A STUDY TO DETERMINE THE CURRENT PREVALENCE OF BURULI ULCER IN THE ADULT POPULATION AND DETERMINE ANY GENDER ISSUES OUT OF THE BURDEN OF BURULI ULCER IN GA DISTRICT OF GREATER ACCRA REGION

BY

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DECLARATION

I hereby declare that this is an original work based on my own research and that it has neither been presented in any form for any other degree nor concurrently being submitted in candidature for any other degree. Where my work is indebted to the work of others, I have duly acknowledged.

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Prof. G. A. Ashitey: .....

DEDICATION

I dedicate this work to my daughter Awura Adjoa Antwiwaa Amofa and her brothers.

And all women in general.

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LIST OF ABBREVIATIONS

DDHS	District Director of Health Services
DHMT-	District Health Management Team
DNA	Deoxyribonucleic Acid
GPS	Geographic Positional System
GSS	Ghana Statistical Service
GNT	Ghana National Television Station
HIV	Human Immune deficiency Virus
MPH	Master of Public Health
OPD	Out Patient Department
SES	Socio-Economic Status
SPH	School of Public Health
WHO	World Health Organisation

ABSTRACT

In this study a total of 3761 individuals in six villages were interviewed out of which 497 clinical lesions at various stages of the diseases were identified given a crude prevalence rate of 13.2 percent or 13,215 per 100,000 compared to the National case search rate of 87.7 per 100,000 for the whole Ga district with the set back mentioned in the text.

The definition of adult has intentionally been chosen to start from age 15 years to enable us have a meaningful discussion of any gender issues that may arise from the disease since women of reproductive age is 15-49 years by WHO convention. Consequently the adult population formed 60.2% of the total population surveyed. From the 2,263 adult population 357 patients were identified with clinical lesions at various stages giving a crude prevalence rate of 15.8 per cent or 15,775 per 100,000.

This prevalence gives the erroneous impression that the disease is more prevalent in the adult than in children but this could be explained by the fact that those with the scar formed the majority who obviously might have reached adult age since it takes a long time before the disease reach the scaring stage. However, the active lesions (pre-ulcerative and ulcer cases) showed majority of them being 15 years and below which is widely known by the numerous publications worldwide.

i. The current prevalence rate of Buruli ulcer in the adult population with respect to the active lesions of the disease in the six communities was found to be 4.5 percent or 4,463 per 100,000.

ii. The current prevalence rate of healed lesions in the adult population without deformity was much higher 10.1 percent or 10.075 per 100,000.

iii. The current prevalence rate of healed lesions in the adult population with disability or handicaps was the least 1.2 per cent or 1,237 per 100,000.

iv. Very surprisingly there were not much problem with respect to gender issues as almost all the affected adults both men and women claimed they could perform their gender roles.

In the opinion of the author therefore Buruli ulcer has no effect on gender issues in these hyper-endemic rural areas where stigmatisation is not a problem. The situation may be different however if these patients with serious scar were to be in the Metropolis where people are not familiar with such scars. This can be inferred from the Media Reports in 1993.

In a hyper-endemic communities therefore Buruli ulcer appears to have no effect on gender issues the author may conclude. This conclusion is based on

the responses from the questionnaires. However, the author strongly suspect that gender role is a problem considering the statement in the preceding paragraph.

A further research focusing on effect of Buruli ulcer on gender roles only may confirm my suspicion.

These prevalence rates has confirmed the general perception that the disease is grossly under reported in this district in particular and that the disease is hyper-endemic in the rural Ga district (in fact an epidemic by epidemiologic standard) with the highest prevalence rate in Ghana if the urban areas (where the disease is virtually nonexistent) which form two thirds of the district population were to be excluded as mentioned earlier. The study has also confirmed the impression of Amofah et al (2002) that "the more one looks for the disease in known disease endemic and nearby areas the more likely additional cases will be found".

Absolute illiteracy had no direct relationship with acquiring the disease as less than 25% of those with the disease had no form of education at all. About 38.4% of the population has had primary education while 36.6% of the affected population had completed secondary level of education. This confirms the school going age as the most affected. These are the very playful and active age group predisposing them to a break in the skin – the most likely point of entry by the microorganism.

The most crucial observation by the author and the community leaders is poor sanitation and personal hygiene due to lack of potable water as the predisposing cause of the disease and not mere presence of multiple water bodies. The disease is less common among villages along the Densu lake which is a permanent water body while those villages with high prevalence in the district are virtually dry and depend on man made ponds for water during the dry season.

For example the Chief of Obakrowa maintained that prior to provision of hand pump wells in that village the disease was very prevalent in the village but since then the prevalence is reducing. Danchira seems to have the highest prevalence because there is no hand pump well in the village and there are many hamlets who use man-made ponds as their source of water the nature of which is unwholesome for human use. This village and Obakrowa have similar topographical features with very little stagnant water bodies on a high level.

This observation has a scientific medical backing quoting the most eminent Public Health Physician in Ghana will be self-explanatory. "Sickness may be cured or prevented through immunization or other direct intervention. But true health does not come from the Doctor. It comes from the food we eat the water we drink, the environment in which we live and the life style we adopt" unquote (Sai F.T. 2002). These words are the simplified and modern form from the Father of Modern Medicine (Hippocrates) as in the text.

The disease is more common among farmers and fishmongers emphasizing sanitation and personal hygiene as a higher predisposing factor. The relative high figures among traders might be those who had the disease at a younger age as is reflected in the prevalence in those with scar without deformity.

The site of the disease conform to the generally known – the limbs forming about 80%. Very interestingly there was one case of active Buruli ulcer in the sole of the right heel of a woman at Danchira and another at the Anal region. Multiple lesions were not uncommon like those with scar and pre-ulcerative lesion, scar with ulcer indicating re-infection is a common phenomena. However, there was no situation – where the whole household was affected; the highest was four cases in one household of ten members refuting person to person contact as a form of spreading the disease.

All these communities are very deprived by all standards; inaccessible, poor health facility, not affordable with acceptability problem because of poor road network, scarce health facilities, low socio-economic status and their superstitious beliefs respectively.

Contrary to the general belief of low mortality about the disease, it is the authors opinion that mortality is most likely to be high in these inaccessible, unaffordable, deprived areas who do not report such mortalities to the health authorities due to superimposed under-nutrition, anaemia and secondary infection as was observed

during the study. During the two month period of the survey three patients with severe form of the disease died of it without notifying the health authorities. I got to know them when I went back to check whether they have heeded to my advice to attend to the Health Centre and if possible take a photograph of them.

The last but not the least observation is the closeness of the area or part of the district indirectly being part of the Accra Metropolis and with the rural-urban migration if the mode of transmission is later discovered to be contagious then an epidemic in the capital may be the result. The cost of containing this chronic disease will be very disastrous to the nation, whose per capita income is about US $300.

In the light of all the above the author recommend that the first line of action to curb the spread of the disease is to provide them with potable drinking water. Those who have been provided with hand pump wells should be educated to utilize these facilities, employing participatory approaches. The education is very important because in Obakrowa for example which has the facility some of the members were still using the small streams and ponds.

Health education and promotion should be intensified in all the rural communities especially emphasizing on sanitation and personal hygiene.

Provision of good road network at least motorable feeder roads to all the endemic villages for health providers to get access to them and the possibility of easily

obtaining transport to the Amasaman Health Centre at all times will help the communities patronizing the health facility better.

Provision of basic schools in the villages to reduce the walking distance to the nearest school some about 2-3 kilometres away. This will help improve the educational level and the teaching and practicing of personal hygiene.

The need to expand the health facility at Amasaman to a District Hospital and expanding the staff position more especially skilled surgeons and nurses in the art of skin grafting technology. At least one plastic surgeon in the Centre to start using the modern theatre facility already provided will encourage more Buruli ulcer patients to utilize the health facility.

Finally considering the work of Hippocrates in the text, the modern version of it by Fred Sai and the advice from Lucas of Nigeria it is time contemporary public health practitioners started being pro-active in preventing more diseases by concentrating on the Environment which would solve more than half of our medical problems instead of being "consulting room Public Health physicians" to quote Dr. Coleman of School of Public Health during his lecture to us on sanitation at Accra Metropolitan Assembly Health Directorate.

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CHAPTER ONE

1.0 INTRODUCTION AND BACKGROUND INFORMATION

Buruli ulcer though not a new disease, has become a problem of a dimension baffling the health profession of late. Sir Albert Cook was the first to record cases of skin ulcers similar to those caused by *Mycobacterium ulcerans* in 1897 while working on the Buruli region of Uganda (WHO:2000a) – hence its name "*Buruli ulcer*" but he did not publish these cases in the medical literature. After that the disease was forgotten for half a century. In Australia the disease is called "*Bairnsdale ulcer*" when in 1948, MacCallum et. al. working in the Bairnsdale province in Australia described the disease in more detail as is currently known and confirmed *Mycobacterium ulcerans* as the causative organism for this devastating disease as the first case study published in the Medical Journal.(MacCullum et al: 1948) *Mycobacterium ulcerans* infections produces characteristic, slowly progressive skin ulceration. Since then cases have been reported throughout the tropical and subtropical world. The diseases however, remained fairly obscure until 1998 when the World Health Organisation (WHO) recognised it as a major Public Health Problem(WHO:2000a) and the disease is now known to be endemic in developing countries worldwide especially West Africa, parts of Eastern and Central Africa (WHO:2000b). See **figure 1** which shows a map of the distribution of the disease globally.

Figure 1
Worldwide distribution of *Mycobacterium ulcerans* disease (Buruli ulcer)

Note: Shaded areas do not represent the extent of the problem but indicate only those countries where the disease has been reported or suspected.

Epidemiology and Transmission

Epidemiologically, the mode of transmission to man and the natural habitat of the organism are still not known even though the causative bacteria must of necessity be naturally found in the environment of the endemic areas.

Buruli ulcers occurs in tropical and sub-tropical humid environments. The agent *Mycobacterium ulcerans* is from the family of bacteria which causes tuberculosis and leprosy (WHO:1998). After tuberculosis and leprosy it is the most common mycobacterial infection of humans(Weir : 2002). The disease often occurs in people who live or work close to rivers and stagnant bodies of water(Muelder : 1992; Oluwasanmi et al : 1976). Changes in the environment such as construction of irrigation systems and dams, seem to have played a role in the resurgence of the disease. No racial or social group is exempt. Infection with Human Immune deficiency Virus (HIV) is not a known risk factor.(Stienstra et al : 2001).

The disease is more severe in impoverished inhabitants of remote rural areas. Mortality due to the disease is low but morbidity is high. Complications include contracture deformities, amputation of limbs, breast, genitalia and destruction of the eye. In some localities 20-25% of those with healed lesions are left with disabilities that have a long term social and economic impact (Portaels et al : 2001). The current economic and social burden imposed by Buruli ulcer is enormous. In Ghana the average cost of treatment per patient is estimated to be US$780. (Portaels et al : 2001).

The prevalence of the disease is not accurately known. In Côte d'Ivoire over 15,000 cases were recorded between 1978 and 1999. Prevalence rates have been estimated at 16% in some communities in Côte d'Ivoire and at 22% in some

communities in Ghana. (Portaels et al:2001) In Benin nearly, 4,000 cases were recorded between 1989 and 1999. (Portaels et al:2001) A few cases have been reported in non-endemic areas in North America and Europe as a sequel to international travel. Lack of familiarity with Buruli ulcer has frequently resulted in significant delays in the diagnosis and treatment of these cases. It is speculatively believed to occur in the soil or on vegetation infecting the dermis through thorn prickles or other penetrating injuries. Trauma to the skin may therefore provide an entry point.

