

- ii -

TITLE

A REVIEW OF HYDATIDOSIS AS SEEN IN  
KENYATTA NATIONAL HOSPITAL  
OVER TEN YEAR PERIOD  
MAY 1975 - APRIL 1984

---

DR. GIKENYE GICHAMBIRA WAITITU GABRIEL, M.B., Ch.B. (NRB.)

A THESIS SUBMITTED IN PART FULFILMENT  
FOR THE DEGREE OF MASTER OF MEDICINE  
(SURGERY)

APRIL, 1985.

University of NAIROBI Library



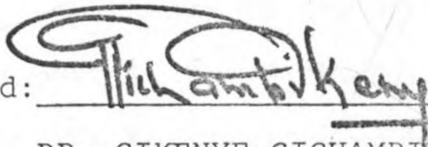
0324673 3

UNIVERSITY OF NAIROBI  
LIBRARY

DECLARATION

This dissertation is my original work; it has not been published elsewhere or presented for a degree in any other University or Institution.

Signed: \_\_\_\_\_



DR. GIKENYE GICHAMBIRA WAITITU GABRIEL

This dissertation has been submitted for examination with my approval as University Supervisor.

Signed: \_\_\_\_\_



MR. E. O. OJARA

ACKNOWLEDGEMENT

I am indebted to Mr. Ojara, E.O. (M.B., Ch.B., M.Med.) for accepting to supervise and for the help he gave during the course of this work.

My sincere thanks to the hospital Director, Kenyatta National Hospital, Dr. F. Mueke, for allowing me to make use of the hospital records. Thanks to the records department for making available the case files to me.

My sincere thanks to Mrs. Violet Waweru for typing the manuscript.

SUMMARY

A retrospective study of hydatidosis between May 1975 - April, 1984 was carried out. Age, Sex, ethnicity and geographical distribution were investigated. Aspects of clinical presentation, the scope of investigations and modalities of treatment were explored.

60% were either in their childhood, adolescence and early adulthood (5-24years). There was a male:female ratio 1:1.3. Turkana, Maasai and Kikuyus constituted 83% but several groups were involved. It was found to be widely distributed throughout Kenya. Surgical therapy was given to 60% of patients chemotherapy to 17.1% and a combination to 15.3%. More than 7% received no treatment.

The results are represented in full and discussed.

AIMS

a) To analyse demographic data, sex, age, ethnic group and district of origin and thereby the occurrence of clinical disease in humans in Kenya.

b) Determine the main complaints and the average duration before medical advice is sought; compare different ethnic groups.

c) Review the investigations performed, their adequacy and try to determine the most suitable ones in this environment.

d) Determine frequency of anatomical sites affected

e) Review of therapy over the study period, advantages and disadvantages of various therapeutic modalities with special reference to surgical complications

## INTRODUCTION

Echinococcosis (Hydatidosis) as a clinical entity appears to be as old as man himself. It is described in the writing of Hippocrates (1). Later it was described by Galen.

Echinococcosis is caused by the larvae stage of the dog tapeworm (or other carnivore) man, sheep, camel being intermediate hosts. There are twelve species known but only two cause disease in man. *E. granulosus* and *E. multicularis*, the former being more widespread than the latter (1). The cysts found in *E. Granulosus* infection are well loculated and those of *E. Multicularis* poorly so forming a mesh work of honey comb appearance.

In both types of hydatidosis man is infected by indirectly ingesting dog's faeces or other items so contaminated and containing the ova. Once ingested into the human gastro-intestinal tract the outer coat of the ova is digested, and the ova penetrates the gut mucosa to enter the portal circulation. The ova may then be trapped in the liver sinusoids, in the lungs or any other part of the body. Wherever it is trapped the ova develops into a cyst, which represents the larvae stage of the worm.

The cysts consist of an inner, geminal layer also called the endocyst and outer fibrous layer or the pericyst. From the inner layer scolices develop. These are potentially adult worms, if flesh containing the cyst was to be eaten by a definitive host, dogs, wolves, hyena and other carnivores. The pericyst represents reactive change by the host to the parasite. A viable scolex has the ability to perpetuate asexually and develop into a secondary cyst in event of rapturing the primary cyst.

The animal source was suspected by P.J. Hartmon in the Seventeenth Century and in the following a hundred years or so the adult worm had been grown in the dog from scolices of both domestic animals and human sources (43). In the present day, the adult worm can be bred from scolices in vitro (42). This has the advantage of earlier study of biochemical properties and needs and may lead to better understanding in sub-species and a more rational approach to chemotherapy.

Hydatidosis is found in many parts of the world, the sheep rearing areas of Europe, the Soviet Union, Australia and New Zealand, Middle East, the Americas particularly Argentina and Chile, Eastern and Southern Africa (1,38).

In Kenya, an area said to be a hyper endemic zone of the world (22) the first human record of hydatidosis appear to be that of Wray (2). His observant eye noted the frequency of the disease in patients operated on in Kitale Hospital. He further noted that those afflicted were mainly of Turkana ethnicity. Two years earlier, Ginsberg had found an overall infestation rate of 30% in all animals slaughtered at Athi River Abattoir (5). Later in 1963 Nelson GS found a high parasite prevalence in the domestic dog in the three areas he studied: 50% in Nairobi, 75% in Turkana and 25% in Kajiado District (4). Among the wild carnivores at the Northern part of Maasai reserve, he examined, the Silver backed jackal and the spotted hyena, there was an infection rate of 38% and 15.8% respectively.

Among the herbivorous, the incidence of affection appears greater in the domestic livestock than in the wild. In cattle the percentage of carcasses infected, has between 1954 and 1978, varied between 25% and 47% among sheep and goats 30% and 40% and 10% to 20% respectively (5,10). Herbivores in the wild that have been examined include, buffaloes, baboon, the blue duiker water buck, grants gazelle, impala and the wildebeest. The highest rate



being  
of affection/12.2% of the 567 animals examined.

A similar pattern was seen in Turkana (40). Of the 188 dogs examined 49.4% harboured the adult worm. Fewer than 20% of the wild carnivore examined harboured the worm.

The economic aspect of this disease cannot be underestimated. An enormous amount of money is lost to the farmer due to rejection of carcasses or dropping of grade of meat obtained from infected cattle. In addition, the lost man hours due to chronic ill health and the amount of money that must be invested in treatment goes to emphasize that the disease must be tackled by all means at our disposal to control this drain on the meagre national resources.

