



UNIVERSITY OF GHANA  
THE BALME LIBRARY

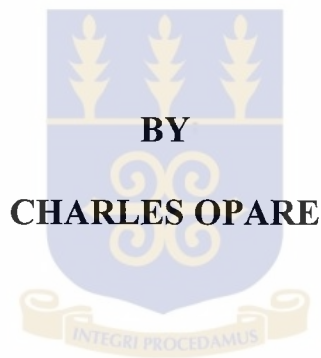
BALME LIBRARY THESES

1. Balme Library theses are available for consultation in the Library. They are not normally available for loan, and they are never lent to individuals.
2. All who consult a thesis must not copy or quote from it without the consent of the author and of this University.
3. Any copying or quotation permitted should be duly acknowledged.

RC121.A6  
Op 1  
blthr C.1  
G3591f3



**KNOWLEDGE, ATTITUDES, BELIEFS AND  
PRACTICES OF INHABITANTS OF THE TAMALE  
MUNICIPALITY ON ANTHRAX: IMPLICATIONS FOR  
THE PREVENTION OF HUMAN ANTHRAX**



**A DISSERTATION SUBMITTED TO THE SCHOOL OF  
PUBLIC HEALTH, LEGON**

**IN PARTIAL FULFILMENT FOR THE AWARD OF  
MASTER OF PUBLIC HEALTH OF THE UNIVERSITY  
OF GHANA**

**SEPTEMBER 1999**



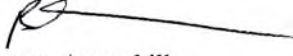

**DECLARATION**

I declare that this dissertation has been the result of my own field research, except where specific references have been made, and that it has not been submitted towards any degree, nor is it being submitted concurrently for any other degree.

Candidate

  
Dr. Charles Opare

Academic Supervisors

  
Dr. Bawa Awumbilla  
Dr. B. D. Akanmori

## DEDICATION

This work is dedicated to my wife Evelyn, and the children; Linda, Loreen, Alice, Emma and William, for their encouragement, support and the sacrifices they made towards it.

*May the Good Lord bless them .*



## ACKNOWLEDGEMENT

“Education is expensive but ignorance is more expensive”. For this reason, I am most grateful to the Good Lord for providing me with the opportunity, strength and grace to see me through this Master’s course. I am indebted to all my lecturers for providing me knowledge which helped me at the Tamale Municipality for the production of this dissertation. I wish to place on record the support and direction from my field supervisor, Dr. Agana Nsiire, Metropolitan Director for Health Services, Tamale.

Special thanks to Drs B.D. Akanmori ,Senior Research Fellow, Noguchi Memorial Institute for Medical Research, and Bawa Awumbilla, Senior Lecturer, Department of Animal Science, University of Ghana, for their direction, supervision and constructive contributions during the preparation and writing of this work. I benefited from the suggestions and direction of Dr Matilda Pappoe of the School of Public Health and I am very grateful. To name all the people who have contributed substantively to this work would double its length. However, to Mrs Fati Dimah, Mr N.M. Abdul –Mumin and their colleagues and Miss Evelyn T. Bayon who helped in the questionnaire administration and preparation of this work, I am very grateful.

And to the communities I visited and those who consented to be interviewed, my debt and gratitude to them is not lessened. Thank you to each of you- named or unnamed. I thank my sponsors the Ministry of Food and Agriculture for their support. My warmest acknowledgement is reserved for my favourite critic, my exacting but enthusiastic partner, companion and friend, Abena for her contribution.

Finally, I register my profound gratitude to the Director and others from the School of Public Health, the staff of the Municipal Health Office, Tamale and all who in diverse ways helped me to get this work produced. *May the Good Lord bless you all.*

**TABLE OF CONTENTS**

	PAGE
Title Page	i
Declaration	ii
Dedication	iii
Acknowledgement	iv
Table of contents	v
List of Tables and Map	viii
Abstract	x
Chapter One	1
1.0 Introduction	1
1.1 Background	1
1.2 Statement of the Problem	3
1.3 Rationale for the Study	4
1.4 Objective of the Study	5
Chapter Two	6
2.0 Literature Review	6
2.1 History of Anthrax	6
2.2 Anthrax as a disease in Livestock	7
2.3 Anthrax as a Human disease	8
2.4 Anthrax in livestock in Ghana	9
2.4.1 Human Anthrax in Ghana	10
2.5 Control of Human Anthrax	10
2.5.1 Control of Anthrax in livestock through vaccination	11
2.5.2 Control of Anthrax in Livestock through Public Education	11
2.5.3 Prevention of Human Infection	12

2.5.4	Constraints to control of Anthrax in Ghana	12
2.5.5	Human Behaviour and Anthrax Outbreaks	13
2.6	The Conceptual Framework for the study	13
2.6.1	Drawing on local knowledge and making locally relevant and acceptable	14
2.6.2	Beliefs	14
2.6.3	Knowledge, Attitudes and Practices of people in relation to disease	15
	Chapter Three	16
3.1	Study Design	16
3.1.1	Variables Studied	16
3.2	The Tamale Municipality	16
3.2.1	Population and Administration	16
3.2.2	Rainfall and Vegetation	16
3.2.3	Infrastructure and Social Amenities	17
3.2.4	The Health Care System and Facilities	17
3.2.5	The Social and Political Structure of Dagbon	18
3.2.6	Economic Activities	20
3.3	The Study Population	20
3.4	Sampling	20
3.5	Data Collection	21
3.5.1	Primary Data	21
3.5.2	Secondary Data	21
3.6	Quality Control	21
3.7	Analysis of Data	22
3.8	Ethical Consideration	22

Chapter Four	23
4.0 Results	23
4.1 Socio-Demographic Characteristics of Respondents	23
4.2 Knowledge, Attitudes, Beliefs and Practices (KABP) of Respondents	23
4.2.1 The Disease in Animals and its causes	23
4.2.2 Signs of Anthrax in Animals	23
4.2.3 Vaccination against Anthrax	25
4.2.4 Causative Agent	25
4.2.5 Risk Factors	28
4.2.6 Disposal of carcass	28
4.2.7 Prevention of Human Anthrax	29
4.3 Distribution of KABP on Butchers and Consumers	29
4.4 Interrelationships between Socio-Demographic characteristics and KABP	31
4.5 Focus Group Discussions (FGDs) and In-depth Interview	33
4.5.1 Focus Group Discussion Findings	34
4.5.2 In-depth interview Herbalist/Soothsayer	35
4.5.3 In-depth interview with Acting Regent	37
4.6 Discussion	38
Chapter Five	41
5.0 Conclusions and Recommendations	41
5.1 Conclusion	41
5.2 Recommendations	43
References	44
Appendix	
Figures	
Questionnaire	

**LIST OF TABLES**

	PAGE
Table 1 Distribution of Respondents by Age, Sex, Education, Marital Status and Religion	23
Table 2 Distribution of Respondents by what they attribute sudden Death in cattle to	23
Table 3 Distribution of Respondents by their knowledge concerning Anthrax and Vaccination	25
Table 4 Distribution of Respondents by what they know about Anthrax And Vaccination	25
Table 5 Distribution of Respondents by their attitudes and beliefs on Anthrax	26
Table 6 Distribution of Respondents by their perceptions and practices Relating to Anthrax	26
Table 8 Distribution of KABP on Butchers	29
Table 9 Distribution of Respondents (Butchers) on what Anthrax is	29
Table 10 Distribution of Respondents (Butchers) on what they would do When called to butcher carcass of cattle	29
Table 11 Distribution of KABP of Consumers on Anthrax	29
Table 12 Distribution of Respondents (Consumers) knowledge on what Anthrax is	29
Table 13 Distribution of study population by religion and where to send sick member of family	30

Table 14 Distribution of study population by religion and knowledge of Local name for Anthrax	30
Table 15 Distribution of study population by level of education and usage of herbs to prevent Anthrax	30
Table 16 Distribution of study population by age group and usage of herbs to prevent Anthrax	30





## ABSTRACT

The study was intended to find out the knowledge, attitudes, beliefs and practices of cattle owners, herdsman, butchers and consumers on anthrax, its transmission, risk factors and prevention, in order to determine the human behaviour factors responsible for human anthrax outbreaks in the Tamale municipality. It was also intended that the findings would help in the control of animal anthrax as well as the prevention of human anthrax.

A descriptive study was conducted using both qualitative and quantitative methods. Data was collected using structured questionnaire, focus group discussions and in-depth interviews.

The study revealed that 96% of the study population have knowledge of anthrax and the signs that indicate anthrax in cattle. However, knowledge about the causative agent is poor and included links with the supernatural. This lack of knowledge about the cause of the disease does not encourage participation in control measures in livestock, such as vaccination and also prevention of human disease by proper disposal of carcasses.

Eight percent of the respondents believe that using herbs can prevent human anthrax and 9% indicated that they would send suspected anthrax patients to the herbalist. These percentages even though small, would suggest that human anthrax can persist in the areas of these respondents. About two-thirds of respondents are of the view that animals which have died of unknown causes are cut up and used because they serve as a source of inexpensive meat for the community.

Also, 16.8% of the respondents indicated that cooking meat from carcasses with herbs could prevent anthrax. This, taken together with the low incomes of the farmers and

cattle owners makes it very tempting to eat meat of animals which have died of unknown causes including anthrax.

On the risk of getting anthrax from handling or cutting meat, about 10% of the study population indicated there is no risk. This is alarming since such views mean no compliance with the rule of burning or burying suspected anthrax carcasses and may perpetuate human anthrax, through consumption of infected carcasses.

Based on the findings of the study, the following key recommendations are made to the relevant authorities;

1. The Veterinary Services in collaboration with the Ministry of Health (MOH), the Municipal Assembly and other related agencies should organise durbars to educate residents of Tamale about the public health importance of anthrax and in particular about the causative agent of anthrax, how it is spread, and how this can be prevented by disposal of cattle which have died of unknown causes.
2. Livestock owners should be compelled by law to report all unexpected deaths in their herds.
3. Suspected anthrax cases should be confirmed by reliable laboratory tests.

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 BACKGROUND

Anthrax (Greek: Black) is an acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. It is primarily a disease of herbivorous mammals (e.g, cattle, goats, and sheep), and pigs (Blood, et al.1994). The disease is also an important zoonosis affecting humans as well. Anthrax causes deaths in livestock thus affecting the livestock industry worldwide. Tanzania lost 97,585 cattle through anthrax from 1981 to 1990. Similarly, Zambia lost 4000 Hippos (*Hippopotamus amphibus*) in 1987 due to anthrax (Turnbull, 1991).

Anthrax causes morbidity and mortality in humans too. In 1979, an outbreak of largely pulmonary anthrax occurred in Yakaterinburg (Sverdorsk), Russia in which 66 individuals were documented to have died. Investigations disclosed that the cases occurred as a result of a plume emanating from a Biological Research Institute and led to the conclusion that the outbreak was due to accidental aerosol generated in work related to biological warfare studies (Benenson, 1995).

Human anthrax outbreaks have also occurred in Switzerland affecting 25 workers in a textile factory. The source of infection was goats hair imported from Pakistan (Pfisterer, 1991). And in Andhra Pradesh in India 30 anthrax cases were reported as a result of infection from eating contaminated meat (Sekhar and Singh, 1990). When material containing anthrax bacilli is exposed to the air, spores are formed which protract the infectivity of the environment for very long periods. The spores are resistant to most external influences including the salting of hides.

normal environmental temperatures and standard disinfectants. Anthrax bacilli have remained viable in soil stored for 60 years in a rubber-stoppered bottle, and field observations indicate a similar duration of viability in exposed soil particularly in the presence of organic matter, in undrained alkaline soil and in warm climate. (Schwabe, 1998)

Control of animal anthrax is through the annual vaccination of cattle and public health education on the disposal of carcasses. Since the spores of the causative organism can survive for decades if the carcasses are buried, the preferable disposal technique is to incinerate the carcasses at the site of death (Benenson, 1995). Should this method be impossible, deep burial with quicklime and decontamination of soil seeded by carcasses or discharges with 5% lye, anhydrous calcium oxide (quicklime) is an important control measure.

Human anthrax is controlled through animal vaccination and educational campaigns by public health and veterinary staff aimed at educating people on the dangers of consumption of carcasses of animals “found dead from an unknown cause”, (Turnbull, 1991). Proper inspection of meat before being distributed for consumption is also an important control measure. Human anthrax can also be controlled by immunization of high risk persons with a cell free vaccine prepared from culture filtrate containing protective antigen (Benenson, 1995). This is effective in preventing cutaneous and probably inhalation anthrax, it is recommended for laboratory workers routinely working with *B. anthracis* and workers handling potentially contaminated industrial raw materials such as wool, hair and hides. Control of human anthrax in Ghana is through public education and meat inspection by veterinary and health officials. Other control measures include

prohibition of selling meat from an animal that died of an undisclosed cause and regulations for the proper disposal of carcasses.

In the UK, the incidence of anthrax has declined dramatically over the past century. This is due to improved factory hygiene and the development in 1937 of an effective livestock vaccine which reduced the incidence of the disease throughout the world and hence the level of contamination in products imported into Britain. Another factor had been the increased use of man-made alternatives to animal products. The first stages of the processing of hides are now being carried out in the country of origin instead of Britain. The development of a human vaccine have contributed to a reduction in industrial cases of anthrax (Turnbull, 1991).

## **1.2 STATEMENT OF THE PROBLEM**

In Ghana, vaccination of livestock is undertaken each year and the public is made aware of the disease through meetings and announcements. Vaccination coverage is however not complete and nomadic Fulani herdsmen often do not have their animals vaccinated. There is therefore the potential for animal anthrax transmission.

Official statistics suggest that anthrax has claimed over 1000 lives in Ghana since 1980, resulting from sporadic outbreaks. These may be due to inadequate responses or preparedness from health and veterinary services resulting in ineffective monitoring and containment (Wastling, et al. 1999). Moreover there are many outbreaks of anthrax in animals despite the availability of a locally produced vaccine. Most of these occur in the Northern Regions of the country. These outbreaks of animal anthrax are unfortunately associated with outbreaks of human anthrax

resulting in mortality or morbidity. The records available at the Veterinary Services Department Tamale, indicated at least 4 outbreaks of animal anthrax in the Tamale Municipality from January to April 1999 while the Ministry of Health records revealed at least 89 cases of human anthrax in 1998, indicating that the disease is still a major problem in the area.

### **1.3 RATIONALE FOR THE STUDY**

According to Opoku-Pare, animals are a great asset and important investment for most Ghanaians so the sudden death of cattle with no prospect of compensation can be a financial distress. This financial loss may probably play a role in the consumption of meat from anthrax-infected animals or exhumation of animal carcasses for recovery of hides, leading to the high relationship between human and animal disease (Wastling, et al.1999). It is important to identify the real cause of human anthrax outbreaks in general and in the Tamale municipality in particular. It is needful to find answers to why the persistent outbreaks of both animal and human anthrax in this part of the country despite the fact that the anthrax vaccine for livestock is produced in Tamale. Among the many reasons, human behaviour may probably play an important role in contributing to outbreaks of human anthrax in the Tamale municipality. Indeed human behaviour patterns have been found to play important roles in the persistence of diseases such as guinea worm, schistosomiasis and malaria (Obeng, 1997).

#### **1.4 OBJECTIVES OF THE STUDY**

The objectives of this study are;

1. To determine the knowledge, attitude, practices and beliefs of cattle owners, herdsmen butchers and consumers in the Tamale municipality with respect to human anthrax, and how these are related to the situation of anthrax, in the area.
2. To identify any behaviour patterns that may contribute to human anthrax outbreaks.
3. To recommend measures to improve the control of animal anthrax and the prevention of human anthrax in the same area.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 HISTORY OF ANTHRAX

Anthrax has been the scourge of man and animals since first written history of disease. It was one of the plagues of Egypt in the time of Moses (c1250 BC) and it was known in Asia Minor at the time of the siege of Troy (c1200 BC). Accounts of its symptoms in the writings of Homer (c100 BC), Hippocrates (c 400 BC), Varro (116 – 27) BC, Virgil (C70-19 BC), and Galen (c-AD 200) show that it was well known to the Greeks and Romans (Turnbull, 1991).

Anthrax was the first disease of man and animals shown to be caused by a micro organism, and it was the disease on which much of the work on bacteria and vaccines was done and from which many of the principles of pathogenic microbiology were derived. Robert Koch established his famous postulates in 1877 by proving that *Bacillus anthracis* (so named by Cohen in 1875) was the cause of anthrax. Louis Pasteur's vaccine was used worldwide for some 50 years but many attempts at developing better alternatives were made in the 1920's and 1930's culminating in Sterne's successful live spore vaccine which was largely responsible for making anthrax controllable across the world. This remains the livestock vaccine in use in most countries today (Turnbull, 1991). Anthrax occurs worldwide but it is endemic in most countries in Africa, Asia and South America.

## 2.2 ANTHRAX AS A DISEASE IN LIVESTOCK

Sudden death in a herbivore without prior symptoms or following a brief period of fever and disorientation should lead to suspicion of anthrax, and bloody fluid exuding from the nose, mouth, or anus of the dead animal is particularly suggestive. Failure of the blood to clot, absence of rigor mortis and the presence of splenomegaly are the most important necropsy findings. The disease occurs in all vertebrates but is most common in cattle and sheep and occurs less frequently in goats and horses. Predisposing causes include close grazing of tough scratchy feed in dry times, which results in abrasions of the oral mucosa and confined grazing on heavily contaminated areas around water holes (Benenson, 1995).

At death in most susceptible species, the blood contain  $10^7 - 10^9$  bacilli/ml, provided the animal has not been treated. Pigs are noted for being an exception and the bacterium may be undetected in blood at death (Schwabe, 1998).

The causative agent, *Bacillus anthracis* is facultatively anaerobic. It is a gram positive, spore-forming rod that occur in chains. Colonies on sheep blood agar are large and flat, with a ground glass appearance and comma-shaped outgrowths (Nester, 1983). Unlike most *Bacillus* species, it is non-motile and susceptible to a specific bacteriophage. Anthrax spores are resistant to environmental conditions and remain infectious for years in soil, wool, hides and other habitats (The Merck Veterinary Manual, 1986).

In laboratory confirmation of anthrax, the Macfadyean polychrome methylene blue stain is used. Large members of blue-black staining bacilli, often surrounded by a clearly demarcated pink capsule is fully diagnostic. For differential diagnosis, blackleg, botulism, toxicosis (eg. toxic plants, heavy metals, snake bite) lightning strike, and peracute babesiosis may cause symptoms similar to those of anthrax. As a control in animals penicillin injection is given to all animals showing fever after the first case is confirmed. Vaccination of livestock in endemic areas is a prerequisite which protects them for at least one year.

### 2.3 ANTHRAX AS A HUMAN DISEASE

Man acquires the infection by direct inoculation of spores through breaks in the skin by inhalation of spores or by ingestion of contaminated meat. There may be person to person spread in particular circumstances; for example an outbreak in the Gambia was in part traced to the use of communal loofahs when bathing and in the U.K and Russia shaving brushes have been a source. The organism may be transmitted mechanically by insects including the house fly (Turnbull, 1991).

The disease in humans appears in three forms: cutaneous anthrax, inhalation and gastro-intestinal anthrax. In cutaneous anthrax, itching of an exposed skin surface occurs first, followed by a lesion that becomes papular, then vesicular, and in 2-5 days develops into a depressed black eschar. The eschar is usually surrounded by moderate to severe and very extensive edema, sometimes with small secondary vesicles. The head, forearms and hands are common sites of infection. Untreated cutaneous anthrax has a case fatality rate between 5% and 20% (Benenson, 1995). Initial symptoms of inhalation anthrax are mild and nonspecific, resembling acute

symptoms of respiratory distress. X-ray evidence indicate mediastinal widening. Fever and shock follow in 3-5 days, with death shortly after. Symptoms of intestinal anthrax include abdominal distress which is followed by fever, signs of septicemia and death in the typical case. Laboratory confirmation is made by demonstration of the causative organism in blood, lesions or discharges by direct polychrome methylene blue MacFadyean stained smears or by culture. In anthrax treatment, penicillin is the drug of choice and is given for 5-7 days. Tetracyclines, erythromycin or chloramphenicol are also effective (Benenson, 1995).

#### 2.4 ANTHRAX IN LIVESTOCK IN GHANA

Anthrax in livestock occurs countrywide but it is more concentrated in the Northern Regions of the country. The Northern region is endemic for anthrax. Although anthrax is an old disease, records show that there have been consistent animal outbreaks every year since 1983. The number of animals affected was 3804 and out of this, 979 animal deaths were recorded from 1993 to 1998 (Veterinary Services, 1998). There have also been 14 confirmed anthrax outbreaks in livestock in the Tamale municipality from 1995 to April, 1999 (Veterinary Services, 1999). Anthrax outbreaks in livestock have been reported in all the districts in the Northern Region. In the Tamale municipality all the 6 subdistricts had been affected since 1993 (Veterinary Services, 1998).

The various species of livestock affected during outbreaks since 1993 were 3721 cattle, 77 sheep and 6 goats. Total deaths were 979 (Veterinary Services, 1998). Countrywide, between 1994 and 1997, 76 outbreaks were recorded involving 1216 animals; cattle 78%, sheep and goats 22%

(Veterinary Services, 1998). Anthrax is therefore a cause of significant economic losses in livestock in the municipality, where average protein intake is already low.

#### 2.4.1 HUMAN ANTHRAX IN GHANA

Human anthrax also occurs countrywide but more often in the Northern Regions of the Country, in association with outbreaks of animal anthrax. A total of 80 human deaths have been reported usually associated with the consumption of contaminated food and meat from animals which have died of anthrax (Veterinary Services, 1998). Ten human deaths were recorded in relation to outbreaks in livestock in the Northern Region since 1993. Eighty-nine human anthrax cases were recorded in 1998 with 5 deaths (Ministry of Health, 1998). The highest number of 51 cases was associated with an outbreak which occurred in the East Gonja district in September, 1998. Twenty-two human anthrax cases were recorded in Nakpanduri in the East Mamprusi district in December, 1998 (Ministry of Health, 1998). Sixty-one persons had contact with anthrax carcass during an outbreak in March 1999 in the Tamale municipality. They were given chemoprophylaxis of amoxicillin capsules. There have also been an anthrax outbreak in the East Mamprusi district resulting in 3 human deaths (Andane, 1999).

#### 2.5 CONTROL OF HUMAN ANTHRAX

Control or prevention of human anthrax could be achieved through public health education. Health education aimed at exposing the risk factors of anthrax, touching on proper disposal of anthrax carcass and education on the causative agent is a prerequisite for the control or prevention of human anthrax. Legislation and its enforcement is also important in human anthrax control. Investigation of contacts and source of infection and the specific treatment of patients

with penicillin, tetracycline or chloramphenicol are important for the control of human anthrax.

Other control measures involve the control of the disease in livestock, reducing animal anthrax and minimizing the chances of human exposure.

#### **2.5.1 CONTROL OF ANTHRAX IN LIVESTOCK THROUGH VACCINATION**

The annual vaccination of livestock in endemic areas is a prerequisite for the control of anthrax in livestock. Prompt immunization of all animals at risk during outbreaks and the treatment of in-contacts with penicillin or tetracycline is very important. This annual vaccination of livestock has led to the elimination of anthrax in some developed countries such as Britain and the United States of America (Blood, et al 1994).

#### **2.5.2 CONTROL OF ANTHRAX IN LIVESTOCK THROUGH PUBLIC EDUCATION**

Public education on the importance of vaccination to livestock owners is quite vital to the control of anthrax in livestock. Also, education on the proper disposal of anthrax carcass and the disinfection of contact areas with formaldehyde (30%) and caustic soda (40%) are important for the control of anthrax in livestock. Public education has played a major role in the eradication of guinea worm in Ghana where the disease was endemic. Public education has led to fewer cases of anthrax in Tanzania and Kenya (Titball, et al. 1991).

### 2.5.3 PREVENTION OF HUMAN INFECTION

One important way of preventing human infection is by ensuring that there is no direct contact with animals which have died from the disease. This means the animals should be buried or burnt without being cut open. Prohibition of selling meat from an animal that died of an undisclosed cause helps in the prevention of human infection. Education campaigns by public health and veterinary staff aimed at educating people not to eat meat from livestock not slaughtered in an approved abattoir and inspected is vital in the prevention of human infection.

With the introduction of abattoirs in the major cities of the country with regular meat inspection, human anthrax cases hardly occur in the major cities in Ghana.

### 2.5.4 CONSTRAINTS TO CONTROL OF ANTHRAX IN GHANA

Lack of cooperation by some livestock farmers, and poor vaccination coverage due to lack of education on the importance of vaccination is a constraint to the control of anthrax. Logistical problems faced by the Veterinary Services, inaccessibility of certain remote areas is a constraint to the control of anthrax. The periodic infiltration of Fulani herdsmen with their cattle which may not be vaccinated is also a constraint to the control of anthrax in Ghana.

Other constraints include livestock owners not reporting sudden deaths in their herds to Veterinary Officials and the consumption of uninspected meat. Some traditional beliefs concerning the usage of herbs to anthrax contaminated meat and sending anthrax patients to the herbalist instead of a hospital may serve as constraints to the control of anthrax in Ghana.

## 2.6 HUMAN BEHAVIOUR AND ANTHRAX OUTBREAKS

It is clear that human behaviour is important in the control activities against anthrax. Compliance in ensuring that cattle are vaccinated and that any deaths in cattle are reported to the Veterinary Services to ensure proper diagnosis and disposal if it is anthrax, are crucial. The socio-economic and educational levels and religious beliefs of people will influence their decisions to a large extent.

## 2.7 THE CONCEPTUAL FRAMEWORK FOR THE STUDY

A theoretical perspective guiding the study is the Health Belief Model (HBM). The Health Belief Model was developed by Rosenstock and Becker to explain why people did not use health services (utilization behaviour), but has been applied to many aspects of health behaviour as well

The Health Belief Model (HBM), says that if a person is to perform a particular act (Health) he/she has to believe they are susceptible, that the health problems caused affect him or her personally rather than other people or society as a whole; feel that the condition is serious; and that it can lead to death or other serious outcomes if action is not taken (Hubley, 1993). The person also has to believe that the condition could be prevented, and that the benefits of taking action will outweigh the disadvantages.

When applied to the study under consideration, the questions to be asked are:

- ◆ To what extent does a cattle owner, herdsman, butcher or consumer in Tamale municipality consider himself susceptible to anthrax?
- ◆ How serious does he/she consider anthrax?

- ◆ Does he/she think anthrax can be prevented?
- ◆ Does he/she think refraining from consumption of suspected anthrax carcasses has more benefits than disadvantage?

### 2.6.1 **DRAWING ON LOCAL KNOWLEDGE AND MAKING PROGRAMS LOCALLY RELEVANT AND ACCEPTABLE**

Communities often have detailed knowledge about their surroundings. This community knowledge includes among other things, the treatment and prevention of diseases. It makes sense, therefore, for service providers and other development workers to involve communities in making plans because they know local conditions and the possibility for change. If the community is involved in choosing priorities and deciding on plans, they are much more likely to become involved in the programme and make use of the services because such programs are seen to be meeting their needs (Hubley, 1993).

### 2.6.2 **BELIEFS**

Beliefs deal with a people's understanding of themselves and their environment. Beliefs about the different possible outcomes from performing actions are especially important in understanding behaviours. Social Science theory tells us that while some behaviours may exist on their own, others are a part of a wider system of belief, such as religion (Hubley, 1993).

A behaviour, value or belief can be shared by a group of people, a whole community or even a country. A person also develops beliefs from what he/she reads or hears from other persons. It is therefore important to find out how a particular belief has been acquired in order to predict how

it might be changed. According to Fishbein, whether or not a person forms an intention to perform a behaviour will also depend on the overall pressure from those around him (Hubley, 1993).

### **2.6.3 KNOWLEDGE, ATTITUDES AND PRACTICES (KAP) OF PEOPLE IN RELATION TO DISEASE**

Human behaviour arising out of people's knowledge, beliefs and attitudes play an important role in disease control.

For example, human behaviour patterns have been implicated in the persistence of diseases such as guinea worm and schistosomiasis. For schistosomiasis, physical contact with infected water makes a person contract the disease (Obeng,1997). Although this mode of infection makes workers on irrigation schemes, agriculturists and fishermen vulnerable, it appears that by far the greater proportion of infections encountered in communities is through the behaviour of persons who use irrigation canals, ponds, streams and swamps which are transmission sites for water collection, bathing and washing and swimming (Obeng, 1997). Similarly, the behaviour patterns of wading through infected streams and ponds for the collection of water for drinking and domestic use brings about guinea worm infection.

## **CHAPTER THREE**

### **METHODS**

#### **3.1.1 STUDY DESIGN**

This is a descriptive study using both qualitative and quantitative methods, to collect data on the level of knowledge, attitudes, practices and beliefs of cattle owners, herdsman, butchers and consumers in the municipality. It was conducted over a period of six weeks. In addition, available medical and veterinary records were also examined.

#### **3.1.2 VARIABLES STUDIED**

The variables studied were:

- ◆ Knowledge of cattle owners, herdsman, butchers and consumers regarding anthrax in general, its transmission and the control of the disease
- ◆ The attitude and beliefs of cattle owners, herdsman, butchers and consumers on anthrax and its control.
- ◆ The practices of cattle owners and herdsman in terms of disposal of carcasses and vaccination of their cattle.

Relationships between some Socio-demographic characteristics and some of the independent variables were explored.

#### **3.2 THE TAMALE MUNICIPALITY**

##### **3.2.1 POPULATION AND ADMINISTRATION**

The Tamale Municipal area is one of the 13 District Assemblies in the Northern Region of Ghana. It has a population of 290,538 (Ministry of Health,1998) within an area of about 1011



sq.km making it the smallest of all districts. It has a population density of 276 per sq. km. and about 170 communities and villages. The Municipality is bordered to the North by Savelugu/Nanton district, to the east by Yendi and East Gonja districts and the west by Tolon/Kumbungu and West Gonja districts. The Municipal capital Tamale, (also the capital of Northern Region), by virtue of its strategic location plays a very important role in administration, industry, education, commerce and trade. The Municipal Chief Executive is the political head of the municipality. He is assisted by the Municipal Coordinating Director. The Municipal Assembly constitutes the focal point in the decentralized administration. There are 13 decentralized departments under the Assembly.

### 3.2.2 **RAINFALL AND VEGETATION**

The rainy season is from April to October while the dry season starts from November to March (Dickson and Benneh 1970). The average annual rainfall is about 1100 mm with the heaviest in August and September. The average sunshine is about 7.5 hours per day. High temperatures are experienced all year round. The maximum daily temperatures are between 33 and 39 degree Celsius, with minimum night temperatures between 16 and 25 degrees Celsius. The vegetation is Guinea Savanna woodland with widely spaced dawadawa, shea, baobab and neem trees mixed with perennial grass. The area is about 180 meters above sea level, fairly flat with a series of low ridges that serve as water shed to small streams (Dickson and Benneh 1970)..

### 3.2.3 **INFRASTRUCTURE AND SOCIAL AMENITIES**

Under the Tamale roads rehabilitation programme, 79 km of roads in urban Tamale will be asphalted and the drains lined and covered. The Tamale municipality has more educational

facilities than any other district in the Northern Region. It has about 357 educational institutions, but the illiteracy rate is about 79% (Municipal Assembly Report). There is pipe borne water in the municipality but it is not reliable. About 30% of the people get their water from ponds, wells and dams.

Transportation in the municipality is quite good mostly made up of private transport, (vehicles, bicycles and motor cycles). The main means of transport is bicycle and motorcycles.

#### **3.2.4 THE HEALTH CARE SYSTEM AND FACILITIES**

There are 18 health facilities in the Municipality, operating at the municipal level, sub-district level and at community level, providing all kinds of health service programmes to the people. These facilities include a Regional Hospital, which is also a teaching hospital for the School of Medical Sciences, University of Developmental Studies, in Tamale. Other facilities include a Military Hospital, Health Centers, Private Clinics and Private Maternity Homes. There is also a well equipped Veterinary Laboratory at Pong-Tamale, 22 miles from Tamale on the Tamale-Bolgatanga trunk road. The Veterinary Laboratory apart from diagnostic activities, produces anthrax vaccines for livestock vaccination in the country. There is also a Public Health Reference Laboratory and a Private Diagnostic Laboratory in the municipality.

#### **3.2.5 THE SOCIAL AND POLITICAL STRUCTURE OF DAGBON**

The indigenous people of the municipality are Dagombas. At the top hierarchy of chiefdom is the paramount chief called the Yaa-Naa, and under him are three (3) divisional chiefs who are sons of past Yaa Naas. These are the Kariga Chief, Savelugu Chief and Mion Chief. There are also three

divisions of Queen Mothers, whose statuses or positions are at par with the three (3) divisional chiefs mentioned above, Gundogu Lana, Kpatuya and Shilin Naa. These are all based in Yendi seat of the Dagbon Paramourty.

In the traditional sense all towns and villages in the Dagbon traditional area are under the Yaa-Naa and as such pay allegiance to the Paramourty. At the village level the chief is assisted by the Wulan or the Senior linguist, followed by the Kpena-Lana, Chief Imam, Tindana and Lun-Naa. At the head of the household or clan is the family head, who is assisted by the senior wife and NachimKpiema (eldest son). The female children in the house are in charge of domestic chores: cooking, washing of cooking utensils, fetching firewood etc whilst the boys are in charge of farming, sweeping, clearing of weeds around the compound, herding cattle and taking care of fowls, goats and sheep.

The Dagombas in general are polygamous in nature. The system of marriage in the past was through betrothal, elopement and confiscation of women by chiefs, opinion leaders and rich men. With modernity, religion has influenced the system of marriage and hence people either marry in the Moslem or Christian way.

The Dagombas constitute a structured society. Apart from formal education, one is either born into a "Nakoha" family (Butcher), Blacksmith family, Wanzam family etc. the Wanzam performs duties such as barbering, circumcision and other minor surgical interventions. Language of the Dagombas is Dagbani, however, Hausa is spoken by a large section of the

inhabitants. There are three religions dominating in Dagbon:- these are Islam, Christianity and the Traditional Religion.

### 3.2.6 ECONOMIC ACTIVITIES

The main economic activities are farming, petty trading and light industry. There are few agro-based industries in the municipality. These are the rice mills, vegetable oil mills and cotton ginneries. Other activities are processing and exportation of shea nuts and livestock. During the dry season the people hunt. Farming is the main activity for most of the people. The crops produced are maize, groundnuts, yams, guinea corn, millet, rice, cassava, soya beans and pigeon peas. The main livestock reared are cattle, sheep and goats. The poultry industry is at its infant stage. Collection of sheanuts is a major activity for the women during its season.

### 3.3 THE STUDY POPULATION

The study population of 250 (males and females) comprised of cattle owners, herdsmen, butchers, and consumers who live in the urban, sub-urban and rural communities. They are made up of peasant farmers, traders, artisans and other vocations. In the rural communities, they live mostly in mud huts thatched with grass as shown in Figs (1,2,3 and 4)

### 3.4 SAMPLING

Cattle owners, herdsmen, butchers and consumers were randomly selected for interview from a sample frame of a list of cattle owners/herdsmen and butchers using an estimated sample of size 250 based on the population of Tamale Municipality 290,538 (MOH, 1998). An assumed anthrax awareness frequency of 10% and a worst acceptable anthrax awareness frequency of 15% was

used. A breakdown of the sampling size was assumed as follows; Cattle owners 20%, Herdsmen 20%, Butchers 10% and consumers 50%. This came up to cattle owners 50, herdsman 50, butchers 25 and consumers 125 as the number of persons to be interviewed.

### **3.5 DATA COLLECTION**

#### **3.5.1 PRIMARY DATA**

Data was collected through a structured questionnaire by trained interviewers (Figs 1 and 2). The questionnaire were pre-tested on the staff of the Municipal Health Office. Also, the interviewers were trained for 2 days in order to minimize errors. Focus group discussions and In-depth interviews were also employed. The actual data collection was carried out over a period of five weeks. An In-depth interview of a Herbalist/Soothsayer was also conducted (Fig 3).

#### **3.5.2 SECONDARY DATA**

Secondary data were obtained from existing records at the Ministry of Health and at the Veterinary Services, at Tamale.

### **3.6 QUALITY CONTROL**

Spot checks for quality control and completeness of information collected were made. Completed questionnaires were collected each day and cross checked with the interviewer.

### 3.7 ANALYSIS OF DATA

Data were analyzed using the EPI Info Software. Frequencies of respondents knowledge, attitudes, beliefs and practice about anthrax and its control were done. The chi square test of association of some of variables were also done. P value less than 0.05 was considered significant.

### 3.8 ETHICAL CONSIDERATION

Permission was sought from the Tamale Municipal Assembly, the chiefs, the land lords in the community before entry and administration of questionnaires. The study was explained to the people in the local language, and those who agreed to participate were included.

## **CHAPTER FOUR**

### **4.0 RESULTS**

#### **4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS**

Out of the 250 respondents 218 were males (87.2%) and 32 females (12.8%). This is in line with the fact that the livestock industry in the country especially large ruminants is dominated by men. Sixty percent of the respondents were above 35 years and nearly 40% of the respondents have some form of education (Table 1). More than 80% of the respondents were Moslems and 10.4% were christians.

#### **4.2 KNOWLEDGE, ATTITUDES, BELIEFS AND PRACTICES (KABP) OF RESPONDENTS**

##### **4.2.1 THE DISEASE IN ANIMALS AND ITS CAUSES**

The study revealed that 96% of the study population knew about anthrax and could mention the local names such as ‘yogu’ in Dagbani and ‘Cepha’ in Hausa both major languages spoken in the Municipality (Table 4). On attribution to sudden death 22.8% of the study population said they would attribute sudden death in their herd to snake bite and 33.6% indicated anthrax. At least a third of the respondents know that anthrax causes sudden death (Table 2)..

##### **4.2.2 SIGNS OF ANTHRAX IN ANIMALS**

On the signs that suggest anthrax 33.2% of the respondents settled for “Blood from the natural Orifices” 47.6% for “flies do not settle on blood” and 12% for “Blood will not clot”. Majority of the respondents totaling 96.8% know about some signs that may suggest anthrax (Table 3).

Table 1 **Distribution of Respondents by Age, Sex, Education, Marital Status and Religion**

CHARACTERISTIC	FREQUENCY	PERCENTAGE
<b><u>Age</u></b>		
Under 18	3	1.2
18 – 35	97	38.8
above 35	150	60.0
<b><u>Sex</u></b>		
Male	218	87.2
Female	32	12.8
<b><u>Marital status</u></b>		
Single	23	9.2
Married	224	89.6
Divorced	3	1.2
<b><u>Education</u></b>		
None	160	64
Primary	36	14.4
Secondary	34	13.6
Tertiary	20	8.0
<b><u>Religion</u></b>		
Christian	26	10.4
Muslim	208	83.2
Traditional	16	6.4
<b><u>Profession</u></b>		
Unemployed	3	1.2
Artisan	19	7.6
Trader	47	18.8
Farmer	107	42.8
White collar job	70	28.0
others	4	1.6

Table 2 **Distribution of Respondents by what they attribute sudden death in cattle to**

CHARACTERISTIC	FREQUENCY	PERCENTAGE
Snake bite	57	22.8
Lightning	28	11.2
Poison	62	24.8
Anthrax	84	33.6
Others	19	7.6

#### **4.2.3 VACCINATION AGAINST ANTHRAX**

On vaccination, 99.2% said they know about anthrax and all the respondents said it is necessary to vaccinate cattle (Table 4). On what vaccination does, 56.4% said it makes their cattle healthy, however 36.4% indicated it gives the cattle immunity for the disease they are vaccinated against (Table 3).

More than half of the respondents indicated they know of anthrax, contagious bovine pleuropneumonia (CBPP) and Rinderpest Vaccinations. On the purchase of cattle, 62% of the respondents said they do not consult the Veterinarian. before buying cattle. The rest, 38% said they do consult the Vet before buying cattle (Table 4).

#### **4.2.4 CAUSATIVE AGENT**

Knowledge about the causative agent is non-existent among the respondents. From the In-depth interviews, respondents gave various animals and insects such as birds, moths, spiders and wall gecko's as agents that cause anthrax. Similar names were also given by majority of participants in the Focus group discussions as causative agent for anthrax.

Table 3 **Distribution of Respondents by their knowledge concerning Anthrax and Vaccination**

<b>CHARACTERISTIC</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
<b><u>Signs that suggest anthrax</u></b>		
Blood from natural orifices	83	33.2
Blood will not clot	30	12.0
Flies do not settle on blood	119	47.6
All above	10	4.0
Others	8	3.2
<b><u>Usefulness of vaccination of cattle</u></b>		
Makes them strong	15	6
Makes them healthy	141	56.4
Given them immunity	91	36.4
Others	3	1.2
<b><u>Types of cattle vaccinations</u></b>		
Anthrax	90	36
CBPP	3	1.2
Rinderpest	10	4
Others (All above)	147	58.8
<b><u>Knowledge about category of cattle to be vaccinated</u></b>		
All cattle should be vaccinated	180	72
Pregnant cows should not be vaccinated	48	19.2
Calves should not be vaccinated	22	8.8

Table 4 **Distribution of Respondents by what they know about anthrax and participation in vaccinations**

<b>QUESTION</b>	<b>YES</b>		<b>NO</b>	
	<b>FREQUENCY</b>	<b>PERCENTAGE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Do you know the local name for anthrax?	240	96	10	4
Before buying cattle do you consult the Vet?	95	38	155	62
Do you know about vaccinations?	248	99.2	2	0.8
Is it necessary to vaccinate your cattle?	250	100	-	-
Do you vaccinate your cattle annually?	234	93.6	16	6.4

Table 5 Distribution of Respondents by their attitudes and beliefs on anthrax

QUESTION	YES		NO	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
Do you think you can die when you consume a carcass?	226	90.4	24	9.6
Should meat for consumption be inspected?	247	98.8	3	1.2
Do you think cooking carcass with herbs can prevent anthrax?	42	16.8	208	83.2
Do you think anthrax can be spread by taking contaminated meat from one place to another?	239	95.6	11	4.4

Table 6 Distribution of respondents by their attitudes and beliefs regarding anthrax

CHARACTERISTIC	FREQUENCY	PERCENTAGE
<b>What to do in case of sudden death of animal</b>		
Call in Vet	156	62.4
Bury or burn if Vet cannot be reached	99	36.4
Cut and distribute to family & friends	3	1.2
<b>Where to send sick member of family after consumption of carcass</b>		
Hospital	191	76.4
Herbalist	23	9.2
Vet Officer	36	14.4

Table 7 Distribution of respondents by their perceptions and practices relating to Anthrax

CHARACTERISTIC	FREQUENCY	PERCENTAGE
<b>Reasons why carcass might be butchered</b>		
Cattle is expensive	40	16
Source of meat for a large community	160	64
Source of protein	28	11.2
Others	22	8.2
<b>Disposal of carcass</b>		
Bury	228	91.6
Burn	18	7.2
Butcher it and distribute	4	1.6
<b>In which way can human anthrax be prevented</b>		
Annual vaccination of cattle	191	76.4
Using herbs	20	8.0
Refraining from carcass consumption	31	12.4
Others	8	3.2

#### 4.2.5 RISK FACTORS

On the risk factors associated with the consumption of carcass, 90.4% of the respondents indicated that consumption of carcass of cattle that have died of unnatural causes may lead to death. However 9.6% of the respondents indicated there is not risk (Table 5). From the Study, 16.8% of the respondents indicated cooking meat carcasses of cattle that have died of unnatural conditions with herbs can prevent anthrax (Table 5).

From the study, 76.4% of the respondents said they would send their sick member of family who had consumed an anthrax carcass to the hospital. However 9.2% indicated they would send the patient to the herbalist (Table 6).

On why cattle that had died of unnatural conditions might be butchered, 64% of respondents said, because the carcass would be a source of meat for a large community, 16% indicated because cattle is expensive and 11.2% said because it is a source of protein (Table 7).

#### 4.2.6 DISPOSAL OF CARCASS

From the study, 91.2% of the respondents said they would dispose of the carcass of cattle by burial and 7.2% said they would burn it (Table 7). These figures are very laudable but may be critical because of the stigma of labeling someone a “carcass eater” However 1.6% boldly indicated they would butcher it and distribute for usage by family and friends. On their attitude on sudden death of cattle, 62.4% said they would call a Vet, 36.4% said they would bury or burn the carcass if a Vet cannot be reached while 1.2% said they would butcher it and distribute to family and friends ( Table 6).



#### 4.2.7 PREVENTION OF HUMAN ANTHRAX

From the study 76.4% of the respondents said human anthrax could be prevented by the annual vaccination of cattle. Eight percent (8%) asserted that using herbs could prevent human anthrax while 12.4% indicated that refraining from carcass consumption could prevent human anthrax (Table 7).

#### 4.3 DISTRIBUTION OF KAPB ON BUTCHERS AND CONSUMERS

Apart from responses from the total sample population of 250, responses were also categorized for 25 butchers and 125 consumers (Tables 8,9,10,11and 12). All the butchers indicated that they have heard of anthrax and that cutting anthrax carcass can cause sickness or even death. From the study 96% of the butchers said they have heard of animal anthrax outbreak in their community but only 12% said they have heard of any human death due to anthrax in their community. On what anthrax is, 84% of the butchers indicated it is an animal disease that can affect humans (Table 9). From the study 88% of the butchers said they would not butcher the carcass of cattle that has died because of their religion. (Table 10).

Of the number of consumers, 96.8% said diseases from animals can be transmitted to man and 89.6% indicated that one could die if he/she consumes carcass of cattle that had died from unnatural causes. Also from the study, 90.4% of the consumers said cooking meat with special herbs cannot prevent anthrax. However 9.6% said the opposite reflecting that special herbs can prevent anthrax.

On what anthrax is, 81.6% of the consumers said anthrax is an animal disease that affects humans. Ninety –two percent of the consumers are in favour of meat being inspected by Veterinary staff before being sold to the public.

Table 8 Distribution of KABP on butchers

QUESTION	YES		NO	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
Have you heard of the disease anthrax?	25	100	-	-
Do you know anthrax carcass when cut can cause sickness or even death?	25	100	-	-
Have you heard of animal anthrax outbreak in your community?	24	96.0	1	4.0
Have you heard of any human death in your community due to anthrax?	3	12.0	22	88.0

Table 9 Distribution of respondents (butchers) on what anthrax is

CHARACTERISTIC	FREQUENCY	PERCENTAGE
Animal disease that can effect humans	21	84
Animal disease	4	16
Others	-	-

Table 10 Distribution of respondents (butchers) on what they would do when called to butcher a carcass that has died

CHARACTERISTIC	FREQUENCY	PERCENTAGE
Call a Vet to ascertain cause of death	3	12.0
Would not butcher because of my religion	22	88.0

Table 11 Distribution of KABP of consumers on anthrax

QUESTION	YES		NO	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
Do you know disease from animal can be transmitted to man?	121	96.8	4	3.2
Does it matter when meat has been inspected by Vet before being sold?	115	92.0	10	8.0
Do you know that you can die if you consume or handle carcass of cattle that had died?	112	89.6	13	10.4
Would you buy from your neighbour meat uninspected but cheap	7	5.6	118	94.4
If you know meat is from cattle that has died would you buy?	4	3.2	121	96.8
Have you heard of the disease anthrax?	124	99.2	1	0.8
Do you think cooking carcass with special herbs can prevent anthrax?	12	9.6	113	90.4

Table 12 Distribution of respondents' knowledge on what anthrax is (consumers)

CHARACTERISTIC	FREQUENCY	PERCENTAGE
Animal disease that can effect humans	102	81.6
Disease that cause sudden death in cattle	17	13.6
Human disease occurring after eating cattle that had died	6	4.8

#### 4.4 INTERRELATIONSHIPS BETWEEN SOCIO-DEMOGRAPHIC CHARACTERISTICS AND KABP

An attempt was made to find the relationship (if any) between the respondent's socio-demographic characteristics and their knowledge, attitudes, beliefs and practices, with view that such information may be helpful in developing any education programme on anthrax control. Two variable classifications were run and the chi-square test used to explore any relationships. The results of the chi-square tests suggest that most people would prefer to go to the hospital irrespective of their religion. (Table 13).

Table 13 **Distribution of study population by religion and where to send sick member of family**

Religion	Where to send a sick member of family.			Total
	Herbalist	Hospital	Vet. Officer	
Christian	0	23	2	25
Muslim	18	157	33	208
Traditional	5	11	1	17
Total	23	191	36	250

Table 14 **Distribution of study population by religion and knowledge of local name for anthrax**

Religion	Local name for anthrax		Total
	Yes	No	
Christian	21	4	25
Muslim	199	6	205
Traditional	20	0	20
Total	240	10	250

Table 15 **Distribution of study population by level of education and usage of herbs to prevent anthrax (P value significant at 0.05)**

Level of education	Cooking with herbs can prevent anthrax.		Total
	Yes	No	
None	36	123	159
Primary	4	32	36
Secondary/Tertiary	2	53	55
Total	42	208	250

P value = 0.003

Table 16 **Distribution of study population by age group and usage of herbs to prevent anthrax**

Age group	Cooking with herbs can prevent anthrax.		Total
	Yes	No	
Under 35 years	16	85	101
Above 35 years	26	123	149
Total	42	208	250

P value = 0.739

When the knowledge of local name for anthrax was looked at from a respondent's religious background, it was found that a greater percentage know the local name compared to those who did not know. (Table 14). Knowing the local name of anthrax may therefore not depend on whether one is a Moslem or a Christian. Another test suggested there is a relationship between level of education and the usage of herbs in preventing anthrax. The higher the respondents level of education, the less likely he/she would be to indicate usage of herbs as a prevention for anthrax (Table 15). The chi-square test also indicated that there was no association between a respondent's age and usage of herbs to prevent anthrax (Table 16).

#### 4.5 FOCUS GROUP DISCUSSIONS (FGDs) AND IN DEPTH INTERVIEWS

The orientation of this study as indicated earlier called for the use of qualitative and quantitative methods in data collection. In the qualitative approach, FGDs and in depth interviews were used. A structured questionnaire was used for the collection of quantitative data. While structured questionnaire presents only a snapshot imagery of a situation, if it is able to capture it, Focus Group Discussion and In Depth Interviews filled what was lacking in the questionnaire because the mix of methodologies underscores the importance of triangulation to enhance data (Senah 1997).

To compliment the information gathered from the questionnaire, FGD's and In depth interviews were held with a number of cattle owners and herdsman. Three FGD's and two in depth interviews were conducted. The FGD's were held at Nyerize, Kunyevilla and Nyehola involving a total of 30 cattle owners/herdsman. In depth interviews were made with the Acting Regent of Nyerizee, a herbalist/soothsayer at Kunyevilla. two cattle owners and two consumers at Nanbogu-Yakura and Nanbogu-Yapala respectively.

The research questions included the following:

*What is anthrax?, What causes anthrax?, what are the signs of anthrax? And what are the risk factors?*



#### 4.5.1 FOCUS GROUP DISCUSSION FINDINGS

The FGDs unveiled the perceptions of the participants on anthrax. On what is anthrax, many said it is a disease of both animals and humans. Some went on further to say that anthrax surfaces when someone casts a spell on a household or on to a kraal. On the causative agent, Nashanu Sulemana of Kunyeivila said *“Anthrax is caused by a moth-like organism hiding in the bush under grasses. It can be hiding in the crevices of buldings or in roof where it lays eggs”*. The belief is that the organism can be in a place and may not be harmful. It is when someone casts a spell using it that it becomes dangerous. From the village Nyerizee, it was realized that the services of a herbalist/soothsayer must be sought before one can know the cause of anthrax in his herd or home.

According to a participant from the Nyerizee village, *“The causative agent of anthrax is called Nantoo. It looks like a small vampire bat with a pointed mouth”*

It is believed that the Herbalist/soothsayer could arrest the causative agent from their hiding places and with their nests which look like cotton or spider web and burn them. Reacting to where to send an anthrax victim to the participant further said, *“I will not send my anthrax patient to the hospital but rather the herbalist because anthrax and injection do not match”*

The belief that when one presents edema or boils to the hospital he/she is injected is ripe here.

Also on the causes of anthrax, Amidu Suleman of Nanbogu-Yakura retorted *“Nantoo or Birikogno which causes anthrax lives in the bush under grasses or within shrubs. It is brought home from the bush by wizards and witches. It is when they have cast a spell that the organism becomes harmful and poisonous. Otherwise it is not harmful in the bush.”*

The signs that suggest anthrax could be mentioned by majority of the respondents but the risk of anthrax was downplayed. The belief was that for anthrax to strike and kill animals and humans is indicative of the fact that a witch or wizard had cast a spell into that herd or house. Otherwise, concoctions of “black medicine” or “Red Medicine” made from herbs by the medicine man

could cure it. The linkage of anthrax to witchcraft is so strong that when anthrax is being discussed women dare not come near. Any woman who seems to be knowledgeable on it could be branded a witch. One respondent Abdul-Rashid Mumuni of Kunyeivilla used a Dagbani proverb “ *The meat that you will eat and put in medicine, if you don't eat it, it is good for you*” to illustrate that consumption of carcasses is not the best even if one thinks he/she may not get sick. Some of the perceptions revealed during the discussions include;

- ◆ Carcasses of cattle when consumed would stop further deaths in the herd.
- ◆ When flies hover around the carcass it is an indication that the carcass is not harmful when consumed. When it is the opposite, the carcass is harmful.
- ◆ The old men do not partake in consumption of the carcass.
- ◆ Concoctions of “red medicine” sprinkled in rooms, on cattle, put in water for bathing and in food will ward off anthrax.
- ◆ The scent of these concoctions in pots could scare off the anthrax organism as it flies over the community during the dry season.
- ◆ Anthrax is linked to witchcraft.

#### 4.5.2 IN DEPTH INTERVIEW WITH HERBALIST/SOOTHSAYER

An in depth interview was conducted with a herbalist/soothsayer Iddrisu Seidu at Kunyeivilla village on the Nyankpala road near Tamale. When asked about anthrax and its causative agents

Iddrisu Seidu said, “*Anthrax is a sudden killer disease known and called locally yogu. It affects both humans and animals but affects animals more. It is caused by an organism called 'Nantoo or Birikogno' It is invisible and cannot be seen by the ordinary eye except with the 'spiritual eye'*”

On the structure and habitat of the organism he said, “ *Nantoo is like a small immatured vampire bat or a moth. Even though invisible it hibernates on tree tops, in crevices of walls, under stones or logs*”

Can anthrax be treated? “*Yes if it is detected early. Treatment is effected by giving locally made medicine from herbs to the victim to drink in soup or put in water for bathing. If it occurs in the form of a boil, some of the medicine can also be ground and smeared around the boil.*” Iddrisu emphasized.

According to him preparations for the prevention of anthrax include the bark, roots and leaves of trees and shrubs. He mentioned the following as part of a preparation;

*Doo(Dawadawa tree), 'Zankunga', 'Kpiliga', 'Gamampoo', Striga plant and a left over of fire-torch after burning.*

He described one preparation as thus; “ *Herbs collected are assembled. A fowl is slaughtered and its blood sprinkled over the herbs with some incantations. Herbs are then chopped and pounded in a mortar to make 'red medicine' which is made into morsels.*”

On his view on the link of anthrax with witchcraft, Iddrisu Seidu said, “*anthrax is associated with witchcraft. Witches cause the spread by casting a spell. The organism can fly and can transfer the disease from one locality to another*”

To buttress this point he said; “*it is good for one to take precaution before the disease strikes.*”

He mentioned the warm season and the beginning of the wet season as the periods to be wary of.

An indepth interview with a consumer Afa Abdul-Razak Taufeeq also registered some invaluable perceptions.

He said “*anthrax is caused by 'Nantoo' which has features like a small vampire bat, a wasp or a very matured wall gecko. This type of wall gecko is different from the normal one. It has hair all over the body with both the mouth and tail pointed like the tip of a needle and is very fearful*”

He also said anthrax is associated with witchcraft and it kills in a matter of minutes or days.

Taufeeq further said, “*the disease is in two forms the 'hidden type' which surfaces after it has killed its victim and the 'superficial' which can be treated*”

He describe symptoms similar to malaria and a very painful, hard, pointed and reddish boil on any part of the body as being some of the signs of the disease in humans. At this point he

cautioned against sending the victim to the hospital, saying, *“the disease does not like injections”*

#### 4.5.3 IN-DEPTH INTERVIEW WITH ACTING REGENT

An in-depth interview was made with the Acting Regent of Kunyeivila. As an opinion leader, questions pertaining to the animal industry and the study were posed to him. The questions and responses are below cited:

**Question:** What does vaccination do to your animals and what time do you want vaccination to be done?

**Acting Regent:** *“Vaccination is good. It makes our animals healthy. I would like vaccinations to be done 2 times in a year. One in the dry season and one in the wet season”*

**Question:** Do you have any control over people who cut and consume their dead animals?

**Acting Regent:** *“Yes in this village dead animals are buried. We have made a law. There is a fine for any person who is caught butchering a dead animal. A fine of 10,000 cedis has been instituted. In addition, the whole village will agree and seize the carcass and bury it”*

**Question:** Have you experienced an anthrax outbreak in your village before?

**Acting Regent:** *“Five years ago, there was an anthrax outbreak and many of our animals were lost”*

**Question:** There is a National policy on privatization of Vet Services. How do you see that affecting you?

**Acting Regent:** *“This may not be in our interest because veterinary charges will be high. The private man will charge a lot for his services in order to make profit. When our animals are sick we cannot pay for the services of the vet, and they may die”*

**Question:** In your opinion what are the causes of anthrax and how is it transmitted?

**Acting Regent:** *“The anthrax disease is caused by an animal which looks like a small vampire bat, a spider or a butterfly. This animal resides in the crevices of walls, in the thatch in our homes or under grasses in the bush. Only those who have “ double eyes” can see this animal.”*

#### 4.6 DISCUSSION

Anthrax is still a major health problem in the Tamale Municipality and the Northern Region as a whole. From the records studied, there were 4 anthrax outbreaks in the first quarter of 1999 and 89 human anthrax cases the previous year. This is in line with what pertains in other countries in the sub-region eg. Burkina Faso and Togo where anthrax is considered to be one of the most significant zoonoses (Wastling, Akanmori and Williams, 1999). Human anthrax is also endemic in those agricultural regions of the world where anthrax in animals is common, including countries in south and central America, southern and eastern Europe, Asia and Africa (Beneson 1995).

But why these anthrax outbreaks and its associated human cases in the Tamale Municipality? Human behaviour may obviously play a role in this because according to the study many of the respondents do not know that anthrax is caused by a living organism, bacteria which is in the environment ie. the soil. This lack of knowledge may lead to persons not following proper methods of carcass disposal, thereby perpetuating anthrax in the environment.

The social-demographic characteristics of respondents revealed that 87.2% were males and 32 females. The livestock industry especially large ruminants is dominated by men and this supports the preponderance of males. This is in line with observations in other countries in Africa (Koney 1992). Cattle is normally inherited in the Northern Region serving a form of security, a source of income and prestige. Owners are therefore not young and may account for 60% of the respondents being above 35 years. Nearly 40% of the study population have some form of education, this means that public education through leaflets in English and the local dialect will reach a considerable number of people. According to Peterson, “Man’s conquest of many preventable diseases is the consequence of a highly organized campaign of public information”.

Community participation is also vital in the link to control anthrax. One reason health education programmes fail according to Hubley, is that they are directed at individuals and ignore the influences of other people. Few people make decisions or perform actions without considering the opinions and views of those around them. Thus before the community will participate, they should be enlightened on why they should participate and what they are expected to do (Hubley, 1993). Thus with the right information, cattle owners, herdsman, butchers and consumers could make informed decisions that could help in the control of anthrax.

Ninety-six percent of the study population having knowledge of anthrax and at least a third knowing that anthrax causes sudden death can help in public health education for anthrax control.

Knowledge about vaccination indicated by 99.2% of the respondents and particularly on immunity as what vaccination does for their cattle by 36.4% could be harnessed for public health education.

The Northern Region is the cradle of the Veterinary profession in Ghana, and the livestock population is among the highest in the country. Vaccinations have been carried out here annually for a long time and one would expect a very high percentage knowledge on the types of vaccinations carried out on cattle especially anthrax CBPP and Rinderpest. However 58.8% of the respondents knowing more than one type of animal vaccination is good for public health education.

The results from the study also indicated that 62% of the respondent do not consult the Vet before buying cattle. Though 38% of respondents said they do consult the Vet, it would be important for the livestock industry to have cattle inspected before being purchased. This will ensure the breeding of healthy animals and eliminate those which have not gone through vaccination programmes eg. Anthrax. It could also help find recalcitrant farmers and have their animals vaccinated. Knowledge about the causative agent, mainly associated with the supernatural ie. witchcraft, is very strong.



According to (Hubley, 1993), a belief can be shared by a group of people, a whole community or even a country. These beliefs have been maintained for a long time and passed down from parents to children. Public health education should therefore include education on the causative agent. Confirmation of causative agent by reliable laboratory tests is also important as found out during the study ( Fig 4).

On the risk factors, 9.6% indicating that there is no risk in the consumption of carcass of cattle that has died of unnatural causes is quite disturbing, because it could bring about incidence of human anthrax and should therefore be a target for public health education.

A percentage of 16.8 asserting that cooking with herbs can prevent anthrax is also alarming and should be a target for public health education. This finding is similar to what pertains in Zambia. Turnbull, reports that it is a social custom for the people of Zambia to skin, butcher and eat animals that die unexpectedly although villagers do understand that such animals may have had a serious transmissible illness such as anthrax (Turnbul, 1991). From the study, 9.2% indicated they would send their anthrax patient to the herbalist. This is also disturbing and should be a target for public health education.

The responses for why cattle that had died of unnatural conditions might be butchered such as, cattle being expensive (16%) and a source of meat for large community (64%) are a cause for concern and may perpetuate human anthrax in the community.

The focus group discussions and indepth interviews also revealed much of traditional beliefs concerning anthrax as a disease in livestock and human, its causative agent and transmission. This is also vital in public health education.

Human behaviour arising out of the knowledge and attitudes of people have played an important role in the control of diseases such as guinea worm and schistosomiasis. It is envisaged that KABP of cattle owners, herdsmen butchers and consumers from this study could help in the prevention of human anthrax in the Tamale municipality.

## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 CONCLUSIONS

The study has revealed that more than two-thirds of the respondents know that anthrax is an animal disease that can affect humans. The signs that suggest anthrax are known by more than 90% of the respondents. However knowledge about the causative agent is nonexistent. Indigenous knowledge of a causative agent linked to the supernatural is very much pronounced. This gives the indication that any public health education must be focused primarily on the causative agent. The period anthrax is likely to strike i.e. in the warm season is well known by two-thirds of the respondents. All the respondents indicated it is pertinent to vaccinate cattle and more that 30% could tell about immunity. The importance of vaccination is well recognized by the study population. This can be used effectively in anthrax control. Eight percent of the respondents believe that using herbs can prevent human anthrax. Though this figure is not very large, it should not be overlooked because it suggests that human anthrax can persist in areas of these respondents.

A smaller percentage of about 9% indicated that they would send their anthrax patients to the herbalist. This indicates that help may come very late for families of such persons because the victims may be sent to the hospital after herbal treatment had failed. About two-thirds of the respondents are of the view that carcasses are butchered primarily because it serves as a source of meat for a large community. This may suggest an underlying factor that is poverty.

The study has also revealed that more than 50% of the study population do not seek veterinary assistance when they buy cattle. Cattle breeding would be very much improved, if cattle owners were educated to seek assistance in this area. On the risk factors of anthrax about 10% indicating there is no risk in carcass consumption is alarming. This can perpetuate human anthrax.

More than 16% of the study population indicated that using herbs to cook meat from carcasses could prevent anthrax. This group is more likely to consume anthrax-contaminated carcasses, which may cause human anthrax outbreak. The findings have revealed that about two-thirds of the study population would call a vet when there is sudden death in their herd. This is laudable meaning consumption of carcass could be averted and the probable disease situation taken care of. The study also showed that butchers and consumers (a subset of the study population) had adequate knowledge. However linking the causative agent to the supernatural, thus witches and wizards runs through. About 90% of butchers would not butcher carcasses because of their Religion and more that 90% of consumers know disease from animals could be transmitted to humans.

Finally, the study has revealed a gap between knowledge and practices, with regards to the risk anthrax poses to humans. The study population has a high level of knowledge about anthrax apart from the causative agent, but some practices and beliefs are not consistent with the level of awareness found.

## 5.2 RECOMMENDATIONS

Based on the study findings and other information collected during the study, the following recommendations are made:

1. Livestock owners should be educated to consult the Veterinary Services when purchasing cattle and compelled by law to report all unexpected deaths.
2. The Veterinary Services in collaboration with MOH, the Municipal Assembly and other related agencies should organized regular durbars on anthrax. Such education should be on:
  - ◆ The causative agent of anthrax
  - ◆ Disposal of anthrax carcass.
3. A poster in English and the local dialects with pictures describing the disease, its causative agent, risk factors etc. should be pasted at vantage areas for the community to see and read.
4. Suspected anthrax cases should be confirmed by reliable laboratory tests.

## A. REFERENCES

1. Andane, D. (1999). Ban on Slaughter, Movement of Livestock. The Daily Graphic, 19<sup>th</sup>, June, pp 3.
2. Benenson, S. A (1995). Anthrax .Communicable Disease Manual. American Public Health Association, pp 18-22.
3. Dickson, K. B. and Benneh, G., (1970). A New Georgraphy of Ghana. Longman, London, pp. 18.
4. Blood, D. C., Radostits, O. M, and Gay, C.C. (1994). Anthrax. Veterinary Medicine, 8<sup>th</sup> Edition. Bailiere Tindall, London, 671-676.
5. Hubley, J (1993). Communicating Health. Macmillan Education Ltd., London, pp. 24-25
6. Koney, E. B.M. (1992). Livestock Production and Health in Ghana. Advent Press; Accra, Ghana, pp 31-33.
7. Ministry of Health, Annual Report 1997/98, Tamale.
8. Nester, E. W. (1983). Anthrax. Microbiology, 3<sup>rd</sup> Edition. Holt-Saunders, Japan, pp. 818-819.
9. Obeng, L. E. (1997). Parasites, the sly and sneaky enemies inside you. Goldsear, U.K., pp. 159, 211.
10. Pfisterer, R. M. (1991). Anthrax cases in Switzerland. Veterinary Record, 128pp. 410.
11. Schwabe, C. N. (1998). Zoonoses. William and Wilkins, Baltimore, pp3-5.
12. Sekhar, P. C., and Singh, R. S. (1990). Anthrax Outbreak in Andhra Pradesh. Indian Journal of Medical Research. 38 (4): 448-452.
13. Senah K.A. Money be Man. Het Spinhuis Publishers, Amsterdam 1997.



14. The Merck Veterinary Manual, (1986), 6<sup>th</sup> Edition. Merck & Co Inc. USA  
pp.359-362
15. Titball R. W, Turnbull, P. C., and Huston, R. A. (1991). The Monitoring and  
Detection of *Bacillus anthracis* in the Environment. Journal of Applied  
Bacteriology. Symposium supplement, 70. Salisbury, Wilts U.K.,pp.95-  
100.
16. Turnbull, P. C, Bell, P. H., and Saigawa, K. (1991). Anthrax in Wildlife in the  
Luangwa Valley. Veterinary Record, 128(4), pp. 339-403.
17. Wastling, J. M, Akanmori B. D., and Williams D.J.L. (1999). Zoonoses in  
West Africa: Impact and Control. Parasitology Today. Vol.15(8) 301-349
18. WHO Bulletin (1994). Anthrax control and research with special reference to  
National Program Development in Africa. Memo from a WHO meeting.  
Switzerland, pp. 13-22.
19. Veterinary Services Department, Annual Report (1997/98).



Figure 1 Questionnaire administration at Nyirezee, Tamale Municipality



Figure 2. Author administering questionnaire at Kunyeivila, Tamale Municipality



Figure 3. Author with Herbalist/Soothsayer, Iddrisu Seidu(Left), at Kuuyeivila, Tamale Municipality



Figure 4. Sudden death of 64 sheep at Zagyuri, initially suspected to be due to anthrax but later confirmed by the Pong -Tamale Veterinary Diagnostic Laboratory as enterotoxaemia due to *Clostridium perfringens*. This occurred during the study period

**KNOWLEDGE, ATTITUDES, BELIEFS AND PRACTICES OF CATTLE OWNERS, HERDSMEN, BUTCHERS AND CONSUMERS ON ANTHRAX IN THE TAMALE MUNICIPALITY**

DISTRICT: ..... Serial No.....

SUB-DISTRICT: .....

VILLAGE: .....

INTERVIEWER: .....

DATE: .....

**(A)**

1. Within which age group do you fall?  
(a) Under 18 yrs                      (b) 18-35 yrs                      (c) above 35 yrs
2. Sex  
(a) Male                      (b) Female
3. Marital Status  
(a) Single                      (b) Married                      (c) Divorced
4. Religion  
(a) Muslim                      (b) Christian                      (c) Traditional
5. What level of education have you attained?  
(a) Illiterate                      (b) Middle form 4/JSS  
© Secondary/vocational  
(d) Tertiary (polytechnic, university)
6. What is your professional status?  
(a) Unemployed                      (b) artisan                      (c) trader  
(d) farmer                      (e) other specify
7. If you are a cattle owner, herdsman or butcher how many cattle do you have?  
(a) below 25                      (b) 25-50                      (c) above 50                      (d) above 100

**B****KNOWLEDGE**

1. To what would you attribute a sudden death in your herd?  
(a) Snake bite (b) lightning (c) poisoning  
(d) others specify
2. Do you know the local name for anthrax?  
(a) Yes (b) No
3. Which of the following signs will suggest anthrax?  
(a) Blood from the natural orifices  
(b) Flies do not settle on the blood from the orifices  
(c) Blood will not clot  
(d) Others specify
4. Before buying cattle, do you consult the Vet?  
(a) Yes (b) No
5. If No who do you consult?  
(a) Chief fulani (b) Chief butcher  
(c) any person who has some knowledge about cattle  
(e) others specify
6. Do you know about vaccinations?  
(a) Yes (b) No
7. Is it necessary to vaccinate your cattle?  
(a) Yes (b) No
8. If yes what does vaccination do to your cattle?  
(a) Makes them strong (b) Makes them healthy  
(c) Gives them immunity for the disease they are vaccinated against  
(d) Others specify
9. If yes what types do you know?  
(a) Anthrax (b) CBPP (c) Rinderpest  
(d) Others specify
10. Who does anthrax vaccination?  
(a) Vet Personnel (b) MOH (c) Others specify
11. How much does the vaccination cost you?  
(a) Specify amount (b) no charge  
(c) payment in kind (d) others specify

12. Do you vaccinate your cattle annually?  
(a) Yes (b) No
13. If yes, what time of the year?  
(a) before the raining season  
(b) after the raining season  
(c) beginning of the dry season  
(d) others specify
14. If No, why don't you?  
(a) Cattle die after vaccination  
(b) Cows abort after vaccination  
(c) Personnel collect money  
(d) Others specify
15. What category of cattle do you think should not be vaccinated?  
(a) Pregnant cows (b) Young ones e.g. calves  
(c) Breeding bulls (d) Others specify

### C

#### **ATTITUDES AND BELIEFS**

1. How would you recognize a sick cattle?  
(a) Cattle does not eat (b) Lags behind the group  
(c) Passes diarrhoea (d) Others specify
2. When your cattle die what would you do?  
(a) Cut it and distribution to family and friends  
(b) Call in the butcher to buy and sell to consumers  
(c) Call in the vet to ascertain cause of death  
(d) Bury it or burn it if vet cannot be reached  
(e) Others specify
3. Do you think you can die when you consume the carcass of cattle that has died?  
(a) Yes (b) No
4. Where would you go when members of your family become sick after cutting, handling the carcass of cattle that has died?  
(a) Vet officer (b) Hospital (c) Soothsayer  
(d) Herbalist (e) Others specify
5. Do you think meat meant for consumption should be inspected by veterinary personnel?  
(a) Yes (b) No -

6. Do you think cooking meat of cattle which has died with certain herbs can prevent you from getting sick?  
(a) Yes                      (b) No
7. What herbs do you use?  
(a)                              (b)                      (c)  
(d)
8. Do you think you can spread anthrax by taking the contaminated meat from one place to another?  
(a) Yes                      (b) No

### PRACTICES

1. Why do you keep cattle?  
(a) For economic reasons                      (b) For food  
(c) For prestige                      (d) Others specify
2. How would you dispose of the carcass of cattle which has died?  
(a) Bury      (b) Burn it      (c) Butcher it and distribute  
(d) Others specify
3. Would you exhume the carcass when the carcass has been buried by vet officials?  
(a) Yes                      (b) No
4. If you found someone exhuming carcass that has been buried by vet officials what would you do?  
(a) Report tot he chief                      (b) Report to the police  
(c) Report to vet officials      (d) Report to MOH officials  
(e) Others specify
5. Who gives the order for the butchering of the carcass?  
(a) Cattle owner                      (b) Herdsman                      (c) Family head  
(e) Others specify
6. Why do you think cattle has died might be butchered?  
(a) Cattle is expensive                      (b) A source of meat for a large community  
(c) Source of protein                      (d) Others specify
7. In which ways do you think animal anthrax can be prevented?  
(a) Annual vaccination of cattle  
(b) Cooking anthrax contaminated meat with social herbs  
(c) Refraining from consuming carcass of cattle that has died  
(d) Others specify

8. How often should vaccination be done?  
(a) Yearly (b) Once in the lifetime of the animal  
(c) Others specify

### **QUESTIONNAIRE FOR CONSUMERS**

1. Do you know diseases form animals can be transmitted to man  
(a) Yes (b) No
2. Do you eat beef?  
(a) Yes (b) No
3. How frequently?  
(a) Daily (b) Weekly (c) Monthly  
(d) Others specify
4. Where do you buy meat for cooking?  
(a) Butchers shop (b) Farmers (c) Others specify
5. Does it matter to you when meat has been inspected by a Vet before being sold to the public?  
(a) Yes (b) No
6. How would you recognize meat which has been inspected by a vet?  
(a) When purchased from the butchers house  
(b) From the abattoir (c) Others specify
7. Would you buy from your neighbour meat that has not been inspected and it is cheap?  
(a) Yes (b) No
8. If you got to know the meat is from cattle that had died would you still buy?  
(a) Yes (b) No
9. Do you know that you can die when you cut, handle or consume meat from cattle that has died?  
(a) Yes (b) No
10. Do you think cooking the meat of cattle that has died with some special herbs can prevent you from getting sick?  
(a) Yes (b) No
11. What do you look for when you buy meat?  
(a) Colour meat (b) Colour of fat (c) Texture  
(d) Nothing (e) Others specify

12. In your view what would you say is a wholesome meat?  
(a) Colour of meat (b) firmness (c) Odour  
(d) Others specify
13. Have you heard of the disease anthrax?  
(a) Yes (b) No
14. If Yes, what is it?  
(a) Animal disease that affects humans  
(b) Human disease occurring after eating cattle that had died suddenly  
(c) Disease that cause sudden death in cattle  
(d) Others specify
15. How do you prepare meat?  
(a) Cook (b) Roast (c) Fry (d) Eat raw  
(e) Others specify

### **QUESTIONNAIRE FOR BUTCHERS**

1. How long have you been working as a butcher?  
(a) 1-5 yrs (b) 5-10 yrs (c) above 10 years
2. Where do you get meat from?  
(a) Cattle owners (b) Government farm (c) Others specify
3. Who inspects your meat before you sell?  
(a) Vet personnel (b) Environmental health personnel  
(c) Yourself (d) Others specify
4. If you were called to buy and butcher carcass of cattle that has died what would you do?  
(a) Call a vet to ascertain cause of death  
(b) Butcher it and sell because it is cheap  
(c) Would not butcher cattle which has already died because of my religion  
(d) Others specify
5. If yes, what is it?  
(a) Animal disease (b) Human disease  
(c) Animal disease that can affect humans  
(d) Others specify

6. Do you know that anthrax contaminated meat, when cut, handled or consumed  
can cause sickness or even death?  
(a) Yes (b) No
7. If you inadvertently open an anthrax carcass, what would you do?  
(a) call a Vet (b) call MOH personnel  
(c) call Assembly man (d) others specify
8. Have you ever heard of animal anthrax outbreak in your community?  
(a) Yes (b) No
9. Have you heard of any human death in your community due to anthrax?  
(a) Yes (b) No