A STUDY TO DETERMINE THE PREVALENCE OF TAENIASIS AMONG PATIENT VISITING MISIKHU MISSION HOSPITAL IN NDIVISI DIVISION OF BUNGOMA DISTRICT.

THIS PROJECT HAS BEEN SUBMITTED IN PARTIAL FULFILMENT OF THE KENYA NATIONAL EXAMINATION REQUIREMENT FOR THE AWARD OF A NATIONAL DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY.

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COURSE: DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

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THE ELDORET POLYTECHNIC
CHEMICAL TECHNOLOGY DEPARTMENT
TRADE PROJECT
DECLARATION

I Nickson Simani Ifedha do declare that this is my own original work and the same has never
Been presented to the Kenya National Examination Council or any other examination body.

Sign........................................

Date.................................6/11/2002

Supervisor............................

Sign........................................

Date......................................
DEDICATION

This work is dedicated to my late father Moses Ifedha Khadeji who passed on in August 1997.
ACKNOWLEDGEMENT

I greatly acknowledge the assistant granted by Mrs. Ochieng (Lecture Eldoret Polytechnic) for her tireless supervision, the staff of Misikhu Mission Hospital for their cooperation.

Gratitude goes to my parents for their financial and moral support. Much credit also goes to my brother Erick and sister Nancy for their helping hand during the study period.

May God reward all abundantly.
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ABSTRACT

A study to determine the prevalence of taeniasis among patients visiting Misikhu Mission Hospital in Ndivisi Division of Bungoma District was carried out from January to April 2001. The distribution of the disease among various age groups and sex was investigated.

Samples from different age groups and sexes were examined using direct saline methods and concentration method (Formol Esther method).

1800 stool samples were examined 403 proved to be positive case with taeniasis 225. Positive cases were from male patient while 178 positive samples were from female patients. The most affected ages was 8 – 10 years (55 positive) children and 20 – 23 (50 positive case and above in adults.

Taeniasis is a sex related disease since both male and female are infected but with a higher incidence in males. The disease has a lower prevalence rate in Misikhu village as compared to other villages.

Taeniasis is prevalent because out of 1800 samples 403 case were positive. It was recommended that people should observe proper hygiene in terms of food, environment and their body sanitation to curb the disease spread.
1.0 CHAPTER ONE

1.1 INTRODUCTION

Taeniasis is a disease caused by helminthes belonging to the class cestoda, family Taeniidae and genus Taenia (Lineaus 1758). There are two common species which affect man i.e. *Taenia Solium* (Pork tapeworm) and *Taenia saginata* (Beef tapeworm) that are virulent and can cause death.

Taeniasis remain an important health problem in developing countries. Its transmission is related to consumption of viable cysticercus found in unhygienic and undercooked beef or pork and their related products by man.

This parasitosis is geographically distributed in Africa, Asian and Latin America while the greatest incidences are found in pig and cattle rearing countries like Mexico and Brazil.

The development of Taeniasis is said to be increasing in the US and Europe due to the increasing immigration and more frequent travels to endemic regions (Refs. Antoniuk 1999).

Among those affected are all ages with a very low prevalence in infants and strict vegetarians. Identification of human tapeworm infection is important for public health purposes because prompt identification of *Taenia Solium* carriers may prevent further human cysticercosis infections a major cause of acquired epilepsy.
1.1.1 PROBLEM STATEMENT

Prevalence of Taeniasis among patients visiting Misikhu mission hospital within Ndivisi Division of Bungoma District between January and April 2001.

1.1.2 HISTORICAL CAUSES

Due to the peoples reluctance in seriously taking Taenia infection has been injurious thus delay to take appropriate treatment. The stigma related to tapeworm in this community i.e. if one seen with proglottids on the body, he or she is laughed at and rejected. This has led to some keeping of from seeking medical advice at the right places and resort to herbs and witch doctors for treatment that are never effective.

The community leaving around this hospital has a social life, which greatly contributes to the spread of Taeniasis‘ in that in most of their social gatherings, or ceremonies they like slaughtering cattle whose meat is roasted and consumed without proper inspection of a qualified meat inspector. Most pork selling butcheries do offer roasting services which are not up to date thus miss killing all Taenia Solium Larvae (Cysticercus Cellulosae) leading to transmission to man.

The debilitating effect of Taeniasis in a population already surviving on a protein deficient diet is very acute.