While there is plenty of evidence that hydatidosis is very prevalent in both Turkana and Maasai areas of Kenya (2,4,8,35,36), it appears that other areas and ethnic groups have not been spared. In 1965 McClutchie (3) reported a sudden death in a Kisii boy, who at autopsy was found to have cysts that had burst from the myocardium. Although a macroscopic discontinuity was not established, a microscopic discontinuity was not ruled out. It is quite possible that microscopic discontinuity led to arrhythmia and death. However, as McClutchie postulates anaphylaxis might well have been the cause.

Okello 1979 (35) raised the suspicion that other parts of Kenya might have human cases. Earlier 1973, Rottcher (36) reviewed over 160 patients from hospitals covered by the Flying doctors service, these areas by their remoteness from the more developed, more populated areas were both in Turkana and Maasai populated districts. Furthermore, most of the hospitals from which he obtained his materials lacked facilities to confirm diagnosis or to offer treatment for the pulmonary cases.

Laboratory investigations may be on general assessment of a patient for example haemoglobin level and B.U.N. They may also be specific either in confirming diagnosis and or locating the anatomical fixation, indirect haemagglutination, immuno electrophoresis, radio-immunoassay, Latex agglutination, enzyme linked immuno absorbent assay. Some of these immunological screens have been popularized by different workers (47) some claiming superiority of one method over another in simplicity, interpretation, specificity and sensitivity.

Other investigations are applied in locating the cysts. These include plain x-rays (particularly) chest, ultrasonography CT scan and also selective

angiography. In addition to diagnosis, these investigations may be used to monitor the result of treatment -(medical) and the follow-up to rule out recurrence.

Patients with hydatid disease seek medical attention late (9,32) and a number may present with complications (25,49). O'Leary in 1979 found that among the Turkana the average duration between symptom and seeking medical attention was three years - with range between half and 20 years! It is the aim of this study to compare the average duration between symptoms and medical attention between the Turkana and other groups, whose attitude to modern hospital medicine may be different.

Surgical treatment has been described since the 19th Century (40). Since those times, surgical excision has for a long time remained the only form of therapy for this disease. Despite the progress made in surgery, particularly in sister fields of physiology, anaesthesia and pathology, this form of therapy has not been short of shortcomings. Patients still have to undergo general anaesthesia, with its attendant risks and side effects. Surgery per se has its risks, for example haemorrhage, and attendant risks of blood transfusion, and other mis adventures by its very nature, depending on the

experience and the competence of the surgeon. Particular complications peculiar to this disease are anaphlactic shock and secondary cyst formation from spillage of cyst fluid containing viable scolices. These factors have driven the clinician and scientist alike to seek easier successful and convenient form of medical therapy devoid of surgical complications and risks and hopefully having non or few of its own.

In the last decade, many trials of medical treatment have been done (9,12,15,18,21,29). Mebendazole has been the most widely used drug. Albendazole too has been used and recently praziquantel. Like surgery, medical treatment seem to have complications peculiar to it despite the earlier optimissim. It is the aim of this study to compare the result of medical and surgical treatment as seen in Kenyatta National Hospital.

MATERIALS AND METHODS

Patients case records for patients treated for echinococcosis were retrieved from the hospital's record department.

Kenyatta National Hospital is the final referral centre for the whole of the Republic. Patients are admitted from regional (provincial), and district hospitals. It serves in addition some neighbouring countries for treatment in specialized units.

One hundred and twelve case records were retrieved for the period under study (May 1975 - April, 1984). Details including sex, age, occupation, ethnic group and district of origin were recorded. The main complaints and their duration before seeking medical advice were also recorded.

Further, the main physical findings at the initial clinical examination on admission to hospital were also recorded. All investigations either special for hydatidosis or for patients general assessment were also recorded. Mode of therapy offered being either surgical excision alone, medical treatment alone and a combination of both surgery and chemotherapy was also recorded.

Note of responses to either mode of therapy was made. Any complications arising from therapy were also noted, these included any ill effects of surgery and death where it occurred

A final heading comments was included in the proforma. Under this heading, peculiarities of individual cases which could not be included elsewhere were noted. Length of follow up was recorded under this heading.

A total of a hundred and twelve patients case records were retrieved. However, seven patients were found unsuitable and were dropped from the study.

Two among those dropped had had four years abdominal swelling, which clinically were thought to involve the liver. Both had been referred to surgical out-patient clinic, and subsequently lost to follow up. Not a single investigation had been performed and there was no past history to suggest recurrence. The third patient was lost to follow up after a haemogram had been performed. A fourth patient who was thought to have infected cyst of the lung grew mycobacterium tuberculosis and improved on anti-T.B. therapy. However, the diagnosis was not accordingly altered on the discharge abstract. A fifth patient was admitted in very ill condition and died before investigations or therapy could be carried out. No autopsy report was available.

The sixth had a right ovarian mass which was proven to be non-hydatidosis at histology. The pre-operative diagnosis was not accordingly changed. The seventh patient was excluded having had spontaneous disappearance of abdominal mass in three weeks of admission. Naturally, the patient requested to be discharged.

A copy of the proforma used to collect the desired information is included.

REVIEW OF HYDATID DISEASE

AS SEEN IN

KENYATTA NATIONAL HOSPITAL

MAY 1975 - APRIL 1984

NAME: ..... AGE: .....

SEX: .....Male or Female.

OCCUPATION: .....

.....

ETHNIC GROUP: .....

DISTRICT OF RESIDENCE: .....

MAIN COMPLAINTS: Duration before seeking hospital/  
medical attention.

Pain: .....

Fever: .....

Abdominal Swelling: .....

Cough: .....

Haemoptysis: .....

Orbital swelling: .....

Fracture .....

Others .....

.../cont.





TREATMENT

1. Chemotherapy: .....
  - (a) Mabendazole .....
  - (b) Albendazole .....
2. Surgical Excision: .....
3. Surgical excision and (a) Mabendazole .....  
(b) Albendazole .....

OPERATIVE FINDINGS:

Abdominal site:

- Liver .....
- Mysentry .....
- Kidney .....
- Ovary .....
- Pancreas .....
- Spleen .....
- Other sites .....

Orbital .....

Thoracic

- Lungs .....
- Breasts .....
- Central Nervous System: .....
- Brain: .....
- Spinal Cord: .....

Bones: .....

Others: .....

Single cyst .....  
Multiple cyst .....  
Daughter cysts .....

COMPLICATIONS

Suppuration: .....  
Pneumonia .....  
Anaphlactic shock: .....  
Discharging sinus .....  
    Duration (weeks) .....  
Others: .....  
Death: .....

