The Spatial Pattern of Leprosy in the Cross River Region of Nigeria

Thesis submitted in accordance with the requirements of the University of Liverpool for the degree of Doctor in Philosophy by Mary Irene Brightmer

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MARY IRENE BRIGHTMER

THE SPATIAL PATTERN OF LEPROSY IN THE CROSS RIVER REGION OF NIGERIA

ABSTRACT

Leprosy is a chronic disease, affecting mainly the peripheral nerves and skin and causes disability if left untreated. In spite of the early identification of the pathogen, the aetiology is still uncertain. It was formerly widespread throughout the world but is now most prevalent in the tropics and sub-tropics.

The introduction of modern drug treatment in 1950 caused optimism that the disease would soon be eradicated, but progress has been slow. The Cross River region of southeastern Nigeria was in the vanguard of leprosy research and treatment until the Civil War in 1967. The work has never fully recovered, and patterns of new cases occurring in the 1980s indicated continuing transmission and suggested the existence of centres of infection.

The study investigates the spatial characteristics of leprosy in the Cross River region, and examines the historical, environmental and social factors which may account for the pattern. A specific aim was to identify likely centres of infection, to provide guidelines for the leprosy control service. It was also hoped that from their examination it might be possible to identify factors associated with the distribution of leprosy, its aetiology, and its persistence in the region.

The overall distribution showed that in the extreme south and east of the region leprosy was close to eradication by the mid-1980s. The highest leprosy rates were in the extreme north where leprosy control activities were established later, and which is geographically and economically peripheral to the south. This accords with the frequently recognised association of leprosy with poverty, although the mechanism remains unknown. Successful results from the implementation of the newest leprosy treatment in the north demonstrate the value of medical intervention to reduce the overall caseload, but the number of new cases remains high.

The study investigates the role of disability as a factor in the stigma associated with leprosy which has been especially marked in part of the south. Although stigma has diminished with improvements in treatment, it remains a problem and contributes to the persistence of the disease in the region.

The leprosy rates and control programmes in areas adjacent to the study region are assessed, and suggest that the distribution patterns continue across boundaries. The variation in the quality of leprosy control presents a potential problem of cross-border transmission, which could threaten eradication programmes in the longer term.

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NOTES ON TERMINOLOGY

'Cross River State'

During the period of this study the fieldwork region was known as Cross River State, one of the nineteen states of the Federation of Nigeria. It had been renamed from Southeastern State, which was created in 1967 by the sub-division of the former Eastern Region. In 1987, towards the end of fieldwork, Cross River State was sub-divided into two states, a smaller Cross River State and Akwa Ibom State. The latter comprised the southwestern area of the original Cross River State, locally known as the 'Mainland'. In this study the terms Cross River State and Cross River region are used to refer to the original Cross River State. The term 'Mainland' is used to refer to the area which became the new state of Akwa Ibom.

Local Government Areas have been altered several times in name, number and extent, but remained stable throughout the fieldwork period. The names used in the study are those which operated until 1988.

'Leprosy'

The negative associations of the term 'leper' as a label for the patient suffering from leprosy led to a review of the terminology by a committee at the Fifth International Congress of Leprosy in Cuba in 1948. It was recommended that the use of the term 'leper' be abandoned, and the person suffering from the disease be designated 'leprosy patient.' At the same time, it was recommended that the name 'leprosy' should be retained as the scientific designation for the disease, and this was reaffirmed at the Sixth Congress in Spain 1953 (Skinsnes, 1973).

There have been subsequent discussions in some medical circles, especially in the USA, on the unsuitability of all reference to 'leprosy.' Terminology based on the name of the discoverer of the bacillus, Hansen, has therefore been developed, and is used by some agencies and publications.

The 1948 recommended terms are used in this study.

CHAPTER ONE

INTRODUCTION

DISEASE AND DEVELOPMENT

In spite of optimism in the 1950s progress in the control of leprosy has been slow, and the WHO (1987) has acknowledged that

> '...leprosy is still a severe public health problem in Africa, Asia and Latin America. Its prevalence and social and economic impact remain virtually unchanged'
> p 117

There has been increasing disappointment in the ability of scientific knowledge to solve the world's problems, and especially the health problems of the poor. In rich countries the poor die younger, and in the world as a whole the life expectancy in the poorest country is only half of that in the richest (UNDP, 1993).

Medicine and health care are dominated by the biomedical model which reduces the explanations for ill health to biological processes, and the solutions to medical interventions. Consequently there has been neglect of the social and environmental context of health, and a low priority for research and expenditure on disease prevention.

The WHO recognised a close relationship between disease and the human condition in the opening words of the first public document of its Special Programme for Research and Training in Tropical Diseases (TDR):

> 'Many millions of the people living in the tropical regions of the world are cut off from the mainstream of social and economic progress. Victims of a heavy burden of disease as well as of harsh economic circumstances, they are not free to choose and plan a better future ... Health and development are therefore inextricably interlinked and any strategy for improvement must be based upon this reality.'
> (Mahler and Morse, 1976, cited in WHO, 1987, p 149)

The relationships between disease and socio-economic development have been widely acknowledged in medical geography since the publication of a seminal paper in 1970 (Hughes and Hunter, 1970), which recognised that economic development leads to improvements in human health and a decline in infectious disease, although it drew attention to the side effects of certain aspects of development.

In medicine, McKeown (1979; 1985) caused controversy when he traced the decline of mortality rates from major diseases in England and Wales over the past century, and concluded that the main influences were nutrition, environment and behaviour, rather than medical interventions. He argued that an exaggeration of the role of medicine in reducing mortality has led to a misuse of resources in disease control programmes.

Stock (1986) has gone further than either Hunter or McKeown, and has emphasised the political dimension in the patterns of ill health in Africa. He commented on the high morbidity and mortality rates from diseases which have been successfully treated or even eliminated elsewhere. He claims that many of the health-related problems attributed by geographers to natural ecosystems and human behaviour are more closely related to the political economy. He calls for a 'politically sensitive medical geography', and criticises medical geographers who have tended to

> ' ... uncritically accept official and scientific definitions of disease. In reality, health problems are often socially produced.'
> (p 696)

Leprosy is a disease which has been endemic in most regions of the world. Changes in the global distribution of leprosy demonstrate that even without chemotherapy socio-economic improvements lead to its disappearance, as in Britain centuries ago, and in other parts of the more developed world by the early years of this century. Modern drug therapy was introduced in the 1950s, but four decades later the world distribution of leprosy is still associated with the poorest countries of the world. Any geographical study of the occurrence of leprosy must therefore take into account the relative roles of direct medical intervention, and social, economic, environmental and political changes in explaining the distribution of the disease.

In Africa, leprosy is a disease of rural areas and its occurrence is closely related to the periphery, as has been noted for certain other diseases in the tropics, for example Chagas' disease (Prothero and Davenport, 1986). Like Chagas' disease it occurs in countries and communities which are peripheral in spatial, social, cultural, economic and political terms.

The precise mechanism of the link between leprosy and development remains elusive, but for decades the importance of development has been acknowledged by medical professionals who have spent their lives applying the tools of biomedicine to cure leprosy. As long ago as 1940 Muir, the General Secretary of the British Empire Leprosy Society, now LEPRA, said that:

> 'The solution of the leprosy problem will be closely bound up with the future progress of Africa.'
> (p 142)

The renowned leprologist Stanley Browne (1985), was recommending the advantages of a new drug therapy and stated:

> 'Meanwhile, raising the socio-economic level of the populations of the Third World would seem to be among the most obvious general measures tending to reduce the prevalence of leprosy.'
> (p 13).

In their chapter on the prevention of leprosy in the current edition of the leprosy handbook Jopling and McDougall (1988) gave the final word to living conditions:

> 'Poor housing and hygiene can play an important part in the spread of leprosy, and campaigns to control the disease in developing countries will have a better chance of success if they can take place on a background of improved living standards generally.'

They cite Latapi, the Italian leprologist, whose words were first published in the 1960s:

> 'Leprosy cannot be completely rooted out with physicians, control offices, leprosaria and propaganda; it will disappear when the economic and cultural factors change, because leprosy is the thermometer of civilisation.'
> (p 149)

Africa is still waiting for the process of socio-economic development which should reduce and eventually eradicate leprosy. Meanwhile how is it benefiting from the application of medical science?

In 1982 a new combination of drugs was recommended for leprosy treatment, and has been successful in reducing the number of existing cases wherever it has been fully implemented, although its effect on the incidence of new cases has not been confirmed. But there are logistical and financial problems in its implementation caused by the poor infrastructure, low literacy rates and unreliable economic base of the less developed countries.

The Director of the WHO leprosy programme, in reviewing the progress of multidrug therapy, acknowledged the operational and administrative problems in its implementation in developing countries (Noordeen, 1991a). The inadequacy of multidrug therapy alone to bring about effective leprosy control, has been highlighted by two leprologists who argue for research into improvements in the operational aspects of its implementation (Mc Dougall and Georgiev, 1989). The huge expenditure and effort on laboratory-based research for new therapies is questioned, when there is already an effective treatment. Smith (1991), whose research area is immunology, admitted that the latter's impact on leprosy control had been small, and recommended the priority should be on operational studies to improve the deployment of existing medical tools.

Leprosy is one of the six diseases selected for the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR), established in 1976. It was recognised that even where effective chemotherapy exists for the TDR diseases, the neglect of social, cultural and economic dimensions in implementation has contributed to the limited success of their control, for example of leprosy and malaria.

Consequently, in 1979 the TDR Scientific Working Group on Social and Economic Research (SER-SWG) was established, with the objective:

> 'To increase the effectiveness of disease control measures and programmes through integration of human behavioural factors in programme design and management.'
> (WHO, 1983 p 344)

Leprosy control programme managers and social scientists made recommendations for conducting interdisciplinary social and medical research (WHO, 1983). Nevertheless, the Eighth Progress Report of TDR (WHO, 1987) stated that the two priorities in leprosy research were immunology and chemotherapy. The priorities have not changed. In 1992-3 the budget for research on the immunology and chemotherapy of leprosy alone was one and a half times the budget for social and economic research on all six groups of tropical diseases in the programme (WHO, 1993a).

This demonstrates the continuing focus on biomedical control strategies, with searches for new drug regimens and a vaccine, although some professionals have stated their opinion that a vaccine is a minor tool in the control of a rare disease of long incubation like leprosy (Fine, 1989; Noordeen, 1985).

Meanwhile, the characteristics of underdevelopment which help to perpetuate leprosy also mean that most of the known sufferers in Africa are not even benefiting from the treatment already available, and recommended by the WHO for over a decade.

ORIGIN AND AIMS OF THE STUDY

In 1983 I had the opportunity to revisit a leprosy hospital in Nigeria, first visited in 1964, and to attend rural out-patient clinics. The doctor, who was also there in 1964, remarked that she was seeing new cases of leprosy which were more serious than before the Civil War (1967 -70):

> ' ... which must mean that there are pockets of infection somewhere in the area which will continue to produce new cases into the future.'
> (Dr EM Davis, personal communication, 1983)

The comment suggested that this was a 'geomedical problem' and it provided the stimulus for this study.

The premise is that there are geographical dimensions to the problem of leprosy, the investigation of which may contribute to a greater understanding of the disease. These include the spatial distribution of its occurrence, the relationships of the disease with the ecological and cultural environment, and the pattern of health care provision.

The original aim was to locate the suspected centres of infection in order to provide guidelines for the leprosy service, which could target such areas. A second aim emerged. In spite of the early identification of the pathogen for leprosy there is still an inadequate understanding of the aetiology of the disease and its geographical distribution. It was hoped that through the study of the distribution, it might be possible to identify factors in the aetiology of leprosy, conscious, however, of Mayer's warning (1986) of the difficulty of progressing from a recognition of association to the identification of causal relationships, due to the multifactorial biological, cultural and behavioural stimuli to disease.

The aims of the study thus coincide with what Mayer (1982) called the 'two ulterior aims' of the best medical geographic studies, which are to:

> '... seek both to identify the cause of disease of unknown aetiology and contribute to public health measures to minimize the effects of disease.'
> (p 219)

As the study progressed it became clear that the explanation for the distribution of known leprosy in the region could not be limited to the disease ecology tradition of medical geography. Inequalities in health care provision, past and present, had to be taken into account as factors in the current distribution pattern, as was found by Hunter in his study of tuberculosis in Puerto Rico (Hunter and Arborne, 1984), and reported by Ponnighaus et al (1988) in the major leprosy control project in Malawi.

The study therefore combines the two main traditions of medical geography, disease ecology and the geography of health care, in both explaining the spatial pattern of leprosy in the region, and in recommending future action. Others have already remarked that the dichotomy between the two medical geographies is becoming increasingly blurred, and that important research problems straddle the boundary (Mayer, 1982; Bentham et al, 1991).

The first visit to the region for this study provided opportunities to discuss leprosy with people from different sections of the community as well as with patients and medical staff. It was a significant learning experience, revealing an alternative perception of disease causation to the familiar biomedical one, and it became obvious that a study of disease in this region must include its social and cultural context, and elements of medical anthropology. A third strand in the study is therefore an examination of the attitudes to leprosy in the context of indigenous beliefs about health and disease, and their role in the implementation of control programmes.

COLLABORATION WITH HEALTH PROFESSIONALS

The major thrust of the study has been empirical and practical, involving close interaction with the leprosy doctor already mentioned and with other medical doctors and health professionals working in leprosy in the region and elsewhere. No other social scientists are known by the writer to have been working in the field of leprosy in Nigeria; the shortage of human and financial resources for leprosy work have meant that the focus has been on treating known cases. Medical staff provided the writer with insights as well as opportunities for fieldwork, and also welcomed the perspectives offered to them. For instance, advice was sought from the author on refining the leprosy hospital recording system. An important change recommended and adopted from 1986 was the recording of the Local Government Area of new patients, specifically so that the geographical distribution could be identified which could direct future case finding activities when resources permitted. Meanwhile it provided data for this study.

The writer was invited to contribute to workshops for leprosy fieldworkers in Nigeria, and the papers presented were widely disseminated. An invitation has recently been extended to collaborate in fieldwork in 1994, in some of the areas identified by this study as requiring special attention. Such direct and beneficial involvement of a geographer with medical workers is not unusual and has been increasing in recent years (Prothero, 1981; Prothero and Davenport, 1986).

The fieldwork was partially funded by the British Leprosy Relief Association (LEPRA), whose objective is the eradication of leprosy. A Board member and internationally-known leprologist was enthusiastic about the proposals for this study, and recommended the funding. As editor of one of the two international leprosy journals he commissioned a paper following the first period fieldwork, which was published as a 'Special Article' (Brightmer, 1987). It was regarded as a significant contribution to the leprosy literature, because of the long absence of published material on leprosy in the study region since the Nigerian Civil War.

The writer was subsequently encouraged by the same leprologist to submit an abstract for a paper on the subject of a geographer's role in leprosy for the Thirteenth International Leprosy Congress (1988), convened every five years. The paper, entitled 'The Role of a Geographer in Leprosy Research and Control: Case Study from Nigeria' was accepted and was programmed in the session on Epidemiology and Control (FP 098, Congress Abstracts, *International Journal of Leprosy,* Vol 57, p 322). The paper was subsequently revised for publication in Leprosy Review (Brightmer, 1990).

The findings of this thesis have demonstrated that the problem of leprosy is an example of 'international health divides'. A paper was therefore submitted for the session on this theme, which was convened by the Medical Geography Study Group at the 1993 Annual Conference of the Institute of British Geographers. It was accepted and presented, (Abstract in Appendix III).

The papers generated by this study, have been presented and/or published in the fields of medicine and medical geography, and illustrate the multidisciplinary nature of the subject.

CHOICE OF STUDY REGION AND TIME SCALE

The original focus of the study was to be the area served by the doctor and leprosy hospital referred to. Until 1987 this area was part of Cross River State, separated from the rest of the state by the Cross River and locally known as the 'Mainland'.

Initial fieldwork confirmed the availability of quantitative leprosy data for Cross River State from 1980. The study area was extended to include the whole State, providing a wider context for the Mainland, which remained the focus.

The main analysis is of data for Cross River State for the 1980s, but the time-scale of the study includes the whole period of leprosy treatment and control in the region during this century, to provide insights into the later prevalence patterns. Formal leprosy treatment in the Mainland began in 1927, and until the Civil War in 1967 the region was at the forefront of leprosy treatment and research. The bibliographical references to leprosy in this region show the wealth of the sources from 1927 to 1967, with reports in hospital and Government records published in Nigeria and in international publications.

The Civil War from 1967 to 1970 caused a major decline in leprosy work within the region and neighbouring areas, and since then there have been few international bibliographical references to leprosy in the area. Local records of the leprosy situation during the 1970s are also sparse, but quantitative data for Cross River State is available from 1980 until the end of 1986. The subdivision of the state in 1987 caused a disruption in official data-collecting and processing. The area's leprosy returns for 1987 had not been compiled one year later, and at the time of writing in 1993 there are no complete statistics available for the new state, so that 1986 is the last year with a sequence of data for the whole of the former Cross River State.

The 1986 cut-off for the whole region coincides with the beginning of the implementation of multiple drug therapy throughout the northern area of the state. Since 1986 changes in case numbers in that area can be largely attributed to the new drug programme. Therefore a focus on the leprosy situation in the region from 1980 to 1986 fits in with the changed political and therapeutic situation.

Fieldwork was conducted during several months each year between December 1984 and January 1988, by which time results of the new therapy were being recognised in the north. Since fieldwork was completed there have been meetings and regular correspondence with people still engaged in leprosy work in the region.

The thesis begins with a review of the current knowledge about leprosy and its transmission, and an account of its treatment. The global distribution is presented, and the specific environmental and social characteristics which may contribute to this are discussed. The geographical and historical features of the study region which may influence the leprosy situation are examined, and a separate chapter is devoted to a consideration of health and disease in the region and the attitudes to it, in order to place leprosy in this wider context. To provide a national setting chapter six details the variations in leprosy prevalence and attitudes in Nigeria, and outlines the development of the leprosy control programme of the Federal Government and its problems. Following this the history of leprosy and its treatment in the study region provides the background for the subsequent analysis of the distribution of leprosy in the 1980s, and especially the spatial variations of reported new cases. The importance of the social dimension in leprosy is addressed in a chapter which presents patient case studies to show the prevailing attitudes to the disease in the region, and investigates their role in maintaining leprosy as a public health problem. The final chapter examines the occurrence and control of leprosy in areas adjacent to the Cross River region to assess whether the spatial patterns extend across the borders, and to evaluate the potential risk to leprosy control of cross-border transmission. The conclusion reviews the results of over sixty years of leprosy work in the region, and assesses the factors accounting for the continuing problem. It suggests ways forward for eradicating leprosy in the Cross River region, and proposes further research which may contribute to a greater understanding of the aetiology of the disease.

Abstracts of papers presented, and copies of papers published are submitted for examination along with this thesis (Appendix III).

CHAPTER TWO

LEPROSY

THE DISEASE AND ITS CONTROL

This chapter reviews the literature on leprosy to provide a background for the analysis of the disease in the study region. It examines the nature of leprosy and its transmission, and current treatment and control measures.

THE DISEASE

Leprosy is a chronic, mildly communicable disease of the peripheral nervous system, infecting the skin and other tissues. It is also known as Hansen's disease or Hanseniasis, after the discoverer of the pathogen which is believed to be the bacillus *Mycobacterium leprae*. It was first identified by the Norwegian, Armauer Hansen, in 1873. Probably more than 95 per cent of humans are resistant to leprosy: if infected their immune system successfully attacks the bacilli, and they recover without clinical symptoms. However, if the initial response of the immune system is deficient, the leprosy bacilli multiply within the tissues and clinical symptoms eventually develop.

Studies have shown that subclinical leprosy infection is common in household contacts of leprosy patients, although few develop the disease (Jopling and Mc Dougall, 1988). As yet, there is no simple test for subclinical leprosy infection and its progress is uncertain, but it is increasingly the view that contacts with sub-clinical infection may be capable of transmitting leprosy (Machin, 1988).

Leprosy was previously regarded as a disease unique to humans, but is now viewed as a zoonosis, since naturally acquired leprosy-like disease has been described in the armadillo in Louisiana, in a chimpanzee from Sierra Leone and a Mangabey monkey from Nigeria (Walsh et al, 1981; Meyers et al, 1992). In all three species the infection was highly bacilliferous and potentially infectious to humans. Researchers in the USA have reported numerous feral armadillos with naturally-acquired leprosy in Louisiana, a leprosy-endemic State, and some humans have reportedly acquired leprosy from armadillos in Texas. Leprosy research began on the armadillo in 1966, but serological evidence points to the presence of *M. leprae* in Louisiana armadillos before this date (Truman et al, 1986). Endemic human leprosy in Louisiana cannot be attributed to armadillos, as the latter migrated into the state in 1926 and human leprosy had already been there for a century (Walsh et al, 1981). The only significant reservoir of infection is regarded to be the human, although extra human sources are increasingly suspected (WHO, 1985).

CHARACTERISTICS OF MYCOBACTERIUM LEPRAE

The characteristics of the leprosy pathogen influence the nature of the disease in the patient, its transmission, and may therefore contribute to its spatial distribution. *M. leprae* belongs to the Mycobacteria, a genus of rod-shaped bacteria, mostly non-pathogenic, which are common in water, dust, vegetation, and especially the soil. The three most common mycobacteria pathogenic to humans are *M. leprae,* *M. tuberculosis* and *M. bovis*. *M. ulcerans* is also pathogenic but less common. It is highly localised in tropical savanna regions (Grange, 1991), and causes disease in the north of the study region. *M. avium* is pathogenic as an opportunistic infection in HIV/AIDS patients.

The evident preference of *M. leprae* for the cooler, peripheral parts of the human body is because its optimum temperature for growth is 30 - 33° C (Bryceson and Pfaltzgraff, 1990).

M. leprae is atypical of the genus, in being non-cultivable *in vitro* on conventional bacterial culture media. This characteristic is used to distinguish it from other mycobacteria, but has hindered research into leprosy treatment, delaying drug and vaccine development and studies of drug resistance, and has limited the supply of bacilli for microbiological and biochemical research. A major breakthrough came when the use of animal models was first developed by Shepard who succeeded in growing *M. leprae* on the footpads of mice, selected because of their relatively low temperature (Jopling and McDougall 1988). Since 1968 studies on the nine-banded armadillo, which also has a low body temperature, showed that it was susceptible to experimental infection with human leprosy, and this animal is now the main source of *M. leprae* for experimental work (Job et al, 1985).

Another feature of *M. leprae* affecting the study and treatment of leprosy is that it is one of the slowest growing human pathogens known, with a cell division time of 12 to 13 days in mice, and presumably in humans too (Jopling and McDougall, 1988). This leads to a long incubation period before symptoms appear, usually given as three to five years, but which may extend from two to ten years (Ridley, 1988). The time between infection and the manifestation of disease may be too long for the identification of the source of infection, and it is similarly impossible to trace and examine all past and present at-risk contacts of new cases. It also means long delays in monitoring results of vaccine trials.

M. leprae in humans has been described to be of high infectivity but low pathogenicity, (Davey, cited in Machin, 1988) which promotes its survival and transmission. Unlike most pathogens it does not secrete toxins into the human system, and therefore a bacillary load of millions may be present but the host can feel perfectly well, and fails to recognise the need to seek treatment until nerve and skin damage are evident.

M. leprae had been considered to be an obligate intracellular parasite, able only to live within human cells, but the use of *in vivo* cultivation has shown that it can survive outside the human body for several days, depending on environmental conditions. It has remained viable in nasal secretion for up to 14 days (Bryceson and Pfaltzgraff, 1990), in moist soil at room temperature for 42 days (Ramu, cited in Job, 1981), and for more than 9 days under humid tropical conditions (Desikan, 1977).

There is increasing research evidence of sources of *M. leprae* outside the human body. Non-cultivable mycobacteria, which may have been *M. leprae*, have been identified in sphagnum moss in the former leprosy-endemic areas of Norway. They multiplied like *M. leprae* after mouse foot-pad inoculation (Kazda et al, 1980). In a more widespread study, viable mycobacteria resembling *M. leprae* were isolated from environmental samples collected from leprosy-endemic areas in Asia (India), Africa (Ivory Coast), Latin America (Peru) and Europe (Portugal) as well as Norway (Kazda, 1981). In the same study environmental samples were tested from Germany, Scotland and Sweden, areas from where leprosy has long disappeared, and they were negative for anything resembling *M. leprae.*

The phenolic glycolipid-1 antigen is believed to be specific to *M. leprae*, and, because of the difficulty in identifying the bacillus, is being increasingly used to test for the presence of *M. leprae* (Smith, 1992a). It may become an important tool to demonstrate the occurrence of viable *M. leprae* in the environment, and has already been used in addition to biological tests in a study of 17 samples of soil and water from leprosy districts of Bombay. One sample reportedly revealed the presence of *M. leprae,* although the researchers advise caution in the interpretation of the result, (Kazda et al, 1986).

The ability of *M. leprae* to survive in damp and dark conditions may affect the distribution and transmission of the disease (Lieber and Lieber, 1987). A confirmation of the survival of *M.leprae* in the environment, and knowledge of the optimum conditions for this, may provide a breakthrough in the understanding of the aetiology of leprosy.

FORMS OF LEPROSY

One of the features of leprosy is the wide variation in its clinical symptoms, but there are believed to be no bacterial strains of varying pathogenicity. The variation in clinical symptoms is a function of the patient's immunity to *M. leprae*, and can be viewed as a spectrum from high immunity to virtually none (Jopling and McDougall, 1988; Ridley, 1988) (Fig 2.1).

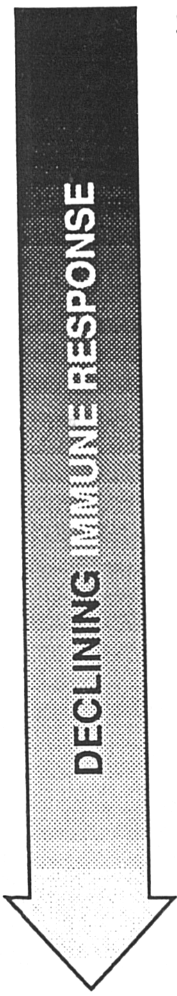
The forms of leprosy vary from localised and, in many cases, self-healing disease which produces only slightly hypopigmented, ill-defined macules on the skin, with limited or no nerve impairment. The bacillary load is small and *M. leprae* are not usually found in skin smear tests. This is the highly resistant paucibacillary form of the disease.

At the other end of the spectrum, a high level of infection results from the inability of the patient's immune system to recognise and control the multiplication of *M. leprae*, and the massive bacillary load produces a systemic disease affecting many tissues. This is multibacillary leprosy.

Between the two extremes, there is a range of clinical manifestations reflecting the level of the immune response. The spectrum represents a continuum, with the condition of the patient in the middle area often unstable. Drug treatment of such a case can cause improvement towards paucibacillary leprosy, but intercurrent infections, and pregnancy in women, can cause downgrading to higher bacillary rates.

Fig.2.1

Consequences of Infection with *Mycobacterium leprae*



Subclinical infection

Probably 60 - 90% of individuals in endemic areas are asymptomatic carriers of the bacillus

Self-healing leprosy

Sluggish but effective resistance.
Many never detected.
The ill-defined skin patches are especially difficult to detect in light skins.

Visible clinical leprosy

Spectrum of immune response
from moderate
(causing PAUCIBACILLARY leprosy)
to nil (MULTIBACILLARY leprosy)

Over the years, as understanding of leprosy has increased, several classifications of disease types have been used, to designate whether the patient is infectious, to determine the prognosis and choice and length of treatment, and estimate the likelihood of complications (Jopling and McDougall, 1988). There are three systems in widespread use to-day. Figure 2.2 shows the relationships between the terminology of the three systems and the clinical forms of leprosy.

The Madrid or International classification was introduced at the Sixth International Congress of Leprosy in Madrid in 1953, when the use of modern chemotherapy with dapsone was first officially recommended. The Ridley and Jopling classification is a refinement of this, and was proposed for research purposes, and relates the form of leprosy to the immunity of the patient (Ridley and Jopling, 1966).

The new multidrug therapy recommended by the WHO in 1982 resulted in the widespread use of the two-fold classification for the purpose of prescribing appropriate chemotherapy (WHO, 1982). This classifies all leprosy types as either multibacillary or paucibacillary.

All three systems are currently used in the literature, and also in leprosy control records in the study region, sometimes in combination. With the increasing use of multidrug therapy there is a gradual transfer to the use of the multibacillary/paucibacillary terminology, and this is mostly used in this thesis.

Fig.2.2

Main Classifications of the Forms of Leprosy

INTERNATIONAL (Madrid 1953)	RIDLEY AND JOPLING (1953)	MDT CONTROL PROGRAMME (WHO 1982)
L Lepromatous	LL Lepromatous	Multibacillary
	BL Borderline Lepromatous	
B Borderline	BB Mid-Borderline	
	BT Borderline tuberculoid	Paucibacillary
T Tuberculoid	TT Tuberculoid	
I Indeterminate	I Indeterminate	

TRANSMISSION

The method of transmission of leprosy is likely to be a vital factor in the spatial distribution of the disease, and a greater understanding of the process could explain the aetiology and would assist in the planning of effective control measures. Ever since Hansen tried unsuccessfully to infect himself with *M. leprae*, there have been many studies of the mode of transmission, and these have been extensively reviewed (Job, 1981; Fine, 1982; Pallen and McDermott, 1986; Machin, 1988).

Until the discovery of *M. leprae*, leprosy had been attributed variously to supernatural, hereditary and contagious causes. In 1867 a report on leprosy worldwide claimed that it was an hereditary disease (Royal College of Physicians, 1867). Even after Hansen established that leprosy is an infection, the question still remained of the mode of transmission. In fact, the necessary role of *M. leprae* in leprosy disease, although long accepted, has never been conclusively demonstrated. Even if exposure to *M.leprae* is a necessary factor in the disease it cannot be regarded as a sufficient factor. It does not fulfil Koch's postulates for a pathogen, and its role is admitted to be 'largely circumstantial' (Fine, 1982). The apparent rarity of secondary cases in non-endemic areas such as much of Western Europe suggest that contact patterns alone do not determine the distribution of clinical leprosy (Sommerfelt et al, 1985).

There are three main questions about transmission:

(i) the source of the pathogen, whether from paucibacillary or multibacillary cases or both, or from extra-human sources;

(ii) the method of transmission, whether directly from person to person, or directly via the environment or a vector;

(iii) the routes of exit and entry into the host.

(i) The source of the pathogen

It is now known that large numbers of leprosy bacilli are dispersed daily into the environment from untreated multibacillary cases (Job, 1981). The latter are regarded as the main, but not the only source of bacilli; some workers believe that at certain stages of their disease, paucibacillary cases may have a higher bacillary load than usual, causing periodic infectivity (Brown, 1959). However, sufficient numbers of bacilli have never been isolated from a paucibacillary patient to infect even the most susceptible animal model, and the role of the paucibacillary patient as a source of infection is probably small. Transmission by multibacillary patients with a large bacillary load prior to the appearance of clinical symptoms is possible, but verification awaits simple methods for identifying subclinical leprosy (Job, 1981).

(ii) Mode of transmission

The traditional view that leprosy requires 'prolonged and intimate contact' is being increasingly challenged. The recent demonstrations of the potential survival of *M. leprae* outside the human body, present the possibility of indirect transmission, and may also allow a role for a vector. Indirect transmission may explain the fact that two thirds of all patients claim to have no known contact (Bryceson and Pfaltzgraff, 1990).

It can still be assumed that direct contact may be more efficient; increased risk has been demonstrated for both household and non-household contacts of existing cases (WHO, 1985). The risk is believed to relate to the degree and duration of contact, and is significantly increased if the original case is multibacillary (Job, 1981; Ridley, 1988). However, this does not necessarily demonstrate direct transmission; household contacts are more exposed to bacilli emitted into the immediate environment, and which may remain viable.

Studies in the Pacific on the social and demographic pattern of the epidemic spread of leprosy in a small community, suggested that indirect skin to skin transmission was likely for the 14 per cent of cases which had no regular contact with a multibacillary case (Lieber and Lieber, 1987). Frayed sleeping mats were proposed as the route by which bacilli were indirectly transmitted from person to person. A leprosy specialist in Nigeria during the 1950s proposed a similar role for the bamboo beds widely used in Nigerian rural areas (Dr M Corcos, personal communication, 1986).

The viability of *M. leprae* outside the human body provides for the possible involvement of vectors, either directly from the infectious patient, or from the environment. Experiments have shown that *M. leprae* infection can be transmitted from the blood of multibacillary leprosy patients to mouse footpads by the mosquito *Aedes aegypti*. The rate of infection was low, implying that the route was not very efficient, but occasional transmission by this means was not ruled out. (Narayanan et al, 1977, cited in Pallen and McDermott, 1986).

It has also been shown that the bedbug, *Cimex spp*, ingests bacilli from patients (Job, 1981; Machin, 1988) and flies (*Diptera*) feeding on nasal mucus and on ulcerating skin lesions have been shown to be heavily contaminated with bacilli. Similarly, fleas, lice and mites have been shown to have ingested non-cultivable mycobacteria, presumed to be *M. leprae*, in blood meals in the vicinity of leprosy patients (Machin, 1988). Fieldwork revealed that some communities in the study area believe that cockroaches are a cause of leprosy, but this has never been confirmed scientifically. The significance of arthropods as vectors of leprosy has generally been doubted because of the small bacillary load that can be transferred. But it is recognised that occasional transmission by this means is a possibility (Pallen and McDermott, 1986). Machin (1988) concludes that although a number of anthropods have been shown to be potential vectors, the infection of a clean human host has not been demonstrated, and there is no likely single universal vector for the transmission of leprosy.

(iii) **Routes of transmission**

The fact that the first clinical sign of leprosy is usually the skin lesion has supported the belief that the skin is the route of bacillary exit and entry, and that the main sources of bacilli were the skin and body secretions of an infectious patient. Other routes considered for transmission are the upper respiratory tract and the gastro-intestinal tract.

Route of exit

The discovery that up to 100 million bacilli are discharged daily from the nasal secretions of untreated multibacillary leprosy cases, has led to the currently favoured view of a mode of transmission in leprosy similar to tuberculosis, with the upper respiratory tract the route of bacillary exit and entry (Jopling and McDougall, 1988)

Leprosy bacilli are deep inside the human skin, so intact skin is not believed to be a usual route of exit (Jopling and McDougall, 1988). Ulcerating lesions in multibacillary patients contain bacilli, but such lesions are uncommon, and the number of viable bacilli is small compared with the nasal source, but they may provide a source for transmission (Job, 1981; Bryceson and Pfaltzgraff, 1990).

In the study region, some leprosy workers are convinced that direct dermal transmission occurs via clothing contaminated with bacilli and explains the high prevalence among women because of their habit of sharing clothes (Inyang, 1985 personal communication). Since there is a low level of multibacillary leprosy in the region, this theory is not supported by current thinking.

Machin (1988) reviewed reports of leprosy bacilli in faeces, and doubts their significance for transmission. He similarly dismisses the significance of sexual transmission, which has frequently been asserted.

Route of entry

The respiratory route of entry was demonstrated in the animal model by Rees and McDougall (1977, cited in Jopling and McDougall, 1988) who successfully infected immunosuppressed mice by exposing their heads to *M. leprae* in aerosol. This supported the view that the respiratory route of entry can produce leprosy with only a short period of exposure. If it applies to humans, it could explain how even casual contact with an infectious case might cause leprosy, and why few new leprosy patients can identify a contact.

The dermal route of entry has also been demonstrated in the animal model, with the innoculation of mouse footpads but there have been unsuccessful attempts over the years to transmit leprosy to human volunteers via the skin (reviewed in Machin, 1988).

It was widely believed that the first skin lesion marked the point of entry of the pathogen but the evidence is now interpreted as inconclusive (Bryceson and Pfaltzgraff, 1990; Ridley, 1988). There are three questions relating to the dermal entry of *M. leprae:* does it occur? if so, does it cause a lesion at the entry site? and are bacilli subsequently transported to other sites by the blood stream?

Few, if any, species of bacteria are known to be capable of penetrating intact skin (Pallen and McDermott, 1986). *M. leprae* is inert, non-motile and relatively non-toxic, and therefore has no features to assist it to penetrate skin. The hair follicle has sometimes been suspected as a route (Patki, 1991; Job, 1981), and there may be evidence to support the dermal route of entry where the skin is damaged. There have been reports of early leprosy lesions at the sites of tattooing, vaccination, ritual scarification, roadside injury and dog-bites (Gupta and Bhata, 1986; Sehgal, 1986). The assumption is that in these cases the damaged skin provides the route for inoculation of bacilli. But the evidence is ambiguous, as the pathogens may be reaching the skin via the bloodstream. Fine (1982) has drawn attention to the overlapping of possible factors explaining lesion sites: exposed skin is more open to skin contact, injury, and insect bites, and is cooler and therefore more favourable to multiplication of *M. leprae.*

If the direct inoculation theory explains the location of skin lesions in leprosy, it would apply best to paucibacillary leprosy with one or very few lesions. It could hardly explain multibacillary leprosy where the lesions are too numerous at the time of presentation to make direct skin inoculation plausible.

The leprologist Dr Paul Brand holds to the view of the dermal entry of *M. leprae* from the soil, and he believes that leprosy infection is associated with not wearing footwear, (personal communication from R E Pfaltzgraff, 1987). He regards *M. leprae* as a soil bacillus that becomes pathogenic under certain circumstances. His view is supported by the fact that leprosy is commonly a disease of poor rural areas, where people, especially children, may be unshod and therefore have close contact with soil organisms. Bare feet receive wounds which could provide an entry route for the leprosy bacillus. Even in cooler regions such as Norway, there would have been seasons when people may have been unshod. When they began to wear shoes, with improving standards of living and increased urbanisation, leprosy disappeared. These possible associations are discussed in more detail in Chapter Three.

The risk of leprosy infection via the gastro-intestinal route is unknown (Pallen and McDermott, 1986). *M. leprae* are present in large numbers in the breastmilk of mothers with multibacillary leprosy, but it has not been confirmed that leprosy has been transmitted in this way (Job, 1981).

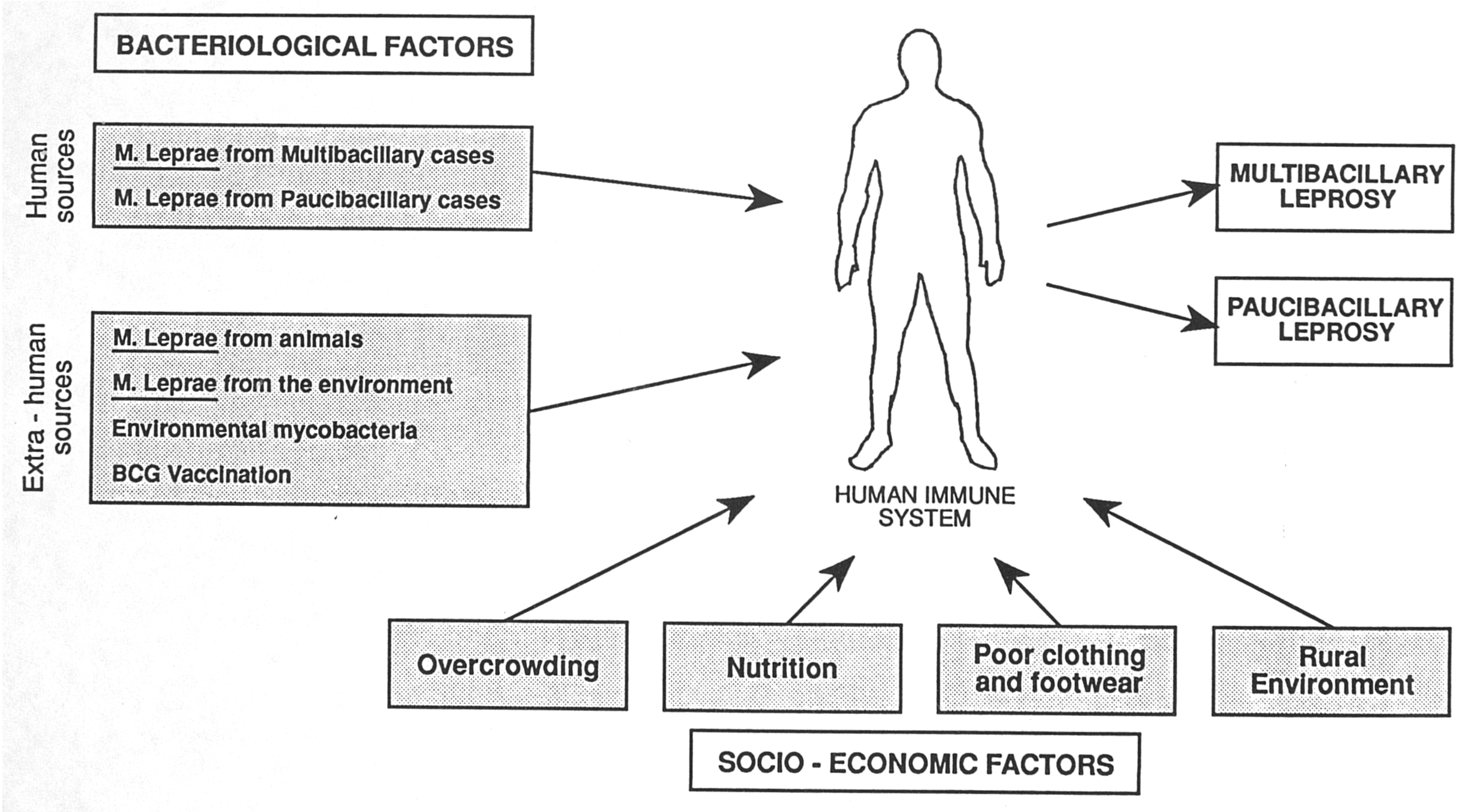
Trans-placental transmission has been considered a possibility, and could explain the reports of clinical leprosy developing in very young children (Jopling and McDougall, 1988) but it has not been demonstrated (Machin, 1988).

Contact with an untreated case of multibacillary leprosy must still be regarded as the single most important means of transmission, but the paucibacillary case must also be considered as a possible source of infection. Indirect transmission via the environment is a possibility awaiting confirmation, and vector transmission cannot be ruled out. However, until there are improved means of detecting subclinical infection with the leprosy bacillus, many questions must remain on the modes of transmission in particular, and the aetiology in general (Fig 2.3).

LEPROSY AND THE IMMUNE SYSTEM

Only a small proportion of the people exposed to *M. leprae* develop clinical disease. These people have a selectively defective immune system, which is unable to resist the bacillus. The origin of the defect, and whether it is acquired or inherited, is unknown. Children are more susceptible than adults: only five per cent of exposed adults develop clinical leprosy, but 60 per cent of children do so (Joplin and McDougall, 1988).

Fig. 2.3. **Possible Aetiological Factors in Leprosy**



There are two components in the human immune response to most bacterial infections: humoral immunity which is activated by antibodies, and cell-mediated immunity which is effective against intracellular pathogens like *M. leprae*. People who develop leprosy have a defect in their cell-mediated immune response to *M. leprae*, probably only delayed in paucibacillary cases, but severe in multibacillary cases.

There is no general failure of cell-mediated immunity in leprosy patients, and they are no more susceptible to intercurrent bacterial infection than other people (Pfaltzgraff and Bryceson, 1985). This has prompted the suggestion that the immune defect in such patients may be due to the presence of *M. leprae* itself, and therefore acquired.

A theory which is supported by experiments with mice, but difficult to verify in humans with the present diagnostic tools, is that leprosy is an acquired defect caused by the route of entry of *M. leprae*. The view is that respiratory entry of the bacillus causes desensitisation to the antigen rather than immunity, resulting in multibacillary leprosy. Conversely, intradermal innoculation, sets in motion cell-mediated immunity and causes paucibacillary leprosy (Ridley, 1988).

This theory would not allow for a genetic pre-disposition to leprosy type. Although a gene for susceptibility to leprosy has not yet been identified and studies of identical twins do not conclusively support a genetic theory of susceptibility to leprosy, they do suggest a genetically-determined liability to develop either paucibacillary or multibacillary leprosy once infected (Ridley, 1988).

The progress currently being made in immunology in the fields of tissue transplant, cancer and AIDS, are likely to increase the understanding of the nature and causes of the range of the immune response to *M. leprae.*

TREATMENT AND CONTROL

There is no exact medical definition of leprosy control, but it includes more than the treatment of the disease (Jopling and McDougall, 1988). Current leprosy control has four main objectives: the interruption of transmission by early diagnosis and treatment with appropriate chemotherapy; the cure of the disease; the prevention of deformity and disability; and the rehabilitation of patients, which may include reconstructive surgery (WHO, 1987).

Few countries have been bold enough to state leprosy eradication as their goal, although it has been accepted by India in its 'National Leprosy Eradication Programme'; and 'virtual eradication' is the objective of The People's Republic of China. Several voluntary agencies also state eradication of leprosy to be their goal (Jopling and McDougall, 1988).

Current leprosy control is based on secondary prevention, consisting of case-detection and treatment. The lack of a vaccine and gaps in knowledge about the transmission of the disease, mean that primary prevention is not yet possible. Interruption of transmission was formerly through the physical isolation of cases in leprosaria. Modern drug therapy does not require isolation, because soon after commencement of treatment the patient is non-infectious.

Modern leprosy control and treatment dates from the introduction of the sulphone, dapsone, around 1950. Sulphones for leprosy treatment had been tested widely during the previous decade. In 1953 dapsone was officially endorsed for routine leprosy treatment on the grounds of its efficacy, ease of administration and low cost. For the first twenty years at least, there was confidence in dapsone, and optimism that leprosy would soon be eradicated. Optimism began to wane as the number of registered leprosy cases worldwide continued to increase.

There were two main problems. Dapsone requires lifetime treatment for multibacillary cases and at least three years of treatment for paucibacillary cases, and this long course of therapy causes poor patient compliance. Secondly, resistance of *M. leprae* to dapsone began to be suspected in the 1950s, was first proved in 1964 using the new mouse footpad technique, and was increasingly reported in the 1970s (Jopling and McDougall, 1988).

Multibacillary cases on irregular dapsone monotherapy may develop secondary resistant leprosy after five to fifteen years. Wherever dapsone resistance has been sought among treated multibacillary patients it has been found (WHO, 1982): the rate in some regions is approximately 5 per cent of the treated cases (Levy et al, 1982, cited in Fine, 1982) but is as high as 40 per cent in other regions (WHO, 1988a).

