects. The most notable environmental effects include drying of aquifers, riverbank and bed erosion, water and air pollution, reduced water table and loss of valuable trees and animal species. Socio-economically, sand harvesting is a source of livelihood through the provision of incomes and employment opportunities. It is also associated with some negative social problems such as deaths resulting from conflicts between sand harvesters and the local community; prostitution and abuse of drugs and alcohol, which threaten the security of the local residents. Participatory sand harvesting is recommended for sustainable sand harvesting (Mutisya, 2006).

Makanya (2008) carried out a study to assess the impact of sand harvesting on the environment in West Pokot District of Rift Valley Province. The study adopted a research design with a target population of 200 residents of West Pokot District and 3 Provincial Administration. The data were collected using a questionnaire and an analysis of which was carried out in SPSS package. The study revealed that sand harvesting has adverse effects on
the environment in terms of its destruction to the environment and the topography of the region. This study did not however examine the impact of the environmental degradation on education which the current study dealt with. The researcher was also not able to find a study that looked at the impact of sand harvesting on education development thus the need for the current study.

2.6 Summary of the literature review

The reviewed literature focused on the impacts of sand harvesting on education development. The chapter begins with an overview of what is meant by child labour and then examines the impact of sand harvesting on participation in education, then the impact of child labour on performance and lastly the impact of sand harvesting on the environment. Makanya (2008) carried out a study to assess of the impact of sand harvesting on the environment in West Pokot District of Rift Valley Province. The study revealed that sand harvesting has adverse effects on the environment in terms of its destruction to the environment and the topography of the region. This study did not however examine the impact of the environmental degradation on education which the current study dealt with. The researcher was also not able to find a study that looked at the impact of sand harvesting on education development thus the need for the current study.

Ng’ang’a carried out a study on the effects of child labour on girl child educational performance and reconstruction in Kakuzi Division, Thika District. The study found out that the educational performance of the girls in child labour are poorer than those not in child labour. The study revealed that child labour has negative impact on the educational performance of the girl child, but not much research has been done on the extent of this
influence. There was also need to ascertain the impact of the family characteristics of the girl child labourer, the community's educational initiatives towards the girl child labourer, the performance of the girl child labourer in school and the extent of their educational reconstruction, especially after the introduction of the free primary education scheme in Kenya in 2003. This was addressed by the current study.

Kisanya (2009) conducted a study on factors influencing performance in public primary schools in Kangundo District in Eastern Province of Kenya. The research established that one of the factors behind poor performance in KCPE was pupils being absent from school to be involved child labour. The study however, did not examine ways in which child labour influences performance which was dealt with in the current study. The researcher also proposed that further studies be carried out to investigate the impact of sand harvesting which was done in the current study.

Kiruma (2010) in a study investigated factors contributing dropout in public primary schools in Mukurueni Division, Nyeri District revealed that among factors influencing dropout as pupils abandoning school to be involved in coffee harvesting activities and failing to turn up in school. The study also revealed that quite a number of pupils repeat classes while others dropped out all together due to this form of child labour. This study however did not examine ways in which child labour influences participation in school which the current study has addressed.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction
This chapter presents the research design adopted by the researcher. The dependent and independent variables have been clarified. The location of study, target population sample size, sampling techniques and research instruments used in the study have been articulated. Methods of establishing the validity and reliability of the research instruments, data collection techniques and data analysis methods have been vividly presented. The chapter also highlights some of the logistical and ethical considerations before embarking on the study.

3.2 Research Design
This study adopted a descriptive survey design. The design was considered appropriate for the study because the survey was concerned with describing, recording, analyzing and reporting conditions that exist or existed (Kothari, 1985). Kerlinger (1973) argues that descriptive survey method is widely used to obtain data useful in evaluating present practices and in providing basis for decisions. Surveys are used to gather systematically factual information that is necessary for effective decision making. It is an efficient method of collecting descriptive data regarding characteristics of the population, current practices, conditions and preliminary information for generating research questions (Kathuri & Pals, 1993). Descriptive survey is suitable because many of the impacts of sand harvesting on education development did not permit experimental manipulation Mugenda and Mugenda (1999). In this study, the researcher collected data on impacts of sand harvesting on education development as it is in
schools and described it without manipulating variables; hence descriptive survey was most appropriate.

3.2.1 Variables
A variable is an empirical property that is capable of taking two or more values; it is any characteristic which shows variability or variation. An independent variable influences other variables thereby determining the values of the affected variables. The independent variable is the one which the researcher usually controls. A depended variable is one controlled by the independent variable (Orodho, 2009). In this case sand harvesting was the independent which impacts on participation rates, pupils' performance and the environment that supports learning in public primary schools which are dependent variables which in return affect education development (dependent variable).

3.3. Location of the study
The study was conducted in Kathiani Division, Kathiani District in Machakos County. Kathiani Division cover an area of 78 square kilometres with a population of 126,644 (1999 census). The local climate is semi arid while the terrain is hilly. The division has an altitude from 1000 to 1600 metres above sea level. Akamba people are the dominant tribe.

3.4 Target population
The study targeted two education zones, Kathiani and Mitaboni in Kthiani Division which have 43 primary schools with a total population of 800 class 7 and 8 pupils, 43 principals, 20 class teachers, 2 local administration officers and 2 Area Education Officers.
3.5 Sample size and Sampling techniques

3.5.1 Sample size

A representative sample is one that has at least 10% of the target population (Kothari, 2005). The researcher therefore using stratified random sampling technique selected 80 pupils which is 10% of the total pupil target population of 800, twenty (20) class teachers which is 50% and 10 principals. All the 2 local administration officers and 2 Area Education Officers were involved in the study. The researcher consequently worked with a sample population of 104 respondents.

3.5.2 Sampling Techniques

From the target pupil population of 800, stratified random sampling method was used to select sample pupil population. In stratified random sampling, the population is first subdivided in to two or more strata, based on categories of one or a combination of relevant variables (Orodho, 2009). In this case the researcher subdivided the target population according to the education zones of Kthiani Division. This was aimed at ensuring that both zones could be accorded equal representation in the study. The researcher used simple random sampling method in each stratum and selected 80 boys and girls which is equivalent to 10% of the target pupil population. In a simple random sample of a given size, all such subsets of the frame are given an equal probability. Each element of the frame thus has an equal probability of selection; the frame is not subdivided or partitioned.
3.6 Research Instruments

The research instruments for the study were questionnaires and interview guides. The questionnaires consisted of, open and closed ended questions. Questionnaires were used because they enable one to collect as much information as possible in a short time. Besides, use of questionnaires enables respondents to feel free to note down their responses without inhibition since they are not being observed. The study also used an observation schedule.

3.6.1 Head teachers Questionnaire

The head teachers’ questionnaires comprised of two sections. Section A sought personal information of head teachers on their qualification levels, experience as head teachers and any other training on school management. Section B sought information from head teachers on the impacts of sand harvesting on education development in Kathiani Division.

3.6.2 Class Teachers’ Questionnaire

The class teachers’ questionnaires also comprised of two sections. Section A sought personal information of class teachers on their qualification levels, experience as head teachers and any other training on school management. Section B sought information from class teachers on the impacts of sand harvesting on education development in Kathiani Division.