The causative organism

Mycobacterium ulcerans is a slow growing environmental mycobacterium. It is an acid-fast micro-organism that grows on common mycobacteriological media, e.g. Lowenstein-Jensen (L-J) medium. It grows best at low temperatures (30-32^{o}C), at lower than atmospheric oxygen tension (pO_2 < 2.5 kPa) and within a pH range of 5.4-7.4. A positive culture requires incubation for 6 to 8 weeks (or longer) under appropriate conditions.(WHO:2001)

Pathogenesis

Once introduced into the subcutaneous tissue the organism proliferates and elaborates a toxin that has affinity for fat cells. The resulting necrosis then provides a favourable milieu for further proliferation of the organism. During the necrotic phase, there is very little or no cellular immune response and the burulin skin test is negative. By an unknown mechanism, either the toxin may be neutralized or the organism may

cease to proliferate or to produce toxin. Healing seems to begin when the host develops cell-mediated immunity, at which time the burulin skin test may become positive.

The inflammatory cells then destroy the etiological agent *(M. ulcerans)* and the disease subsides with scarring. Bones may be affected by direct spread from the lesion or as a result of *M. ulcerans* bacteraemia. In contrast to other pathogenic mycobacteria, which are facultative intracellular parasites of macrophages, *M. ulcerans* occurs primarily as extracellular microcolonies.

Clinical spectrum of the disease

Clinically the disease manifests as papules, nodules, plaques, oedematous forms and ulcers. The disease may be active (ongoing infection) or inactive (previous infection with characteristic depressed stellate scars with or without other sequelae). A new case is a patient with no previous history of or treatment for Buruli ulcer. A recurrent case is a patient presenting within one year with a further lesion at the same or a different site. Recurrence rates vary from 16% for patients presenting early to 28% for patients presenting late (Portaels et al:2001). Recurrence at the same site may be due to inadequate excision. Recurrence at a different site may be due to haemotogenous or lymphatic spread.(WHO:2001)

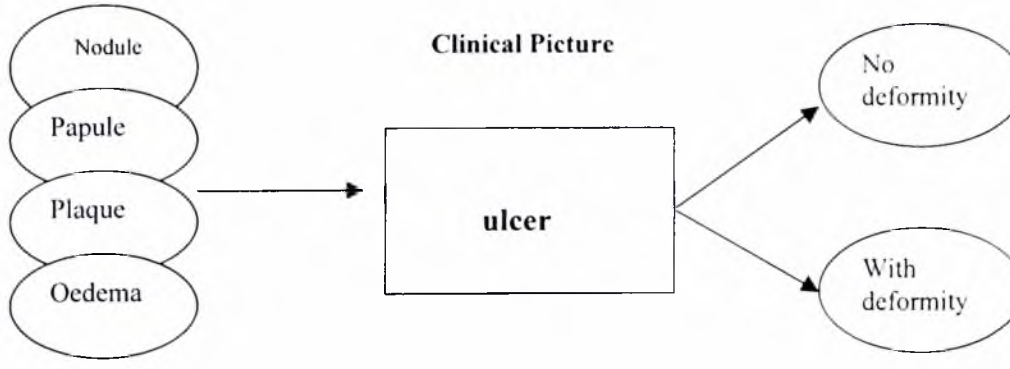
A typical Buruli ulcer begins as a small painless nodule beneath the skin and is sometimes mistaken for a boil. The organism produces an exotoxin, identified as a heat stable phospholipo protein polysacoharide complex, which causes lesion in the skin. The lesion extends from the skin to form a very itchy painless nodule which is mobile over deeper tissues. The undermined skin undergoes necrosis and the necrotic contents are

discharged forming a large ulcer with deeply undermined edges, which continue to grow at the circumferences. This ulcer may be patchy or so massive, which is followed by debilitating deformities even though the disease has a low mortality rate. The exotoxin- as recently been identified as a compound – a ployketide-derived macrolide is now known as *mycolactone* (WHO:2001) – has been identified and its chemical structure established, which causes the sub dermal necrosis and destruction. The toxin has both cytotoxic and local immunosuppressive properties. Injection of the purified toxin into experimental animals causes changes in subcutaneous fat similar to those seen in Buruli ulcers.

This is the first macrolide known to be produced by a human pathogen and the only macrolide identified in the genus *Mycobacterium*.

As the nodules are not painful initial early detection is rare. Many Africans are hesitant to seek clinical treatment because of superstitions surrounding the disease.

The four known clinical presentations.



Diagnosis

The diagnosis of the disease is by clinical examination and laboratory investigation.

Clinical: In a known endemic area, an experienced person can make the diagnosis of Buruli ulcer on clinical grounds. The following clinico-epidemiological features are important diagnostic clues:

1. The patient lives in or has travelled to a known endemic area.
2. Most patients are children under 15 years of age.
3. About 85% of lesions are on the limbs (WHO:2001).
4. Lower limb lesions are twice as common as upper limb lesions.

Laboratory: Any two of the following findings are required to positively diagnose Buruli ulcers;

1. Acid-fast bacilli (AFB) in a smear stained by the Ziehl-Neelsen (ZN) technique;
2. Positive culture of *M. ulcerans* (but this required 6-8 weeks or longer);
3. Histopathological study of excisional biopsy specimen (result available rapidly);
4. Positive polymerase chain reaction (PCR) for DNA from *M. ulcerans*.

Treatment

1. Surgical

The only successful clinical treatment is the surgical excisions of a nodule when diagnosed early enough or surgical excisions of the infected areas or ulcerated areas followed by skin grafting which is expensive and leaves patients prone to infection. Unfortunately, it has a high recurrence rate. (WHO : 2001)

Limiting factors include:

1. Inadequate surgical facilities;
2. Need for prolonged stay in hospital;
3. High treatment costs;
4. Recurrence after surgical treatment rates of 16% to 28%(WHO:2001)
5. The risk of transmission include heat and hyperbaric oxygen, which have not been definitively proven and may be impractical in developing countries
6. **Drug treatment:** Several antimycobacterial agents have *in vitro* activity against the causative organism but no single agent has been proven to be regularly useful in the treatment of the disease. Agents used include rifampicin, rifabutin, clarithromycin, azithromycin, streptomycin and amikacin.

   Combinations of agents have been used, with apparently varying success. Drug treatment alone, even with combinations of drugs, is usually ineffective when there is an established, progressing lesion. Research into drug treatment is a priority.

Control and Prevention

Community control strategies are currently limited by a lack of knowledge regarding the source of infection and the mode of transmission. The current standard treatment is surgery. Expert opinion is that early surgical management leads to improved results and resolution that are both cost saving. Early treatment is best promoted by an effective village-based surveillance programme. Current attitudes and beliefs may stigmatise and create fear in the affected individuals thereby delaying early and effective treatment.

Health educational and promotional materials should dispel such misinformation and focus on early detection and surgery. Minor surgery (e.g. nodulectomies) may be performed at the local level. Severe non-ulcerative oedematous and ulcerative lesions may better be treated at health centres with well equipped theatre facilities for effective management to reduce recurrence rates and infections.

1.1 RATIONALE AND STUDY JUSTIFICATION

Buruli ulcer, though not a new disease, has become a problem of a dimension baffling the health profession of late. In Ghana the attention to the disease is however 'fairly new'

The disease is very common in the rural communities that are of low Socio-Economic Status (SES) where health facilities are scarcely available, inaccessible, not affordable with acceptability problem by the communities involved. Rural Ga district has these very characteristics with only one District Health Centre established less than ten years ago with only one medical doctor. This health centre (Amasaman District Health Centre) has a very wide catchment area having more than 300 villages or settlements.

Under reporting is most likely to be the rule rather than the exception in rural Ga district despite the recent active interest about the disease in the district because of poor accessibility, affordability, and acceptability of the health facilities in the rural Ga district due to their poor road network, poor economic status and their superstitious beliefs respectively.

The only record of survey carried out in the Ga district was done by Mensa-Quainoo in 1997 for her thesis during her Masters in Public Health training in the University of Ghana, Legon which has not been published yet (Ref. Appendix B). Then in 1999 a national case search was undertaken to identify endemic districts with Buruli ulcer in Ghana by Amofah et al. Ga district as a whole was fifth among the ten top

districts as severely affected by the disease. This case search indicated that if much efforts are put in any of the affected districts it would establish in a more comprehensively the manner of the burden of the disease.

Rural Ga district has similar characteristics as other districts in Ghana while Ga district as a whole has almost half of the district as **urban** or **metropolitan** which forms **two-thirds of the Ga district population (Ref. Table 1 page 17)** Moreover the problem of Buruli ulcer is virtually non-existent in these urban areas of Ga district. A study to determine current prevalence in rural Ga specifically where the problem exists appears more scientifically appropriate just as public health physicians report cholera outbreak in Chorkor a suburb of Accra Metropolis and not Accra as a whole. Rural Ga district is most likely to have the highest prevalence rate in Ghana compared to the national case search fifth position for Ga district as a whole which has the set backs mentioned above.

There is no record of study on the effect of Buruli ulcer on the reproductive functions of women of reproductive age or as a gender issue in particular.

The purpose of this study therefore is to generate enough data and information in the communities that will assist:

(i) planning and management of the disease in the identified endemic communities

(ii) provide additional qualitative information that will contribute to formulating future research questions, and also design an effective future epidemiological interventions in the communities or in the district.

The study therefore will examine gender issues among Buruli ulcer affected victims and the magnitude of the problem among the adult population. The immense benefit that the Ga district and the Nation as a whole will derive from such a study cannot be over emphasized.

OBJECTIVES OF THE STUDY

1.2 Main Objective

The main objective of this survey is to establish the extent of the disease in the rural communities in the Ga districts and to document any changes in the prevalence rate of the disease that might have occurred since the last count about 6 years ago by a team led by the District Director of Health Services.

1.3 Specific Objective

1. To determine the current prevalence of Buruli ulcer in the adult population with respect to the active lesions of the disease.
2. To determine the current prevalence of healed lesions in the adult population without deformity.
3. To determine the current prevalence of healed lesions in the adult population with disability or handicaps.
4. To determine any gender issues (eg marital problems, partial/complete inability to perform traditional roles: fetching water, food preparation etc, socio-economic activities, prolonged or obstructed labour from pelvic deformity, problems of breast feeding for those with amputated breasts) arising out of the burden of Buruli ulcer in the rural Ga district.

CHAPTER TWO

LITERATURE REVIEW

Buruli ulcer disease is assuming public health importance in many countries, prompting the establishment of a Global Buruli Ulcer Initiative by the WHO in early 1998. This obviously stemmed from scholarly researches and publications that had been done by eminent scholars worldwide. Sir Albert Cook and MacCallum had been mentioned earlier. See map showing the distribution of Buruli ulcer in the world in **figure 1**.

