

**ENVIRONMENT AND DISEASE: THE CASE OF
CEREBROSPINAL MENINGITIS IN SHIRORO LOCAL
GOVERNMENT AREA OF NIGER STATE.**

BY

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**CHARLES CHINEDU MGBEMENA
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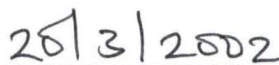
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CERTIFICATION

This dissertation entitled "Environment and disease" The Case of Cerebrospinal Meningitis (CSM) in Shiroro Local Government of Niger State, by **Mgbemena Chinedu Charles** is in partial fulfillment of the regulations governing the award of the degree of Postgraduate Diploma in Environmental Management (PGD) OF Federal University of Technology, Minna and is approved for its contributions to knowledge and literary presentation.



Dr. (Mrs) A. E. Odafen
Supervisor



Date



Dr. M. T. Usman
Head of Department



Date

External Examiner

Date

Prof. J. A. Abalaka
Dean School of Post-Graduate Studies

Date

DEDICATION

This work is dedicated to my Parents, **Mr. & Mrs. A. E. Mgbemena** who laid in me, a solid foundation.

It is also fondly dedicated to my beloved wife, Amaka and our wonderful boys, Kachikwulu (K.K.) and Kenechukwu (K.C.) for their love, support and encouragement. And above all, to the Praise and Glory of God, the Father of my Lord and Saviour, Jesus the Christ.

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Above all, I thank the Lord God Almighty for His divine resources which I depended on to accomplish this task.

ENVIRONMENT AND DISEASE: THE CASE OF CEREBROSPINAL MENINGITIS (CSM) IN SHIRORO LOCAL GOVERNMENT AREA OF NIGER STATE

ABSTRACT:

Cerebrospinal Meningitis (CSM) is the most important contagious bacterial infection of the central nervous system. It is an example of a disease that is well known in industrialized countries but takes its greatest toll in developing countries. Poor housing conditions, insufficient hygiene and malnutrition all contribute to the development and spread of meningitis. The implicated organisms usually is *Neisseria meningitidis*, a gram-negative diplococcus.

Surveillance reports obtained from the World Health Organisation (WHO) indicate that the highest number of cases and the burden of disease occur in sub-Saharan Africa in an area that is referred to as the "Meningitis Belt". This area extends from Ethiopia in the east to Senegal in the west. According to the report, epidemic occur in seasonal cycles between the end of November and the end of June, depending on the location and climate of the country, and declines rapidly with the arrival of the rainy season.

Nigeria lies within the meningitis belt. The prevailing weather and socio-economic conditions in many parts of the country seem to be a conducive environment for the outbreak of meningitis epidemic going by the trends in the spread of the disease over the past few years. Statistics from the World Health Organization (WHO) show that of the 5,948 CSM cases in Nigeria reported in 1998, 650 were fatal. In 1999, a total of 1,946 cases were reported and 165 were fatal. From data available as at May 2000, 711 cases of the disease had been reported, 9 were fatal.

In Niger State, in general, poor living condition, adverse weather condition among others, make this state conducive for CSM activities. Specifically

ommunities in seven of the former twenty-five Local Government Area constitute the CSM belt of Niger State. These communities are predominantly poor and rural in character, with poorly-ventilated, densely crowded houses; harsh weather conditions - high temperature and low humidity during the windy, dusty harmattan season.

Also, resistance to vaccination borne out of ignorance rooted in certain cultural beliefs was found in some members of these communities.

There is a seasonal pattern in the transmission and manifestation of Cerebrospinal Meningitis, with all the reported cases falling in the mid-harmattan period of January to March. This is the period when day temperatures are at their peak (34°C) and the dusty harmattan wind from the North is at its maximum. This is an indication that local climatic conditions influence the epidemiology of CSM. The transmission and manifestation of CSM takes place during the dry season and begins to wane as the rain appears.

This study is focused at demonstrating the need for the placement of environmental considerations along side purely medical options on the front seat in planning preventive and control measures of CSM.

Environmental Health Education of the communities is vital and highly commended in order to stem the development and spread of cerebrospinal meningitis because ignorance of environmental risk factors influence the epidemiology of CSM.

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CHAPTER ONE

1.0 INTRODUCTION

Cerebrospinal Meningitis occurs throughout the whole world from the Arctic to the edge of the Sahara. In areas with a temperate climate, the infection is usually endemic with an attack rate of around two cases per 100,000 population per year. However, the collection of national statistics disguises the fact that even in countries where the infection is endemic there may be localized areas with a relatively high attack rate. A meningitis zone extends across Africa. It is an area where the annual rainfall varies between 300mm (in north) and 1100mm (in South) (Heiki Peltola, 1994). The eastern boundary goes through the eastern regions of Ethiopia and the Western boundary through the Savannas of Senegal.

The statistics are unreliable particularly in developing countries but show, at least, periods of highest and lowest incidence in a given area.

Nigeria lies within the meningitis belt. The average number of reported cases per year is about 3,000 . Of this, about 400 cases are fatal. (Prof Tola Odugbemi, 2002). This is believed to be grossly under - reported.

The first documented outbreak in what is today known as Niger State was in 1991, involving 12 cases, spread over the CSM belt of Niger state. It was not until the massive outbreak of meningitis in 1996, involving all the Northern State of the Federation, that preventive and control measures became issues in management.

Today, with support from international Non-governmental Organizations and UNICEF, the Disease Surveillance Unit of the State Ministry of Health is active throughout the State, especially the areas designated as the meningitis belt of Niger State. However, understanding the interactive relationship between the environment of a people and their disease burden in general, and Meningitis, specifically speaking, must form part of a comprehensive response to the health needs of a people. Those who understand this relationship and how to avoid the waste and destruction brought on by some adverse environmental factors prospered well. Those who do not prospered less well or disappeared from the earth. Unfortunately, the major thrust of response activities in the health sector of our National life has been more towards dealing with the "Problem of the people" without commensurate attention to the "people with the problem".