It was with these views in mind that made me carry out the assessment of Taeniasis prevalence in Misikhu Mission Hospital in Bungoma District.
1.2 OBJECTIVES

(i) To determine the prevalence of Taeniasis by age and sex.

(ii) To determine the geographical distribution of the disease in the villages served by the Misikhu Mission Hospital i.e. within Ndivisi Division.

1.3.0 SCOPE & LIMITATION

1.3.1 SCOPE OF STUDY

The study was carried out at the Misikhu Hospital Laboratory found in Western Province, Bungoma District, Ndivisi Division Misikhu village

The Hospital serves the following villages, Misikhu village Bahayi village Ndivisi village Makemo and Kamukuywa. The region has Misikhu Mission hospital as the sole medical centre with a population of 15,000 people i.e. within Ndivisi Division.

1.3.2 SCOPE LIMITATIONS

(i) Reluctance of some people to give their stool samples for examination.

(ii) Lack of enough equipment to keep specimens in the most probable form and condition in case of heavy workload thus giving false diagnosis at latter analysis.

(iii) Only cases presented to the hospital were examined.

(iv) Lack of enough finance for the purchase of the required reagents
1.4.0 LITERATURE REVIEW.

CONTRIBUTING FACTORS TO THE SPREAD OF TAENIASIS IN THE TROPICAL COUNTRIES

A study was done in 1983 at KEMRI & KETRI Nairobi on contributing factor to the spread of Taeniasis by current public health research in the tropics with special session on communicable disease:

- It was discovered that the unreliability of sewer treatment caused the spread of Taeniasis by the contamination of grazing fields.
- The survival of eggs in the sewer is enhanced due to large quantity of detergents and insecticides entering the sewer from homesteads preventing sedimentation, oxidation, heat formation and putrefaction, which would lead to the destruction of the eggs.
- The unripe sludge used as fertilizer is also a source of mass infection.
- Birds may act as disseminators of proglottidus picking up the segments floating on the surface of unprotected sewage. The dissemination may be due to the loosing part of the proglottid in flight or by passing viable eggs. This is possible in those birds, which do not posses a crop. Bird may even infect areas up to 20KM. From the sewer plant.

Research about the spread of Taeniasis done in 1945 by the African veterinary research journal indicated that the failure of routine “eye and knife” meat inspection performed on African cattle contributed to the transmission of Taeniasis. As early as 1945 the author was put in charge of a large meat-packing plant in Kenya which fast produced corned beef for the army and then for the five consecutive years “food for Britain”. During fifteen month (1945 – 1946) the routine examination of 92,845 animals for measles indicated that an extremely large number of animals harboured heavy infections of Taenia inclusive about 50% i.e. the cysticercus in the meat. This was arrived at after using other diagnostic means other than the “eye and knife”.
Further experience at the same packing plant with some 600,000 herd of cattle proved that up to 50% of carcasses showed cysts after they had been passed as “free from infection” after passing through a meat cutting machine enabling inspection of whole carcasses cut into pieces not large than one inch.

FAILURE TO INCRIMINATE DOMESTIC FLIES
(Diptera: Muscidae) AS A MECHANICAL VECTORS OF
TAENIA EGGS (Cyclophyllidae: Taenidae) IN RURAL MEXICO.

Source

Summary
Flies caught in homes in a rural village in Guerrero, Mexico, between November 1994 and August 1995 were assessed for their role in the transmission of Taenia Solium L. Most (99%) of the trapped flies were Musca domestica L. None of the 1,187 guts or 1,080 legs of the contained T. Solium eggs. Pigs roam freely in this village consuming human fecal materials immediately after defecation, thereby limiting fly contact with T. Solium eggs.
1.4.1 THEORETICAL STATEMENTS

Taeniasis is a disease caused by helminthes belonging to the class cestoda, family Taeniidae and Genus Taenia (Linnaeus 1758). The most common species that affect man are Taenia solium and Taenia saginata. Ref. (Souls by E.J.L. 6th edition Helminthes of domesticated animals)

**Habitat**

Adult worms of both species reside in the small intestine of man.

**Transmission**

The disease is a zoonosis. Infection with T. Saginata occurs when undercooked beef is consumed for which it is prevalent among Mohammedans, while infections with T. Solium is common among those eating raw or undercooked pork. Eating viable cysticerci in pork or beef infects man. Man with ova leads to human cysticercosis.