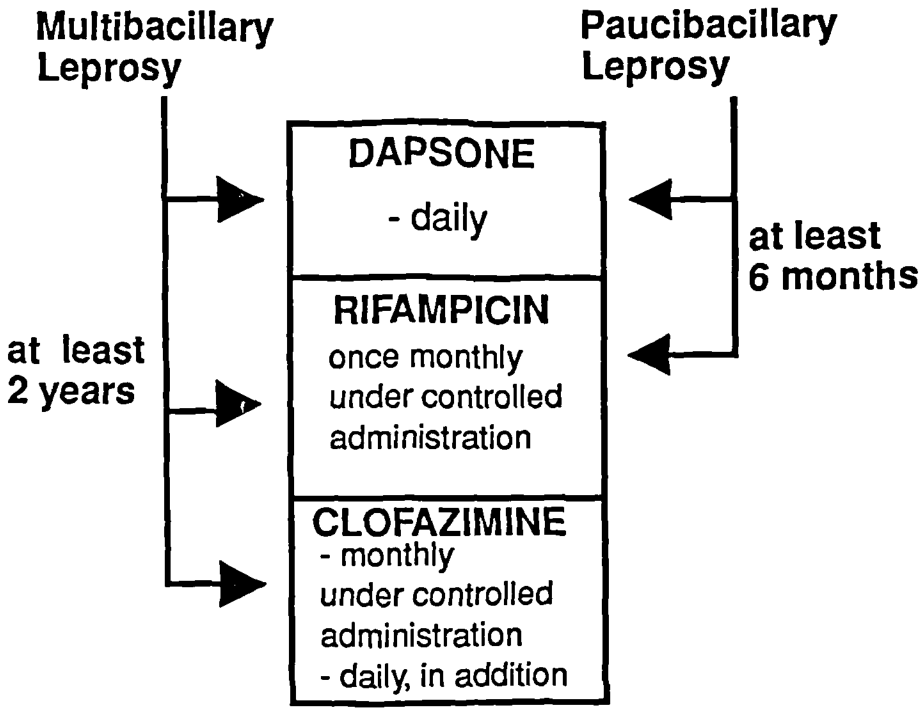
If drug-resistant bacilli are transmitted the new cases show primary resistance, and fail to respond to dapsone treatment from the beginning. Primary resistance occurs in multibacillary and paucibacillary leprosy (Jopling and McDougall 1988).

The first case of primary resistant leprosy was diagnosed clinically in South America in 1977, and has been found in some parts of the world in up to 70 per cent of newly-detected multibacillary cases. In 1982 on the basis of studies in Africa and Asia, it was reported that secondary and primary resistance to dapsone had become widespread, and resistance to other anti-leprosy drugs has also been reported (WHO, 1988a).

During the 1970s there was a search for new drugs to overcome resistance. In 1982 the WHO recommended new multidrug regimens (MDT) for all active leprosy cases (WHO, 1982). Paucibacillary cases should receive rifampicin once a month in addition to daily dapsone, and should be treated for six months. Multibacillary cases should receive rifampicin and clofazimine once a month, and in addition daily dapsone and clofazimine, for a minimum of two years, or until skin smear tests show no presence of bacilli (Fig 2.4).

In 1988 the 13th International Leprosy Congress in The Hague acknowledged the value of MDT as a superior cure bacteriologically and clinically, acceptable to patients and staff, and with low toxicity and relapse rates. In 1992, for the first time, the WHO estimated the total number of leprosy cases worldwide had fallen (WHO, 1992a). Progress in India, which has the largest number of cases, has been impressive, but a problem continues to exist where MDT implementation has been slow. In Africa MDT coverage consistently remained below 30 per cent until a rise to 45 per cent was reported in 1993 (Gelin and Declerq, 1989 to 1992; WHO, 1993b).

Fig. 2.4
Multidrug Therapy (MDT)
(Recommended by WHO 1982)



The WHO (1987) has identified three main factors which continue to impede control efforts:

> 'lack of disease control tools, notably a vaccine capable of interrupting disease transmission; the low priority accorded to the disease by many countries with endemic leprosy which have limited resources; and social stigma, which favours concealment, rather than disclosure and treatment, of the disease.'
> p 116

Research continues for a shorter treatment. Large-scale trials of a month long drug treatment began in seven countries in February 1992 (WHO, 1993a). It combines existing anti-leprosy drugs with the strongly bactericidal drug, ofloxacin, and results are expected after four or five years. The drug is expensive, but the shorter duration of use would make its cost equivalent to the existing multidrug therapy. A major advantage of the shorter treatment period would be to reduce the opportunities for patient defaulting.

No proven vaccine for leprosy is available. Tests on the efficacy of BCG in protecting against leprosy were made in Uganda and Burma with conflicting results. Some protection from leprosy is provided and its significance is discussed in Chapter Three.

Several vaccine trials are in progress, using combinations of BCG with killed *M. leprae* and other *Mycobacteria* species. Results are expected by the end of the 1990s, and could usher in a further stage in leprosy control (WHO, 1985). However, the effect of a vaccine on a disease with a long incubation period like leprosy will not be obvious in the short-term. Many workers warn that the current strategy, of early detection and treatment, will remain the most important one for a number of years, and that the promise of a vaccine must not deflect from this (Fine, 1989).

Although further efforts are required to introduce more widely the 1982 recommended MDT, to continue the search for a vaccine, and to develop shorter courses of treatment, there is also an increasing recognition by the WHO of the need for a wider view of leprosy control, to include the social aspects.

The UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) recognised that research on medical technology must be complemented by research to ensure the 'applicability and acceptability of new technologies and to improve the utilisation of existing tools.' (WHO, 1983 p 343).

Multidrug therapy has reduced the existing cases wherever it has been implemented, but the inadequacy of chemotherapy alone to reduce the number of new cases of leprosy is now being recognised (Fine, 1992; Feenstra, 1992).

CONCLUSION

In spite of leprosy's long history, less is known about the pathogen and its transmission than for most other infectious diseases; even less, for instance, than the recently identified HIV/AIDS. Because of this, although there is an effective cure for leprosy, the eradication of the disease is proving to be a slow process. It is also being increasingly recognised that the social context of the disease should be taken into account in the design of leprosy programmes, and aspects of this will be considered in the next chapter.

CHAPTER THREE

LEPROSY

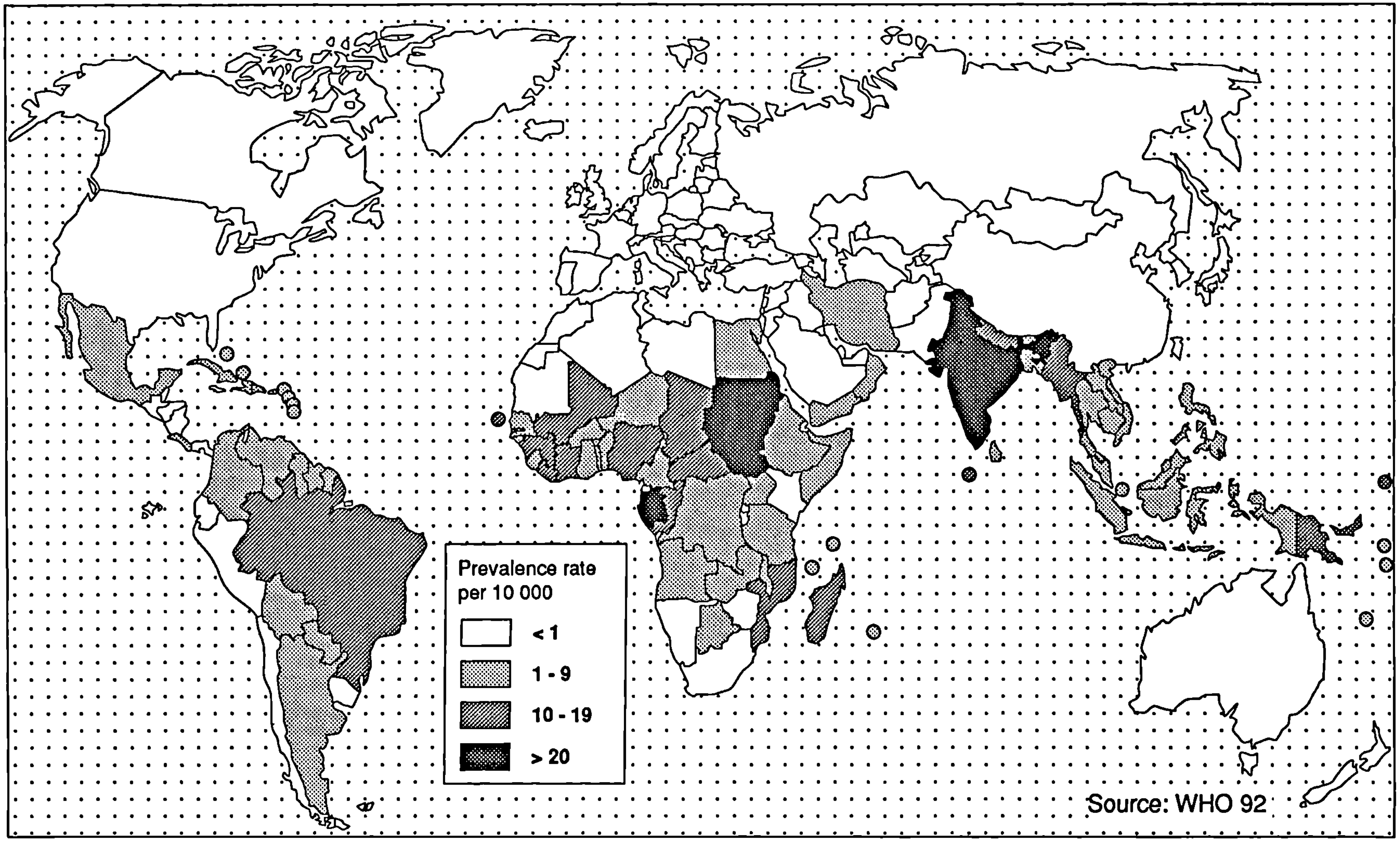
SPATIAL, EPIDEMIOLOGICAL, ENVIRONMENTAL AND SOCIAL CHARACTERISTICS

To provide a context for the analysis of leprosy in the study region this chapter examines its global distribution, epidemiology, environmental associations and social characteristics. There is increasing evidence that ecological factors play a part in the distribution of the disease, and this is reviewed. The occurrence of leprosy in relation to other diseases and to social change is examined. Leprosy is stigmatised more than most diseases, and the origins of this and its effects on prevalence and control are discussed.

GLOBAL DISTRIBUTION

Leprosy is widely distributed and is reported in 156 countries (Gelin et al, 1991), but is now most prevalent in the tropics and sub-tropics, especially of Africa and Asia (Fig 3.1). It was previously more widely endemic, even in the Arctic, and was once common in Western Europe. The estimated total number of cases for the past three decades was 10-12 million, but in 1992 and 1993 the WHO revised the estimates downwards to 5.5 million and 3.1 million respectively (WHO May 1992, June 1993).

Fig. 3.1 **Prevalence of Registered Leprosy Cases February 1992**



It is estimated that 55 per cent of the total cases are in India, which has two thirds of the world's registered cases (WHO June 1993). Although the largest numbers of cases are in Asia, the highest reported prevalence rates are in sub-Saharan Africa, where overall they are treble those in Asia.

Worldwide over the previous twenty years until 1985 there was a steady increase in the number of registered cases but since 1985 there has been a decrease (Table 3.1).

TABLE 3.1

Registered Leprosy Cases By WHO Region 1966-1992 (Thousands)

	1966	**1976**	**1985**	**1987**	**1990**	**1992**
Africa	1686	1398	988	507	482	352
Americas	178	241	306	334	302	335
South-East Asia	791	1748	3737	3709	2693	2190
Europe	20	20	17	13	7	7
Eastern Mediterranean	41	63	75	102	100	93
Western Pacific	117	128	246	198	153	110
TOTAL	2832	3600	5368	4862	3737	3087

(Sources: Noordeen, 1991a; WHO May, 1992)

The decrease since 1985 probably represents a real decline in the number of leprosy cases in some regions, due to the success of multidrug therapy (MDT) and the removal of long-term cases from registers (Noordeen 1991a). This explanation cannot apply to Africa because of the slow rate of MDT implementation by 1990 (Table 3.2). The explanation for the decrease in the numbers registered in Africa may be due either to a real reduction in cases due to effective dapsone monotherapy, or to reduced and less efficient case-finding, or a combination of both (WHO 1987).

TABLE 3.2

Implementation of MDT By WHO Region 1987, 1990 and 1993 (per cent)

	1987	**1990**	**1993**
Africa	12	25	45
Americas	13	23	30
South-East Asia	39	56	52
Europe	18	14	36
Eastern Mediterranean	27	38	51
Western Pacific	36	46	73
WORLD	34	48	49

(Sources: Lechat, 1989; Declercq and Gelin, 1992; WHO, June 1993)

On the basis of broad patterns and trends in the distribution of leprosy, the world can be divided into 7 zones (Fine, 1982; WHO, 1988b) :

1 The Old World tropical and sub-tropical belt has a long history of leprosy and a continued high level of endemicity, especially in sub-Saharan Africa and south Asia which together have 90 per cent of the world's cases.

2 The Mediterranean basin has had 2,000 years of endemic leprosy, but now has only low prevalence in a few foci, and this is probably decreasing.

3 Northern Europe had widespread leprosy 1,000 years ago, but it has been disappearing since the fourteenth century, and most cases now are immigrants from endemic regions.

4 Northern Asia has a long history of leprosy but the extent and prevalence is unknown in the former USSR, and China has only recently reported to the WHO. In Japan it is rapidly disappearing after high rates earlier this century.

5 In Latin America and the southern USA leprosy was first introduced 500 years ago by Europeans, and endemicity now varies, but is generally low, except in Brazil.

6 Northern USA and Canada had foci of leprosy following its introduction by northern Europeans in the last 200 years, but it has disappeared and the region is comparable with northern Europe.

7 The Pacific Islands and Australia received leprosy within the last 200 years which produced epidemics in some islands. There is continuing endemicity in some communities such as the Australian Aborigines.

In the developing countries of Zone 1, where leprosy is most prevalent, the high population growth rates caused by continuing high birth rates and rising life-expectancy, suggest that high levels of leprosy may continue for some years unless there is a marked improvement in control measures and standards of living.

EPIDEMIOLOGY

Epidemiology is the study of the distribution of diseases in populations (Barker, 1982). It is a tool used to identify disease determinants, in order to advise on prevention and to plan and evaluate control strategies. Certain characteristics of leprosy (Chapter 2) create special problems in studying its epidemiology, especially the chronic nature of the disease which poses particular difficulties in collecting and interpreting epidemiological data. The standard measures are <u>prevalence rates</u>, which are the proportion of the population with disease at any one time, and <u>incidence rates</u>, which are the proportion of the population presenting with new disease during a unit of time.

Many leprosy patients are self-reporting and are therefore unlikely to represent all cases of the disease, therefore true prevalence rates are rarely available. Incidence has been identified as the basic and critical measure in all epidemiological studies, but is particularly difficult to obtain in the case of chronic disease. Because of the slow development of clinical symptoms in leprosy, new cases do not represent the true number of new cases in any one year, therefore true incidence rates are rarely available.

Local changes in case-finding procedures, changing attitudes to the disease and even new leprosy staff all contribute to annual fluctuations in data which have nothing to do with changes in the disease occurrence in a population. Case-detection surveys, either sample or mass, which are frequently used for other diseases, are expensive and time-consuming for a relatively rare disease like leprosy. The stigma of leprosy may cause patients to conceal their symptoms and avoid detection. Because of the disease spectrum in leprosy, correct diagnosis is difficult, especially under field conditions, and requires skilled and experienced staff. Because of the lack of precision in diagnosis, and variations in choice of classification, caution is required in comparing epidemiological data from one situation with another. There have also been widely differing policies for the registration of 'cured' patients, who may be 'released from treatment' or 'released from control' or 'remain under surveillance' (Feenstra, 1992; Fine, 1981; Newell, 1966; Pannikar, 1992). The definition of what constitutes a 'leprosy case' has therefore varied from one region to another, although the WHO has attempted to address this, and has recommended a standard definition for adoption by all countries, with leprosy prevalence rates computed on the basis of this definition

> 'A 'case of leprosy' is a person showing clinical signs of leprosy, with or without bacteriological confirmation of the diagnosis, and requiring chemotherapy'
> (WHO, 1988a, p 14)

The same WHO document recommends that separate lists are maintained of a further two categories of patients: those who have completed treatment but require surveillance, and those who have deformities and disabilities due to leprosy. The cases released from surveillance and not requiring further attention need not be maintained on any register (WHO, 1988a).

A further problem in examining the epidemiology of leprosy is the lack of simple, widely available methods for detecting sub-clinical leprosy infection. Only disease occurrence can be studied, and little is known of the pattern of infection in a population (Fine, 1981).

For all these reasons the usual definitions and categories within epidemiology require special qualification in relation to leprosy, and the data of known cases can only appropriately be evaluated in their local context.

Epidemiological information in leprosy is based on three main data sources: routine medical registers, studies of groups of individuals, and population-based surveys. The quality of routine medical registers of leprosy is inferior for some of the reasons given, and also because of infrastructural problems in developing countries where leprosy is most prevalent. The epidemiologist, Paul Fine (1981) dismisses routine leprosy data as

> 'of little use beyond the mere indication that leprosy exists in an area......I question whether it contributes to our understanding of the disease.'
> (p 200).

However it could be argued that such data at least provide a starting point for studies of the disease in a region.

Studies of leprosy in groups of individuals is usually for specific experimental purposes and not necessarily to obtain epidemiological data, although they have been used for this. There have been few total population studies of leprosy because of logistical problems, but there are some from India associated with the planning of control programmes, and there is currently a broad-based comprehensive study in Malawi coinciding with a large-scale control programme (Ponnighaus et al 1987).

Random sampling techniques would not be appropriate for leprosy due to the clustering pattern of the disease in families and communities. School surveys and contact surveys, which are frequently used in control programmes, likewise do not provide a complete picture of the disease in an area. During the colonial period, in several countries of tropical Africa, leprosy data were obtained during routine surveys for other diseases, for example yaws in Nigeria (Eastern Region Medical Reports, several years), and trypanosomiasis in East Africa, and have provided some information.

Age

Leprosy appears at all ages from earliest infancy to old age. It has often been stated that it is primarily an infection and disease of childhood, but the evidence shows that advancing age does not confer immunity. Opportunity for exposure is probably the main factor in determining the age of infection and onset. Military veterans from non-endemic areas of the USA, who had served in leprosy-endemic regions of the world and subsequently developed leprosy, had an average age of onset of 46 years (Aycock and Gordon, 1947, reported in Doull, 1962).

In most areas the ages of registered patients reveal nothing about age of onset because registers contain accumulations of patients on long-term treatment. Ages of patients on treatment usually rise to a peak between 30 and 50 years, and then fall gradually, due to a combination of recovery and mortality (WHO, 1985).

Ages of new cases are more useful in age studies, although reliable and comparable statistics are scarce because of the gradual appearance of symptoms and dependence on the patient's memory for the time of onset. Marked regional variations in age of onset have long been identified and can change in the same region over time (Varuna & Prasad, 1967, citing Badger, 1959).

Noordeen (1985) describes the age patterns of leprosy in different populations, distinguishing between those where leprosy is recently introduced, where the disease is of high endemicity, and where the disease is dying out. In populations where leprosy is recently introduced and an epidemic develops, the disease affects all ages equally.

In areas of high endemicity, a bimodal curve for incidence of paucibacillary disease is common, with a peak at 10-14 years followed by a depression at 20 years, and then a rise to a plateau covering the ages 30-60. The suggested explanation is that in such areas all persons are infected in childhood and the most susceptible develope the disease, producing the early peak. The persons who developed it in adulthood have either had a long latent period, or were reinfected in adulthood (Noordeen, 1985).

In populations where the disease is dying out most new cases are older adults (Noordeen, 1985). In Texas, which had very little endemic leprosy by the 1950s, the average age of onset was 40 years (Kluth, 1955, cited in Doull, 1962). The author's visit to leprosy hospitals in Japan in 1989, where leprosy is declining, confirmed this pattern. In two leprosy hospitals no child cases had presented for several years. This was in marked contrast to the large number of new cases in children in the Nigerian study area (Chapter 10).

A characteristic in all regions is that the age of onset of multibacillary leprosy is higher than for paucibacillary, indicating a longer incubation period (Noordeen, 1985).

Sex

Leprosy registration figures in many countries suggest that there are sex differences in leprosy, especially in adults. This raises the question whether the causes are genetic, or social and environmental. The difference in most regions, especially in Asia, is that there are more males than females registered for treatment. However, in Africa an equal leprosy sex ratio has frequently been reported, with a higher rate among females in some areas (Noordeen, 1985). The statistics may reflect differential opportunity of contact: if men are more mobile within the community they may be at greater risk of exposure to infection. Other factors may explain the difference, such as variations in reporting rates between the sexes, and bias in diagnosing leprosy because males may be more thoroughly examined than females by the mostly male leprosy workers. Socio-economic rather than biological factors may therefore account for any observed sex differences in leprosy in adults.

In his analysis of the sex ratio in leprosy, Noordeen (1985) relates the different patterns to the same three population types identified in the age analysis. Male prevalence rates are higher in a population with endemic leprosy, but in a population either where leprosy is recently introduced or is dying out prevalence tends to be equal between the sexes. Changing sex ratios were proposed by Worsfold (1958) as an indicator of the stage of leprosy in a community. He suggested that the evolution from a traditional way of life in small community groups to more modern life-styles causes changes in the exposure to leprosy in males and females at different rates. This view accords with the more recent conclusion of Noordeen (1985) that social and environmental influences are more likely to be operating than biological ones in the observed sex differences in leprosy.

There are also reported sex differences in leprosy-type, with males generally showing a higher rate of multibacillary leprosy, especially over 15 years of age: the ratio was 2:1 in most studies (Newell, 1966). Below 15 years the multibacillary rate is low because of its longer incubation period, and the male preponderance is less widely reported. Noordeen (1985) has confirmed the higher male multibacillary rate as a consistent finding in several parts of the world.

Ethnicity

Leprosy of all types occurs in all ethnic groups, and all races appear to be equally susceptible to the disease. However, certain ethnic groups appear to have consistently higher multibacillary/lepromatous rates than others. There are significant differences reported by continent, with over 20 per cent lepromatous in Europe and America, 5 to 20 per cent in Asia; and under 5 per cent in sub-Saharan Africa (Fine, 1982).

It is now believed that there is an association between multibacillary disease and lighter skin, rather than with race per se, or with geographical location. White Caucasians have the highest rate of multibacillary leprosy, followed by Mongolians then Asian Indians. The lowest rates are in Negroes. This pattern persists in emigrants, suggesting that it is not due to local factors, and rates in multi-racial societies support the pigmentation hypothesis. In Malaysia the multibacillary rate was highest among Chinese, lower among Malays and lowest among Indians. White immigrants in Brazil and in South Africa have a higher rate of multibacillary leprosy than the respective indigenous peoples, and in India, Anglo-Indians have more multibacillary leprosy than the Indians (Noordeen, 1985).

Langerhans cells play a part in cell mediated immunity, but this function is impaired by solar radiation, unless they are shielded by skin pigmentation. This may account for the apparent association between a light skin colour and a poor immune response to *M. leprae* which results in multibacillary leprosy (Fine, 1982). Experiments on mice exposed to ultra-violet radiation also support the view that sunlight might reduce natural immune responses to the antigens of *M. leprae*

Fig. 3.2

Variations in Leprosy during its Epidemic and Endemic Phases

Epidemic	Endemic	Declining Endemic
1. The disease spreads rapidly	The disease spreads slowly.	Little transmission
2. Cases are found in most villages and homes and no particular foci can be identified	Cases are often clustered around foci of villages or families.	Isolated cases
3. Most people get paucibacillary disease which heals spontaneously.	Increase in multibacillary disease	*Relatively* more get multibacillary disease.
4. All ages and sexes are equally susceptible.	Children and young adults are more commonly affected, and males more than females, according to exposure to risk.	New cases are older, few children affected. Both sexes equally susceptible.
5. Contact with multibacillary patients does not seem to be important in determining the pattern of spread.	Contact with multibacillary patients greatly increases the risk of infection and affects the pattern of spread.	Most cases were infected at an earlier phase.

Source: Adapted from Bryceson and Pfaltzgraff 1990

(WHO, 1985). A role for skin pigmentation in determining leprosy type is therefore strongly indicated.

DISEASE DYNAMICS

Epidemics have a short duration and are usually associated with acute diseases like influenza, but epidemic phases of leprosy have been identified. They may occur when leprosy is first introduced into a population, after which the disease settles into a long-standing endemic phase (Bryceson and Pfaltzgraff 1990). The recognition of these phases in leprosy helps to explain the pattern of disease in a community: it has been shown above that the age and sex patterns of people affected, and the type of the disease, vary in these three phases (Fig 3.2).

Epidemics, with prevalence rates up to 30 per cent, have been recorded in several regions in the past two centuries, including part of eastern Nigeria (Davey, 1957). Leprosy was epidemic in Hawaii around 1820, and in New Guinea a few years later when 15 per cent of the population developed the disease within 15 years (Leiker, 1960). The epidemic on the Pacific island of Nauru began in 1912 when one female case arrived from a neighbouring island. Nauru's population was then 2,500; by 1925 an examination of the whole population showed that over a quarter had leprosy, mainly paucibacillary. Incidence then decreased to four per cent in 1952 and one per cent in 1981 (Noordeen, 1985).

Leiker (1971) studied the New Guinea epidemic and reviewed literature on others, and concluded that all show a similar pattern: they are reported exclusively in isolated communities with low levels of population mobility, low standards of hygiene, and factors favourable for the transmission of infectious diseases; in many cases leprosy has been recently introduced; there are low levels of tuberculosis; and the disease is distributed throughout the community irrespective of age or sex.

As the epidemic phase subsides the incidence rate of new cases decreases, more multibacillary cases occur, the child rate increases in relation to the total, and the disease becomes more localised (WHO, 1985). This second, endemic, phase may continue for a longer or shorter time, depending especially on social characteristics, and whether or not there are control measures.

In the third and final phase new disease rates decline, and the cases include an increasingly high proportion of household contacts, multibacillary cases, new cases presenting at an older age, and a reduction in the sex differences, or even a reversal to give more infected females (Noordeen, 1985).

Leiker (1971) explains the changing disease pattern during the three phases as resulting from increasing exposure to infection affecting individual resistance to *M. leprae*, which can change from potential to actual resistance in most people. His hypothesis would account for the observed differences in age, sex and contact cases in the three phases. The history of leprosy in Western Europe, requires factors other than chemotherapy to explain the decline and disappearance of the disease, and resistance may provide the explanation.

Hunter and Thomas (1984) also propose that the changing status of leprosy in a population is related to changes in individual resistance to the disease. They apply their hypothesis to Africa and propose that increasing urbanisation is associated with increased tuberculosis infection and this provides increased resistance to leprosy. An inverse relationship between leprosy and tuberculosis was suggested in 1924 by Rogers, from a study of disease rates in Africa, Oceania and America (Leiker, 1971). The hypothesis is also consistent with the view of Muir (1957) who proposed that communities go through cycles of disease associated with socio-economic changes (Fig 3.3).

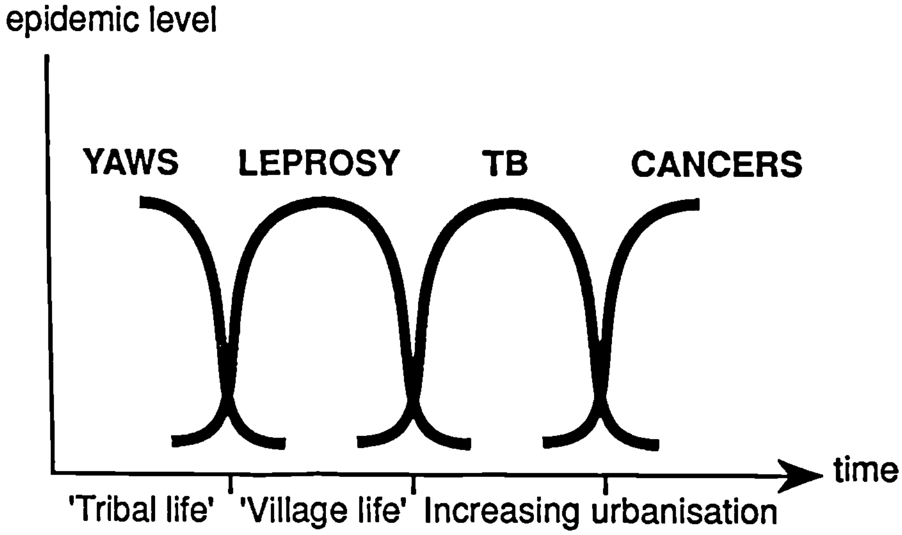
Such views have been refined in the epidemiological transition model, proposing a transition in disease patterns which are parallel to the demographic transition (Omran, 1971). There is a shift from infectious, parasitic and nutritional diseases, dominant in the first demographic phase, to degenerative disease in the later phase.

Leprosy is a typical disease of the first phase. Japan, which is in a late phase of demographic transition, experienced accelerated demographic and epidemiological transition due to rapid socio-economic development. However, leprosy still occurs, although rates are low. Due to the long incubation period new cases continue to present, most of which are elderly, and were infected during an earlier stage of the country's transition.

These hypotheses provide useful models for comparing diseases and their interactions in different populations, and will be considered below in relation to the pattern of leprosy in the study region.

Fig. 3.3

Hypothesis of Disease Cycles Related to Socio-Economic Development



(after Muir 1957)

ENVIRONMENTAL AND ECOLOGICAL ASSOCIATIONS

Leprosy has traditionally been regarded as a disease transmitted directly from person to person. At various times its distribution has been thought to be associated with particular environmental factors such as climate, altitude, and diet, and with social factors such as rural life, and a low standard of living. Each association has been investigated but there have been no firm conclusions on any one as a single risk factor. The wide geographical distribution shows that macro-climate plays no role, but microclimatic conditions may be relevant. A diet dominated by fish is no longer thought to pre-dispose to leprosy, but a low protein diet may be a factor (Irgens, 1981). An association between leprosy and poor socio-economic conditions has long been recognised, but the precise roles of factors such as overcrowding, hygiene, nutritional state, intercurrent infection, or housing have never been established.

The fact that over half of the leprosy cases in well-studied populations occur in persons who claim to have no known contact questions the traditional view of direct transmission, and suggests that alternative modes of transmission should be examined. There are certain social and physical environmental associations which are providing increasingly convincing clues to the distribution of leprosy, and which suggest that an environmental source of *M. leprae* may be responsible for at least some human leprosy cases (Blake et al, 1987).

There are two aspects of the possible role of ecological factors in the occurrence of leprosy. One relates to the conditions suitable for the potential survival of *M. leprae* outside the human body. The other relates to the conditions for the environmental mycrobacteria which may affect a person's immune response to subsequent exposure to *M. leprae.*

Experimental evidence has shown that a humid environment provides the optimal survival conditions for *M. leprae* outside the human body (Chapter Two). This is typical of Mycobacteria, a genus with approximately 60 species, most of which live freely in the environment, especially in wet situations like swamps, rivers, estuaries and piped water supplies (Grange, 1991). Irgens (1981) found mycobacteria, which could be *M. leprae*, on sphagnum moss in areas where leprosy last disappeared in Norway. The WHO has acknowledged the possibility that *M. leprae* might persist as a soil or vegetation saprophyte (WHO, 1985). This would support the view of Brand already referred to, that people in close contact with the land, especially those going barefoot in rural areas, may be infected with leprosy via the soil.

Studies increasingly suggest a role for environmental mycobacteria both in affecting levels of leprosy endemicity and the ratio of disease type (Lyons and Naafs, 1987; Grange, 1991). Environmental mycobacteria share many common antigens with one another and with *M. leprae* and *M. tuberculosis*. This may be the explanation for the reported apparent negative correlation between leprosy and tuberculosis prevalence. Individually or together the various mycobacterial antigens may possibly affect a person's resistance to leprosy, but no single mycobacterial species has yet been identified as promoting or protecting against leprosy (Fine, 1982). A number of environmental mycobacteria are reported to be increasingly causing disease in animals and humans in the United Kingdom, and are opportunistic infections in HIV/AIDS patients (Grange and Yates, 1986; Grange, 1991).

A study in Zimbabwe in two regions of contrasting paucibacillary/multibacillary ratios tested 16 environmental mycobacteria for their potential influence on the type of leprosy which develops. It was suggested that some of these mycobacteria may modify the immune response to *M. leprae* of individuals already susceptible to leprosy by priming the relevant suppressor mechanisms of the immune system, but there were no firm conclusions (Lyons and Naafs, 1987).

Differences in environmental mycobacteria were proposed as a possible explanation for differences in the results of tests of the efficacy of BCG in protecting against leprosy in Burma and Uganda (Palmer and Long, 1966, cited in Fine, 1982). Grange (1991) reports that slow growing mycobacteria are particularly prevalent in Burma, while rapid growers predominate in Uganda. Palmer and Long proposed that the disappointing results of BCG in Burma may partly be explained by the role of environmental mycobacteria having already provided protection against leprosy, equivalent to that which BCG would have given. This explanation is supported by the fact that older children, who would have had longer exposure to the environmental mycobacteria, were relatively less protected by BCG than younger. However, there are other explanations for the poor results in Burma such as the role of skin colour, and the possibility that BCG protects from paucibacillary but not multibacillary leprosy.

ATTITUDES AND STIGMA

Attitudes towards leprosy, and especially the stigma widely but not universally associated with it, may be factors in the true and/or reported pattern of the disease in a region.

Leprosy stigma is believed to be as old as the disease, and has been known in India and China since 600 BC when leprosy was first recorded and recognised as a clinical entity (Jopling, 1991). India, is well-known for heavy stigmatisation of the disease, which Waxler (1981) claims is intensified by the caste system. China, the other ancient home of the disease, also has a long history of stigmatisation which resulted in the reported shooting of 215 'lepers' in Kwangtung Province in 1937, the third such episode that year, 'for the purpose of combatting the spread of the disease' (Leprosy Review, 1937, p 129). In West Africa there is a variation in attitudes, from extreme prejudice against leprosy among the Igbo and some other peoples of southern Nigeria, and in Liberia (Harley, 1970), to the reported complete acceptance of people with leprosy in The Gambia (Mallac, 1960; and McFadzean and McCourt, 1955).

Stigma has been defined as 'A mark of disgrace or infamy; a sign of severe censure or condemnation.' (OED) Goffman identified three groups of people characterised by stigma: those with physical deformity, those with aberrations of character or personality, and those categorised socially by race, class or religion (Goffman, 1963). Leprosy patients may suffer all three in some communities: they are probably deformed, they are regarded as suffering leprosy as a punishment, and in most cases they are socially from a low, often poor rural, class. Stigmatisation in such communities may be extremely pronounced.

It is not surprising that leprosy patients in such communities are also stigmatised in their own eyes, being subject to the norms of their society and culture. The patients' own perception of their disease frequently leads to low self-esteem and masochistic behaviour, with neglect of self and the apparent lack of desire for rehabilitation. This phenomenon of self-stigmatisation by leprosy patients has been recognised in several studies (Ryrie, 1951; Gussow and Tracey, 1968; Waxler, 1981).

The origin of the social stigma in leprosy has been attributed to three interrelated factors: primitive fear associated with both the disfigurement and the chronic onset of the disease; rational fear of contagion; and religious fear, which intensifies the primitive fear (Edwards 1964). Religious fear, where leprosy is considered a divine punishment for sin, has been reported especially in China, Japan, India, and in parts of Africa.

Skinsnes (1964b) analysed the pathology of leprosy which might account for its frequent association with stigma, and listed characteristics of a hypothetical disease which would be the ultimate in physical disablement and would elicit extreme negative social responses. The characteristics of such a disease would be externally manifest; progressively crippling and deforming; nonfatal and with a long course; insidious in its onset; not epidemic but of high endemicity; associated with low standards of living; apparently incurable; and preceded by a long incubation period. There is clearly a strong resemblance to leprosy, and Skinsnes concluded that it is this complex and its uniqueness which are responsible for the extreme social reactions to leprosy. It is true that the popular view of leprosy in the West and in some other areas where it is stigmatised, is in this extreme form, which would describe an advanced, untreated case with maximum deformity and disability. There are also such depictions of leprosy in literature, where leprosy is used as a metaphor (Joseph Conrad, 1902; Graham Greene, 1963; Stephen Donaldson, 1977). If the biological characteristics of the disease were entirely responsible for the stigma, then stigma would be universal, which it is not. Why is leprosy not stigmatised among certain communities of, say, Nigeria? The writer suggests a partial explanation is that it does not always appear in the form of the 'total maximum illness'. Multibacillary cases in most of Africa represent a small minority of the total. Paucibacillary leprosy occurs in the population alongside and equivalent to other disablng diseases.

Gussow and Tracy (1970, 1971) have shown that the western view of leprosy as being universally stigmatized originated in the nineteenth century, and was reinforced by medical, political and social events. They reject the view that leprosy stigma in Western Europe had survived from medieval times into the modern era. Because leprosy disappeared from much of Western Europe around the sixteenth century, except for a few small foci, they argue that the fear of the disease would also have disappeared from the popular mind. This view was recently supported by evidence from Manchester Infirmary records of the eighteenth century, which show that there was no fear of a leprosy diagnosis (Jopling, 1991). Gussow and Tracey (1971) argue that the link in the popular western mind, between Biblical and modern leprosy and the associated negative attitudes, is a result of the involvement of church-related agencies in leprosy work since the 1870s.

Events in the mid-nineteenth century contributed to the European fear of leprosy with the increasing contact between Europeans and leprosy endemic areas. Europeans were migrating to Africa and Asia at the same time as Asians, especially Chinese, were migrating to Australia, Hawaii and the west coast of North America. Concern about the occurrence of leprosy in British overseas possessions led to the commissioning of the Royal College of Physicians' report in 1862. Leprosy was then incurable, and the official medical view was that it was hereditary (Royal College of Physicians, 1867).

Two events in 1873 heightened the fear of the potential threat of leprosy: Hansen's discovery of *M. leprae*, and the contracting of leprosy by the Belgian priest Father Damien in a colony in Hawaii. With his widely publicised death in 1889, and leprosy increasingly reported from overseas, major alarm was expressed that leprosy was about to become pandemic. References to leprosy in the London Times between 1870 and 1930 peaked in 1889-91, reflecting the panic (Gussow and Tracey, 1971). Segregation laws for leprosy were established by the beginning of the century in many colonies.

But no major outbreaks were reported and the panic subsided. Leprosy subsequently received little attention from colonial officials for two main reasons. Contact between leprosy sufferers and most Europeans overseas was limited or non-existent. Also, although incurable it was not a killer disease like the 'big-five': cholera, plague, smallpox, typhus and yellow fever.

In Britain The Mission to Lepers was founded in 1874, and increasingly the care and treatment of sufferers throughout the world became the concern of Christian agencies. Secular medicine and research showed little interest in the disease and effectively left it to the missions.

Leprosy therefore accidentally became a 'different' disease with a religious identity. Several scholars (Gussow and Tracey, 1971; Waxler, 1981) suggest that this image of leprosy has been fostered through fund-raising campaigns by missions and churches in the West.

There are hypotheses associating the degree of stigma with a variety of factors. Some believe that an increase in 'civilisation' and education increases stigma (Pfaltzgraff, personal communication 1987). In Tanzania it is said to be the result of Western medical education, and in India is related to the caste system (Waxler, 1981). Elsewhere, the rarity of the disease increases the stigma (Christian, 1981), or it is increased by the degree of deformity (Pfaltzgraff, personal communication 1987). In many areas the stigma has been declining during recent decades, which some of these hypotheses may perhaps explain.

CONCLUSION

Leprosy can be identified as an infectious disease typical of the earlier stages of social and economic development. It remains a particular problem in its original endemic areas of India and tropical Africa. In most areas the estimates of leprosy cases and the numbers registered for treatment have declined during the past decade, largely attributed to effective chemotherapy.

In India a well-organised control programme is achieving good results, but the poor economies and weak infrastructure of many African countries have hindered its decline, and are slowing the implementation of the new chemotherapy.

Epidemiological data in relation to age, sex, and leprosy-type, provide evidence of varying patterns of the disease in different populations. High rates of childhood leprosy indicate continuing transmission, typical of the areas of high prevalence to-day, whereas new cases occurring mainly in the elderly, suggest the final stage of the endemic phase.

During its decline leprosy typically persists in localised foci. There is increasing evidence of indirect leprosy transmission, and a role for micro-climates and their associated environmental mycobacteria in the occurrence of leprosy. These may help to explain the location of the leprosy foci in regions of declining endemicity. Because rural environments provide greater opportunities for contact with the soil and associated environmental mycobacteria, especially with poor clothing and footwear, these may also account for the strong association of leprosy with poor rural areas. However, socio-economic development and/or a good leprosy treatment programme can accelerate the decline of the disease in a community.

The endemic phase of leprosy in some communities is probably prolonged by the beliefs about leprosy which have led to negative attitudes and stigma. These are widespread but not universal. They may affect the control of the disease if patients attempt to conceal the early symptoms, and inadvertently continue to transmit infection instead of seeking treatment. Delays in treatment may also cause irreversible deformity. Changing these attitudes and encouraging early reporting is one of the priorities in leprosy control.

CHAPTER FOUR

THE CROSS RIVER REGION

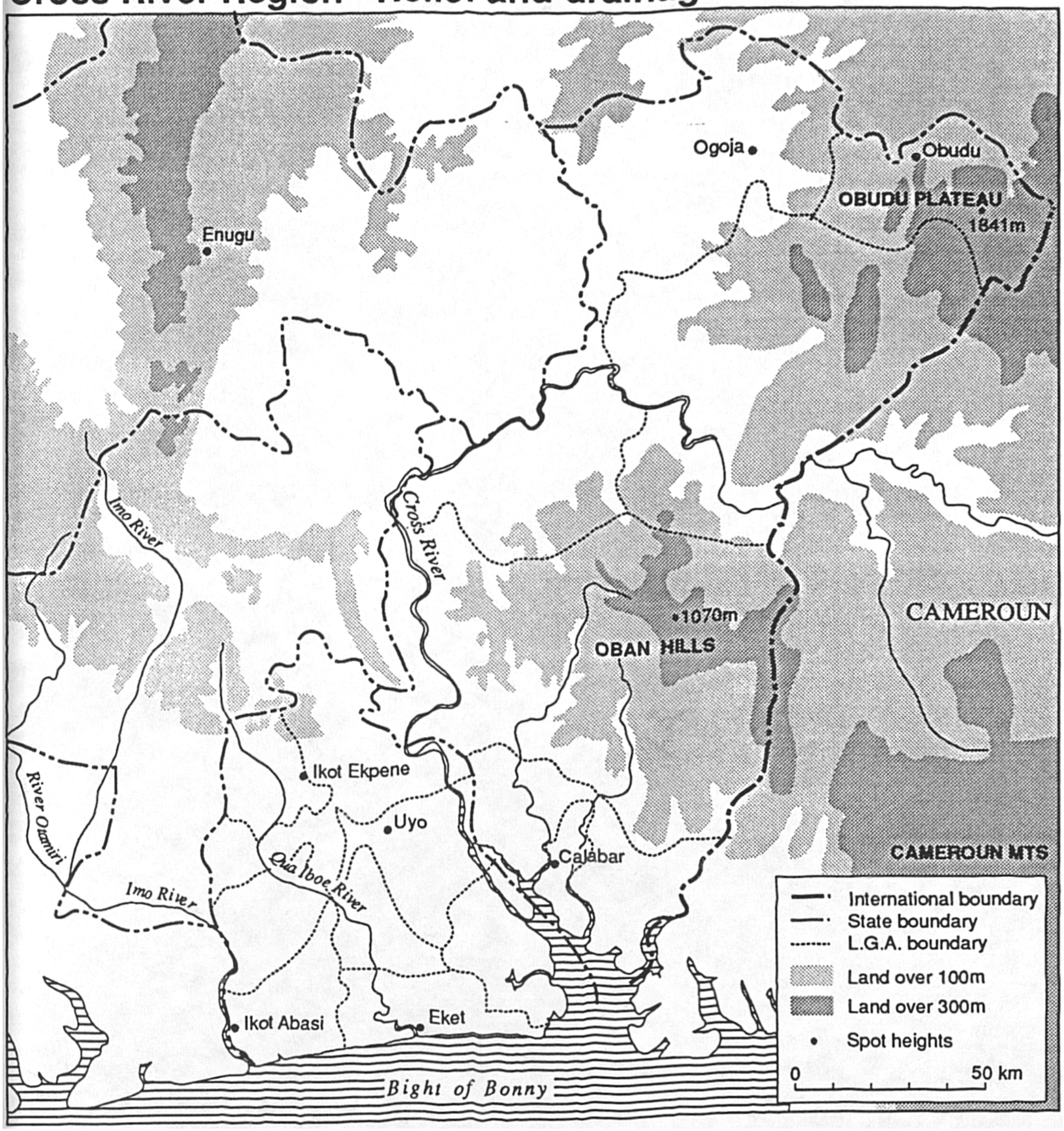
The region is in tropical west Africa which has some of the highest leprosy prevalence rates in the world, (Chapter Three). It lies between 4 and 7 degrees north in south-eastern Nigeria, extending 240 kilometers inland from the coast. The altitude rises to 1841 metres in the extreme north-east on the Obudu Plateau (Fig 4.1). It has a rich diversity of peoples and languages especially in the northern half. Calabar in the south east was in contact with the Portuguese as early as the 15th century, but areas of upland forest in the east have still not been settled. Although the port of Calabar has provided good access to the rest of the world since pre-colonial times, the region has poor land links with the rest of the country and the neighbouring Cameroun Republic. The selection of the rival port of Lagos as the colonial capital in 1906 led to the decline of Calabar and its hinterland, and the development of the whole region has since suffered due to its geographically peripheral location.

PHYSICAL ENVIRONMENT

The region covers over 28,000 square kilometres and is drained mainly by the Cross River which rises in the Cameroun Mountains. This river has been an important factor in the economic and political history of the region. The lower Cross River divides the region into two, marking differences in human and environmental characteristics. The area to the west of the Cross River estuary,

Fig. 4.1

Cross River Region - Relief and drainage



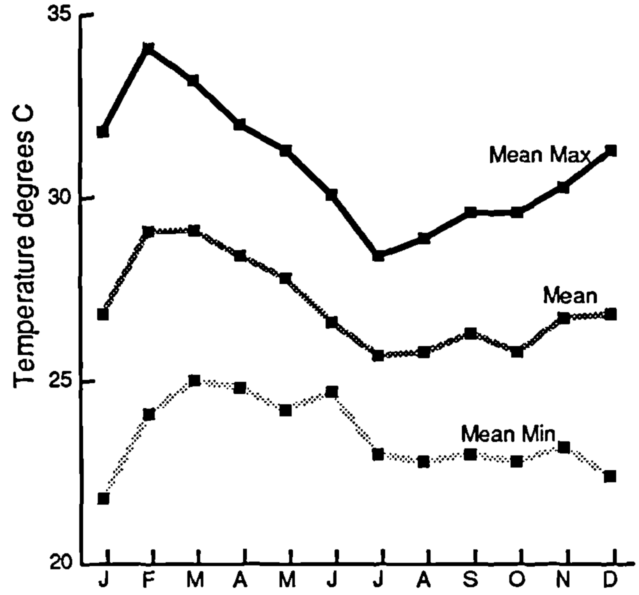
locally known as the 'Mainland,' mostly lies below 100 metres and is drained by the Qua Iboe River and its tributaries and by the Imo River (Fig 4.1). The Mainland area, which was designated as the new state of Akwa Ibom in 1987, has uniformly gentle relief on coarse, well-drained tertiary Coastal Plains Sands. The coast is a broad sandy shoreline with mangrove swamps where the rivers empty into the ocean. North and east of the Cross River the landscape is more diverse, with the upland areas of the Oban Hills and the Obudu Plateau.