3.6.3 pupils’ Questionnaire

The pupils’ questionnaires also comprised of two sections. Section A sought personal information of pupils on their gender and level of study (class). Section B sought information from pupils on the impacts of sand harvesting on education development in Kathiani Division.
3.6.4 Interview Guides

An interview guide is a set of questions that the interviewer asks when interviewing respondents. An interview guide makes it possible to obtain the data required to meet the specific objectives of the study (Orodho, 2009). The interview guide was constructed and structured to avoid a lot of writing by the interviewer during the interview process. It was also constructed to facilitate categorization of responses in line with the research objectives. The guide was used to get responses from local leaders, education officers and head teachers.

3.7 Validity of Instruments

Validity is the degree to which a test measures what it purports to be measuring. It is the degree to which results obtained from the analysis of the data actually represents the phenomenon under investigation (Orodho, 2009). There are different types of validity but for this study, the researcher used construct validity. Construct validity is perceived as a measure of the degree to which data obtained from an instrument meaningfully and accurately reflects or represents a theoretical concept (Orodho, 2009). For the purposes of this study, content validity of the instruments was established through consultation with supervisors who examined the instruments and assessed the relevance of the content to the study. The pilot study helped the researcher to improve the face validity, construct validity and content validity of the instruments. Findings from the pilot study were used to make corrections in the instruments accordingly to suit the objectives of the study.
Reliability of Instruments

Reliability of measurements concerns the degree to which a particular measuring procedure gives equivalent results over a number of repeated trials. Reliability of an instrument is the consistency in producing a reliable result. Reliability focuses on the degree to which empirical indicators are consistent across two or more attempts to measure the theoretical concept (Orodho, 2009). There are diverse methods used to estimate the reliability of measuring instruments but the researcher in this particular study used pilot testing. The pilot testing method involves administering the same instrument twice. This was administered prior to the actual data collection. The head teachers’, class teachers’ and pupils’ instruments were used to ascertain reliability. Reliability of the research instruments was determined from the test items used during the pilot study. Koul (1984) points out the half-split method involving splitting the test items into halves (odd and even items) then calculating the Pearsons Correlation Coefficient (r) between the scores of the two halves. The Pearsons Correlation Coefficient (r) formula to be used is:

\[ r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{[N\sum x^2 - (\sum x)^2][N\sum y^2 - (\sum y)^2]}} \]

Where: \( x \) = Deviation of the \( X \) measures from the assumed mean and \( Y \) = Deviation of the \( Y \) measures from the assumed mean. The correlation coefficient (r) obtained by the researcher was 0.6998 and was used to calculate the whole test reliability using Spearman Brown Prophesy formula (\( 2r/(1+r) \)). The full reliability of the items was 0.8234 which tends towards +1, hence the instruments were found to be more reliable and deemed good to use in this study.
3.9 Pilot study

Prior to the use of the developed interview guide and questionnaire in the main study they were pilot tested. This was done with a convenient sample of 20 informants drawn from Kathiani Zone. The instruments were pilot tested in order to ensure measurements are of acceptable reliability. Primary schools and individuals that are not part of the main study were considered. These informants comprised of three (3) head teachers, three (3) class teachers, nine (9) pupils of selected primary schools, two (2) education officers, and three (3) local leaders through purposive sampling method. This is a form of sampling the investigator relies on his or her expertise or expert judgment to select units that are representative or typical of the population (Orodho, 2009). The information gathered from the test informants was used to sharpen and refine the questionnaire and the interview guide.

3.10 Data collection Techniques

Data collection was done by use of questionnaires and face to face interviews. Face to face interviews were done using interview guide for the key respondent’s especially Education Officers, head teachers and public administrators who did not have ample time to fill in the questionnaire. The researcher administered the questionnaire to the targeted respondents and also conducted face to face interview in person, this gave the interviewer an opportunity to use probing questions where need arose in order to obtain more complete data. It also enabled the researcher to develop rapport with the respondent as opposed to if the researcher used a research assistant.
3.11 Data Analysis

Data were analyzed mainly through use of descriptive statistics and presented in frequency
distribution tables, percentages, bar and pie charts and measures of central tendency especially
the mean, mode and median. In addition to this, advanced statistical techniques (inferential
statistics) were used.

3.12 Logistical and Ethical consideration

Prior to going to the field, the researcher sought authority from the relevant authorities
including school management, ministry of Education Science and Technology and Provincial
Administration.
CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction
This chapter presents the data, analysis and interpretation. The chapter begins by presenting findings on the demographic information of respondents followed by the presentation of findings on the what extent to which sand harvesting affects school participation of boys and girls, affects performance of boys and girls in national examinations, affects the environment which indirectly supports learning of boys and girls and the positive and negative impacts of sand harvesting on education in Kathiani Division.

4.2 Respondents Demographic Information
This section presents the demographic information of the respondents and schools sampled for this study. This was aimed at revealing the characteristics of the respondents and schools under study in relation to the effect of sand harvesting on KCPE performance in public primary schools in Kathiani Division.
4.2.1 Head teachers experience in years

Head teachers were asked to indicate their experience in school headship. The results are as presented on Figure 2.

The results on Figure 2 show that a higher number of head teachers (40.0%) have headed school for more than five years followed by 20.0% who have headed schools for five years and then 10.0% who have headed schools for four years, three years, two years and one year respectively. This shows that most head teachers sampled for this study have been in headship positions for a substantial period of time and can therefore be relied upon to give reliable information on the impact of sand harvesting of KCPE performance.

4.3 Sand harvesting and school participation

The first objective of the study was to investigate the extent to which sand harvesting affects school participation of boys and girls in Kathiani Division. The findings are as discussed in the successive sub-sections.
4.3.1 Dropout cases in schools

The researcher asked pupils to state whether there are cases of dropouts in their schools. The results are as shown on Figure 3.

![Figure 3: Pupils' opinion about dropout cases in schools](image)

The results on Figure 3 show that majority that is 75 pupils (93.8%) said they had witnessed cases of dropouts in their schools while 5 pupils (6.2%) said they have not witnessed any such cases. This is an indication that most public primary schools in Kathiani Division are faced with high rates of school dropout with sand harvesting being cited as the major contributing factor. These findings are in agreement with Baker *et al* (2001) who observed that a major factor in the non-participation of children in schooling was found to be the need to prioritise educational investment in a few children, with the subsequent earnings of those not enrolled in school contributing to the household finances. But even for those children enrolled in school, their frequent failure to complete primary education was due to an inability of the children
successfully to combine income generation, partly to finance their education, with that of school attendance.

4.3.2 Dropout trends between 2009 to 2011 according to head teachers

Head teachers were asked to give the dropout trends in their schools from 2009 to 2011. The findings are as shown on Table 4.1.

Table 4.1: Dropout trends from 2009 to 2011 according to head teachers

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has been increasing</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Has remained the same</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Has been dropping</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The findings show that majority of head teachers 60% said that dropout cases have been on an increase in the schools followed by 30.0% who said they have remained the same while 10.0% said they have been dropping. The area Education Officer was of the view that dropout incidents have been steadily raising and was a big concern in the division. This confirms the earlier finding that public primary schools in Kathiani Division are experiencing high cases of school dropout as a result of pupils being involved in sand harvesting activities.

4.3.3 Rate of dropout by gender form 2009 to 2011 according to head teachers

The researcher asked head teachers to state dropout cases based on gender in the last three years. Their responses are as presented on Table 4.2.
Table 4.2: Rate of dropout by gender from 2009 to 2011 according to head teachers

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>More boys than girls</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>More girls than boys</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Equal number of boys and girls</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The results show that according majority of head teachers (60.0%) said that more boys than girls dropout of schools while 40.0% indicated that more girls than boys drop out of schools. The Area Education officers also indicated that more boys than girls were dropping out of school. The results are an indication that more boys are dropping out school in Kathiani Division more than girls which means that more boys than girls are involved in sand harvesting forcing them to drop out. These findings concur with Ball and Lamb (2001), found that boys are more likely to be 'at risk' of early school leaving demonstrated low school achievement and that such live in rural or remote areas with a low socio-economic status.

4.3.3 Reasons for Dropout according to head teachers

The research sought from head teachers and pupils the reasons why pupils are dropping out of school. The findings are as shown on Table 4.3 and 4.4.
### Table 4.3: Head teachers' views on the causes of drop out

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engaging in sand harvesting</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Girls' pregnancy</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Due to lack of school fees</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Drug abuse</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Peer pressure</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Early marriages</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Lack of knowledge on the importance of education</td>
<td>1</td>
<td>10.0</td>
</tr>
</tbody>
</table>

N = 10

The results revealed that majority of head teachers (70.0%) revealed that pupils in their schools are dropping out to engage in sand harvesting. This is followed by 30.0% who said it is due to lack of school fees and early marriages respectively while 20.0% cited girls' pregnancy. This is a clearly indication that sand harvesting is a major contributor to pupils dropping out of school in public primary schools in Kathiani Division. This is in line with Okojie et al (1996), report that in Nigeria school children get engaged in independent work in order to earn money thus neglecting school. Although not clearly indicated it could be argued that the money is for personal use and the household survival.
Table 4.4: Pupils’ views on the causes of drop out

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed as sand harvesters</td>
<td>53</td>
<td>66.2</td>
</tr>
<tr>
<td>Lack of school fees</td>
<td>21</td>
<td>26.2</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>16</td>
<td>20.0</td>
</tr>
<tr>
<td>Being orphaned</td>
<td>15</td>
<td>18.7</td>
</tr>
<tr>
<td>Drug abuse</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td>Indiscipline</td>
<td>11</td>
<td>13.7</td>
</tr>
<tr>
<td>Peer pressure</td>
<td>10</td>
<td>12.5</td>
</tr>
<tr>
<td>Employed as house girls</td>
<td>8</td>
<td>10.0</td>
</tr>
<tr>
<td>Lack of school uniforms</td>
<td>8</td>
<td>10.0</td>
</tr>
<tr>
<td>Misunderstanding with teachers</td>
<td>7</td>
<td>8.7</td>
</tr>
<tr>
<td>Early marriage</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>To sell food to sand harvesters</td>
<td>3</td>
<td>3.7</td>
</tr>
<tr>
<td>Lack of parental support</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Fear of certain subjects e.g. Mathematics</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

N = 80

The results on Table 4.4 show that majority of pupils (66.2%) cited pupils being employed in sand harvesting as the reason behind them dropping out of school. This was followed at a distance by lack of school fees as cited by 26.2% of the pupils, then pregnancy as cited by 20.0% and being orphaned as cited by 18.7%. The findings are an indication that most pupils in public primary schools in Kathiani Division are dropping out of school to work as sand
harvesters. This shows that sand harvesting is a major reason behind pupils dropping out of school in the division. The findings agree with Kanbargi and Kulkarni (1991) who draw inferences about the effect of work on schooling, concluding that children in Karnataka who work are less likely to attend school than those who do not work.

4.3.4 Pupils involved in sand harvesting according to pupils

The researcher asked pupils to indicate whether they are involved in sand harvesting or not. The results are as presented on Figure 4.

![Figure 4: Pupils opinion on fellow pupils involved in sand harvesting](image)

Figure 4: Pupils opinion on fellow pupils involved in sand harvesting

The findings on Figure 4 show that a higher number 47 pupils, (58.8%) said they are not involved in sand harvesting while 33 (41.2%) said they are involved. The local administrative officer pointed out that several cases of pupils being involved in sand harvesting have been reported and continue to be reported. The results are an indication that a substantial number of pupils are involved in sand harvesting. These findings concur with Tungesvik (2000) whose findings indicate that about 61% of the children who labour are found in Asia, while 32% live in Africa and 7% in Latin-America.
4.3.5 Number of boys and girls involved in sand harvesting

The researcher asked head teachers and class teachers to give an estimate of boys and girls involved in sand harvesting. The findings are as shown on Figure 5 and 6.

![Graph showing dropout by gender](image)

**Figure 5: Number of boys and girls involved in sand harvesting**

The findings on Figure 5 show that a higher number head teachers (30.0%) indicated that about 6 to 10 pupils in their schools are involved in sand harvesting followed by 20.0% who said 1 to 5 boys, 16 to 20 and more than 20 boys respectively. The findings also show that only 4 head teachers said girls are involved in sand harvesting where majority of them (75.0%) said about 1 to 5 girls are involved while 25.0% said between 6 to 10 girls are involved in sand harvesting. The findings are an indication that more boys than girls are involved in sand harvesting activities meaning that boys are the most affected academically by this activity. These findings concur with Ball and Lamb (2001), found that boys are more
likely to be 'at risk' of early school leaving demonstrated low school achievement and that such live in rural or remote areas with a low socio-economic status.

Figure 6: Number of Pupils involved in sand harvesting according to teachers

The findings on Figure 6 show that majority of class teachers (60.0%) said that between 6 to 10 pupils in their schools are involved in sand harvesting followed by 30.0% who said between 1 to 5 pupils while 1 (10.0%) said none of the pupils is involved in sand harvesting. These findings are a further indication that quite a number of pupils in public primary schools in Kathiani Division are involved in sand harvesting which negatively affects their participation of school.
4.3.6 Number of times in a week pupils are involved in sand harvesting

The researcher asked the pupils who are involved in sand harvesting to indicate the number of times in a week they are involved in sand harvesting. The results are as shown on Figure 7.

![Figure 7: Number of times in a week pupils are involved in sand harvesting](image)

From the findings, a higher number of pupils that is 29 (36.6%) said they are involved in sand harvesting twice a week followed by 22 pupils (27.2%) who said they are involved once a week then 14 pupils (18.1%) who said they are involved on daily basis, 10 pupils (12.1%) are involved thrice a week. and lastly 5 pupils (6.0%) said they are involved four times a week.

The Area Education Officer observed that most pupils have had to forfeit attending lessons to participate in sand harvesting. The results show that pupils in public primary schools in Kathiani Division are spending a substantial amount of school time in sand harvesting thus negatively affecting their school attendance. These findings are in agreement with Baker et al (2001) who observed that a major factor in the non-participation of children in schooling was found to be the need to prioritize educational investment in a few children, with the
subsequent earnings of those not enrolled in school contributing to the household finances. But even for those children enrolled in school, their frequent failure to complete primary education was due to an inability of the children successfully to combine income generation, partly to finance their education, with that of school attendance.

4.3.7 Time of the day they do sand harvesting

The research asked pupils to state the time of the day they do the sand harvesting. The results are as presented on Table 4.5.