**Geographical distribution.**

Cosmopolitan with great infection amongst non–Mohammedans who consume both pork and beef while lower in in Mohammedan who majorly use beef. T. Solium is world widely distributed with an estimated 4 million infected people in China, India, Central America Chile, Brazil and New Guinea.

**Morphology:**

Adult worms of both species are white in colour T. Saginata may be 5 – 10 metres in length while T. Solium measures 2 – 3 metres. The scolex (or head) of both species measures 1 – 2 millimeters in diameter with four circular suckers and scolex of T. Solium contains rostellum and hooklets. A neck part of the T. Saginata is fairly larger than T. Solium.

Proglottides comprising of complete unit of tape work may be mature (if reproductive organs appear), immature (reproductive organs not appeared) or gravid which may be found mixed with stool comprise about 1 –2 thousands of segments of T. Saginata and less than 1000 for T. Solium

The lifespan of adult worms is about 10 year. Eggs are released by rupture of ripe proglottides. The eggs are spherical in shape brown in colour, the inner embryosphere is brown and thick walled and the egg contains an oncosphere with three pairs of hooklets.
LIFE CYCLE

The worms have their life cycle in two hosts i.e. one definitive host chiefly man an intermediate host – cattle for T. Saginata and pig for T. Solium.

Adult worms reside in the small intestine of man and eggs or segments are passed out with faeces on the ground. The animal pick the eggs in their grazing grounds or feeds. In the alimentary canal of the animal the eggs rupture and oncosphere are released. The oncospheres reach into the muscular tissue through circulating blood and develop into larvae forms or cysticercus. Eating the undercooked beef or pork containing viable cysticercus infects the human beings. The cysticerci come into the intestine of man through bile and develop into adult worms by gradual strobilisation. The worm grows into sexual maturity-within 2 – 3 months i.e. with mature segments with fully developed and functional reproductive organs and start laying eggs, which are passed out through feaces along with gravid segments, and thus repeating the cycle. Fig. (ref to appendix)

Pathogenicity

The following are the pathological feature of Taeniasis.

- Abdominal disorder
- Chronic indigestion
- Intestinal disorder.
- Diarrhea.
- Human cysticercosis acquired from the ingestion of ova of Taenia solium, excreted by human carriers in their feaces followed by the development of cysts in human tissue. The presence of cysticerci in the body vital organs
- e.g the brain causing convulsions or acquired epilepsy
  and ocular cysticercosis which results to blindness

ECONOMIC IMPORTANCE

- Causes Taeniasis/ Cysticercosis in man
- Causes loss the beef and pork industry through the
  rejection of carcasses with cysticerci.

CONTROL AND PREVENTION

- Environmental hygiene: Teaching people the prevention
  of contamination of water, soil, food with excreta should
  take priority in any control program.
- Avoid eating partially cooked pork and beef.
- Treatment of human carriers.
- Deworming of pigs and cattle i.e. the intermediate hosts.
- Proper meat inspection.
1.4.2 DEFINITION OF CONCEPTS

1. Zoonosis – an infection of both man, domesticated and wild animals.

2. Cysticercus – This is the resting stage of the larval form of the life cycle of Taenia species. It is normally in the intermediate hosts.

3. Host – Living organism which harbours another living organism and usually gives mutual metabolic support to other living organism.

4. Life cycle – These are the stages from an egg to the adult form of a parasite i.e from one definitive host and back to the definitive host.

5. Pathogenicity – The process of disease production

6. Proglottide – An individual segment comprising of a complete unit of a tapeworm.

7. Oncosphere – A six hooked embryo inside the egg of the Taenia species surrounded by the egg shell.

8. Gravid Segment – The segment of Taenia which is full of eggs.
HYPOTHESIS.

1. Taeniasis is more prevalent in males with the highest number in young males.

2. Taenia infection is less in Misikhu village, as compared to other villages served by Misikhu Mission Hospital.
1.4.3 METHODOLOGY.

The microscopic identification of Taenia parasite is the most dependable method of confirming their presence.

Microscopical laboratory techniques for investigating Taenia parasites include:-

(i) **Direct saline preparation**

Direct saline method is simple and rapid. This is where a small amount of stool is mixed with a drop of physiological saline on a slide and examined microscopically. This allows the observation of helminthes ova i.e. Taenia eggs and larvae.

Physiological saline is isotonic to the larvae forms thus allowing them to be life and motile to be easily identified.

The nature disadvantage of this method is that only small volumes of stool are examined.

The method was used because of its simplicity and was less expensive and could be carried out without electricity.