In the African WHO region, at least 16 of 46 member countries report cases especially in the West Africa and parts of Eastern and Central Africa.(Buntine et al:2001)

The mode of transmission is not known but recent identification of *M. ulcerans* in certain acquatic insects (*Naucoris* and *Dyplonychus* species) has raised the possibility of mechanical transmission of the infection.(Portaels et al:1999) Buruli ulcer commonly affects the young even though cases are reported in all age groups (Uganda Buruli Group:1969; Van der Werf TS et al:1989). Oluwasanmi et. al.(1976) and van der Werf (1989) did not find any sex difference in their series but Barker (1973) reported prevalence to be higher among women than men and among boys than girls. The disease is characteristically found more often on the extremities (85%) than on the trunk(WHO:2001). Infection is normally restricted to relatively small area and patchy in its distribution (Rook et al:1979; Hayman et al:1985)

The first probable case of Buruli ulcer in Ghana was reported in the Ga district of Greater Accra region in 1971; the presence of additional cases along the tributaries of the Densu river in the area was considered likely (Bayley:1971). Unfortunately, not much was

heard about the disease, neither were there further publications by the local medical scientists until 1993, the media started awakening of the Ghanaian public to this dreadful disease. Of particular interest was the publication in the Ghanaian media that "**a strange and terrible disease**" has bedevilled Agroyesum area of Amansie West District of Ashanti Region in 1993.(Daily Graphic 1993 No.13279:1) This media publication generated a pandemonium among the public health physicians who were not much experienced at that time compared to their current expertise. This therefore caused much political and public concern until a seasoned clinician in the person of Prof. J.H. Addy of Korle-Bu Teaching Hospital appeared on the National Television to allay the fears of Ghanaians by diagnosing the "strange and terrible disease" as Buruli ulcer which had been with mankind, Ghana inclusive, for ages. (GNT New Time August 1993)

In 1989 van der Werf et. al. described 96 cases in the Asante Akim North Districts of Ashanti Region. This report was followed by the description of a major endemic focus in Amansie West District in the same region.(Amofah et al:1993) Since then isolated cases have been found in scattered communities in many parts of the country generating much political and media concern and interest. In 1993 a passive surveillance system for reporting Buruli ulcer was initiated in Ghana. By the end of 1998, approximately 1,200 cases had been reported from four regions. (Amofah et al:2001) Gross underreporting was suspected, however, as the media continued to report cases in remote rural communities. Because most cases were known to be in relatively deprived, inaccessible areas the routine reporting system was judged inadequate to provide a true picture of the extend of the disease and the geographical distribution of cases for design of a national control programme. Consequently in June/July 1999,

Amofah et. al. conducted a national case search to provide, a baseline data against which intervention measures could be assessed.

This search published by Amofah et. al. revealed a total of 6,332 cases from all the ten regions with a crude national prevalence rate of active lesions being 20.7 per 100,000 but the rate was 150.8 per 100,000 in the most diseases endemic district – Amansie West District. (Amofah et al:2002)

The main objective of that study was to establish the extent of the disease in Ghana to facilitate development of a national programme for its control. The specific objectives were to determine the epidemiologic characteristics of Buruli ulcer in Ghana and determine physical accessibility of disease-endemic communities to health-care services.

From the study, the highest case load was found in Ga District of Greater Accra Region with the number of active and healed lesions of 1,113 compared to Amansie West and Asante Akim North total of 739 of Ashanti Region. **See Table 1 below**. Prior to this national search, media reports and political agitations were concentrated on Ashanti region.

There is therefore the need to establish the region or **most importantly the district** with the highest prevalence taking into consideration the under listed Rationale or Justifications and Ga District, especially the rural settlements in my opinion may have the highest prevalence in the country. This suspicion has been corroborated by the District Director of Health Services of Ga District who conducted a survey in 1997 in

rural Ga District and had a prevalence rate of 3,200 per 100,000 which unfortunately she has not been able to publish up to date. (Ernestina Mensah-Quainoo personal communication).

Table 1 **Prevalence of Buruli ulcer in 10 districts with the highest caseloads, Ghana, 1999**

District	Region	No. of active cases	No. of active and healed lesions	Prevalence (rate of active cases per 100,000)
Amansie West	Ashanti	159	474	150.8
Asante Akim N	Ashanti	138	265	131.5
Upper Denkyira	Central	121	306	114.7
Afigya Sekyere	Ashanti	118	149	107.1
Ga	Greater-Accra	467	1,113	87.7
North Tongu	Volta	107	129	85.7
Assin	Central	159	173	83.7
Gomoa	Central	158	161	81.9
Wassa Amenfi	Western	136	167	61.1
Kwahu South	Eastern	122	132	57.0
Ghana Average Crude Prevalence Rate				20.7

Source: Amofah G.K. et. al. : 2002

The above studies in Ghana led to more awakening about the disease in Ghana and intervention measures put in place some of which are:

1. National Buruli ulcer control office under Dr. Ampadu, a Public Health Physician.

2. Intensive work about the disease are been done in the Ga District and other disease endemic districts in the country.
3. Health education and promotion activities have been intensified in these areas to improve their health status.
4. Provisions of hand pump wells in some of these communities.

Possible Reproductive Health Problems and Gender Issues that might have arisen out of the burden of Buruli ulcer disease.

Even though much has been published about Buruli ulcer in all aspects including economic impact very little or nothing at all has been published on the effect of Buruli ulcer on the reproductive Health or gender issues arising out of it. Since the sequalae of the disease is disfigurement of the individual, there is a potential threat to marriage. If there is amputation of the upper limbs, for example in a case of a man, he is unlikely to get a wife because he cannot undertake economic activities to cater for the woman in a predominantly farming communities. Even a severe disfigurement, which is peculiar to this disease, in the face or any other part of the body is likely to reduce his chances with all the psychological consequences. It is also known that the disease can affect the genitalia, which may lead to amputation or dysfunction depending on the severity of the disfigurement. If such an unfortunate disfigured person is a royal he or she will definitely lose the chance of being enthrone on the stool.

Of serious consequence is the effect of a disfigured woman and her reproductive health or gender roles. Severe deformity will affect their livelihood like that of the man and getting a husband likewise very slim. Those with osteomyelitis and deformed limbs

may have their gender functions like food preparation, carrying wares from the farm or for sale in case of petty trading and fetching of water may be difficult if not impossible. Deformity of the lower limbs may affect their ability to walk to attend antenatal at the nearest health facility should they get pregnant with the expected problems of lack of antenatal care. Severe deformity may affect the pelvis and coupled with no antenatal care may lead to prolonged or obstructed labour and its consequences.

Buruli ulcer also affect the breast and if in a rare case both are amputated breastfeeding is rule out. Such women may get pregnant and deliver if only the breast were affected.

Finally, since *Mycobacterium ulcerans* is in the family of bacteria causing tuberculosis I therefore wanted to know whether Buruli ulcer causes infertility as tuberculosis does which may be one of the causes of infertility of unknown aetiology. This may start a focus point of generating more research interests into the effect of Buruli ulcer on the Reproductive Health as well as gender issues worldwide.

CHAPTER THREE

3.0 DESCRIPTION OF THE STUDY AREA

Introduction

Details of the study area have been provided in the sub-district profile already submitted and below are the summary of the salient features of the district.

The communities in the district are more than 8km from the existing health facilities and thus have limited access geographically to any service delivery point. Although private clinics abound in the urban and sub-urban areas, they are beyond the physical and financial reach of most rural dwellers.

The challenges to health service provision in the district is seeing some improvement as the district Health Centre is gearing towards being upgraded to a District Hospital.

District Characteristics

The Ga administrative District is the second largest of the five districts that make up the Greater Accra Region in the South of Ghana. It is one of the newer districts created in the country in the 1988 but the third most populated of the 110 Districts. It has a land area 859 square kilometres. For health purpose service delivery in the district is subdivided into 5 catchment areas referred to as sub-districts refer **figure 2** namely:

1. Amasaman
2. Danfa
3. Madina
4. Obom
5. Weija

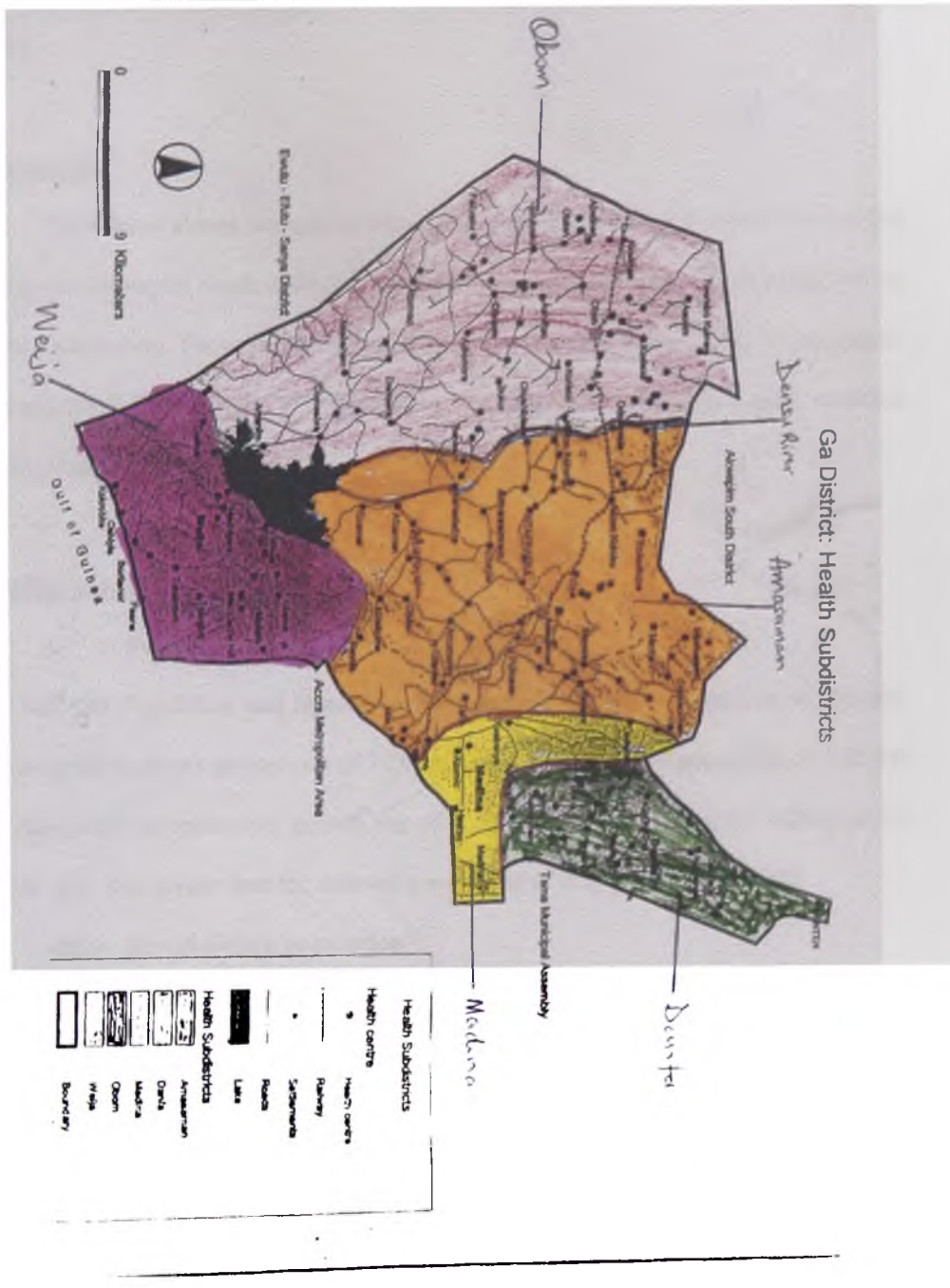


Figure 2

Each sub-district is served by one main Health Centre: some have additional smaller clinics.

Boundaries

The district shares boundaries with the Awutu-Efutu-Senya district of the Central region, the Akwapim South district of the Eastern region, the Tema Municipality and the Accra metropolis. These neighbouring districts are located to the West, North, North-East and South-East respectively. The South boundary of the district is a sandy coastline off the Atlantic Ocean.