COMMENTS

(i) Suitable for study.....  
(ii) Length of follow up.....  
(iii) Other relevant comments .....

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

RESULTS

A total of a hundred and five case records were studied. There were 47 males and 58 females.

TABLE I  
SEX INCIDENCE

	NO.	%
MALES	47	44.8
FEMALES	58	55.2
T O T A L	105	100

TABLE II DISTRIBUTION BY ETHNIC GROUPS

	NO.	%
Turkana	33	31.4
Maasai	33	31.4
Kikuyu	21	20
Kamba	5	4.76
Luo	5	4.76
Samburu	2	1.7
Boran	1	1.0
Others	4	3.8
Pokot	1	1.0
TOTAL	105	100%

TABLE III AGE DISTRIBUTION

AGE	NO.	%
0 - 4	5	5.3
5 - 14	43	45.3
15 - 24	14	14.7
25 - 34	15	15.8
35 - 44	2	2.1
45 - 54	7	7.4
55 - 64	6	6.3
65+	3	3.1
TOTAL	95	100

Age for 10 patients was entered as adults.

TABLE IV

AGE INCIDENCE BY ETHNICITY AMONG  
THE TURKANAS MAASAI AND  
KIKUYUS

AGE	TURKANA		MAASAI		KIKUYU	
	NO	%	NO	%	NO.	%
0 - 4	1	3.4	2	7.1	2	10
5 -14	13	45	17	60.7	12	60
15 -24	7	24	3	10.7	1	5
25 -34	6	20.7	4	14.3	1	5
35 -44	0	-	0	-	1	5
45 -54	1	3.4	1	3.6	1	5
55 -64	1	3.4	1	3.6	1	5
65+	0	-	0	-	1	5
	29	100	28	100	20	100

TABLE V

SEX RATIO BY ETHNIC GROUPS  
AMONG TURKANA, MAASAI AND  
KIKUYU

ETHNIC GROUP	M	F	RATIO
TURKANA	12	22	1:1.8
MAASAI	14	18	1:1.3
KIKUYU	12	9	1:3.1

TABLE VI

PRESENTING FEATURES

	NUMBER	%
PAIN: CHEST	15	14.3
ABDOMINAL	20	19
MASS/ABDOMINAL SWELLING	60	57
HAEMOPTYSIS	13	12.4
ORBITAL SWELLING	4	3.4
COUGH	33	31.4
FEVER	4	3.4
FRACTURES	1	1
OTHERS	7	6.7

Others: Vomiting and contipation for example

Case 50.

Headaches, weakness of the limbs, Loss  
of Consciousness.

Weakness of one half of the body -  
hemiparesis, in cases 4 and 75.

TABLE VII

DURATION BETWEEN SYMPTOM AND MEDICAL  
ATTENTION

AVERAGE FOR THE WHOLE	70.1 WEEKS
AVERAGE FOR TURKANA	83 WEEKS
AVERAGE FOR KIKUYU	64.2 WEEKS



TABLE VIII

(A)

SITE OF CYST	NO
<u>ABDOMEN</u>	
Liver	60
Mysentry	14
Spleen	5
Kidney	3
Ovary and tube	3
Bladder	3
Stomach	1
Retro-peritoneal	1
<u>CHEST</u>	
Right lung	19
Left Lung	8
<u>OTHER</u>	
Orbit	4
Cerebellum	1
(Lt.) tibia	1
Cerebrum	1

(B)

MULTIPLE SITES AFFECTED IN SAME PATIENT	
INTRA-ABDOMINAL	BOTH ABDOMINAL AND CHEST
13	4

TABLE IX

A HAEMOGLOBIN ESTIMATION

	NO.	%
Haemoglobin level equal to to or above level for age	47	47
Haemoglobin level below expected level for age	53	53
TOTAL	100	100

B

TEST	NUMBER DONE	NO. POSITIVE	% POSITIVE
OESINOPHILIA	43	20	43.5
CASSONIS	30	28	93.3
ULTRASOUND	34	33	97

CHEST X-RAY

C

	NUMBER	%
ROUNDED OPACITIES	31	70.5
ELEVATED HEMIDIAPHRAGM	2	4.5
BRONCHOPNEUMONIA	2	4.5
NORMAL	11	25.0
TOTAL	44	100

Notes:

Complement fixation test and immuno-electrophoresis were positive in all cases on which they were performed. However, the cases were so few for analysis. Of all the chest x-rays done for patients with suggestive of a cyst in the chest cavity, only two were negative. Both were due to elevated hemidiaphragm on the right side due to a cyst in the liver.

TABLE X

MODES OF THERAPY

MODE OF THERAPY	NO.	%
SURGERY ALONE	63	60%
MEBENDAZOLE ALONE	10	9.5
ALBENDAZOLE	8	7.6
SURGERY AND MEBENDAZOLE	12	11.5
SURGERY AND ALBENDAZOLE	4	3.8
NO TREATMENT	105	100

TABLE XI  
RESULTS OF SURGICAL TREATMENT

	NUMBER	%
UNCOMPLICATED	33	52.4
ANAPHLACTIC REACTION	3	4.7
DISCHARGING SINUSES	10	15.9
PNEUMONIA	4	6.3
WOUND INFECTION	3	4.7
SUBPHRENIC ABSCESS	2	3.2
B' PLEURAL FISTULAE	2	3.2
TRANSIENT JAUNDICE	2	3.2
PLEURAL EFFUSION	2	3.2
DEATH	7	11

NOTES ON THE ABOVE RESULTS

1. B'Pleura - Broncho-pleural, fistulae and pleural effusion complicated only the pulmonary cases.
  2. Discharging sinuses from dead space vacated by the cyst, the tibial involvement also lead to chronic osteomyelitis is included here.
  3. Deaths: Case 10: Surgery was for exploratory laparotomy, no ultrasound done pre-operatively. Patient succumbed to pneumonia, and one of the four under - PNEUMONIA.
- C 32: Multiple abdominal sites were affected. The general peritoneal cavity was washed with formalin.
- C 50: Patient had concurrent acute intestinal obstruction, three feet of small gut was found to be gangrenous and resected. The diagnosis of hydatidosis was made at laparotomy.
- C 43: Died in I.C.U. post-operatively; cause of death not known.
- C 72: Had anaphlactic shock on the table and died four days later in I.C.U. Patient is one of the 3 under anaphlactic reaction.
- C 91 Died of ventricular fibrillation. There was no autopsy report.
- C 92 Developed ascites post-operatively - Laparotomy. He was incidentally found to have a rounded opacity right side of chest on x-ray but transpired before anything could be done.

- 28 -  
TABLE XII

RESULTS OF MEBENDAZOLE TREATMENT  
AND ALBENDAZOLE

	REDUCED CYST	CYST SIZE NOT CHANGED
ALBENDAZOLE	7	1
MABENDAZOLE	1	9

EXPLANATION

1. One patient who was treated on Albendazole had failed on Mebendazole.
  2. Duration and dose of the above, before response was declared negative, ranged between 4 - 20 weeks.
- B. Albendazole and surgery: Among the four, two recovered uneventfully. One developed pneumonia and the other had a discharging sinus.
- Mebendazole and surgery: Scolices (live) were still found 6 weeks of Mebendazole therapy at surgery.



- 29 -  
DISCUSSION

Echinococcosis (Hydatidosis) has been recognized for many centuries past (1). Despite continuing research into better diagnostic and therapeutic methods, the problem appears to be spreading to hitherto 'virgin' lands (22,19) due to easier transport particularly of man and other intermediate hosts, sheep, cattle and camel.

The incidence of this disease is believed to be highest in Turkana district of North Western Kenya (9) at 96 per 100,000 of population. Here it has been observed for centuries by the local population and goes by the name 'epesipesit'. This high incidence has been attributed to several cultural and behavioural patterns of the Turkana. Their use of the domestic dog to wipe babies after defaecation, drying milk over unhygienic hides and medicinal use of dog's faeces have been cited as contributing to this high level of infection (8,9,38,50). In addition, the Turkana do not bury their dead, except in special cases, and infected human remains complete a special cycle (51) when these are eaten by carnivores.

Hydatid disease among the Maasai assumes a lower prevalence than Turkana (35,38) despite the high number of infected cattle (4,5). Though both Maasai and Turkana are pastoralists, their cultural patterns differ. Maasai have less dogs per homestead than the Turkana (8).

One hundred and five patients were reviewed. There were 47 males and 58 females, a ratio of 1:1.23. This shows a slight female preponderance, compared to that of French (6) 1:1.9 and that of O'Leary (8) 1:1.54. Note must be made however, that their sources were exclusively Turkana inhabited. In the present study the male female ratio for Turkana patient is 1:1.75 is between that of French and that of O'Leary. A female preponderance is also present albeit at a lower degree among the Maasai and the ratio is reversed among the Kikuyus. This may be a reflection on the cultural behaviour patterns of the Kikuyus where the female hardly comes into contact with the dog.

#### DISTRIBUTION BY ETHNIC GROUPS

There were as many Turkanas as Maasai. This may be due to the proximity of both Kajiado and Narok districts,

the home area of the Maasai, to Nairobi. Turkana district is further afield. Maasai patients could be referred to Kenyatta National Hospital more easily.

The Kikuyus were third. They are the most populous single ethnic group in Kenya. They enjoy an even greater proximity to Kenyatta National Hospital even more so than the Maasai. It must be pointed out that only half the Kikuyu cases were found to be residents of traditional home districts in Central Kenya.

Other tribes who were found affected were the Kamba, 5, Luos 5, and Samburus 2.

#### GEOGRAPHICAL DISTRIBUTION

Turkana district had the highest number of cases - per population by the 1979 Kenyan Census (54). This was followed by Kajiado and Narok. It was also found out that half the Kikuyus resided either in Kajiado, and Narok, there was one from Samburu. Since obviously half the population of the Kikuyus does not reside in these districts, one can only postulate that either the parasite reservoir is greater or that they change social behavioural patterns as they migrate.

Two cases came from across the border - Tanzania - in the present study. Both patients were Maasai. This extension of hydatid disease across National borders is not restricted to the South; Northwards into Ethiopia (7) the Nyangaton and Dassanetch have their share. To the West the disease is fairly <sup>common</sup> among the Karamojong (28) of Uganda and to the North, the Southern Sudanese. Of interest to Kenyans, is the number of districts from which patients came, traversing nearly the whole of the Republic. Only two among them (one Kikuyu Nyeri resident but had lived in Narok, one Luo - South Nyanza resident but had lived in Southern Sudan) gave any history of having lived in areas that are well known for hydatidosis.

From available evidence, Turkana district does not have a uniform incidence (8,50). There being sub-areas of higher incidence. It is not clear whether such "pockets" exist in other districts.

#### AGE DISTRIBUTION

Most of the patients were found to be below the age of 25 years. The youngest was found to be 3 years and the oldest was 67, only 5 were below the age of 5 years. French (6) in Turkana found that most of the patients to be between 15 - 44. Similar findings have been reported by O'Leary (8).

It is quite possible that patients referred to Kenyatta National Hospital had by chance selection being of a younger age group. Furthermore in a Country where literacy is low, the ages given may have been estimates of either the referring or the attending physician. What is obvious, however, is that the majority of patients are in their active and productive life.

Age distribution by ethnic group among Turkana Maasai and Kikuyu confirmed the general pattern above.

#### CLINICAL PRESENTATION

Abdominal mass was the most frequent complaint(60%). Pain was the second most frequent presenting feature, mainly in the abdomen and chest. Cough followed closely with or without haemoptysis.

These features have a bearing on the organs involved. There were 90 intra-abdominal cysts 2/3 of them being in the liver and only 33 extra-abdominal over 80% of them being in the lungs. Other complaints were related to pressure symptoms on vital organs, eye, and cerebrum. O'Leary had similar findings in Turkara except for the <sup>low</sup> pulmonary yield.

It is possible that Kenyatta National Hospital with services of cardiothoracic surgeons would receive a greater share of pulmonary hydatidosis. The right lung is usually more commonly involved (39) the reason given being unsatisfactory - higher blood flow.

### INVESTIGATIONS

Haemoglobin was estimated in 100 patients. A haemoglobin level of 14 gm/dl was considered "normal" in the above 15 year olds. A haemoglobin of 11 gm/dl was considered normal in the below 15 year olds. By these arbitrary though not extra-ordinary levels, the haemoglobin was found to be below normal in over 50%. This suggests the possibility of erythropoiesis or haemoglobin synthesis depression by hydatid cyst. This has not been documented. Unfortunately, other investigations for example malarial parasites, intestinal worm infestations were not uniformly done for to attempt to assess this postulate. Oesinophilia is considered unreliable and inconstant feature in hydatidosis (24). Less than half of those whose white blood cell count was done had oesinophilia. This study confirms the above observation.

#### Intradermal Cassonis:

It is still the most widely used screening test(27). It is considered non-specific with a rate of false negatives ranging 2 - 45% (41). In this study, it was positive in 93.3% of cases tested. In absence of control its rate of non-specificity in Kenyatta Hospital cannot be commented on.

ther immunodiagnostic tests; complement fixation, indirect haemoagglutination, immuno electrophoresis were rarely performed that no inference can be made from the study. One of the most promising immuno-electrophoresis 'arc 5' (I.E. P 5) has been found to have short comings; it cross-reacts with other echinococcus species, (E. Vogeli (41) and with Taenia species it is positive in less than 60% in Turkana patients (37).

In pulmonary hydatidosis, the cyst in chest x-ray take the form of rounded or oval opacities unless the cyst has ruptured (39), when a fluid level is manifested. In the present study 44 chest x-rays were done. 33 patients had suggestive physical signs. 29 of these were found to have rounded or oval opacities, two had elevated hemidiaphragm and two had basal pneumonia. All the 44 had complained of cough. Except for the eleven normal the other had cough for longer than 3 weeks, with or without haemoptysis. This examination is then important for patient, with cough for more than three weeks, from endemic areas.

Ultrasonography was found to be quite useful, both in locating the cyst and the follow-up of patients. Among the 34 in whom this examination was carried out

only one was found operatively that had been missed. This examination however has its limitations, availability of machine, trained personnel and therefore cannot be used in every district hospital. Where available, like in Kenyatta Hospital it is a recommended tool by this study.

Even a more expensive procedure is the CAT scan. It is still not available to this hospital. CT scan is recommended for intra-cranial cyst (19), where carotid angiograms may not be diagnostic and ventriculogram risk rupture into the cyst and ensuing dissemination(52).

Other studies, retrograde cholangiography (46) may be made use of as occasion arises.

#### THERAPY OFFERED

Surgery alone was performed in 60%. Chemotherapy alone was a distant second 17.1% and a combination of the two in 15.3% 8 patients received no therapy for different reasons.

A few paragraphs will now be devoted to surgery of hydatidosis in various parts of the body.

Liver: This naturally comes first, due to frequency with which it is affected (1,6,8,9,15). Quite often



the details of the operation were not fully recorded. The principle is to excise the endocyst without spillage and there are several methods as advocated by Borno J. S. (32).

- (i) The pericyst may be incised and the endocyst delivered as a whole.
- (ii) Cyst may be entered at the most accessible part with a three way cannula. Fluid is withdrawn and replaced with a similar amount of scolicedal agent, unless the fluid is bile stained. The pericyst is incised and all the endocyst removed. Edges of the pericyst are trimmed. Tube drains are left in the dead space and captonage of the sac with catgut sutures done.
- (iii) Pericystectomy may be performed, but this is much bloodier operation, the chances of spillage are less.
- (iv) Segmentectomy and lobectomy may sometimes become necessary.

(i) and modified (ii) were performed in this study (scolicedal agent(s) was injected after withdrawal of some hydatid fluid. Both paricyst and endocyst were incised and suction of the fluid and its contents done. Finally the endocyst too would be peeled off the ectocyst by suction. The ensuing dead space would

be treated by tube drainage and captonage. The author has personally assisted in some of these operations. Other methods of treating the dead space are: Omentoplasty and Marsupilization. This last one is associated with complications of haemorrhage, secondary sepsis and post laparotomy hernia (32). Said has described another method - " the cryogenic cone". This method has had encouraging results but has limitations/<sup>frozen</sup>carbon dioxide availability.

Other intraabdominal sites:

- a) In the mesentery where the cysts hang by a pedicle, the excision is relatively easy.
- b) In the spleen, splenectomy is the treatment of choice.

In other sites, general approach as to the liver must be applied.

The Lungs:

This is the second commonest site. In some series it is reported to be the most frequent (23). In the present study the method below was almost exclusively used.

After thoracotomy the pericyst is incised and by the anaesthetist raising the ventilating pressure

the endocyst is enucleated and delivered intact through the wound. The cavity is allowed to collapse after all bronchial leaks are closed. Four lobectomies were done one left lower and three middle right. Among the 19 who had enucleation of the endocyst by the above method, 3 ruptured operatively, before being delivered out of the wound. This method has drawn criticism due to the high risk of rupture operatively (39). Peschiera has described another method where needle aspiration and administration of scolicedal agent, taking care that the agent does not leak into the bronchial tree is done. The cyst is then emptied as completely as possible and both endocyst and pericyst are dissected in total controlling haemorrhage by ligatures as the dissection proceeds, as well as closing leaking airways. Needle aspiration is also done where lobectomy is to be performed if the cyst is tense and adherent to the pleura. Complicated hydatid cysts for example rupture into pleura may lead to tension pneumothorax and has to be attended to as an emergency to evacuate fluid by a closed tube thoracostomy.

### Special Sites

Hydatid cysts are not as frequent in bone as in other sites (23) and are slow growing (20). There was only one case in those studied. Whereas in the soft tissues there is a strong fibrous pericyst, this does not form so well in bone tissues. The clinical picture is that of pathological fracture, Surgery and enucleation is not possible and curettage has the attendant risk of dissemination of the viable scolices and development of secondary cysts (20). Where the bone of the spine are involved, paraplegia is a frequent sequelae. Ferrandez (6) recommends excision of the bone segment involved and filling the defect with cortico cancellous bone graft.

Being a less frequent site the index of diagnostic suspicion is lower than would otherwise be.

### Intracranial and Intra-orbital

Intra-cranial and intra-orbital cases have been reported in this Country (30,48). There were four intra-orbital cases, orbital swelling from endemic areas must be suspected to be hydatidosis until proven otherwise.

Two intra-cranial hydatidosis were treated, the dangers of ventriculograms has already been alluded to. Clinically they present with features of raised intra-cranial features and skull x-rays are hardly diagnostic (52).

Any other part of the body for example breast (27) may be involved, and hydatid should be a differential diagnosis for cystic swelling, in abnormal sites in this Country.