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>3</td>
<td>9.0</td>
</tr>
<tr>
<td>During class time</td>
<td>6</td>
<td>18.1</td>
</tr>
<tr>
<td>Evening/night</td>
<td>18</td>
<td>54.9</td>
</tr>
<tr>
<td>Weekends</td>
<td>3</td>
<td>9.0</td>
</tr>
<tr>
<td>Any time the lories comes</td>
<td>3</td>
<td>9.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The results on Table 4.5 show that majority of pupils (54.9%) said they are involved in sand harvesting in the evening and at night followed by 18.1% who are involved in the exercise during class time while 9.0% said they are involved in sand harvesting in the morning, weekends and any times the lories come. The local administration officer revealed that on a number of occasions his officers have arrested some pupils who were harvesting sand at the time they should have been in school. The results are an indication that quite a number of
pupils are involved in sand harvesting during school hours which negatively affects their participation in school.

4.3.8 Ways of balancing harvesting and school attendance

The researcher asked pupils who are involved in sand harvesting ways through which they are balancing sand harvesting and school attendance. The results are as shown on Table 4.6.

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make use of weekends</td>
<td>16</td>
<td>48.4</td>
</tr>
<tr>
<td>Absent from school</td>
<td>14</td>
<td>42.4</td>
</tr>
<tr>
<td>Attend part of the school days</td>
<td>11</td>
<td>33.3</td>
</tr>
<tr>
<td>Make use of the evening/nights</td>
<td>8</td>
<td>24.2</td>
</tr>
</tbody>
</table>

N = 33

The study findings revealed that a higher number of pupils (48.4%) make use of weekends followed by 41.4% who absent from school, then 33.3% who attend part of the school days and lastly 24.2% who make use of the evening/nights. The results show that quite a number of pupils are missing days or part of school days to participate in sand harvesting. It can therefore be concluded that sand harvesting in impacting negatively of pupils’ participation in school.

4.3 Sand harvesting and performance in national examinations

The study sought to establish the extent to which sand harvesting influences pupils performance in public primary schools in Kathiani Division. The findings are as discussed in the successive sub-sections.
4.4.1 Factors influencing performance

The researcher asked class teachers to state the factors influencing performance in their schools. The results are as shown on Table 4.7.

Table 4.7: Factors influencing performance

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand harvesting</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Drug abuse</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Indiscipline</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Absenteeism</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Poor attitude</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Poor relationship between the school and the community</td>
<td>1</td>
<td>10.0</td>
</tr>
</tbody>
</table>

N = 10

The results on Table 4.7 show that majority of class teachers (70.0%) cited sand harvesting as the major contributor to poor performance in their schools followed by 50.0% who cited drug abuse, 40.0% cited indiscipline while 30.0% cited absenteeism. The Area Education Officer observed that participation in sand harvesting was majorly responsible for the deteriorating performance in KCPE examinations. These findings are an indication that sand harvesting is contributing to a large extent to poor performance in public primary schools in Kathiani Division as well as other vices most of which are related to sand harvesting such as drug abuse and absenteeism. This concurs with Akabayashi and Psacharopoulos (1999) who assert that the possible importance of reduced learning achievement is well recognized as one of the major harmful effects of child work.
4.4.2 Comparison in performance

The researcher asked class teachers to give a comparison in terms of performance between pupils who are involved in sand harvesting and those who are not involved. The results are as presented on Table 4.8.

Table 4.8: Comparison in performance

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Those involved record lower grades</td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td>Those involved are always absent from school</td>
<td>9</td>
<td>90.0</td>
</tr>
<tr>
<td>Concentration levels of those involved are low.</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>They have higher cases of indiscipline</td>
<td>4</td>
<td>40.0</td>
</tr>
</tbody>
</table>

N = 10

From the findings, all class teachers (100.0%) said that pupils involved in sand harvesting record lower grades than those who are not involved. This is followed by 90.0% who said that those involved are always absent from school then 60.0% who said concentration levels of those involved are low while 40.0% they have higher cases of indiscipline. The findings are an indication that pupils involved in sand harvesting are recording poor results in examinations owing to missing school and other vices related to sand harvesting. This confirms that according to the results for Easy Maths and Advanced Reading support the view that child work harms educational achievement (Glewwe, 1999). According to Patrinos and Psacharopoulos (1997) or Akabayashi and Psacharopoulos (1999) although these results confirm the accepted wisdom of the effects of work on learning achievement, they introduce a
new view of how that arises. First, these effects are substantial even though some findings showed that work had relatively little impact on school attendance. Second, the findings show that a substantial proportion of the effect is direct rather than indirect, via schooling. This is important because much of the work on the educational harm of child work has focused on its effects on schooling. The direct link between work and learning achievement, holding education constant, could be because of exhaustion or because of a diversion of interest away from academic concerns.

According to Akabayashi and Psacharopoulos (1999) however, it could also be caused by those children who work being innately less interested in academic achievement. This latter possibility needs further investigation, as it would imply that it is not work that harms educational achievement, but a lack of motivation that affects both work and learning. It is also worth noting the way that working for the family eliminated the harmful effect of work on the easy mathematics score. This has important implications for judging the relative harm of work for the family and work elsewhere. As far as gender is concerned, girls were found to do worse in all the tests, even allowing for their lower Raven scores. Girls also carry out more housework, which was shown to reduce the easy mathematics score. Kisanya (2009) in a study on factors influencing performance in public primary schools in Kangundo District in Eastern Province of Kenya established that one of the factors behind poor performance in KCPE was pupils being absent from school to be involved child labour.
4.5 Sand harvesting and the environment

The study sought to establish the impact of sand harvesting on the environment which by extension affects learning in public primary schools in Kathiani Division and thus have an impact on performance. The results are as presented in the following sub-sections.

4.5.1 Negative Effects of sand harvesting on the school environment

The researcher asked pupils, class teachers and head teachers to state the negative effects sand harvesting has on the environment. The results are as presented on Table 4.9 and Table 4.10.

Table 4.9: Negative Effects of sand harvesting on the school environment according to pupils

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has caused water shortage</td>
<td>57</td>
<td>71.2</td>
</tr>
<tr>
<td>Has caused sudden drying up of rivers</td>
<td>44</td>
<td>55.0</td>
</tr>
<tr>
<td>Has caused soil erosion</td>
<td>41</td>
<td>51.2</td>
</tr>
<tr>
<td>Led to the destruction of roads</td>
<td>39</td>
<td>48.7</td>
</tr>
<tr>
<td>Led to desertification</td>
<td>34</td>
<td>42.5</td>
</tr>
<tr>
<td>Makes river beds ugly due to expose rocks</td>
<td>23</td>
<td>28.7</td>
</tr>
<tr>
<td>Lorries have made cracks on the classroom walls</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>Causes a lot of dust on trees</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

N = 80

The findings reveal that majority of pupils said sand harvesting has a negative effect on the environment as it has caused water shortage followed by 55.0% who said it has caused sudden
drying up of rivers, 51.2% said it has caused soil erosion, 48.7% said it has led to the
destruction of roads, 42.5% said it has led to desertification, 28.7% said it makes river beds
ugly due to exposed rocks, 15.0% said lorries have made cracks on the classroom walls while
1.2% said it causes a lot of dust on trees. The results are an indication that sand harvesting has
a profound negative impact of the environment ranging from destruction of water sources to
soil erosion, and destruction of the infrastructure. These findings concur with Imoru (2010)
who observed that although sand mining contributes to the construction of buildings and
development; its negative effects include the permanent loss of sand in areas, as well as major
habitat destruction.