Demographic Characteristics

(i) Population Growth

The National Population and Housing census puts the district's population at 550,468. The population shows an increase of 303.6 per cent over the 1984 population of 136,348 and represents an intercensal growth rate of 8.7 per cent representing the highest in the region. It is also higher than the national growth rate of 2.7per cent.(GSS:2000)

(ii) Rural-Urban population

The relatively fast growth in the size of some localities adjoining the Accra Metroplolis such as Dome, Taifa, Gbawe, New Achimota, Anyaa, Nii BoyeTown, Mallam and Agbogba which were rural in 1984, have now attained urban status. This is mainly as result of spill over of the growth of the Accra Metropolis into surrounding districts. The District remains predominantly urban (73%), which is above the national average of 43%.(GSS:2000) The general distribution of population is depicted in **Figure 3**.

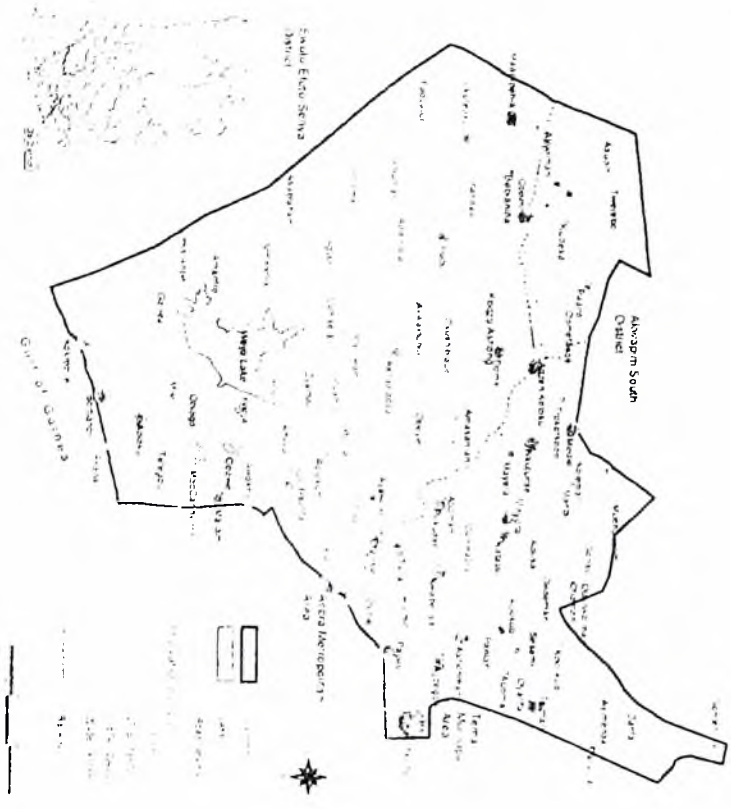


Figure 3

(iii) Population Density

The 2000 population figure also gave a density of 640.8 persons per sq. km much higher than the national density (79.3) and a little lower than that of Greater Accra region (895.5). This indicates great pressure of the population on land and resources or what the land can generate.

It is also necessary to take different localities into account. The most populous locality as reflected in Table 1 below is Madina (13.9%) of the district's population, followed by Dome (5.4%) and Gbawe (5.3%). What this means is that the population is widely concentrated in Madina, Dome, Gbawe, Taifa and towns developed around the Accra Metropolitan Area. These are centres with much economic and social infrastructural facilities.

(iv) Age and Sex Structure

The age structure of the district is typical of less developed economies, which are characterised by large proportion of children (<15yrs) and a small proportion of elderly persons (>64yrs). The proportion of the population under 15years in 2000 (34.8%) is a reflection of high fertility. The proportion of the elderly is also a reflection of low life expectancy.

The age structure of the sexes follows the national and regional patterns. For instance the dependency level is lower for males, mainly because the younger dependency group (<15yrs) is lower (34.0 as against 35.0 females). Males constitute 50.2 per cent of the population translating into a sex ratio of 99.1 females to 100 males.

The district can be described as heterogeneous as about half of the population are migrants with a large mix of various ethnic groupings. Notable among them are Akans, Ga-Dangme, Ewes, Guans, Gurma, Mole-Dagbani and others.

TABLE 2 POPULATION BY LOCALITY

Locality	Population			
	2000			
	Total	Male	Female	1984
Madina	76697	37625	39072	28364
Dome	29618	15090	14528	1954
Gbawe	28969	14530	14459	837
Taifa	26145	13276	12869	1009
New Achimota	22767	11591	11176	2417
Awoshie	19897	9930	9960	105
Ofankor	16177	8143	8034	1649
Anyaa	15738	7898	7840	39
Chantan	13585	6718	6867	
Amanfro	12803	6385	6418	293
Adenta West	12559	6528	6037	587
Sowutuom	12520	6118	6402	
Pokuase	10858	5543	5315	2527
Santa Maria	10775	5352	5423	
Nii Boi Town	9850	4916	4994	
Tabora	8778	4500	4278	
Mandela	8458	4274	4184	
Tantra Hill	8047	4116	3991	127
Mallam	7153	3457	3696	
Kwashiebu	7143	3528	3615	
RURAL LOCALITY	**191918**	**97013**	**94905**	**96540**

Source: 2000 Population And Housing Census, GSS

Conclusion

The study was conducted in the two major rural areas of the district Obom and Amasaman. These villages are certainly a deprived areas by all standards. Its inhabitants, mostly farmers have small farms that they cultivate at the subsistence level. Potable water is difficult to come by and during the dry season it is a rare commodity. It can be deduced from the environmental conditions pertaining in these sub-districts are responsible for the health conditions that plague the people.

This conclusion is firmly supported by words of the **Father of Modern Medicine Hippocrates** the relevant portion of which is quoted. Out of this Fred Sai has simplied and modernised as quoted at page 54.

"The Chief Controlling factors, then, are the variability of the weather, the type of country and the sort of water which is drunk. You will find, as a general that the constitutions and the habits of a people follow the nature of the land where they live. Where the soil is rich, soft and well-watered and where the surface water is drunk; which is warm in summer and cold in winter, and where the seasons are favourable, you will find the people fleshy, their joints obscured, and they have watering constitutions. Such people are incapable of great effort. In addition, such a people are, for the most part, cowards.

They are easy-going and sleepy, clumsy craftsmen and never keen or dedicated. But if the land is bare, waterless and rough, swept by the winter gales and burnt by the summer sun, you will find there are people hard and spare, their joints showing, sinewy and hairy.

They are by nature keen and fond of work, they are wakeful, headstrong and self willed and inclined to fierceness rather than tame. They are keener at their crafts, more intelligent and better warriors. Other living things are the most radically opposed types of character and physique. If you draw your deductions according to these principles, you will not go wrong" (Radice:1950)

3.1 Period of Study

The initial preparatory phase of the study was started on 20th January 2003 and the actual fieldwork was carried out between 26th May to 9th August 2003.

3.2 METHODOLOGY

3.2.1 Design -

This is a descriptive study and exploratory in nature employing the use of structured questionnaire as data collection tool.

3.2.2 Method

The method used started with the development of a detailed questionnaire appropriate for the study. The key issues addressed in the questionnaire were the occurrence of Buruli ulcer in the district. The burden of disease was considered in terms of number of cases affected, age and sex distribution, clinical presentation (preulcerative, ulcer or deformity), and site of lesion. Pre-ulcerative lesions include nodular, plaque, papular and non-ulcerative oedema forms as described by the WHO Global Buruli Ulcer Programme.(WHO:2000b) Deformities include scars, constriction of limbs, ankylosis of joints or amputations.

This paragraph describes the relationship between the background variables independent variables and the main dependent variable – prevalence rate of the disease and any gender issues arising out of the burden of the disease.

3.2.3 Variables

1. Background Variables

Age of respondents

Sex of respondents

Marital status of respondents

Religion of respondents

Occupation of respondents

Educational status of respondents

2. Independent Variables

Level of Education

Local name of disease

Causes of Buruli ulcer

Type of treatment

3. Dependent Variables

Category of persons affected by the disease

Period of manifestation of the disease

The burden of the disease in the community

Community perception to Buruli ulcer patients

Mode of treatment

Gender issues

These variables are somehow related in the sense that your level of education affect your perception of the disease, the causation and type of treatment you may seek etc.

The questionnaire was developed bearing in mind the four main specific objectives to cover areas such as population characteristics, disease burden, socio-economic activities and gender issues that may arise out of the burden of Buruli ulcer with the active supervision and contribution by my academic supervisor. The last part of the questionnaire appeared to cover only affected females on the gender issues. This was done intentionally for ethical and socio-cultural reasons. The affected men were personally interviewed by the author himself so the men were not left out on the gender issues.

3.2.4. Study Population

The Study Population was the total head count of the each community involve as detailed below:

A professional mapper was contracted to assist us to map out the villages by first numbering all the houses in the villages and later drew each house with its house number attached to ensure that we do not leave out any house during the administration of the questionnaire. The reason was that we intended to do the study with the Geographical Positional System (GPS) in mind which could be a useful tool for any future research in these areas. But time constraint forced us to postpone the GPS to a later date. Again due to the same time constraint he was able to fully complete three of the villages. (**see maps figures 4, 5, & 6**). However we did number the houses of the other villages ourselves and we were able to cover all the six villages and their outlined hamlets. Each member of