This has been the case with Meningitis in Niger State even amongst Primary Health Care workers. Over the years, inspite of documented evidence of environmental factors of meningitis development and spread, the observed thrust of response to outbreaks, has been to deal with the medical problem without addressing seriously the environmental factors of development and spread.

Indications are that the meningitis problem appear to be on the increase in some Local Government areas between 1996 and 2001. This calls for immediate remedial action. A comprehensive approach to dealing with the meningitis problem in this state must include measures to cope with adverse

weather conditions, specific household overcrowding especially in poorly – ventilated buildings.

1.1 THE ENVIRONMENT:

The environment is taken in a broad sense to mean, in my opinion, an aggregation of physical, biological, social, cultural and economic factors that govern and/or contributes to, positively or negatively, a people's existence in a particular geographical location at any given time.

1.2 STATEMENT OF THE PROBLEM:

Cerebrospinal Meningitis is caused by infection with a Gram-negative diplococcus, *Neisseria meningitidis*. The organisms usually appear in clinical samples as bean-shaped Gram-negative diplococci. They are delicate organisms which are very sensitive to chilling or drying. They possess an outer polysaccharide capsule, an outer membrane, a cytoplasmic membrane and an underlying peptidoglycan layer. Structural differences in capsule, polysaccharide define eight main serogroups: A,B,C,X,Y,Z, W135 and 29e .

Meningococci ,as they are also called, are spread by respiratory droplets. Most infections are acquired from carriers who are far more numerous than cases.

Asymptomatic carriers may harbour meningococci for many months in the nasopharyngeal cells. However, in adverse environmental conditions characteristic of the middle of the dry season, when it is very hot, dry and dusty, damage to the respiratory mucosae can release these organisms into the

blood stream of the carrier and / or to the immediate environment through coughing or sneezing. In poorly-ventilated and over-crowded households or communities, cross infection and spread is definitely a primary problem. The clinical features of meningitis the onset of which is gradual include headache, fever, vomiting, general malaise, neck rigidity.

The question posed by this research topic is how aspects of the environment and people's attitude to the environment can become developmental and spread factors in cerebrospinal meningitis.

1.3 BACKGROUND TO THE PROBLEM:

Outbreaks were first recorded in General, in 1805 (B.M. GREENWOOD 1984) and in New England the following year. The disease was first reported in North Africa in 1840; epidemics were first recorded in sub Saharan Africa in the first years of the twentieth century. The occurrence of outbreaks of CSM has been on a yearly basis in Nigeria. In 1996 there was a massive outbreak of CSM affecting almost all the Northern states of the federation. In all, 108, 566 cases were recorded with 11,231 deaths, giving a case fatality rate of 10.3%. (Disease surveillance Unit, Niger State). Niger State falls within the meningitis belt of Nigeria. The first recorded outbreak in the state was in 1991, involving 12 cases.

1.4 JUSTIFICATION OF THE STUDY:

The study intends to bring out the relevance of some environmental factors in the development and spread of Cerebrospinal meningitis in Niger State. Studies indicate that the annual incidence of cerebrospinal meningitis in

Africa is approximately 50 per 100,00 inhabitants, that is, every 20,000th inhabitant in Africa contracts meningitis annually. This incidence is ten-fold in comparison with the developed countries of the West. The vagueness of this estimate is in itself evidence of how little we know about the prevalence and distribution of the disease. The setting up of the Africa meningitis initiative and subsequently in Nigeria, the Inter-agency co-ordinating committee (ICC) have helped to focus attention on the disease and the problems involved in its study.

Although CSM has been recognised for many years (B.M. GREENWOOD 1984) and its occurrence reduced in some areas where it was previously highly prevalent, studies by Prof. Tolu Odugbemi (2002) have revealed that the disease is increasing in prevalence and intensity especially in the meningitis belt of Nigeria, wherein lies Niger State. It is especially so among the rural and poor communities, with very poor nutritional status, living in poorly ventilated and overcrowded houses and settlements. The continued outbreak and spread of cerebrospinal meningitis in Parts of Niger State deserves urgent attention. The fact that the environmental factors of development and spread of CSM are not hidden and therefore can be addressed; the fact of high mobility of population with the attendant consequence of spread to other parts of the country, provide justification for this study.

1.5 AIM AND OBJECTIVES:

This study is aimed at demonstrating that certain environmental conditions and attitudes are major contributory factors of development and spread of cerebrospinal meningitis. Positive adjustments in these conditions and attitudes can therefore place a limit on the development and spread of CSM. Within this, lie the following specific objectives for Niger State.

1. To identify the pattern and intensity of spread of the disease in terms of space, seasons, age.
2. To assess the environmental factors that are associated with the prevalence of CSM in Niger State and any inherent relationship.
3. To recommend environmentally friendly and healthy attitudes and actions that can help place a limit to the development and spread of CSM.

1.6 SCOPE AND LIMITATION OF STUDY:

The study referred to data covering the entire Niger State. However, the researcher gave particular attention to areas designated as the CSM belt of Niger State. Where meningitis is prevalent. These include Kontagora, Rijau, Rafi, Agwara, Magama, Shiroro, Mokwa, Borgu. Seven of these constitute the northern fringes of the State. Shiroro Local Government Area was singled out for case study. Some of the limitations regarding data collection on the prevalence of CSM have to do with time frame. From the Disease Surveillance unit of the Niger State Ministry of Health, data available covers

only 1996, 1997 and 2001. This is mainly due to lack of proper data storage system.

1.7 ORGANISATION OF THE DISSERTATION:

This dissertation is divided into five chapters. The first chapter deals with the background information on cerebrospinal meningitis especially in the study area, and the need to study the environmental factors behind the spread of the disease. It also contains the objectives as well as a brief analysis of the relevant geographical features of Niger State.

Chapter two reviews the past literature relevant to the disease while chapter three describes the method of data collection and data analysis.

Chapter four deals with discussion of results and analysis while chapter five deals with recommendations and conclusion.

1.8 DESCRIPTION OF STUDY AREA

1.8.1 Locational Aspects:

Niger State is one of the second generation states of the Federal Republic of Nigeria. The State was created in 1976. It lies within the middle belt of Nigeria which is characterized by relatively sparse and fragmented population groups whose key ethnic groups are Nupe, Gwari and Hausa.

The Capital of the State is Minna and the State has, as at the time of this study, twenty-five local government area councils. Shiroro Local Government Area lies between latitude $8^{\circ} 51'$ and $11^{\circ} 20'$ North, and between longitude $3^{\circ} 75'$ and $7^{\circ} 25'$ East. With a population of about 157,010, which according to the 1991 population census represents about 6% of the population of the State.

The population distribution among its twenty-five local government council is presented in Table 1.1

1.8.2 Climate of the Study Area:

1.8.2.1 Pattern of Mean Rainfall in Shiroro Local Government Area of Niger State:

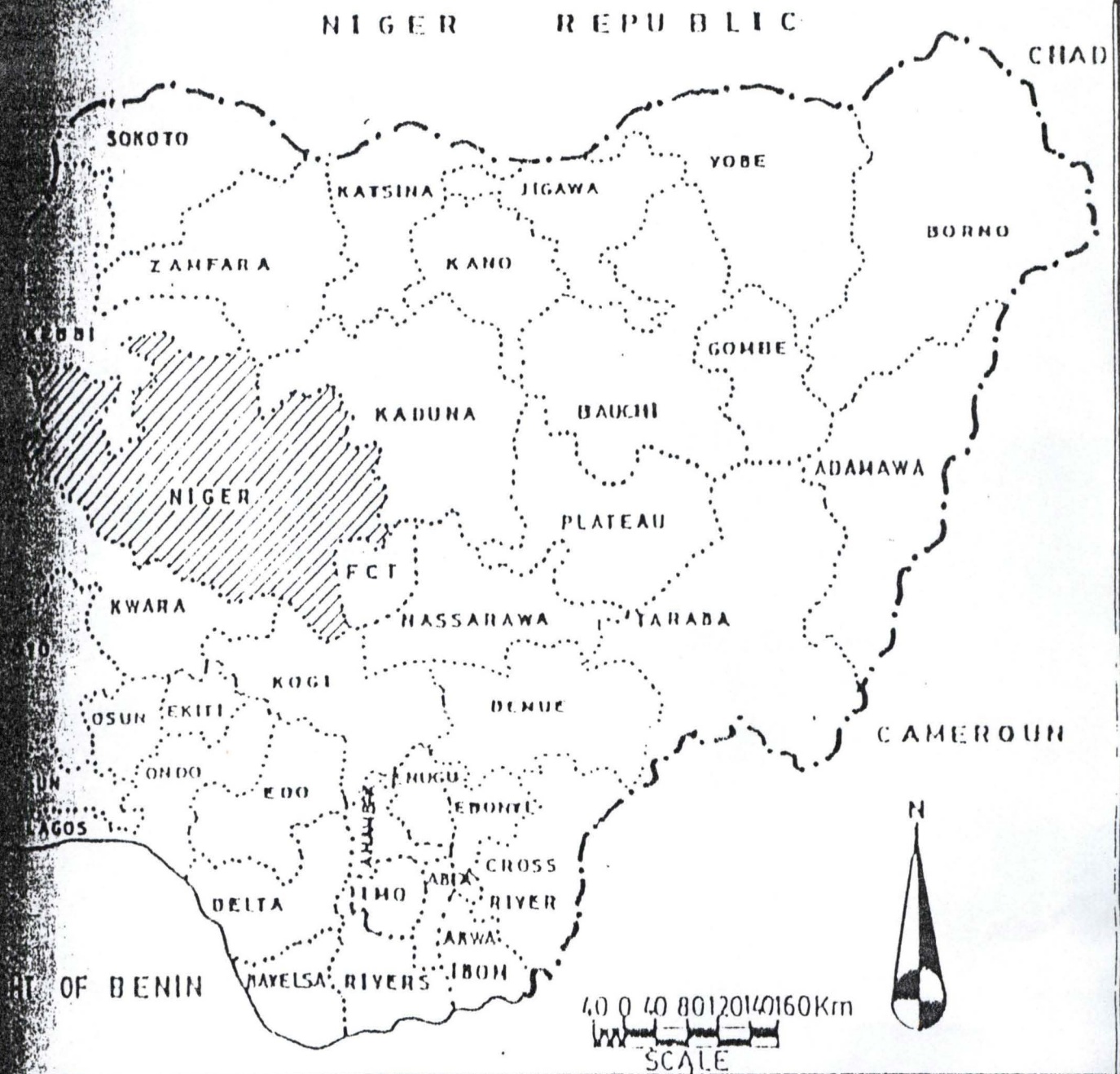
The local climatic conditions of the study area influence the epidemiology of CSM.

With the coming of the rains, CSM epidemic begins to wane to the extent that in the CSM belt of Niger State, no case of CSM is recorded between the months of April and October which coincide with the rainy season. This may be due to the absence of the dusty harmattan wind which usually carries droplets of this organism released from damaged respiratory mucosae.

The mean annual rainfall in the state varies between 1000mm and 1500mm. In Shiroro Local Government Area of the state which fall in the CSM belt of the State, the mean annual rainfall is less than 1000mm.

1.8.2.2 SUNSHINE HOURS:

The duration of sunshine per day, combined with solar radiation intensity are two important parameters that determine the drying power of the ambient air. Shiroro Local Government Area enjoys high sunshine hours of 8 – 9 hours per day. Hence daytime lengths are on the average about 8.5 hours for most of the dry season. During this Period Relative Humidity could be as low as 40% or less. This dryness in most cases encourages the spread of

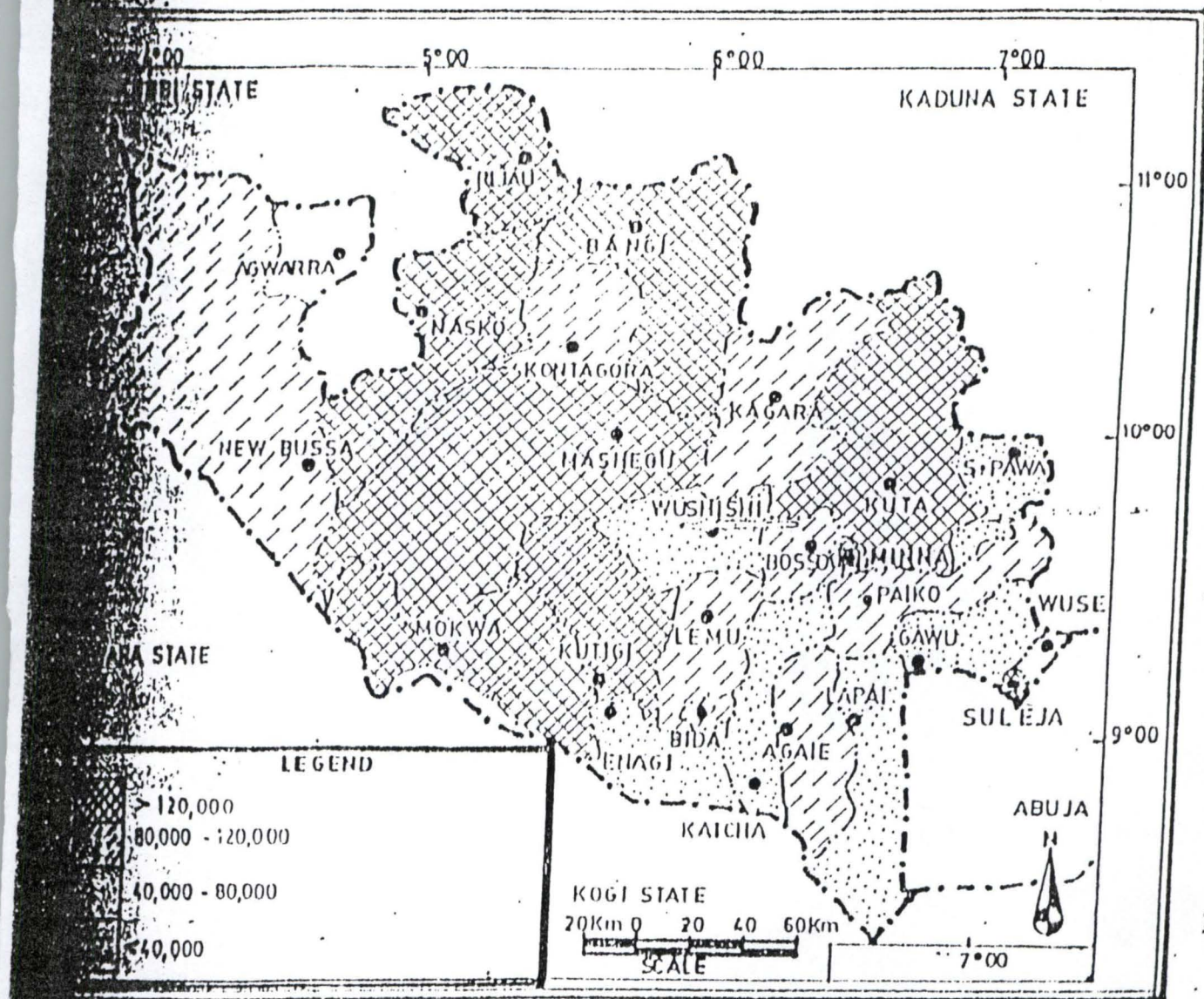


LEGEND

- National Boundaries.....
- State Boundaries.....
- Study Area..... 

Fig. 2.4 MAP OF NIGERIA INDICATING NIGER STATE

Source :- Geography Department F.U.T Minna (1999)



Population map of Local Government Areas in Niger State.

Fig. 1.2

Source: Author's Field Survey

TABLE 1.1 LOCAL GOVERNMENT AREA, THEIR HEADQUARTERS AND POPULATION:

S/NO	LOCAL GOVT. AREA	LOCAL GOVT. AREA H/QUARTERS	POPULATION
1.	AGAIE	AGAIE	97,955
2.	AGWARA	AGWARA	38,916
3.	BIDA	BIDA	102,070
4.	BORGU	NEW BUSSA	110,336
5.	BOSSO	MAIKUNKELE	90,397
6.	CHANCHAGA	MINNA	139,772
7.	EDATI	ENAGI	49,314
8.	GBAKO	LEMU	88,768
9.	GURARA	GAWU BABANGIDA	48,903
10.	KATCH	KATCHA	70,828
11.	KONTAGORA	KONTAGORA	106,358
12.	LAPAI	LAPAI	73,647
13.	LAVUN	KUTIGI	124,246
14.	MAGAMA	NASKO	129,749
15.	MARIGA	BANGI	137,334
16.	MOKWA	MOKWA	137,083
17.	MASHEGU	MASHEGU	147,617
18.	MUYAN	SARKIN PAWA	43,319
19.	PAIKOROR	PAIKO	109,356
20.	RAFI	KAGARA	116,948
21.	RIJAU	RIJAU	122,050
22.	SHIRORO	KUTA	157,010
23.	SULEJA	SULEJA	122,760
24.	TAFA	WUSE	28,540
25.	WUSHISHI	WUSHISHI	46,305

Source: National Population Commission, Minna (1991).

through the vehicle of dusty winds. Past studies and current data show that the peak of transmission in the study area occurs between January and March which coincides with the middle of the harmattan season.

1.9 THE ECONOMIC ENVIRONMENT:

Most indigenous dweller in the CSM belt of the study area are poor, illiterate farmers whose standard of living is commensurately low. Malnutrition, mainly more of a product of ignorance rather than poverty in this area, is taking its toll on the population. This compromises the body's antibody – response to this disease.

1.9.1 The Social Environment: Kontagora, Rijau, rafi, Agwara, Magama, Shiroro, Mokwa and Borgu area councils have a total population of 918,450. Available data indicate an average population of fifteen persons per household living in poorly-designed thatched mud houses with no cross-ventilation at all.

Poor environmental sanitation and unhygienic practices which encourage the growth of *Neisseria meningitis* were also documented among this population.

1.9.2 The Cultural Environment:

Documented evidence by the Disease Surveillance unit shows that some members of this population for some superstitious reasons do not accept any form of vaccinations. This is a major hindrance to efforts to curtail spread during outbreak.

CHAPTER TWO

2.0 REVIEW OF RELEVANT LITERATURE:

According to a publication in the Punch Newspaper of Wednesday 27th February 2002, British health experts worried by the possibility of an outbreak of cerebrospinal Meningitis (CSM), on the 20th of February, urged the authorities to be vigilant about potential cases of meningitis occurring among Muslims returning home from pilgrimage to Mecca. The sea of human beings in Mecca, in very close contact with each other in overcrowded pilgrimage routes makes cross-infection a high possibility. The fears are understandable. According to a report by the Agence France Presse (AFP), in France, 51 cases of a vicious strain of bacterial meningitis occurred among pilgrims or people with whom they had been in contact with after their return home. Of the cases reported, eight were fatal.

According to a publication of the British Health authorities (2002), a similar incident happened last year. The authorities had launched a vaccine campaign against this strain, called W135, and three other strains. A, C and Y, but the Vaccine arrived late and as a result, there were 42 cases of meningitis among the pilgrims, nine of which were fatal. Former Provost of the College of Medicine, University of Lagos, Prof. Tolu Odugbemi (2002) explained that "CSM is a contagious bacterial

In Nigeria, the prevailing weather and the generally poor living conditions in many parts of the country seem to be a conducive environment for the outbreak of meningitis epidemic going by trends in the spread of the disease over the past few years (Odugbemi, 2002) '.

Heiki Peltola, University of Helsinki, (1994) submits that the statistics are unreliable particularly in developing countries but show, at least, periods of highest and lowest incidence in a given area. A meningitis zone extends across Africa. It is an area where the annual rainfall raises between 300mm (in north) and 1100mm (in South). The eastern boundary goes through the eastern regions of Ethiopia and the western boundary through the Savannas of Senegal (H. Peltola. 1994). Heiki Peltola (1994) also writes that local climatic conditions influence the epidemiology of meningococcal disease. According to him, the epidemic spreads in the area within weeks and reaches sometimes considerable proportions. When the harmattan wind from the north Subsides and rains come, the epidemic wanes but often returns after 1 – 2 years.

Besides household contacts, one special risk group for CSM are the pilgrims to Mecca. With modern tourism, an epidemic could spread rapidly and widely (H. Peltola, 1994).

Surveillance reports obtained from the World health Organization (WHO) indicate that the highest number of cases and the burden of the disease occur in sub-Saharan Africa in the meningitis belt.



Fig. 2.1 The sub-Saharan Meningitis Belt

Source: Authors field survey

According to the report, epidemics occur in seasonal cycles between the end of November and end of June, depending on the location and climate of the country, and declines rapidly with the arrival of the rainy season.

Nigeria lies within this belt. Statistics from the WHO show that of the 5,948 CSM cases in Nigeria reported in 1998, 650 were fatal. In 1999, a total of 1,949 cases were reported and 165 were fatal. From the data available as at May 2000, 711 cases of the disease had been reported and 9 were fatal. H. Peltola submits that even though many developing countries are familiar with meningitis and consider it as one of their public health problems, hard data is scanty. Only seldom has it been possible to create a system that collects information on all cases, not only on those verified in hospitals. Many patients, according to him, are, however, lost before reaching hospital.

According to the Punch Newspaper of 27/02/02, quoting Ethiopian Ministry of Health, that Country as at February 3 2002, had reported a total of 1,332 cases of CSM including 185 deaths mainly in the Southern Nations Nationalities and People's Region (SNNPR) since the onset of the outbreak in September, 2001. *Neisseria meningitidis* serogroup A has been identified as the causative agent. The high population density with its attendant complication of overcrowding, current dry season and low immunisation coverage are said to have exacerbated the meningitis epidemic in that country.

The Punch, also quoting a WHO report, writes that the most recent meningococcal meningitis Pandemic, which began in 1996, has so far resulted in approximately 300,000 cases being reported to the W.H.O. The

most affected countries have been Nigeria, Burkinafaso, Mali and Niger Republic.

Consultant Paediatrician and Medical Director 'Emel Hospital' Lagos, Dr. Femi Mobolaji – Lawal also explains that because meningococcal disease is potentially fatal, it should always be viewed as a medical emergency. The first reported cases in Niger was in 1991 with 12 cases (MOH). Not much is contained in the literature with respect to Niger State. However, the picture represented for the CSM belt in Nigeria is true for the state.

2.1 RISK FACTORS FOR MENINGOCOCCAL DISEASE:

Whether exposure to a meningococcus results in clinical disease or asyptomatic carriage is influenced by a number of factors (Greenwood et al 1984). There include

i. Socio-economic Factor:

Poor living conditions – attack rates are highest in deprived sections of a community.

ii. Household Contact:

Subject in close contact with a case are at risk, especially during epidemics. The risk may be as high as 1:20 for siblings of a patient.

iii. Damage to Respiratory Mucousae:

Adverse environmental conditions – high temperature and low humidity are important in Africa.

Antecedent Viral Infections.

iv. Immunological:

Deficient levels of IgG or IgM bactericidal antibodies, High level of blocking IgA antibody.

Heredity or acquired complement deficiencies.

Greenwood et al (1984) also submit that in the United States, infection is often introduced into a new household by an asymptomatic father. In Africa, according to them, spread from child to child is probably more important.

As part of prophylaxis, they also submit that improvements of general standards of living and prevention of overcrowding in barracks, schools, communities and specific households would help to prevent spread of cerebrospinal meningitis.

2.2 WHO SHOULD BE PROTECTED AND HOW?

Greenwood et al (1984) suggested some guidelines based on the risk factors in specific groups.

i. Household Contacts:

Those most at risk of contracting CSM are close household contacts of a patient with the infection. During an epidemics the risk for siblings sleeping in the same room as a patient may be as high as 1 in 20. Such close contacts should receive the full range of prophylactic measures available – isolation, and appropriate vaccination and medication.

ii. Residential Schools and Barracks:

When a case of CSM occurs in a residential school, doss house, or barracks, further cases of the infection are likely. Subjects in close contact with the patients, for example those sleeping in the same small dormitory, should be managed in the same way as household contacts.

iii **Hospital Personnel:**

The risk of this disease in hospital personnel is a little greater than that of the general population, vaccination of such personnel is a sensible precaution.

v. **General Population:**

Mass vaccination can bring an epidemic of group A or group C meningococcal disease under control in a short time. The effectiveness of this measure has been demonstrated in the village, city or national level.

They also submit that since the end of the second World War there have been few major epidemics of meningococcal disease in Europe or North America. This they attribute to improvements in living conditions.

CHAPTER THREE

3.0. METHODOLOGY – TECHNIQUES OF DATA COLLECTION AND ANALYSIS:

3.1 DATA COLLECTION

The data gathered for this study covered and represented the area under study. The data is reasonably adequate and reliable enough for the identification and analysis of the aim and objectives of this study.

This study was carried out using Shiroro Local Government Area as a test case, with a population of 157,010.

The study was based on the following types of data

- (1) Prevalence data obtained from the Disease surveillance unit of the Niger State Ministry of Health.
- (2) Survey of the living quarters and other condition of life in some communities in Shiroro Local Government Council.
- (3) Climatic variables extracted from relevant publication.

3.1.1 DATA ON PREVALENCE OF CSM

Data on CSM prevalence were obtained for the Month of January to March of each year for the period of (1996, and 2001). The researcher relied on the “Immediate Notification Form” used by the Disease Surveillance unit of the

State Ministry of Health. The information obtained covered the location of the outbreak, names of victims, age and gender distribution information that show the living condition of the communities. Also, Niger State Health workers that oversee the communities within the Local Government Areas in the meningitis belt were interviewed on the measures taken in response to outbreaks

3.1.2 SURVEY OF LIVING QUARTERS AND GENERAL LIVING CONDITION

A visit was paid to one of the communities in Shiroro Local Government area. During the visit, a survey of the house in which they live and the population of persons per household and the level of environmental sanitation was noted. The level of nutritional awareness was also noted.

3.1.3 CLIMATIC DATA

Climatic data were extracted from the climatic change centre and Department of Geography, Federal University of Technology Minna. these include:

- (1) Rainfall parameters
- (2) Sunshine hours
- (3) Relative humidity

(4) Wind speed

These parameters have already been discussed, as they pertain to the study area in the description of the study area in chapter one. With regard to the objective of the study, the data collected lent credence to the fact that the environment of these communities influence the spread of CSM.

3.2 **PRESENTATION OF RESEARCH INFORMATION**

The most reliable data obtained from the Disease Surveillance Unit of Niger State Ministry of Health were those of 1996 and 2001, all recorded between January and March. Other years were either lost or incomplete owing to improper data storage. Tables 3.1 and 3.2 show the Local Government areas that form the CSM belt of Niger State and the number of reported cases in 1996 and 2001.

The climatic data extracted from the Department of Geography have already been discussed in description of the study area in chapter one.

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The climatic data extracted from the Department of Geography have already been discussed in description of the study area in chapter one.

TABLE 3.1 RECORDED OUTBREAK OF CSM IN THE CSM BELT OF NIGER STATE. JAN – MARCH 1996

NO	L.G.A	C.S.M.		CASE/FATALITY RATE (CPR) %
		CASE	DEATH	
1.	AGWARA	68	5	7.3
2.	BORGU	-	-	-
3.	KONTAGORA	310	43	13
4.	MAGAMA	37	18	48
5.	MOKWA	6	2	33
6.	RAFI	36	20	55
7.	RIJAU	142	42	29
8.	SHIRORO	31	12	39

Source: *Disease Surveillance Unit Ministry of Health Niger State.*

TABLE 3.2 RECORDED OUTBREAK OF CSM IN THE CSM BELT OF NIGER STATE. JAN – MARCH 2001

NO	L.G.A	C.S.M CASE	DEATH	CASE/FATALIM RATE (CPR) %
1.	AGWARA	115	21	18
2.	BORGU	26	5	20
3.	KONTAGORA	99	5	5
4.	MAGAMA	102	15	15
5.	MOKWA	57	8	14
6.	RAFI	15	3	20
7.	RIJAU	-	-	-
8.	SHIRORO	40	2	5

Source: *Disease Surveillance Unit, Niger State Ministry of Health.*

Because some of the affected communities have little or no access to medical facilities and because of inaccessible routes to some of the communities. Many cases of fatal CSM die unreported.

3.1.4 SALIENT FEATURES IN SHIRORO LOCAL GOVERNMENT AREA

Shiroro Local Government Area is the most densely populated of all in Niger State. However, a significant portion of this population is not easily accessible by road. It is for this reason that the researcher believes that much higher CSM figures occur than were actually recorded.

**TABLE 3.3 HEALTH FACILITIES IN KUTA, SHIRORO LGA AND CSM
CASES RECORDED**

NO	HEALTH FACILITY	CASES	DEATH	PERIOD
1.	Lafiya Clinic	24	2	Jan – March 2001
2.	Savana Clinic	8	-	Jan – March 2001
3.	Sunsungye Clinic	2	-	Jan – March 2001
4.	Rural Hospital Kuta	6	-	Jan – March 2001
		40	2	

Source: *Disease Surveillance Unit, Niger State Ministry of Health.*

Available data also showed that unscheduled visits to eleven villages in Shiroro Local Government Area during the period covering January to March 2001, revealed twenty – five unreported cases in these villages, with five already dead. The prelude to death as described pointed to CSM.

**TABLE 3.4 UNREPORTED CASES IN ELEVEN VILLAGES IN SHIRORO
L.G.A**

/NO	VILLAGE	CASES	DEATH	PERIOD
1.	Gidan Yiko	1	-	Jan – March 2001
2.	Driagbe	1	-	“
3.	Paigado	4	4	“
4.	Agbala	1	-	“
5.	Obah	3	-	“
6.	Yalayi	5	-	“
7.	Doko Vinga	1	-	“
8.	Wada	2	-	“
9.	Kafa	4	-	“
10.	Layi	3	-	“
11.	Unguwar Nasarawa Kuta	1	1	“

Source: *Disease Surveillance Unit, Niger State Ministry of Health.*

3.2.2 OTHER FINDINGS IN SHIRORO LOCAL GOVERNMENT AREA INCLUDE

- (1) Ignorance of and sometimes cultural resistance to vaccination.
- (2) Unnecessary exposure to dusts and harmattan winds oblivious of inherent changes. Little wonder many of them were found to have upper respiratory tract infection at this season of the year.
- (3) These villagers live in settlements of 6 to 8 small-sized huts built with little or no provision made for cross-ventilation.
- (4) There are about 15 to 18 persons per household living in small-sized huts, evidence of overcrowding.
- (5) The above describes the background of all the victims of CSM in this area.
- (6) The researcher noted that the age of CSM victims ranged from 5 years to 20 years.

Mention must be made of Agwara Local Government area, which the least population of 38,916, has persistently recorded the highest case per hundred people. Apart from the issue of overcrowding arising from its high population density with respect to land mass, its proximity to Kebbi State, another endemic area could also be contributory.

**TABLE 3.5 CASES OF CSM RECORDED FOR NIGER STATE FROM JAN –
MARCH 1996**

NO	LOCAL GOVT AREA	CSM CASE	DEATH	%
1.	AGAIE	-	-	
2.	AGWARA	68	5	9
3.	BIDA	6	2	36
4.	BORGU	-		
5.	BOSSO	3	2	67
6.	MINNA	-	-	61
7.	GBAKO	18	13	
8.	GURARA	-	-	30
9.	LAPAI	20	6	51
10.	LAVUN	-	-	13
11.	MAGAMA	37	18	
12.	KONTAGORA	310	43	
13.	MOKWA	6	2	36
14.	PAIKORO	-	-	
15.	RAFI	36	20	52
16.	RIJAU	142	47	34
17.	SHIRORO	31	12	39
18.	SULEJA	14	7	50
19.	WUSHISHI – MANGI	124	18	14
	TOTAL	179	189	

Source: *Disease Surveillance Unit, Niger State Ministry of Health.*

TABLE 3.6 REPORTED CASE OF CSM IN NIGER STATE FROM JAN – MARCH 2001

S/NO	LGA	NO OF CASES	NO OF DEATHS	CFR%
1.	AGWARA	115	21	18
2.	BORGU	26	5	20
3.	AGAIE			
4.	BIDA			
5.	BOSSO			
6.	EDATI			
7.	GBAKO	2		NIL
8.	GURARA	2	5	NIL
9.	KONTAGORA	99		5
10.	KATCHA		1	
11.	MINNA	18	15	6
12.	MAGAMA	102		15
13.	MARIGA		2	
14.	MUNYA	13		15
15.	MASHEGU		6	
16.	MOKWA	47		12
17.	LAVUN	1		
18.	LAPAI			
19.	PAIKORO		3	20
20.	RAFI	15		
21.	RIJAU			
22.	SULEJA	3	2	5
23.	SHIRORO	40		
24.	TAFA			
25.	WUSHISHI			

Source: Disease Surveillance Unit, Niger State Ministry of Health.

CHAPTER FOUR

4.0 ANALYSIS AND DISCUSSION OF RESULTS:

The results indicated that between .05% to .1% of the population of individual areas of the C.S.M. belt of Niger State are reported as victims of this disease every year. Even though there is evidence of gross under-reporting this figure is nonetheless worrisome because of the short period in which this occurs. This underscores the importance of the factors that encourage development and spread of C.S.M.

Results obtained from villages in Shiroro Local Government areas shows that all the victims share the same background of over-crowded and poorly ventilated houses. Non had ever received immunization against CSM.

Over crowding makes cross-infection from a Nasopharyngeal carrier to a non-carrier easy through the release of respiratory droplets and inhalation of same by the non-carrier.

Also, the poorly-ventilated houses do not make for cross-ventilation which could have carried away the respiratory droplets via air currents.

All the CSM cases were recorded during the period covering January to March. The peak being between January and February. This coincides with the mid-harmattan wind from the North. This is most severe at the northern fringes of the State. Little wonder why all of this areas fall within the CSM belt of Niger State. Apart from the dusty harmattan wind being a factor of transport and transmission of the respiratory droplets it is also implicated in the development of clinical cerebrospinal meningitis in asymptomatic carriers. (Greenwood et al 1984)



Plate 4.1 Entrance to a cluster of poorly-ventilated huts housing 15 persons in Milebokwa, Shiroro Local Government Area.

Source: Author's Field Survey



plate 4.2 Poorly-ventilated And Over-crowded living quarters in Milebokwa, Shiroro Local Government Area.

Source: Author's Field Survey

4.1 NASOPHARYNGEAL CARRIERS

Most subjects infected with meningococcal disease become asymptomatic nasopharyngeal carries. The ratio of carriers to cases varies from figures as high as 10,000:1 in situations of endemic transmission to values as low as 100:1 during epidemics (Greenwood et al 1984). Asymptomatic carriers may harbour the organisms for many months. Damage to the respiratory mucosae by adverse weather conditions releases the organisms into the blood stream or as respiratory droplets into the immediate environment. Depending on the state of immunity of the carrier or infected persons, clinical meningitis may result.

In summary, the factors of local climatic condition as have been described, specific household overcrowding, poorly ventilated houses and passive resistance to vaccination were found by this researcher to be accountable for the development and spread of cerebrospinal meningitis in Shiroro Local Government areas.

of January-March. Therefore there is a direct proportional relationship between the climatic factors of sunshine hours, temperature, low humidity and wind speed (all characteristics of the dry harmattan period) and the incidence of this disease.

5.2.2 SOCIO-ECONOMIC FACTOR:

This study observed that all of the victims, in the study areas of Shiroro Local Government lived in deprived sections of the community. The standard of living was poor; they lived in overcrowded settlements of 6 to 8 huts , with an average of 15 to 18 persons. These huts were poorly ventilated.

5.2.3. CULTURAL FACTORS:

This study observed that in the study areas, some of the residents were either ignorant of or passively resistant due to some indigenous beliefs, to vaccinations. This was contributory to the CSM outbreak of January – March 2001 that occurred in Shiroro Local Government area.

5.2.4 RECOMMENDATION:

As a result of the environmental factors of development and spread of Cerebrospinal meningitis, highlighted in this study the following are recommended for effective control of this disease.

- Ignorance is a major environment factor that promotes spread of CSM during the dry season. Health officials must stop paying lip-service to environmental health during their vaccination campaigns. A lot of attention has been given to the “Problem of the people” without commensurate attention to the “people with the problem”. Vigorous campaign must as well be mounted to demonstrate to the rural dwellers that just by simply opening up the walls of their living rooms to

create more windows can help to stem this ugly tide. This should be a very inexpensive procedures.

- Some of these rural dwellers have the habit of settling down within the same confined environment with their married children and of course, their grandchildren. Spacing out should be vigorously encouraged.
- Malnutrition compromises the hosts ability to nullify the invasion of his bloodstream by *Neisseria meningitidis*, leading to clinical Meningococcal disease. Most of these rural dwellers are Yam producers. They feed almost entirely on their Carbohydrate source. Their children therefore look Marasmic and therefore susceptible to this and other diseases.

This may have to do more with ignorance than poverty because there are very cheap sources of protein available everywhere. The onus lies on the community health workers who always rush their vaccines to areas of outbreak to educate these dwellers on proper nutrition as well.

- Where there is resistance or apathy towards pre-season vaccinations, Community Health Workers must wear this down through sustained interaction and education.
- Unnecessary exposure to dusts and dusty harmattan winds during the harmattan season, especially of children between the ages of 5 and 15, must be addressed via community health education.

Finally, it must be mentioned that epidemics of Cerebrospinal Meningitis may never leave us completely for the following reasons:-

1. Frequent Mobility of Population

2. Host factors of Immunity
3. According to the Bible, "You will always have the poor amongst you...."
(John 12:8) and I dare add, the ignorant, as well.

However, if these recommendations are implemented side by side with the purely Medical measures, the endemicity of Cerebrospinal Meningitis, as is now the case with developed countries, would have been dealt a mortal blow.

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IMMEDIATE NOTIFICATION FORM. FORM DSN – 001

1. Name of Reporting Institution _____
2. Location -----

Town

LGA

State
3. Name of Disease C. S. M. -----
4. Symptoms and signs: -----
5. Date and Place of Onset: -----
6. Age and Sex distribution of Cases and deaths

AGE		CASES		DEATHS		TOTAL
		MALE	FEMALE	MALE	FEMALE	

7. Weekly incidence since index case was seen

Week Beginning (Date)	Location (Name of Town or Village)		

8. Have samples been collected for laboratory studies? YES ☐ NO ☐
9. To which institution(s) were they sent? Specify -----
10. Results (if available) specify -----
11. What measures have been taken so far : -----
12. Day other relevant information? Specify -----

Name of person reporting: ----- Sign: -----

Designation: ----- Date: -----

Address: -----