Table 4.10: Negative Effects of sand harvesting on the school environment according to
Class teachers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some rivers have dried up.</td>
<td>9</td>
<td>90.0</td>
</tr>
<tr>
<td>Pollute rivers leading to scarcity of drinking water</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Led to increase in soil erosion</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Caused desertification</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Disruption of the flow of rivers</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Destruction of roads</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Air pollution caused by fumes from lorries</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Destruction of aquatic life</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Destruction of the beauty of the landscape</td>
<td>3</td>
<td>30.0</td>
</tr>
</tbody>
</table>

N = 10
The findings on Table 4.10 revealed that majority of class teachers (90.0%) indicated that sand harvesting negatively affects the environment as some rivers have dried up followed by 70.0% who said that it leads to pollution of rivers leading to scarcity of drinking water, 60.0% said it has led to increase in soil erosion and caused desertification, 50.0% said it leads to disruption of the flow of rivers and has led to destruction of roads, 40.0% said it has caused air pollution caused by fumes from lories while 30.0% said it has led to destruction of aquatic life and the beauty of the landscape. These findings are an indication that sand harvesting has numerous negative effects on the environment which have an impact on pupils thus affecting their performance in school.

According to International Labour Organization (ILO) (1998) indicates that worldwide, children are being exposed to hazards in their work environments, such as coming into contact with toxic pesticides, lifting heavy loads, operating machinery without appropriate training, being exposed to strong sunlight, dealing with lack of water and sanitation facilities, etc. Guarcello et al. (2004) studied the cases of Bangladesh, Cambodia, and Brazil, where the causal link between hours of work and ill health indicates that the number of working hours exerts a significant effect on the probability of negative health outcomes.
Table 4.11: Negative Effects of sand harvesting on the school environment according to Head teachers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of water</td>
<td>8</td>
<td>80.0</td>
</tr>
<tr>
<td>Loss of times in search of water</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>The noise from lorries interferes with learning</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Flooding makes roads impassable</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Lack of concentration in class</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Pupils are affected by waterborne diseases.</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Lots of dust causing coughing among pupils.</td>
<td>4</td>
<td>40.0</td>
</tr>
</tbody>
</table>

N = 10

The study findings revealed that majority of head teachers (80.0%) sand harvesting negatively affects the environment as it leads to lack of water followed by 70.0% who cited loss of times in search of water and the noise from lorries interfering with learning, then who said it leads to flooding which makes roads impassable, 60.0% said it leads to lack of concentration in class, 50.0% said pupils are affected by waterborne diseases while 40.0% said it leads to lots of dust causing coughing among pupils. This is a further indication that sand harvesting has an adverse effect on the environment especially as it leads to scarcity of water and leads to the destruction of roads making schools inaccessible.
4.5.2 Impact of environmental destruction to education

The study sought from pupils and head teachers whether the destruction of the environment caused by sand harvesting has an impact on education. The results are shown on Figure 8.

The results on Figure 8 show that 69 pupils (86.3%) said that the destruction of the environment caused by sand harvesting has an effect on education while 11 pupils (13.7%) said it has no effect. The Area Education Officer was of the view that environmental degradation as a result of sand harvesting has a direct negative impact on education. The findings also show that all head teachers said that the environmental destruction caused by sand harvesting has an effect on education. This further shows that sand harvesting leads to environmental destruction which in the end effects education. The findings are an indication that environmental destruction due to sand harvesting has an influence of education in public primary school in Kathiani Division.

Figure 8: Impact of environmental destruction to education according to pupils
4.5.3 Ways through which environmental impact of sand harvesting affects education

The researcher asked head teachers to state ways through which environmental destruction caused by sand harvesting affects education in public primary schools in Kathiani Division.

The results are as shown on Table 4.12.

Table 4.12: Ways through which environmental impact of sand harvesting affects education according to Head teachers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Led to insufficient water for the school</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Pupils are introduced to drugs</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Led to the destruction of roads</td>
<td>4</td>
<td>40.0</td>
</tr>
</tbody>
</table>

The findings show that majority of head teachers (70.0%) indicated that environmental destruction caused by sand harvesting affects education as it leads to insufficient water for the school followed by 50.0% who said pupils are introduced to drugs while 40.0% said it has led to the destruction of roads leading to school causing lateness.

Aside forcing them out of their farms, quarrying has other negative impacts such as noise pollution, air pollution, damage to biodiversity and habitat destruction, amongst others, which obviously made the rural people to rank it as ‘severe’ among those activities affecting their agricultural land. The finding of this study agrees with Okafor (2006) who opines that quarrying activities cause significant impact on the environment like many other man-made activities. It also corroborates with Anand (2006) and Mabounje (2008) who opines that the
biggest negative impacts of quarrying on the environment is the damage to biodiversity and quarry carries the potential of destroying habitats and plant species. Air pollution generally and especially dust from quarry sites are known to be responsible for vegetation injury and crop yield loss and thus become a threat to the survival of plants (Iqbal and Shafig, 2001).

Sand dust production was another land-related livelihood activity, which the respondents ranked to be 'severe'. The dust from this activity does not only affect the agricultural activity of the rural people, it pollutes air as well as affects their health. Guach (2001) reported that dust from mining sites is a major source of air pollution, although the severity will depend on factors like the local microclimate conditions, the concentration of dust particles in the ambient air, the size of the dust particles and their chemistry. The air pollution is not only a nuisance (in terms of deposition on surfaces) and possible effects on health, in particular for those with respiratory problems, but dust can also have physical effects on the surrounding plants, such as blocking and damaging their internal structures and abrasion of leaves and cuticles, as well as chemical effects which may affect long-term survival.

4.6 Effects of Sand Harvesting on education

The study sought to establish the effects of sand harvesting on education in Kathiani Division. The results are as discussed in the successive sub-sections.

4.6.1 Positive Effects of Sand Harvesting

The researcher asked class teachers and pupils to give positive effects of sand harvesting on education. The findings are as presented on Table 4.13 and Table 4.14.
Table 4.13: Positive effect of sand harvesting on education according to class teachers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of income to parents</td>
<td>8</td>
<td>80.0</td>
</tr>
<tr>
<td>Source living to pupils who are orphans</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Source of employment</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Pupils get money to register for exams.</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Money got used to buy food for pupils</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Pupils get money to buy school equipment</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Sand has been used to build classes</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Money used to by school uniform for their children</td>
<td>3</td>
<td>30.0</td>
</tr>
</tbody>
</table>

N = 10

According to the results on Table 4.13, majority of class teachers (80.0%) said that sand harvesting has a positive impact on education as it serves as a source of income to parents. This is followed by 60.0% who said it is a source of livelihood for pupils who are orphans and a source of employment, 50.0% said pupils get money to register for exams and to buy food, 40.0% said pupils get money to buy school equipment while 30.0% said sand has been used to build classes and that money earned has been used to by school uniform. This is an indication that sand harvesting has a number of positive effects on education in terms of enabling parents and pupils to acquire basic needs, pay educational levies and also purchase various educational materials.
Table 4.14: Positive effect of sand harvesting on education according to pupils

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get money to pay school fees</td>
<td>50</td>
<td>62.5</td>
</tr>
<tr>
<td>Paying remedial fees</td>
<td>46</td>
<td>57.5</td>
</tr>
<tr>
<td>Get money to buy food</td>
<td>38</td>
<td>47.5</td>
</tr>
<tr>
<td>Get money to buy uniform</td>
<td>34</td>
<td>42.5</td>
</tr>
<tr>
<td>Get money to buy education facilities</td>
<td>31</td>
<td>38.7</td>
</tr>
<tr>
<td>Helps in utilising free time</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Helps in knowing about soil organisms</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

\(N = 80\)

The results on Table 4.14 revealed that a higher number of pupils (62.5%) said sand harvesting has enabled them to get money to pay school fees followed by 57.5% who said it has helped them in paying remedial fees, 47.5% said it helps them get money to buy food, 42.5% said it helps them get money to buy uniform, 38.7% said it helps them get money to buy education facilities, 2.5% said it helps in utilising free time while 1.2% said it helped in knowing about soil organisms. The results are an indication that sand harvesting has a number of positive effects on education as it enables them to acquire basic needs and finance their education from the money realised from the exercise. The local administration officer observed that sand harvesting is a major source of livelihood to the area and that many parents have been able to take their children through school using money earned from the activity.
4.6.2 Negative effect on sand harvesting on education

The researcher asked class teachers and pupils to give the negative effects of sand harvesting on education. Their responses are as presented on Table 4.15 and Table 4.16.

Table 4.15: Negative effects of sand harvesting on education according to Class Teachers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dropping in academic performance</td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td>Dropping out of school</td>
<td>8</td>
<td>80.0</td>
</tr>
<tr>
<td>Increase in school absenteeism</td>
<td>8</td>
<td>80.0</td>
</tr>
<tr>
<td>Lack of class concentration due to noise made by lorries</td>
<td>8</td>
<td>80.0</td>
</tr>
<tr>
<td>Pupils are prone to illness</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Failure to do homework</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Parents forcing their children to join it.</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Introduction of drug abuse</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Pupils sleeping in class.</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Exposure to money leading to lack of concentration in class</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Makes students worn out</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Failure to attend remedial lessons</td>
<td>3</td>
<td>30.0</td>
</tr>
</tbody>
</table>

N = 10

The findings show that all class teachers (100.0%) said that sand harvesting affects education negatively as it leads to pupils dropping in academic performance followed by 80.0% who said it leads to pupils dropping out of school and lack of class concentration due to noise made by lorries. The findings also show that 70.0% of class teachers feel that it makes pupils to be
prone to illness followed by 60.0% who said it leads to failure of pupils to do homework, parents forcing their children to join it, introduction of drug abuse and pupils sleeping in class. The local administration officer observed that sand harvesting has led to many pupils dropping out of school having been lured by the money earned from the exercise. This is an indication that sand harvesting has negative influence of education as it takes most of pupils study time as well as numerous disruption caused by sand harvesting.

About 40.8 percent of respondents indicated that erosion occurrence was one of the changes observed due to sand mining activity of rural people. This agrees with Charlier and De Meyer (2000) who reported that erosion has increased in many locations as a consequence of human activity which encouraged increased frequency of flooding and deterioration of ecosystems. Most (74.2%) of the respondents observed that there was increase in relative farm-homestead distance. Farm lands were now far away from the village centres since the nearby agricultural lands have been degraded and can no longer adequately support agricultural production. The farms have thus been shifted to fallow grounds for better production. This poses difficulty in the movement of farm produce to the village or market centre, thereby increasing the price of farm produce in the market, because of the extra transportation cost incurred this increases the prices of foodstuffs bought by schools. Aside the reduction in the size of land available for agricultural purposes (as indicated by 67.1 percent of the respondents), the sales value of such lands at the mining sites declined drastically. This makes it difficult either to use such land for farming activities, or dispose it in order to acquire fertile land or finance education. The cumulative effect of the sand mining activities does not only affect the agricultural activities on the land, but also has severe impacts on the construction of roads, bridges and school
buildings. Large tracts of revenue land is rapidly getting cleaned up, besides innumerable trees are facing the axe and the land which was used for sand mining is becoming futile now which was once used for cultivation, (Hedge, 2011).

In the Northern Region of Ghana and the East Gonja District (EGD) in particular, commercial gravel extraction to supply aggregate to the construction industry has been on the increase in recent years. This has to a large extent contributed to land degradation and desertification through the destruction of economically important trees, mostly indigenous in nature. This practice leaves behind bare soil and a large expanse of gullies which can collect water during rainy seasons. This can result not only in health-related problems for neighbourhood communities, but can cause negative impacts on the environment as well (Heath, Merefield & Paithankar, 1993; Veiga & Beinhoff, 1997; Warhurst, 1994, 1999).

Table 4.16: Negative effects of sand harvesting on education according to pupils

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disruption lessons/ studies due to noise.</td>
<td>56</td>
<td>70.0</td>
</tr>
<tr>
<td>Led to water shortage in schools making pupils to walk for long distances in search of water.</td>
<td>52</td>
<td>65.0</td>
</tr>
<tr>
<td>Led to food shortage</td>
<td>35</td>
<td>43.7</td>
</tr>
<tr>
<td>Led to cracking of classroom walls</td>
<td>32</td>
<td>40.0</td>
</tr>
<tr>
<td>Led to many potholes leading to school causing lateness</td>
<td>29</td>
<td>36.2</td>
</tr>
<tr>
<td>Led to outbreak of waterborne diseases in schools</td>
<td>27</td>
<td>33.7</td>
</tr>
<tr>
<td>Pupils leave school to run after lorries</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td>Too much dust makes pupils sick</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>The galleys have led to many accidents involving pupils</td>
<td>8</td>
<td>10.0</td>
</tr>
</tbody>
</table>

N = 80
The findings on Table 4.16 show that majority of pupils (70.0%) said that sand harvesting negatively affects education as it causes disruption lessons/studies due to noise. This is followed by 65.0% who said it leads to water shortage in schools making pupils to walk for long distances in search of water then 43.7% said it leads to food shortage, 40.0% said it leads to cracking of classroom walls, 36.2% said it leads to many potholes leading to school causing lateness while 33.7% said it leads to outbreak of waterborne diseases in schools. This is further confirmation that sand harvesting has numerous negative effects on education which affects performance in public primary schools in Kathiani Division.

4.7 Solutions to mitigate negative impacts of sand harvesting

The researcher asked head teachers, class teachers and pupils to give solutions on ways through which negative effects of sand harvesting on education can be mitigated. The results are as presented on Table 4.17.

Table 4.17: Solutions to mitigate negative impacts of sand harvesting according to head teachers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulating laws forbidding sand harvesting among pupils.</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Sand harvesting should be banned</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Use of provincial administration to enforce compulsory education.</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Government should streamline sand harvesting</td>
<td>2</td>
<td>20.0</td>
</tr>
</tbody>
</table>

N = 10
The findings on Table 4.17 show that formulation of laws forbidding sand harvesting among pupils was the most cited solution to deal with negative effects of sand harvesting on education as cited by 60.0% of head teachers. This was followed by the suggestion that sand harvesting should be banned as cited by 30.0% of head teachers, then use of provincial administration to enforce compulsory education and that the government should streamline sand harvesting as cited by 20.0% of head teachers. The Area education officer suggested that strict measures should be taken by the provincial administration to ensure that children are not involved in sand harvesting. The same was echoed by the local administration officer.
Table 4.18: Solutions to mitigate negative impacts of sand harvesting according to class teachers

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The government should ban sand harvesting</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Government should create more job opportunities</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Truancy among pupils should be dealt with accordingly.</td>
<td>6</td>
<td>60.0</td>
</tr>
<tr>
<td>Pupils should be given bursaries to fund their education.</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Sensitisation campaigns should be organised to address the effects of sand harvesting</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>County council should come up with laws to regulate sand harvesting</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>Sand harvesting should be regulated to protect the education of minors.</td>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>A policy to admit dropouts should be put in place.</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Parents and teachers should work together to discourage pupils from joining sand harvesting</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Members of the local community should be encouraged to come up with other income generating projects.</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Individuals who employ minors should be prosecuted.</td>
<td>2</td>
<td>20.0</td>
</tr>
</tbody>
</table>

N = 10

The findings revealed that majority of class teachers (70.0%) suggested that the government should ban sand harvesting followed by 60.0% who said that the government should create...
more job opportunities and that truancy among pupils should be dealt with accordingly then 50.0% said pupils should be given bursaries to fund their education and that sensitisation campaigns should be organised to address the effects of sand harvesting.

Table 4.19: Solutions to mitigate negative impacts of sand harvesting according to pupils

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ban pupils’ involvement in sand harvesting</td>
<td>68</td>
<td>85.0</td>
</tr>
<tr>
<td>Sand harvesting should be banned</td>
<td>52</td>
<td>65.0</td>
</tr>
<tr>
<td>Government should provide alternative sources of employment.</td>
<td>34</td>
<td>42.5</td>
</tr>
<tr>
<td>Punish drug abusers</td>
<td>29</td>
<td>36.2</td>
</tr>
<tr>
<td>Divert routes away from schools.</td>
<td>27</td>
<td>33.7</td>
</tr>
<tr>
<td>Provision of bursaries to needy pupils</td>
<td>26</td>
<td>32.5</td>
</tr>
<tr>
<td>Promote soil conservation measures</td>
<td>23</td>
<td>28.7</td>
</tr>
<tr>
<td>Give guidance to pupils involved in sand harvesting</td>
<td>22</td>
<td>27.5</td>
</tr>
<tr>
<td>Sensitise the community of dangers of sand harvesting</td>
<td>21</td>
<td>26.2</td>
</tr>
<tr>
<td>Harvesting should be done over the weekends.</td>
<td>19</td>
<td>23.7</td>
</tr>
<tr>
<td>Dropouts should be assisted back to school.</td>
<td>19</td>
<td>23.7</td>
</tr>
<tr>
<td>Harvesting should be done far from school.</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>Fence off schools</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>Establish a governing body to control sand harvesting</td>
<td>6</td>
<td>7.5</td>
</tr>
</tbody>
</table>

N = 80
The findings on Table 4.19 show that majority of pupils (85.0%) suggested that there should be a ban on pupils' involvement in sand harvesting followed by 65.0% who said that sand harvesting should be banned, then 42.5% said the government should provide alternative sources of employment, 36.2% said that drug abusers should be punished, 33.7% said that routes to the sand mining should be diverted away from schools while 32.5% suggested the provision of bursaries to needy pupils.
CHAPTER FIVE

SUMMARY, CONCLUSION, RECOMMENDATIONS AND SUGGESTIONS

5.1 Introduction
This chapter provides the summary of the study, conclusion of the study, recommendations and suggestion for further study.

5.2 Summary of the Study
The study investigated the impacts of sand harvesting on education development in public primary schools in Kathiani Division. The link between sand harvesting and participation rates was investigated and findings revealed that 93.8% of public primary schools in Kithiani Division are faced with high rates of school dropout and as cited by 60.0% of head teachers with more boys than girls are dropping out school. This according to 70.0% of head teachers was majorly attributed to sand harvesting. The results also show that pupils are spending a substantial amount of school time in sand harvesting thus negatively affecting their school attendance. The study also sought to establish the extent to which sand harvesting influences pupils performance and according to 70.0% of head teachers sand harvesting is contributing to a large extent to poor performance in addition to other vices such as drug abuse as cited by 50.0% of head teachers and indiscipline as indicated by 40.0% of head teachers all of which are attributed to sand harvesting. According to all head teachers (100.0%), pupils who are involved in sand harvesting recorded lower grades in examinations. It was however, also revealed that sand harvesting has negative influence on education as it takes most of pupils study time as well as numerous disruption causes by sand harvesting and most notably causes disruption of learning as a result of noise as revealed by 70.0% of pupils.
The study also sought to establish the impact of sand harvesting on the learning environment and the results revealed that sand harvesting has a profound negative impact of the environment ranging from destruction of water sources to soil erosion, and destruction of the infrastructure which have an impact of on pupils thus affecting their performance in school. The study showed that majority of head teachers (71.2%) said that sand harvesting caused water shortage followed by 55.0% who said it caused sudden drying of rivers and 51.2% said it causes soil erosion. The study findings finally show that sand harvesting has a numbers of positive effects on education in terms of enabling parents and pupils to acquire basic needs as cited by 80.0% of head teachers pay educational levies and also purchase various educational materials as cited by 62.5% of head teachers.

5.3 Conclusion

The study investigated the impact of sand harvesting on educational development in public primary schools in Kathiani Division. The study revealed that sand harvesting is having a substantial negative impact on participation of pupils in education as a number of pupils have dropped out of school to join in sand harvesting while quite a number of them are involved in harvesting during school hours leading to poor attendance. The study also revealed that sand harvesting has led to poor performance as pupils involved in the exercise are recording low grades. The study further revealed that sand harvesting has a profound impact on the environment which has adverse effect on learning due to scarcity of water, damage to the infrastructure and noise from lorries passing nearby schools ferrying sand. It was finally revealed that sand harvesting have positive effects on education as income acquired from it is being used to fund education and also provide basic needs for students. The study therefore
concludes that sand harvesting has negative impact on performance but is also an essential economic activity which calls for ways of streamlining it to minimise its negative influence on education.

5.4 Recommendations of the Study

In the light of the findings and conclusions of the study, the following recommendations were deemed important for the enhancement of enrolment and grade retention rate:

1. The study recommends that the government should regulate sand harvesting activities through constant monitoring to ensure that under-age children are not used as labourers to enhance participation in schools.

2. The government and members of the community should ensure that sand harvesting is conducted at a far distance from educational facilities to eliminate any interruptions on learning in schools to enhance academic performance.

3. Through the Ministry of Environment and Natural resources, the government is required to ensure that sand harvesting activities are regulated to minimise the negative impact of the exercise on the school environment.

4. The government and corporate sponsors should provide bursaries to needy pupils to minimise cases of pupils having to engage in sand harvesting to raise money for their education. This will promote participation rates as pupils will not have to be involved in sand harvesting to get funds to finance their education.

5. The government should ensure full implementation of free primary education by ensuring the elimination of extra levies that pupils have to pay to reduce chances of pupils being involved in sand harvesting to raise money for their education.
5.5 Suggestions for Further Research

The study recommended the following areas for further studies:

1. The study was confined to Kathiani Division of Machakos County leaving out other parts of the country where pupils are also involved in sand harvesting. A similar study should therefore be carried out in other parts of the country.
**REFERENCE**


Raven, J. C., 1956, Guide to the coloured progressive matrices (Sets A, Ab, B), London: Lewis.