(ii) **Concentration Methods:**

Concentration method are used to examine a large volume of stool rapidly. The methods detect small numbers of parasites in stool which may be missed on the direct examination.

Concentration method employ the use of emulsifying agents which allow the exposure of helminthes ova, cysts of protozoa and larvae by sedimentation from debris and fatty material after centrifugation.

The method was used for stool specimens which gave negative results with direct saline method.

Concentration methods include:-
**Formol-ether sedimentation technique**

In which the parasites are sediment by centrifugal force

Ether – is used to dissolve fecal fat and to separate the fecal from the sediment parasites. The method is commonly known as modified Ritchie method.

The method include the use of solution with low gravity to allow sedimentation of parasites and eggs.

**Advantages:**

- Good method for recovering of ova and cysts.
- The specimen is fixed therefore low chances of infection.
- The specimen can be examined at a later date.

**Disadvantages**

- Expensive
- Time consuming.
- Can only be used where there is electricity.
- Not good for light ova and cysts
- The method was used since it allowed examination for specimen at a later date incases where there was heavy workload and for specimen received at late hours.

**Zinc sulphate floatation method:-**

The method uses zinc sulphate which has a greater gravity than parasite i.e. ova and larval forms allowing them to float on the surface where they stick to the trapping surface.

**Advantages**

- Reduce some specific gravity of ova of some parasite

**Disadvantages**

- It is cumbersome
- Expensive
- Time consuming.
- There is a possibility of infection.
- Not good for operculated ova

The method was not used due to being cumbersome and time wasting.

1.5.0 MATERIALS AND APPARATUS

1.5.1 APPARATUS

- Binocular microscope (Light microscope). The new tropical medicine designed by Gillett and Sibert company and tropical technology.
- Microscope glass slides (clean and frosted at one end).
- Cover slips (glass).
- Mortar & pestle.
- Centrifuge – fixed angle, electric with test tube balance.
- Plain glass centrifuge tubes.
- Graduated glass centrifuge tubes.
- Screw – capped universal bottles with rubber liner.
- Pasteur pipette with rubber teat.
- Wide mouthed plastic containers with lids (4cm. Diameter).
- Strainer / sieve.
- Applicator sticks (wooden).
- Grease pencil.
1.5.2 MATERIALS

- Normal saline (0.85% NaCl)
- 10% formol saline.
- Ether.
- Fresh stool sample.

1.6.0 SAMPLING TECHNIQUES

Fecal samples requested from patients visiting the hospital for the three consecutive months.

This was carried out successively because it was under the collaboration of the medical staff in the hospital.

The specimens were stored in a fridge at a temperature of 22 degrees Celsius in well-capped specimen bottles in case of a heavy workload in the laboratory or specimen requested at late hours of the day.

The patients were issued with disposable plastic bottles and proper instructions given on how to collect their samples without contamination.

A total of 1,800 stool samples were analysed and 403 were proved positive.
1.6.1 PREPARATION OF STANDARD AND OTHER REAGENTS.

(i) Physiological Saline:-

To prepare physiological saline:

- Sodium chloride 0.85g
- Distilled water 100mls

Add sodium chloride to the distilled water and shake until it makes a solution. Label and store.

(ii) Formol - Ether

Stool is emulsified in 10% formol Ether.

Preparation:-

Formaline 100ml.
Physiological Saline 900mls

1. Add the Formaline to the saline.
2. Mix well and transfer to a reagent bottle with a well fitting lid.
3. Label it and store.

Caution:

- Ether is highly flammable. Keep away from naked flames.
- Formaline is irritating to the skin and the vapour may be dangerous if inhaled. Formaline should be prepared in a fume chamber and away from fire sources or naked flames.

(iii) Quality control of physiological saline:-
Test all new batches of physiological saline as follows:-

- Pipette about 1 ml of physiological saline.
- Add a drop of capillary or anticoagulated venous blood.
- Leave the test tube standing at room temperature for about one hour.
- Without disturbing the deposit, examine the saline for pinkish colour indicating haemolysis (rupture of red blood cell).
- If there is no haemolysis re suspend the blood cells in the saline by tapping the tube.
- Place a drop of the suspension on a clean slide and put on a cover slip.
- Place the slide on the microscope stage and examine with X40 objective for crenated red cells. Crenate red cells appear small and shrunken with an irregular surface.
- If there is evidence of haemolysis or crenation of red blood cells discard the saline and prepare a new batch paying attention to accurate weighing of sodium chloride. *physiological saline should be clean and colorless, if it becomes turbid, discard*, *Do not use saline that is infected with small flagellates and bacteria. Check the saline once a week as follows:-*
- Place a drop of saline on a clean microscope slide, put on a cover slip.
- Place the slide on the microscope stage and examine with X10 objective for motile flagellates.
- Examine bacteria in more detail with X40 objectives.
- If flagellates or bacteria are seen, discard the saline and prepare fresh one.