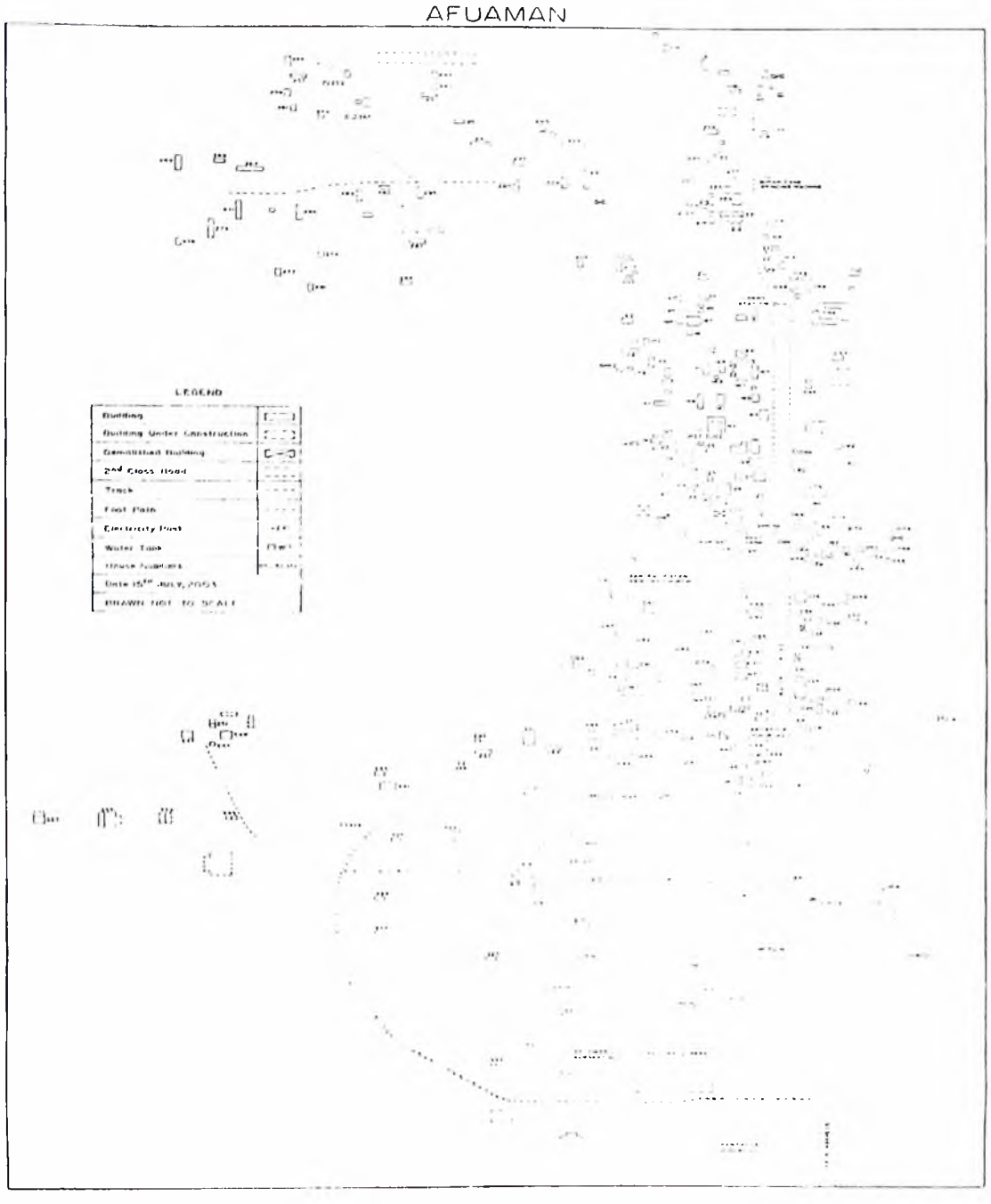


Figure 4

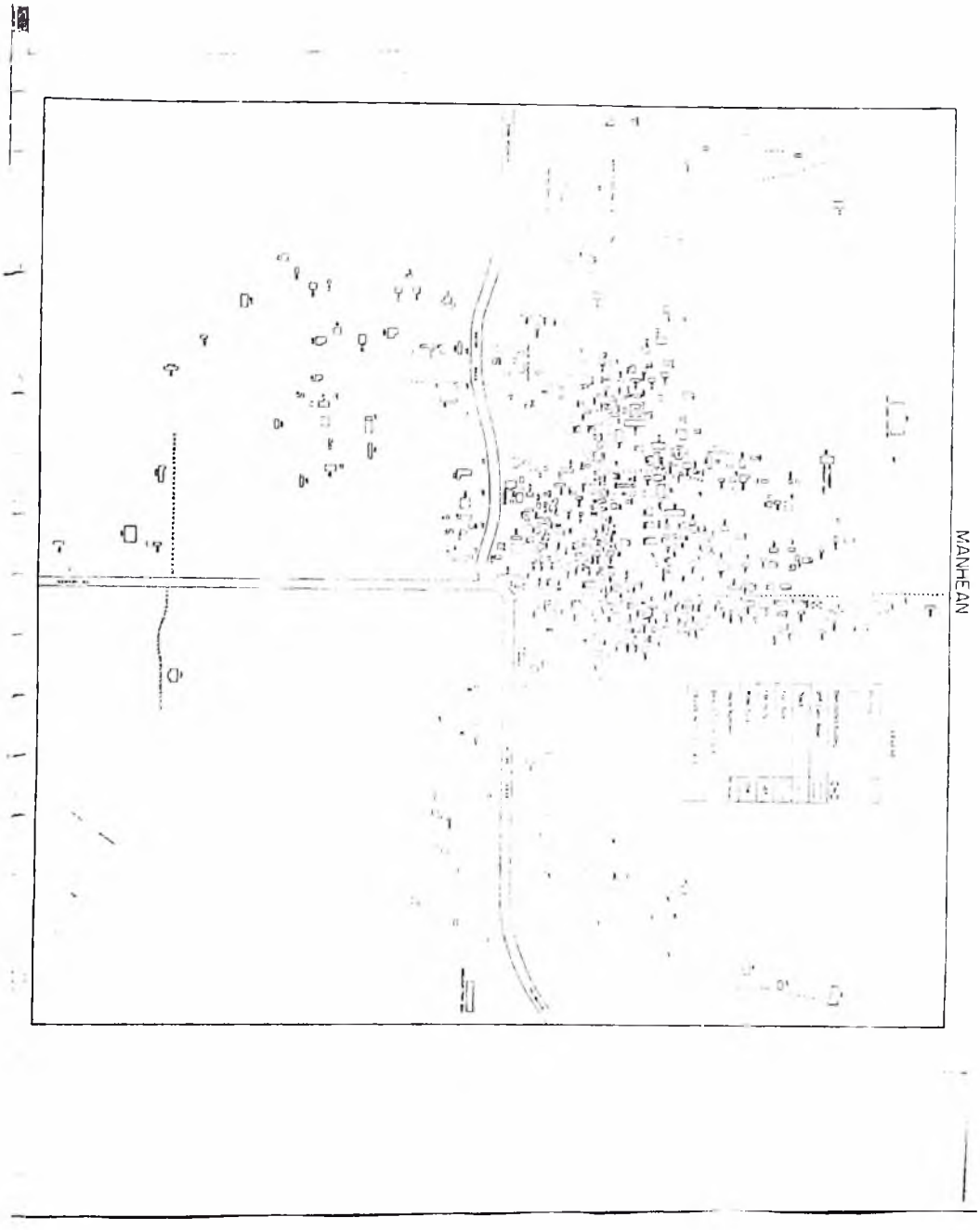


Figure 5

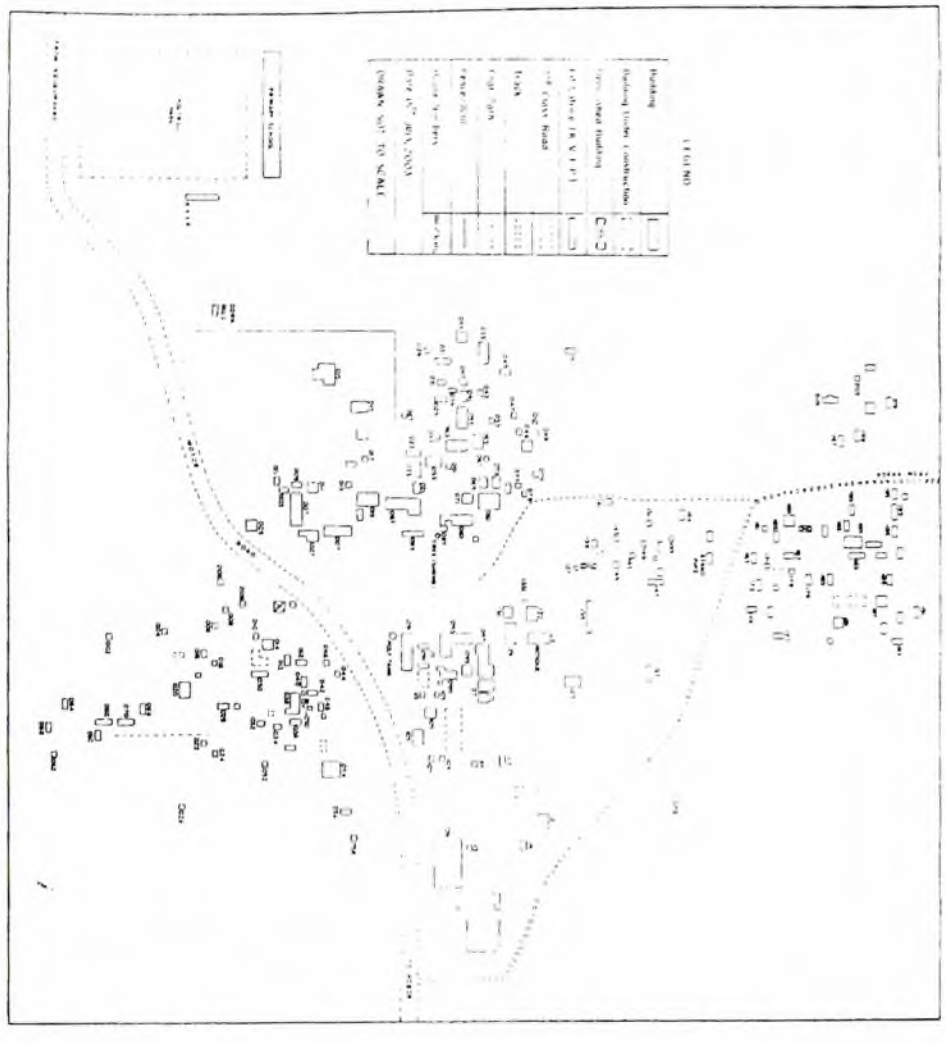


Figure 6

the communities both children and adults were covered forming a miniature population census at the same time. Total population covered was about 3,761 compare to Ghana Statistical Service Population Census 2000 figures of 4,100 for these villages. In the analysis the adult population were separated for the study and another colleague was supposed to work on the children under 15 years of age.

3.2.5 Sample Size and Sampling

Sample size sampling were not possible in this study for reasons explained under problems encountered during the study on page 39. There was therefore no attempt to conduct a cohort study. Because of the low prevalence of the disease in most of the communities we decided to have an initial familiarization tour of the rural Ga district and with the help of some of the environmental health officers who are experts in the district vis-a-vis the high endemic villages in the district from the last National case search (**see map figure 7**) and six villages were chosen purposefully by the **convenient sampling method**. Three of the six villages were close to the river Densu which serves as their main source of water and the other three which were further from the river use ponds and other small streams which are tributaries of the Densu river as their only source of water.

This was done to check whether there is any difference between the prevalence among villages who use the Densu river as their main source of water and those villages who do not.