Sada and T. Odemerho (ed). Environmental Issues and Management in Nigerian Development p. 6669


UNICEF, (2008) *Education the key to freeing tens of millions children from hazardous labour*.


APPENDIX ONE
HEADTEACHERS INTERVIEW GUIDE

Introduction

Section A: General Information:

1. Sex: Male [ ] Female [ ]

2. Number of years as a head teacher in the current station? __________

Section B: School participation of Boys and Girls

1. What is the trend of enrollment (by gender) in your school in the last 5 years?

2. What is the drop out trend in your school (by gender) in the last 5 years?

3. What are prevalent factors contributing to school dropout of boys and girls in your school?

4. Ten (10) being the highest kindly rate the factors in three (3) above in terms of magnitude.

5. How many of your boys and girls are involved in sand harvesting?

6. How is their school participation in comparison to those who are not involved in sand harvesting in terms of retention, absenteeism and truancy?

Performance of Boys and Girls

1. What is the school mean score by gender for the last five (5) years?

2. What factors affect performance in your school?

3. How does sand harvesting practice rate in comparison to other factors above, ten (10) being the highest in affecting performance of boys and girls in your school?

4. What do you suggest should be done to minimize negative impacts of sand harvesting on performance in your School?
Section D: Learners Environment

1. How has sand harvesting affected the environment within the school catchments?

2. Do these effects on the environment in one (1) above affect education in your school?

3. If yes in 2 above in what ways?

4. What are the positive effects of sand harvesting on education in your school in comparison to schools in zones where sand harvesting is not practiced?

5. What are the negative effects of sand harvesting on education in your school in comparison to schools in zones where sand harvesting is not practiced?

6. Suggest ways in which the negative effects of sand harvesting on education can be minimized.
APPENDIX TWO

CLASS TEACHER QUESTIONNAIRE

Introduction

This questionnaire seek to gather information to be used in a study of impact of sand harvesting practice on academic performance of Boys and Girls in Kathiani Division in Kathiani District. Your honest response will be used for the purpose of this study and will be treated with utmost confidentiality. Do not indicate your name anywhere in this questionnaire.

Instruction

You are kindly requested to honestly respond to the questionnaire items by ticking (✓) or filling in the blank space(s) for items seeking your personal opinion.

Section A: General Information

1. Sex: Male [ ] Female [ ]

2. Class Teacher standard

3. Zone

Section B: School participation of Boys and Girls

1. How many pupils in your class are involved in sand harvesting?

2. How is their participation in school in comparison with those who are not involved in sand harvesting terms of?
   Absenteeism and truancy
   Retention and Completion Performance
3. How has sand harvesting affected the environment within the school catchment? ......

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

4. Do these effects on the environment affect education of your pupils?

Yes ( ) No ( )

5. If yes in four (4) above list down five major ways. .................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

6. What are the positive impacts of sand harvesting on education of pupils in your class?
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

7. Briefly give suggestions on what should be done to minimize negative impacts of sand harvesting on education in your School? ..............................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

APPENDIX THREE
INTERVIEW GUIDE FOR AREA ASSISTANT CHIEF

Section A: General Information

1. Sex
   A Male [ ]  B. Female [ ]

2. Area of operation

A: School Participation of Boys and Girls

1. What are the major causes of school drop out of boys and girls in your Division in order of prevalence?

2. What is the magnitude of school dropout of boys and girls in schools where sand harvesting is rife in relation to schools where sand harvesting is not practiced in your Division?

B: Impact of sand harvesting on performance of boys and girls

1. How do you rate general academic performance of primary schools in your division?

2. Following your response in (1) above, briefly explain what factors in your opinion contribute to this kind of performance.

3. How do you rate the general academic performance of schools where pupils are sand harvesters in comparison to those where sand harvesting is not practiced?

4. How does the discipline of pupils involved in sand harvesting compare with those who are not sand harvesters in your division?
Section B: Effects on the Environment Which Indirectly Supports Learning of Boys and Girls

1. How has sand harvesting affected the environment in your Division? Briefly explain.

2. How do these effects of sand harvesting on environment affect education?

3. What are the positive effects of sand harvesting on education in your Division?

4. Briefly give suggestions on what should be done to minimize negative impacts of sand harvesting on education in your Division?
APPENDIX FOUR

PUPILS QUESTIONNAIRE

Introduction

This questionnaire seek to gather information to be used in a study of impact of sand harvesting practice on academic performance of Boys and Girls in Kathiani Division, Kathiani District. Your honest response will be used for the purpose of this study and will be treated with utmost confidentiality. Do not indicate your name anywhere in this questionnaire.

Instruction

You are kindly requested to honestly respond to the questionnaire items by ticking (√) or filling in the blank space(s) for items seeking your personal opinion.

General information

1. Male () female ()
2. Class

Section B: School Participation of Boys & Girls

1. Are there any of your classmates whom you entered standard one with who dropped out of school? Yes () No ()
2. If yes in (1) above what were their causes of dropping out of school?

3. Do you get involved in sand harvesting practice? If yes in three (3) above how many times per week?

4. What time of the day do you do sand harvesting?

Section C: Effects of Sand Harvesting on Performance

1. Does sand harvesting affect your performance in class?

2. How does your performance compare with your classmates who are not involved in sand harvesting?

3. What are the positive effects of sand harvesting on your education?

4. What are the negative effects of sand harvesting on your education?

Section D: Impact of Sand Harvesting on Learners’ Environment

1. How has sand harvesting affected the environment neighbouring your school?

2. Does this affect your education in any way? Yes ( ) No ( )

3. If yes in (2) above explain briefly how.

4. What do you suggest should be done to protect your learning environment from negative sand harvesting effects?
APPENDIX FIVE

INTERVIEW GUIDE FOR EDUCATION OFFICER

1. How does school enrolment of boys and girls your District in Divisions where sand harvesting is practiced compare with Divisions where it is not?

2. What is the rate of drop out in your District by Gender in divisions where sand harvesting is done in comparison to where it is not?

3. How school attendance and truancy of boys and girls in Divisions where sand harvesting is done compare with Divisions where sand harvesting is not done?

4. What is your management doing to curb the above menace?

5. What is the current district mean?

6. How is the performance in K.C.P.E of Divisions affected by sand harvesting in comparison to those that are not?

7. In what ways does sand harvesting practice contribute to the above performance of boys and girls?

8. How has sand harvesting affected environment in your area of jurisdiction?

9. How do these effects in (1) above affect education in your District?

10. What are the positive effects of sand harvesting on education in your District?

11. What do you think can be done to alleviate these negative impacts on the environment?

12. Suggest long term solutions to the sand harvesting menace.
NCST/RCD/14/012/610

Our Ref:

Veronica Nthambi Mutiso
Kenyatta University
P.O.Box 43844-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "Impacts of sand harvesting on education in Kathiani Division, Kathiani District, Machakos County, Kenya," I am pleased to inform you that you have been authorized to undertake research in Kathiani District for a period ending 30th June, 2012.

You are advised to report to the District Commissioner and the District Education Officer, Kathiani District before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

DR. M. K. RUGUTT, PhD HSC
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioner
The District Education Officer
Kathiani District.