EXPERIMENTAL PROCEDURE.

1. DIRECT SALINE PREPARATION

APPARATUS
- Microscope (Light Microscope)
- Glass slide.
- Coverslips
- Applicator stick

MATERIALS
- Stool specimen
- Physiological saline.

PROCEDURE
- A clean glass slide was chosen and on it a drop of physiological saline was placed.
- Using an applicator stick a small portion of the stool sample was placed and emulsified with the saline on the slide and on it a cover slip was put. The slide was labeled with the patients laboratory number using a grease pencil.
- The slide was placed on the microscope stage using X10 objective swung into position the specimen was examined systematically.
- A more detail examination was done using X40 objective and the findings recorded in a file.
- The cover slips were placed in the container of disinfectant marked “COVER SLIPS” while the slides placed in a container of disinfectant marked “SLIDES”.
- The wooden applicator sticks and capped disposable stool containers in the bucket marked “INCINERATION”.

2. **FORMOL – ETHER CONCENTRATION METHOD.**

**APPARATUS**
- Light microscope.
- Funnels.
- Pestle & mortar
- Electric centrifuge
- Glass centrifuge tubes (plain)
- Glass slides.
- Coverslips
- Applicator sticks
- Grease pencil
- Pasteur pipettes with rubber teat
- Screw capped universal bottle with rubber liner

**MATERIALS**
- Stool sample
- Cotton gauze (strainer)
- Ether
- 10% formol saline
PROCEDURE

- About 10mls of 10% formol saline was measured in a clean graduated glass centrifuge tube and poured into the clean mortar.
- 1–2 grams of stool was placed in the mortar using an applicator stick and emulsified with the pestle.
- The suspension was sieved through a strainer i.e. though two layers of cotton gauze into the universal bottle and capped tightly. The bottle was labeled with the patient laboratory number using a grease pencil.
- About 3 mls of ether was measured in the graduated glass centrifuge tube and poured into the universal bottle that was screwed with a cape tightly and shaken vigorously.
- The mixture was transferred into a plain glass centrifuge tube and labeled with the patient laboratory number.
- The mixture was centrifuged at a medium speed for two minutes using an electric centrifuge.
- The mixture separated into four layers:
  (i) An upper layer of ether
  (ii) A plug of debris and fatty material.
  (iii) A layer of formol saline
  (iv) Sediment.
- The plug of debris was loosened with an applicator stick, the supernatant (ether, formol saline plug of debris and fatty material) into a sink with running water or into the bucket of disinfectant marked “BODY FLUIDS”.
- The bottom of the tube was tapped with a finger to resuspend the sediment. A drop of the sediment was transferred on to a clean glass slide using a Pasteur pipette with rubber teat.

- A coverslip was put on the slide then labeled with a patient’s laboratory number and placed on the microscope stage.

- Using X10 objective into focus and position the preparation was examined systematically for ova. More details were examined using X40 objective and the results were recorded in a file.

- Capped disposable stool containers and cotton gauze and wooden applicator sticks placed in the bucket marked “INCINERATION”. Cover slips placed in the container of disinfectant marked “COVERSLIPS”. Slides, pipettes and centrifuge tubes were placed in the container of disinfectant marked “SLIDES”. The universal bottles, pestle and mortar were placed in the bucket of disinfectant marked “REUSABLE CONTAINERS”.
2.1 PRESENTATION AND ANALYSIS OF THE RESULT.

The results that were obtained were worked on and tabulated as per age group and sex. For easier work the following groups were used among the children of ages between 2 – 16 years.

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The following ages were used for both adult women and men.