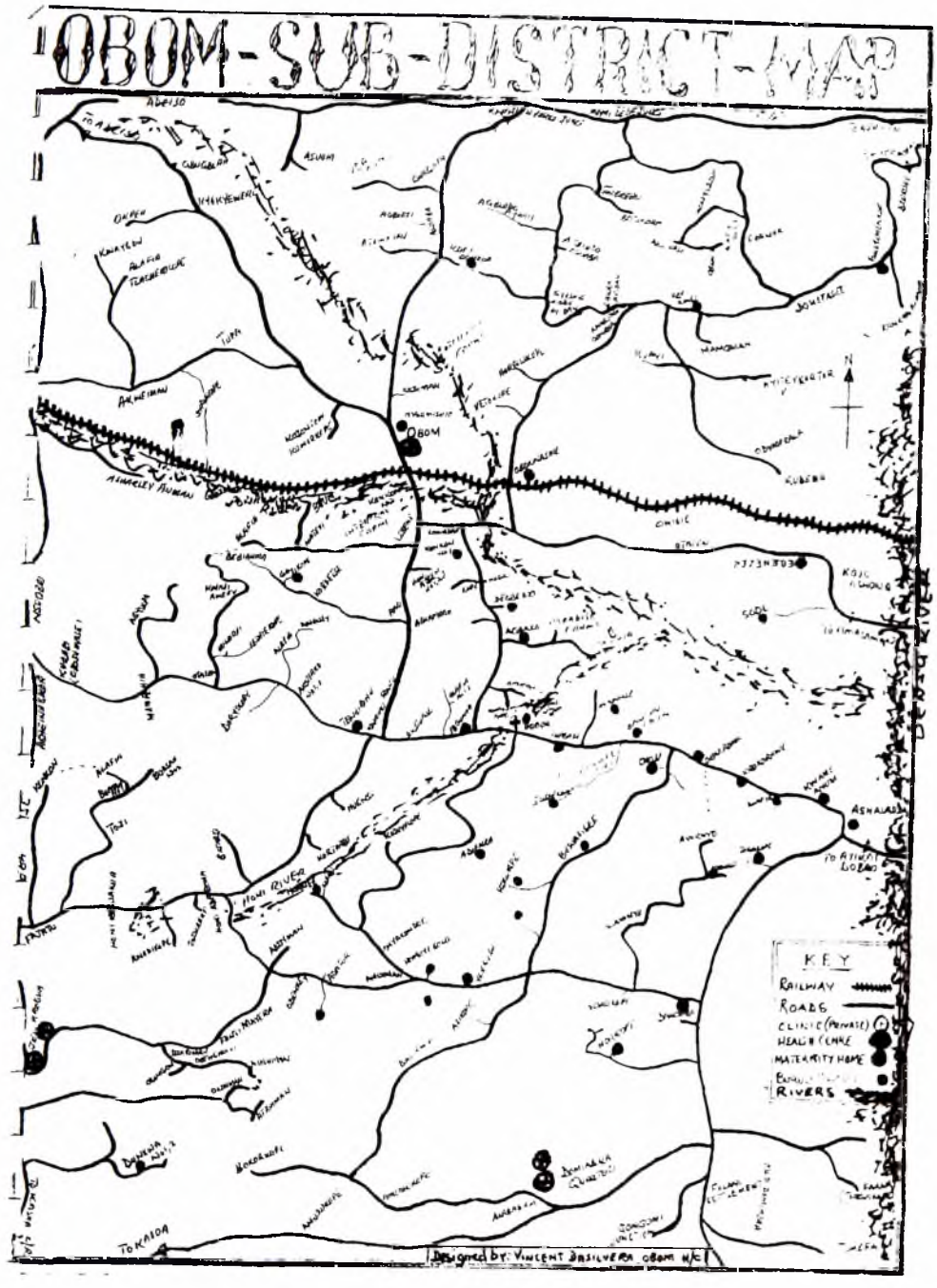


Figure 7

3.2.6. Training of Field Assistants

Ten fields Assistants who had been involved in Buruli ulcer studies in the district before were recruited with the help of the Senior Nursing Officer (Public Health) who initially was delegated by the DDHS to assist me at the DHMT. A day convenient for all of them was selected for the training. These assistants were given a questionnaire each to understudy them to be familiar with it since this one was more detailed than what they had been used to, to make their later training easy to understand by noting down any part of the questionnaire not clear to them before the training were to start. Five days later they were assembled for a thorough one day training on the identification of Buruli ulcer lesions and how to administer the questionnaire.

The training procedure entailed an explanation of the aims and objectives of the study, ethics to be observed by the researcher (refraining from soliciting responses against the persons will, to respect the views of respondents, to assure them of utmost confidence etc.). Then translation of the questionnaire into Ga, Ewe and Twi and back to English to ensure consistency and avoid ambiguity and general discussions and clarifications on issues related to the study. After the above discussion each person was asked to come out with any part of the questionnaire which he/she was not clear about and had jotted down while studying them before the training day and these were fully explained till they understood them to the letter as a form of recapitulation of the whole training and confidence building.

3.2.7. Data Collection

The permission of the local political and traditional authorities was sought in advance and the purpose of the survey was explained to them and all the participants. At every village the assistants of the school teachers and their pupils were sought to list those known to have the disease (active or healed) as a form of inter-sectorial collaboration. This list helped a lot as there were cases who were hiding for years without the health authorities in the districts knowing. At every visit I personally mobilised the field assistants and go with them very early to the villages and come back with them late in the evening for effective supervision of the data collection. The field assistance enter each house in the study villages. Every household in each house was also identified separately with a code for each member of the household for the questionnaire administration. A copy of the questionnaire is attached as Appendix A. The data collection used pictorial document designed by the WHO Global Buruli Ulcer Initiative(WHO:2000b). At each village and hamlets they showed the pictures of Buruli ulcer disease at different stages of development to the household head and the dependant to find out those who have the disease. Fortunately there was not much problem in the disease identification since the communities are very much aware of the disease because of the previous surveys/studies. Where the Field Assistants encountered difficulties I was called to do a clinical examination myself on the spot.

All persons with lesions that met the WHO standard case definition were interviewed with the questionnaire as well as those without the disease in the household. There was no laboratory confirmation of the cases.

3.2.8. Ethical Consideration

Before the onset of the study permission was sought from the District Director of Health Services (DDHS) assisted by the Field Practice Coordinator of the School of Public Health. The Senior Nursing Officer Public Health was delegated to assist us. Community entry was done in each village assisted by the one community nurse from Oduman Health Centre and the environmental officer of Obom Health Centre to sensitize them about the impending survey. The permission of the local political, traditional authorities and opinion leaders were sought again and the purpose of the survey was explained to them and all the participants. A sterile pre-packaged dressing was taken along and those having the ulcers were dressed for them by ourselves. Those with the early stages of the disease were advised to go to the Amansaman Health Centre for early treatment as well as those with the ulcers. The particulars of these and all other cases were provided to the DHMT for follow up.

3.2.9. Study Limitations

1. The main limitation to the study was the fact that it was not a random sample but a convenient sample so the result is applicable to the six villages and not the district.
2. Because it is difficult to diagnose the disease we only measured the clinical manifestations of the disease so it is possible to miss those in the incubating stages.
3. Since the prevalence of the disease is low any case that was undetected could make a significant prevalence in the overall prevalence that we may estimate in our study.

4. The period in which the study was undertaken coincided with the rainy season and therefore a busy time for the respondents most of whom were farmers. Hence shortly after starting administering the questionnaires most of them leave for their farms and the traders also leave for Accra and Kasoa. To overcome this problem the data collection process was repeated three times in each village and outlined hamlets until every member in the communities was covered. Saturdays and Sundays were included in our data collection days and we started early in the morning from 6a.m till about 8p.m. to ensure those who travelled out of the communities and those who went to their farms were all interviewed.

3.2.10. Problems encountered during the study

The most important one was uncooperative attitude of the DDHS to assist us and initially limited us to only one village (Manhean) which happens to be the least affected among the six villages. This explains why sampling and sample size was impossible to do making the study unrepresentative of the district. The DDHS did not introduce us to members of the DHMT nor the District Chief Executive of the District.

It took a hectic time for my academic supervision to convince her which she later reluctantly agreed for us to include other villages and accept even the questionnaire developed under the supervision of the academic supervisor. Four weeks of the field practice was initially lost through shuffling between her and my academic supervisor.

Unfortunately there was very little logistical support from the DDHS and she refused to avail to us any document on Buruli ulcer in the district as part of literature review culminating in my letter to the Director of the School of Public Health (Appendix B) which yielded no result as there was no copy at the School of Public Health Library, Balme Library and the Graduate School Archives **despite its mandatory requirement. Added to these was the unfortunate indisposition of my colleague researcher who had sickle cell crisis and was admitted twice in the hospital after initial three days of data collection and never appeared again from 5th July 2003 till the end of the field practice on 9th august leaving me single handed to undertake the survey for the two of us within the short period after the initial delay mentioned earlier on.**

I was therefore forced to use private transportation to carry the Field Assistants to the communities and back at an exorbitant cost since each vehicle was hired very early in the morning till late in the evening as specified above.

Contrary to the attitude of the DDHS is her philosophical statement "I believe that health knowledge should be simplified and shared. Not shrouded in mystery and monopolised" – Ernestina Mensah-Quainoo 1995 unquote **which is boldly displayed at the reception of the DHMT**. If her thesis for the MPH course is not available in the University, (**a mandatory requirement**) one wonders what else she is prepared to share about health in that district as expected from all health professionals.

CHAPTER FOUR

RESULTS OF THE STUDY

4.0. DEMOGRAPHIC CHARACTERISTICS

Introduction

This chapter presents data from the field. The data has been arranged under the following headings so as to address the main and specific objectives of the study.

1. Age and Sex Distribution of Total Sample Surveyed
2. Age and Sex Distribution of Adult Population
3. Sex Distribution of Adult Population with the Disease
4. Age and Sex Distribution of the Population with the Disease
5. Prevalence Rate of the Disease Among Adult Population
6. Distribution of the Disease by Level of Education
7. Prevalence of Active Buruli ulcer by Communities 2003
8. Different Manifestations of the Disease and Occupation
9. Reproductive Health and Gender Issues

Table 4.1 Age and Sex Distribution of Total Sample Surveyed

Age Group	Female	Male	Total
0 – 14 years	744	754	1498
15 – 24 years	362	318	680
25 – 44 years	509	383	892
45+ years	383	308	691
Total	**1998**	**1763**	**3761**

Table 4.2 Age and Sex Distribution of Adult Population

Age group	Female	Male	Total
15-24 years	362	318	680
25-44 years	509	383	892
45+ years	383	308	691
Total	**1254**	**1009**	**2263**

Table 4.3 Sex Distribution of Adult Population with the Disease

Sex	Pre-ulcerative	Ulcer	Scar		Total (N)	Crude Prevalence Rate per cent
			Without Deformity	With Deformity		
Male	28	22	88	9	147 (1009)	14.6
Female	27	24	140	19	210 (1254)	16.7
Total	**55**	**46**	**228**	**28**	**357 (2263)**	**15.8**

Table 4.4 Age and Sex Distribution of the Population with the Disease

Sex	Age group in years	Pre-Ulcerative	Ulcer	Scar		Total
				Without Deformity	With Deformity	
Male	15 – 24	9	9	45	2	65
	25 – 44	8	4	28	7	47
	45+	11	9	15	0	35
	Total	**28**	**22**	**88**	**9**	**147**
Female	15 – 24	7	7	54	7	75
	25 – 44	11	7	54	7	79
	45+	9	10	32	5	56
	Total	**27**	**24**	**140**	**19**	**210**

Table 4.5 Prevalence Rate of the Disease Among Adult Population

Disease	Prevalence Rate per cent
Active Lesion	101/2263 (4.5)
Scar Without Deformity	228/2263 (10.1)
Scar With Deformity	28/2263 (1.2)
Gender Issues	3/2263 (0.1)

Table 4.6 Distribution of the Disease by Level of Education

Level of Education	Pre-Ulcerative n/N(%)	Ulcer n/N(%)	Scar	
			Without Deformity n/N(%)	With Deformity n/N(%)
None	9/806 (1.1)	9/806 (1.1)	59/799 (7.4)	12/799 (1.5)
Primary	22/652 (3.4)	28/652 (4.3)	73/648 (11.3)	12/648 (1.9)
Secondary	25/805 (3.0)	20/805 (2.5)	79/816 (10.1)	4/816 (0.5)
Total	**56/2263 (2.4)**	**57/2263 (2.1)**	**211/2263 (9.3)**	**28/2263 (1.2)**

Table 4.7 Prevalence of Active Buruli ulcer by Communities 2003

Community	Pre -Ulcerative n/N(%)	Ulcer n/N(%)	Crude Prevalence Rate per cent
Close to Densu river			
Afuaman	23/597 (3.9)	10/597 (1.7)	5.5
Kwame Anum	3/89 (3.4)	1/89 (1.1)	4.5
Manhean	13/662 (2.0)	15/662 (2.3)	2.7
Far from Densu river			
Danchira	9/424 (2.1)	12/42 (2.1)	5.6
Krokorshwe	1/175 (0.6)	5/175 (2.9)	3.4
Obakrowa	7/326 (2.1)	6/326 (1.8)	3.9

Table 4.8 Different Manifestations of the Disease and Occupation

Occupation	Population	Pre - Ulcerative	Ulcer	Scar	
				Without Deformity	With Deformity
Farming/fishing	1093	29	27	104	14
Trading	393	8	5	40	3
Student/Pupil	213	5	5	23	2
Unemployed	143	4	3	18	2
Food vendor	127	3	1	17	4
Mason	70	3	1	9	0
Tailor/Seamstress	56	0	1	9	1
Hairdressing/Barbering	45	0	1	1	1
Teaching	42	0	0	4	0
Carpentry	39	2	0	2	1
Plumbing/Electrician	28	0	0	1	0
Mechanic	14	0	2	0	0
Total	**2263**	**55**	**46**	**228**	**28**

CHAPTER FIVE

DISCUSSION

In this study a total of 3761 individuals in the six villages were interviewed out of which 497 clinical lesions at various stages of the diseases were identified given a crude prevalence rate of 13.2 per cent or 13,215 per 100,000 for the six villages. Even though the DDHS surveyed villages are unknown for comparison her figure of 3.2 per cent or 3,200 per 100,000 is also higher than the National case search figure of 87.7 per 100,000 for the whole Ga district with the set backs mentioned earlier.

All the cases were diagnosed on the basis of clinical case definition without laboratory confirmation as a result, atypical cases such as early and healed lesions may be confused with other diseases endemic in Ghana such as yaws. However, experience shows that in disease-endemic communities Buruli ulcer is readily diagnosed empirically.

The community members are very much aware of the disease to my surprise which markedly reduce confusing it with other diseases. This is because there had been some studies in the district by the DDHS in 1997, the National Case Search in 1999, some Non-Governmental Organisations (NGO) and the recent management of the disease by the DDHS at Amasaman Health Centre had all combined to sensitise the communities about the disease.

Data from the study showed that since manifestations of the disease are quite different from other similar diseases the communities themselves have named it in their native language. The Ga names for the disease are called "odontihela" and

"abuagbonyo", the Ewe names are "detsifudor" and "detsifufofoe" because of the single or multiple cotton wool like appearance dotted within the lesion prior to full blown ulceration.

All these factors made it easier to diagnose the disease coupled with the fact that any ambiguous case was clinically examined by us to either confirm or disregard it as Buruli ulcer disease.

Table **4.1** shows the age and sex distribution of the sample surveyed while **table 4.2** indicates the similar distribution of the adult population which is the focus of this thesis since another colleague was to study the under 15 year population.

In this thesis the definition of adult has intentionally been chosen to start from age 15 years to enable us have a meaningful discussion of any gender issues that may arise from the disease since women of reproductive age is 15-49 years by W.H.O. convention. Consequently, the adult population formed 60.2% of the total population surveyed as shown in **Table 4.2.**

Table 4.3 shows the sex distribution of the adult population with the disease at its various stages with a crude prevalence rate of 15.8 per cent.

This prevalence gives the erroneous impression that the disease is more prevalent in the adult than in children but this could be explained by the fact that those with the scar formed the majority who obviously might have reached adult age since it takes a long time before the disease reach the scaring stage. However the active lesions (pre-ulcerative and ulcer cases) showed majority of them being 15 years and below which is widely known by the numerous publications worldwide. (Marston et al:1995). This rate has confirmed the general perception that the disease is grossly under reported in this

district in particular and that the disease is hyper-endemic in the rural Ga district with the highest prevalence rate in Ghana if the urban areas which form two thirds of the district population were to be excluded. **See Table 2 in the Study Area in Chapter Three.**

The study has also confirmed the impression of Amofah et. al.(2002) that "the more one looks for the disease in known disease-endemic and nearby areas the more likely additional cases will be found" It is pertinent to note further that in that National case search the highest case load was found in the Ga district mainly in the rural areas.

Similar to what Barker et. al. (1973) found our study shows a higher prevalence among women than men in all stages of the disease and all age groups are affected. Among the age groups the disease affect the youth more than the older age group in all stages of the disease with 25% affecting those above 45 years.

Only two women got divorced because of the disease and one woman had a rival wife because of the disease. The disease is so common in these communities that there is no stigmatisation about it and any affected person man or woman did not feel shy or mocked at and could perform any activity as those without the disease. There was no case of penile amputation or deformity and the male functions were similar to that of the females. Of outmost importance was a young woman whose lower limbs had been badly deformed but was an apprentice seamstress using crutches and was going about her duty diligently.

In the opinion of the author therefore Buruli ulcer has no effect on gender issues in these hyper-endemic rural areas where stigmatisation is not a problem. The situation may be different however if these patients with serious scars were to be in the Metropolis where people are not familiar with such scars. This can be inferred from the Media Reports in 1993.

In a hyper-endemic communities therefore Buruli ulcer has no effect on gender issues the author may conclude. This conclusion is based on the responses from the questionnaires. However, the author strongly suspect that gender role is a problem considering the statement in the preceding paragraph and that a further research on Buruli ulcer and gender roles only may confirm this.

Absolute illiteracy had no direct relationship with acquiring the disease as less than 25% of those with the disease had no form of education at all. About 38.4% of the population has had primary education while 36.6% of the affected population had completed secondary level of education. This confirms the school going age as the most affected. These are the very playful and active age group predisposing them to a break in the skin – the most likely point of entry by the micro organism.

Nearness to the river Densu did not show much as the source of the disease as the community with the highest prevalence Danchira was far from the river. The general observation by the community leaders and the researcher is poor sanitation and personal hygiene due to lack of potable water as the predisposing cause of the disease.

For example the Chief of Obakrowa maintained that prior to provision of hand pump wells in the village, the disease was very prevalent in the village but since then the prevalence is reducing. Danchira seems to have the highest prevalence because there is no hand pump well in the village and there are many hamlets who use man-made ponds as their source of water the nature of which is **unwholesome for human use.**

Afuaman and Manhean are close to the river but Manhean has many huge poly tanks regularly filled with potable water within the village hence the reduced prevalence rate while Afuaman has no such facility. At the time of the survey the idea of supplying Afuaman with similar potable water like Manhean had been started. It is hoped this may

also reduce the prevalence rate at Afuaman. The author strongly belief that the provision of potable water in sufficient quantities to the rural communities is likely to drastically reduce the prevalence of the disease.

Table 4.8 shows the different manifestation of the disease and occupation and clearly demonstrates the high prevalence among farmers and fishmongers emphasising sanitation and personal hygiene as a solution to the problem. The relative high figures among traders might be those who had the disease at a younger age as is reflected in the prevalence in those with scar without deformity.

As is generally known the site of the disease was mainly on the limbs which formed about 80%. The rest were spread over all parts of the body namely the head and neck, back, abdomen, thorax, breast and buttocks. **Very interestingly there was one case of active Buruli ulcer in the sole of the right heel of a woman at Danchira. Another one had a nodule at the anal region.**

Finally multiple lesions were not uncommon like those with scar and pre-ulcerative lesion, scar with ulcer indicating re-infection was a common phenomena. However there was no situation where the whole household was affected; the highest was four cases in one household of ten members refuting person to person contact as the form of spreading the disease. Similarly there was not much difference in the prevalence among those who regularly had contact with water and those who did not but the whole district is dotted with multiple streams, all tributaries of the Densu river and multiple artificial large ponds especially in the raining season due to the activities of sand winning contractors as detailed in the sub-district profile submitted. It is interesting to note that all these communities have all the characteristics mentioned in the rationale of this study: scarce health facility, inaccessible, very deprived with low socio-economic status. The one nearest to Amasaman Health Centre is about 15 kilometres away which is Manhean.

which has the lowest rate while the farthest is Danchira which has the highest rate. This study has shown that the extent of Buruli ulcer in rural Ga district is much more greater than currently recognised through the routine reporting system. The socio-economic consequences are enormous for the household and the country as a whole (Asiedu et al:1998; Koopmanschap et al : 1993) if nothing is done positively to control the spread of the disease.

Lastly but not the least contrary to the general belief of low mortality about the disease, it is the author's opinion that in these inaccessible, deprived areas, who do not report such mortalities to the health authorities mortality is likely to be high due to superimposed undernutrition, anaemia and secondary infection as was observed during the study. During the two month period of the survey three patients with severe form of the disease died of it without notifying the health authorities. I got to know of them when I went back to check whether they have heeded to my advice to attend to the Health Centre and if possible take a photograph of them.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 Conclusion

The main objective of this study is to determine the current prevalence of Buruli ulcer in the adult population and determine any gender issues that may arise out of the burden of the disease. This study is very important since there is the suspicion of the area having the highest prevalence rate in the country, yet no publication of it has been done despite some studies already done in the area.

More crucial is the closeness of the area or part of district indirectly forming part of the Accra Metropolis and with the rural-urban migration **if the mode of transmission is later discovered to be contagious then an epidemic in the capital of Ghana may be the result. The cost of containing this chronic disease will be very disastrous to the nation, whose per capita income is about US$300.**

Findings

The author would like to conclude by presenting the major findings of the study.

(i) **The current prevalence rate of Buruli ulcer in the adult population with respect to the active lesions of the disease in the six communities was found to be 4.5 per cent or 4,463 per 100,000.**

(ii) **The current prevalence of healed lesions in the adult population without deformity was much higher 10.1 per cent or 10,075 per 100,000.**

(iii) **The current prevalence rate of healed lesions in the adult population with disability or handicaps was the least 1.2 per cent or 1,237 per 100,000.**

(iv) **Very surprisingly there were not much problem with respect to gender issues as almost all of the affected women and men claimed they could perform their gender roles. There was no case of infertility from the data.**

1. That rural Ga district is likely to have the highest prevalence rate of the disease in the country considering the fact that the six villages chosen out of the many endemic villages has proved that. **If all the endemic villages are surveyed which is not difficult, giving adequate resources, the above statement will be positively confirmed.**
2. The disease affect children more than adult in the active stages but because it is a chronic disease more adult have scarred form of the disease than the children. Children are affected most because young children do not observe good personal hygiene. This buttress the suspicion of the author that poor sanitation, poor personal hygiene and inadequate potable water are the most likely predisposing cause of the disease.
3. Those with scar but are able to perform their normal functions are eight times more than those who end up with a disability or handicap.
4. The disease does not affect the reproductive health of the patients who get affected by the disease. Neither is gender issues a problem caused by the disease. The disease condition causes a lot of sympathy from the community

mostly because this mishap is seen as no fault of the patients. There is therefore no stigmatisation to Buruli ulcer patients.

5. Nevertheless the disease creates an enormous socio-economic burden on the household both direct and indirect. More attention should be paid to this very issues since it can affect the economy of the nation by the high cost of treatment, overstretching the limited resources of health facilities and reduce the working age-groups of the nation.

6. Contrary to the general belief that mortality is low it is the authors opinion that it may be high in these inaccessible, unaffordable deprived areas who do not report such mortalities to the health authorities, due to superimposed under-nutrition, anaemia, and secondary infection as was observed during the study.

7. These communities are typically rural by all standards; lack of potable drinking water, good motorable roads, electricity, transportation and far from adequate health facilities and inadequate number of basic schools. Amasaman the district health centre where treatment for Buruli ulcer patients in the form of nodulectomy and skin grafting is carried out is on the average twenty-five (25) kilometres away from most of the communities.

8. Majority of people have not had good formal education and are therefore virtually illiterate, even though about 75% have had primary or secondary education, they can hardly read and write and are mostly farmers and traders.

9. *Mycobacterium ulcerans* the main causative agent is spongy-like in nature which has been identified by the people as the main causative agent and forms

the basis for the various names given to it by the local people. Hence in Ga the name is "odontihela" and "detsifudor" in Ewe.

10. That the disease is likely to be controlled if potable water, good personal hygiene and improvement in the environment is undertaken even though the mode of transmission is unknown quoting the most eminent Public Health Physician in Ghana will be self-explanatory. "Sickness may be cured or prevented through immunization or other direct intervention. But true health does not come from the Doctor. It comes from the food we eat, the water we drink, the environment in which we live and the life style we adopt" unquote. (Sai:2002) These words are the simplified modern form from the Father of Modern Medicine Hippocrates alluded to earlier on at page 26.

Recommendations

Against the background of these findings the following recommendations are being made:

- Buruli ulcer is not just a clinical or epidemiological problem but encompasses psycho-social ramifications, mental, economic, political and social factors that are embedded deep in the web of causation. To understand the totality of the disease consideration must be given to the interplay of all associated factors listed above. (Akumey:2002) In addition the environment in which they live is very paramount in the causation of the disease.
- The first line of action to curb the spread of the disease is to provide them with potable drinking water. Those who have been provided with hand pump wells should be educated to utilize these facilities, employing participatory approaches. The

education is very important because at Obakrowa for example which has this facility some of the members were still using the small streams and ponds.

- Health education and promotion should be intensified in all the rural communities especially emphasising on sanitation and personal hygiene.
- Provision of good road network at least motorable feeder roads to all the endemic villages for health providers to get access to them and possibility of easily obtaining transport to the Amasaman Health Centre at all times will help the communities patronising the health facility better.
- Provision of basic schools in the villages to reduce the walking distance to the nearest school some about 2-3 kilometres away. This will help improve the educational level and the teaching and practising of personal hygiene.
- There is the tendency for the local people to patronise the Buruli ulcer management at Amasaman Health Centre if only:

  The nature of the therapy is made clear to them and all misconceptions about it such as the possibility of recovering from the anaesthesia, the fear of death if one is injected, and the fear of being amputated especially in the advanced forms of the disease.

  The availability of the DDHS, who currently is the only person in charge of managing Buruli ulcer, at all times is very crucial. (Akumey:2002) The present situation of monopolising the management of buruli ulcer and at the same time doing the Administrational work of the District, being a member of a lot of

committees in the Ghana Health Service, obviously is incompatible in modern day cost-effective and efficient management practice.

The use of the surgeon specialist in the Health Centre to assist in the surgical management would have been more prudent instead of him being confined to the consulting room at the OPD.

The possibility of easily obtaining transport to the Amasaman Health Centre at all times will help the communities. If the roads are motorable throughout the year some private transport owners may choose to stay in the villages to ensure the above suggestion.

In order to encourage Buruli ulcer patients to seek medical care well enough before complications set in an improvised theatre should be provided at Obom Health Centre and skilled staff in the art of skin grafting technology should be employed for treatment of Buruli ulcer.

Since the Returns from the district to the National Buruli ulcer Control Programme Office is woefully inadequate and at times never done but has to be collected by the Control Programme office staff after several hide and seek it is very important that the two disease control officers are functionally and efficiently utilised as members of the DHMT. They could have helped in solving the Returns to the National Control Office. These two staffs strangely enough

were seeing the villages of this study for the first time when they were members of my field assistants even though one of them had been there for over three years and has no data concerning Buruli ulcer.

Finally in the light of the above problems in the district mitigating against research work it will be prudent to station a **more research oriented and cooperative Director** to the district since the School of Public Health and the Ghana Health Service cannot afford to lose the enormous research work in that District.

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BURULI ULCER SURVEY
MAY – AUGUST, 2003

QUESTIONNAIRE

COMMUNITY.....

DATE OF INTERVIEW.....

A. BACKGROUND CHARACTERISTICS OF RESPONDENT

1. Name.....
2. Age .....
3. Sex ☐ Male ☐ Female
4. House No. .....
5. Household identity .....
6. Occupation .....
7. Have you changed job? ☐ Yes ☐ No
8. If yes, what was your previous job? .....
9. How long have you lived here? .....
10. Have you had contact with a Buruli Ulcer case? Yes ☐
11. Marital status
    1. Single ☐
    2. Married ☐
    3. Divorced ☐
    4. Widowed ☐
    5. Other, specify.....

12. Educational level completed
    1. None ☐
    2. Primary ☐
    3. Middle/JSS ☐
    4. Vocational/Technical SSS ☐
    6. University / Polytechnic ☐
    7. Other, specify .....

B CONTACT WITH WATER

13. Do you fetch water from the river? Yes ☐ No ☐

14. If yes how often? .....

15. Do you swim in the river? Yes ☐ No ☐

16. If yes, how often? .....

17. Do you walk barefooted? Yes ☐ No ☐

18. Do you walk through a river to school, farm or market? ☐ Yes No ☐

C DISEASE IDENTIFICATION

(i) SWELLING

18. Do you have a swelling on your skin? Yes ☐ No ☐

19. If yes where is it located?

Upper limbs ☐	☐ Right	Left ☐		
Lower Limbs ☐	☐ Right	Left ☐		
Abdomen ☐	☐ Back	Buttocks ☐		
Thorax ☐	☐ Head	Neck ☐		

20. How long has the swelling been there?

21. Is the swelling increasing in size? Yes ☐ No ☐

22. Is the swelling warm or painful? Yes ☐ No ☐

23. Does anyone in your family have a similar swelling? Yes ☐ No ☐

24. What is the relationship between you and that family member?

25. Which of the swelling occurred first? Mine ☐ His/hers ☐

26. Size of swelling in cm

27. Have you had any treatment? Yes ☐ No ☐

28. If yes, where?

Traditional ☐ Self ☐ Clinic ☐

29. If at the clinic, how were you treated? Excision ☐ Skin grafting ☐

other, specify.....

30. Was the treatment successful or useful to you? Yes ☐ No ☐

(ii) BOIL

31. Do you have a boil on your skin? Yes ☐ No ☐

32. If yes, where is it located? .....

Upper Limbs	☐	Right	☐	Left	☐
Lower limbs	☐	Right	☐	Left	☐
Abdomen	☐	Back	☐	Buttocks	☐
Thorax	☐	Head	☐	Neck	☐

33. How long has the boil been there? .....

34. Is the boil increasing in size? Yes ☐ No ☐

35. Is the boil warm or painful? Yes ☐ No ☐

36. Size of boil in cm.....

37. Does anyone in your family have a similar boil?

38. What is the relationship between you and that family member?

39. Which of the boils occurred first? Mine ☐ His/Hers ☐

40. Have you had any treatment? Yes ☐ No ☐

41. If yes, where?

Traditional ☐ Self ☐ Clinic ☐

42. If at the clinic, how were you treated? Excision ☐ Skin grafting ☐

other, specify.....

43. Was the treatment successful or useful to you? Yes ☐ No ☐

44. If no, why? .....

(iii) ULCER

45. Do you have an ulcer on your skin? Yes ☐ No ☐

46. If yes, where is it located?

Upper limbs	☐	Right	☐	Left	☐
Lower limbs	☐	Right	☐	Left	☐
Abdomen	☐	Back	☐	Buttocks	☐

Thorax ☐ Head ☐ Neck ☐

47. How long has the ulcer been there? .....

48. Is the Ulcer increasing in size? Yes ☐ No ☐

49. Is the Ulcer warm or painful? ☐ Yes No ☐

50. Does anyone in your family have a similar Ulcer? .....

51. What is the relationship between you and that family member? .....

52. Which of the Ulcers occurred first? ☐ Mine His/Hers ☐

53. Size of the ulcer in cm.....

54. Have you had any treatment? ☐ Yes ☐ No ☐

If yes,

55. Where? ☐ Traditional ☐ Self Clinic ☐

56. If at a clinic how were you treated? Excision ☐ Skin grafting ☐

Other, specify.....

57. Was the treatment successful or useful to you? Yes ☐ No ☐

58. If no, why?.....

(iv) SCAR

59. Do you have a scar on your skin? Yes ☐ No ☐

If yes, ...

60. Where is it located?

Upper limbs ☐ Right ☐ Left ☐

Lower limbs ☐ Right ☐ Left ☐

Abdomen ☐ Back ☐ Buttocks ☐

Thorax ☐ Head ☐ Neck ☐

61. How long has the scar been there?.....

62. Is the scar warm or painful? Yes ☐ No ☐

63. Does anyone in your family have a similar scar? Yes ☐ No ☐

64. Which of the scars occurred first? Mine ☐ His Her ☐

(v) DEFORMITY

65. Do you have any deformity? Yes ☐ No ☐

66. If yes what kind of deformity is it? .....

67. Contracture of Upper limbs Right ☐ Left ☐ Both ☐

68. Contracture of Lower limbs Right ☐ Left Both ☐

69. Loss of organ(s) Breast ☐ Eye ☐ Genitalia ☐ Other specify ☐

70. Do you have any Amputations due to Buruli ulcer? Yes ☐ No ☐

71. If yes, where? Upper Limbs ☐ Right ☐ Left ☐

Lower Limbs ☐ Right ☐ Left ☐ Other specify

F. FOR AFFECTED ADULT FEMALE ONLY

72. Are you unable to fetch water from the river because of your deformity?

Yes ☐ No ☐

73. Do you feel shy to go to the market or attend traditional ceremonies? ☐ Yes No ☐

74. Are you allowed to perform traditional duties like naming ceremonies, eating with other people, attending funerals, etc? Yes ☐ No ☐

75. Did you get the disease before marriage? ☐ Yes No ☐

If yes,

76. How did the disease affect your marriage?

77. Did you have a difficulty in getting married because of your deformity? Yes ☐ No ☐

78. Were you unable to get pregnant? Yes ☐ No ☐

79. Were you divorced because of the disease? Yes ☐ No ☐

80. Were you unable to walk to attend antenatal clinic? Yes ☐ No ☐

81. Were you unable to walk to deliver at the clinic? Yes ☐ No ☐

82. Was your delivery prolonged? Yes ☐ No ☐

83. If yes, how long? Hours ☐ Days ☐

84. Did you have a caesarean section on account of pelvic deformity? Yes ☐ No ☐

85. Did the baby survive at delivery? Yes ☐ No ☐

86. Did you have difficulty breastfeeding because of the disease? Yes ☐ No ☐

87. If Yes, how.....

Appendix B

School of Public Health
Legon
01/08/2003

THE DIRECTOR
SCHOOL OF PUBLIC HEALTH
LEGON

Dear Madam,

REQUEST FOR DR. ERNESTINA MENSAH QUAINOO'S THESIS 1997 SPH GRADUATE

I would be grateful if you could release the above thesis to enable me complete my literature review on my thesis. The reasons are

1. My literature review will be incomplete if I am unable to identify that work has been done or is being done on the topic of my thesis.
2. This will also assist me to justify why I have decided to undertake my current topic. I want to prove the originality of my work.
3. This is also to prevent any suspicions that I may just have copied or slightly modified somebody's work.
4. It may help to prevent any prejudice or pre-empt any other person's work done or to be done in the district.

I hope these are good reasons for my request.

Thank you in advance for your usual co-operation.

Yours faithfully,

DR KWAME AMOFA

CC: DR. ERNESTINA MENSAH QUAINOO'S
DISTRICT DIRECTOR OF HEALTH SERVICES
GHANA HEALTH SERVICE
AMASAMAN