#### The place of scolicial agents

Formalin was the Scolicial agent mostly used. There are a few cases where cetrinide and hydrogen peroxide were used. Cetrinide has been used elsewhere with variable success (9,16,54). Cetrinide (acetyl-trimethyl ammonium bromide) must, however be used with care. Chemical peritonitis (10) of a severe nature has been reported associated with Cetrinide irrigations of abdominal hydatid cyst. There is evidence that it may cause Met-haemoglobinemia (26). In the present study one patient, below died post operatively after the general peritoneal cavity was washed with formalin. Is it possible enough formalin

could have been absorbed to cause death? Other scolicedal agents that have been found successful in the laboratory (17) include hydrogen peroxide iodine, octoglycine, dihydropentioiodide, sodium hypochlorite and glycerine. In the mouse they have a shorter effective time, at a higher dilution and less toxic than formalin as currently in use. Hypertonic saline has also been used clinically (18) but it can be complicated by hypernatremia (31).

In summary, scolicedal agents lower recurrences but must be used with care since they are not risk free.

Complications of surgical treatment:

Just over half of the patients operated on for hydatidosis had no complications. All the discharging sinuses were along the tube tracks from the dead space in the liver after extraction of the cyst. One persisted for over 20 weeks draining bile stained fluid that internal fistula to the jejunum had to be created surgically, erosion of a cyst into large biliary channel is a known complication of hepatic hydatidosis (25).

Wound sepsis is unbelievably low; even when subphrenic abscess is included the total of the two does not exceed 6%. Awori (53) found an incidence of

15.6% of all clean wound in the same hospital. There is a possibility of incomplete documentation but wound sepsis rate is no greater in surgery for hydatidosis than in other general surgical procedure in this hospital.

The operative mortality is alarming even if cases 43, (concurrent intestinal obstruction) No. 91 (fibrillation possibly due to cardiac involvement) are excluded, the mortality rate is 8%. All effort to prevent anaphlactic shock must be made; one of the three patients who had it died. All the three had pulmonary hydatid cyst. Either the pleural contamination leads to shock more easily than the peritoneum, or that there is generally less care to prevent spillage on thoracic operations for hydatid cyst. Recurrence cannot be commented <sup>on</sup> / since follow up was very short.

### Chemotherapy

Mebendazole was introduced in 1977 for clinical use in treatment for hydatidosis. It is related to the Veterinary thiabendazole (synthetic benzimidazole). Its mode of action is limiting glucose uptake by the parasite. Many reports of variable success have appeared in the literature (6,9,15,21,18). Okello (29) found it ineffective in 16 patients but the period of

the trial was very short compared with elsewhere (12). In the present study the duration of mebendazole administration was not uniform. One patient had mebendazole for 1 year at 40 mg/Kg without response, and of the ten only one showed any response.

Several complications have been attributed to mebendazole, glomerulonephritis (11), nausea and vomiting, pruritis, dizziness (13) and leucopaenia (44). Some of the complications like glomerulonephritis may be related to hydatid disease per se due to immune complexes (45). In the initial animal experiments, testicular atrophy was observed in the rats (21) but this has not been reported in human cases.

Albendazole by this study is more promising but optimism is cautioned, patients have been known to develop secondary cysts post operatively even with use of albendazole (34).

#### COMBINED CHEMOTHERAPY AND SURGERY

This may have a place in situations where there is spillage operatively, chemotherapy being given post-operatively, or where spillage is anticipated for example in Osseus hydatidosis of the spine. In such cases



chemotherapy must be given for well over four weeks.

One patient who had prophylactic chemotherapy of Mebendazole had viable cysts four weeks after mebendazole was commenced in the present study.

CONCLUSIONS

1. Hydatidosis although commoner in Turkana and Maasai areas, is widespread throughout Kenya. Due to easier travel ethnicity will in future be a poor diagnostic criterion. Any doctor, surgeon working in Kenya must be aware of the most common presentation and also of the more subtle ones.
2. The main complaints are <sup>commonly</sup> related to the abdomen particularly swelling or mass. Second most common is cough particularly when the duration is greater than three weeks or associated with haemoptysis.
3. This study suggests that hydatid disease suppresses haemopoiesis or erythropoiesis. The author would like to do a controlled study on this aspect.
4. Cassoni's test, chest x-ray and ultrasound were the most useful investigations, eosinophilia could not be relied on. Few immuno-diagnostic tests were done, but from available evidence more than one is needed to confirm diagnosis, in any particular case.

.../cont.

5. Surgery is still the therapy of choice, and though scolicedal agents are indicated they must be used with great care.

Chemotherapy has a place particularly in the inoperable and in prophylaxis where spillage is anticipated.

REFERENCES

1. Golematis B. :  
Surg. Ann. 1978, 357-84.
2. Wray J.R.:  
Note on human hydatid in Kenya.  
East Afr. Med. Jour. V. 35.
3. McClutchie, S.  
Sudden death in hydatid disease of the heart.  
East. Afr. Med. Jour. V 723 - 4 1965.
4. Nelson, G.S.:  
Echinococcus in Man and animals in Kenya.  
Ann. Trop. Med. and Paras. 57: 136 (1963).
5. Ginsberg:  
Incidence of hydatid disease in Kenya  
Slaughter animals.  
East. Afr. Med. Jour. 33: 297 (1956).
6. French, C.M.  
Age and sex distribution of hydatid disease  
in Turkana. East. Afr. Med. Jour. 1980 57:  
791-4.

7. Fuller, G.K. et al.  
Hydatid disease in Ethiopia.  
Ann. Jour. Trop. Med. and Hyg. 30 (3)  
645 - 52.
8. O'leary, P.A.  
Five year Review of hydatid disease in Turkana  
District.  
East. Afr. Med. Jour. 1976 58: 608-10.
9. O'Leary et al.  
Hydatid disease in Turkana.  
Proc. of East Afr. Ass. of Surgeons 1979, 103.
10. Gilchrist  
Clinical peritonitis after Centrimide washout  
of hydatid cyst. Lancet 2: 1374, 1979.
11. Kung'u, A.  
Glomerulonephritis following chemotherapy of  
hydatid with mebendazole. East Afr. Med. Jour.  
59: 404, 1983.
12. Bryceson, et al.  
Experience with Mebendazole in treatment of  
inoperable hydatid disease in England.  
Tras. Roy. Soc. Trop. Med. and Hyg. 76:  
510, 1982.

13. Murray.  
Complications of Mebendazole treatment.  
B.M.J. 2: 1111, 1979.
14. Frayha, et al  
Treatment of hydatid cyst with Cetrimide.  
Trans. Roy. Soc. Trop. Med. and Hyg.  
1978.
15. French, G.M.  
Mebendazole and surgery for human hydatidosis  
disease in Turkana. East. Afr. Med. Jour.  
1984 61 (2) 113.
16. Eslami, A. et al  
Solicidal effect of Cetrimide on hydatid cyst.  
Trans. Roy. Soc. Trop. Med. and Hyg. 72:  
307 - 8.
17. Meyman, E. et al  
Host parasite relationship in echinococcus.  
(Laboratory evaluation of chemical scollicidal  
adjuvant in surgery. Ann. Surg. 158:211-5.
18. Kayser, H.J.S.  
Treatment of hydatid disease with mebendazole  
at Frere Hospital East London. South. Afr.  
Med. Jour. 1980 58: 550-3.

19. Ozgen, T. et al  
Use of computerized tomography in the diagnosis of cerebral hydatid cysts. Journ. Neurology 50 (3): 339-42 Mar. 1979.
20. Hooper, J.  
Hydatid disease of the femur. Jour. Bone and Joint Surg. 59A 974-976.
21. Beard, T.C. et al  
Medical treatment of echinococcus. Med. Jour. Australia 1 (12) 633-5, 1978.
22. Mottossian, R.M.  
Hydatidosis a global problem of increasing importance. Bull. W.H.O. 55 (4) 499-507, 1977.
23. Mottoghian, et al.  
Post-operative recurrence of hydatid disease British Jour. Surg. 65 - (4) 237-42.
24. Ferrandez, H.D. et al.  
Osseus hydatid disease.  
British Jour. Surg. 60 (5): 685-90.
25. Mstafa, R. et al  
Rupture of hydatid disease of the liver into biliary tract. Brit. Jour. Surg. 65 (2): 106.

19. Ozgen, T. et al  
 Use of computerized tomography in the diagnosis  
 of cerebral hydatid cysts. Journ. Neurology  
 50 (3): 339-42 Mar. 1979.

20. Hooper, J.  
 Hydatid disease of the femur. Jour. Bone and  
 Joint Surg. 59A 974-976.

21. Beard, T.C. et al  
 Medical treatment of echinococcus. Med. Jour.  
 Australia 1 (12) 633-5, 1978.

22. Mottossian, R.M.  
 Hydatidosis a global problem of increasing  
 importance. Bull. W.H.O. 55 (4) 499-507, 1977.

23. Mottoghian, et al.  
 Post-operative recurrence of hydatid disease  
 British Jour. Surg. 65 - (4) 237-42.

24. Ferrandez, H.D. et al.  
 Osseus hydatid disease.  
 British Jour. Surg. 60 (5): 685-90.

25. Mstafa, R. et al  
 Rupture of hydatid disease of the liver into  
 biliary tract. Brit. Jour. Surg. 65 (2):  
 106.



26. Baraka, A. et al  
Cetrimide induced Met-haemoglobinemia after surgical excision of hydatid cyst. Lancet 1980, Jul. 12 (8185) 88-9.
27. Mirza, et al.  
Hydatid disease of the breast.  
East Afr. Med. Jour. 1979 56:235.
28. Owuor, R.B. et al.  
Hydatid disease in Uganda. East. Afr. Med. Jour. 1980 57 (4) 285-8.
29. Okello, G.B.A. et al  
Treatment of hepatic hydatid disease with Mebendazole a report of 16 cases. East Afr. Med. Jour. 1981 58: 608-10.
30. Okello, G.B.A. et al  
Retro-orbital hydatid cyst. East Afr. Med. Jour. 1980 57 (4): 285-8.
31. Gage, T.P.  
Hypernitremia after using hypertonic saline irrigation. Ann. Int. Med. 1984 Sep. 101 (3) 405.

32. Barno, J.L.  
Hydatid disease of the liver. Am. Jour.  
Surg. 135 (4): 597-600.
33. Vialtel, P. et al.  
Membranous nephropathy.  
New Eng. Med. Jour. 1981 March 304 (10):  
610-1.
34. Punitis.  
Albendazole Lancet 1983 Nov. 2 (8361).  
1255-6.
35. Okello, G.B.A. et al  
A Review of hydatid disease in Kenyatta  
National Hospital over three year period.  
East Afr. Med. Jour. 1981, 58: 695.
36. Rottcher, K.H.:  
Hydatid disease in East Africa. East Afr.  
Med. Jour. 1973 50:695.
37. Chemtai, et al  
Application of immuno-electrophoresis in  
diagnosis of human hydatid disease in Kenya.  
East Afr. Med. Jour. 1981 583-587.

32. Barno, J.L.  
Hydatid disease of the liver. Am. Jour.  
Surg. 135 (4): 597-600.
33. Vialtel, P. et al.  
Membranous nephropathy.  
New Eng. Med. Jour. 1981 March 304 (10):  
610-1.
34. Punitis.  
Albendazole Lancet 1983 Nov. 2 (8361).  
1255-6.
35. Okello, G.B.A. et al  
A Review of hydatid disease in Kenyatta  
National Hospital over three year period.  
East Afr. Med. Jour. 1981, 58: 695.
36. Rottcher, K.H.:  
Hydatid disease in East Africa. East Afr.  
Med. Jour. 1973 50:695.
37. Chemtai, et al  
Application of immuno-electrophoresis in  
diagnosis of human hydatid disease in Kenya.  
East Afr. Med. Jour. 1981 583-587.

38. W.H.O. Chronicle 34: 131-138. The global importance of parasitic zoonoses.  
(Social economic and other factors influencing prevalence).
39. Peschiera, C.A.  
General thoracic surgery. Chapter on hydatidosis.  
T. Shields. Lea and Febinger, 1972.
40. Mcpherson, C.  
Report to the rotary international for period  
May 1979 to December.
41. Clinical parasitology: by Caraig and Faust's  
Lea and Febriger, 1970.
42. Symth, J.D.  
In vitro cutlure of human hydatid.  
Lancet 1980 Jan 26 (8161): 202-3
43. I. Marshals and G.T. Edwards.  
Effects of sustained release of praziquantel.  
Anna Trop. Med. Paras. 1982 76 (6): 649-51.
44. Miskolitz.  
Leucopaenia associated with mebendazole.  
Am. Jour. Trop. Med. and Hyg. 1980 Nov. 29 (6):  
1356-8.

45. Sanzhez, et al  
Membranous glomerulonephritis secondary to  
hydatid disease. Amr. Jour. Med. 1981  
Feb. 70 (2): 311-5.
46. Cotton, M. et al  
Endoscopic retrograde cholangiography in  
hepatic hydatid disease. Br. Jour. Surg.  
1978 65: 107-8.
47. Houba.  
Immunological investigations for tropic para-  
site disease. Edited by Houba.  
Churchill Livingstone.
48. P. Clifford.  
Intra-cranial hydatidosis in Kenya.  
East Africa Med. Jour. 1968, 45: 651.
49. Said, Farrouk.  
A new approach to the surgical treatment of  
hydatid cysts.  
Ann. R. Coll. Surg. Eng. 59 (2) 115-8,  
March, 1977.
50. French, C.M.:  
Hydatid disease in the Turkana. Ann. Trop.  
Med. Parasit. 76: 459.  
Ann. Trop. Med. Paras. 76: 453.

51. McPherson:

Active intermediate host role for man:

Ann. Jour. Trop. Med. and Hyg.

32 (2): 397-404.

52. U. Kaya et al

Intracradiol hydatid cysts. Jour. Neur.

Sur. 42: 580-584.

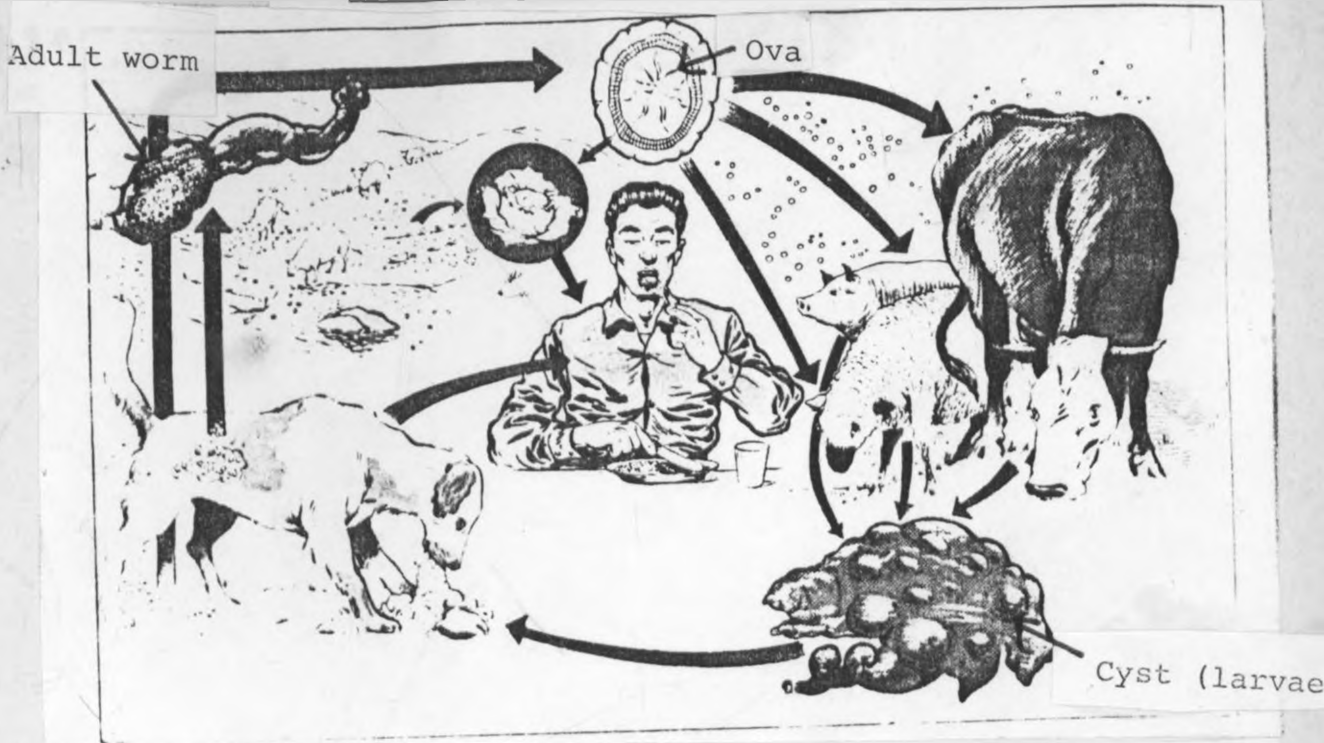
53. Awori, N.W.

Wound sepsis, post-operative in general surgical  
unit at Kenyatta National Hospital.

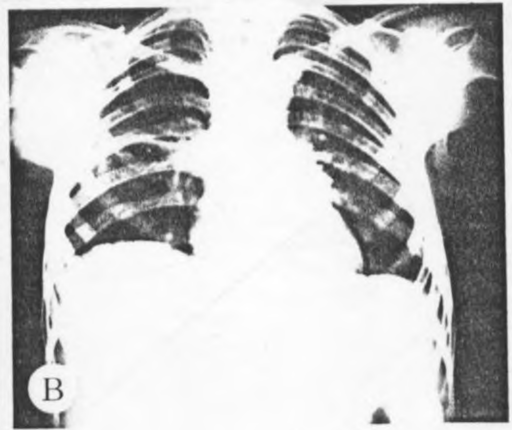
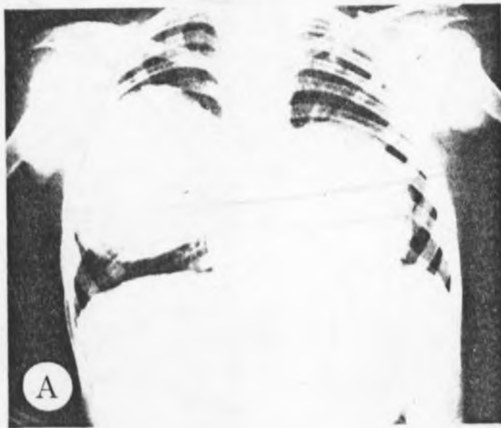
East Afr. Med. Jour. 1971 - 48, 631.

54. Kenya Population Census 1979, V. 1.

LIFE CYCLE OF ECHINOCOCCUS GRANULOSUS



Typical X-ray appearance of hydatid cyst in the lung. "Rounded or oval opacity" with normal chest X-ray for comparison.



MAP OF KENYA

Distribution of human cases, of hydatidosis according to districts of residence.



MARSABIT

3

SAMBURU

2

ISIOLO

WAJIR

2

LAIKIPIA

MERU

NYANDARUA

2

NYERI

KIRINYAGA

EMBU

2

MURANG'A

4

KIAMBU

5

NAIROBI

MACHAKOS

3

KITUI

2

TANA RIVER

0

21

KAJIADO

21

TANZANIA

2

KILIFI

0

TAITA

MOMBASA

NAIROBI

RIVER

AMU

KISumu



MAP OF KENYA

Distribution of human cases of hydatidosis according to districts of residence.