<table>
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and above.
The prevalence of Taeniasis in children of both sexes as per the analysis presented for three consecutive months:

<table>
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<tr>
<th>AGE</th>
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<th>MALE</th>
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<tr>
<td>Total</td>
<td>69</td>
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Table 1 (b)

Prevalence of Taeniasis in adult of both sexes as per the analysis presented for three consecutive months:

<table>
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<th>AGE</th>
<th>FEMALE</th>
<th>MALE</th>
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</tr>
<tr>
<td>38 - 41</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
<td>140.</td>
</tr>
</tbody>
</table>
Figure 1: Prevalence of Tonsillitis in Children of Both Sexes as Per THE Analysis Presented for THREE Consecutive Months.
Figure (2) Prevalence of the disease in adult of both sexes as per the analysis presented for three consecutive months.
### TABLE 2

**The total distribution of taeniasis as per residential places of patients for the three consecutive months.**

<table>
<thead>
<tr>
<th>Villages</th>
<th>Males</th>
<th>Female</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misikhu</td>
<td>25</td>
<td>38</td>
<td>63</td>
</tr>
<tr>
<td>Bahayi</td>
<td>52</td>
<td>30</td>
<td>82</td>
</tr>
<tr>
<td>Ndivisi</td>
<td>48</td>
<td>54</td>
<td>102</td>
</tr>
<tr>
<td>Makemo</td>
<td>60</td>
<td>24</td>
<td>84</td>
</tr>
<tr>
<td>Kamukuywa</td>
<td>40</td>
<td>32</td>
<td>72</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>225</strong></td>
<td><strong>178</strong></td>
<td><strong>403</strong></td>
</tr>
</tbody>
</table>
Fig. 3 The distribution of T.A.E.S. as per residential places of patients for the three consecutive months.
2.2 DISCUSSION OF RESULTS

From the results obtained it was evidenced that the main age group affected most in the children is between 8 – 10 years. This can be explained by their ignorance about Taeniasis since it is assymptomatic in most cases and also due to their increased activity, which brings them into contact to sources of infection. The adults are at risk of contracting the disease due to their social activities like eating raw or undercooked meat i.e. pork or beef during parties and ceremonies, but on the other hand adults in this area are not highly affected due to their knowledge about the control of the parasite and also preventive measures to be undertaken.

Males contract the disease easily as compared to the females due to their social mode of life and their indulgence in activities that are related to the infection and spread of the disease. On the other hand poor personal hygiene, poor sanitation and poor disposal of human excrector are the key factors to the spread of the disease.

It was discovered that among the five villages assessed Misikhu proved to be having the lowest Taenia prevalence as compared to other villages of study

In summary it was noted that the study had a general lower prevalence or rate of infection of Taenia. This was due to the protective means undertaken by the community and education which has added to the peoples knowledge of the disease hence not ignoring it.

From the population structure: ages of 8 – 10, 20 – 23 and 24 – 27 have the highest percentage prevalence and hence can be used as target groups in the control of infection.
3.0 CHAPTER THREE

3.1 CONCLUSION

From the analysis of the result it was concluded that the group most affected as per age and sex are the male. This can be clearly seen from table 1(a) and (b), fig. 1&2.

It has also been concluded that Taeniasis is less prevalent in villages by Misikhu mission hospital in that only 403 stool samples proved to be positive out of a total population of 15,000 people.
3.2 RECOMMENDATIONS:

Considering the fact that Taeniasis is prevalent in areas served by Misikhu mission hospital, the following recommendation should be researched upon to curb further spread of the disease.

(i) Dangers associated with the "eye and knife," meat inspection should be put in place.

(ii) There is need for re-evaluation of the present meat inspection techniques.

(iii) Biological and epidemiological research should be done prior to introduction of a control program.

(iv) The training of the community at large through health – workers to know the economic importance of the disease.

(v) There is need for the modification of railway train lavatories, which may contribute to the dissemination of eggs of Taenia to animals grazing on or near the railway lines.
APPENDIX I

MEDICAL LABORATORY MANUAL FOR TROPICAL COUNTRIES

LIFE CYCLE

TAENIA SAGINATA

CATTLE
Cysticercus bovis develops in muscle
Eggs ingested and oncosphere hatches

HUMAN HOST
Cysticercus ingested in undercooked beef
Tapeworm in intestine
Segments and eggs in faeces

TAENIA CYSTICERCUS

TAENIA EGG

GRAVID SEGMENTS
T. saginata
T. solium
Invaginated head
Bladder
Uterine side branches
Embryonic booklets
Thick striated wall

HUMAN HOST
Cysticercus ingested in undercooked pork
Tapeworm in intestine
Segments and eggs in faeces

PIG
Cysticercus cellulosae develops in muscle
Eggs ingested and oncosphere hatches

LIFE CYCLE
TAENIA SOLIUM
3.4 REFERENCES:


