CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Guinea worm disease is a parasitic worm infection that occurs mainly in Africa. It is also called dracunculiasis. People get infected when they drink standing water containing a tiny water flea that is infected with the tinier larvae of the guinea worm.

Over the course of the year in the human body, the immature worms pierce the intestinal wall, grow to adulthood and mate. The males die and the females make their way through the body, maturing to a length of as three feet, and ending up near the surface of the skin, usually in the lower limbs.

Except for a few remote villages in the Rajastan Desert of India and Yemen, guinea worm disease now occurs only in Africa. Infected areas in Africa lie in a band between the Sahara and the equator. More than half of all cases of guinea worm diseases are reported from Southern Sudan. Other countries with more than one thousand cases each year are Nigeria, Burkina Faso, Niger, Ghana, Mali, Uganda, Togo, Benin, and Ivory Coast. Smaller numbers of cases are reported from Mauritania, Ethiopia, Chad, Senegal, and Cameroon. Statistics indicate that Ghana still ranks second in Africa apart from Sudan.

Figures available to the Ghana Guinea Worm Control Programme indicate that guinea worm assumed a higher dimension since 1981. Even though the figures seem to be dropping, it still poses a great challenge to the health of the people of Ghana.

According to the World Health Organization (WHO), Cameroon, Kenya, Senegal and Chad have all managed to eradicate guinea worm but the disease remains endemic in twelve countries, most of which in West Africa. (United Nations Office for the Coordination of Humanitarian Affairs).

In West Africa, the worst affected region is the Northern Ghana. In the Ashanti Region, guinea worm infestation seems to have taken wider dimension with the Sekyere East District having the greatest share.

According to the Sekyere East District Health Directorate Annual Report in 2006, eighteen (18) cases were reported in 2004 and 2005, and thirty one (31) cases reported in 2006.

1.2 STATEMENT OF THE PROBLEM

The Sekyere East District lies at the north eastern part of the Ashanti Region with approximate land size of 3965 km2. About 2/3 (two third) of the District falls within the Afram Plains which is hard to reach due to poor terrain.

Out of one hundred and fifty five communities (155), one hundred and twenty (120), are in the Afram Plains. The Afram Plains portion is typically agrarian. It therefore means that almost about 90% of the people are farmers and live in the rural area.

Guinea worm infestation is endemic in the communities. The reason is that the supply of potable water in the District is inadequate. Many communities in the Afram Plains portion of the District do not have access to portable water and rely on rivers and streams which is infested with copepods for drinking water and for domestic activities.

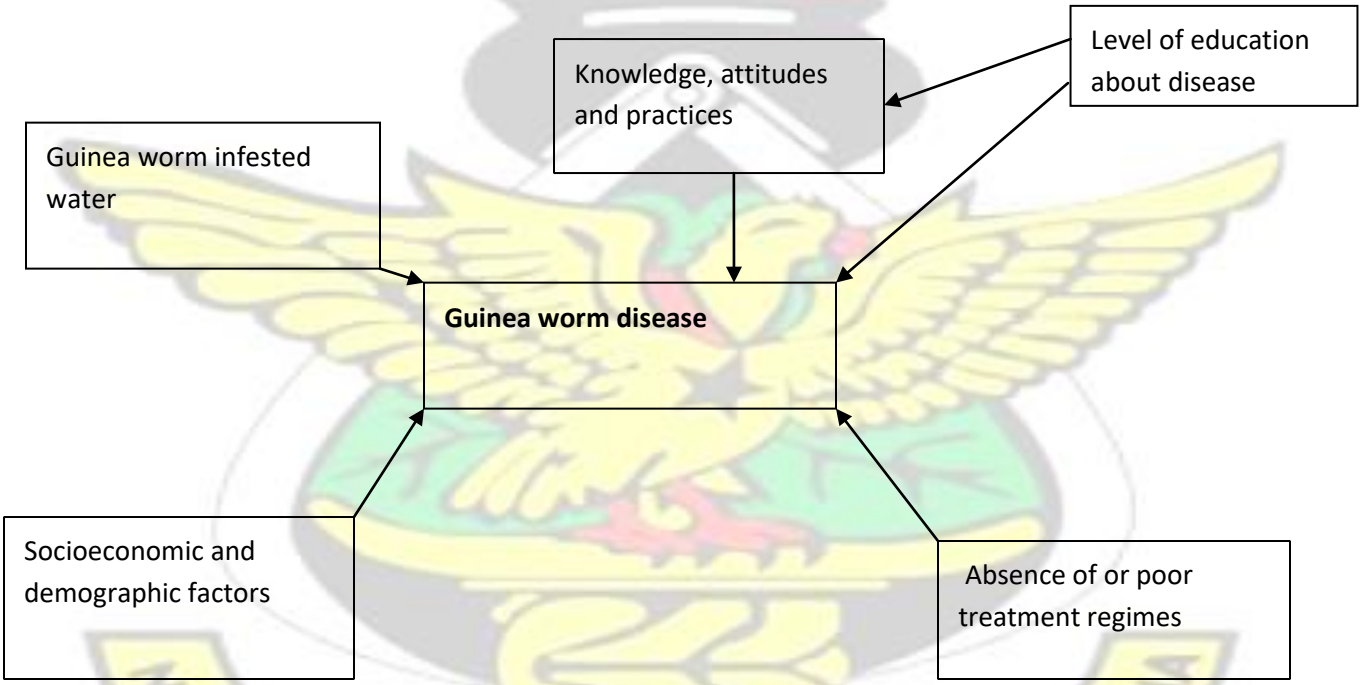
This explains why the guinea worm disease is very acute in such areas like Anyinofi and Densi. Records available to DHMT (2006) indicate that guinea worm disease increased from eighteen (18) in 2004 to thirty one (31) in 2006. Even though the figure in 2007 seems to be dropping, efforts should be made by way of research to assess the situation.

The DHMT has stated that guinea worm disease is one of the major health problems of the communities such as Anyonofi, Fumsua and Densi.

1.3 RATIONALE OF STUDY

The rationale of the study is to identify the impact of guinea worm infestation in the Sekyere East District and the treatment regimes being carried out by the stakeholders. Because of the guinea worm disease infestation in the Sekyere East District, the economic activities of the affected inhabitants have gone down considerably since they cannot attend to their farming ventures on regular basis hence the relevance of the study.

1.4 CONCEPTUAL FRAMEWORK ON ASSESSMENT AND TREATMENT OF GUINEA WORM DISEASE IN THE SEKYERE EAST DISTRICT



EXPLANATION OF CONCEPTUAL FRAMEWORK

Using water already infected with the disease will increase the disease burden. The knowledge level of the people about the disease will depend on the level of general education. Low level of education about the disease can lead to infestation of the disease. Knowledge, attitude and practices

of the people may contribute to incidence of the disease. Presence of poor treatment regime cannot fight the disease. If there is no treatment regime, incidence of the disease will increase leading to deterioration of the health of the people in the communities.

1.5 RESEARCH QUESTIONS

1. What water-borne disease is very endemic in the Afram Plains portion of Sekyere East District?
2. What factors predispose the people to such water-borne disease in the Sekyere East District?
3. What type of treatment regime is used by the affected people in the Sekyere East District?

1.6 OBJECTIVES

1.6.1 GENERAL OBJECTIVE

To identify the factors associated with guinea worm disease in the Sekyere East District

1.6.2 SPECIFIC OBJECTIVES

1. To find out the number of people affected by the guinea worm disease.
2. To identify the full range of social, economic and demographic factors which predispose the people to guinea worm disease.

3. To identify the various treatment regimes used by the affected people.

4. To use the findings to recommend to stakeholders (N G Os , District Assembly , Donors and Government) on the improvement of water systems of the inhabitants in the District and thus eradication of guinea worm disease.

1.7 **PROFILE OF THE STUDY AREA**

The Sekyere East District in the Ashanti Region of Ghana was created in 1988.
It has Effiduase as the district capital. Located in the north-eastern part of the region, it lies approximately between Latitude 6, 45-7,32 degree north and Longitude 0 22 west.

The District shares borders with Afigya Sekyere (to the west), Sekyere West (to the west), Asante Akim North (to the South East), and Ejisu Juaben (to the South West). It covers a total land area of about 4,231.4 sq km.

The climatic conditions in the district conform to the general conditions that prevail within the middle belt of Ghana. Double maxima rainfall is experienced in a year. The major rainy season starts in April and ends in July, whilst the minor season begins in September and ends in early November.

1.7.1 **ECONOMIC ACTIVITIES**

Basically, agriculture employs about 66% of people in the Sekyere East District. The core of the farming activities include: tomato farming, plantain, cassava, cocoyam and pepper. The District boasts of four financial institutions namely; the Asokore and the Kumawuman Rural Banks, the Ghana Commercial Bank and the Barclays Bank Ltd.

The two rural banks have branches in almost all the towns in the district. A survey conducted revealed that other trades like hair dressing; tailoring, carpentry, and blacksmithing are also practised in the district.

Source: District Annual Health Report (2006).

1.7.2 **POPULATION DISTRIBUTION**

The 1984 Population Census indicated that the district had a total population of 83771. This figure however, increased to 157396 in 2000, showing an increase of 87% over sixteen year period at a growth rate of 3.5% .(Population and Housing Census, 2000). The increase in population in 2000 was due to the increased number of settler farmers from the Northern Ghana into the Afram Plains portion of the District, rapid urbanization of towns like Asokore, Effiduase, and Kumawu and the easy accessibility from these towns to Kumasi.

1.7.3 **TRANSPORT AND COMMUNICATION**

The main means of transport and other transactions in the district is road network. The total length of road in the district is estimated at 185.2km with about 85% of this length classified as feeder roads. Among this number therefore, only three roads could be classified as trunk. They are the 53.4km Ejisu-Effiduase-Woraso road, the 25 km Asokore-Anunuso road and EffiduaseOyoko-Nsuta road.

The Afram Plains portion has the worst of road which makes the area very difficult to reach. Post offices are available in the following towns: Effiduase, Kumawu, Asokore, Dadease etc. Mobile telephony is also available in many parts of the district. All these make communication effective and efficient. Source: DHMT Annual Report (2006)

1.7.4 **HEALTH FACILITIES**

The District boasts of three hospitals namely: the Effiduase Government Hospital (The District hospital), the Ahmadiyya Moslem Mission Hospital at Asokore and the Westphalian Hospital at Oyoko.

Apart from these hospitals the district has six health centers located at Kumawu, Woraso, Banko, Akokoaso, Okaikrom and Anyinofi. Besoro has one health center which is called Jesus Care Volunteer Center.

STAFF STRENGTH

The following is the tabular arrangement of staff strength at the district hospital

GRADE	DISTRICT HEALTH ADMINISTRATION	HOSPITAL	SUBSIDIARY
Doctors	None	3	-

Pharmacists	1	1	-
Medical assistant	-	1	1
General nurses	-	22	4
Nurses	1	-	14
Laboratory	-	2	1
Dispensary technician	-	4	1
Disease control	2	-	5
Nutrition	1	-	-
Biostatistics	-	2	2
Accounts	2	2	1
Health assistants	-	10	3
Drivers	2	1	-
Others	6	16	3
Casuals	2	10	14
TOTALS	17	74	50

Source: DHMT Annual Report 2007

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 THE PREVALENCE OF GUINEA WORM DISEASE

Dracunculiasis (guinea worm disease) is a disabling infection transmitted through drinking water containing cyclopoid copepods (water fleas) habouring infective larvae of the parasite *Dracunculus medinensis*.

Larvae of the pathogen are liberated in the duodenum following ingestion of contaminated water. During an incubation period of approximately one year, the larvae develop into worm 20 cm to 120 cm in length. Emergence of the worms through the skin (usually the lower part of the legs) causes severe local pains and can incapacitate the patient for one to three month.

Although dracunculiasis rarely kills and recovery is generally complete, the disease has serious effects on the health status of the affected population. (WHO Worldwide Weekly Report 1990)

Since the seminal review by Ralph Muller about dracunculus and dracunculiasis in the serial publication in 1971, the Carter Center for Disease Control and Prevention in the United States of America reported that guinea worm was endemic in Cameroon, Chad ,Ethiopia, Cote D`voire, Ghana to mention but a few.

Transmission of the disease in Yemen was documented in1985 and the WHO declared Central Africa Republic endemic free in 1995. (WHO 2004).

As of the end of 2004 a total number of 16026 cases from twelve countries (91%) of these were from Ghana and Sudan alone. This is very alarming taken into consideration that Sudan is a war torn zone.

Ghana requires to do more in order to deal with the problem of guinea worm disease. (WHO, 2004).

In 2006, out of 25217 cases reported, 20582 were from Sudan alone.

Much needs to be done as the World Health Organization has declared 168 countries free of dracunculiasis include Pakistan in the year 2000, Senegal and Yemen in 2004.

According to WHO, twelve countries in West Africa still have endemic area

In Burkina Faso, WHO reports that about 174 cases were seen last year.

This was so pressing which prompted their health officials to launch a campaign against it. But the problem of neglect, the WHO Representative in Burkina Faso said " but our fears are that people get complacent when they are no longer make headlines" (UN Office for the Co ordination of Humanitarian Affairs).

Donald et al (1974) published a research conducted with collaboration of Universities of California and Ghana (Legon) which was on guinea worm specified that guinea worm is found to occur almost exclusively in villages depending on pond water during dry season.

According to the report, the recent occurrence of guinea worm disease for the first time in many villages in the survey area suggests that the disease is spreading.

The risk of increasing disease in the Accra plains is serious, because almost half of the 159 villages surveyed used pond waters, and residents travel to endemic area.

The study however, indicated that male farmers were at greatest risk of becoming infected. For example the average work loss in untreated adults was more than five weeks.

The Encyclopedia Wikipedia reports that by 2004, the three most endemic areas were in Ghana, Sudan, and Nigeria that is, 7275, 7266 and 495 respectively. By 2006, Ghana reported a total of 4136 cases.

Burkina Faso, Cote d 'lvoire, Ethiopia, Mali, Nigeria, Niger, Togo, Uganda, Benin, Chad, Kenya, Mauritania have 499 cases.

A study by Brieger et al., (1980) at the College of Medicine, University of Ibadan, Nigeria reveals that in Oyo State alone, guinea worm was very endemic. The survey of 188 ever endemic hamlets with an estimated population of 23556 found that 74.3% of the people still drink only pond water.

Another 11.3% people have wells that have become dysfunctional. Only 14.4% of this rural population has access to functioning wells.

The study however, emphasized that due to such inadequacy of proper water facilities, guinea worm was very endemic in Nigeria.

It is however reported that dracunculiasis in itself is not lethal, and the overall mortality rate due to secondary infection is quite low. (The Wikipedia Report).

Even without primary treatment, the prognosis is generally good as long as a secondary infection of the worms exited, which may lead to sepsis if prevented or treated. Another common and more chronic complication is encapsulation of the adult warm, which occurs when the remains of the warm persist in the extremity, the Wikipedia reports.

2.2 **CAUSES OF THE PREVALENCE OF GUINEA WORM DISEASE**

Almost all fifteen (15) countries west of the Sahara which are endemic for dracunculiasis (CDC 1997, WHO 1997) have nomadic or semi nomadic populations.

Dracucunliasis was first reported during the wet season among the nomads of Mali and Niger (Chabasse et al. 1985).

In one local government area in Nigeria, it was endemic in 28% of the Fulani settlement with an average of 38 active cases per settlement during the study period (Brieger et al. 1997).

In Ethiopia, about 20% of Nyangaton (pastoralists) settlements surveyed were affected by guinea worm. (Jamaneh and Taticheff 1993).

Ghana Statistical Service in its Demographic Health Survey (2003) reports that the Northern part of the country (Northern, Upper East and Upper West Regions) where the Fulani herdsmen are abound have the most recorded number of guinea worm diseases. These Fulani herdsmen mostly lead nomadic lives which predispose them to lack of improved drinking water and thus being infected with the disease.

Another study revealed that nomads who are also Fulani in the case of Ghana mostly get their drinking water from ponds, step wells and water holes excavated from the basin of dry streams, which is ideal for Dracunculus transmission (Macpherson 1981).

The 2003 Ghana Demographic and Health Survey (GDHS) by the Ghana Statistical Service has another report that almost half (46.4%) of rural households lack access to improved drinking water.

This revealed itself during the Demographic Health Survey (DHS) as those with poor source of water had the highest risk of getting water related diseases such as guinea worm. The survey continued to stress that households with piped water recorded the lowest or none in respect of water related diseases (GSS, NMIMR, ORC, Macro, 2004).

In 1998, estimate indicated that only 2% of the rural population in Ghana had access to piped water within the home and the situation remains unchanged because of population increase (Ghana Statistical Service and Macro International, 1999).

Unprotected water sources such as dams(dugouts), reservoirs, streams, rivers, seasonal ponds and shallow wells appear to be the main sources of drinking water for many rural communities in the rural areas in the Northern Region of Ghana.(CWSA/CIDA, 2001; Peletz 2006, Johnson, 2007).

Peletz, (2006) stressed that in many of the communities, water contamination during collection, transport; storage and use in the households continue to pose serious threat to health and can cause guinea worm disease.

The seasonal variation of guinea worm disease is closely related to rainfall. In arid areas, transmission usually coincides with the rainy season, when surface water is available. In wet areas, transmission is most intense in the dry season, when sources of drinking water are limited. Stagnant sources of drinking water such as ponds, cisterns, pools, in dried up riverbeds, temporary hand-dug wells and step-wells, commonly harbor populations of copepods and are usual sites where infection is transmitted. Belcher et al (1975).

Guinea worm is limited to villages which depend on contaminated sources of drinking water. In disease endemic villages the prevalence ranges from 15% to 70%. The incidence of disease varies by sex, age, and occupation, and by village and country. This variation is likely due to how and where people of different ages and sex obtain their drinking water. Nwosu et al (1980).

Guinea worm disease occurs almost exclusively in isolated rural areas. Although rarely fatal, it causes a major economic burden on affected villages. In Nigeria it has been estimated that infected people lose one hundred days of work per year and that children are absent from school for 25% of the school year. The cost in lost revenue for the individual and the community can be very high.

In a study in Benin, the annual cost of guinea worm disease was estimated to be 16 000 CFA francs per patient (USD $60). Cairncross et al (2002).

From a survey of eighty seven (87) households in Southern Nigeria, the estimated annual loss in three rice growing states in Southern Nigeria was USD $ 20million). The Dogon people of Mali have referred to the guinea worm disease as "the disease of the empty granary"

2.3 **THE VARIOUS TREATMENT REGIMES/METHODS FOR GUINEA WORM DISEASE**

In structured observations, CWSA/CIDA(2001) reported that 43% of households in the Northern Region particularly guinea worm endemic communities, used cloth filters to treat their drinking water, primarily to remove the guinea worm copepods.

Peletz (2006), in self- reported responses found out that 54% of households reported using filter cloth.

The CWSA/CIDA(2001) and Carter Center for International Task Force for Disease Eradication indicated many other treatment methods as Abating, Containment and distribution of pipe filters.

According to the report, Abating is the application of chemical larvicide called ABATE to ponds. Containment is the prompt detection of all remaining diseases before or within 24 hours of worm emergence. The pipe filters are short pipes hanged with rope to be carried by individuals and can be used to drink water direct from ponds, rivers, streams etc, the Report said.

Other treatment methods the Report revealed were as follow; placing an occlusive bandage on the wound to keep it clean, prevents the patients from contaminating sources of drinking water and oral medications to relieve the associated pain and topical antiseptics or antibiotic ointment to minimize the risk of secondary infection, allows the worm to be removed by gentle traction over a number of days.

Greenaway (2004) provided a pictorial overview of infection and pain of guinea worm disease.

To Greenaway, "as the guinea worm emerges through the dermal legion, the affected person pulls it slowly and carefully (to minimize inflammation and pain) by winding a few centimeters of the worm each day onto a stick.

This painful process may take several weeks, as the worm may be up to one centimeter long. The pain can be relieved with wet compresses on the legion and the use of an oral analgesic. The risk of super infection can be reduced with the use of topical antiseptics or antibiotic ointment" (Magnussen P et al., 1994 and Kale. OO. 1996).

In one study by Belcher et al., (1975) the mean duration of disability from guinea worm disease was 50% shorter among patients who had been given antibiotics as well as instructions and supplies to clean and dress their wounds than among those who did not receive intervention.

This buttresses the point of Cairncross et al., (2002) who concluded that "no anthelminthic medication is effective against the disease, and there is no vaccine".

Chippaux (1981) found out that treatment with mebendazole was associated with aberrant migration of worms which were more likely than usual to emerge in places other than the lower limbs. Prevention, the findings suggest, is the only effective intervention to reduce the incidence of guinea worm disease. [CMA, Feb 2004 170(4)]

Dr. Ernesto Ruiz-Tiben (Director of Guinea Worm Eradication Programme,{GWEP}) commented that with application of such regimes and methods guinea worm will be the first ever parasitic disease ever eradicated. "If and when that happens, we will have done it without a drug and without a vaccine to treat or prevent the disease. If we can do that, it will be one of the greatest achievements in public health" (Carter Center for Disease Control, 2004).

2.4 EFFORTS BEING MADE BY HEALTH MANAGERS INCLUDING DISTRICT HEALTH MANAGEMENT TEAM (DHMT), GHANA HEALTH SREVICE (GHS), MINISTRY OF HEALTH (MOH), AND NON-GOVERNMENTAL ORGANIZATIONS (NGOs) TOWARDS ERADICATION OF GUINEA WORM DISEASE

The DHMT 2007 Report of the Sekyere East District captured the Afram Plains portion as guinea worm endemic since 1995. Since then, the DHMT has mounted contingency measures to detect, treat and eradicate the disease.

According to the Report, the following strategies were adopted;

i) Detection of cases and containment
ii) Containment of the affected persons
iii) Report cases to the GHS for onward report to MOH iv) Aim for eradication
v) MOH takes action and reports to NGOs such as World Vision International (WVI) and Action Aid International (AII), who in turn provide boreholes and other logistics for eradication.

The Report further indicated that the DHMT has formed an action oriented surveillance team called Community Based Surveillance Team (CBST) to detect cases by visiting the various homes in the communities concerned. When cases are detected by the CBST, the report said, they are reported to the Zonal Coordinators (ZC) for onward transmission to the Sub-District Leader who later reports to the DHMT for concrete and effective action to be taken.

Beginning in 2002, more than six thousand five hundred (6500) members of Ghana Red Cross Society Mothers Club were mobilized to help conduct surveillance for cases and health education in disease-endemic villages, thus supplementing the manpower of existing village volunteers. Since 2003, the government of Ghana through the ministry of Health has allocated more than US$3m for improved water supply in disease-endemic villages, as well as more funding for other aspects of its programme (Hopkins et al. (2002).

The challenge of eradicating guinea worm disease was accepted by the then minister of health, Dr Kwaku Afriyie on the maiden visit to Ghana by the former United States president Jimmy Carter and other senior officials of Carter Center on 4th February 2004.

The visit was to urge Ghana to finish the guinea worm eradication on time. Jimmy Carter said that "there is no excuse for the unnecessary suffering caused by guinea worm disease". Dr. K Afriyie conceded saying "Ghana must raise public awareness and gain a sense of urgency at all levels to turn its numbers around and no longer hold the title of most endemic guinea worm disease in West Africa. Ghana will meet this challenge by making guinea worm a priority, providing improved water supply to endemic communities and increasing health education"(Carter Center for Disease Control 2004).

It must also be remembered that any attempt at eradicating guinea worm is channeled through Ghana Guinea Worm Eradication Programme (GGWEP). Ghana received her portion of the eradication of guinea worm as a result of a global guinea worm eradication programme. It targeted a number of countries who had been affected by dracunculiasis including Ghana with a number of options targets towards safe health and achievement of a greater task.

Choosing a target is easy, however, compared with the task of mobilizing the resources for the battle. Much of the credit for that achievement goes to members and former members of the staff of the Centers for Disease Control and Prevention, who through an advocacy campaign in 1980 and sustained over more than a decade (Hopkins D, R. (1983, 1985, 1987, 1990) succeeded in convincing former United States President Jimmy Carter, the UNICEF Executive Board, the 1989 African Regional Committee of the World Health Organization (WHO) and the 1990 World Summit for Children to take up the challenge.

In 1991, the World Health Assembly declared "its commitment to the goal of eradicating dracunculiasis by end of 1995; this date being technically feasible given appropriate political, social, and economic support". The target date was set in order to enhance the advocacy effort at the international level and in the countries of endemicity as well. The advocacy effort needed to be replicated in each country to get a national programme established (Edingbola, LDP and Withers, Jr. et al.1992).

In 1982, India was the first to initiate a national campaign. By 1990 four other countries followed; Pakistan, Ghana, Nigeria and Cameroun.(Cairncross, et al. 2002).

The use of Geographic Information System (GIS) is another area where dracuncunliasis eradication has interacted positively with other public health activities.

In fact, it was the first global public health initiative to pioneer the use of GIS as a planning tool.

In 1993, the WHO-UNICEF Joint Programme on Data Management and Mapping, called HealthMap (HM), was established at World Health Organization (WHO) headquarters, in order to implement and maintain a GIS for the guinea worm eradication programme at global, national and local levels.

Commercial software was used at international and national levels to enter, store and maintain data on over eighty thousand (80 000) georeferenced villages in Sub-Saharan Africa, such as village populations, and schools, health and water supply infrastructure, in addition to the epidemiological information on guinea worm disease.

In 1997, it was felt necessary to develop dedicated software, adapted to the specific needs of dracunculiasis eradication as well as other public health initiatives and which can be easily used by technical, sub-national levels in the countries of endemicity.

The HealthMapper software was therefore developed by the HM unit, it contains a standardized georeferenced database of country, regional, district, and subdistrict boundaries, with rivers, roads, villages and water, health, and social infrastructure. The system also comprises a userfriendly mapping interface and a database management facility (WHO, 1999).

2.5 RECOMMENDATIONS AND SUGGESTIONS TOWARDS GUINEA WORM ERADICATION

Studies conducted by Anonymous (1983), Hopkins, D.R(1976) and Sharma, M.I.D(1980) showed that guinea worm is easily eradicatable. Their assertion was based on the following;

i) The Cyclops is not mobile vector like a mosquito, and the carrier state in both the cyclops and human hosts is of limited duration.

ii) Diagnosis is easy and unambiguous. iii) Cheap and effective means are available to prevent transmission.

iv) The disease has a limited geographical distribution.

v) It is markedly seasonal distribution in times also permits a more intensive focus on its prevention in seasonal campaigns.

vi) Transmission from animals to people is practically unknown.

The above assertions indicate that guinea worm can be prevented and eradicated without a greater cost to the health managers.

Preventive and health education measures such as :

a) Providing clean water to endemic areas

b) Treating water that may be contaminated with ABATE, Aquatabs, chlorination and providing cloth and pipe filters for people.

c) Preventing contact of persons who have active infections with the water supply can help check the spread of guinea worm disease.

By the middle of 1990, as case numbers began to come down, there was increased enthusiasm to step up the level of intervention and move towards "case containment". Essentially, this involves a shift of emphasis from helping individuals to protect their own health by avoidance or filtration of infected water towards the protection of ponds and the community at large from contamination infected people.

The Nairobi Meeting in 1994 defined and agreed on technical standards for effective case containment (Anonymous, 1994). According to the criteria, a case is considered to have been successfully contained if;

i) it was detected before or within 24 hours of worm emergence;
ii) the patient has not entered any water source since the worm emerged, or if so, the source has been treated in time to prevent transmission;
iii) the case has been properly managed by cleaning and bandaging until the worm(s) is fully removed, and the patient has been discouraged from contaminating any water source; and
iv) the diagnosis and the containment of the case have been verified by a supervisor within seven days of worm emergence.

It must be noted that these measures require substantial additional resources (Greer, G M et al., 1994).

It therefore followed from this eradication programme that where resources did not permit a supervisor to visit each village of endemicity more than once a month, he or she could not be considered to be implementing case containment, even if the village health worker did carry out some containment activities.

It is recommended that the prevention of guinea worm infection have been to keep people from drinking potentially contaminated water and prevent those who are infected from having contact with the water supply. Thus, clean, safe water for the control of a variety of microbial and parasitic disease including guinea worm, was an idea too long in incubation, and once implemented, it has made a profound effect on this disease (Anonymous, 1996, Mororthy V. N, 1937, Muller, 1971)

CHAPTER THREE

3.0 METHODOLOGY

A Descriptive cross-sectional household survey was used to assess the factors associated with the guinea worm infestation in the Sekyere East District of Ashanti.

3.1 STUDY AREA

The study area covered three communities which are Densi, Hiamankyene and Anyinofi in the Afram Plains portion of the Sekyere East District of Ashanti Region.

3.2 STUDY POPULATION

The study population involved 50 households each from Densi, Hiama Nkyene and Anyinofi in the Afram Plains portion of the district. Some frontline health workers in the Sekyere East District Health Administration and hospital and other health facilities were also involved in the study population.

3.3 SAMPLE SIZE

The sample size was sixty (60) respondents selected from three towns with twenty (20) chosen from each town. These towns were Densi, Hiamankyene and Anyonofi.

3.4 SAMPLING TECHNIQUE

Since it was not feasible to carry out the whole population studies and to utilize available resources (time, money, material and manpower) and secondly, due to the homogenous nature of study population, simple random sampling was adopted.

That is, the three towns chosen were each entered and sixty (60) households were randomly selected from each town.

Afterwards, twenty (20) respondents were picked based on every third count of the sixty (60) households chosen. This depended on the area/suburb of the town selected.

Then, interviews and observations were used to assess the situation.

The rationale for such a selection method was to maximize the understanding of decision makers as to where the sample was conducted and why the results were reflected in certain broad geographic areas.

3.5 STUDY VARIABLES

Dependent variable:

Prevalence of the guinea worm disease, treatment of drinking water, wading through water, treatment regimes, washing in ponds and effectiveness of treatment methods.

Independent Variables:

Level of education.

TYPE OF VARIABLES

Type of variable	Variable	Operational definition/indicator	Scale of measurement	Data collection tool	Data collection technique
Independent variables	Prevalence of guinea worm disease	Presence or absence of guinea worm disease	Binary 1. yes 2. no	Questionnaire	Interview /observation

	Wading of water body	Wading or not	Binary 1. yes 2. no	Questionnaire	Interview
	Treatment of drinking water	Treated or untreated	Binary 1. yes 2. no	Questionnaire	Interview
	Treatment regime	Presence or absence of regime	Binary 1. yes 2. no	Questionnaire	Interview
Dependent variable	Level of education	Last level attained	Ordinal 1. primary 2. secondary 3 other	Questionnaire	Interview

Source: Field Survey,2008

3.6 DATA COLLECTION TOOLS

Detailed structured questionnaire and observations were used to collect data. The questionnaire was both open and close ended which included health workers, household heads and other residents in the affected communities mentioned.

The observation was used to have a look at the signs and symptoms through visual approaches such as paying attention to the affected individuals and signs recorded. Observation was very helpful as it gave the researcher the chance to observe specific signs and symptoms seen on the field.

3.7 PRE-TESTING OF QUESTIONNAIRE

After the collection of questionnaire, twenty were pretested and afterwards some were modified to meet the objective of the study. It was necessary for the pretest to be conducted in a similar area with similar characteristics to enable the instruments to be redesigned if need be. Kofikrom was chosen for the pretesting, after the pre-testing some of the questions were modified, deleted or added. For example, there was a question which read “Do you stay in streams for washing activities?” It was found out that the question did not meet the standards set during the pretest. Therefore, the question was later changed to read “Do you cross river/stream before going to the

farm/market? Also, “ethnicity” was not included in the main questionnaire but after the pretest, the need was felt that “ethnicity” be it added to it.

3.8 DATA PROCESSING

The SPSS software version 14 and the Microsoft Excel software 2007 were used to process the data. The Microsoft Excel software was used to code, categorize and summarize the data obtained from the field.

3.9 ETHICAL CONSIDERATION

Ethical consideration was sought from the School of Medical Science, Kwame Nkrumah University of Science and Technology and the Sekyere East District Directorate of Health. The purpose and procedure of the research were explained to each participant and was made to answer any question which would not affect them in anyway. Consent was also obtained from each participant in the study. This, they did by either appending their signatures or thumbprints. The participants were assured of strict confidentiality of written materials and the accrued benefits they stood to gain from the study or research. This is because they had the chance to explain themselves with respect to the research topic “An assessment and treatment of the guinea worm disease in the Sekyere East District of the Ashanti Region of Ghana.

3.9.0 ASSUMPTIONS

All responses and the data provided are assumed to be accurate and a true representation of the study area.

3.9.1 LIMITATION OF STUDY

The study had challenges such as insufficient finances, time and personnel.

CHAPTER FOUR

4.0 **RESULTS**

This chapter shows the details of the findings of one hundred and fifty (150) households sampled. This presentation is made in the form of tables and charts for easy understanding.

4.1 **SOCIAL CHARACTERISTICS OF RESPONDENTS - SOCIO-ECONOMIC**

4.1.1 **GENDER – DISTRIBUTION OF RESPONDENTS**

Among the respondents interviewed, thirty were men and thirty were women

Table 4.1 Gender

GENDER	FREQUENCY	PERCENTAGE (%)
Male	30	50
Female	30	50
TOTALS	60	100

Source: Field Survey 2008

4.1.2 **MARITAL STATUS- DISTRIBUTION OF RESPONDENTS**

On marital status, twenty six respondents said they have married, fourteen were divorced, eight were widowed, four separated and eight responded that they were single. This represented 43.4%, 23.3%, 13.3%, 6.7% and 13.3% respectively.

Table 4.1.2 MARITAL STATUS- DISTRIBUTION OF RESPONDENTS

STATUS	FREQUENCY	PERCENTAGE (%)
Married	26	43.4
Divorced	14	23.3
Widowed	8	13.3
Separated	4	6.7
Single	8	13.3%
TOTAL	60	100

Source: Field Survey 2008

4.1.3 LEVEL OF EDUCATION OF RESPONDENTS

Twenty four people (40%) had primary education. Twenty two (37%), had either junior high or middle school certificates and only four(6.7%) had senior high school certificates. Ten people (16.3%) did not attend school at all.

Table 4.1. 3 Level of Education of Respondents

EDUCATION	FREQUENCY	PRCENTAGE (%)
Tertiary	Nil	
Secondary/Senior High	4	6.7
Junior High/Middle	22	37
Primary	24	40
None	10	16.3
Total	60	100

Source: Field Survey 2008

4.1.4 LEVEL OF INCOME OF RESPONDENTS

On their level of income, forty two people said they had a very low income and eighteen had average income. This shows that a 70% were poor people and only 30% had average income. The classification of income levels was done taken into account the local economy. Thus, respondents who received between 10-90 Ghana cedis were classified as low, 100-200 Ghana cedis as average income earners and 210-250 Ghana cedis were put into the high income class.

Table 4.1. 4 Level of income of Respondents

LEVEL OF INCOME	FREQUENCY	PERCENTAGE (%)
High	0	0
Average	18	30
Low	42	70
Total	60	100

Source: Field Survey 2008

4.1.5 KNOWLEDGE ATTITUDES AND PRACTICES ON GUINEA WORM INFESTATION AMONG RESPONDENTS

On cultural values, forty four (73.3%) said they had knowledge about the disease with only sixteen (26.7%) people having no knowledge about it. Majority of the respondents had no idea about taboo, that is, (90%) responded no and (10%) said yes. Their reason was due to the fear of contamination

Table 4.1.5 Knowledge Attitudes and Practices

KNOWLEDGE ABOUT GUINEA WORM DISEASE	FREQUENCY	PERCENTAGE (%)
Yes	44	73.3
No	16	26.7
Total	60	100

Source: Field Survey, 2008

Table 4.1.6 Idea About Taboo

IDEA ABOUT TABOO	YES	NO
PERCENTAGE	90	10

Source: Field Survey, 2008

4.2 DISEASE PREVALENCE

The researcher asked questions about people who have been ever diagnosed to have gotten guinea worm disease. The response had twenty people (33.3%), some have been treated and others still have the disease. Forty respondents (66.7%) said they had not been infested with guinea worm disease before.

Table 4.2 Disease Prevalence

DISEASE PREVALENCE	**FREQUENCY**	**PERCENTAGE (%)**
Yes	20	33.3
No	40	66.7
TOTALS	60	100

Source: Field Survey, 2008

4.3 CROSSING OF STREAMS/RIVERS

Forty two people responded" yes" to crossing rivers and streams before going to their economic activities such as farms, market and others. The crossing was done by wading through the rivers and streams. This figure represented 70% of the people interviewed. Eighteen people said that they did not cross any river or stream when going to farm or any economic activity representing 30% of the total respondents. Table

4.3 Crossing of Streams

CROSSING OF STREAM	FREQUENCY	PERCENTAGE (%)
Yes	42	70
No	18	30
Total	60	100

Source: Field Survey, 2008

4.4 SOURCES OF DRINKING WATER

The research asked questions on four sources of drinking water to find out which of them had guinea worm infective agents. These included pipe-borne water (borehole), lake, stream and rivers. Forty people drank from borehole source, ten had their source from lakes, five had drinking water from rivers and five took theirs from streams. This represented 66.7%, 16.6%, 8.35%, 8.35% respectively.

Table 4.4 Sources of Drinking Water

SOURCES OF DRINKING WATER	FREQUENCY	PERCENTAGE (%)
Borehole/pipe borne water	40	66.7
Lakes	10	16.6
Streams	5	8.35
Rivers	5	8.35
Total	60	100

Source: Field Survey, 2008

4.5 TREATMENT OF DRINKING WATER/TYPES OF TREATMENT

On whether they boiled their water as a way of treatment twenty (20) people said no to water treatment and forty said yes to water treatment. This represented 33%, 67% respectively. Among the forty respondents, twenty two (55%) people responded that they used filtering method, ten (25%) said that they used chemicalization method and eight (20%) said they used boiling.

Table 4.5 Treatment and Types of Drinking Water

TREATMENT OF DRINKING WATER	FREQUENCY	PERCENTAGE (%)
Yes	40	67
No	20	33
Total	60	100

Source: Field Survey, 2008

Table 4.6 Treatment Regime for Drinking Water

TYPES OF WATER TREATMENT	FREQUENCY	PERCENTAGE (%)
Boiling	8	20
Filtering	22	55
Chemicalization/Abating	10	25
Total	40	100

Source: Field Survey, 2008

4.7 TREAMENT REGIME FOR THE GUINEA WORM DISEASE

It was revealed that all respondents used the same methods as far as treatment is concerned. Thus, they used the following as the way of treating the disease; early reporting, wounds dressing and application of drugs and ointment.

Table 4.7 Treatment Regime for the Guinea Worm Disease

TYPES OF TREATMENT FOR GUINEA WORM DISEASE	YES	NO	TOTALS
Early Reporting	40	20	60
Wounds Dressing	56	4	60
Application of Drugs and Ointment	60	nil	60

Source : Field Survey 2008

CHAPTER FIVE

5.0 DISCUSSION

5.1 INTRODUCTION

This chapter considers the findings gathered on the sample from the study population and discusses it in line with the objectives and the literature review of the research.

5.2 DEMOGRAPHIC CHARACTERISTICS

The average age of the respondents was forty two (42) years; the oldest was eighty one (81) and the youngest was twenty (20) years. Both male and female respondents were equal in number; thirty (30) for male and thirty (30) for female. Almost half of the respondents were married, followed by quite a greater number divorced, widowed, separated and single.

No respondent had tertiary education with only few having senior secondary school education. The most dominated respondents had had junior high school education, primary school education and no formal education at all.

Most of the respondents had low income with another high number of respondents in the average income. All respondents were farmers.

Incidentally, about 73% of the respondents had knowledge about the guinea worm disease and very few had no knowledge at all about the disease.

5.3 **DISEASE PREVALENCE**

Twenty respondents (33.3%) interviewed said they have been infected but some have been treated and some still have the disease (ten respondents). Forty respondents (66.7%) said they have not been infected. Almost three quarter (70%) of the respondents crossed rivers and streams before getting to their farms, markets and schools. Only eighteen (18) respondents (30%) did not cross rivers and streams before they get to their farms, markets and schools.

The infection of guinea worm disease has an association with streams and rivers which is infected with copepods in the spread of the disease. This is in respect of transmission of the disease.

Cairncross, (2002), revealed that transmission of the disease is mostly through humans already infested with the guinea worm disease who step into stagnant pools, rivers and streams.

5.4 **SOURCES OF DRINKING WATER**

Two third (66.7%) of the respondents drank from boreholes or pipe borne water, (16.6%) used water from lakes, 8.35% used water from streams and 8.35% drank from rivers. Together, twenty (20) respondents used water from untreated source which may be contaminated and unsafe.

In a Self-Reported Survey, Peletz, (2006) reported that more than half (56%) of the rural population in the Northern Region does not have access to an improved water sources. According to Peletz, water from unimproved sources is usually contaminated by both human and animal excreta and therefore poses disease risks to people.

The 2003 Ghana Statistical Service reported that almost half (46.4%) of rural households lack access to improved drinking water. This revealed itself during the Demographic Health Survey as those with poor source of water had the highest risk of getting water diseases such as guinea worm. The survey continued to stress that households with piped water recorded the lowest or none in respect of water related diseases.

5.5 **TREATMENT OF DRINKING WATER**

Forty (67%) respondents treated water before using it against twenty (33%) respondents who did not treat the water they used. The number of respondents who did not treat water before drinking was on the higher side.

Drinking water from such untreated sources has a higher tendency to attract the copepods which can easily generate into guinea worm. In structured observation, CWSA/CIDA (2001) reported that 43% of households in the Northern particularly guinea worm endemic communities, used cloth filters to treat their drinking water, primarily to remove the copepods.

Similarly, Peletz (2006), in self-reported responses found that 54% of households reported using cloth filters. Both CWSA/CIDA (2001) and Peletz (2006) found that a few households used other water treatment technologies such as boiling, chlorination and alum.

5.6 **TYPES OF WATER TREATMENT**

On the types of water treatment, the study revealed that (20%) boiled their water, (55%) filtered and (25%) used Abating/chlorination. The study showed that the greater number of respondents used filtering which was cloth and pipe but there are other effective water treatment products like Aquatabs which can be used to kill the copepods in the drinking water. (CWSA/CIDA, 2001)

In a randomized, placebo-controlled, double-blind, longitudinal study to test the health impact of Aquatabs (chlorine-based water purification tablets) in the Tamale Metropolis, the Centers for Disease Control and Prevention [CDC (2000)] reported that 70 (29%) of households at baseline were filtering their water, 54 (23%) were using alum and 33 (14%) did not use any form of water treatment. The CDC interim report stated that after the five month intervention study (during which free Aquatabs and placebo tablets were distributed to intervention and control households respectively), households water filteration dropped to 54 (23%), alum used reduced to 16 (7%) and Aquatabs adoption rate was universal (CWSA/CIDA, 2001).

The study went on to identify three basic water treatment methods, thus: boiling, filtering and abating which are so traditional and less scientific. Murcott (2006), identified three broad and modern areas of water quality- physical, chemical and microbiological that can be improved by households water treatment. It is further envisaged that such modern methods be used to improve the water quality.

5.7 TREATMENT REGIME USED BY THE AFFECTED

The research revealed that almost all of the respondents used the same treatment regime as far as treatment of guinea worm disease is concerned. The existing treatment regime were; early reporting of the disease to the CBST, dressing of wounds and subsequent prescription of drugs (pain killers) to the affected.

Even though the guinea worm disease existed in the Sekyere East District, no clearer picture is painted about how the affected is treated. This does not give any relief to those affected. Prof. Chris Greenaway, (2004) captured that as the guinea worm emerges through the dermal legion, the affected person pulls it out slowly and carefully (to minimize inflammation and pain) by winding a few centimeters of the worm each day onto a stick. To Prof. Greenaway, this painful process may take several weeks as the worm may be up to one centimeter long. The pain can be relieved with wet compresses on the legion and the use of an oral analgesic.

Magnussen, (1994) also prescribed that the risk of bacterial superinfection can be reduced with the use of topical antiseptics or antibiotic ointment. The above assertion was given a boost by a study by Belcher et al., (1975) which supported the use of antibiotics to treat guinea disease faster. The study stated that, the mean duration of disability from guinea worm disease was shorter among patients who had been given antibiotics as well as instructions and supplies to clean and dress their wounds than among those who did not receive intervention.

It is further concluded that using the natural means such as wounds dressing cannot in itself help to quickly treat and cure guinea worm disease but provide the affected with highly recommended antibiotics to ensure speedy treatment and cure.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS 6.1 CONCLUSIONS

Sixty (60) respondents were interviewed on the assessment and treatment of guinea worm in the Sekyere East District of Ashanti Region through households survey. Majority of respondents did not have higher education but have in-depth knowledge (73%) about the existence of guinea worm disease in the community. 33% of the interviewee had been affected by guinea worm disease and 33% also drank from untreated water sources such as lakes, streams and rivers with 77% drinking from pipe borne water.

Sixty seven (67%) of respondents treated water before drinking and 33% did not treat water before drinking. The highest percentage of respondents (55%) used filtering, followed by boiling (20%) and abating/chlorination (25%) as means of water treatment. The research identified three basic treatment regime; early reporting, wounds dressing and drugs prescription.

Promotion of modern water treatment products like Aquatabs on large scale, drilling of more boreholes and intensive health education were suggested as a means to prevent and eradicate guinea worm disease.

6.2 RECOMMENDATIONS

The study identified that drinking from untreated water sources which is infested with copepods can lead to the infestation of the guinea worm disease in the Afram Plains portion of the Sekyere East District. The following measures were recommended for speedy action to be taken by the stakeholders.

The District Assembly

The District Assembly should provide more boreholes to discourage people from drinking potentially contaminated and infected water sources.

The District Health Management Team

Periodic education on the need to drink from treated sources and effective adoption of fashionable and modern water treatment products like Aquatabs on larger scale should be vigorously pursued by DHMT to ensure clean, safe and hygienic drinking water.

The Ministry of Health and Ghana Health Service

The Ministry of Health and the Ghana Health Service should partner the DHMT to ensure that potable water is provided.

Area for future research

Research and educational institutions should encourage more research in a bid to eradicate the guinea worm disease as health menace in the district.

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APPENDICES

APPENDIX 1

QUESTIONNAIRE A) HOUSEHOLDS

A RESEARCH IS BEING CONDUCTED ON THE ASSESSMENT AND TREATMENT OF GUINEA WORM DISEASE IN THE SEKYERE EAST DISTRICT OF ASHANTI REGION OF GHANA. YOU ARE PLEASE REQUIRED TO ANSWER THE FOLLOWING

QUESTIONS WHICH WILL ONLY BE TREATED AS CONFIDENTIAL AND PURELY ACADEMIC

BACKGROUND INFORMATION

SOCIO-ECONOMIC FACTORS

1) Gender a)male b)female
2) Number of children a)1-3 b)4-6 c) 7+
3) Marital status a)Single b)Married c)Divorced d)Widowed e)Separated
4) Religion a)Moslem b)Christianity c)Traditionalist d)Others
5) Level of education a)Primary b)JHS/Middle c)SHS/O Level d)Tertiary e)None
6) Level of income a)High b)Average c)Low
7) Ethnicity……

DEMOGRAPHIC FACTORS

8) Do you cross river/stream before going to the farm/market? a) Yes b) No
9) Location of houses a)Closer to a stream b)Along side a stream c)In between a stream
10) Sources of drinking water a)Pipe borne b)Lake c)Stream d)Rivers
11) Treatment of drinking water a)Yes b)No
12) Type of treatment a) Boiling b) Filtering c) Chemicalization/Chlorination

CUTURAL VALUES

13) Any knowledge about water borne infection a)Yes b)No
14) Any taboo about the use of water sources a)Yes b)No
15) If answer in Q14 is Yes, then why?.....
16) Does the community have any day set aside to weed along the sources of drinking water? a) Yes b) No

17) If yes, how frequent? a)Weekly b) Bi-weekly c)Monthly d)Other

18)Does cattle /other animals drink from the stream? a)Yes b)No

19) Do you wash in streams? a)Yes b)No

PREVALENCE OF DISEASES

20) How often do you visit the clinics? a)Every week b)Every two weeks c)Very often

21) What problem do you complain of? a)Head ache b)Body itching c)General body weakness d)Swelling on any ppart of the body

22) Have you been ever diagnosed as having guinea worm disease? a)Yes b)No

23) If yes to Q22, then when?.....

24) What problems do you experienced?..... 25) What methods do you use to treat the guinea worm disease? a)…… b)…….. c)……

26) Has the method been effective? a)Yes b)No

27) Has there been any prescription from any medical personnel? a)Yes b)No 28)What went into the prescription?..... ..... ……

29)Has the prescription been effective? a)Yes b)No

30) To What extent?……

……

……

B) HEALTH WORKERS

1) How many people do you attend to everyday?.....

2) What type of diseases do you treat? Please mention them…….

3) Has guinea worm disease come your attention? a)Yes b)No

4) If yes, which part of district do they come from?.....

5) What effort is the DHMT making as far as treatment is concerned?.....

6) Have you reported it to the Ghana Health Service? a)Yes b)No 7) What was the response like?.....

8) Has the attention of the Ministry of Health been drawn ? a)Yes b)No 9)What was the response?.....

10) Has guinea worm disease received any attention from any Non-Governmental Organization? a)Yes b)No

11) If yes , what collaboration is the DHMT having with such an NGO in the treatment of guinea worm?.....

12) Is treatment of guinea worm a priority for the DHMT? a) Yes b)No

13) If answer to Q12 is Yes why?.....

14) Can you list any treatment method ? a)……
b)……. C)…….
d)…….

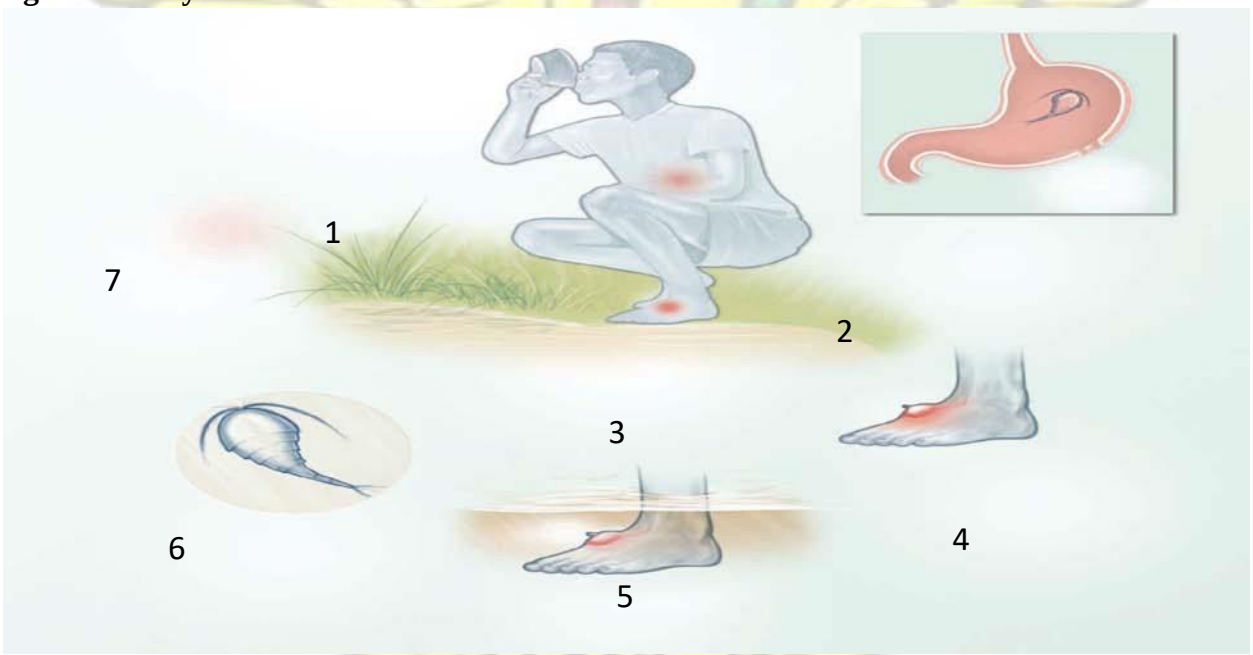
15) How long does it take to treat a guinea worm infested person?
……

16) Is the treatment of guinea worm disease expensive? a)Yes b) No

17) if yes to Q16, who bears the cost of treatment? a)DHMT b)Individuals c)MOH d)NGOs

Appendix 2: Scenes of Guinea Worm Disease and Water Treatment

Fig 1.1 Life Cycle of Guinea Worm



1. Human drinks unfiltered water containing copepods (water fleas) harbouring infective third-stage guinea worm larvae
2. Gastric juices kill the copepods; the released larvae penetrate the host's stomach and intestinal wall and enter the abdominal cavity and retroperitoneal space
3. Fertilized female worms migrate toward the skin surface, usually on the lower extremities (Males worm die soon after mating)
4. A year after infection, the female worm induces a painful blister and begins to emerge through the skin
5. When the lesion comes into contact with water, the emerging worm releases larvae into the water source. Free-living larvae survive only 3 days until they find a host.
6. The immature larvae are ingested by water fleas
7. After 2 weeks, and 2 molts within the water fleas, the larvae develop into infective larvae. Ingestion of the infected water fleas by humans completes the life cycle.

Fig 1.2

Guinea worm emerging from foot ulcer

Fig 1.3

Foot blister induced by the female guinea worm in person with the guinea worm disease.

Fig 1.4

A woman strains her family's drinking water through a cloth filter to prevent them from contracting guinea worm disease.

Fig 1.5

A human case of guinea worm disease, with an emerging worm.

The worm is often wound on the stick, a practice which is believed to have given rise to the caduceus symbol of medicines.

Fig 1.6

Male and female dracunculus medinensis