The climate is tropical. High temperatures are modified by altitude only in the extreme north-east on the Obudu Plateau. In the coastal areas they are lowered slightly by maritime influences. The diurnal temperature range of 10°C during the period of the Harmattan, the northerly wind from the Sahara in January and February, exceeds the mean annual temperature range of 3°C (Fig 4.2).

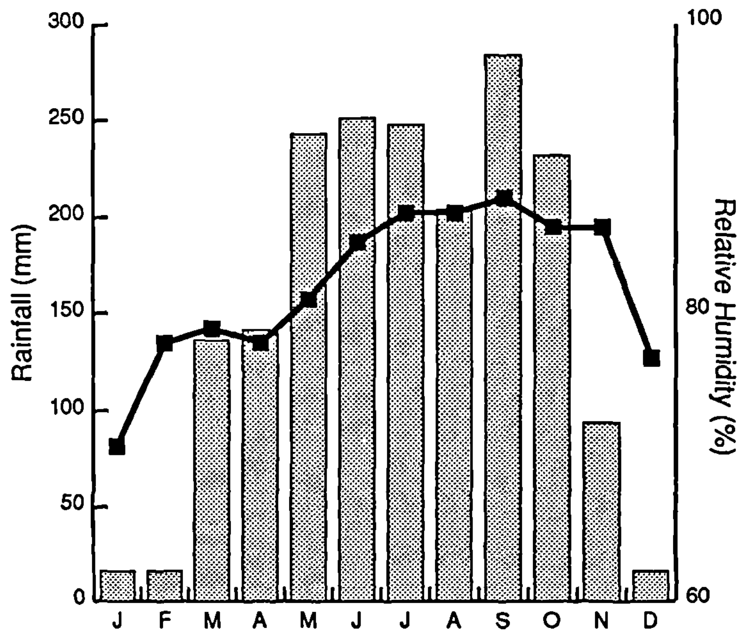
Rainfall is high and markedly seasonal. There is a dry season from November to April dominated by a northerly air mass, and a wet season from May to October caused by the south-west monsoon. The coastal areas of the south-east receive over 3,500 mm, but the highest totals are in the Oban Hills (Oban receives 5,627 mm). In all these areas there is rain in most months. Rainfall totals decrease to 1,500 mm in the north, and there may be seasonal water shortages, with implications for health and personal hygiene. The monthly distribution of rainfall is constant, but annual rainfall totals are very variable. In Uyo, the 1980's showed a marked decrease after the wetter 1970's (Table 4.1).

Fig. 4.2
Climatic Data for Uyo 1983 - 86

a. Monthly Temperatures: Maximum, Minimum and Mean



b. Monthly Rainfall and Relative Humidity



Source: Federal Government of Nigeria Met Station No. 0507.05B
University Campus, Uyo. Lat. 05.00N. Long. 07.50E

TABLE 4.1

Decline in Annual Rainfall Totals Recorded in Uyo 1977 - 86.

Year	Total mm
1977	3856
1978	3271
1979	3825
1980	2863
1981	2423
1982	2443
1983	1599
1984	1879
1985	2133
1986	1905

(Source: Federal Government Met Station, Uyo)

Vegetation in most of the region is modified tropical rainforest. In the densely populated southwest, cultivation has removed all but the economically valuable trees, resulting in 'oilpalm bush'. Cultivation in the north of the region has reduced the forest to 'derived savanna'. The original high forest survives only in the sparsely populated upland areas of the east, especially in parts of Akampka.

The southwestern area, the Mainland, is well-drained, and in spite of the very high precipitation there is little surface water due to the porous soil parent material. Soils are highly leached with few nutrients and little organic matter. Nevertheless, they have sustained an agricultural system which supports some of the highest rural population densities in tropical Africa, between 500 and 1,000 per square kilometre. Traditional crop husbandry conserves the scarce nutrients and organic content, principally through inter-cropping and bush fallowing. In the last few decades population pressure has led to a marked decrease in the length of the fallow and a consequent decline in soil quality. In response there has been a reduction of the range and quality of crops cultivated, especially a decline in the nutrient-hungry but relatively more nutritious yam, and an increase in cassava. The latter provides a reliable harvest even on poor soils and was previously a hungry season and famine crop, but has taken over more of the land.

Apart from the Mainland, soils are generally of good quality. They are developed on shales and igneous rocks and support a variety of commercial and subsistent agricultural systems. In Ogoja large surpluses of foodcrops are grown on smallholdings and are sold in local markets and transported outside the region. On the Obudu Plateau, which is tsetse-free, a Government cattle ranch established during the colonial period is a rare example of meat production in the region. Further south, mainly in Ikom, Akampka and Odukpani tree crops of oilpalm and rubber are grown on plantations.

Throughout the Cross River Region smallholders have produced commodities for export since early colonial times, especially palm-oil, cocoa and rubber, and production continues although palm-oil is no longer exported.

POLITICAL DEVELOPMENT

The region is occupied by Bantu and Semi-Bantu-speaking peoples whose indigenous political organisation has been, and mostly remains, democratic. The Efik people of the Cross River delta developed a unique political organisation during the period of the Atlantic slave trade, enabling them to effectively command the trade until its abolition, and then to successfully transfer into 'legitimate' commodities. They organised themselves into powerful trading 'houses' based originally on lineage, and prevented other peoples of the region from establishing direct trading relations with Europeans. They kept law and order principally through secret societies (Jones, 1956).

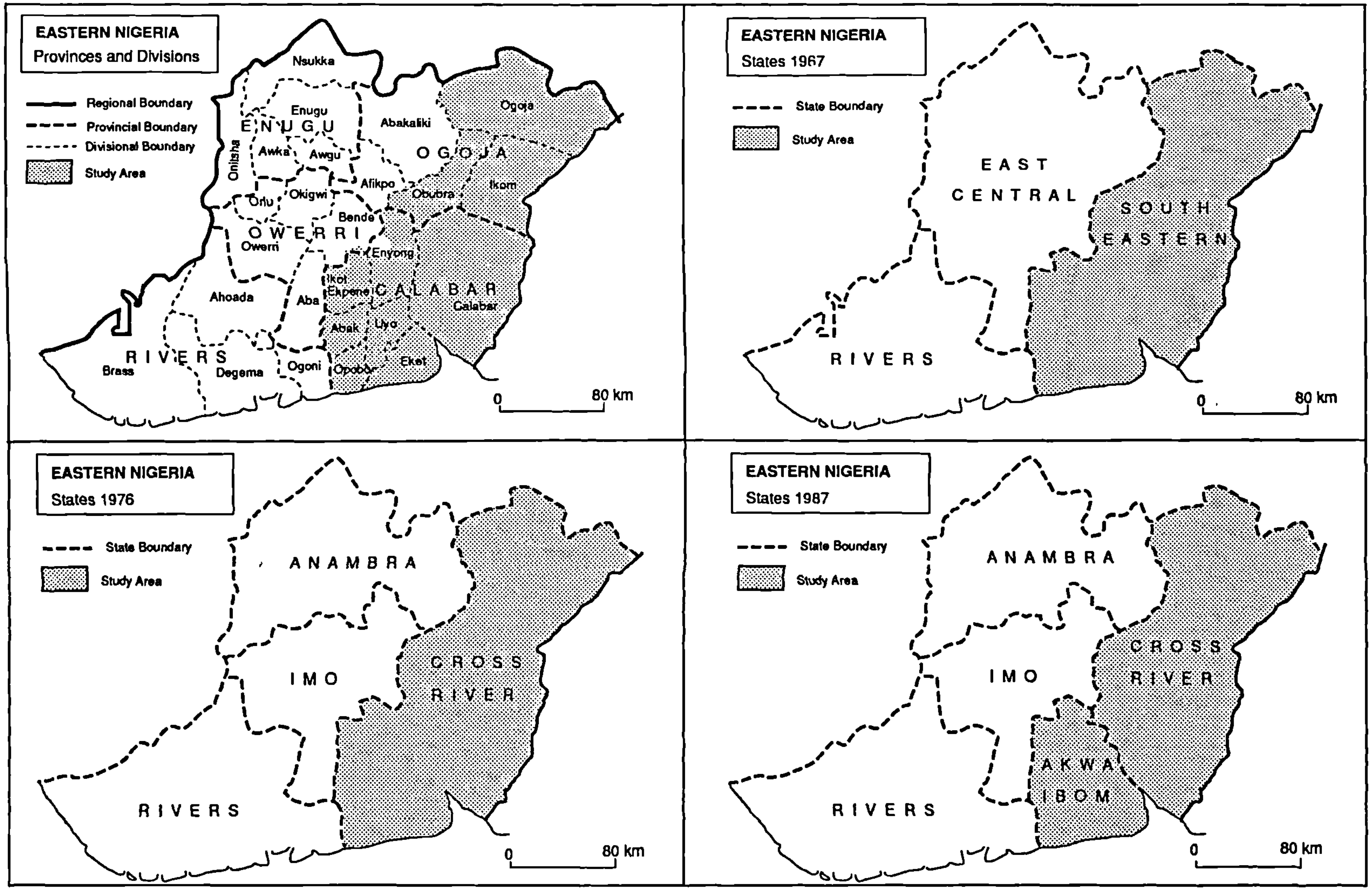
The Efik community gradually became heterogeneous, absorbing people from other coastal communities as well as from the interior, and the trading houses eventually included non-agnates and even slaves (Jones,1956). Calabar was a well-known trading centre by the beginning of the eighteenth century, having already traded in slaves and ivory for at least a century (Latham,1973).

British authority began in the region in 1849 with the appointment of a Consul to the Bights of Benin and Biafra (Crowder,1966). The Consulate was based on the Spanish-held island of Fernando Po until 1882, when it moved to Calabar. Consuls succeeded in keeping the area pro-British, promoting legitimate commerce, mediating in disputes between British and African traders and protecting British interests. The foundations were thus laid for British annexation following the Berlin Conference in 1884-85, and in June 1885 a protectorate was proclaimed over the territory. In 1889 the Oil Rivers Protectorate was formerly constituted, becoming the Niger Coast Protectorate in 1893, and the Southern Nigeria Protectorate in 1900. Calabar remained the seat of the colonial government until 1906, when the Colony of Lagos was amalgamated with the Protectorate under the same administration, and the whole area was designated the Colony and Protectorate of Southern Nigeria. Lagos became the seat of government, and Calabar was relegated to provincial status. In January 1914 the unification of the Northern and Southern Protectorates created Nigeria.

Due to segmentary social organisation in the hinterland of Calabar, with politically independent villages, British authority was established only slowly, between 1890 and 1911. In contrast with the Cross River estuary and other early nineteenth century trading areas, some parts of the region had no direct contact with Europeans until the twentieth century. British authority and free trade were imposed in the 1890s in the upper Cross River region, through a gunboat patrol on the river and a mobile force on land. Further south the Aro expedition in 1901 and 1902, carried out by troops of the West Africa Frontier Force, brought most of the Mainland under control (Abasiattai, 1987).

The colonial administration of Nigeria was based on twenty four Provinces made up of Divisions. The study region included the Divisions of Ogoja, Ikom, Obubra and Obudu in Ogoja Province, and the whole of Calabar Province (Fig 4.3). In 1954 the country was divided into Regions to prepare for a Federal system of Government at independence in 1960. The study region was in the Eastern Region, with the capital at Enugu.

Fig.4.3 **Changing Administrative Structure of the Study Area**



The secession of the Eastern Region from the Federation in 1967 led to the Civil War. The Nigerian Government created twelve States in 1967, one of which was South Eastern State which coincided with the study region, and in 1976 was renamed Cross River State. In September 1987 it was sub-divided, creating a smaller Cross River State, with Calabar remaining as capital, and the new Akwa Ibom State coinciding with the Mainland, with its capital at Uyo.

During most of the colonial period statistical data were collected on a Provincial and Divisional basis, and later on a Regional basis. Since 1967 the states have been divided into Local Government Areas (LGAs) which have provided data since the Civil War. Disruption in parts of the region during the war was such that all data for that period is partial.

POPULATION

Ethnic groups

The indigenous peoples belong to two major groups and a number of minor ones; the differences between them are mainly linguistic. Some of the minor groups have close affinities with groups in neighbouring Benue State and the Cameroun Republic. There are few permanently resident non-Africans.

The largest ethnic group of the region is the Ibibio/Annang/Efik, who make up seventy per cent of the population, and occupy Akwa Ibom State, and Calabar and Odukpani Local Government Areas (Udofia and Inyang, 1987). Oral tradition maintains that they were the first inhabitants of the area, having migrated from the Mount Cameroun area in early times. Studies suggest that they spread out from a focus in the present Uyo Local Government Area to occupy most of the Mainland, and extended further west than at present into the area now occupied by the eastern Ngwa Igbo (Noah, 1980).

In the seventeenth century a dispute among the Ibibio is reported to have led to the breakaway of a group which moved to the east bank of the Cross River, settled in present-day Calabar and became the Efik people (Simmons, 1956).

The Efik partially displaced the Qua people who remain a minority in the Calabar area. The Qua belong to the Ejagham, the other major ethnic group of the region, and are closely related linguistically to the Bantu of Central and Southern Africa (Essien, 1987). The Ejagham make up thirteen per cent of the population (1963 census) and are scattered throughout the region. The next largest group, Bekwarra Bette, is very small in comparison, and occupy parts of Ogoja and Obudu in the north of the region. There are many other smaller ethnic groups, with a great diversity of dialects, languages and traditions (Essien, 1987).

It is believed that all these peoples were in the region by 1750, although their territories were not fixed (Abasiattai, 1987). The original migrations which brought them are unknown, as there was no written language until Efik was written last century. The Atlantic Slave Trade caused secondary dispersal, as groups tried to avoid capture.

Population estimates and distribution

The estimated population of the Cross River region in mid-1986 was 6.196 million, a projection from the population of 3.5 million recorded at the 1963 census, based on an estimated growth rate of between 2.5 and 3 per cent per annum. The 1963 census is generally regarded as an overcount (Kirk-Greene and Rimmer, 1981), but these growth rates are believed to be underestimates, but have been widely used in the absence of vital registration or any more reliable data.

There was a census in 1991 but the Government of the new state of Akwa Ibom is to contest the population of 2.35 million which has been announced, arguing that it should be closer to four million (West Africa, July 1992). Table 4.2 presents a summary of the population figures.

TABLE 4.2

Cross River State: Population 1963 and 1991

Year	Source	Population
1963	Census	3.7M
1991	Official Projection	7.1M
1991	Census	4.2M *

* Includes New CRS (1.85m) and Akwa Ibom State (2.35M)

(Sources: Nigerian census 1963, 1991; CRS Government, 1980)

The population in the region is unevenly distributed, with some of Nigeria's highest and lowest rural densities in adjacent Local Government Areas (Fig 4.4, Table 4.3). Several LGAs in the Mainland area have densities matched only by

TABLE 4.3

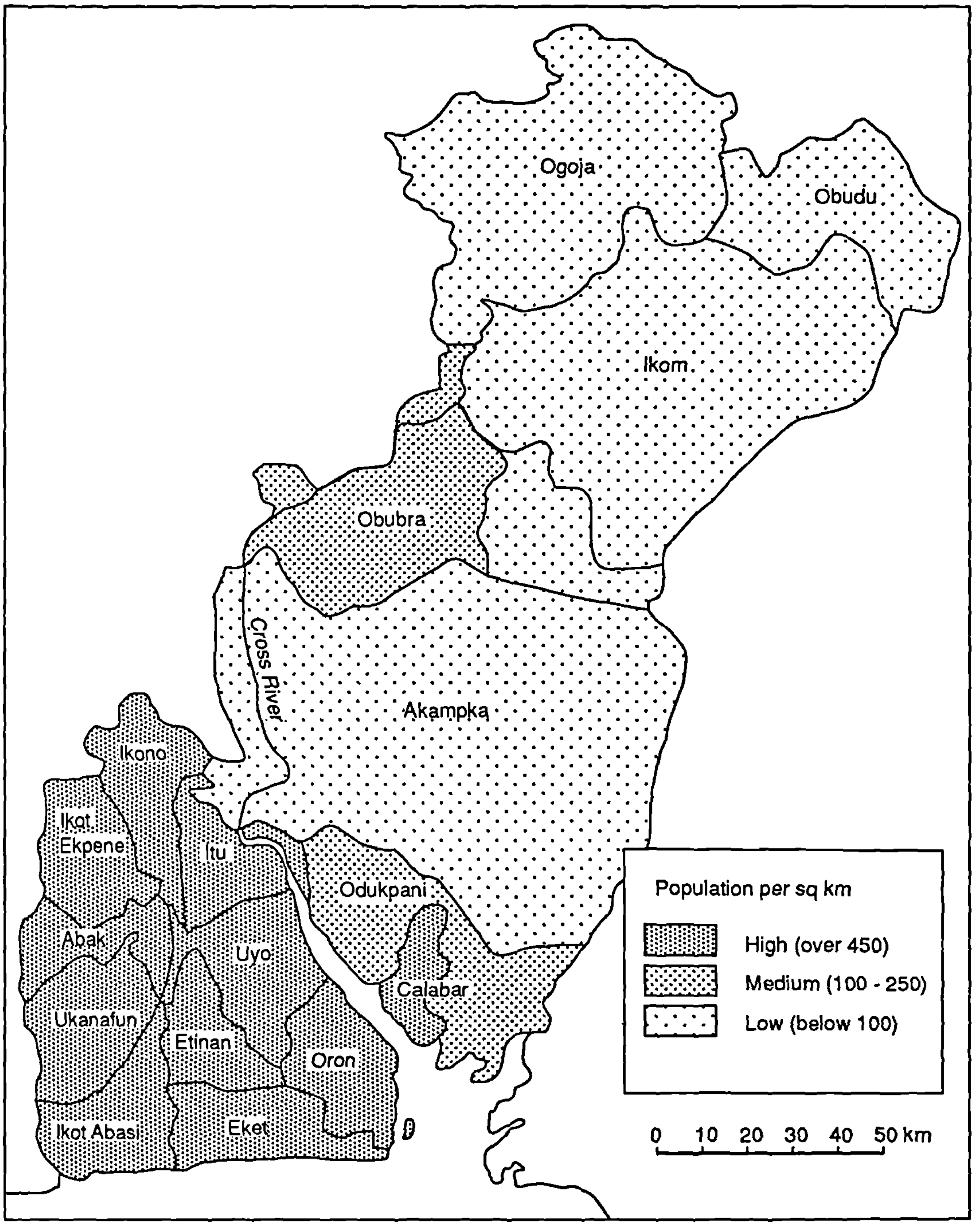
Cross River State: Population by Local Government Area 1986

Local Government Area.	Population (1,000's)	Population density per km sq.	Density rank
Abak	330	645	5
Akampa	195	29	17
Calabar Mun.	194	581	6
Eket	594	801	2
Etinan	485	924	1
Ikom	205	38	16
Ikono	332	464	10
Ikot Abasi	430	543	8
Ikot Ekpene	449	696	3
Itu	280	469	11
Obubra	431	206	12
Obudu	133	84	15
Odukpani	230	135	13
Ogoja	320	91	14
Oron	564	553	7
Ukanafun	399	503	9
Uyo	622	680	4
TOTAL	6,196	216 (mean)	

(source: CRS Governmant Projections from the 1963 Census)

Fig. 4.4

Cross River State: Population Density 1986



the core areas of Igboland and Yorubaland, and the whole of the Mainland plus Calabar has densities over 450 persons per square kilometre. East of the Cross River, apart from Calabar, densities are lower, generally below 200 persons per square kilometre, and only 29 in Akampka LGA which has large uninhabited areas.

Areas of high population density appear to be related to cultural cores rather than to favourable environmental conditions. Relief nowhere especially promotes or inhibits human settlement. The areas of highest density occupy the poorest soils, on the Coastal Plains Sands. It has been suggested that their lightness and ease of clearing initially allowed successful settlement and cultivation. The Mainland area occupies only one third of the region but has almost three quarters of the population.

Demography

Demographic data are from the 1963 census and occasional sample surveys. Calabar was a declining urban area at the time of the 1963 census until 1967 when it became capital of the new South-Eastern State. In 1979 its growth was further stimulated when the bridge over the Cross River at Itu was completed, providing a road link with the rest of Nigeria. The official projection of the population of Calabar municipality based on an annual growth rate of 3 per cent may be underestimated. Calabar is a medium-sized town for Nigeria, and studies have shown that such towns in the 1970s had annual rates of growth varying between 6.6 per cent and 10.1 per cent, with a mean of 8.3 per cent (Ekanem, 1980).

Accepting this estimated mean for Calabar it is possible that the 1983 population was 419,457, rather than 177,800, the official projection.

Information on fertility, crude birth rates and life expectancy in Calabar is available from small sample surveys in urban areas in the 1970s (Ekanem, 1980). These report a mean completed family size of 6.5 children, and a crude birth rate of 43 per thousand population. High growth rates for Calabar can thus be deduced, and attributed to both natural increase and immigration.

In a study of 1350 households with 4,042 people in Calabar in 1975, 40 per cent were under 15, 50 per cent 16 - 50, and 10 per cent over 50. The sex ratio was 147 overall. These results are consistent with other studies of age-sex ratios in African urban areas which show more males. The differential is greater for the migrants (153) than for the indigenes (125) and is 147 for the whole sample (Ekanem, 1980).

Calabar can be regarded as the only true urban area in the region, but the rapid development of Uyo since 1987 as the capital of Akwa Ibom State will confer urban characteristics on its demographic pattern. In the absence of demographic data for the rural areas general observations only can be made. High birth rates and high rates of infant mortality with low life expectancy are typical of the rural population in tropical Africa. Birth rates may be lower and death rates may be higher than for the urban area of Calabar. The main difference is likely to be in the higher proportion of females in the rural population, due to the significant level of male out-migration for labour.

MOBILITY

The region is characterised by a high degree of mobility on several spatial and temporal scales, but there are three main types:

1. Rural to urban migration of educated people, mainly to Calabar within the region, and also to the Federal capital.
2. Out-migration of young males, especially from overpopulated rural areas of the Mainland, to other rural areas both within and beyond the Cross River region.
3. Frequent short-term trips for trading, fishing and palm-fruit tapping.

Migrant tenant farmers move from Annang areas especially, to the Akpabuyo district in southern Odukpani in the vicinity of Calabar, and to cocoa farms in the Cameroun Republic and western Nigeria (Udo 1975; Ekpenyong, 1984).

There has been more movement to Calabar since 1967, when it became the state capital, and especially after the end of the Civil War in 1970. Table 4.4 shows the ethnic distribution of a sample of approximately 3,200 migrants to Calabar surveyed in 1975; they were principally local Ibibio/Annang/Efik. The region is only a minor receiving region for migrants from elsewhere in Nigeria. Most are Igbo from the neighbouring area to the west, who provide retailing and other services in many of the Local Government headquarters towns. Other Nigerians are represented in the police, military and other Federal institutions in the region.

TABLE 4.4

Ethnicity and Sex of Immigrants in Calabar 1975

Ethnicity	Male (percentage)	Female (percentage)
Efik	24.4	27.6
Ibibio	52.3	52.2
Annang	9.3	6.2
Other Nigerians	14.0	14.0
TOTAL NUMBER	1,962	1,284

(Source: Ekanem, 1980)

EDUCATION AND LITERACY LEVELS

The Efiks of Calabar displayed an early interest in western education, associated with their pre-colonial commercial enterprises. They invited the Scottish Presbyterian missionaries, hoping to have their children taught English, and the first missionaries arrived in 1846 (McFarlan, 1946). The Presbyterian missionaries were the first to write down the Efik dialect which was used in Calabar, and prepared an Efik dictionary and grammar, and translated the Bible (Essien, 1990). This minority dialect of the Ibibio/Annang/Efik group became the literary form of the language, and became and remains the lingua franca for trading purposes throughout the Cross River basin (Simmons, 1956).

Due to the early contact with the Christian missions, the region has some of the oldest post-primary educational institutions in Nigeria. It also has two universities and a polytechnic. English rather than Pidgin is widely used, except in the north.

Since 1976, when primary school fees were abolished in the Universal Primary Education Programme of the Third National Development Plan, most young people, especially in the Mainland, have attended primary school for a few years at least. Thus most people under 20 have some ability in written and spoken English.

TABLE 4.5

Level of Education of Heads of Households in Calabar 1975 (per cent)

Level of Education	Non-Migrants	Migrants		TOTAL
None	19.0	5.5		8.1
Primary	41.4	38.4		38.9
Secondary and above	39.2	51.6		49.3
No Response	0.4	4.5		3.7
NUMBER	250	1,100		1,350

(Source: Ekanem, 1980)

Nevertheless literacy rates are generally low among the older generation and in the rural areas. The small educated elite from these communities are now in the urban areas, serving in Government, commerce and industry. The 1975 Calabar study provides data on the level of education of heads of the 1350 households enumerated, and showed that migrants had higher levels of education (Table 4.5).

ECONOMIC DEVELOPMENT AND MODERNISATION

Although the region was important in the economic and political development of West Africa in pre-colonial and early colonial times, its growth has stagnated since the inter-war period due to a combination of its geographical location and national politics. The region is spatially peripheral to the core areas of Nigeria. This was reinforced when the plan to construct a railway from Enugu to Calabar was aborted, and Port Harcourt was selected as the coastal terminus. The decision marked a major turning point in the development of the port of Calabar and of the whole region (Udo, 1967). Coastal and river transport, which had given the Cross River basin its early pre-eminence, ceased to provide advantages when transportation became increasingly land based, first with the railways, and then after 1950 with the expanding road network. The Cross River effectively isolated Calabar because of the lack of a road bridge until 1979.

The region possesses rich resources which have contributed significantly to the national economy. The human resources, especially the early adoption of western education, also suggest that this region was likely to benefit from national investment for development. However, in Nigeria ethno-politics have played a significant role in development planning since independence, and have resulted in unequal resource allocation, to the detriment of certain areas which include the study region. The initial creation of twelve states in 1967 was intended to address such inequalities . Nevertheless Cross River State has few federally funded projects, such as roads and industries, and the Ibibio people are poorly represented in high office (Akwa Esop Imaisong Ibibio). Other Nigerian minority groups feel similarly neglected.

The region has a core area in the south which contrasts with a northern periphery of relative underdevelopment. The core coincides with the area of highest population density in Calabar and the neighbouring Mainland area. All the modern industrial development is located here, as well as many of the workshops and services of the informal sector, providing non-agricultural employment, and attracting migrants from the rest of the region. The greater economic diversity of the southern area provides more prosperity, which is evident in the more permanent housing structures, better clothing and higher school attendance especially for secondary school. The absence of data means that this contrast cannot be demonstrated quantitatively.

COMMUNICATIONS AND TRANSPORT

Communication links are important in promoting development and modernisation, but are also a direct result of development and modernisation. The growth of communications and transport within and beyond the region has been closely related to successive phases of economic growth, and the disparities within the region are reflected in the transport network.

Early transport was by waterways of the Cross River system, the Qua Iboe and Imo Rivers, and the coastal creeks. There are areas in the northern part of the region which can only be reached by water for most of the year, and water transport continues to carry people and goods to important traditional waterside markets like Itu. But since the 1940s people and goods have increasingly moved by road.

There are two major highways in the region, the north-south to Benue State and the north of the country, and the east-west to Imo State and the west. There is a dense network of all-season roads in the Mainland area, which have been constructed since the end of the Civil War, although they are in various states of disrepair. Normal daily movement by many rural people throughout the region is by foot. There are several kinds of transport services, such as bicycle, motor-cycle and motor taxis and vans and lorries. The fares are high and mostly beyond the reach of the poor.

The policy of the Federal Government to raise revenue by imposing tolls on major road routes has not helped Calabar's location. The new toll for the Cross River road bridge, implemented in 1988, adds further to the expense of transportation.

MARKETS

The system of daily and periodic markets as the principal means of economic and social exchange is well-known and well-documented for Nigeria (Hodder and Ukwu, 1969). Most markets are for the exchange of produce within the region, but several markets in Ogoja are important in the chain of produce exchange, especially for yam and plantain, supplying a large part of the the densely populated Igbo area.

In the Ibibio area of the south the traditional market week is eight days, and periodic markets are usually held once a week, or in some cases twice. In the north of the region the market week is five days. Some periodic markets are evening ones, and some recently established markets are held on a seven day cycle.

Men and women are probably equally likely to attend local markets up to 15 kilometres, but men are more likely to trade at distant markets. Travel to the latter may be on foot, by canoe, bicycle, motor-cycle taxi or 'pick-up' van.

URBANISATION

The population of the region is predominantly rural. At least six of the LGA headquarters in the region are only villages, but have government offices, a clinic and a police station. They are the nuclei of the towns of the future, as retail and service functions and a growing population are gradually attracted to them, and permanent buildings are constructed.

The creation of Akwa Ibom State has affected the relative development rates of Calabar and Uyo, with Calabar becoming increasingly peripheral both spatially and economically. However, in addition to being capital of Cross River State, the city has other assets such as the Federal University, Nigerian Naval Base, and most of the processing and manufacturing industries of the region, both private and government.

Uyo is a rapidly expanding new state capital benefiting from large investments of government and private capital for the construction of public and commercial buildings, and infrastructure. The establishment of the university in 1983 had already brought additional people and capital to the town, with a huge growth in demand for accommodation and services.

CONCLUSION

The Cross River has played an important part in the history and geography of the region. Its estuary provided easy access, and led to the establishment of early contacts with Europeans. Calabar and other ports eventually became important for the slave trade and subsequent 'legitimate' trade. Development of the latter by the Efiks of Calabar enabled the region to acquire educational establishments and political structures earlier than most other regions of Nigeria.

The river is still an important means of transport locally, but has isolated Calabar from the rest of Nigeria since road transport replaced water transport as the main means of travel, although the bridge at Itu helped to reduce the disadvantage.

The choice of Lagos as capital and of Port Harcourt as the railway terminus, meant that Calabar's early growth and national significance were not sustained. The city and the region have become increasingly peripheral to Nigeria in economic terms, a situation which its offshore oil wealth has not reversed. Its incorporation into Biafra also contributed to its relative decline, with the disruption of the Civil War and damage to its infrastructure through bombing.

The Cross River is the boundary between the Mainland and the rest of the region. The Mainland with Calabar forms the core of the region, socially and economically, and may be a factor in leprosy prevalence.

CHAPTER FIVE

HEALTH AND DISEASE IN THE CROSS RIVER REGION

In order to place the occurrence and treatment of leprosy in the wider context of health and disease in the region, this chapter examines disease patterns, and attitudes to health and disease. The range of choices open to the ill person seeking treatment are analysed.

SOURCES

As usual in developing countries there is a lack of reliable quantitative data on morbidity and mortality, but an attempt is made here to present a general picture. Morbidity data are incomplete because cases are under-reported, and frequently there is poor diagnosis. There is only one pathology laboratory in the region, at the College of Medical Sciences in the University of Calabar. The pathologists believe that diseases exist in the region, for instant schistosomiasis, which are not recorded and for which laboratory diagnosis has never been sought. (Professor E B Attah, personal communication, 1987).

Mortality data is also incomplete, for many reasons. There is no compulsory death registration and hospitals provide only limited mortality data. This is partly because relatives prefer to take patients home when death is imminent, and are mostly unwilling to allow post-mortem examinations due to traditional beliefs.

Government hospitals and clinics fail to report statistics regularly to the Ministry of Health, although reporting procedures are in place. There is an increasing number of private medical practices and no reporting system for them had been developed. Many people rely on traditional medicine or spiritual healing through indigenous African churches, which have no mechanism for case reporting.

The sources for this review include the annual reports of the Cross River State Ministry of Health Epidemiological Unit, and the records of several Hospitals which were visited, although they were generally incomplete. St Luke's Hospital at Anua in Uyo, produced detailed annual reports until the Civil War, and these are referred to.

PATTERN OF HEALTH AND DISEASE

Most of the health-related indicators for Nigeria are typical of countries classified by the World Bank as having low income economies. They have low life expectancy and high infant and child mortality rates, with Nigeria ranked twenty ninth in the world by infant mortality rate (Grant, 1992). Only one per cent of Government expenditure was reportedly allocated to health, and since total expenditure was low, this represents an extremely low health budget (Table 5.1).

Although data on individual diseases are scarce, those available show the dominance of malaria in the country and the region. The role of this disease in debilitating and lowering resistance to other diseases, probably including leprosy, is well-known. The ecological environment for malaria is optimal in the Cross

River region, with high temperatures and high humidity all the year round, and rainfall in most months (Chapter Four).

TABLE 5.1

Nigeria: Health-Related Data

	Nigeria
Life expectancy (1990)	52
Infant mortality (1990)	101 per 1000
Under 5 mortality (1990)	167 per 1000
% of infants with low birth weight (1980 - 88)	20
Daily per capita calorie supply as % of requirements (1988)	86
% of government expenditure allocated to health (1986 - 90)	1

(Source: Grant, 1992)

For the the last three decades at several spatial levels malaria has ranked first as a cause of reported illness (Barbour et al, 1982; CRS Ministry of Health Annual Reports, 1980 - 86; Anua Hospital Annual Report, 1962 - 3). Although the recommended methods for avoiding contact with the mosquito are well-known in the region, few precautions are taken. Official control of malaria mainly consists of the spraying of vector habitats in the urban area of Calabar when insecticide is available (State Epidemiological Unit, Calabar, personal communication, 1986). Domestic control of the insect is limited to the occasional use of insecticide sprays and the burning of mosquito coils, but only because of the nuisance value of the insects. The psychology explaining this lack of preventive behaviour may be relevant in understanding individual attitudes to the control of other diseases including leprosy.

Tropical diseases such as filariasis, guinea worm, yaws and yellow fever, occur in the region (CRS Ministry of Health Reports, various years). Other major causes of ill-health are associated with low standards of living and poor hygiene and sanitation: dysentery, typhoid, intestinal worms, cholera, ringworm and nutritional diseases. Tuberculosis is reportedly increasing in both rural and urban areas (Dr C. Edem, Medical Officer in charge of Infectious Diseases Hospital, Calabar personal communication, 1986). There are also diseases of childhood, such as measles, whooping cough, polio and diptheria, which are preventable with immunisation. Degenerative diseases such as stroke and cardiovascualr disease are reported but uncommon. Cancers are probably more common than these, but are rarely reported in hospitals. There is an increasing number of deaths due to road traffic accidents caused by the extension of road networks.

The people of the region, especially the rural poor, are frequently suffering simultaneously from several infections combined with poor nutrition. The problem of multiple pathologies in sub-Saharan Africa has been well-documented, and was recorded in the reports of Anua hospital.

> 'The physician on the ward round or in the out patient clinic is confronted with a wonderful variety of pathology. Double or even treble pathology is only too common. In practically all cases the presenting pathology is further complicated by conditions peculiar to the tropics, e.g. Hook-worm infestation; Filariasis etc. Malaria and its sequelae are so common that they are not classified in this report, yet they must always be borne in mind.'
> (St. Luke's Hospital Anua, Medical Report, 1962/3 p 24)

The same problem is shown in the leprosy hospital patient records. Newly-diagnosed patients admitted to the leprosy hospitals are routinely examined, and the blood, urine and stools tests usually reveal roundworm, hookworm and amoebic infections, as well as avitaminosis and anaemia. In the first decades after the establishment of leprosy hospitals, before the introduction of modern chemotherapy, patients were treated for these other conditions, and it was conceded that this significantly contributed to an improvement in their leprosy (Macdonald, 1957).

Nutritional deficiency is rarely a direct cause of illness and death, but has been shown, like malaria, to be associated with general ill health and susceptibility to infection, in many parts of West Africa including the study area. (Collis, et al 1962; Hughes and Hunter 1970; Udo 1971; Uyanga 1979).

Udo (1971) identified nine food-deficit areas in Nigeria, one of which was 'the congested districts of Abak, Ikot Ekpene and parts of Uyo' which coincides with a large part of the Mainland area of the study region. The ratio of weight to height in children was used as an index for measuring food deficit, and the area of the present study showed the greatest food deficit (Udo 1971). It was described as overpopulated in relation to the local food supply, with a shortage of calories. A subsequent study of nutrition in the region concluded that nutritional intake was 'far below the Nigerian national average' (Uyanga 1979).

Dietary deficiencies were also reported during the 1960s by the hospital in Uyo:

> 'It is rare to see frank starvation, but protein deficiency and vitamin B deficiency is commonly seen....'
> (St. Luke's Hospital Anua Medical Report In-Patients 1962/3 p 30).

The 1965 Paediatric Report gave 85 cases of malnutrition during the previous year: 39 cases of calorie malnutrition, 24 cases of moderate kwashiorkor, and 22 cases of severe kwashiorkor.

Observations and discussions during fieldwork suggest that the nutritional status, especially of children, fluctuates according to macro-economic factors. For instance there were severe problems during and following the Civil War (1967-70). Nutrition improved during the economic boom of the later 1970s and was probably fair when the Uyanga study (1979) was conducted. In 1983 the leprosy doctor in Etinan stated that 'we never see kwashiorkor now.' However, during the later 1980s, when Nigeria was suffering from economic austerity, there were rising food prices and a deterioration in nutrition and the present writer saw several children with marasmus in the hospital in Ogoja in June 1987.

ILLNESS BELIEFS

This large subject can only be touched upon here; the purpose is to provide a context for an understanding of health care systems, and the analysis later of specific attitudes to leprosy (Chapter Eleven).

At its foundation in 1948 the WHO indicated that health is 'a state of physical, mental and social well-being, not merely the absence of infirmity'. Disease may be defined as physical disfunction, and illness as the personal experience of disease, but these are relative concepts and sociologists regard them as social constructs viewed differently by different societies (Neylan et al, 1988).

Western medicine has frequently been accused of being pre-occupied with physically-specific disease rather than with the whole illness experience, whereas attitudes to-wards health and illness in most African societies reveal a more holistic view. Health:

> 'concerns a person's body , but equally it concerns a person's relationship to other people. This relationship extends to the family and the wider circle of the clan and the tribe, as well as ancestors and spirits. Health is not an individual matter. It is a matter of a person's well-being in the context of the community.'
> (Fuglesang 1989, p 4)

Bannerman et al (1983) have commented that the WHO definition of health fits the outlook of traditional medicine better than western medicine.

In African medicine the medical and religious elements are never completely separate. Certain diseases which have known causes and cures in western medicine may be attributed to supernatural or 'personalistic' causes (Foster 1983). These include deities who punish wrongdoers, ancestors, witches who work for personal reasons or for hire, and spirit possession. They require remedies which may have little or no connection with the patient's disease.

It is widely believed that western medicine is ineffective for some ailments (Okafor 1983). Informants in the study area stated that certain diseases are 'not for hospital,' and have to be treated by 'strong medicine'. Mental disorders and leprosy are commonly included in this group. However, in some people's perception there is an apparent combination of causes, because even diseases demonstrated under the microscope to be 'caused' by a germ have invoked the response 'but I have that germ in my blood because it was put there by witchcraft.' Koumare (1983) has also reported the concept in African medicine of 'natural' and supernatural' causes of illness, and has noted that a 'non-natural' disease may take the form of a 'natural' disease when it is inflicted as an act of vengeance. This framework is useful in understanding the concept of leprosy causation in the Cross River region.

In the study region there are separate views of acute and chronic disease, and impatience with long-term biomedical treatment. The 1965 report for Anua described this:

> 'Chronic ill health is not well understood by the people in general and a common outcome is to disappear and try their luck elsewhere. They wander from hospital to hospital and on to the charlatans and witch doctors. Their family and friends gradually grow tired and lose interest in these victims who struggle on until hopelessly and finally they succumb after years of suffering and mental anguish.'
> (p 17)

Good (1988) also reported a distinction in African responses to acute and chronic disease, where biomedicine is available it is commonly selected for acute and life-threatening diseases, and traditional treatments are regarded as more appropriate and reliable for less threatening disease.

There are implications for leprosy control arising from these beliefs because they frequently cause delays in seeking treatment, or impatience with long term therapy. Consequently, complications and disabilities are greater, and the infection continues to be transmitted.

HEALTH CARE SYSTEMS

There is a wide range of medical provision within the region, based on both 'indigenous' and 'western' practices. Western scientific medicine for many Nigerians is only one of several alternatives available. John Orley (1980) claimed that Western scientific medicine came as one more alternative to the numerous medical systems already available to the African patient.

> 'The Africans being pragmatists looked for a system that worked and if one traditional remedy failed then another could be tried until eventually Western medical treatment could also be given its chance.'
> (p 127)

Orley also comments:

> 'We have, however to accept that a reason for the continuance of traditional medicine in Africa is the failure of western scientific medicine at times.'
> (p 127)

Since its introduction Western medicine has been biased in favour of curative services. Okafor (1988) has observed that during three decades of independence, health planning and expenditure have emphasised curative medicine, although the first National Development Plan 1962-68 proposed the establishment of a National Institute of Preventive Medicine directed at the eradication of preventable diseases. But the spending allocated to this amounted to only 1.45 per cent of the total proposed capital expenditure on health.

Preventive medicine through immunisation and selected public health measures has been in existence since the colonial period. It was piecemeal, achieving success when targeting specific diseases, as in the case of smallpox and yaws. In the 1980s the Nigerian Government launched the Expanded Programme of Immunisation (EPI), with support from UNICEF which supplied vehicles, refrigerators and cold boxes. Immunisation is provided against six infections: measles, polio, tuberculosis, typhoid, whooping cough and diphtheria.

In Cross River, implementation is highest in Calabar and in several Local Government Areas in the south, such as Eket, but had hardly begun by 1988 in some districts when this writer accompanied ministry officials on visits to Akampka and Odukpani to request co-operation in the launch of the EPI programme.
National coverage so far is poor: in 1988 it was reportedly 50 per cent, placing Nigeria only in 31st position for Africa (Grant, 1990). But the figures conceal the problem of the large percentage receiving the first dose who fail to report for the second or third. The WHO/UNICEF Report on the State of the World's Children 1989 stated that the drop-out rate for Africa was over one third and was rising, whereas in the rest of the world it was dropping (Grant, 1989). The drop-out rate may explain why several children were in Ogoja hospital in 1987 with complications from measles, although their mothers claimed that they had been immunised.

Another explanation is that the cold chain may have been broken during vaccine storage or transport. Both of these factors have been recognised as problems in the successful implementation of the immunisation programme in less developed areas.

In the Cross River region western medicine is provided by a range of facilities:

1. Government institutions: hospitals, dispensaries, clinics, maternity units;
2. Private hospitals and clinics;
3. Private pharmacies with qualified pharmacists offering advice and giving injections
4. 'Patent Medicine Stores' selling proprietary products and offering advice, usually in markets
5. Mobile medicine vans advertising and selling high cost 'miracle cures,' mainly vitamins and mineral tonics.

In almost all cases the patient pays the costs for diagnosis and treatment at the point of delivery, except for the treatment of tuberculosis and leprosy in government institutions, which is officially free of charge.

The Government institutions form a hierarchy ranging from the Federal Government teaching hospital in Calabar to small rural clinics (Table 5.2). Some government hospitals and clinics were originally established by voluntary agencies during the colonial period, but were taken over by the government after independence, although in most cases the agencies continue to provide some support.

TABLE 5.2

Cross River State: Hierarchy of Government Medical Institutions 1986

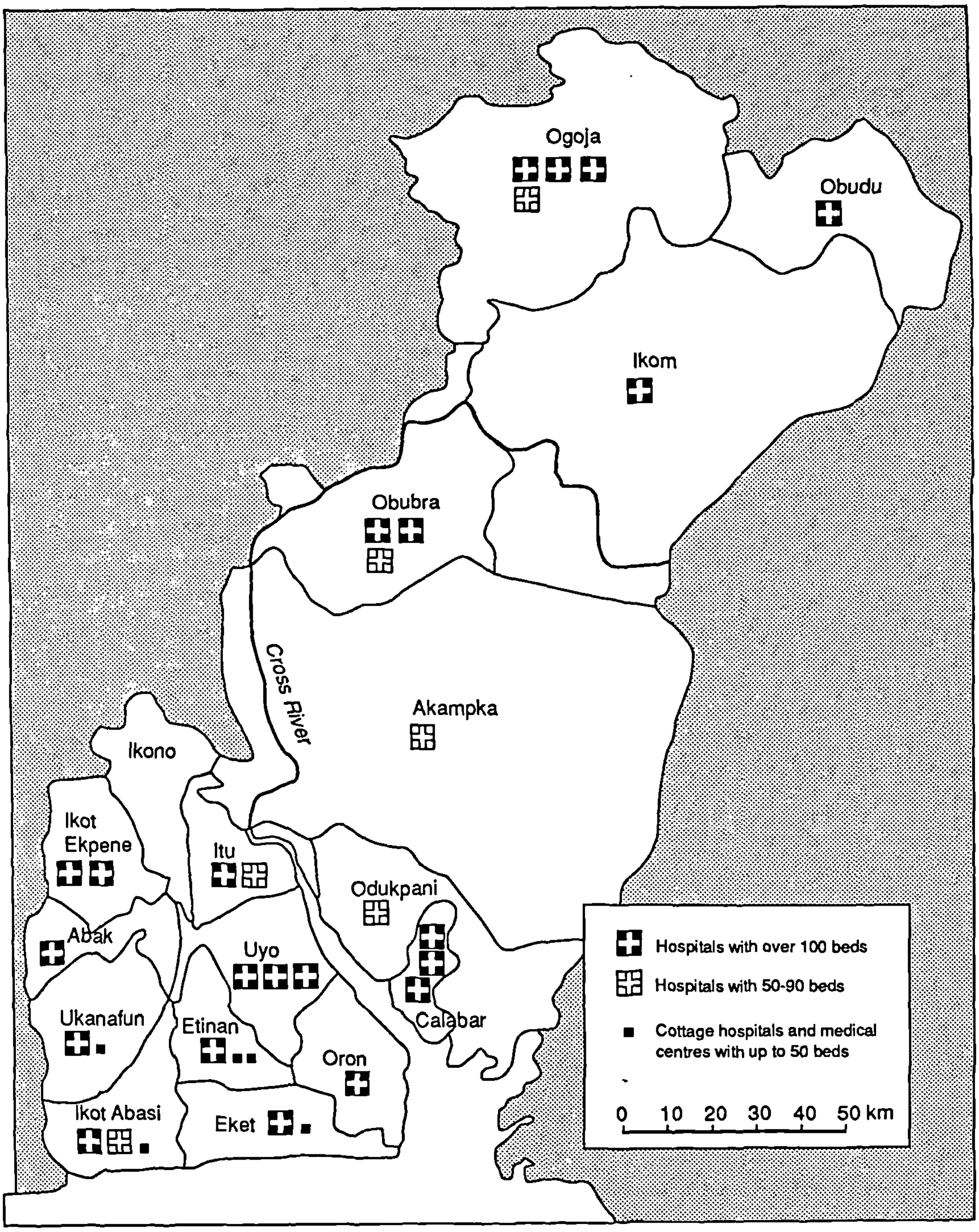
Teaching Hospital	1
SPECIALIST HOSPITALS (Infectious diseases, leprosy, maternity, psychiatric, tuberculosis)	7
General Hospitals	22
Cottage Hospitals	5
Epidemiological Units	17
Health Centres	
Rural Clinics and Dispensaries	

(Source: CRS Ministry of Health, 1987)

In 1984 there were 136 doctors, mostly Nigerian, serving in the State Government hospitals (CRS Ministry of Health, 1985), a large number in the Federal Government University Teaching Hospital in Calabar, and an increasing number in private practice.

Cuts in Government expenditure in the mid-1980s led the Cross River State Government to encourage medical doctors to move from the public sector into private practice. Western medicine is therefore increasingly available in private hospitals and clinics. Most of these cater for in- and out-patients, and provide services such as X-rays and laboratory tests which are not always available in the Government institutions due to cutbacks. Thus a patient may take a mix from the public and private sectors, although services in the private sector are very expensive.

Fig. 5.1
Cross River State, Nigeria: Location of Government Hospitals, 1986



Source: CRS, Ministry of Health Report, 1986

As elsewhere, medical facilities are unequally distributed. Chiwuzie et al (1987) noted that 80 per cent of the Nigerian population lives in the rural areas where only 20 per cent of the health services are located, and Okafor (1984, 1988) has also commented on the unequal geographical distribution between urban and rural areas, and between states. The Cross River region shows that there are also inequalities in provision between Local Government Areas within the State (Fig 5.1). The increase in the private sector is not leading to more spatial equality in provision as there are marked rural-urban disparities in medical facilities as explained by Barbour (1982):

> 'It is hard to persuade young Nigerian doctors to work in remote rural areas....and....doctors will always establish their clinics where they find customers able and willing to afford their services.'
> (p 54)

As well as the unequal geographical access to facilities, there is unequal access on the basis of cost, and this is inevitably increasing with the expansion of private medicine and the reduction in government provision.

TRADITIONAL MEDICINE

In contrast, traditional medicine is widely available and is accessible to all sectors of the population. Chiwuzie et al (1987) estimate that seventy per cent of Nigerians consult traditional medical practitioners (TMPs). There is only fragmentary evidence of their numbers, but Last (1986) reports that TMPs are much more numerous than western medical practitioners in Africa, and estimates that they provide health care for 80 to 90 per cent of the rural population. Koumare (1983) estimates that there is one traditional healer to 500 people in Africa, in contrast to one western doctor to 40,000 people. Although traditional medicine can be expensive, the methods of payment are more flexible than for western medicine, with the option of payment 'in kind', thus increasing its effective accessibility.

African traditional medicine has been described as

> 'the total body of knowledge, techniques for the preparation and use of substances, measures and practices in use, whether explicable or not, that are based on the sociocultural and religious bedrock of African communities, are founded on personal experience and observations handed down from generation to generation, either verbally or in writing, and are used for the diagnosis, prevention or elimination of imbalances in physical, mental or social well-being.'
>
> (Koumare et al 1983, p 25)

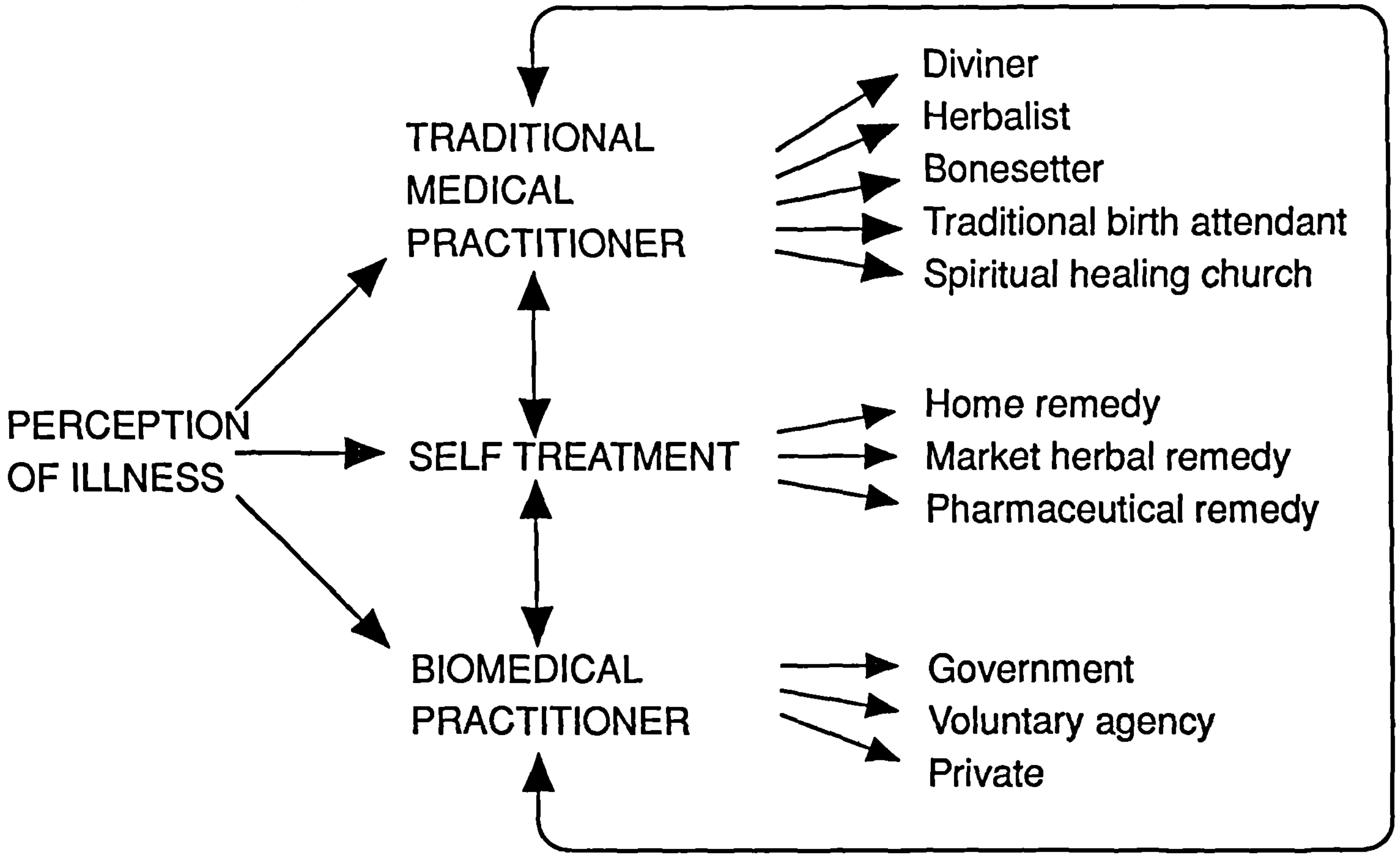
The term 'traditional medicine' is used here, but it is recognised that there are problems with the term. Its dynamic character has been noted by Good (1988):

> 'Any tendency to view African traditional medicine as static or retrograde will not be supported by observation. Instead it is absorbing new ideas and methods and adapting to the rapidly changing contexts of African social and economic life.'
> (p 14)

The terms 'indigenous' and 'African' are sometimes employed, but also lack precision, because 'African' medicine is usually a syncretism of African and non-African concepts and skills, which are continually evolving.

There are four categories of traditional practitioners widely recognised in sub-Saharan Africa: diviners, herbalists, traditional birth attendants and the more specialist bone-setters. All are found throughout the study region. Practitioners in Calabar operate from 'healing homes', and many appear to combine the functions of herbalist and diviner. The three main types of TMPs are numerous and widespread, but there are fewer bone-setters, and certain well-known ones attract clients from a distance.

Fig. 5.2
Cross River State: Choices in Medical Treatment



In addition to these four groups, faith healers are numerous, and combine traditional African philosophies with Christian beliefs. Spiritual healing churches are located in both rural areas and urban centres, and are frequently places of refuge for the dying. Uyanga (1979b) has described the medical role of such churches in the Mainland area of the region, which

> 'can also boast of many more and strange churches than any other part of Nigeria.'
> (p 48)

There is therefore a variety of health care in the region, providing choice to individuals. Good (1988) has identified the range of health care strategies adopted by a community as an 'ethnomedical system', comprising the professional spheres of western and traditional medicine, and the popular sphere of self-help which may adopt either biomedical or traditional strategies or both. Figure 5.2 illustrates these choices, and shows that the patient frequently moves between systems. The factors influencing the initial choice of traditional or western medicine relate to a combination of the nature of the illness and the characteristics of the patient and family, and include the following:

perceived nature of the illness
beliefs about the cause of the illness
history and severity of the illness
age and status of the patient
level of education of people involved
financial status
accessibility and convenience
fame of specific curers

Since the mid-1970s the WHO has been encouraging the Governments of developing countries to be more open-minded about traditional medicine. Traditional medicine was endorsed in the Declaration of Alma Ata in September 1978, which encouraged its incorporation in Primary Health Care (PHC). Progress in the official integration of traditional medicine into PHC programmes in Africa has been slow for many reasons, which have been examined and discussed elsewhere (Good 1988, Oyebola 1986). Progress was made in Nigeria during the Second Republic 1979-83, when traditional medicine gained Government recognition in line with the Alma Ata Declaration, but formal incorporation has been slow, and traditional medicine in Nigeria, like many African countries, is legally tolerated (Oyebola 1986).

Mabogunje (1980) recognised the potential role of TMPs in the development process and recommended their mobilisation:

> 'To wait until there are adequate numbers of Western trained doctors before a significant segment can have access to health care, is to be guilty of inhibiting the release of vitally needed and latent productive capabilities................a mobilised society would be forced to incorporate the resources represented by these traditional forms of health service, to use them in a more systematic way to reach out deliberately to a larger proportion of the population...'
> (p 336)

Views on the value of traditional medicine and its incorporation range from negative 'unwarranted objections' to 'optimistic overassessments', and Phillips (1990) warns against both. Colonial attitudes to traditional medicine in the region were typically negative; misunderstanding and fear were usual, and traditional medicine was frequently suppressed by officials, missionaries and traders. The rules laid down by Hope Waddell, one of the first missionaries in the area in 1846 and founder of one of the first western educational institutions in Nigeria, demonstrate this:

> 'Use no native medicine, employ no native doctor, drink no rum, pray to Jesus for a blessing, and praise him for recovery.' (McFarlan, 1946, p 39).

Enthusiasm for traditional medicine may ignore some potential dangers (Velimirovic 1992). Koumare (1983) strongly advocates a coherent policy to promote TM in national health programmes in Africa, but recognises that the public needs protection against malpractice. Nigerian doctors and medical students showed general approval for merging western and traditional medical systems, but

> 'condemned TMPs who were guilty of charlatanism, witchcraft, and, most importantly, a failure to acknowledge the limits of their skills and competence, and associated reluctance to refer their patients promptly'
> (Chiwuzie et al, 1987).

TABLE 5.3

Adults Reporting to Anua Hospital with Complications Arising from 'Native Treatment'

	1961 and 1962	1964
cases admitted	89	41
deaths	13	15

(Source: St Lukes Hospital, Anua, Annual Medical Reports 1961/2; 1964)

Reports from patients during fieldwork indicated that traditional medicine almost always did more clinical harm than good for leprosy. Foster (1983) provides a reminder that TMPs cure, but that they may also cause illness through sorcery, and do not take the Hippocratic oath. Learmonth (1988) has noted that traditional medicine, like western medicine, has its iatrogenic casualties. Such casualties may resort to western medicine, as Anua Hospital reports reveal (Table 5.3).

CONCLUSION

The chapter shows that illness in the region is dominated by malaria, multipathologies and malnutrition, and it is against this background that leprosy occurs. The immune status of an individual affects the outcome of infection with *M. leprae*, and is known to be impaired by poor nutrition and concurrent infections. It is suggested here that the characteristics of ill-health in the region may provide risk factors for the continuing prevalence of leprosy.

An understanding of concepts in traditional medicine and indigenous attitudes towards illness aids an understanding of the responses of leprosy patients to their disease. There is a plurality of health care available in the region, and traditional medicine has a prominent role, especially, but not exclusively in rural areas. An acknowledgement of its importance should be taken into account in case-finding and case-holding in leprosy, and there are sound reasons for drawing TMPs into the leprosy control programme. This is entirely consistent with the WHO recommendations on their incorporation into Primary Health Care.

CHAPTER SIX

LEPROSY IN NIGERIA

THE GLOBAL CONTEXT

Nigeria was ranked third in the world for the number of cases by country in 1991 and had 46 per cent of Africa's total registered cases (Tables 6.1 and 6.2). By registered prevalence rate it was ranked thirteenth in the world, with 1.37 cases per thousand people, which was double the mean for Africa (Gelin, 1992)

There have been changes in the presentation by the WHO of the numbers of leprosy cases. For the first time in 1993 the WHO reported the estimated as well as the registered number of cases in the top 25 leprosy-endemic countries (Weekly Epidemiological Record No 25 1993). The number of cases in Nigeria was revised downwards, placing the country fourth for registered cases and sixth for estimated cases (Table 6.3). Since only one quarter of those registered were reportedly receiving the new short-term multidrug therapy (MDT) in 1993 (Table 6.3), the number of leprosy cases in Nigeria is likely to remain high for the foreseeable future.

TABLE 6.1

World: Countries by rank order of registered leprosy cases, and MDT coverage 1991

Rank	Country	Reg cases	MDT%
1	India	1,965,000	46
2	Brazil	259,917	19
3	Nigeria	153,631	9
4	Indonesia	92,035	40
5	Myanmar	78,499	32

(Source: Gelin, 1992)

TABLE 6.2

Africa: Leprosy rates and numbers 1991

	Africa	Nigeria
Prevalence rate per 1000 population	0.62	1.37
Total number of registered cases	332,311	153,631

(Source: Gelin, 1992)

TABLE 6.3

World: Registered leprosy cases, estimated cases and MDT coverage, 1993

Rank	Country	Reg cases	Est cases	MDT%
1	India	1,459,000	1,677,000	51
2	Brazil	250,000	284,000	25
3	Indonesia	75,000	170,000	49
4	Nigeria	62,000	63,000	24
5	Myanmar	57,000	120,000	56

(Source: WHO, 1993b)

Nigeria was recognised several decades ago as 'The country in Africa where there is probably most leprosy' (Muir, 1940, p 139). At the 1939 Nigeria Leprosy Conference it was stated

> 'Of the countries of the world probably only India and China contain a greater number of lepers than Nigeria, but even in those two countries the incidence of the disease is probably not so high as it is here.'
> (Briercliffe, 1940, p 84)

Since 1938 estimates have consistently suggested that one per cent of the population in Nigeria has leprosy (Schram, 1971), including a recent Federal Ministry of Health estimate of one million cases in an estimated population then of over 100 million (Federal Ministry of Health, 1987, unpublished document). Although the WHO believes that this is very unlikely and the true leprosy figures for Nigeria are uncertain, there is no doubt that it is a serious problem in the country and that Nigeria is still one of the most heavily infected countries in the world.

THE ORIGIN OF LEPROSY IN NIGERIA

There has long been debate about the continent of origin of leprosy. Hoffman (1932) claimed that 4,000 year-old Egyptian documents reported leprosy among Sudanese slaves, and he believed that tropical Africa was the original home of the disease. Browne (1985) rejects the early Egyptian evidence as inconclusive, and claims that the earliest textual reference to true leprosy in Africa dates from 62 BC, when Roman troops returned with leprosy after being stationed in Lower Egypt. The earliest archaeological evidence of leprosy in Egyptians is from recent excavations of burials from the second century BC.

Most scholars favour the view of an Asian origin, believing that the earliest descriptions of true leprosy are dated 600 BC and come from India (Browne, 1985). However, whether an African or Indian origin or even a dual origin is the case, it is generally believed that the disease came into Nigeria from the north and east. Mayer (1930) proposed that after its introduction it was spread by Muslim slave-raiding in the north and middle regions after 1000 AD, and in the south in later centuries by population movements associated with the Atlantic slave trade.

DISTRIBUTION

Since leprosy was first reported in Nigeria during the colonial period a great variation in prevalence rates has been recognised. The most recently reported rates, for 1982 and 1990 suggest that most of northern Nigeria has rates above the mean, while very low rates occur in the Yoruba states of the south-west (Tables 6.4, and 6.5 Fig 6.1).

Although high prevalence rates have long been recognised in the north of Nigeria, the very high rates still reported in certain northern states are generally doubted. Recent reviews of registers in Katsina State revealed that the number of registered cases exceeded by many times the number receiving treatment (Waaldjik, 1989). Names on registers were found to represent either cured cases, dead patients, people who had never had leprosy, or fake names. Results of this review were reported to the WHO, and result in the lower rates registered for Kaduna and Kano States in 1990, compared with the rest of the north, which had not been reviewed (Table 6.5).

Recent reviews of registers in parts of Cross River and Imo States prior to the proposed introduction of MDT, have shown a similar situation to Katsina, but with smaller discrepancies (Unpublished hospital reports, Uzuakoli, 1987 and Moniaya, 1985-6). On the other hand there is also under-reporting of leprosy, with undetected cases discovered during occasional surveys, (for example, Survey Report for Itu, Ekpene Obum Hospital Report, unpublished, 1992). In Rivers State artificially low rates are reported because there is negligible leprosy work, resulting in some patients presenting for treatment in neighbouring states (Chapter Twelve).

TABLE 6.4

Nigeria: Leprosy Rates by State 1982

States	Population (1,000's)	Registered Cases	Prevalence Rate per 1000	Prevalence Rank
Ondo	4,571	949	0.21	18
Lagos	2,648	779	0.29	17
Ogun	3,399	1,624	0.48	15
Oyo	8,193	698	0.09	19
Bendel	4,293	5,318	1.14	13
Borno	4,694	19,550	4.16	5
Kwara	2,814	10,950	3.89	8
Niger	1,995	12,131	6.08	4
Sokoto	7,125	46,000	6.46	2
Bauchi	4,000	16,209	4.05	7
Gongola	4,713	16,000	3.39	9
Kano	9,065	30,320	3.34	10
Kaduna	6,434	40,250	6.26	3
Anambra	5,683	7,190	1.39	12
Imo	4,662	5,096	1.27	14
Cross River	5,695	8,313	1.46	11
Rivers	2,602	837	0.32	16
Benue	3,802	34,050	8.96	1
Plateau	3,181	12,925	4.06	6
TOTAL	89,569	270,179	3.02	

(Source: Declercq et al, 1989)

TABLE 6.5

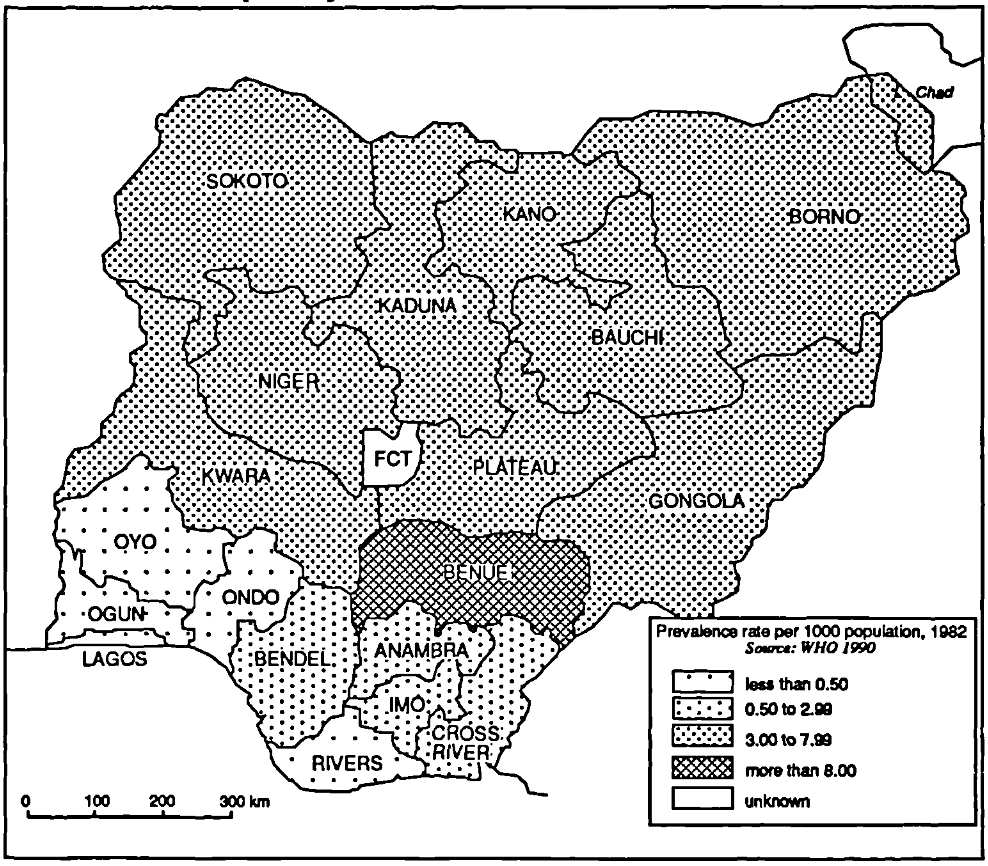
Nigeria: Leprosy Rates by State 1990

States	Population (1,000's)	Registered Cases	Prevalence Rate per 1000	Prevalence Rank
Ondo	5,700	1,094	0.19	15
Lagos	4,020	600	0.15	18
Ogun	3,250	591	0.18	16
Oyo	10,890	769	0.07	19
Bendel	5,150	816	0.16	17
Borno	6,680	18,000	2.69	4
Kwara	3,590	7,034	1.96	6
Niger	2,500	14,654	5.86	2
Sokoto	4,490	41,554	9.25	1
Bauchi	5,080	8,509	1.68	8
Gongola	5,450	11,168	2.05	5
Kano	12,080	7,500	0.62	10
Kaduna	8,570	2,930	0.34	11
Anambra	7,510	5,320	0.71	9
Imo	7,670	2,125	0.28	14
Cross River	7,270	2,263	0.31	12
Rivers	3,600	1,095	0.30	13
Benue	5,070	19,570	3.86	3
Plateau	4,240	8,039	1.90	7
TOTAL	112,810,	153,631	1.36	

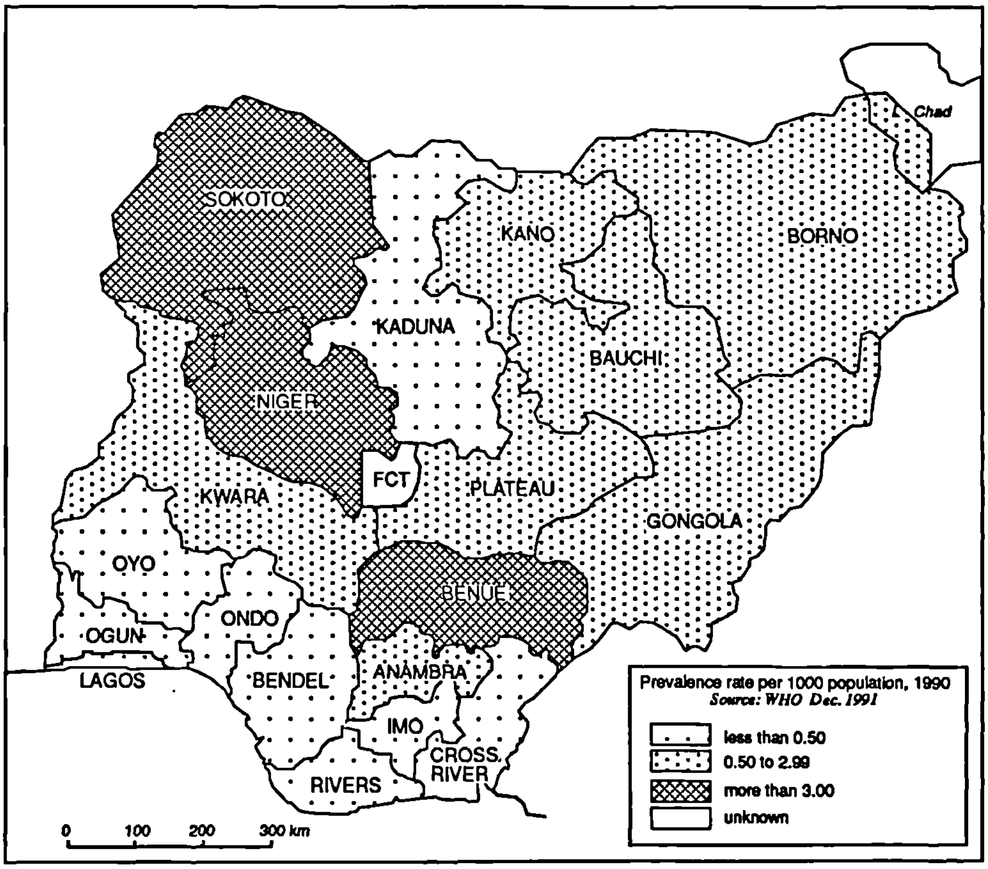
(Source: Gelin et al, 1991)

Fig. 6.1

NIGERIA - Leprosy Prevalence Rate 1982



NIGERIA - Leprosy Prevalence Rate 1990



THE COLONIAL PERIOD

The existence of leprosy in the territory now called Nigeria has long been recognised (Seale 1957). Nigeria did not exist as a colony at the time of the leprosy report to the Royal College of Physicians in 1867. The report for Sierra Leone, the only colonial territory in West Africa, states

> ". . . (leprosy) is altogether confined to the natives, and particularly to those who come from the Niger and Congo neighbourhoods.. . . They are principally liberated Africans, who brought the disease with them."
> (Royal College of Physicians, 1867, p 52).

The 1921 census provides the earliest figures for the number of leprosy cases in Nigeria (Tables 6.6, 6.7, Fig 6.2). The rates were high for Northern Nigeria and were noted to be ten times higher than for India (Cochrane, 1928). The rates for the South were much lower, but the colonial officer responsible for the census report stated that leprosy existed to a 'larger extent' than indicated because 'census officials could not go into the matter at all thoroughly.' (p 171, Talbot, 1926).

The next report was in 1927, an estimate for the World Survey which suggested 90,000 cases, a prevalence rate of 4.7 per thousand (Cochrane, 1928). Susequently there was an attempt to describe and explain the distribution of leprosy in Nigeria, based on replies to a questionnaire sent to medical departments in each Province (Mayer, 1929 and 1930). Maps were published before ('tentative') and after, and although there are anomalies, the consistent feature is the low leprosy rate in the southwest (Figure 6.3).

All of these estimates were made prior to the effects of the introduction of leprosy treatment in the south east which revealed that there was more leprosy than hitherto realised. In relation to the Igbo area, it was later remarked that:

> 'The hope of a cure broke through the barrier of secrecy that the people with leprosy had maintained, and it became evident that this was one of the most heavily infected parts of the world'.
> (Brown 1960 p 2)

TABLE 6.6

1921 Census - Northern and Southern Nigeria: Numbers of Leprosy Cases

	Leprosy Cases		Population	Rate per 1000
	Males Females	Total		
Northern Nigeria	19,413 13,359	32,772	10M	3.2
Southern Nigeria		7,251	8M	0.9
TOTAL		40,023	18M	2.2

(Sources: Compiled from Cochrane, 1928; Talbot, 1926)

Fig. 6.2

Nigeria Census 1921 : Leprosy Rates

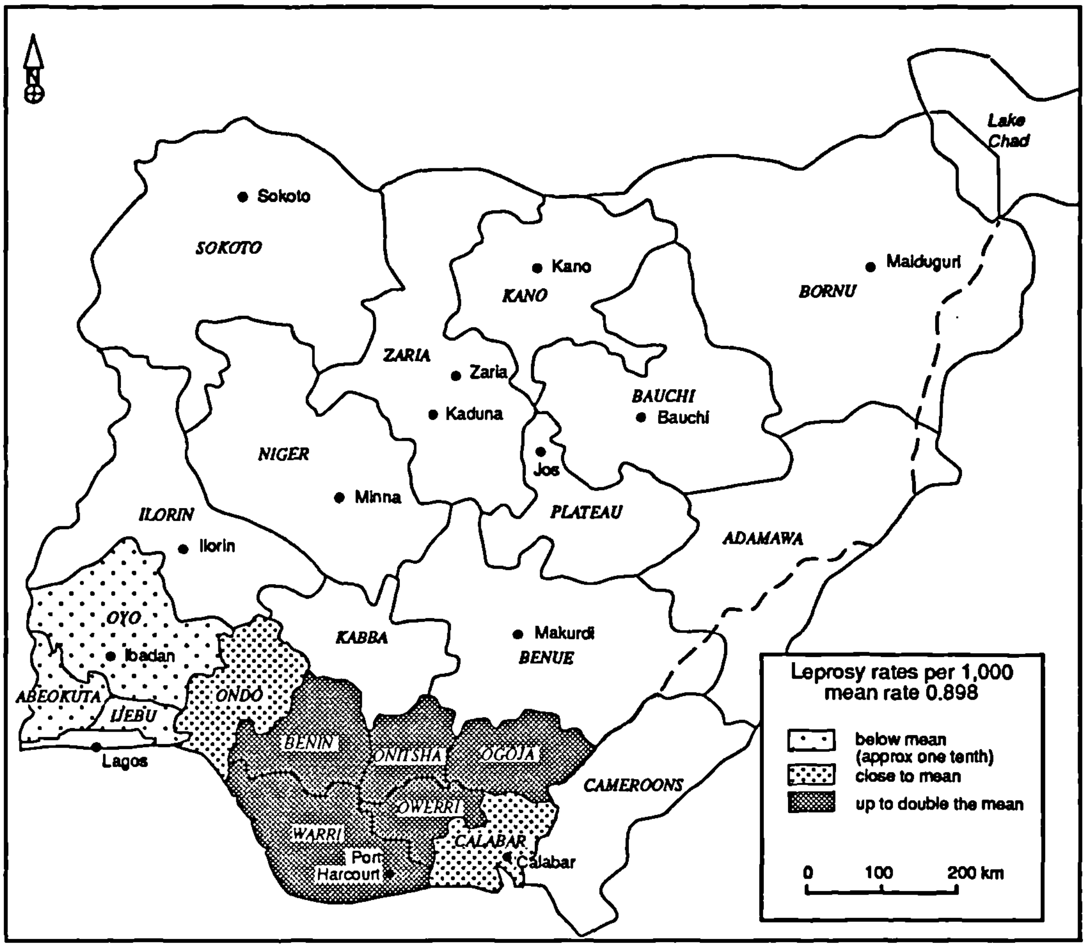
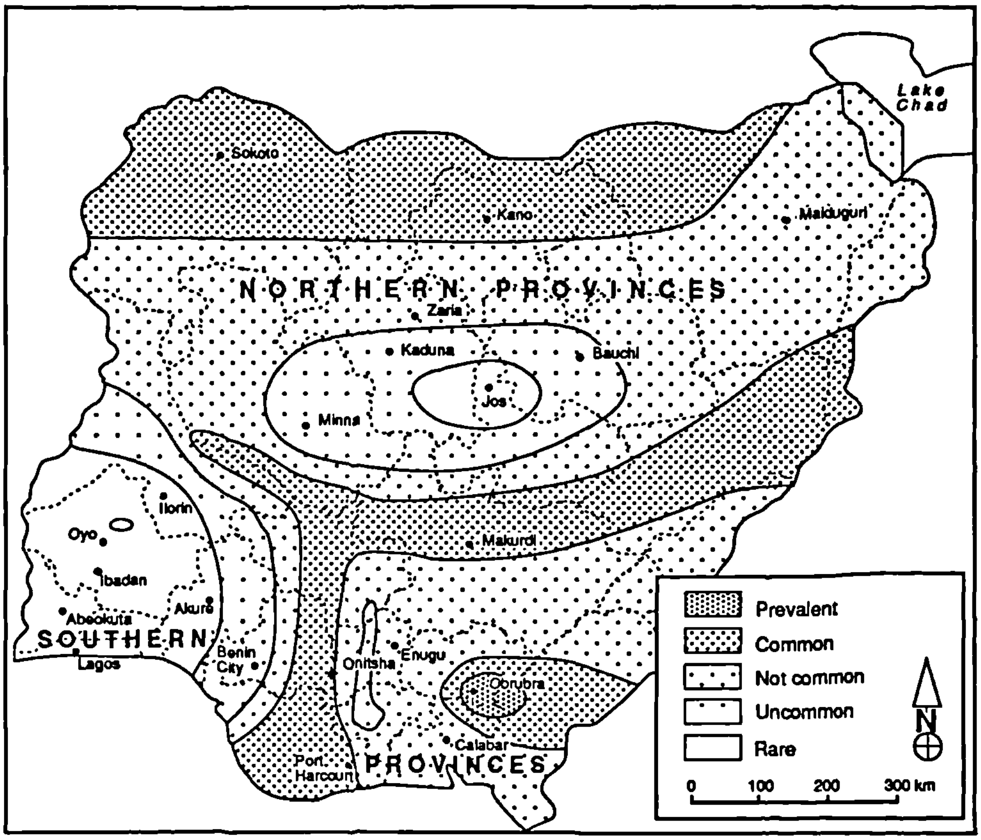


Fig. 6.3 . Mayer's maps of Leprosy in Nigeria

"Tentative Map of the Distribution of Leprosy in Nigeria" 1929



"Impressions of Leprosy Prevalence Rates in Nigeria" 1930

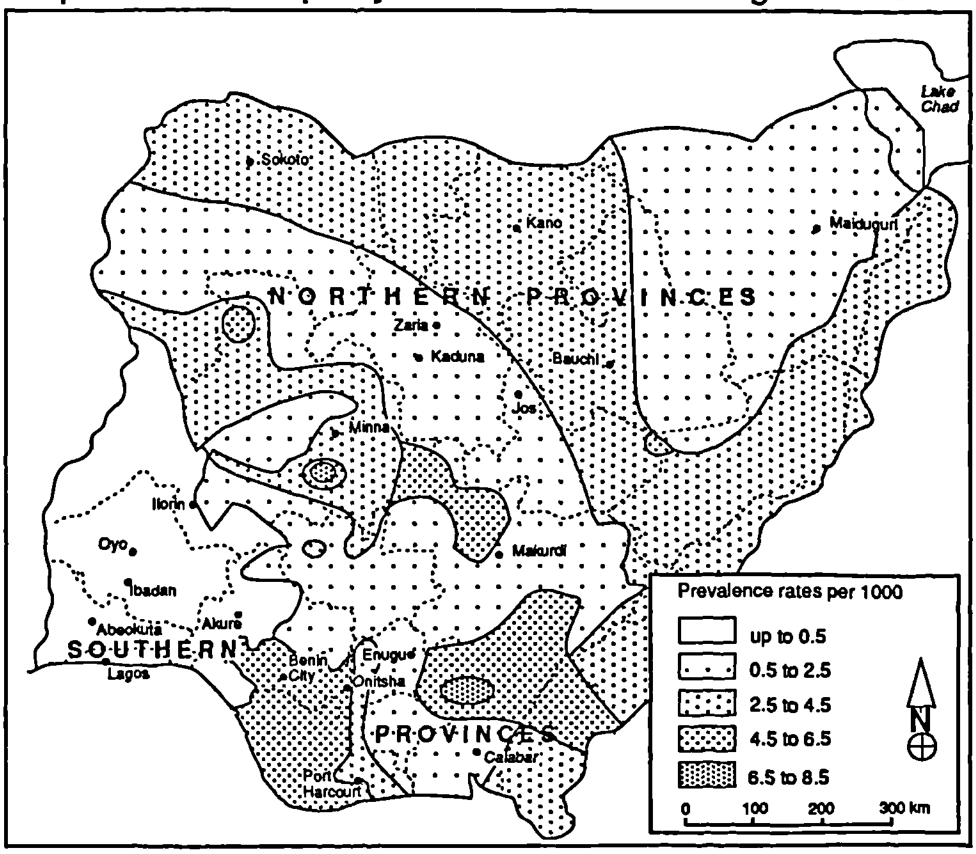


TABLE 6.7

1921 Census Southern Nigeria: Number of Leprosy Cases

Province	Leprosy cases	Population	Rate per 1000
Lagos Colony		225,000	
Abeokuta	30	319,000	1.0
Benin	495	403,000	1.2
Calabar	416	979,000	0.4
Ijebu	7	183,000	0.0
Ogoja	1130	636,000	1.8
Ondo	314	375,000	0.8
Onitsha	1932	1,494,000	1.3
Owerri	2336	1,976,000	1.2
Oyo	94	1.085,000	0.1
Warri	497	396,000	1.3
TOTAL	7251	8,071,000	0.9

(Source: calculated from census figures quoted in Talbot, 1926)

Leprosy treatment was introduced at Itu in 1926 and at Uzuakoli in 1932 both in the southeast. Brown, who built Uzuakoli, reported seeing Igbo villages full of outcast leprosy cases. Uzuakoli was quickly filled to capacity, and in the first three years twice as many patients applied as could be admitted, so that in 1935 they were treating only 1,100 of the estimated 12,000 cases in Owerri Province (Brown, 1936, 1960). Similarly, when treatment began at Oji River in neighbouring Onitsha Province in 1936, provision was made for 250 patients but 2,000 applied. In Rivers Province high rates were discovered during surveys in the 1940s, which were prompted by the large number of cases from Rivers which were reporting for treatment to Uzuakoli, (Seal, 1957).

The high rates of leprosy in parts of Owerri, Rivers and Onitsha Provinces during the 1930s and 1940s were some of the highest leprosy rates which have been recorded anywhere in the world (Brown, 1936; Davey, 1938). They were identified as evidence of an epidemic of mild leprosy, similar, but on a larger scale, to the leprosy epidemic reported on the island of Nauru in the early years of the century (Davey et al, 1956). During the epidemic it was rare for a patient to show evidence of long-standing infection. Some of the highest incidence rates were found in villages which were formerly isolated communities 'as yet little touched by civilisation' (Davey, 1938, p 113), where social and economic changes were being introduced as the area came under British administration. Davey (1957) deduced that an influx of people with leprosy, outcasts from elsewhere, first introduced the infection.

He commented that the conditions for the spread of a new infection were ideal: a population with no previous exposure, with increasing contacts with neighbouring communities, little clothing, and overcrowding in compact villages. Reviewing results of leprosy surveys between 1941 and 1956 it was concluded that the epidemic was short, peaked in 1943, and declined even before modern chemotherapy was introduced (Davey, 1957).

LEPROSY TYPE AND SEX RATIO

Leprosy in Nigerians is most often the milder paucibacillary form, typical of darker skinned races, rather than the more severe multibacillary form (Chapter Two). The ratio of ten per cent multibacillary has most often been quoted, but some reports indicate that leprosy type rates are not uniform, and a higher multibacillary rate has been reported from some areas, especially the north (Cochrane, 1953).

Some leprosy workers have reported increases in the multibacillary ratio (Pfaltzgraff in Monrovia, (1979), and Davis E M personal communication 1984). Because classifications have changed, data are incomplete, and diagnosis is variable and unreliable, the confirmation of regional variations or of a change in the ratio is impossible.

The sex ratio of adult leprosy cases in Nigeria does not conform to the ratio of two males to one female frequently reported elsewhere. In the north of Nigeria the reported ratio has frequently been the reverse, with two females to one male, described by Pfaltzgraff as 'the usual Nigerian sex ratio' (Pfaltzgraff in Monrovia, 1979, and Reddy et al, 1985). In the study area there is little difference in leprosy prevalence between the sexes and there was little difference reported in the neighbouring Igbo area during the leprosy epidemic.

BELIEFS ABOUT LEPROSY

Leprosy and other diseases are attributed to four categories of causes according to indigenous Nigerian beliefs:

a) supernatural agencies

b) certain foods and poisons

c) contact

d) heredity

Many people believe that leprosy has a supernatural cause, although this may be combined with other causes. Pfaltzgraff made a comparative study of the leprosy beliefs of ten ethnic groups of Nigeria, eight of which were small groups indigenous to the Plateau region, and the others were the Ibibio and Fulani (Pfaltzgraff, n.d.). All ascribed leprosy to a supernatural agent.

Another common belief shown by the Pfaltzgraff study is that leprosy is caused by eating certain foods or by deliberate poisoning, and this was so with the Yoruba who associated leprosy with bad and dirty food (Mayer, 1930).

A number of peoples consider that leprosy can be inherited, for example the people of Adamawa (Mayer, 1930) and some Igbo groups who believe that all offspring of an offender punished by the gods will suffer from the disease (Brown, 1937).

Whatever the beliefs about the cause or the possibility of a cure, the use of traditional medicine for leprosy is widespread and includes drinking and/or bathing with medicines prepared by the traditional healer, scarification or cauterisation of the lesion, animal sacrifices, and payment of money and gifts. Medicines are prepared mostly from herbs, roots and bark, but seeds, shells, fruit juices, parts of animals and fish are also used, often mixed with local gin.

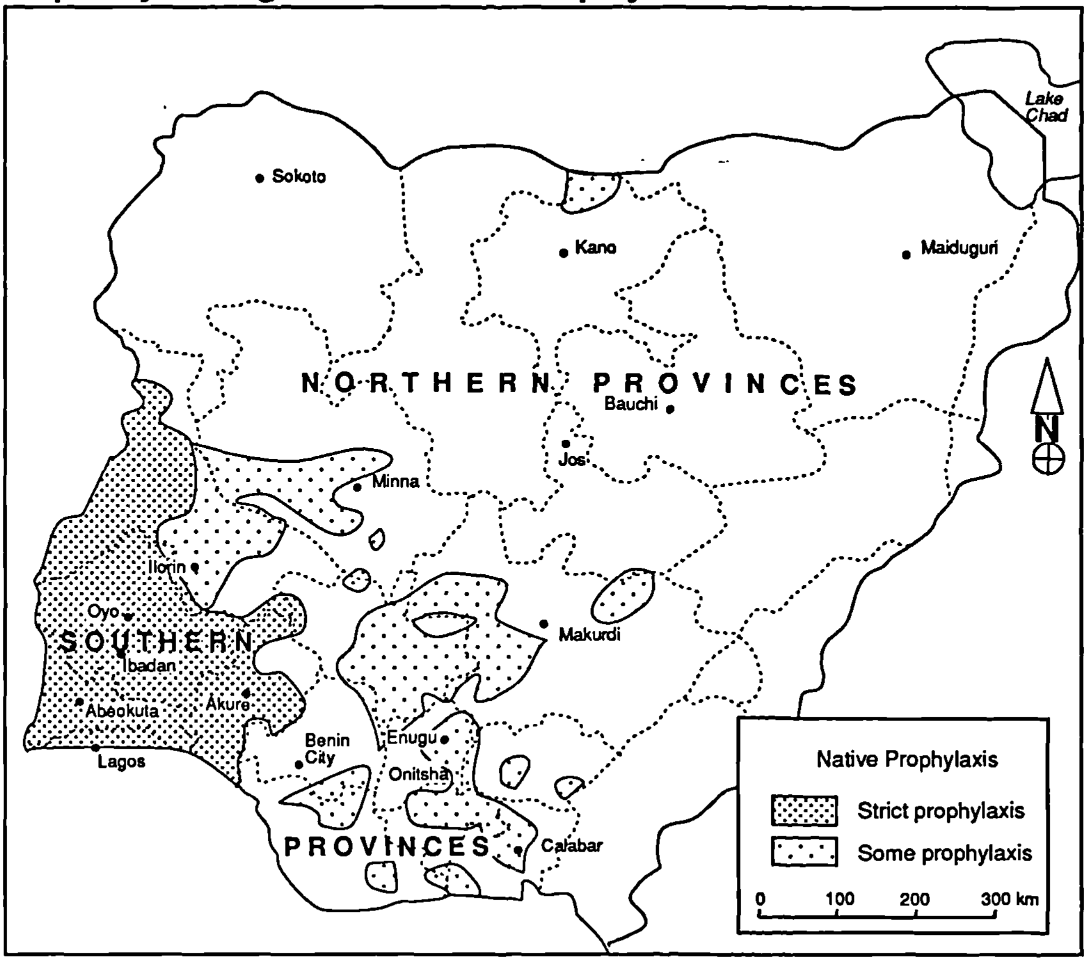
ATTITUDES AND STIGMA

There is great variation in attitudes to leprosy and its sufferers. Mayer (1930) described a spectrum 'from absolute indifference to great dread and loathing' (p 14), and mapped the degree of prophylaxis which was practiced, based on segregation (Fig 6.4). In general there is indifference in the north of the country, and fear in the south.

The indifference of the Hausa-Fulani peoples has been widely reported, (Howard, 1936; Mayer, 1930; Reddy et al, 1985; Shiloh, 1965; Stock, 1988). Howard and Mayer claimed that this is partly due to Muslim fatalism, but the role of Islam in forming attitudes to leprosy is unclear. The Koran permits a husband to divorce a wife with leprosy, and because the religion encourages almsgiving leprosy sufferers have traditionally been able to support themselves by begging in public places in the Muslim areas of northern Nigeria. Because of the Hausa indifference to-wards leprosy, the segregation villages which were a feature of early leprosy control in the south, were largely unacceptable in the north (Shiloh, 1965).

In contrast to Hausa-Fulani indifference, the Yoruba people of the south-west have used extreme measures against leprosy. They were reported to have killed all children suffering from leprosy and to have driven adults out of the walled towns into the bush, (Mayer 1930 reporting Dalziel). Respondents during fieldwork report that Yoruba leprosy sufferers are forced to live outside the town walls. The Annang people of the study area report similarly extreme treatment of leprosy in former times, with murder and expulsion of patients.

Fig. 6.4
Leprosy in Nigeria - Native Prophylaxis



Source: Mayer 1930

The fear of leprosy by the Igbo has long been reported. They treat leprosy cases in the same way as their outcast group, 'osu'. It was reported that there was fear even of the sound of the name of the disease, in Igbo or in English, 'lest its repetition should cause the sickness to come upon the speaker'. Hence the use of euphemisms like 'white sickness', referring to the pale skin lesions of early paucibacillary leprosy, and 'changing of the skin' (Brown, 1937). Such fears have been recently reported: in 1986 medical attendants refused to hand tablets directly to patients in a clinic near Onitsha (Dr C Bourdillon, personal communication, 1987).

During the Igbo leprosy epidemic the fear of the disease was probably partly overcome by the desire to receive the newly introduced treatment, and there was less concealment. But it was reported that everyone was still watchful for signs of the disease in others: no man would wrestle with a fully clothed opponent for fear he was hiding leprosy, and anyone who was always fully clothed would be suspected of having leprosy. For the same reason a man would be expected to wear only a loin cloth when visiting his prospective bride's parents (Brown, 1936).

In many Nigerian communities varying degrees of segregation have been practised. The sufferer may be required to stay in a separate house, either within or outside the family compound. The restrictions may prevent marriage, the use of communal cooking and eating utensils, the drawing of water and bathing at the communal place, and normal burial. Divorce of a partner with the disease is allowed by many groups, and trading with patients is often avoided. In some groups the person with leprosy loses their identity as a full member of the community, which is reflected in their being omitted from the census. Re-admission to the community is sometimes possible after a cure (Pfaltzgraff, n.d.).

In many groups the sufferer will not receive full customary burial rites. Among Ibibio they are 'buried like an animal', without ceremony and somewhere in the bush, rather than in their own compound. The Yoruba buried in 'the bad bush' anyone dying with leprosy or other contagious diseases (Olowomeye, 1991).

It has been reported from India, that where leprosy is more common the stigma against it is less (Christian, 1981). This would broadly apply in Nigeria, where the north has higher leprosy rates but less leprosy stigma than the south. Whether the prevalence rate is a cause or an effect of the prevailing attitudes to the disease is unclear, because attitudes can affect both the true and apparent disease rates. In the north of Nigeria indifference to leprosy may assist transmission. Mayer (1930) suggested that the reported frequency of leprosy among the ruling houses of Sokoto, Bornu, Bida, Yola, and other aristocracies of the north, could be accounted for by their widespread slave adoption and indifference to slaves with leprosy, as long as they could work.

Indifference to leprosy may also explain artificially high rates of reported leprosy, because where it is not feared people with no disease may report to leprosy clinics to obtain free medication, because there is a belief in northern

Nigeria that dapsone is effective against malaria and can also help a women in the safe delivery of a child (Bryceson and Pfaltzgraff, 1990).

On the other hand, stigmatisation which leads to strict segregation is believed to reduce transmission, and this may be a factor in explaining the very low leprosy rates among the Yoruba. However, there is no simple correlation between heavy stigmatisation and low leprosy rates. The Annang people who stigmatise leprosy more than the neighbouring Ibibio have higher rates, rather than lower.

There is some ambiguity in the indigenous beliefs relating to leprosy. Even when associating the disease with a supernatural cause like breaking a taboo or committing crime, the segregation of the patient may be practised, as if acknowledging a contagious factor in the occurrence of leprosy. Muir (1940) also recognised this, commenting:

> 'wrong deductions are drawn from correct observations, there is an admixture of superstition with correct knowledge, and there is a lack of vigour and perseverance in carrying into effect the measures suggested by what real knowledge there is.'
> (p 138)

He believed that this confusion delayed the disappearance of the disease from Africa, and he advocated the study of indigenous ideas, customs and superstition to improve leprosy control measures.

Mayer reported in 1930 that some customs associated with leprosy in Nigeria were rapidly passing away. Pfaltzgraff's study of attitudes, which was conducted in the 1950s, and fieldwork for this study in the 1980s demonstrate that many are still practised, although Chapter Seven discusses the improvement in attitudes and reduction of stigma which appear to be associated with successful treatment.

DEVELOPMENT OF LEPROSY CONTROL

Western medical care for leprosy began in Nigeria in 1889 when five patients were treated in the Contagious Diseases Hospital in Lagos, (Daramola, 1967). Treatment continued there until a 'leper asylum' with thirteen patients was established at nearby Yaba in 1898 (Annual Colonial Report, Lagos, 1898).

Leprosy was recognised as a public problem at the beginning of the century in several main townships, resulting in legislation 'to make provision for the prevention of the spread of leprosy' (Davey et al, 1956). The Lepers Ordinance was enacted in 1908 for the Colony and Protectorate of Southern Nigeria, and in 1911 The Lepers Proclamation was enacted for the Protectorate of Northern Nigeria. They were replaced by The Leper Ordinance 1916 for the Colony and Protectorate of Nigeria. These acts made provision for:

- the establishment of asylums and settlements for the treatment and segregation of 'lepers'
- the prohibition of certain trades to 'lepers'
- the prohibition of 'lepers' to use public lodgings, transport, bathing places
- detention of a 'leper' in an asylum or settlement after an enquiry
- compulsory notification of a suspected 'leper', with a penalty

- penalty for conveying or assisting a leper to enter Nigeria, and powers to return unlawfully landed lepers to place of origin
- penalties for allowing a leper to escape, voluntarily or negligently
- prohibition against trading with leper inmates of an asylum
- the support of the leper in the asylum or settlement by the patient's own community, bound by Native Law.

The Ordinance remained in place, with additional regulations enacted from time to time, but was rarely enforced, as acknowledged in the Chairman's address at the 1939 Leprosy Conference in Enugu:

> 'The Leprosy Ordinance of 1916 has played a comparatively small part in shaping policy, and many of its clauses are now a dead letter. If they were not, it would have been necessary many years ago to have changed the Ordinance.'
> (Briercliffe, 1940, p 84).

Proof of its rare implementation comes from someone describing the Nigerian leprosy problem in 1938, clearly ignorant of its existence, who recommended that for improved leprosy control

> 'a leprosy ordinance would be brought into effect making it illegal for a leper to be at large . . .'
> (Russell, 1938).

But in 1940 the Director of Medical Services in Nigeria stated that the outlook of the Ordinance belonged to a bygone age.

The lack of its enforcement in Nigeria, unlike other parts of the British Empire under similar legislation, was possibly due to the scale of the Nigerian leprosy problem. Provision for the large number of cases in some areas would have entailed enormous expenditure, and would probably have defeated its own object by provoking sufferers to conceal their leprosy rather than be taken forcibly. In some areas cultural factors rendered it unenforcable, such as in Adamawa where the people refused to segregate leprosy cases, because there was 'nothing in the Koran about sick people all gathered in one place' (Mayer, 1929 p 14).

Nevertheless, asylums and settlements were established under the Ordinance. Most were poorly organised, and became places of refuge for paupers who were usually advanced cases which in some societies would formerly have been driven into the bush to die, been poisoned or even buried alive, (Howard, 1936). In the Muslim north they were almost always severe cases who had nowhere else to go and were too disabled to beg.

In 1926 new leprosy treatment was introduced at Itu in the study region, and a well-organised settlement for leprosy patients was established by the Scottish Presbyterian Mission (Chapter Seven). With the effective rejection of compulsory segregation, a policy emerged by 1930 that medical treatment should be provided for leprosy. A memorandum was circulated by the Nigerian Government on 'Leprosy Relief Work,' based on methods adopted in India, and the Government began to provide leprosy drugs (Mayer, 1930).

From 1930 to 1950 Nigeria became known world-wide for leprosy control based upon large voluntary settlements, originally established by Christian missions, where patients lived and worked, usually by farming. Organisation and funding involved co-operation between the Nigerian Government, local authorities, and international agencies such as Christian Missions, the British

Empire Leprosy Relief Association (BELRA) and TOC H. Such co-operation between agencies within a single institution has continued to the present day.

Following a visit by the Secretary of BELRA to seventeen leprosy institutions in Nigeria in 1936 (Fig 6.5) recommendations were made which became the basis for future Nigerian Government action on leprosy (Muir, 1936).

1 A leprosy board in each Province

2 A leprosy settlement in each Province for 500 to 1000 patients, and for training anti-leprosy workers.

3 Clan settlements where Provincial Settlements were inadequate for the numbers of cases

4 A Sanitary Inspector and leprosy survey for each clan

5 Isolation of all cases, and isolation of infants from infectious parents

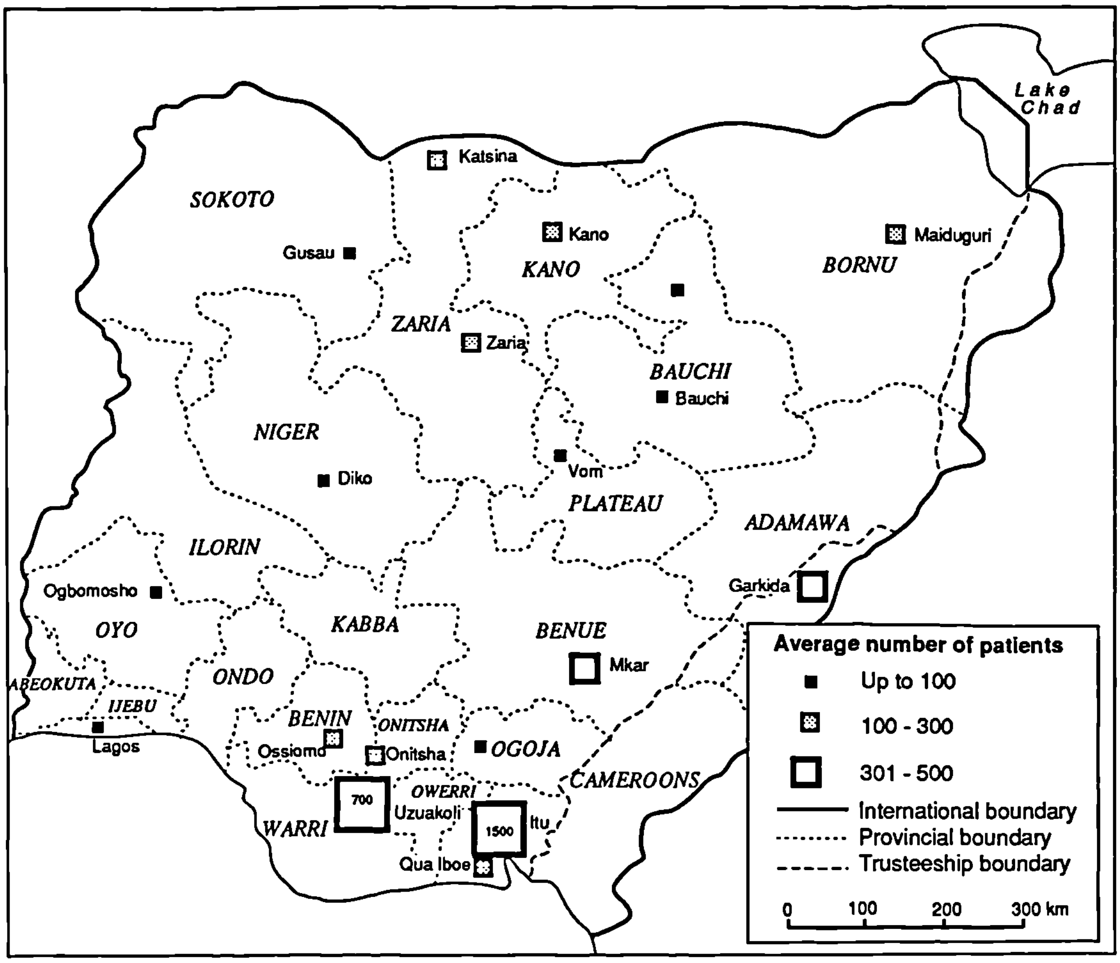
6 Education of the public

The Clan Settlements system was especially appropriate for the densely-populated Igbo Province of Owerri which had a high rate of leprosy, and seven were established by 1940. Because of the scale of the problem out-patient treatment was started by Uzuakoli Leprosy Hospital as an experiment in 1939, and patients attended the nearest roadside leprosy clinic. By 1941 more than 7,000 were attending and 1,000 more were under observation. The largest was treating 900 patients with new clinics opening monthly (Davey, 1942).

In 1945 leprosy received the highest priority in Nigeria's medical programme with the establishment of the Government Leprosy Service. The Government

Fig. 6.5

Nigeria: Leprosy Settlements and Colonies 1936



continued to work in co-operation with international voluntary agencies, and with UNICEF which supplied funding, personnel, drugs and equipment.

The Leprosy Service was established initially in the south, consolidating the existing work. The headquarters was at Oji River, near Enugu, and a research unit originally established by BELRA was located at Uzuakoli. After 5 years' experience, the Government programme was extended to the whole country (Bland, 1952). To take account of contrasting conditions three Regional Advisory and Consultative Committees were established in the Northern, Western and Eastern Regions respectively (Bland, 1952), which continue to function at the time of writing (1993).

By April 1951 there were 55,000 patients under treatment in a variety of institutions, out of a total population of approximately 25 million, but the number was to increase dramatically over the next decade.

The expansion of the Government Leprosy Service nationwide coincided with the introduction of dapsone in leprosy treatment (Chapter Two). One of the main benefits of dapsone was that it allowed the extension of out-patient treatment, and during the 1950's out-patient clinics were established throughout the country, and patients attended weekly or monthly for drugs and check-ups.

Government involvement in leprosy meant few changes in the south, where leprosy work remained essentially in the hands of the existing institutions.

Changes were greater in the north where only 12,000 leprosy patients were treated in 1952, but these increased to 264,000 by 1962 (Shiloh, 1965). The additional funding plus the new treatment were only two factors explaining this increase. It was believed that the main factor was the availability of treatment at Native Authority out-patient clinics, where other diseases were also treated:

> 'Furthermore, the fact that the programme is government-sponsored, and essentially Moslem-staffed and administered, has removed the stigma of leprosy service as essentially a Christian missionary activity. Leprosy treatment is recognised as a part of the normal programme of the Ministry of Health of their own Moslem-dominated regional government and Moslems have no religious fears in accepting treatment.'
> (Shiloh, 1965, p 145).

The Government Leprosy Service remained in place until the Civil War (1967-70), when the facilities in the south east were severely damaged. The bombing of Uzuakoli destroyed the research centre, which has never been revived, and training ceased at Oji River.

THE NATIONAL LEPROSY CONTROL PROGRAMME

Leprosy control is under the Federal Ministry of Health, operating through State ministries, but close collaboration continues with voluntary agencies, especially Christian Missions. The Federal programme was adopted in 1977 during Nigeria's peak planning decade, when oil revenues were high and new state structures were established in the ambitious Third National Development Plan, 1975 - 80.

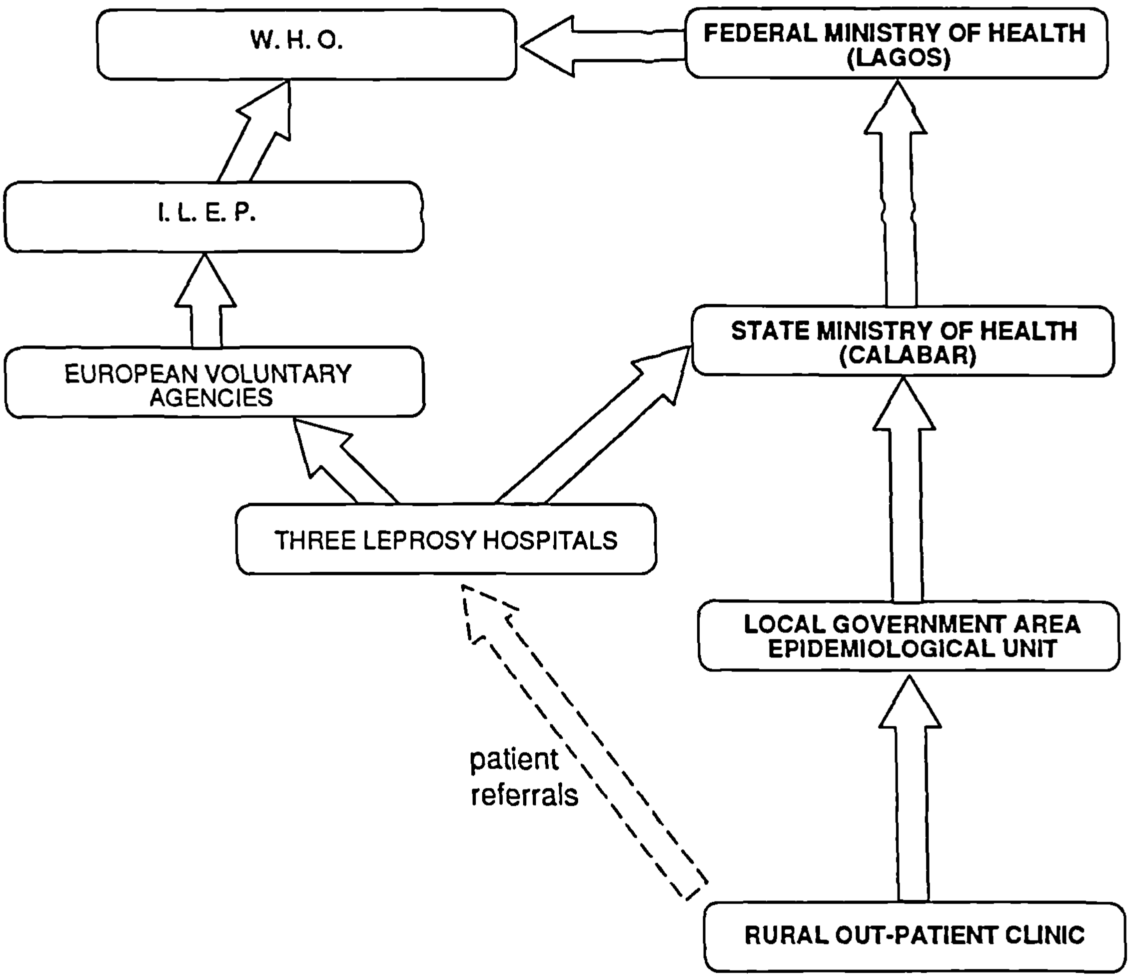
The Federal Government takes responsibility for policy-making, central recording, technical supervision and co-ordination and finance to states. State Governments are responsible for the establishment and maintenance of the leprosy control service, the appointment and provision of training of staff, and the implementation of the National Programme. Local Governments operate under the direction of the State Government.

The three zonal Leprosy Advisory and Consultative Committees (LACCs), established in 1951, coinciding with the former three administrative regions of the country, are composed of representatives from each state in the respective Zone. They plan strategies for improved leprosy control within their zone, organise training workshops and liaise with the Federal Government.

Leprosy drugs are supplied to State Ministries by the Federal Ministry of Health. Some overseas agencies arrange and fund the supply of drugs and other amenities, especially for work by their own personnel, and their involvement results in disparities in leprosy provision within and between States.

There are local, national and international reporting systems for leprosy (Fig 6.6). Clinic returns are sent to Local Government Headquarters, and composite Local Government returns are sent monthly, quarterly and annually to the State Government. State returns are sent to the Federal Ministry monthly, quarterly and annually. Finally the Federal Ministry reports to the

Fig. 6.6
CROSS RIVER STATE
Leprosy Control Service Reporting Structure 1986



WHO. Overseas agencies report to their own headquarters, most of which belong to the International Federation of Anti-Leprosy Organisations (ILEP) which also compile their own statistics. Thus there are two international reporting bodies for leprosy, the WHO and ILEP.

Due to the economic recession a severe shortage of resources has been experienced in Nigeria's public health service. The lack of funds for drugs, salaries, vehicles and training has seriously affected the leprosy service, resulting in minimal case-finding and inadequate case-holding.

Nigeria has no regular public health surveys, even in schools, therefore case-finding is limited. Mass surveys for leprosy alone are not practicable because it is a rare disease, but it could be detected if there were other health checks. There are recommendations from the WHO for contact tracing of all newly-diagnosed leprosy cases, but this does not happen systematically.

There is also a problem in case-holding, with poor patient compliance and the lack of follow-up of defaulters. For instance in Gongola State it was reported that 62 per cent of the new patients admitted over a two and a half year period had been lost from registers before discharge (Pfaltzgraff, Monrovia 1979). More serious is the report of poor compliance in 29 per cent of the patients placed on multidrug therapy (MDT) at Ekpene Obum Leprosy Hospital in the study region: in 1989 only one third of the patients completed their treatment (Annual Report, Ekpene Obum, unpublished, 1990). Irregular use of the new drugs may lead to pathogen resistance and have serious consequences for future leprosy control. This fact points to the need for a tightening up of control services before the widespread implementation of MDT in Nigeria.

A 1986 revision of the National Leprosy Control Programme addressed the issue of training, and proposed a strengthening of facilities within Nigeria, with the establishment of seven new centres at existing leprosy hospitals in Abeokuta, Garkida, Mongu, Ossiomo, Uzuakoli, Yadakanya and Etinan, and an expansion of the existing facility at Zaria, (Federal Ministry of Health, unpublished, 1986). The proposals have not been implemented to date (1993) except the upgrading of Zaria for training in combined leprosy and tuberculosis control.

In 1988 the Government established the policy of combined leprosy and tuberculosis control in the National Leprosy and Tuberculosis Control Programme (Federal Government Printer, 1989). In line with the WHO recommendations this is to become part of the horizontal programme of Primary Health Care. Integration of leprosy control with TB was proposed in Nigeria more than a decade ago but progress has been slow.

CONCLUSION

Although Nigeria has a long history of modern leprosy control and the registered disease rates are declining, in 1993 it was ranked as the fourth country in the world for the total number of registered cases.

Prevalence rates vary, and may be partly accounted for by the varying indigenous attitudes to the disease, which in some societies, most notably the Yoruba, may have reduced transmission. Four characteristics of the reported leprosy distribution pattern have been recognised since earlier this century:

a) very low rates in the Yoruba area of the south-west

b) very high rates in the Igbo and adjacent areas of the south-east, especially from the 1920's to 1950's, with a marked decline by the end of that period, so that rates are now generally fairly low

c) high rates in the north, although true rates may be lower than reported

d) variation in the Middle Belt, but the current situation is uncertain.

The adverse attitudes to leprosy in many parts of the country must be addressed in the planning of improved programmes of control. This would include education of health professionals and the general population (Awofeso, 1992; McDougall, 1986).

The large scale of Nigeria's leprosy problem in early colonial times probably prevented the implementation of the segregation laws. Instead, the system of voluntary leprosy treatment which began in 1926 in the south east of Nigeria, became a model for the rest of the country, and for Africa. It also became the basis for the vertical system of leprosy control which remains in place, contrary to official policies for integration into Primary Health Care.

The lack of resources is a serious constraint on effective leprosy control. As in many developing countries, leprosy is the 'Cinderella Service.' The adverse attitudes to the disease and its sufferers also affect the allocation of resources. Faced with so many other public health problems it is hard to criticise Nigeria for not giving more priority to leprosy. However, unlike many other diseases, there are international resources available, which, with Government support and direction, could be used for improved leprosy control.

CHAPTER SEVEN

HISTORY OF LEPROSY IN THE REGION AND THE DEVELOPMENT OF THE CONTROL SERVICES

PRE-COLONIAL AND EARLY COLONIAL PERIOD

The absence of written records hinders the study of leprosy during pre-colonial times; oral evidence is the only source. Interviews with community elders in the south of the region revealed that leprosy was widespread and was believed to be caused by supernatural forces and was greatly feared. Known sufferers were punished by expulsion from the community and left to die in the forest. Social attitudes to leprosy during the pre-colonial period are examined in detail in Chapter Eleven below.

The 1908 Lepers Ordinance for Southern Nigeria provided for the establishment of Leper settlements, where patients were financially supported by their own communities (Chapter Six). There are no records of an 'Ordinance Colony' being established in the study region, but there was one in nearby Port Harcourt (Macdonald, 1933). Although compulsory segregation was never implemented, the Ordinance laid the foundations for the local authority support system later used to fund patients in the mission settlements.

In the Nigerian census of 1921 only 416 leprosy cases were recorded in Calabar Province, in a population of nearly one million, (Table 6.7). It was not until treatment for leprosy was subsequently offered in the region that the scale of the problem was recognised.

CHAULMOOGRA OIL AND MISSION 'LEPER' COLONIES

Leprosy treatment was introduced at the General Hospital of the Scottish Presbyterian Mission at Itu in Calabar Province in 1926. A leprosy patient had come to the hospital requesting treatment earlier that year, but none was available. The doctor asked him to return in three months, having read about encouraging results of a leprosy treatment from India. He sent for supplies. Another patient came later and was given the treatment, and within six months there were 400 patients. The original patient never returned (Macdonald, 1957).

Some patients came from distant villages and some were homeless. They camped on a sandbank in the Cross River until the rains flooded them out in April 1927. Eventually thirty acres of good land were granted for their resettlement a mile from the general hospital, and several hundred patients built houses on the site. Later a church and school were built, and Government funds paid for treatment rooms, a dispensary and a laboratory. Most patients were self-supporting through farming and traditional crafts, but the severely disabled were fed from a Government grant (Macdonald, 1957).

The treatment was with Chaulmoogra Oil and its derivatives, obtained from the *Hydnocarpus anthelmintica* tree, which had been used for centuries in India and China. The oil was imported from India and processed in Nigeria, and this was its first use in Africa (Mayer, 1929). Later the tree was cultivated at Itu. Patients were given injections weekly, later twice weekly. They were painful and often produced side-effects: elderly leprosy patients in the region still bear the scars. In addition, patients were given food, shelter and work, and their other diseases were treated. Exercise, fresh air and cleanliness, and the treatment of all infections were believed to be essential for increasing a person's resistance to leprosy, 'Antileprosy drugs are only a very small part of the drugs needed to treat lepers' (Robertson, 1932 p 57).

The oil helped to arrest some cases, but was admitted to be of limited therapeutic value (Armstrong, 1935). There was hesitation in using the term 'cured', as some patients later returned with active disease (Brown, 1935). The treatment took from four to eight years, and mild cases treated in the early stages were the most likely to improve. Many patients were advanced cases, and chaulmoogra did little to reduce their symptoms.

TABLE 7.1

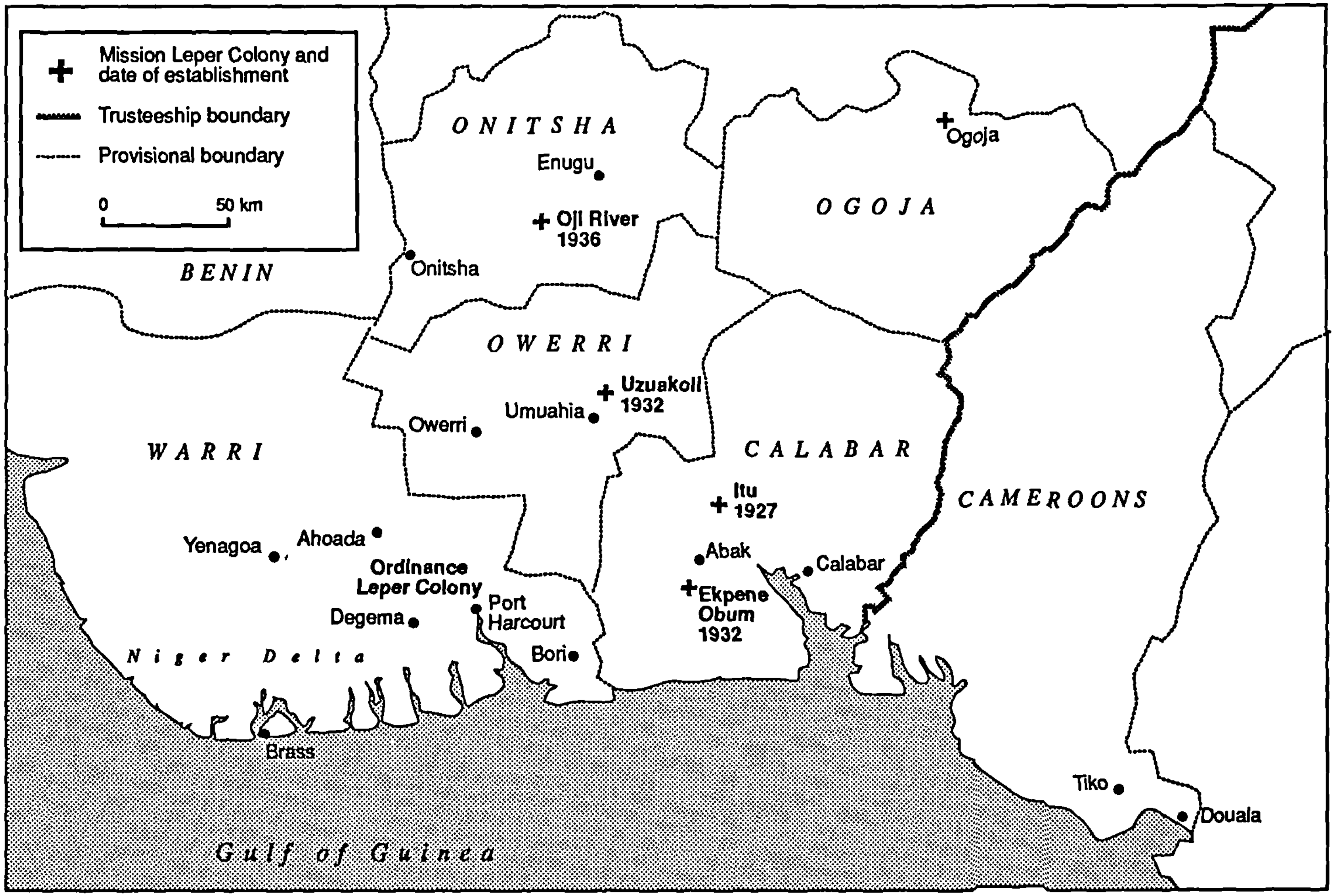
Discharges from Itu - Various Years

1932	52
1933	70
1934	120
1945	211
1950	907

(Sources: Helser, 1933; Macdonald, 1957)

Fig. 7.1

Leprosy Settlements in Southeastern Nigeria in 1936



The first patients were discharged from Itu in 1932 (Helser, 1935). The greatest number discharged in one year during the chaulmoogra period was 907 in 1950, only thirteen of whom had received the new sulphones (Table 7.1) (Macdonald, 1957).

The scale of the local leprosy problem which emerged with the availability of treatment surprised colonial officials, who had previously reported that it was insignificant in the region.

> '... for the first time people became aware that the bush was hiding thousands of lepers who were never seen.'
> (Macdonald, 1957 p 103).

Leprosy sufferers from throughout and beyond the study region went to Itu (Fig 7.1). For example, during the twelve months from April 1931 over one thousand patients were treated, from Owerri Province (455), Calabar Province (322), Ogoja Province (179), and Onitsha Province (41) with 11 from elsewhere in Nigeria and 4 from beyond (Macdonald, 1933). The Cross River, on which Itu is situated, provided easy access at the time when river transport was dominant.

By 1931 there were three hundred cases attending as out-patients, but the doctor argued strongly against out-patient treatment and the clinic was abandoned by 1935. His reasons included the deterioration of the patient's condition caused by walking for treatment, irregular attendance, untreated complications associated with the injections, the impossibility of taking temperatures and of providing proper treatment for other infections, the generally poor nourishment of out-patients, and the fact that patients remained a source of leprosy infection for others in their communities (Helser, 1935; Macdonald, 1957).

By 1936 most patients were coming from areas close to Itu because leprosy settlements had been established elsewhere in response to the increasingly obvious need for treatment in the region: Ekpene Obum in 1932, also in Calabar Province; Uzuakoli in 1932 in Owerri Province; Oji River in 1936 in Onitsha Province (Fig 7.1). Nevertheless, in 1936 it was estimated that only one quarter of the cases in the region were being treated (Muir 1936). Itu remained the largest settlement, and was a model for mission leprosy settlements in Nigeria and elsewhere in Africa. It was organised like a small town with streets and schools, farms and processing factories, and appointed its own chiefs and police. By the mid-1950s an average of 4,300 patients a year were being treated as in-patients, and between 1926 and 1957 a total of about 28,000 patients received treatment (Macdonald, 1957). Numbers of in-patients decreased after the introduction of sulphones in 1950, which shortened the period of treatment.

In contrast to Itu, mission leprosy settlements in the Igbo area began out-patient treatment in the 1930s. As soon as Uzuakoli was opened a greater number of patients than the hospital could accommodate presented for treatment, coming from the densely populated surrounding area. A system of satellite villages for segregation and treatment was established after 1937, and in 1939 a network of roadside clinics was set up for out-patient treatment (Muir, 1940).

Following the initiative of Uzuakoli in the Igbo area, chiefs in the Annang area of the study region requested leprosy segregation villages. A letter from the District Officer of Abak Division to the Resident in Calabar, dated 23 November 1948 states:

> 'It is intended and it is the wish of the people that a leprosy segregation village be opened in this Division. The people have willingly given some land, at the moment approximately 20 acres, and this can be extended. I have inspected the area and it is suitable for building and farming with water very near. The people are willing to clear the land and put up houses according to my direction and the requirements of the Leprosy Control Officer ...According to all reports, the incidence of leprosy is very high in this Division and such a segregation village, representing a true voluntary project by the people, should be encouraged....'
> (Calprof Papers Batch 2 2464/3, Enugu Archives)

This correspondence related to the first of six villages which were established in the 1940s and 1950s in the Annang area in the south of the Cross River region. The communities built houses and allocated farmland for the use of leprosy patients. Patients were treated weekly by leprosy workers visiting from Ekpene Obum. Cases requiring special treatment or surgery were referred to Ekpene Obum, and those who were symptom-free were discharged when the doctor made periodic visits. Of the six segregation villages originally established in Annang, Ikot Otoiwo was still functioning in 1988, contrary to official policies. Several of the others, like Inen Nsai on the Qua Iboe River, became the sites of out-patient leprosy clinics.

In Ogoja Province in the north of the region, leprosy treatment based on chaulmoogra oil began in 1946, and was organised by the Roman Catholic Mission. Segregation villages were established for individual clans throughout the Province and in neighbouring Abakaliki Province. A leprosy hospital was built at Moniaya near Ogoja in 1950.

For leprosy patients the major change resulting from the chaulmoogra treatment was that voluntary segregation replaced forced expulsion. Although some of the fear and stigma remained, patients could expect to recover and eventually return to their communities. From 1933 until the Civil War, several discharge services were held each year at the Mission Leprosy settlements, when the names of symptom-free patients were announced and discharge certificates were presented in a service of thanksgiving.

DAPSONE AND OUT-PATIENT CLINICS

The organisation of leprosy treatment changed with the introduction of modern drugs. During the 1940s the sulphone, dapsone, was tested for the treatment of leprosy, and positive results led to its introduction in the study region by 1949. Nearby Uzuakoli had been one of the major research centres, and Ekpene Obum had run dapsone trials.

> '... Sulphatrone treatment was commenced 8 months ago. There are 33 lepromatous cases receiving it. We begin with one and a half tablets daily and increase to three and give iron therapy with it. There has been marked clinical improvement in a number of cases and none has disimproved.'
> (Annual Report, Ekpene Obum, 1948)

Dapsone soon completely replaced chaulmoogra oil injections. During 1949 261 in-patients received dapsone treatment at Ekpene Obum, and in 1950 out-patient work began with 60 patients (Hospital Reports, various years, unpublished).

With out-patient treatment hundreds more cases could be treated, and because most of them were paucibacillary improvements were soon seen. Patients reported in larger numbers and earlier than previously. The 1955 Annual Medical Report Eastern Region stated:

'The wave of discharges, which had been a feature of the work of the last four years following the institution of dapsone treatment in 1949, is still maintained, and in those districts where treatment has been available for some years there is a clear decline in the number of cases'
(p 20)

Patients released from treatment at out-patient clinics were given discharge certificates following the custom at the mission settlements, Lists of names were sent to district authorities to help acceptance by their communities, and to promote confidence in the new treatment. For instance, in July 1955 a letter was sent by the Leprosy inspector for Southern Annang in Abak to the Council in Ikot Okora:

'Sirs, It is with much pleasure to inform you that the total patients being discharged in Ibesit Leprosy Clinic, Ikot Akpan are forty six (46) as symptom free of leprosy in this year. This is done by Doctor Fisher, the Touring Medical Officer, Aba Area.'

Then follows the list of names, families and villages of the discharged patients, signed by the Leprosy Inspector (Calprof Papers No 2464/4, Enugu Archives)

Out-patient treatment expanded, and by 1967 Ekpene Obum was supervising treatment in 38 clinics, supplying the drugs and processing statistical returns. A leprosy control worker since the 1950s who was still at Ekpene Obum in 1987 recalled:

'We started an out-patient clinic here at Ekpene Obum when dapsone was first introduced, and they poured in on bikes twice a week. Then in the late 1950s we started clinics where we could.'
(Ufot Peter, personal communication, 1987)

Ekpene Obum provided out-patient leprosy treatment in the southern part of the study region west of the Cross River, except for Ikot Ekpene district which was served by Uzuakoli.

A network of rural clinics covering the whole of the northern area of the study region was administered from the leprosy hospital at Moniaya, replacing the 1940s system of segregated villages based on clans.

In the central part of the region treatment was first provided in two large segregation villages established by the Scottish Presbyterian Mission. The village at Obubra was later replaced by the Leprosy Hospital, and served a network of clinics. The other segretation village, at Yakurri, still functioned in the 1980s as a leprosy village for destitute patients, and was the site of an out-patient clinic.

From the 1950s out-patient treatment with dapsone monotherapy therefore became the norm for most leprosy cases in the study region, and continued so for more than 30 years. Patients attended treatment centres, at first twice weekly but more recently monthly, to be examined and to collect dapsone. This did not lead to the immediate closure of segregated villages, which survived because of the continuing stigma, even though segregation had become unnecessary.

Out-patient treatment enabled the former mission leprosy settlements to change their role and they increasingly became hospitals for the short-term treatment of patients with complications, and centres for out-patient work.

Leprosy treatment was well-organised throughout Eastern Nigeria from the 1950s until the Civil War in 1967. Dapsone supplies were secure, new workers were being trained and were paid regularly by local councils, and bicycles supplied by UNICEF gave them mobility. Clinic supervision was therefore regular, and defaulting patients were followed up to ensure their treatment. There was a sense of commitment and optimism among leprosy workers, associated with the proven effectiveness of the new drug. A report in 1964 stated:

> 'In Eastern Nigeria it may be asserted with confidence that leprosy is almost controlled, but eternal vigilance is still necessary ... if control is eventually to be succeeded by eradication ... '
> (Leprosy Research Unit Uzuakoli 1964 Report: p1)

The 1965 report declared:

> ' ... the policy of out-patient treatment at static leprosy clinics throughout the Region has been justified by results.'
> (Browne and Honey, 1966, p 2)

THE CIVIL WAR

The Nigerian Civil War from 1967 to 1970 seriously disrupted leprosy control. The study region was part of the former Eastern Region of Nigeria which in 1967 seceded as Biafra. At the beginning of the war leprosy work continued as before. During the first year Itu leprosy hospital was bombed and in February 1968 its patients were officially transferred to Ekpene Obum although many patients were never seen there (Ufot Peter, Leprosy Officer, personal communication, 1987).

Ekpene Obum suspended of visits to rural clinics in 1967, although the hospital continued to function in a limited way throughout the war. The doctor left and there was no-one with authority to discharge patients, case finding ceased, supervision of field-workers collapsed and work in Biafra was impossible. Fieldwork problems were compounded by a lack of transport, the hospital vehicles having been taken by the government. The supply of dapsone was irregular, and there was a shortage of drugs to treat the complications of leprosy and other illnesses, (personal communications and miscellaneous hospital reports, unpublished).

In the north of the region there was less disruption, but out-patient work from Moniaya was hindered as patients were scattered and their treatment became irregular (Moniaya Hospital Reports, various years, unpublished). The northern and eastern areas of the Cross River region returned to near-normality before the end of the war.

The western areas of the region adjacent to Igbo territory were most seriously affected. Throughout the war there were refugees from both sides moving into and out of the area, as Biafra territory was diminishing. The Annang area in the west remained part of Biafra for longest, during which time official movements between Nigeria and Biafra were restricted. Refugee camps were set up in schools and colleges and other community buildings in the Annang area, (Rev Rufus Ogbonna, Qua Iboe Church General Secretary, personal communication, 1987). Because links with Ekpene Obum were cut off leprosy control in Annang suffered a major set-back: existing patients did not receive drugs and new patients could not be diagnosed or treated.

Contemporary reports confirm that there was significant disruption in the Annang area. The last gunshots of the war were reportedly fired at Ikot Ekpene in the study region, according to the Daily Times of July 1 1970, which described the hinterlands of Ikot Ekpene, Abak and other towns:

> ' ... one sees villages completely destroyed, houses burnt down, economic crops uprooted ... '
> (cited in Hasselbad 1970)

The Nigerian Red Cross was responsible for refugee relief, and reported half a million displaced persons in 1968, concentrated in the Mid-west Region and the former Eastern Region. Teams of Red Cross relief workers were in action, including a team of 17 in Abak, the second largest team after Enugu, (Red Cross, Lagos, 1968, unpublished).

POST-WAR PERIOD

The likelihood of a detrimental effect of the war on leprosy control was recognised in 1970 by the recently established South-Eastern State Government. It requested an account of the problems of leprosy from The Christian Council of Nigeria,

> 'with particular reference to the establishment of mobile clinics throughout the State, the rehabilitation of treatment centres, and suggestions in regard to case-finding, treatment, and training in general.'
> (Hasselbad, 1970, p 1).

The Council invited American Leprosy Missions to undertake a survey, and this was carried out in June and July 1970. The survey report gave an assessment of the effects of the war and recommendations for the rehabilitation of the control service, both for the short and long term. Early in the report it is stated:

> 'A marked increase in the incidence of leprosy may be expected in the next three to five years unless urgent preventive steps are taken to preserve a once effective leprosy control programme.'
> (Hasselbad 1970 p 6)

A letter enclosed with the report stated that

> 'Urgent assistance is needed in South Eastern State:
>
> 1. To avoid a breakdown of the leprosy control service, once a part of the Eastern Region and administered from there, among the most efficient in the world.

2. To avoid a costly increase in the incidence of leprosy, costly in human and financial resources.

3. To assist the rehabilitation of many leprosy patients who, because of the war and administrative disorganisation have become needlessly more crippled, more dependent and less productive. The State cannot afford non-productive citizens.'

(Hasselbad 1970 p 17)

Most of the recommendations were not implemented, and from further evidence below it is reasonable to conclude that the 'once effective control programme' was not preserved after the war. One of the reference points of the survey had been the rehabilitation of treatment centres. Those which had been war-damaged in the Ikot Ekpene area had not been repaired or replaced by 1988. Training was also to be addressed but has been minimal and piecemeal: most of the present senior field workers were trained at Oji River before the war. A WHO officer visiting the region in February 1983 reported his concern that the qualified leprosy staff were ageing (Des Plantes, 1983).

The damage to leprosy control caused by the war was due not only to the disruption of the treatment of known cases, but also to the potentially increased risk of leprosy transmission under war conditions, especially in refugee camps. The dispersal of people had included the movement of leprosy cases, both those under treatment and, it is reasonable to assume, undiagnosed and untreated cases. Any infectious leprosy cases staying in refugee camps, for however short a time, would have been living in physical and nutritional circumstances which would only have worsened their own condition, and would also have increased the risks of leprosy transmission. The extent of the impact can never be measured.

THE STATE LEPROSY CONTROL SERVICE

The leprosy service limped along with the staff and structures that had survived the civil war until 1977 when a new Federal Government programme was established. The Cross River State Ministry of Health took over responsibility for the organisation of leprosy work in the region. Until the subdivision of the state in 1987, this was administered from Calabar. Voluntary agencies continued to support the leprosy hospitals with selected funding and personnel, but the State Ministry gradually assumed control over buildings and staff.

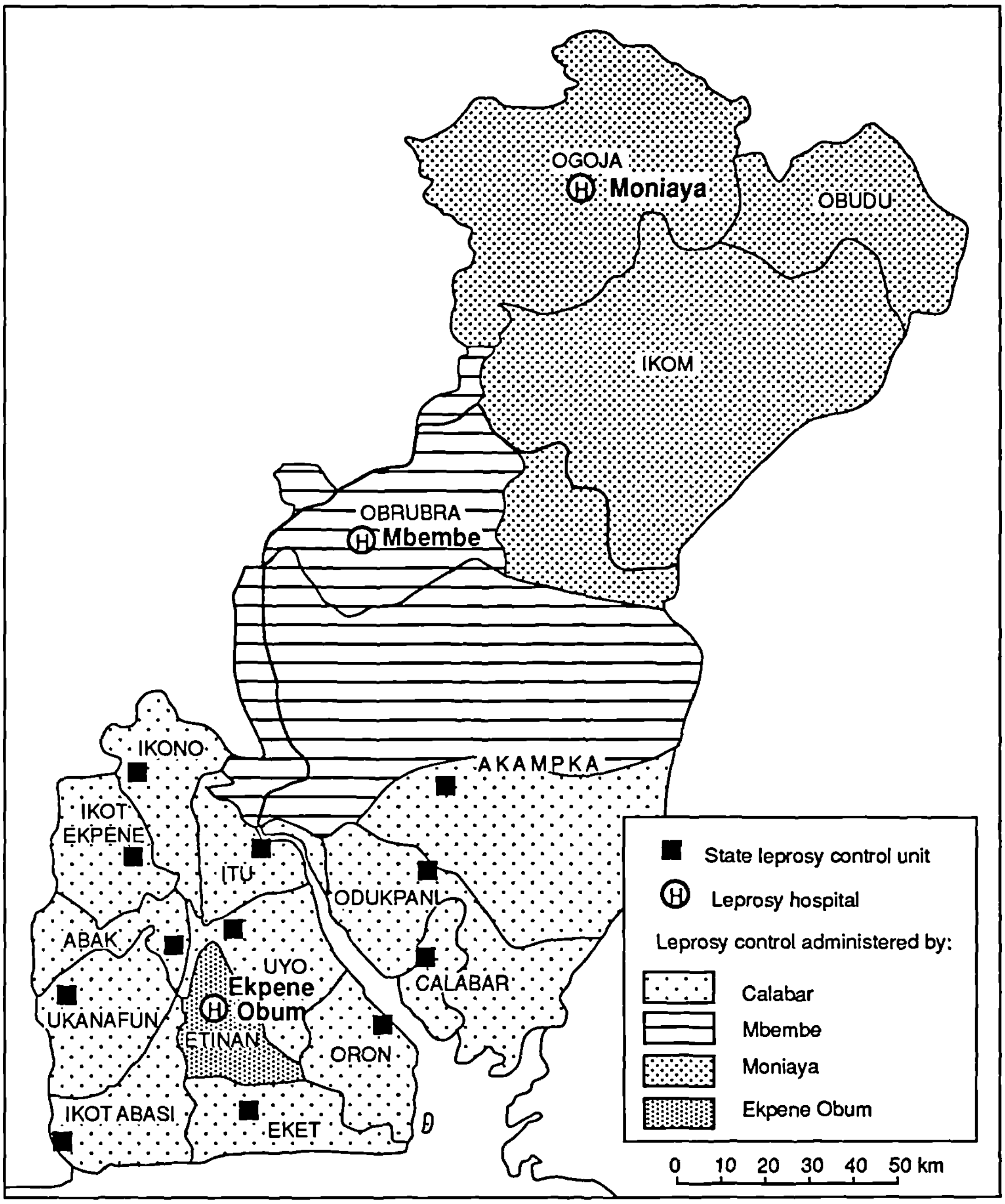
The headquarters town of each southern Local Government Area (LGA) had a Leprosy Control Unit where staff were based and which held the records of leprosy clinics in the LGA. Etinan LGA was an exception, as the clinics were supervised by the leprosy hospital at Ekpene Obum.

The Leprosy Service extended the network of rural clinics, and leprosy diagnosis and treatment by the 1980s was provided at more than 200 out-patient treatment centres. Patients could attend the Leprosy Control Unit any day for diagnosis and treatment, whereas rural clinic treatment was on a designated day, weekly or, more usually, monthly.

Each treatment centre was required to send monthly statistics to the headquarters of its Local Government Area, from where they were sent to Calabar, and thence to Lagos (Fig 6.6). The supply of drugs moved in the opposite direction: they were collected from Lagos by the State Ministry and made available to LGA Headquarters for local clinics as required.

Fig. 7.2

Cross River State: Administration of Leprosy Control



In the northern LGAs of Ikom, Obudu, Ogoja and Obubra, there was an exception to this arrangement. Leprosy clinics had already been established in the first three by the Roman Catholic Mission and administered from the leprosy hospital at Moniaya, which processed the monthly leprosy statistics and sent them directly to Calabar. The Presbyterian leprosy hospital in Obubra similarly administered clinics in Obubra and in northern Akampka (Fig 7.2).

The State Ministry of Health receives a budget from the Federal Government to pay for staff, drugs, buildings, and transport. No part of the leprosy service is required to be self-financing; the WHO policy of free leprosy treatment is officially implemented, although in some cases patients may be asked to pay by unscrupulous leprosy workers.

Although the State leprosy service was established in the 1970s when the country's economic situation was relatively good due to high oil revenues, the benefits have not been felt, and it has been operating under severe constraints. These were due to the effects of the Civil War in the disruption of staffing and organisation, and the subsequent lack of resources to remedy this. The 1977 structure provided for a State Consultant Leprologist, but the post, like others in the leprosy service in the State, was not filled. Annual reports from Calabar referred to shortages of trained staff, transport and drugs. The 1977 report complained of lack of transport, staff vacancies, lack of promotions, shortage of clerical support and 'frustration'. Regarding drugs it stated:

> 'No money was voted for the purchase of drugs for the Leprosy Service. The most part of the year such units as Itu, Abak, Ikot Ekpene, Ikot Abasi, Oron and Eket had no dapsone

> for their patients ... The average number for one patient was 100 per year or 8 per month. It was absolutely insufficient, and there is no wonder that during the year we lost 521 patients as defaulters.'
> (CRS Epidemiological Unit Annual Report, 1977, p5)

The 1981 report registered vacancies in the top three positions of the leprosy control service, and:

> ' ... the greatest constraints are lack of vehicles, funds for maintenance and running costs and the most serious was lack of drugs like DDS (dapsone), including dressings for regular treatment. At the time of writing this report not a single tablet of DDS is available in the central store ... '
> (CRS Epidemiological Unit Annual Report, 1981, p5)

Shortages of transport, drugs and staff continued to be reported during the 1980s, and a suspicion of increasing dapsone resistance due to irregular treatment was also noted.

The effect of the lack of official transport cannot be under-estimated, because of inadequate public and personal transport in the region. The shortage of motor vehicles, including river boats which are necessary in some areas, meant that in many cases the leprosy personnel remained in their offices, unable to run the monthly clinics, trace contacts or follow up defaulting patients, and conduct surveys. Consequently, even when drugs were available and patients took the trouble to report to a clinic, there was often no one to attend to them and they received no treatment.

Prior to the Civil War the main means of transport was by walking, bicycle or canoe, and so the transport problem was less apparent. Since the oil boom of the 1970s new roads have been built and the use of motor vehicles has increased, while the use of bicycles has declined. Resourcing a mobile leprosy service, which is necessary in this rural region, has therefore become more expensive. The motor vehicles supplied during the boom years of the seventies became too costly to service or replace during the recession of the eighties, but leprosy workers have been reluctant to return to the bicycle or walking.

The inadequate drug supply has several causes. Dapsone is cheap, and the shortage of funds is hardly a factor in its erratic supply. Periodic shortages were reportedly due to the lack of transport to collect supplies from Lagos and distribute them throughout the State. Shortages of clofazimine and rifampicin, the other two drugs used in the 1982 multidrug therapy (MDT), were more closely related to finance. Rifampicin is especially expensive, and this was a major factor limiting the implementation of MDT in Government leprosy clinics during the 1980s.

The absence of a State Leprologist and the shortage of leprosy doctors have presented problems in the training and supervision of staff. From 1974 to 1977 there was no leprosy doctor working in the region. In 1977 an expatriate doctor resumed work at Ekpene Obum and in 1983 was joined by another doctor. They reactivated the pre-Civil War programme of doctor's visits to rural leprosy clinics in several LGAs in the Mainland area, working in collaboration with the State government service. MDT was partially introduced for patients at Ekpene Obum, and in several out-patient clinics.

In 1985 an expatriate leprosy doctor began work in Moniaya where there had been no doctor for twelve years. The doctor revitalised leprosy control throughout Ikom, Obudu and Ogoja LGAs, reviewing registers and organising workshops for leprosy workers, prior to introducing MDT. The successful results of this programme are examined in Chapter Nine.

In 1984 there were 136 Nigerian medical doctors practising in the State Ministry of Health (unpublished Ministry of Health document, Calabar, 1985), but the two leprosy doctors were expatriates. Nigerian doctors did not want to work in leprosy due to the continuing negative attitudes to leprosy, the poor career structure in the leprosy service, and the rural location of leprosy hospitals. The same factors apply to the employment of paramedical workers, and result in few incentives to enter or remain in leprosy work. The plans to integrate leprosy with primary health care may help to remove the stigma of working in leprosy and alleviate the staffing problems.

CONCLUSION

The original fear of leprosy in the region and the rejection of its patients owed much to the absence of any known cure. The increasing understanding of the disease during the present century has led to new therapies and new approaches to patient treatment. The Cross River region was ahead in Nigeria, and even the rest of Africa, in the early introduction of chaulmoogra oil for leprosy, and in the establishment of mission settlements for the care of leprosy patients. Its lead continued when it tested and used dapsone in the 1940s before its widespread introduction after 1950.

The introduction of chaulmoogra oil in the 1920s, and dapsone twenty years later, revealed many more patients than were hitherto known. These developments helped to free patients from the fear of leprosy. The introduction of dapsone, which allowed treatment within the community rather than in segregated settlements, was probably the most important development. There appears to be an association between advances in leprosy treatment and a subsequent improvement in attitudes to the disease, although attitudes may lag behind.

The region's early lead in the organisation of leprosy treatment and control was disrupted by the Nigerian Civil War. Subsequent shortages of staff and resources in the State leprosy control service mean that it has never fully recovered, and the MDT recommended by WHO in 1982, is only slowly being implemented. Leprosy is mainly a rural disease, and is therefore relatively 'invisible' and easy to ignore by policy-makers, especially when there are other pressing health needs. The poor funding of leprosy here is not unusual, and is typical of the low priority accorded to the disease in many developing countries.

CHAPTER EIGHT

PREVALENCE AND DISTRIBUTION OF LEPROSY IN THE CROSS RIVER REGION

REGISTERED CASES AND PREVALENCE: DEFINITIONS

In epidemiology the disease prevalence rate is the number of cases with the disease at a particular time per unit of population, and its calculation requires accurate case and population figures. In chronic diseases like leprosy the number of cases on the registers at any one time inevitably includes an accumulation from previous years, and especially where case-holding is inefficient the number may be very different from the true number of cases. For other reasons already discussed (Chapter Three), and especially stigma, the case figures for leprosy may be inaccurate. The problem of inadequate census data for Nigeria has been examined in Chapter Four and is another reason why the leprosy rates for the region are not true prevalence rates Therefore 'registered case rates' are used in this study, calculated from the numbers on registers and the official population estimates.

By the end of 1986, the last year of fieldwork for which leprosy figures were available for the whole region, there were 7,130 registered leprosy cases in Cross River State, and an estimated population of over six million (Table 8.1). This is a rate of 1.15 per thousand, which has been described as 'moderate' (Christian, 1981; Fine, 1982), and would place CRS in the 'high endemic' category and constitutes an 'important health problem' (Bryceson and Pfaltzgraff, 1990; Noordeen, 1985).

TABLE 8.1

Cross River State: Leprosy Registration 1980 to 1986

Year	Reg cases	Population (1000's)	Lep rate per 1000
1980	8604	5337	1.61
1981	8497	5471	1.55
1982	8600	5609	1.53
1983	8048	5750	1.40
1984	7993	5897	1.36
1985	7436	6045	1.23
1986	7130	6197	1.15

(Source: CRS Ministry of Health Leprosy Returns, Calabar, 1980-86)

Leprosy data for the whole of Nigeria have not been reported regularly, but state figures reported to the WHO for 1982 show that the CRS leprosy rate was approximately half the national mean and ranked eleventh out of the nineteen states (Table 8.2). The 1990 figures for Nigeria omit the two new states created in 1987, Akwa Ibom State in the study region, and Katsina State in the north so the 1990 CRS figures reported to the WHO are for the new smaller state. One can conclude that Cross River State represents a region of less than average leprosy rates for Nigeria in recent years.

TABLE 8.2

Nigeria and Cross River State: Registered Leprosy Cases and Rates 1982 and 1990

		Nigeria	CRS
1982	Total	270,719	8,313
	Mean prev rate	3.02	1.46
	Prev rank	-	11
1990	Total	153,631	2,263*
	Mean prev rate	1.36	0.31
	Prev rank	-	12

* refers to the new, smaller state

(Source: Declercq et al, 1988; Gelin et al, 1991)

Notes: (a) Leprosy figures by state in Nigeria were not reported to the WHO for 1983 to 1989 inclusive. (b) This writer notes the discrepancy between the 1982 CRS rates in Tables 8.1 and 8.2. Such variations in leprosy data from different sources are not unusual and are discussed in Chapter Ten.

LEPROSY RATES DURING THE 1980s

During the period 1980 to 1986 the total number of registered leprosy cases in the region declined by approximately 17 per cent from 8604 in December 1980 to 7,130 by December 1986 (Table 8.1). Taking into account the officially estimated annual population increases of 2.5 per cent, the rate of registered cases decreased by over 28 percent, from 1.61 to 1.15 per thousand. The decline may represent a true decline of the disease in the region, or it may be an artefact of the leprosy service, because names are removed from registers through:

i discharge after successful treatment

ii defaulting

iii death

Similarly, new names are added to registers through:

i newly diagnosed cases

ii re-admission of formerly discharged patients

iii re-admission of defaulters .

If the levels of activity in case-finding and case-holding are consistent from year to year, a true decline in leprosy can be assumed if more cases are being discharged per year than new cases are being registered. There was no real change in the level of activity in the leprosy service during the period under discussion here; active case-finding was minimal, and most new cases were self-reporting. Between 1980 and 1985 there were 1405 new cases in CRS, and 1121 defaulters (Table 11.6). The figures for Ekpene Obum Hospital show that the number of new cases greatly exceeded the number discharged during the period and there were also large numbers defaulting in the same years (Table 8.3). The evidence indicates that some of the decline in registered cases can therefore be attributed to patients defaulting from treatment and being removed from the registers. Reports from Moniaya Leprosy Hospital confirm the high defaulting rates, which are discussed further in Chapter Eleven.

TABLE 8.3

Ekpene Obum Hospital, Discharges and Defaulting Rates 1980 - 85

Year	Registered Cases on December 31	New Cases	Discharged	Defaulted	Rate of defaulting during year as %age of cases registered at beginning of year
1979	373				
1980	410	89	9	82	22
1981	470	80	11	50	12
1982	520	66	12	53	11
1983	441	65	11	125	24
1984	440	79	5	91	21
1985	412	41	13	113	26

(Source: Ekpene Obum Hospital Annual Reports to The Leprosy Mission, 1980 - 85)

However, it is likely that at least some of the cases 'defaulting' are cured patients who have effectively discharged themselves, having received dapsone for several years. The leprosy service procedures allowed only a doctor or senior official to formally release patients from treatment and issue discharge certificates. In the south there have been few such qualified staff since the Civil War (Chapter Seven), and there is every reason to believe that there are many former patients who have not been officially discharged, although they have had sufficient treatment, and remain on registers until eventually recorded as 'defaulters' (Dr EM Davis, personal communication 1986). During reviews of the registers in the three northern LGAs in 1986-7, prior to the introduction of MDT, 'large numbers' of cases were found to be registered but no longer attending regularly. The doctor checked patient records and deduced that many had received sufficient treatment, that their disease was inactive and to attend clinics was unnecessary. They were released from treatment 'in absentia' (Moniaya Hospital Report, 1987).

If some of the 'defaulters' represent cured cases, then it may be reasonable to conclude that the true leprosy prevalence rate has been falling throughout the region since 1980, in spite of the generally poor leprosy control services.

This is typical for Africa, according to Cap (1981), who reviewed the leprosy situation in the continent. He acknowledged that although the figures were of 'variable reliability', for most countries there was a decrease in leprosy rates, except where control activities had just started. He attributed the decrease 'to a steadying increase in the number of paucibacillary patients who are released from control' (p 56), and to the number of patients lost through defaulting. He noted that the decline was not due to a decrease in the incidence or case-detection rate, as the number of new cases remained stable over the years, except when there was a local intensification or slackening of leprosy control activities.

DISTRIBUTION OF LEPROSY BY LOCAL GOVERNMENT AREA

The total of 7130 cases in 1986 was distributed unevenly by LGA, with a marked contrast in both totals and rates between the north and south (Table 8.4; Fig 8.1). The distribution pattern has not changed since 1980 (Table 8.5).

There were only 53 cases in 1986 in Eket LGA with an estimated population of 594,000, but 2,674 cases in Ogoja with a population of only 320,000. The rates

TABLE 8.4

Cross River State: Population Density and Registered Leprosy Rates, by Local Government Area, 1986.

LGA	Pop (1000's)	Dens/ km.sq	Dens rank	Lep cases	Lep rate/1000	Lep rank
Abak	333	645	5	120	0.36	10
Akampa	195	29	17	266	1.36	4
Calabar	194	581	6	126	0.65	7
Eket	594	801	2	53	0.09	17
Etinan	485	924	1	495	1.02	5
Ikom	205	38	16	1285	6.27	2
Ikono	332	474	10	82	0.25	14
Ikot Abasi	430	544	8	128	0.30	12
Ikot Ekpene	449	696	3	128	0.29	13
Itu	280	470	11	99	0.35	11
Obubra	431	206	12	417	0.97	6
Obudu	133	84	15	764	5.74	3
Odukpani	230	136	13	91	0.40	9
Ogoja	320	91	14	2674	8.36	1
Oron	564	552	7	120	0.21	15
Ukanafun	399	503	9	163	0.41	8
Uyo	622	681	4	119	0.19	16
TOTAL	6196	216 mean		7130	1.15 mean	

(Source: Compiled from CRS records; Ministry of Health, Calabar)

Fig. 8.1

Cross River State 1986: Registered Leprosy Rates and Population Density, by Local Government Area.

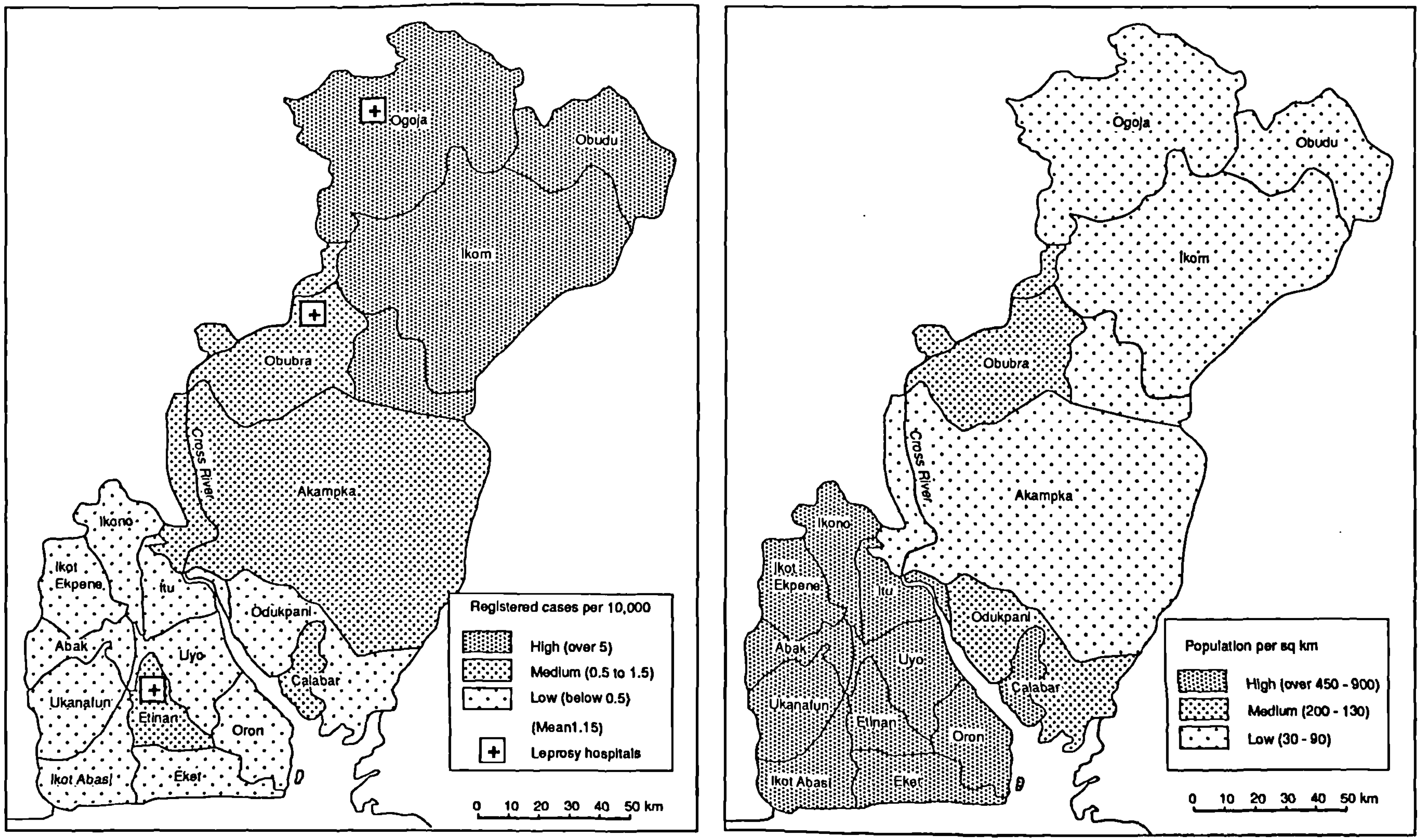


TABLE 8.5

Cross River State: Total Registered Leprosy Cases by Local Government Area, 1980 to 1986.

LGA	1980	1981	1982	1983	1984	1985	1986
Abak	106	114	118	107	109	106	120
Akampa	275	277	281	276	239	258	226
Calabar	66	114	118	147	152	128	126
Eket	74	75	77	74	66	51	53
Etinan	562	617	668	523	598	523	495
Ikom	941	956	970	970	954	956	1285
Ikono	208	185	173	109	90	78	82
Ikot Abasi	226	229	232	119	112	125	128
Ikot Ekpene	113	139	146	140	141	154	128
Itu	156	171	174	143	113	99	99
Obubra	571	502	501	445	425	380	417
Obudu	1479	1390	1466	1423	1384	1084	764
Odukpani	90	93	95	94	94	104	91
Ogoja	3263	3154	3124	3057	3085	3011	2674
Oron	115	106	107	112	115	117	120
Ukanafun	196	202	195	163	164	129	163
Uyo	163	173	155	146	152	135	119
TOTAL	8604	8497	8600	8048	7993	7436	7130

(Source: Compiled from CRS Ministry of Health Annual Leprosy Returns, Calabar, 1980 - 1986).

of over 5 per thousand in the northern group of three LGAs were more than ten times higher than the low rates of the southern group. The rate in Ogoja LGA (8.36) was almost 100 times the rate in Eket LGA (0.09). Rates close to the mean of 1.15 occurred in the middle region, in Obubra and Akampka LGAs, plus two LGAs in the south, Calabar and Etinan.

The latter have artificially raised rates because patients from other LGAs reported there. In the case of Etinan it is due to the leprosy hospital, so the figures include patients reporting from the whole of the Mainland and beyond. In the case of Calabar, it is because it is the state capital, and patients from outside and especially from Akampka and Odukpani LGAs, chose to report there for convenience or to preserve their anonymity. For instance, the treatment register for Calabar Urban clinic in December 1984 had 24 patients from Odukpani out of the 110 total. The registration figures for Odukpani are therefore lower than the true number of patients from the LGA receiving treatment.

The striking north-south contrast in the distribution pattern confirms the popular perception in the region that 'leprosy is worse in the north of the State.' Educated people in Calabar who heard of this study frequently remarked that I should 'go to the north of the State to see leprosy,' and wrongly believed that it had already disappeared from the south.

The relatively higher rate of leprosy in the north has been acknowledged at least since 1953. Colonial records refer to a proposed survey in 1953:

> '...to consider factors contributing to high leprosy incidence in Ogoja Province and adjacent areas of Onitsha, Calabar and Owerri Provinces.'
> (2465/3 Records of Provincial Office Calabar 1st Batch vol I 1-418).

Searches in Nigerian and UK archives have failed to find detailed results of such a survey.

POSSIBLE FACTORS EXPLAINING THE DISTRIBUTION PATTERN

The distribution pattern of leprosy on any scale is neither random nor even, and the diversity in leprosy rates, even in a relatively small area like Cross River, is widely recognised (Noordeen, 1985). Several environmental and human factors in leprosy which may explain the spatial contrasts in the region are examined here.

Climate

The high concentrations of the disease in the humid tropics has led to the suspicion that such an environment, if not a necessary factor, somehow favours the survival and transmission of *Mycobacterium leprae*. Earlier this century Rogers (1923, cited in Nelson, 1958) believed that hot humid climates allowed the easy spread of leprosy. The evidence from surveys between the 1930's and 1950's in East and West Africa were reviewed (Nelson, 1958). They showed that there was no consistent relationship between high leprosy rates and high rainfall, and it was concluded that climate per se was unimportant in explaining the distribution of leprosy.

Hunter and Thomas (1984) have more recently shown 'a fairly close correspondence' between Africa's 'leprosy belt' and the zone with over 40 inches of rainfall (1016 mm) per year. They propose 'ideal' environmental thresholds for leprosy transmission in Africa of 75-85 °F and 40-70 inches of rainfall. They acknowledge that areas with over 80 inches (2032 mm) are not associated with maximum disease prevalence, and suggest that an upper threshold of rainfall may be operating, above which higher rainfall has no effect on the leprosy rate.

In the Cross River region the highest leprosy rates coincide with the areas of lowest rainfall, but since the whole region receives more than the 40 inches threshold suggested by Hunter and Thomas (1984), rainfall would play no part in explaining the varying prevalence. The current high leprosy rates in the drier north of Nigeria and in several Sahelian countries, which have under 40 inches, also suggest a limited role for rainfall. Hunter and Thomas viewed rainfall and temperature as indirect mechanisms, recommending their effect should be

> 'seen in a multi-causal context that will include social and cultural factors of settlement, economy and life-style.'
> (p 38-39)

The indirect effect of climate on clothing, and therefore on opportunities for potential transmission of *M. leprae* via the skin, has been proposed as a reason for higher leprosy rates in the tropics, where less clothing may increase potential leprosy transmission. However, there is no simple connection, because, for instance, in the high temperatures of the Sahel many people are fully covered and leprosy rates are high. The possible role of clothing in Cross River is discussed below.

Climate may be important in providing suitable micro-environments for the survival of *M. leprae* outside the human body, especially in the soil. Chapter Three discussed reports that humid soil and vegetation may act as a habitat for the bacillus. In the study region the well-drained Coastal Plain Sands of the Mainland generally hold little surface water, although the area receives rainfall over 2000 mm. However, there are some areas which are seasonally flooded and others which are poorly drained, which could provide suitable conditions for the survival of *M. leprae*.

Microclimates and ecological factors also determine the occurrence of non-pathogenic environmental mycobacteria, which are increasingly believed to play a part in the human immune response to *M. leprae*, but little experimental work has yet been reported. Suitable microclimates for the survival of *M. leprae* and specific environmental mycobacteria may eventually be found to explain the persistence of leprosy in certain foci in the region. Meanwhile, a role for climate in explaining the distribution of leprosy in Cross River State has not yet been demonstrated.

Altitude

It has frequently been suggested that high leprosy rates in Africa are associated with low altitude, since a number of early writers reported a lower incidence at higher altitudes (cited by Nelson, 1958). An apparent association was subsequently demonstrated in West Kenya, (Leiker et al, 1968), Tanzania (Wheate, 1959) and in Uganda, where Nelson (1958) claimed that areas over 4,000 ft throughout Africa had lower leprosy rates than the surrounding lowlands.

The Cross River region does not fit this pattern. The lowest leprosy rates are in the Mainland area which is below 100m, and the highest rate in 1986 was in Ogoja Local Government Area which is also mostly below 100 metres. The highest altitudes are in Obudu, which rises to 1841 metres (Fig 4.1), and which had the third highest registered case rate. Such inconsistencies suggest that if altitude is significant at all, like climate, it is operating indirectly to influence leprosy rates.

Ethnic Characteristics

There is little ethnic diversity among the peoples of the region, although they are linguistically diverse (Chapter Four). LGAs with the lowest leprosy rates coincide with the area occupied by the Ibibio/Annang-speaking people. In contrast the northern area with the highest rates has many language groups. No-one has yet suggested variations in genetic susceptibility to leprosy between different African groups, although it has been suggested in Asian peoples (Pearson 1982b). The role of the varying behavioural patterns of different groups in affecting the transmission of leprosy cannot be ruled out. The people in the north of the region have more leprosy and generally stigmatise it less. Such an association has been noted elsewhere, including Nigeria as a whole, and is discussed above (Chapter Six), but whether tolerance is a cause or an effect of higher rates has never been demonstrated. It is proposed here that factors other than ethnicity are responsible for the differences in leprosy rates.

Population Density and Socio-Economic Levels

An apparent association between high leprosy rates and lower population density has frequently been noted in tropical Africa (reviewed by Hunter and Thomas, 1984). This occurs in the study region where the LGAs with the highest leprosy rates had the lowest population density (Table 8.4). The Pearson Product Moment Test was used to assess the association between population density and leprosy rate in the seventeen LGAs in 1986. The analysis produced a coefficient of minus 0.6391, indicating a strong inverse relationship, with a high confidence level of 0.001. If Etinan LGA and Calabar are excluded, being inflated due to patients registering from other LGAs, the coefficient is minus 0.6798, showing a closer relationship. A scattergraph was used to demonstrate the relationship for Cross River State and also for the states of Nigeria for 1982 (Figs 8.2 and 8.3). They show that it is not a simple linear one, but they support the apparent association noted elsewhere between high leprosy rates and low population densities.

Fig 8.2 Cross River State: Scattergraph of Population Density and Registered Leprosy Rates, 1986

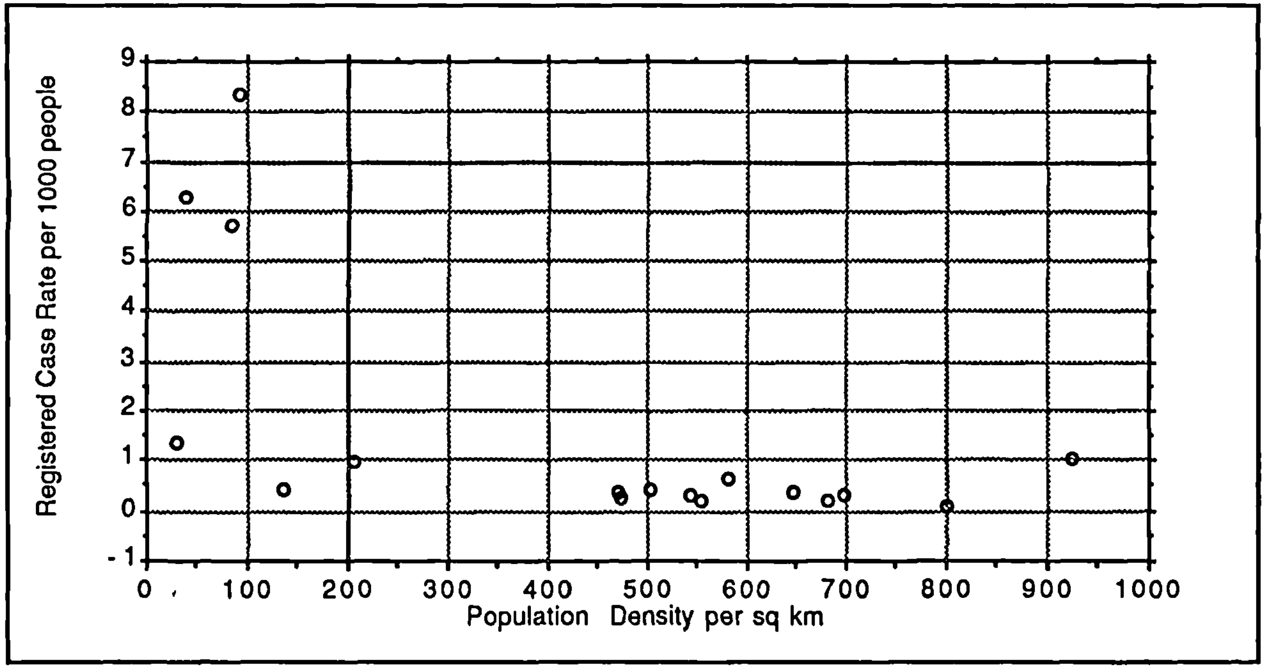
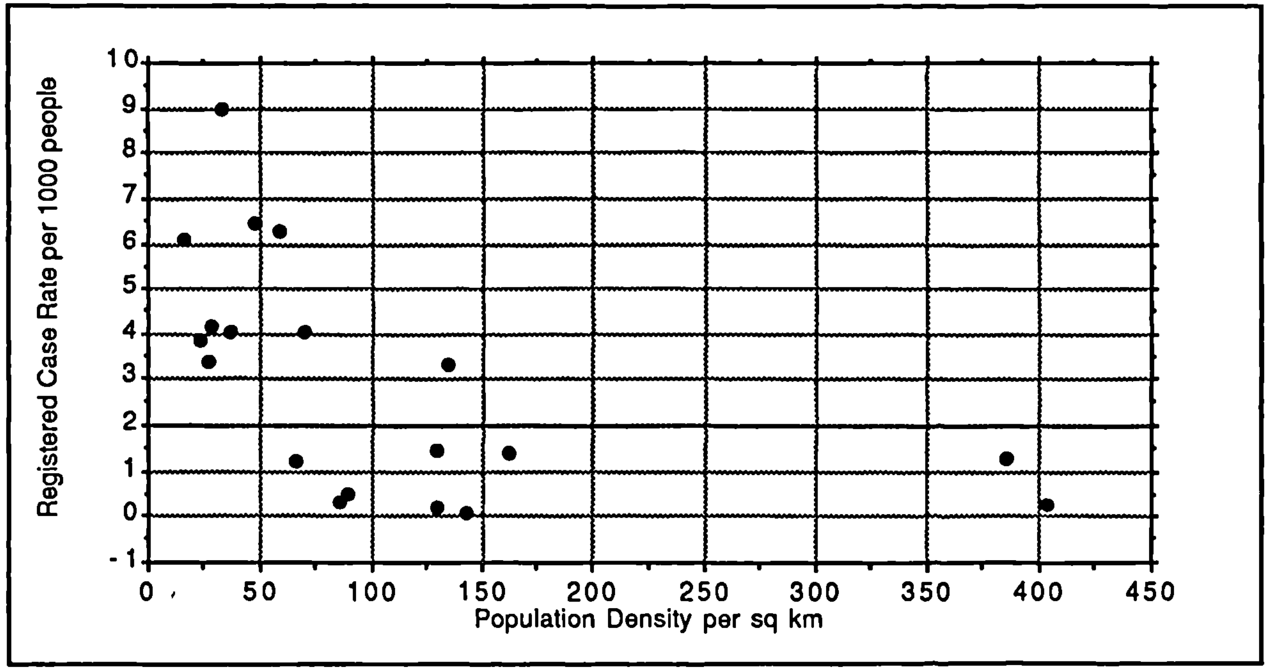


Fig 8.3 Nigeria: Scattergraph of Population Density and Registered Leprosy Rates, 1982



There has been discussion on whether and how population density *per se* may influence leprosy rates. In rural Africa, areas of sparse population generally possess a lower standard of living and poorer infrastructure than areas of higher density, and are therefore less likely to benefit from the social and economic development which appears to lead to a decline in leprosy.

There are marked contrasts between the north and south of the region in the levels of urbanisation, provision of infrastructure, and the range of educational and employment opportunities. These, and the longer period of modernisation in the south have been discussed above (Chapter Four). Characteristics indicative of the standard of living include housing, clothing, water supply and hygiene, and nutrition. Due to data shortages, these are not measured in this study, but are described in general terms.

Housing

Poor, especially crowded, housing has been suggested as a factor in leprosy transmission, as in tuberculosis. Sparsely populated areas do not necessarily have less congested housing, because cultural characteristics frequently determine sleeping arrangements, rather than availability of land. In the northern part of the region houses are small compared with the south, and if congested sleeping conditions contribute to the household transmission of leprosy, as has long been suspected, they may contribute to the higher leprosy rates in the north.

Leprosy stigma in the region prevented a proposed survey to examine the characteristics of the domestic environments of known leprosy patients in rural and urban areas. This would have tested the hypothesis of an association between leprosy and poorer, especially congested, housing.

Clothing

Better clothing is usually associated with a higher standard of living. By the 1980s clothing and footwear were almost universally worn in the south, even by children. This contrasts with the area 25 years ago (personal observation), and with the northern area in the 1980s, where adults were still frequently unshod and where children were rarely clothed or shod. Some researchers believe that the transmission of leprosy or susceptibility to it, is affected by contact with the soil, and that herein lies the link between poor rural areas and the continuation of leprosy (Pfaltzgraff, personal communication, 1986). The north-south contrasts in Cross River appear to support this thesis.

Water supply and hygiene

As long ago as 1940 Muir believed that overcrowded housing, poor hygiene and inadequate nutrition were major factors in the high incidence of leprosy in Central Africa (Muir, 1940). There are differences between the north and south in levels of water supply and hygiene. In the north, there is lower rainfall and poorer infrastructure and regular and clean water supplies are scarcer. Reported outbreaks of bilharzia, guinea worm and yaws are evidence of this; during the 1980s reports of these diseases in the region were limited to the northern LGAs of Ikom, Obubra, Obudu and Ogoja, where leprosy rates were highest (CRS Ministry of Health Annual Reports, Calabar, various years).

Nutrition

Better nutrition usually accompanies higher standards of living. Diet has long been implicated as a risk factor in leprosy, the effect is now believed to be through the immune system, although the details are poorly understood (Chapter Two). A study of geographical variations in the occurrence of leprosy in Tamil Nadu, South India found a significant correlation between malnutrition in children 1 to 4 years old and the prevalence of leprosy, (Sommerfelt et al, 1985).

Chapter Five reports various studies showing low levels of childhood nutrition, and there is recent evidence of poor nutrition in the region, and especially in the north. Soils and farming are more productive in the northern LGAs, and the population is more dependent on agriculture than in the south where many farmers engage in off-farm activities, like crafts and trading, due to pressure on the land. However, better agriculture in the north does not necessarily mean better nutrition. Real poverty and malnutrition in Ogoja LGA for instance, were indicated by several cases of marasmus seen in the hospital during fieldwork, and the alleged trade in child labour to the cocoa growing area of west Nigeria, which, according to newspaper reports was under investigation in 1987.

The abundant evidence of poor nutrition in the region, especially in childhood, suggests that it may be a factor in leprosy through compromising the immune system, and may help to account for the north-south variation.

Tuberculosis

An inverse relationship between leprosy and tuberculosis (TB), has frequently been suggested (reviewed in Hunter and Thomas, 1984). *Mycobacterium tuberculosis* is transmitted more easily and multiplies more rapidly than *M. leprae*. It has been proposed that TB, even subclinical infection, may provide some immunity from paucibacillary leprosy, and has been suggested as an explanation for the decline of leprosy in western Europe. A recent hypothesis has linked declining leprosy rates in Africa with increasing TB associated with urbanisation (Hunter and Thomas, 1984). If the hypothesis were to apply in the study area, there would be higher rates of TB in Calabar and the south, corresponding with the more densely populated areas and the lower leprosy rates.

The thesis was impossible to test in the present study, as data for TB is scarce and TB control activities have been minimal, although very high and increasing TB rates have been estimated since the 1970s. An estimate of 75,000 TB cases was made in 1976, based on the proportion of out-patients with TB reporting to selected hospitals, compared with only 1700 receiving treatment (Kumar, in unpublished Ministry of Health Report, Calabar, 1978).

Subsequent reports continue to state that there is a serious TB problem. The 1977 annual report of the State Epidemiological Unit claimed that 'tuberculosis is probably increasing', and the 1981 State Ministry of Health Report commented 'TB cases are abundant in the Cross River State.' A Federal Government leaflet (nd c. 1980) promoting the Expanded Programme of Immunisation gave estimates for four childhood diseases, but for childhood TB states 'Data are inadequate for projections.' At a 1982 conference in CRS on Leprosy and TB Control the principal speaker reported 'I find it impossible to give you any reliable picture of the status of TB infection in CRS' (Nya, in unpublished Ministry of Health report, Calabar, 1982).

All the State Ministry of Health TB records from 1976 to 1986 were scrutinised, but were found to be incomplete. Five Government Chest Units, at Calabar, Eket, Ikot Ekpene, Oron and Uyo, and the recently established Dutch missionary TB hospital in Ogoja, were visited. In all but the last, diagnosis and treatment were expensive for patients. The Infectious Diseases Hospital in Calabar had no X-ray facilities in 1986 because of the lack of equipment maintenance, and it also lacked drugs for short-course TB therapy. The chest wards in all but Uyo and Ogoja were almost empty, and there were reports of poor patient compliance with treatment after initial diagnosis.

During fieldwork it was observed that TB occurs in both urban and rural areas, and is a disease of young and old. In the absence of records and active TB control activities it is impossible to identify any differences in incidence between urban and rural areas, or the north and south. The Medical Officer in charge of the Infectious Diseases Hospital in Calabar confirmed that TB patients came from urban and rural areas, and especially from the poorer classes (Dr C B Edem, personal communication, 1986).

A high rate of TB has long been recognised in Eket LGA, although due to data shortage this cannot be demonstrated quantitatively. Local people believe that it was brought by European missionaries and spread through the communion cup (Chief of Okon, personal communication 1987). There are sayings in the vernacular that 'the Eket man has TB' (Dr O U Umoetuk, personal communication, 1987). The doctor at the chest unit in Eket confirmed that TB was more prevalent than he had known it in western Nigeria (Dr J Essien, personal communication, 1987). A high TB rate in Eket would support the Hunter and Thomas hypothesis, because Eket has the lowest rates for leprosy in the region, and has one of the highest population densities.

A State TB control programme was initially established in 1972 but the proposed network of clinics was not completed. In 1977 the National TB control programme was established, the same year as the launching of the Expanded Programme of Immunisation (EPI), which was re-launched during 1985. EPI included BCG, but reports indicate that its use in Calabar since 1977 has been spasmodic due to shortages of the vaccine. The TB specialist in Calabar expressed his uncertainty of the efficacy of BCG in the region. His view is that there are environmental mycobacteria which may reduce its value, (Dr C B Edem, personal communication 1986). Tests in Uganda appeared to show that BCG protects against paucibacillary leprosy, but its precise role in leprosy infection is uncertain (Chapter Two). Because of poor coverage and incomplete records it is impossible to assess the role of BCG in either TB or leprosy incidence in the study region.

In 1989 the Nigerian Government announced its policy for the 'Combined TB/Lep Programme', and to make this a 'Health Priority' for the country (Federal Government of Nigeria, 1989). Combined TB and leprosy surveys in urban and rural areas of CRS in the future would be valuable in testing the hypothesis on the role of urbanisation in the relationship between these two mycobacterial diseases.

CONCLUSION

In spite of weak case-finding and case-holding activities in the leprosy service there was a decline in the number of registered leprosy cases in Cross River State between 1980 and 1986. This was partly a result of the number defaulting from treatment, rather than of more discharges or fewer new cases. Nevertheless, it probably represents a real decrease in leprosy cases, as a result of decades of dapsone monotherapy, as elsewhere in Africa.

The distribution of leprosy in CRS is markedly uneven, with the highest rates reported in the northern LGAs, and this did not change between 1980 and 1986. The evidence for factors of the physical environment directly causing the contrast in leprosy rates between the north and south is inconclusive, and in the case of rainfall and altitude is inconsistent with apparent associations reported elsewhere in Africa.

One reason for higher rates in the north may be the later introduction of leprosy there because of its greater isolation. In a study of leprosy in part of Kenya, it was concluded that the variation in leprosy rates was more closely related to the history of the introduction of the disease into the area than to other factors (Leiker et al, 1968). The view was that high leprosy prevalence, rather than indicating a long history, as has often been postulated for Central Africa as a whole, points to a recent introduction. The north of Cross River State may have been in an earlier phase of a leprosy epidemic in the 1980s, similar to, but not so intense as the neighbouring Igbo epidemic of the 1930s and 1940s (Chapter Six). In the absence of leprosy data in the north prior to the establishment of control activities in the late 1940s it is impossible to explore this explanation.

The most convincing association, which is consistent with other regions in Africa, is the inverse relationship between leprosy rates and population density. The latter is probably a surrogate for levels of economic development. The earlier modernising influences in the south of the region laid the foundation for the more diversified economy and higher socio-economic levels. These, along with the earlier introduction of leprosy treatment, helped to reduce leprosy prevalence rates in the south. The effect on present disease patterns of past treatment programmes is generally acknowledged (Ponnighaus et al, 1988). This may be the single most important factor explaining the lower leprosy rates in the south in recent decades.

CHAPTER NINE

SPATIAL VARIATIONS IN NEW CASE RATES

NEW CASES AND INCIDENCE: DEFINITIONS

In chronic diseases like leprosy, incidence rates, which measure the number of new cases occurring per unit population in a specified time, usually a year, are more indicative than prevalence rates of the level of active disease, because prevalence rates include an accumulation of cases over a long period. True incidence can be ascertained only from regular and complete surveys of a whole population, which have rarely been achieved in the case of leprosy. In the study region case-finding surveys for leprosy have been limited, and their frequency has varied over time and between areas. New cases have been mainly self-reporting or have been brought by family and friends. Only a minority have been detected during contact surveys, or the occasional school, village, plantation, and barracks surveys.

In this study reported new case rates are used because of the lack of data by which to measure true incidence rates. These rates are examined for Cross River State in order to assess the level of active leprosy in the region, and the progress made towards its eradication. Explanations are proposed for the apparent regional variations in reported rates, and the extent to which they represent true incidence is evaluated.

The focus of this analysis uses the new case figures for 1986, the last year for which leprosy data were reported for each LGA in the larger Cross River State. The subdivision of the state in 1987 and the subsequent redrawing of LGA boundaries means that 1986 is the final year for which analysis is possible of leprosy figures for the LGAs of the whole of the former CRS. Ministry of Health figures are supplemented by hospital and clinic reports and the results of surveys, where available.

The total number of new cases reported in CRS during 1986 was 475, a mean rate of 0.77 per 10,000 (Table 9.1). This is less than half of the 1.7 rate reported for the whole country for 1987, which is the closest year for which national figures are available (Federal Ministry of Health, 1988, presented at informal workshop International Leprosy Congress, The Hague, unpublished). In CRS in 1986 there was a wide variation in rates between the LGAs, with the highest new case rates almost 100 times greater than the lowest (Fig 9.1). The spatial distribution resembles the one for cases already registered (compare Fig 8.1), and a scattergaph shows a similar inverse relationship between new case rates and population density (Fig 9.2).

The data show that the LGAs fall into three groups according to new case rates, and the analysis will follow this order:

1 Three northern LGAs with high rates, over four times the state mean.

2 Seven LGAs with rates close to the mean.

3 Seven LGAs with low rates, less than one third of the mean.

TABLE 9.1

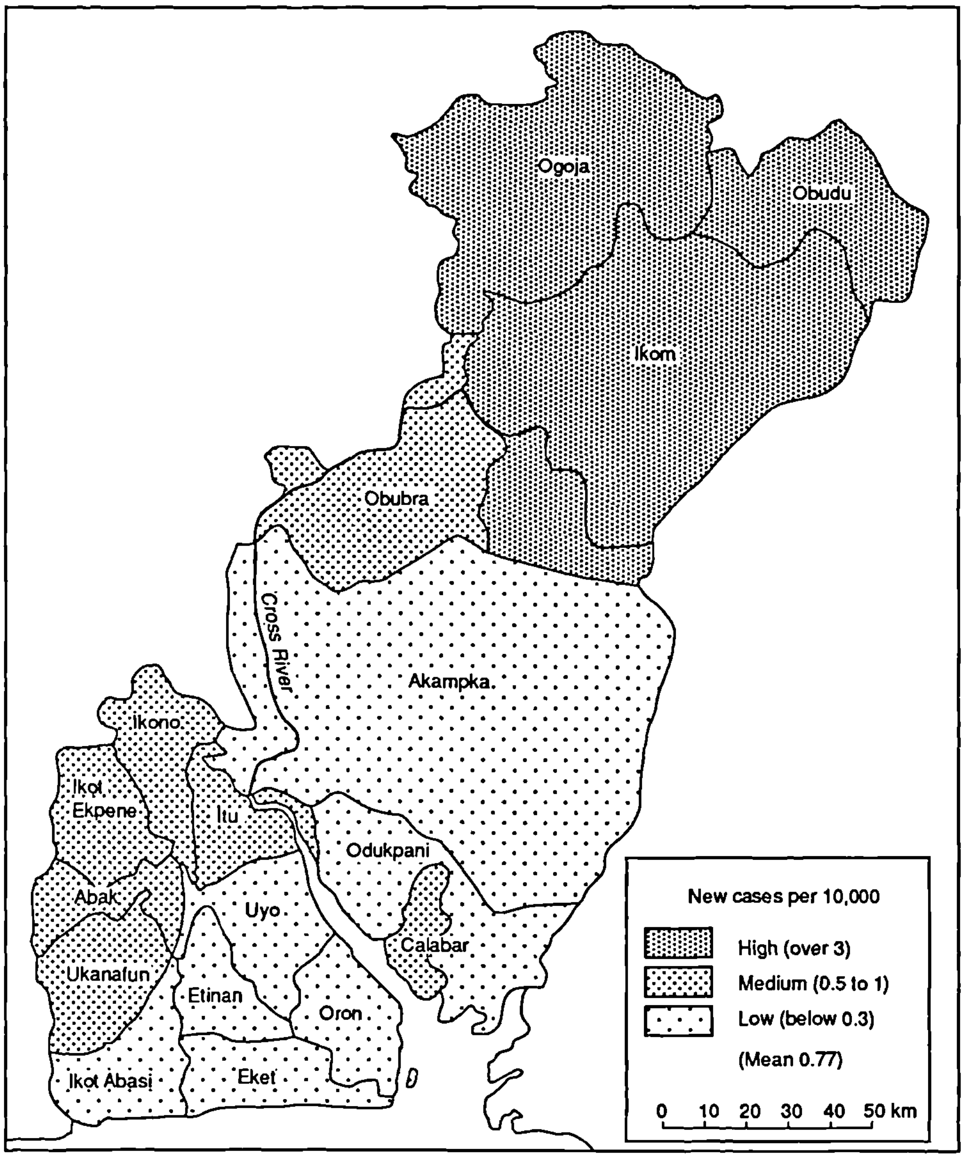
Cross River State: New Cases of Leprosy by Local Government Area, 1986

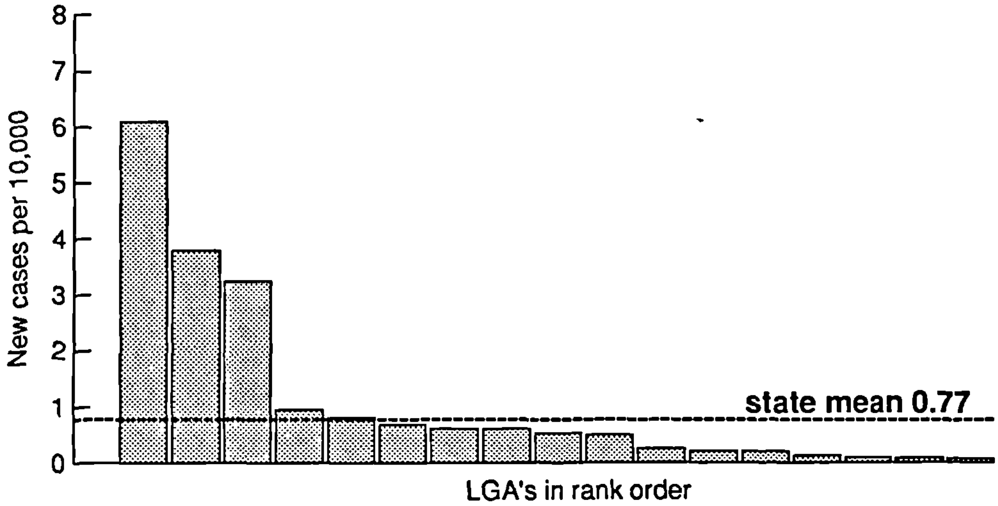
L.G.A.	New Cases	New Cases per 10,000	Rank
Abak	23	0.69	6
Akamkpa	5	0.26	11
Calabar	12	0.62	8
Eket	6	0.10	15
Etinan	4	0.08	16
Ikom	78	3.80	2
Ikono	18	0.54	9
Ikot Abasi	9	0.21	12
Ikot Ekpene	28	0.62	7
Itu	14	0.50	10
Obubra	35	0.81	5
Obudu	81	6.09	1
Odukpani	3	0.13	14
Ogoja	104	3.25	3
Oron	4	0.07	17
Ukanafun	38	0.95	4
Uyo	13	0.21	13
TOTAL	475	0.77 (mean)	

(Sources: calculated from CRS Ministry of Health Leprosy Returns, 1986; Ekpene Obum Hospital Registers, 1986; Moniaya Hospital Annual Report, 1986)

Fig. 9.1

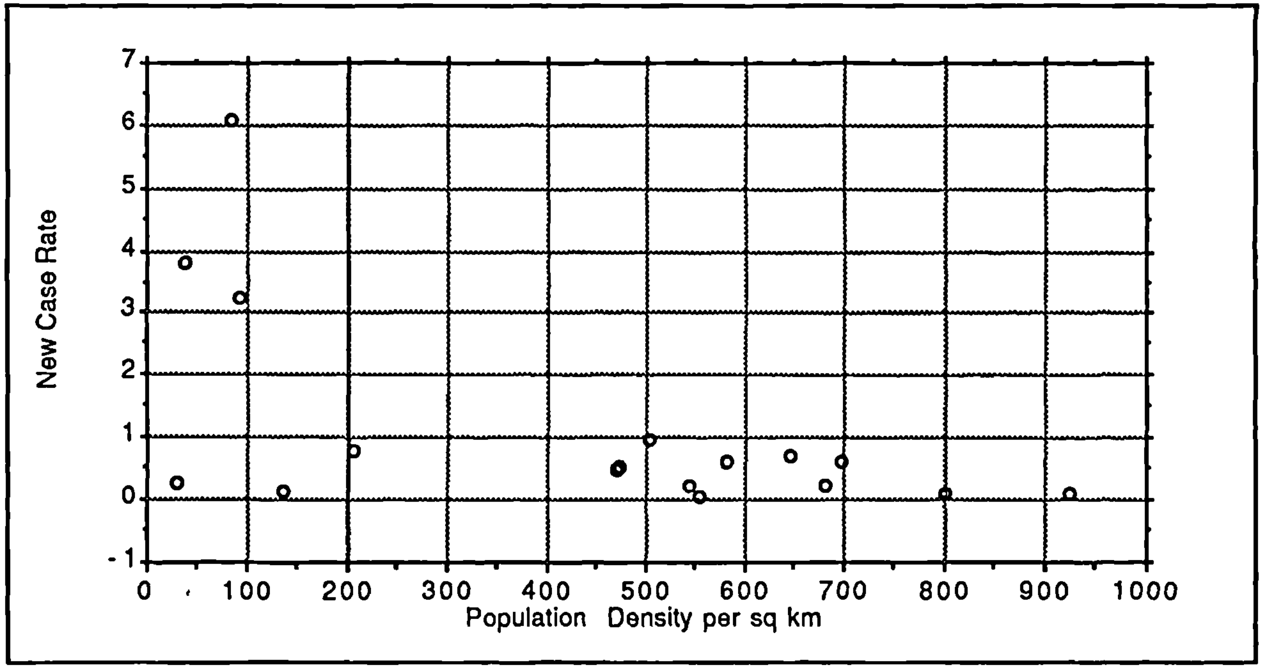
Cross River State, Nigeria: Reported New Case Rates for Leprosy 1986





Cross River State: Reported New Case Rates for Leprosy by Local Government Area 1986

Fig 9.2 Cross River State: Scattergraph of Population Density and Rates of New Cases of Leprosy, 1986



LGAs WITH HIGH REPORTED NEW CASE RATES

The three northern LGAs of Ikom, Obudu and Ogoja were the highest ranking. Overall the rate was 4 new cases per ten thousand people. They stand out from the rest of the state because the rate of the next highest was under one. The leprosy control service in this area has been well-organised in recent decades, with active case-finding and efficient case-holding. Therefore these figures probably fairly represent high incidence rates in the area.

The recognition of the leprosy problem in the area led to an eradication programme to implement the WHO 1982 MDT regimen throughout the three LGAs. This was administered from Moniaya Hospital in Ogoja LGA and was fully in place by 1986, when the Hospital annual report stated that control or even eradication was to be expected within ten years. Subsequent annual reports up to the end of 1991 recorded a large drop in registered cases (Table 9.2).

The decrease in the number of registered cases by December 1991, to almost one tenth of the number in 1985, is accounted for by the successful treatment and discharge of patients in the new short-course therapy, as well as the review of the registers which led to the elimination of names of patients no longer receiving or requiring treatment. However, in contrast to the decline in registered cases, the numbers of new cases in the three LGAs remained high during the same period.

TABLE 9.2

Registered Case and New Case Rates in the Northern Three LGAs Following the Implementation of MDT 1985-1991

Year	Total Registered	New Cases
1985	4422	N/A
1986	2597	263
1987	1223	245
1988	681	193
1989	560	208
1990	504	221
1991	482	182

(Source: Compiled from Moniaya Hospital Annual Reports, 1985 to 1991)

NOTE: The writer notes that the total registered cases in 1985 and 1986 are lower than those compiled from State records (Table 8.5). The hospital reports are more reliable, but the discrepancy does not alter the general pattern or its implications.

The reliability of the reports of continuing large numbers of new cases at the same time as a decline in registered cases is supported by the results of leprosy surveys. The eradication campaign since 1986 has included intensive case-finding activity through contact tracing and school and general surveys. In the latter the detection rate was high, at 16 per 10,000 examined, which strongly supports other evidence of high incidence in the area (Table 9.3).

TABLE 9.3

Northern Three LGAs Leprosy Survey Results 1987 to 1989

	1987		1988		1989	
Survey Type	Ex	Det	Ex	Det	Ex	Det
General	9,188	24	12,837	30	13,388	21
School	26,575	21	14,711	9	30,421	66
TOTAL	35,763	45	27,548	39	43,809	87

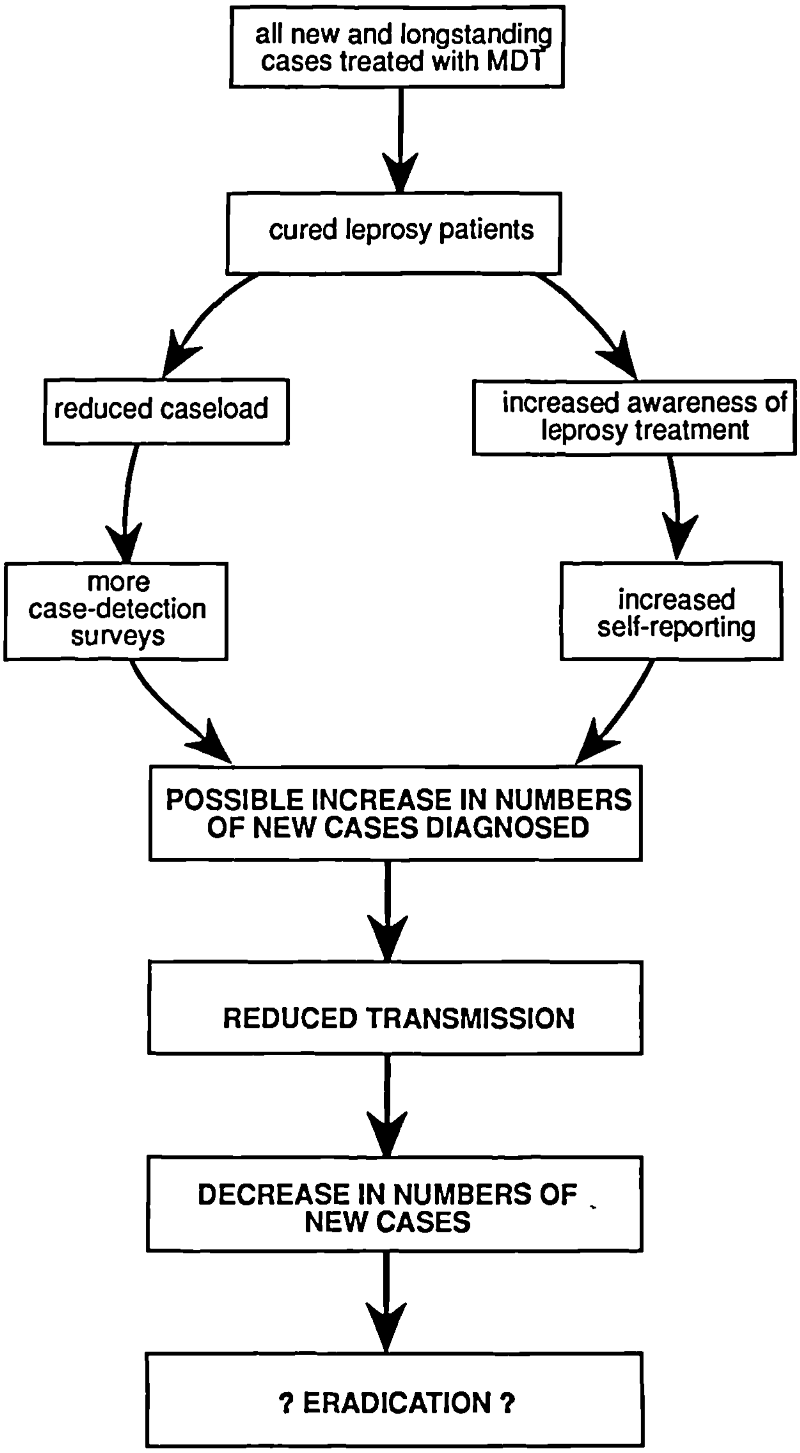
TOTAL EXAMINED (Ex) = 107,120
TOTAL DETECTED (Det) = 171
DETECTION RATE = 16 per 10,000

(Source: Compiled from Moniaya Hospital Annual Reports 1987 - 1989)

The continuing large number of new cases is explained by the nature of leprosy. Because of the slow onset, the number of new cases reporting per year falls slowly if at all, even after the successful introduction of short course therapy. Individuals who were infected years before will continue to develop clinical disease. There is therefore a time lag between the introduction of MDT for leprosy treatment and the decline in incidence. In fact, reported new case rates may even increase before they eventually show a sustained decline, because the new therapy and associated publicity may encourage cases to present earlier than they would otherwise have done (Fig 9.3). The continuing large number of new cases in these three LGAs indicates that there has been active leprosy transmission in recent decades.

Fig.9.3

Effects of Successful Multidrug Therapy on Numbers of New Leprosy Cases



LGAs WITH REPORTED NEW CASE RATES CLOSE TO THE MEAN

(a) Obubra

Both the new case rate and the registered rate for Obubra LGA in 1986 were close to the mean for the state. The LGA has a leprosy hospital at Mbembe, established in 1959. Most in-patients in 1986 were elderly and/or seriously disabled, receiving treatment for ulcers and other complications. Nineteen destitute patients also resided in a settlement in the hospital grounds, and other homeless patients occupied a former segregation village at Yakurri on the main north-south trunk road a few miles away. Most were long-term cases.

The hospital team had conducted leprosy surveys in villages and in army and police barracks, and reported that by the 1980s the incidence of leprosy was declining, although no figures were on record. A leprosy survey in the Owai clan in 1980 detected more cases of yaws than leprosy, and active case-finding for leprosy has not been reported since. (Mbembe Hospital Reports, various years).

Obubra is traversed by the Cross River, which gave good access to the rest of the country, and commercial activity has extended up the river from Calabar since pre-colonial times. This early locational advantage was lost with the demise of river transport after the mid-twentieth century. In the early days of Itu leprosy settlement, patients from Obubra went by river to Itu, and were among the earliest to seek treatment: 1929 records show that a financial contribution was required from Ogoja Province for patients from Obubra (4296-7/1/2099 Records of Provincial Office Calabar 2nd Batch Vol II 419-834, Enugu Archives).

Leprosy may have been more prevalent in Obubra in the past. According to tradition in Ediba village on the Cross River, leprosy has long been known in the area. There were no leprosy patients by 1986, but formerly 10 male and 12 female leprosy patients were known (Chief of Ediba, August 1986).

The figures for new cases in 1986 and the other evidence suggest that the incidence of leprosy was declining in Obubra. There is little difference in the history of leprosy control or levels of socio-economic development between Obubra and the northern LGAs. If Obubra's greater accessibility in the past allowed the introduction of leprosy earlier than further north, then the epidemic in Obubra would have been at a later stage by the 1980s, and this could account for the earlier decline. But a further factor may have been its easier access to Itu leprosy hospital, so that Obubra patients benefited from treatment several decades earlier than the more northerly LGAs, which may have reduced the pool of infection.

(b) Calabar

The reported new case rate of 0.62 for Calabar in 1986, which approached the state mean of 0.77, is misleading, because it included numerous patients from outside the city. The home addresses of cases newly registering at Calabar Urban clinic during 1984 (the 1986 clinic registers were not checked), revealed that only two thirds were resident in Calabar, most of the rest were from Odukpani and Akampka LGAs. Interviews with patients and leprosy officers in Calabar, Akampka and Odukpani revealed that the reasons included patients wishing to conceal their disease and the poor quality of the leprosy service in their own areas.

TABLE 9.4

Calabar Municipality: Leprosy Survey Results 1981 - 82

Date	Number Examined	Detected
March 1981	3539	1
April 1981	660	3
March 1982	1691	8
April 1982	4177	0
May 1982	3981	2
June 1982	3648	0
TOTAL	32923	14

DETECTION RATE = 4.25 PER 10,000

(Source: CRS Ministry of Health Records, Calabar, 1981 and 1982)

Leprosy surveys in Calabar during the early 1980s detected very few cases (Table 9.4). The combined survey results gave a detection rate of over 4 cases per 10,000 persons, which was relatively low, for instance less than one third of the detection rate in the more recent surveys in the northern three LGAs (Table 9.3) and some of the cases included non-indigenes in police and navy barracks.

However, it could be supposed that urban residents with leprosy may return to their villages, thereby raising rural rates and lowering urban ones. No evidence of this was gleaned from interviews. Also there were very few patients from Calabar on Ekpene Obum Hospital registers. The evidence points to a low incidence of leprosy in the resident population of Calabar, certainly lower than the rate for 1986 suggests.

(c) Five LGAs in the north and west Mainland

In 1986 the total number of new cases in the Mainland area was 157, which was a mean rate of 0.358 per 10,000, about half the rate for the whole state and only one tenth 0.95 in Ukanafun (Table 9.5). The Chi-Square statistic was used to test the difference between the observed numbers of new cases in the ten Mainland LGAs (Table 9.10). The calculated Chi-Square value is 106.25, while the critical values at 0.05 and 0.01 per cent significant levels are 16.92 and 21.67 respectively, indicating that there is a significant difference in the rates between the ten Mainland LGAs. The rates overall are low, but the LGAs can be divided into two groups for new case rates of leprosy in 1986 (Fig 9.1; Table 9.5). The five LGAs in the north and west have higher rates, with 77 per cent of all new cases in the Mainland and only 40 per cent of the population. The five in the south and east had very low rates, and are discussed separately.

The five LGAs of Abak, Ikono, Ikot Ekpene, Itu and Ukanafun had rates close to the state mean, and higher than the rest of the Mainland. The accuracy of the higher rates for thee LGAs is confirmed by the registers of Ekpene Obum, and show it continuing in 1987 (Table 9.6). New cases from throughout the Mainland have reported to Ekpene Obum hospital at least since the end of the Civil War in 1970, as well to local clinics. This cannot be explained merely by proximity. For instance, Ikono is the furthest LGA from Ekpene Obum, and had no metalled road, but had the highest number reporting to Ekpene Obum in 1986.

TABLE 9.5

CRS Mainland Area: New Cases of Leprosy 1986

LGA	Pop. 1000's	New Cases at LGA Clinics	New Cases at Hospital	Total No. of new Cases	Rate per 10,000	Rank
(north and west group)						
Abak	333	13	10	23	0.69	2
Ikono	332	8	10	18	0.54	4
Ikot Ekpene	449	23	5	28	0.62	3
Itu	280	9	5	14	0.50	5
Ukanafun	399	37	1	38	0.95	1
(south and west group)						
Eket	594	3	3	6	0.10	8
Etinan	485	0	4	4	0.08	9
Ikot Abasi	430	5	4	9	0.21	6
Oron	564	3	1	4	0.07	10
Uyo	622	11	2	13	0.21	7
TOTAL	4488	112	45	157	0.35 mean	

(Sources: calculated from CRS Ministry of Health Leprosy Returns, 1986; Ekpene Obum Hospital Registers, 1986; Moniaya Hospital Annual Report, 1986)

TABLE 9.6

Mainland LGAs: New Cases Reporting Directly to Ekpene Obum Hospital, 1986 and 1987.

LGA	1986	1987		TOTAL
(north and west group)				
Abak	10	13		23
Ikono	10	11		21
Ikot Ekpene	5	9		14
Itu	5	5		10
Ukanafun	1	6		7
(south and west group)				
Eket	3	2		5
Etinan	4	10		14
Ikot Abasi	4	6		10
Oron	1	2		3
Uyo	2	5		7
TOTAL	45	69		114

(Source: Ekpene Obum Hospital Registers, 1986 and 1987)

Itu LGA also had a steady number of new cases reporting to Ekpene Obum during the 1980s, as well as to local clincs. Concern about these prompted the planning of village surveys by Ekpene Obum staff, beginning in 1992. Nearly eight thousand people were examined in the initial stage, and 42 new patients were placed on treatment, with 15 from a single village (Ekpene Obum Hospital Report of Itu Survey, July 1992, unpublished). This suggests continuing leprosy incidence in Itu.

The question is raised of how long there has been a difference in leprosy rates between the two groups of LGAs in the Mainland. The Calabar Provincial Report for 1953 commented:

> 'Leprosy in this Province merits serious concern only in those areas adjacent to centres of heavy infection in Owerri and Rivers. Recent surveys undertaken by the Nigeria Leprosy Service have confirmed that the worst areas are in Abak Division and along the northern and western boundaries of Ikot Ekpene'
> (p 43, Mss. Afr., Rhodes House Library, Oxford).

Before the Civil War Ekpene Obum was responsible for leprosy control in part of the Mainland, but excluding Itu, Ikot Ekpene and most of Ikono (Chapter Seven). The UNICEF leprosy register from the period survives in Ekpene Obum and confirms the comments in the 1953 Report that Abak and Ukanafun, two of the areas with recent higher new case rates, and Ikot Abasi with lower rates, all had larger out-patient clinics in 1967 than the rest of the Mainland supervised by Ekpene Obum (Table 9.7). Calculations of rates from these numbers are impossible due to boundary changes. Therefore Abak and Ukanafun, which were in the area with higher reported new case rates in the 1980s, also had large numbers of cases decades ago. In contrast, Ikot Abasi which had larger numbers of patients in 1967 was in the area with a low new case rate in 1986.

TABLE 9.7

Leprosy Clinics Supervised by Ekpene Obum, June 1967

Present LGA	Number of clinics	Registered cases
(north and west group)		
Abak	6	235
*Ikono	1	9
Ukanafun	7	426
(south and east group)		
Eket	3	39
Etinan	4	79
Ikot Abasi	9	203
Oron	3	30
Uyo	5	83
TOTAL	38	1104

* most of Ikono was served by Itu Leprosy Hospital until 1968.

(Source: UNICEF Leprosy Register, Ekpene Obum, 1967)

There are several factors which may account for the differences in new case rates in the two areas of the Mainland in 1986. The five LGAs with the higher new case rates lie immediately east of the Igbo area which experienced a leprosy epidemic during the 1930s and 1940s (Chapter Six). This proximity could explain the higher rates there and in Ikot Abasi prior to the Civil War, although they were never reported to be as high as in the Igbo area.

Due to its strategic border location, this area experienced massive disruption throughout the Civil War, in contrast to the more easterly parts of the Mainland (Chapter Seven). In a previous analysis of this data, it was proposed that the effects of the Civil War contributed to the high new case rates: disruption of leprosy control during the war and conditions conducive to increased transmission of communicable diseases in refugee camps may have delayed the decline in leprosy incidence (Brightmer 1990).

The two areas of the Mainland were fairly uniform in human and physical characteristics (Chapter Four), and both areas benefited from in-patient leprosy treatment at Itu and Ekpene Obum during the pre-dapsone era. But there are variations in infrastructure and locational factors which may account for a delay in leprosy decline. Ikono and Ukanafun were especially poorly served, notably by health services and roads, and were the least accessible and developed areas of the Mainland.

The LGAs of Abak, Ikot Ekpene and Ukanafun are occupied by the Annang people, and their greater stigmatisation of the disease, discussed in Chapter Eleven, may also have to be taken into account as a factor in the slow decline.

LGAs WITH LOW REPORTED NEW CASE RATES

(a) Akampka

In 1986 Akampka was ranked only 11th by new case rate but fourth for registered case rate, but the former was not consistent with figures for previous years (Table 9.8).

Fig. 9.4

Akamkpa LGA: Leprosy Clinics 1986

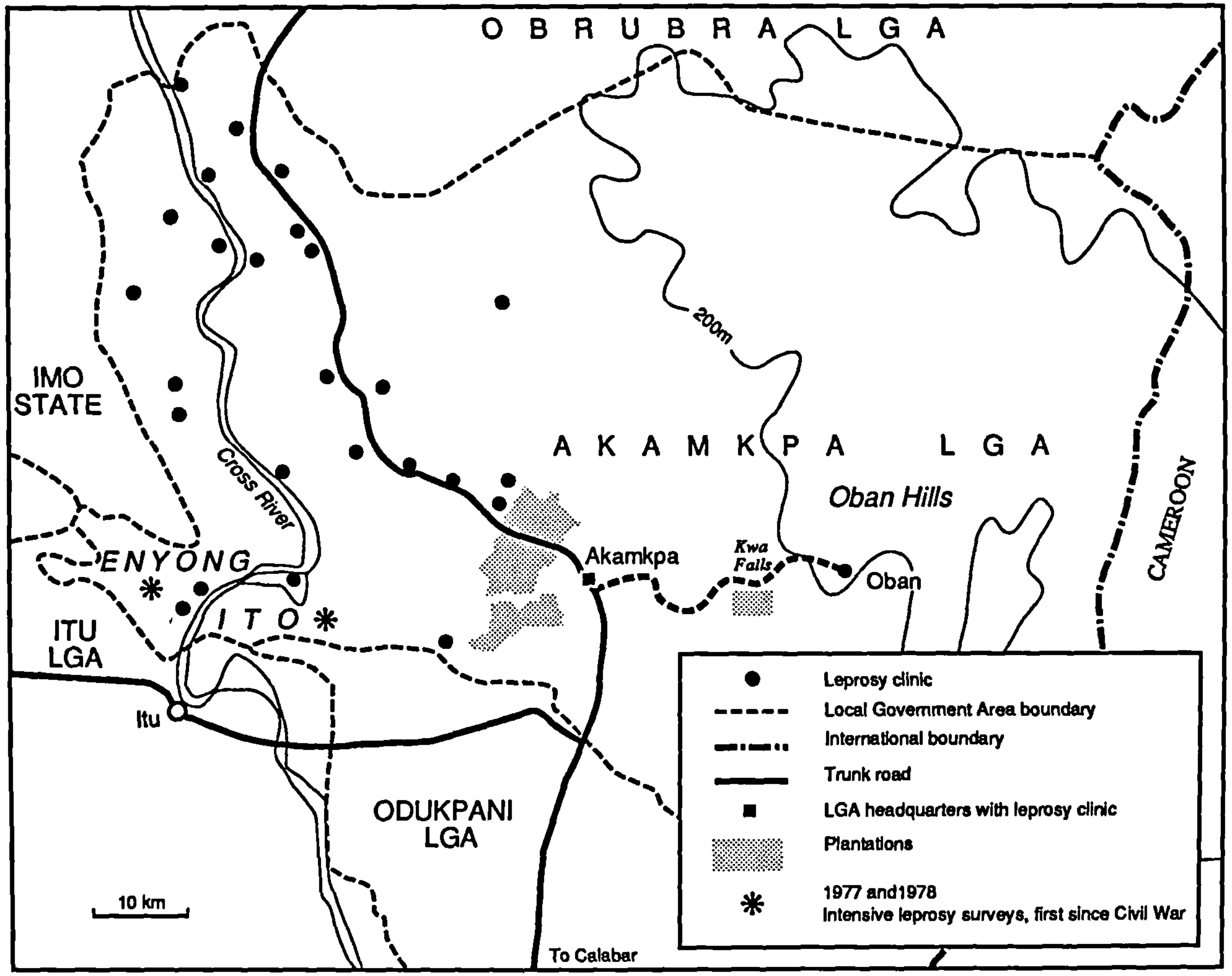


TABLE 9.8

Akampka LGA: New Cases Reporting to Local Clinics, 1981-86

1981	22
1982	26
1983	2
1984	16
1985	14
1986	5

(Source: CRS Ministry of Health, Calabar, various years)

Akampka is the largest and 'least developed LGA in the state. It has poor infrastructure, and is the most sparsely populated with only 29 persons per sq km in 1986. Most inhabitants are in the western half near the Cross River, and on rubber and oil palm plantations. In the east the Oban Hills rise to 1070 m, with some of Nigeria's remaining tropical rainforest (Fig 9.4).

Leprosy control in the LGA was shared between Mbembe leprosy hospital in Obubra LGA to the north, and the Ministry of Health leprosy control unit in the LGA Headquarters in the south. Mbembe supervised 25 clinics, mainly in the north and west, while the Ministry supervised the southern area and Oban (Chapter Seven). During the period of fieldwork little leprosy work was being conducted in Akampka by the Ministry, mainly due to transport and staff shortages.

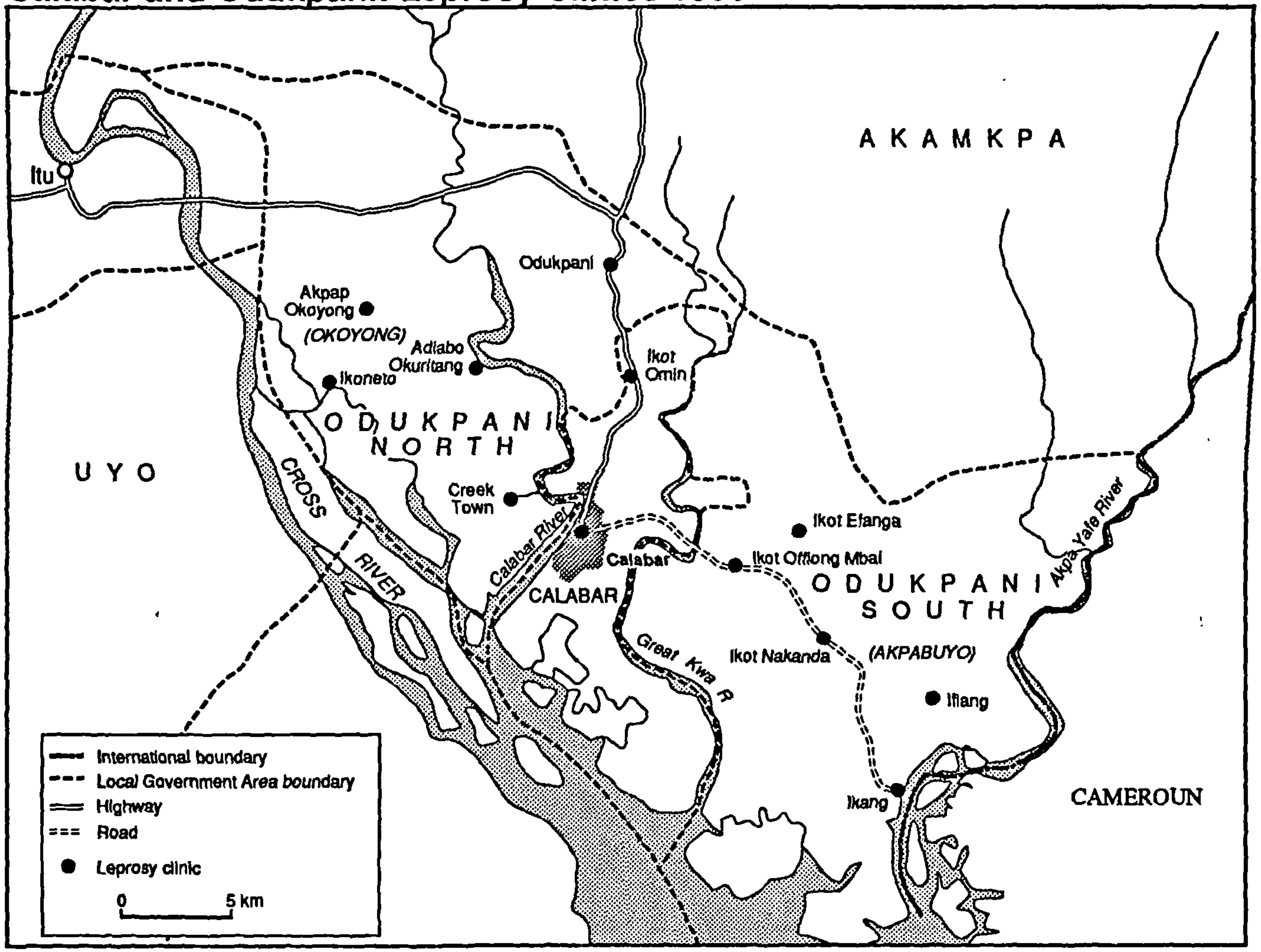
There is evidence to suggest a greater incidence of leprosy than represented by the figures. The registers of leprosy clinics in Calabar and the leprosy hospital at Ekpene Obum included patients from Akampka, and new cases were detected in case-finding surveys during the 1970s and early 1980s. For instance, in 1983 6,000 people were examined on plantations and associated processing plants. Fourteen new cases were detected, eleven adults and three children, (Akampka leprosy staff, personal communication 1985), which is a rate of 23 per 10.000. These did not show up on the returns (Table 9.1), which indicates the poor maintenance and unreliability of records for this LGA. The very low new case rate reported in 1986 probably did not represent a low incidence rate of leprosy, but was due to poor case-finding and case-holding.

(b) Odukpani

Odukpani also had a low reported new case rate in 1986. The LGA has two distinct areas, Creektown and Akpabuyo (Fig 9.5). Creektown has been settled by Efik people for centuries. It was an important trading centre in pre-colonial times, and became a colonial administrative centre. It is most easily reached from Calabar by ferry. There is a motorable road from the Itu-Calabar highway, but this is unreliable in the wet season. Creektown's former importance has declined, associated with the decline of Calabar due to the shift from water to road transport, and its population has decreased.

Akpabuyo lies between Calabar and the Cameroun border. In contrast to the long period of settlement in Creektown, it is more recently settled, mostly for farming by landless Ibibio from overpopulated areas of the Mainland,

Fig. 9.5
Calabar and Odukpani: Leprosy Clinics 1986



especially Ikono LGA and the Annang areas. Akpabuyo has little medical or educational provision. It is poorly served by motorable roads and the only access to some parts is by foot. There is frequent cross-border movement to the Cameroun for trading and agricultural labouring. Some leprosy patients from Akpabuyo reported that they contracted leprosy in the Cameroun; this is discussed below in Chapter Twelve.

Leprosy control was poorly organised, although a new Epidemiological Unit with a leprosy control headquarters for the LGA was opened in 1981. Leprosy clinics were not operating regularly during the fieldwork period, and there was no regular case-finding after 1982. In 1984 46 patients were on registers at the Creektown clinic, but no attendant was able to travel from Calabar to Creektown to provide treatment, due to the shortage of transport in the leprosy service.

It is not surprising therefore that leprosy patients from Odukpani LGA reported to Calabar and Ekpene Obum. The Calabar Urban clinic registers for December 1984 showed that at least 8 out of the 28 new patients during the year were from Odukpani, and 24 of the 110 patients already registered were also from there.

Several patients from Akpabuyo were in-patients at Ekpene Obum. During interviews in 1987 they named several untreated cases in their home villages, who were prevented from reporting due to the high cost of transport. Some families had several cases.

The evidence points to the leprosy incidence rate for Odukpani LGA being above the reported rate in 1986. The relative poverty of the area and its inhabitants, and the fact that they included migrants from Ikono and Annang areas of the Mainland which had higher new case rates, combine to suggest there is a more serious leprosy problem than reported.

(c) The South and East Mainland

The five Mainland LGAs of Eket, Etinan, Ikot Abasi, Oron and Uyo also had extremely low reported new case rates in 1986. They had been low in the previous five years at least (Table 9.9), and were consistent with low registered rates (Chapter Eight).

Only 36 new cases from these LGAs reported in 1986, a mean new case rate of only 0.13 per 10,000 persons. The UNICEF registers show that there had been few leprosy cases during the 1960s in most of this area, except in Ikot Abasi, where there were large numbers (Table 9.7).

TABLE 9.9

South and East Mainland: New Cases at LGA Clinics, 1981 - 86.

	1981	1982	1983	1984	1985	1986	Total
Eket	4	2	5	2	0	3	16
Etinan	7	5	0	1	0	0	13
Ikot Abasi	2	3	5	7	9	5	31
Oron	4	3	5	3	5	3	23
Uyo	1	8	1	7	5	11	33
TOTAL	18	21	16	20	19	22	116

(Sources: CRS Ministry of Health, Calabar; Local LGA Clinics Registers)

Visits to leprosy control headquarters and leprosy clinics in Eket and Ikot Abasi confirmed the validity of their low reported new case rates. New cases were mostly from Edem Aya in northwest Ikot Abasi, and from the border area of the two LGAs (Fig 9.6). In the north-west of Eket, leprosy patients reported to the nearby clinic in Ibiaku in Ikot Abasi LGA. In 1986 they included four cases from the Eket village of Ikot Akpan Nkpe. Ukpana in Eket was reported by a resident to have untreated cases, and a subsequent survey in 1986 detected two new cases, (Ekpedeme Inyang, Leprosy officer, Eket, personal communication 1987).

In Eket leprosy appeared to be entirely confined to the west, adjacent to Ikot Abasi, and rates were slightly higher than recorded because some patients

Fig. 9.6

Ikot Abasi and Eket LGAs: Leprosy Clinics 1986

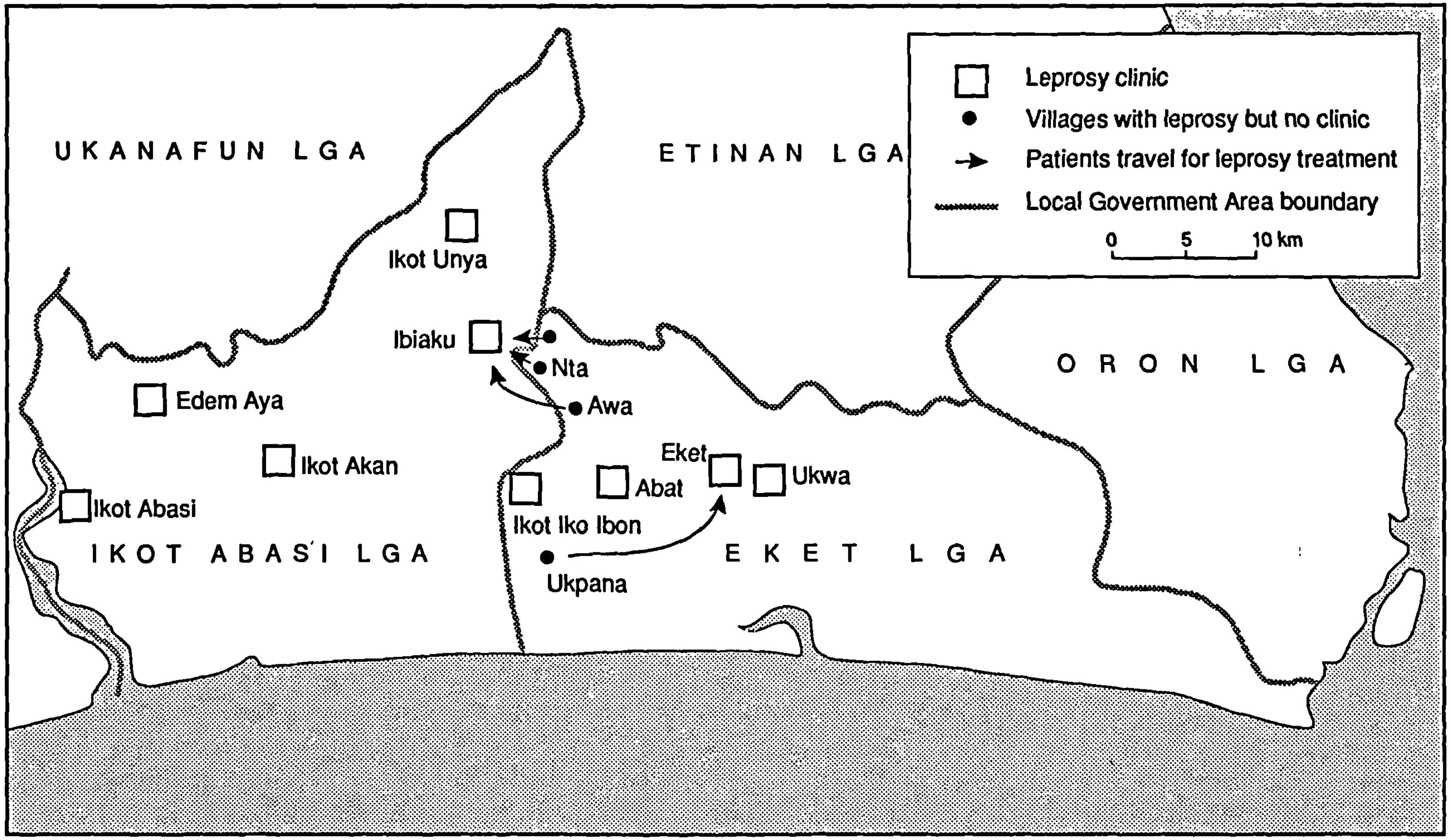


TABLE 9.10

CRS Mainland Area: New Cases of Leprosy 1986 by Local Government Area, Observed and Expected

LGA	Pop (1000's)	% total pop	obs new cases	ex new cases*	ratio observed to expected	rank
(north and west group)						
Abak	325	7.44	23	11.60	1.98	2
Ikono	324	7.40	18	11.54	1.56	4
Ikot Ekpene	438	10.00	28	15.60	1.79	3
Itu	273	6.23	14	9.72	1.44	5
Ukanafun	390	8.90	38	13.88	2.74	1
(south and east group)						
Eket	580	13.24	6	20.65	0.29	8
Etinan	473	10.80	4	16.85	0.24	9
Ikot Abasi	419	9.57	9	14.93	0.60	6
Oron	551	12.58	4	19.62	0.20	10
Uyo	607	13.86	13	21.62	0.60	6
TOTAL	4380		157			

* number of cases expected if all Mainland LGAs had the same new case rate.

(Sources: calculated from CRS Ministry of Health Leprosy Returns, 1986; Ekpene Obum Hospital Registers, 1986) reported in Ikot Abasi. There were no clinics and no known patients in the east of Eket LGA, near the LGAs of Oron and Etinan.

In Etinan and Uyo LGAs, the government clinic registers, leprosy hospital figures and interviews all suggest low incidence rates in the 1980s, and Seal (1962) reported only 'mild endemicity' in Uyo. These two LGAs form the economic core of the Mainland which became the new state of Akwa Ibom in 1987. Chapter Eight discussed how the low leprosy rates there could be associated with this relatively higher level of development, and the long period of leprosy treatment offered at Ekpene Obum.

The lowest rates for new cases in 1986 were in Oron, which also had the lowest numbers of cases on the 1967 register, with little leprosy work conducted there in the 1950s or 1960s. The evidence points to negligible leprosy in the LGA. Not more than five new cases a year reported to local clinics (Table 9.9), and only three new cases in total reported to Ekpene Obum during 1986 and 1987 (Table 9.6). Hospital data for in-patient admissions shows that no new cases from Oron were admitted in 1985 and only three in 1984, and in 1985 only two old cases were admitted for treatment for ulcers associated with their leprosy.

All the evidence points to the group of five LGAs in the south and east having a low incidence of leprosy in 1986, especially Oron (Table 9.10).

CONCLUSION

The overall distribution pattern of reported new case rates in CRS in 1986 reveals variation across the state in the incidence of leprosy, in the quality of leprosy control and in the progress made towards its eradication.

The five LGAs in the extreme south and east had very low incidence, with leprosy close to eradication in Oron LGA, and persisting only in limited village and household foci in Eket and Ikot Abasi. This pattern, where leprosy is confined to limited localities, is typical of the last stages of leprosy, as reported elsewhere, especially in Norway (Irgens, 1981).

The decline has occurred following decades of dapsone monotherapy, but before the implementation of MDT, and in spite of a poor socio-economic base, although it is relatively more developed than other areas of the state.

In contrast, the five neighbouring LGAs to the north and west experienced higher incidence. Along with Ikot Abasi to the south, it appears to have experienced higher leprosy rates for several decades, possibly an extension of the Igbo epidemic which occurred immediately to the west. Leprosy control measures were never so comprehensive here as in the Igbo areas, which may explain the delayed decline in the disease. The decline of leprosy which occurred in Ikot Abasi, may have been delayed in this area due to disadvantages of its location, affecting both the poor infrastructure of two of the LGAs and the demise of the area during the Civil War. The revitalisation of the leprosy service and the implementation of MDT is overdue.

In contrast, the problem of high incidence rates in the northernmost three LGAs has been addressed with the implementation of MDT since 1986. The large numbers of new cases subsequently continuing to report is not surprising and represented cases infected prior to this. The treatment of all new cases with MDT since 1986 will have helped to reduce transmission, and should therefore accelerate the decline in incidence.

Meanwhile, there is a question of a potential risk of leprosy being 'imported' to the south, especially considering the frequent long and short-term movements from the north to the southern core of the region. Any such transmission could delay the eradication of leprosy in the south, but with the efficient implementation of MDT in the north this risk should have been reduced.

The central area of the state, Akampka, Odukpani and Calabar, reported new case rates in 1986 which were an artefact of the leprosy service rather than a representation of the true incidence of leprosy. The reported figures for Calabar were higher than the likely true incidence, which was probably very low, consistent with the low urban leprosy rate reported elsewhere in Africa (Hunter and Thomas, 1984).

In contrast, the low reported rates in Odukpani and Akampka in 1986 were due to an ineffective leprosy service rather than true low leprosy incidence. Akampka was probably the worst-served area of the state for leprosy control. The situation in both LGAs was known to the Government leprosy service and was caused by a shortage of resources, exacerbated by the problem of transport in large and poorly accessible areas. The data show an urgent need for the implementation of a new programme of leprosy control there if the impressive progress towards eradication already made elsewhere is not to be jeopardised.

CHAPTER TEN

AGE, SEX AND DISEASE-TYPE OF LEPROSY CASES IN THE STUDY REGION

One of the features of the epidemiology of leprosy is the regional variations in age, sex and leprosy type which are caused by factors such as social customs, skin colour, and the stage reached in the epidemic between the initial introduction of leprosy and its decline.

Epidemiological surveillance covering periods since 1851 in countries experiencing a consistent decline in leprosy, has shown similar long-term trends in the age, sex and disease-type of new cases (Chapter Three). The period over which the decline has occurred has varied from 69 years in Norway to only 13 in Okinawa in Japan (Irgens, 1985).

Chapters Eight and Nine have shown that leprosy has been declining in the study region in recent decades. This chapter examines the characteristics of age, sex, and leprosy type in the Cross River region, to discover how they compare with patterns elsewhere in Nigeria and beyond, whether there is evidence of variation within the region, and whether there is evidence of changes in the patterns which may signal changing endemicity.

In a discussion of the distribution of leprosy according to age, sex and type, Irgens (1981) has emphasised the effects of the two sources of leprosy infection, namely the household and the community. The assumption is that the age and sex of the individuals most at risk differ according to the source of infection, because the source determines the dose and duration of exposure. Transmission occurring within the household infects all ages, and males and females equally. Transmission in the community infects people circulating outside the home, and the dose and duration of exposure to infection is probably low. Those most at risk are adults, and only those with little resistance to leprosy would be expected to develop the disease, and would therefore be more likely to develop multibacillary leprosy.

Irgens (1985) noted that there is a general shift towards older age groups and a higher multibacillary rate during a decline in incidence, and proposed that increasing age at onset could be regarded as a reliable measure of leprosy decline.

SOURCES OF DATA

Most of the data used are for newly reported cases rather than already registered cases because the latter contain an accumulation of multibacillary and older cases because of the longer treatment required for multibacillary leprosy (Chapter Two).

New case figures from the Ministry of Health in Calabar were examined for the whole of the former Cross River State. This data had been collated on form 'Lep 8' from the returns submitted by approximately 220 clinics and the leprosy hospitals. At the end of 1985 a new form replaced 'Lep 8', and used the paucibacillary/multibacillary designation of leprosy-type. This analysis therefore focuses on figures for new cases between 1981 and 1985, which provide details of age-groups, sex and leprosy-type, and give a profile of leprosy in the whole state before the use of multidrug therapy. Hospital reports and registers were also used, and comparison of their new case figures with 'Lep 8' suggests a high degree of reliability of the latter. To provide a baseline, the numbers of patients already registered are presented (Table 10.1).

TABLE 10.1

CRS Already Registered Cases by Age and Sex, December 1980

AGE	0-15	16-40	over 40	TOTAL	%age
MALE	1187	1619	1108	3914	45
FEMALE	1113	2379	1198	4690	55
TOTAL	2300	3998	2306	8604	
%age	27	46	27		

(Source: 'Lep 8' 1980)

AGE

Patients are classified into three age groups on Lep 8, and the age at which the patient was first registered is recorded, rather than age at onset of the disease. This is only approximate because some people are uncertain of their age, but can be used to indicate childhood rates which were 36 per cent during the period (Table 10.2). This is a high rate of childhood leprosy and shows active disease transmission in the region.

TABLE 10.2

CRS Numbers of New Cases by Age Group 1981 - 1985

Year	0 - 15	16 - 40	over 40		Total
1981	90	146	79		315
1982	107	111	65		283
1983	127	61	57		245
1984	117	99	81		297
1985	62	105	98		265
Total	503	522	380		1405
%age	36	37	27		

(Source: 'Lep 8')

The child rates for the three northern LGAs have been examined for the years after the implementation of MDT (Table 10.3). They show that 27 per cent of new cases 1986 to 1991 were under 16, with the rate showing an increase during the period. In contrast during the early 1980s the child rate of all new cases treated as in- or out-patients at Ekpene Obum Hospital was only 15 per cent (Table

10.4), whereas the child rate of in-patients between 1948 and 1965 was 21 per cent (Table 10.5).

TABLE 10.3

CRS Northern Three LGAs, New Cases 1986 - 1991, Child Rates

Year	Adults	Children	Total New Cases	% Children
1986	193	70	263	27
1987	192	53	245	22
1988	143	50	193	26
1989	154	54	208	26
1990	154	67	221	30
1991	121	61	182	34
Total	957	355	1312	27

(Source: Moniaya Hospital Annual Reports, 1986-91)

There are annual fluctuations in the rates, but in general they are high compared to estimated figures from elsewhere, for instance India, where only 15 per cent of cases were between 0-14 years (Sehgal and Joginder, 1989).

Because children move little within the community at large, it can be assumed that the high rates in the region are caused by infection transmitted at the household level (Irgens, 1981). The lower child rates at Ekpene Obum suggest that there may be less household transmission in the south of the state, associated with the lower overall rates there.

TABLE 10.4

Ekpene Obum Hospital: Age and Leprosy Type of all New Cases 1980 - 84

Year	Lepromatous		Total	Non-Lepromatous		Total	Total
	1-15 yrs	over 16		1-15yrs	over 16		
1980	11	35	46	4	39	43	89
1981	6	37	43	4	33	37	80
1982	4	20	24	12	30	42	66
1983	3	24	27	7	31	38	65
1984	5	29	34	2	43	45	79
Total	29	145	174	29	176	205	379

Total Children = 58; Child Rate = 15%
Total Lepromatous = 174; Lepromatous Rate = 46%

(Source: Ekpene Obum Hospital Annual Reports to The Leprosy Mission, 1980 - 84)

TABLE 10.5

Ekpene Obum Hospital: Child and Sex Rates of In-Patients 1948 - 65

Year	Males	Females	Children		Total Patients
1948	100	59	30		189
1949	130	86	27		243
1950	148	118	49		315
1951	160	120	48		328
1952	100	120	44		264
1953	82	91	46		219
1954	70	66	33		169
1955	65	45	34		144
1956	50	39	26		115
1957	66	70	20		156
1958	89	79	44		212
1959	91	67	58		216
1960	94	72	71		237
1961	120	78	58		256
1962	93	58	55		206
1963	112	77	84		273
1964	119	68	74		261
1965	96	56	44		196
TOTALS	1785	1369	845		3999
Child Rate			21%		
Adult Rate	57%	43%			
Male Ratio	130				

(Source: UNICEF Leprosy Registers, Ekpene Obum, 1948 - 1966)

SEX

Sex differences in leprosy rates have been reported in most regions of the world, a majority of males being most common, except in some areas of Africa (Noordeen, 1985). The sex difference is usually greater in adults than in children, and in multibacillary leprosy. Similar rates in male and female have been noted where leprosy has been recently introduced.

TABLE 10.6

CRS: Numbers of New Cases by Sex: 1981 - 1985

Year	Male	Female		Total
1981	172	143		315
1982	149	134		283
1983	132	113		245
1984	149	148		297
1985	136	129		265
TOTAL	738	667		1405
%age	53	47		

(Source: compiled from 'Lep 8')

In CRS there was a male majority every year, with 53 per cent of the new cases over the whole period, (Table 10.6). In children the sex difference was less, with males only slightly over 50 per cent of the total (Table 10.7).

TABLE 10.7

CRS New Cases in Children by Sex 1981-85

	Male	Female		TOTAL
1981	49	41		90
1982	54	53		107
1983	64	63		127
1984	55	62		117
1985	32	30		62
TOTAL	254	249		503
%age	50	50		

(Source: compiled from 'Lep 8')

The male majority in new cases contrasts with a 55 per cent female rate in the already registered cases in December 1980 (Table 10.1). Is the higher registered female rate a real one, or is it due to

a) poor record-keeping,

b) a higher male defaulting rate,

c) more severe female leprosy requiring longer treatment, or

d) more female leprosy in the past?

There is no data to support either a true markedly higher female rate in the past or present, or more severe leprosy in females. Inaccurate record-keeping and/or higher male defaulting rates may explain the sex differences in the number of cases on registers in 1980. Inspection of the figures for registered cases on 'Lep 8' revealed copying errors continuing from one year to the next. For this reason figures of already registered cases from 'Lep 8' have not been analysed in this study. An error could explain the higher rate of registered females in December 1980. However, leprosy workers reported that men in the region are less compliant with treatment than women, and so higher rates of male defaulting could also explain the smaller accumulation of males on the registers. Defaulting is further discussed in Chapter Eleven.

Sex ratios of in-patients

The difference in the overall male-female ratio of new cases 1981-1985 in CRS is not reflected in the in-patient figures for either of the two main leprosy hospitals in the region, both of which had more male in-patients: in Ekpene Obum 1980 to 1987 over two thirds were male (Table 10.8).

TABLE 10.8

Ekpene Obum: New Cases Admitted as In-Patients, by Sex, 1980-1987

	1980	1981	1982	1983	1984	1985	1986	1987	Total	%
M	39	46	35	30	42	22	22	27	263	68
F	32	22	16	11	14	7	12	12	126	32
Total	71	68	51	41	56	29	34	39	389	

(Source: compiled from Ekpene Obum Hospital Admissions Registers, 1980-1987)

Reports from the early days of leprosy control also show a male majority of in-patients. In 1928 Itu leprosy settlement had twice as many male as female leprosy patients, (Ramsay, 1929), and during the Igbo leprosy epidemic in the 1930s there were three times as many male in-patients in Uzuakoli hospital at the same time as a leprosy survey of Igbo villages found three women to two men among new cases (Brown, 1934, 1936, 1937; Davey, 1938). Records at Ekpene Obum Leprosy Hospital for 1948 to 1967 also show more male than female in-patients, with a male ratio of 130 (Table 10.5).

With only minor sex differences in reported new case rates in CRS, why are there so many more male in-patients? Do males in the region have more multibacillary leprosy than females, and therefore require more hospitalisation? Do they have more serious disability? Disability data for new cases, for in- and out-patients, at Ekpene Obum has not been abstracted. It has been reported from some other regions that there are significantly higher lepromatous/multibacillary rates in males (Chapter Three), but Table 10.9 shows that this cannot be demonstrated for CRS, where the male and female rates were 22 and 21 per cent respectively.

The uneven sex ratio of in-patients is reported in all hospitals in the region, and not only leprosy hospitals, and is also reported by the WHO (1992b). It is probably due to socio-economic rather than medical factors. Most men have easier access to family resources than women, and for most of the year men in rural areas have fewer day to day domestic duties than many women. Therefore the financial and time costs of hospitalisation are less of a constraint on men. Child care especially is a problem for many women patients who would benefit from admission. Ekpene Obum hospital recognises this problem and allows up to two children to accompany the mother, but this still excludes some women patients.

The 53 per cent male rate in reported new cases in CRS in 1980 to 1985 is much less than that reported elsewhere. Pearson (1986) reported three males to one female in Nepal, and Noordeen (1985) reported two to one in 'most parts of the world', but has suggested that the lack of universally high male rates, and the evidence of nearly equal childhood rates, may demonstrate a social and environmental rather than a biological cause for the difference. One factor for a male majority, where it is found, may be the greater risk of infection. In most cultures this results from greater male mobility, and in some from wearing less clothing than females. The latter is unlikely to be a factor in the study region, where males and females are similarly covered.

Females in CRS may now be only slightly less mobile than males, and this may explain similar sex rates. The small differences may be accounted for by greater distances travelled by males who attend more distant markets, and engage in fishing and winetapping. If their activities take them to areas of higher leprosy prevalence than in their home area, they face a higher risk of infection. But even if prevalence is no higher, contact with more people increases the risk of exposure to an infectious leprosy case.

High childhood rates suggest active transmission at the household level, and this affects male and female equally, and so lowers the sex difference. A biological cause for the small observed sex differences in leprosy in CRS is unlikely, and socio-economic factors probably explain the different ratios between in- and out-patients.

LEPROSY-TYPE

Some workers have stated that they are seeing an increase in the multibacillary/lepromatous rate in Nigeria both in the north, (Pfaltzgraff, *Conference* Report, Monrovia, 1979 unpublished), and in the study region (Dr E M Davis, personal communication, 1983).

For a number of reasons any trends in leprosy type are difficult to confirm. Changes in classification and variations in diagnosis due to the nature of the disease mean that there is 'no gold standard' in the diagnosis, and the clinical classification of leprosy is not a precise science, even with laboratory facilities (Fine, 1992; Ponnighaus et al, 1993). The multibacillary category is more inclusive than the lepromatous category and so older figures for leprosy-type cannot be directly converted.

The proportion of lepromatous cases varies in different parts of the world from below 5 per cent to over 70 per cent (Noordeen, 1985). Lower lepromatous rates are usual in the darker skinned races, but where leprosy is dying out, the few cases that occur are predominantly lepromatous and was a feature of the close of the leprosy epidemics in China, Japan and Venezuela (Irgens, 1985; Noordeen, 1985).

The Table (10.9) shows a 21 per cent lepromaous rate in CRS for the period. This is higher than reported for the whole of Nigeria: a 1975 appraisal gave a lepromatous rate of only 12.58 per cent, but does not indicate the basis of the estimate (Adeleye, Conference Report, Jos, unpublished, 1982).

TABLE 10.9

CRS All New Cases by Sex and Leprosy Type 1981-85

Leprosy Type	Male	Female	TOTAL	%age
Lepromatous	155	133	288	21
Borderline	214	204	418	31
Tuberculoid and indeterminate	329	309	638	48
SUB-TOTAL	698	646	1344	
Unknown			61	
TOTAL			1405	

22% of male new cases were lepromatous
21% of female new cases were lepromatous

(Source: compiled from 'Lep 8')

The recent lepromatous rates are also higher than reported in previous decades. In a tour of leprosy institutions in Nigeria Cochrane (1953) reported lepromatous rates of 50 per cent at Mongu in the north, but below 10 per cent in the Igbo in the south where a low lepromatous rate has been consistently reported since 1937 (Seal, 1957; Browne, 1965b).

More recent figures for the three northern LGAs, show a higher multibacillary rate of 36 per cent (Table 10.10), which was also higher than the 33 per cent rate quoted for Nigeria by the Federal Ministry of Health (Kolawole, Conference Memo, The Hague, 1988, unpublished).

The recently reported rates for lepromatous/multibacillary leprosy in the region therefore appear to be higher than frequently reported in the past, and may have risen since the Civil War, as is the impression of several long-term workers.

TABLE 10.10

CRS Northern Three LGAs: New Cases 1986 - 1991 Multibacillary Rates

	1986	1987	1988	1989	1990	1991	Tot
Multibacillary	76	65	72	87	105	67	472
Paucibacillary	187	180	121	121	116	115	840
Total new cases	263	245	193	208	221	182	1312
% Multibacillary	29	27	37	42	48	37	36

(Source: Moniaya Hospital Annual Reports, 1986-91

CONCLUSION

The high child rates of new cases of leprosy in the region in the 1980s show that there is active transmission in the household, and suggest that the incidence of leprosy will continue for several years, because of its long period of incubation. The lower child rate in the south, revealed by the figures from Ekpene Obum, may indicate a decline in household transmission there, which would conform to the low new case rates in part of the Mainland (Chapter Nine).

The slightly higher male rate in adult new cases could be accounted for by increased risk of infection to males in the community at large, due to their greater mobility.

The figures suggest a recent increase in the lepromatous/multibacillary rate, which in other regions of the world has been associated with increasing resistance to mild leprosy and a reduction in endemicity (Chapter Three). High child rates in CRS do not support such an interpretation. But whatever accounts for it, the increased lepromatous/multibacillary rate gives cause for concern, because unless the control programme finds and treats these infectious cases early, there will be continued transmission of leprosy. With the long incubation period for the disease, this will produce new cases into the next century.

CHAPTER ELEVEN

SOCIAL AND ECONOMIC ASPECTS OF LEPROSY IN THE REGION

Leprosy is more than an illness with clinical symptoms; in many societies it has a social significance greater than most other diseases. The fear and stigma associated with leprosy should be taken into account in any study of leprosy and its control. Social aspects of leprosy and the possible reasons for them, have been examined in Chapter Three, and the variations in attitudes to leprosy in Nigeria have been examined in Chapter Six.

More than sixty years of leprosy treatment and forty years of chemotherapy have helped to reduce prevalence in the Cross River region, but have not achieved eradication. Some of the stigma remains, and its role in limiting the effectiveness of the control programme is assessed here. The attitudes of the community and the social experiences of patients are examined as factors to be taken into account in health care planning. Patient case studies were conducted to discover the social and economic impact of leprosy for individual patients in the study region.

SOURCES OF DATA

Fieldwork for this chapter focussed on the south of the region, where most of the data on attitudes to leprosy and the experiences of patients were collected. They relate to the Ibibio people and their major sub-group the Annang.

The data fall into three main categories. Primary data were collected by the writer through personal interviews with leprosy hospital in-patients, out-patients at rural clinics, leprosy workers, community chiefs, groups of civil servants, primary school teachers and university undergraduates. Questionnaires were used but in most cases the interviews extended beyond the structured questions (Appendix I). Throughout the fieldwork informal discussions with people of different backgrounds provided valuable insights.

The patients who were interviewed were neither randomly selected nor were representative of any specific group. It was impossible to select a representative sample of out-patients by criteria such as age group, gender, leprosy type or social group because of the irregularity of clinic attendance by patients and leprosy officers. Visits were made by the author to clinics on days officially scheduled but sometimes no patients reported. Certain patients refused to participate for a variety of reasons, such as a wish for privacy. The most extensive patient interviews were conducted at Ekpene Obum Hospital; several case studies are presented below. They were mostly adult males, because they represented the majority of in-patients, and because more males could speak English. Most out-patient interviews required a leprosy officer to act as interpreter.

Primary data were also collected for this study by undergraduate research assistants from the University of Cross River State, who interviewed twenty six community elders in the Mainland during 1986. The research assistants were a self-selected group who agreed to participate in the study. They interviewed their own elders in the vernacular language, using provided guidelines (Appendix I). The aims were to discover beliefs about the disease, the nature of the treatment of leprosy patients in the past and present, any changes in the level of occurrence, and the names for leprosy in local dialects. Elders from all the Mainland LGAs except Ikono and Ukanafun were interviewed by undergraduate assistants.

Secondary data were obtained from two main sources: hospital records, registers and reports, and Cross River State official leprosy statistics (Appendix II). Hospital record cards provide space for information about the date of onset of leprosy symptoms, previous treatments, history of contacts with leprosy cases, marital status, and social details such as education and occupation (Appendix II). The amount of information recorded varied according to the officer on duty at the time of admission, his workload, and other factors such as the co-operation of the patient; some cards had little information.

It was originally intended to conduct a survey of public attitudes to 'serious diseases' in several areas of the state. The aim was to discover the place of leprosy, compared with other diseases, in people's perception and to examine differences in perception according to age, gender, ethnicity and level of education, and between the north and south of the region. The survey did not proceed beyond the testing of the questionnaire with civil servants and university undergraduates in Calabar during the early stages of fieldwork (Appendix I). Several problems emerged associated with conducting an attitudinal survey in English in a cross-cultural context. Nevertheless, the pilot study provided insights into cultural aspects of health in the region, which proved valuable in subsequent parts of the study.

There was also an early intention to investigate the domestic environment of leprosy patients, especially in the villages of highest leprosy prevalence. Discussions with patients and leprosy officers in the hospital and at out-patients clinics on the preliminary visit showed that there were ethical problems with such a study owing to the stigma of leprosy, and it was dropped.

BELIEFS ABOUT LEPROSY

Like many other ethnic groups in Nigeria (Chapter Six) the Ibibio believe that certain diseases, including leprosy, have supernatural causes. The most widespread Ibibio belief is that leprosy is caused by an evil spirit sent to the person through witchcraft. This was reported in Pfaltzgraff's study in the 1950s and was confirmed during fieldwork, as case studies show.

In Ikot Ekpene, chiefs of one village reported the local belief that leprosy was a punishment from the ancestral spirits for interfering with another person's farm. Chiefs in Itu also reported that stealing crops brought a curse from god in the form of leprosy. In Oron it was claimed that leprosy was a result of offending the ancestors by breaking taboos. Several explanations combine the supernatural causes with natural/physical causes like heredity, lack of hygiene, sexual contact, insect bites or poor nutrition.

The belief in supernatural causes of leprosy led to adverse attitudes shown to the patient and affected the approach of traditional medicine in treatment for the disease. Diseases with a supposed supernatural origin were said to be 'not for hospital', because it was believed that western medicine could not possibly cure something caused by spirits. But traditional medical practitioners (TMPs) appeared to be poor in recognising leprosy, and had no cure but frequently provided camouflaging treatment.

Annang elders asserted that leprosy could not be cured with indigenous medicine, but most other Ibibio groups reported its use for leprosy. It involved the ritualistic application of bark and roots, collected, prepared and administered by TMPs. It usually also included sacrifices, for example of eggs, chickens or goats, offered by the patient to counteract witchcraft. Some patients reported receiving medicines which caused blistering. A boiling mixture was prepared and the leprosy lesion was exposed to the steaming vapour. The scar from the scalding successfully camouflaged the lesion, but frequently became the site of subsequent infection and ulceration which was slow to heal. Some patients had received this treatment before they realised that they had leprosy. In other cases patients took such treatment while they also were receiving chemotherapy. Occasionally this was due to their own impatience with the slow improvement from dapsone treatment, and sometimes on the instructions of the family.

ATTITUDES TO LEPROSY PATIENTS

Leprosy has been feared in the south of the region since pre-colonial times. The fear was especially marked among the Annang people of the south- western area. The Paramount Rulers of both Abak and Ukanafun LGAs in the Annang area reported that 'it was a dreaded disease before the white man came,' (Chief Cosmos and Chief Samson, personal communication, 1987).

The fear of leprosy led to ostracism of its victims. The reports of Annang rulers to the writer confirmed the reports of twenty six other elders to the research assistants (1986) that the pre-colonial custom was to eliminate leprosy sufferers, either by driving them into the forest to die, or to kill them prior to throwing their bodies into the forest. Leprosy was reportedly the only disease to receive such treatment. In communities where attitudes were not so extreme leprosy patients were forbidden to collect water with other people and had to fetch it at night, had to sleep separately and to eat separately using their own utensils, could not marry and should not communicate with healthy people. The Chief of Abak personally remembered such restrictions from 1912 to 1915.

Even more recently leprosy patients rarely received customary burial rites. When a leprosy patient at Ekpene Obum died, the hospital would hope that a relative would come for the body, but frequently no-one came and the hospital would then provide a Christian burial in an unmarked grave in the grounds.

Throughout the Mainland the word for leprosy in all Ibibio dialects is purely descriptive, translating as 'white sickness' and alludes to the light skin patches of paucibacillary leprosy, the commonest local form of the disease. But other words were used for leprosy in the Annang dialect and translate as 'he eats alone' and 'only he may use it'. These obviously reflect the customary isolation inflicted on sufferers. Investigations, including the research assistants' reports from twenty two Ibibio elders, revealed that no similar names associated with leprosy were found in other Ibibio dialects. This suggests that the Annang people always had more fear than the neighbouring Ibibio, perhaps because there was more leprosy in their community. Or it may be that they had a longer experience of leprosy which allowed the development of the wider vocabulary associated with it, as was proposed for the Lunda-speaking people of Zambia (Griffiths, 1965).

Chapter Seven has shown that the harshest attitudes began to moderate when leprosy treatment became available in the south of the region during the 1920s and 1930s, and cured patients returned to their villages. Communities began to provide funds for their own leprosy cases to receive treatment in the 'leper colonies' at Itu and Ekpene Obum. Even the Annang people, who had been most fearful, requested their own voluntary segregation villages, on the model of those established in the neighbouring Igbo area to the west (Chapter Seven).

In spite of evidence of improving attitudes, the continuing stigma is demonstrated by the fact that one of the six segregation villages in Annang was still occupied in 1988 by eleven ostracised patients and their dependants. Some reported having been rejected by husbands or wives because of their disease. Others were confident that they would be welcomed back into their villages when they were cured. None had any visible means of livelihood, and no land rights in the vicinity. Some scavenged in the surrounding farmland for remains of crops, and some were paid for weeding jobs. The latter required contact between patients and healthy people, and illustrates a decline in the fear of leprosy. On the other hand, the patients reported having to collect water from a separate section of the river from the neighbouring healthy population.

The greater fear of leprosy among the Annang, compared with other groups in the Cross River region, is not easily explained. Their closer adherence to traditional religious beliefs and practices was well-known, and the fear of leprosy may be associated with this.

Leprosy officers reported problems associated with working with a stigmatised disease. Many felt professionally isolated, and complained of a lack of opportunities for promotion. The CRS policy of paying a supplement to workers in leprosy, because of the supposed risks involved, effectively institutionalised the stigma. The payment was controversial; senior officers requested its withdrawal because of the attitudes it perpetuated, but the poorly-paid junior officers naturally wished the supplement to continue.

EFFECTS OF ATTITUDES AND BELIEFS ON CASE-FINDING AND CASE-HOLDING

The adverse attitudes to leprosy caused problems for the health services in the detection of new cases, 'case-finding', and in maintaining the patients throughout the course of treatment, 'case-holding'. The control of leprosy, as with other stigmatised diseases, such as sexually transmitted diseases, has problems in contact tracing, unreliable surveys, delayed reporting and poor patient compliance with treatment. These problems cause set-backs for the individual patient, such as unnecessary disability, and for the community, in maintaining the transmission of leprosy and in promoting the emergence of drug-resistant strains.

Active case-finding

The adverse attitudes to leprosy hinder case-finding, both active and passive. In active case-finding health professionals seek out new cases, especially in at-risk groups, through checking contacts of known cases ('contact tracing'), or through surveys in schools and barracks, and in communities of suspected high incidence. Passive case-finding results from self-reporting by patients with clinical symptoms, or by detection of leprosy in a patient receiving health care for another reason. Leprosy surveys in schools, barracks and villages have been less common in recent decades, due to the shortage of resources. Contact tracing has been similarly constrained, but is also affected by the stigma associated with the disease. Many patients do not welcome contacts knowing about their disease, and are unwilling to agree to a contact tracing survey.

Early in the study, it was the opinion of the writer that active case-finding through surveys and contact tracing would be effective in detecting early cases of the disease and should be a priority. The view was based on reports of control strategies for leprosy elsewhere, and used previously for leprosy and other infectious diseases such as yaws in the study area (Seal, 1957; 1972). However, even if sufficient resources were available, this strategy is based on the assumptions that:

1 everyone would agree to examination, and

2 anyone diagnosed with leprosy would agree to receive treatment, and also

3 to name contacts.

These assumptions did not take leprosy stigma into account.

Fieldwork included a village meeting followed by a survey, in which the writer participated with the leprosy doctor. The meeting was arranged after it was alleged in a letter from a member of the village that several untreated adult male leprosy cases refused to present for diagnosis and treatment, and the informant was afraid that leprosy was being intentionally transmitted.

The Abak area leprosy control officer arranged the meeting through the village chief, and it was addressed by the leprosy doctor. The main aim was to educate the people about leprosy, help dispel fear of the disease, and provide information about the free and effective treatment available. At the close of the meeting the village agreed to an immediate survey to detect unknown leprosy cases, and approximately one thousand men, women and children were examined.

No adult cases were detected, but several children with indeterminate leprosy lesions were placed under observation. The suspected untreated cases did not attend the meeting and did not present for examination. One was named and he was visited in his house. Advanced multibacillary leprosy was diagnosed, but he did not wish to receive treatment at that time. Subsequent communications about the other alleged cases indicated that blackmail and extortion were involved, and at least one of the cases was receiving treatment secretly outside his own area for this reason.

The episode demonstrated that in communities with leprosy stigma, the survey method alone is not the solution to the case-finding problem among adults. The most valuable aspect of the exercise was the education for the village about leprosy, rather than the survey. Because of the stigma, people who suspect or know that they have leprosy and have decided to conceal it, would fail to appear for the survey, as may have occurred on the day. Further, leprosy workers throughout the region reported that patients whose leprosy was detected during surveys were frequently the worst defaulters from treatment, although the writer has no data to confirm this.

Being a rare disease, even in areas of relatively high prevalence, mass surveys for detecting leprosy alone are not regarded as an efficient use of resources (Fine, 1981). Fear associated with adverse attitudes to the disease makes them even less so. However, selective village surveys in areas of suspected higher incidence could be a tool, but the experience in the village suggests that these should be preceded by a programme of health education to help to change attitudes and ensure co-operation.

Passive case-finding

Passive case-finding depends mostly on self-reporting. Delayed reporting of leprosy is common in most endemic areas due to the gradual onset of clinical symptoms, but where there is fear of social ostracism, as in the study region, delays are longer.

The extent of delayed reporting was examined using the hospital record cards of 133 new cases diagnosed at Ekpene Obum between January 1980 and December 1984. Only one fifth of the patients reported within one year of the onset of symptoms, and another fifth took more than three years to report (Table 11.1). There were delays of up to ten years in some cases. Some of the patients reporting earliest included children and childbearing women. Pregnancy and childbirth trigger the first leprosy symptoms in some women (Chapter Two), who would be well-placed for early diagnosis and treatment when attending maternity clinics. However, analysis of the figures revealed no significant correlation between reporting delays and age-sex characteristics.

TABLE 11.1

Reporting Delays After First Appearance of Leprosy Symptoms, Ekpene Obum, 1980 - 1984

Delay	No of Patients	%
Under one year	28	21
About one year	17	13
Eighteen months	11	8
Two years	30	23
Three years	18	13
Over three years	29	22
TOTAL	133	

(Source: Patient record cards, Ekpene Obum, 1980 - 84)

Interviews with patients and details on patients' record cards provided some explanations for these delays. They included ignorance that the symptoms were of leprosy, and the confusion of leprosy with common skin diseases in the region such as ringworm and excema. General hospitals and clinics sometimes failed to diagnose leprosy. Delays were also reportedly due to fear of the social consequences of having leprosy diagnosed, beliefs that leprosy cannot be cured by western medicine, and consultations with TMPs. According to record cards ten patients (7.5 per cent) had originally sought treatment for fungal diseases, especially ringworm, and for excema, and seven (5.3 per cent) reported that government or mission hospitals and clinics had failed to recognise their symptoms as leprosy, and had treated them for other conditions. Six (4.5 per cent) had purchased dapsone from markets or from health workers offering it for sale privately. Twenty three (17.3 per cent) admitted that they had taken treatment from TMPs.

After discussions with patients it was hypothesised that delays in reporting by some patients were related to seasonal factors such as the farming calendar and bad roads during the wet season from May to October (Chapter Four). To test this hypothesis the month of admission of new cases as in-patients to Ekpene Obum between 1980 and 1987 were examined for variation and for seasonal patterns (Table 11.2). The analysis of variance statistic was used to test the difference in the number of cases admitted by month, and the summary of the result is shown in Table 11.2(b). The F ratio is 1.4535 with an F Probability of 0.1649 indicating that there is no significant variation in the number of new cases admitted by month.

Table 11.3 shows that 53 per cent of the new case admissions were during the dry season. The Chi-Square statistic was used to test the difference between wet and dry season admissions in the period. The calculated Chi-Square value is 11.84, while the critical value at the 0.05 level of significance is 14.07, indicating that there is no significant difference in admissions between the seasons.

TABLE 11.2 (a)

New Cases Admitted to Ekpene Obum as In-Patients, 1980 - 87

By Month

	1980	1981	1982	1983	1984	1985	1986	1987	Total
Jan	6	8	2	4	9	2	5	6	42
Feb	2	7	7	3	9	6	8	4	46
Mar	4	8	2	6	2	4	5	2	33
Apr	5	4	3	6	5	1	2	4	30
May	2	1	4	0	1	1	3	5	17
Jun	4	7	7	3	3	1	1	4	30
Jul	7	4	1	3	4	0	0	4	23
Aug	6	9	11	4	3	2	1	2	38
Sep	9	5	5	3	4	3	2	3	34
Oct	8	6	4	3	10	4	3	1	39
Nov	9	5	3	4	3	2	3	4	33
Dec	9	4	2	2	3	3	1	0	24
Total	71	68	51	41	56	29	34	39	389

TABLE 11.2(b)

Analysis of Variance: Result for Ekpene Obum Admissions By Month

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob
Between Groups	11	91.4583	8.3144	1.4535	0.1649
Within Groups	84	480.5000	5.7202		
TOTAL	95	571.9583			

(Source: Compiled from Ekpene Obum Admissions Registers 1980-1987)

TABLE 11.3

New Cases Admitted to Ekpene Obum as In-Patients, 1980 - 87

By Season

	Wet Season obs	Wet Season exp	Dry Season obs	Dry Season exp
1980	36	33	35	38
1981	32	32	36	36
1982	32	24	19	27
1983	16	19	25	22
1984	25	26	31	30
1985	11	13	18	16
1986	10	16	24	18
1987	19	18	20	21
	181 (47%)		208 (53%)	

(Source: Compiled from Ekpene Obum Hospital Admissions Registers 1980 - 1987)

TABLE 11.4(a)

Cross River State: New Cases of Leprosy 1981 - 85

By Month

	1981	1982	1983	1984	1985	Total	Rank
Jan	31	9	41	32	16	129	5
Feb	38	24	13	49	7	131	4
Mar	22	19	28	26	18	113	9
Apr	34	21	14	12	51	132	3
May	18	13	14	20	8	73	12
June	21	35	21	22	37	136	1
July	33	9	22	20	28	112	10
Aug	39	23	23	37	13	135	2
Sept	14	20	11	17	24	86	11
Oct	18	35	26	20	16	115	8
Nov	30	34	20	12	22	118	7
Dec	17	41	12	30	25	125	6
TOTAL	315	283	245	297	265	1405	

(Source: Compiled from 'Lep 8')

TABLE 11.4(b)

Cross River State: New Cases of Leprosy 1981 - 85

By Season

Wet Season		Dry Season	
May	73	Nov	118
June	136	Dec	125
July	112	Jan	129
Aug	135	Feb	131
Sep	86	Mar	113
Oct	115	Apr	132
	657 (47%)		748 (53%)

(Source: Compiled from 'Lep 8')

TABLE 11.5

Analysis of Variance: Result for CRS Cases Reporting By Month

Source	D.F	Sum of Squares	Mean Squares	F Ratio	F Prob
Between Groups	11	851.3833	77.3985	0.6995	0.7326
Within Groups	48	5311.2000	110.6500		
TOTAL	59	6162.5833			

The same tests were applied to the reporting figures of new cases for the whole of CRS 1980 - 1985 (Table 11.4). The summary of the result is shown in Table 11.5. The F ratio is 0.6995 with an F Probability of 0.7326 indicating that there is no significant variation in the number of new cases in CRS reporting by month.

The analysis suggests that seasonal factors do not intervene to account for short delays in reporting of new cases. The problems of travel during the wet season, and the inconvenience of reporting during the farming season, are not statistically significant factors. Longer delays in reporting are most easily explained by ignorance, especially in recognising symptoms, the availability of effective treatment, and by the fear of a diagnosis of leprosy.

Case-holding and patient compliance

It is a feature of all chronic diseases in which irregular treatment is not life-threatening, that patients may not comply with the prescribed treatment (Jacobson, 1985). Compliance can be defined as the extent to which a person's behaviour in clinic attendance and taking prescribed medication coincides with the advice of the health care professional. For dapsone monotherapy compliance was defined as taking at least 75 per cent of prescribed medication, usually measured in terms of clinical visits to collect it (WHO, 1980). But collection does not guarantee medication, and a test is available to detect dapsone in the urine which shows this (WHO, 1988b). Poor compliance is a cause for concern in leprosy control, especially because irregular treatment was a factor in the development of widespread bacillary resistance to dapsone (Chapter Two), and is the subject of a recent extensive review (Vadher et al, 1992).

Three groups of causes for poor and non-compliance have been proposed (Matteo and Di Nisola, 1976, cited in Valencia, 1991). These are psychic factors such as thoughts, feelings and attitudes; environmental factors such as access to and cost of medical care; and the dynamics of the practitioner-patient encounter, especially the level and quality of communication and understanding. Fieldwork has shown that psychic factors and the environmental factor of geographical access contribute to poor compliance in the study region; other factors are not ruled out, but were not included in the study.

Official leprosy returns at regional, national and international levels include figures for defaulters or 'patients out of control,' and also 'returned defaulters'. Patients who have not reported for treatment for six months or more are classified in CRS as defaulters. But if a patient misses for five months and returns for treatment in the sixth this would not be recorded as a defaulter. It is possible that the figures understate the scale of the problem because of these criteria, and some leprosy officers in the region have been reluctant to classify a patient as a defaulter, and lose the patient from the register, reducing the apparent workload and presumably threatening their job. Nevertheless, the scale of defaulting is high (Table 11.6). At Ekpene Obum between 1980 and 1985 between 11 and 26 per cent of all registered cases defaulted each year (Table 8.3). In a questionnaire of in-patients at Ekpene Obum in 1988 nearly half of the patients who had been diagnosed for over a year admitted to having defaulted from drug therapy at some stage during treatment.

The geographical access to treatment was a factor in poor compliance. The high cost of transport created problems for out-patients. Most patients had limited financial means and were economically dependent on others. Reluctance to ask for transport money reportedly contributed to defaulting by patients wishing to conceal leprosy. Leprosy stigma prevents the tracing of out-patients to their villages to arrange regular treatment, as it risked exposing patients and families who wished to conceal their disease.

The introduction of the shorter course multidrug therapy (MDT) in parts of the region in 1985 improved compliance (Annual Reports, Moniaya Hospital, various years). Paucibacillary patients require only six months chemotherapy and have been successfully treated with less defaulting. The two year regimen for multibacillary leprosy provides more scope for defaulting. Reports from the northern three LGAs show that a smaller proportion of paucibacillary patients have defaulted on their treatment (Table 11.7). It has also been reported from other regions that the introduction of shorter-course treatment has improved patient compliance (Bryceson and Pfaltzgraff, 1990).

TABLE 11.6

CRS Defaulting 1981 - 85

Year	0 - 15 Years			Over 16			TOTALS		
	M	F	Total	M	F	Total	M	F	
1981	21	36	57	72	90	162	93	126	219
1982	22	18	40	91	58	149	113	76	189
1983	32	25	57	48	44	92	80	69	149
1984	50	69	119	123	95	218	173	164	337
1985	37	45	82	79	66	145	116	111	227
Total	162	193	355 32%	413	353	766 68%	575 51 %	546 49 %	1121

Total Adults = 766
Male Adults = 413 (54% of all adults)

Total Children = 355 (32% total)
Male Children = 162 (46% of all children)

Total Males = 575 (51% of all defaulters)

(Source: Compiled from 'Lep 8')

TABLE 11.7

Defaulting in the Northern Three LGAs 1989-1991

	Multibacillary	Paucibacillary	Total
New Cases	259 (42%)	352 (58%)	611
Defaulters	76 (51%)	73 (49%)	149 (24%)

(Source: Moniaya Hospital Annual Reports, 1989-91)

The matter of patient compliance in leprosy treatment is not confined to the taking of drugs but also to self-care. This includes taking measures to prevent disability and injury, and attending to ulcers. The adverse attitudes in society causes shame in some patients, leading to low self-esteem and self-neglect, even self-hate. The belief in supernatural causes of the disease can be stronger than the belief in modern medicine to cure it, or the effect of measures to prevent further disability. Patients may convince themselves that they deserve the disease and the problems associated with it.

The subject of self-stigmatisation by leprosy patients has been widely recognised (Chapter Three). Interviews with patients revealed that such attitudes contributed to poor compliance in some cases.

Leprosy officers in Annang reported that case-finding and case-holding was affected by adverse attitudes to leprosy by some health workers, who would not allow leprosy out-patients to be treated in general dispensaries. In the pre-dapsone days separate clinics, mostly of earth and thatch, were built for leprosy treatment. Many of these were dilapidated, some had collapsed, and others were damaged or destroyed during the Civil War; for example in Ikot Ekpene LGA leprosy clinics in five villages were lost during the war and had not been replaced. In 1987 leprosy patients were still having to travel to clinics elsewhere, and the leprosy officer reported that the lack of clinics in these villages prevented other known cases from reporting. He was urging the district health superintendent to compel the dispensary assistants to allow leprosy treatment in the dispensaries at Adiasin, Amayam, Ikpe, Odoro Ikot, and Obot Akara. At Ikot Ebak he had previously treated patients in the village dispensary until the health worker wrote to the headquarters complaining that this had discouraged non-leprosy patients from attending, (Mr FT Akpan, Leprosy Officer, personal communication, 1987).

Adverse attitudes to leprosy among health professionals work against the WHO and Nigerian Government policy to integrate leprosy treatment with other health provision, with the intention of improving case-finding and case-holding. There was therefore no policy to build separate treatment centres for leprosy. Many leprosy patients are disabled, and require conveniently located treatment centres to reduce the risk of injury and disability, as well as to promote regular attendance, especially because of high transport costs. Leprosy workers in the LGAs of Abak, Eket, Ikot Abasi, Ikot Ekpene and Ukanafun all cited villages which required new leprosy treatment facilities, because of untreated cases and hardship suffered by existing patients having to travel for treatment.

EXPERIENCES OF PATIENTS

The experiences of patients with leprosy ranged from zero to maximum negative impact, such as social rejection and economic destitution. Fieldwork showed that while some patients suffered no social problems, others were ostracised by their community or family. In a survey of twenty one adult out-patients attending clinics in the south, fifteen reported no social problems arising from leprosy, two admitted that they were concealing their disease, and four reported social problems.

Interviews of adult in-patients revealed that they suffered more social and economic problems than out-patients, shown in the case studies which follow. This is because the hospital became a refuge for patients with such problems. The majority of the case studies are adult males, because males make up the majority of in-patients, and a larger proportion spoke English.

Patient case studies

Case study 1

Adult male from Ikot Abasi LGA. who was admitted to Ekpene Obum in 1966 when he was at primary school. His father and sister and a half brother all had leprosy. He continued his schooling during treatment and was discharged in 1969, but relapsed and returned for further treatment in 1973. He was an in-patient for long periods because of recurrent ulcers, although his leprosy was cured. He had shortened fingers due to leprosy, and slight facial paralysis, but this was not obvious. He claimed that because he did not have obvious skin lesions, no one ever knew of his leprosy, and so had not shown hostility. His main problems were caused by plantar ulcers which require complete rest for healing, and deformed hands which prevented manual work. Between extended hospital stays he lived at home with his mother and extended family of thirty. There was general disapproval because of his economic dependence. He received financial support from the hospital to start photography, but his hand disability prevented success, and his economic rehabilitation was a problem.

Case study 2

Adult male from Ikot Abasi LGA, who was admitted to Ekpene Obum as a schoolboy in 1980 after one year of leprosy symptoms. He was discharged after a year, but one week later returned with reactions requiring supervised medication. Other complications included foot drop and claw hand, weakness in the arms and anaesthesia in one foot. He completed primary education after his diagnosis.

He had been brought up by his mother and stepfather, but was rejected by the stepfather after the repeated periods of in-patient treatment. After discharge he planned to go to his maternal grandmother in a neighbouring LGA. She and some of her neighbours always treated him well, but others in the village would not allow him into the house because of leprosy. He hoped to work at the riverside, loading boats with other boys. He reported that they did not know of his illness and he mixed well with them.

Case study 3

Adult male from Oron LGA, who developed leprosy symptoms in 1971 at the age of twelve while at primary school. Leprosy was not recognised by his teachers, and he remained untreated. In 1973 he developed ulcers and his parents took him 'to native doctors who added to my deformities'. Leprosy was finally diagnosed in 1975 during a village survey which also detected two other cases. He was referred to Ekpene Obum after diagnosis and admitted for one year and then discharged symptom-free with all the skin lesions healed. He subsequently became a regular in-patient receiving treatment for ulcers, and had numerous operations and an amputation below the knee. Other complications included anaesthesia and deformity of the hands. His family rejected him by refusing to provide food, and his father removed his bed from the family house. When not at Ekpene Obum he lodged with a relative, who demanded rent. The rehabilitation fund at the hospital supported his training as a sign writer and commercial artist. Later he began training as a church pastor. He married a non-patient and had three young children.

Case study 4

Adult male from Oron LGA born in 1959, who was diagnosed in 1984 at the age of twenty five after eighteen months of severe multibacillary leprosy symptoms. During that time two government hospitals had mis-diagnosed the symptoms as malaria and rheumatism respectively. He had also attended 'native herbalists' and a Christian prayer house. Eventually a stranger advised him to visit Ekpene Obum, but he was reluctant because he could not believe that he had leprosy as he had never known anyone with the disease. He was a primary school teacher, and highly respected in his community. He came to Ekpene Obum during the school holiday without informing anyone, and hoped to resume school in the new term. He intended concealing his disease, because he feared rejection. He believed that leprosy had been inflicted on him by a jealous senior brother through witchcraft.

Case study 5

Adult male from Akpabuyo, Calabar, born in 1938. Leprosy symptoms appeared at the age of twelve when he was at primary school. He was admitted to Itu Hospital and received chaulmoogra oil injections until 1953 when he started dapsone treatment. During the 1960s he received agricultural training at Oji River leprosy settlement, where he married another leprosy patient, with whom he has three surviving children. He was discharged as symptom free in 1973 but ulcers developed and he had many skin grafts and an amputation. He believed that his leprosy was caused through witchcraft inflicted by relatives who were jealous of his father.

He was a practising Christian, and reconciled these traditional beliefs by explaining that 'Satan made the relatives do this.' But he also recognised the medical explanation for leprosy. He was employed as a ward aid at the hospital.

Case Study 6

Young female from Etinan LGA, born in 1972 and admitted to Ekpene Obum with leprosy at the age of six. She and her younger sister, who also had leprosy, had been admitted several times. There were four other siblings. Their parents were well educated and moved around Nigeria with their work, but visited the hospital regularly when the girls were in-patients. She and her sister both attended school when possible and she hoped to become a nurse. She reported that children at school believed that her skin lesions were excema, and she never told anyone she had leprosy. Complications included anaesthesia of the left leg and foot.

Case study 7

Adult female from Ikot Abasi LGA, born in 1951 and admitted to Ekpene Obum at the age of thirteen. None of her six siblings nor other close relatives had leprosy, but a distant young relative had developed it one year earlier. She received leprosy treatment for three and a half years until discharged as symptom free and lived with her parents until her marriage. Her husband's mother had been a leprosy patient at Ekpene Obum. She subsequently had five children. In 1981 she developed elephantiasis, and returned to Ekpene Obum.

Some of the symptoms resemble leprosy, and her husband believed it to be leprosy again, and divorced her. He had previously accepted her because she had no deformities, but the grossly swollen leg from elephantiasis 'caused him shame.' The older children stayed with her husband, the others stayed with her at the leprosy settlement attached to Ekpene Obum. She had been employed as an orderly since 1981, although she was frequently admitted to the ward for treatment.

Case study 8

Adult male from Calabar who developed leprosy as a child, was diagnosed in Calabar, and admitted to Itu leprosy hospital before the Civil War. He was transferred to Ekpene Obum after Itu was bombed and had been there ever since, with occasional visits to his family in Calabar. He was released from treatment after more than five years on dapsone. Then ulcers caused serious problems leading to an amputation in 1978, and he adapted well to an artificial leg. His elderly father, sisters and a close uncle did not fear leprosy, but the uncle's wife was fearful and 'unfriendly'. With the support of Ekpene Obum he completed primary and secondary school, trained as a limb maker in Ethiopia and was subsequently employed by the hospital.

Case study 9

Adult male from Ikono who claimed that the first leprosy symptoms appeared in 1960 with pain and anaesthesia. He had never seen anyone with leprosy. He consulted three 'native doctors', costing large sums of money and involving animal sacrifices. Skin lesions appeared in 1980, but he did not report to Ekpene Obum until 1984 and was then admitted. He had completed primary education and owned a welding workshop where he trained apprentices until the skin lesions appeared. He became a preacher in a local religious sect which gave him generous support. Although his family did not fear his leprosy, he reported that it was feared by the people of his village: 'The village head cannot allow the person with this sickness to enter the town, he must live alone.' He therefore never returned to his village, but stayed with the sect in Calabar when he was discharged. He married a non-patient and had several children.

Case study 10

Adult male from Ikono LGA who was referred to Ekpene Obum in 1984 by the general hospital in Calabar, where he had been living and working. He believed that he had been infected in his home village where many people had leprosy. Three male relatives were also in-patients. Anaesthesia and a plantar ulcer were his first symptoms. After beginning treatment there was an increase in anaesthesia in hands and feet and he developed a claw hand. Neither he nor his relatives complained of having experienced stigma, although he referred to it: 'People fear a person attacked by leprosy, and won't communicate. They especially fear deformities.'

Case study 11

Adult male from Itu LGA, who was diagnosed in 1980 after four years of multibacillary leprosy. He was admitted several times for complications, including ulcers and eye problems, and was partially blind. He had received two years of primary education. His income had been from palm fruit cutting and wine-tapping, but a foot disability prevented him working. He had no financial support from family or friends, and his wife had divorced him because of leprosy. He was dependent on a hospital allowance for food.

Case study 12

Elderly adult male from Etinan who was admitted in 1945 with severe multibacillary leprosy. His mother had also been a leprosy patient. He had been treated with chaulmoogra oil injections before dapsone. He was severely disabled and both legs had been amputated. After several years of blindness caused by leprosy, he had operations which restored partial sight. He had never married and had no other home but Ekpene Obum, where he acted as the chief of the male compound for which he received a small payment. He died in 1990 at the hospital.

The patient case studies reveal that traditional beliefs about the supernatural cause of leprosy may still be held, even by educated people. They also show the ability of some people to reconcile traditional, Christian and medical explanations for the occurrence of the disease.

The studies show that some leprosy patients in the region continue to suffer from the stigma associated with leprosy, but economic problems were a more important factor in the rejection experienced by some patients. Leprosy disabilities lead to loss of economic independence in the more advanced stages of the disease, which has serious consequences in a society without a system of welfare. The studies show that in some cases the disapproval from relatives, which led to rejection, did not occur until the patient was unable to work. Therefore economic problems may create or reinforce social problems. Figure 11.1 shows the role of disability in the social and economic experiences of patients, and the contrast between patients who receive early treatment and therefore avoid most problems, and those whose treatment is delayed.

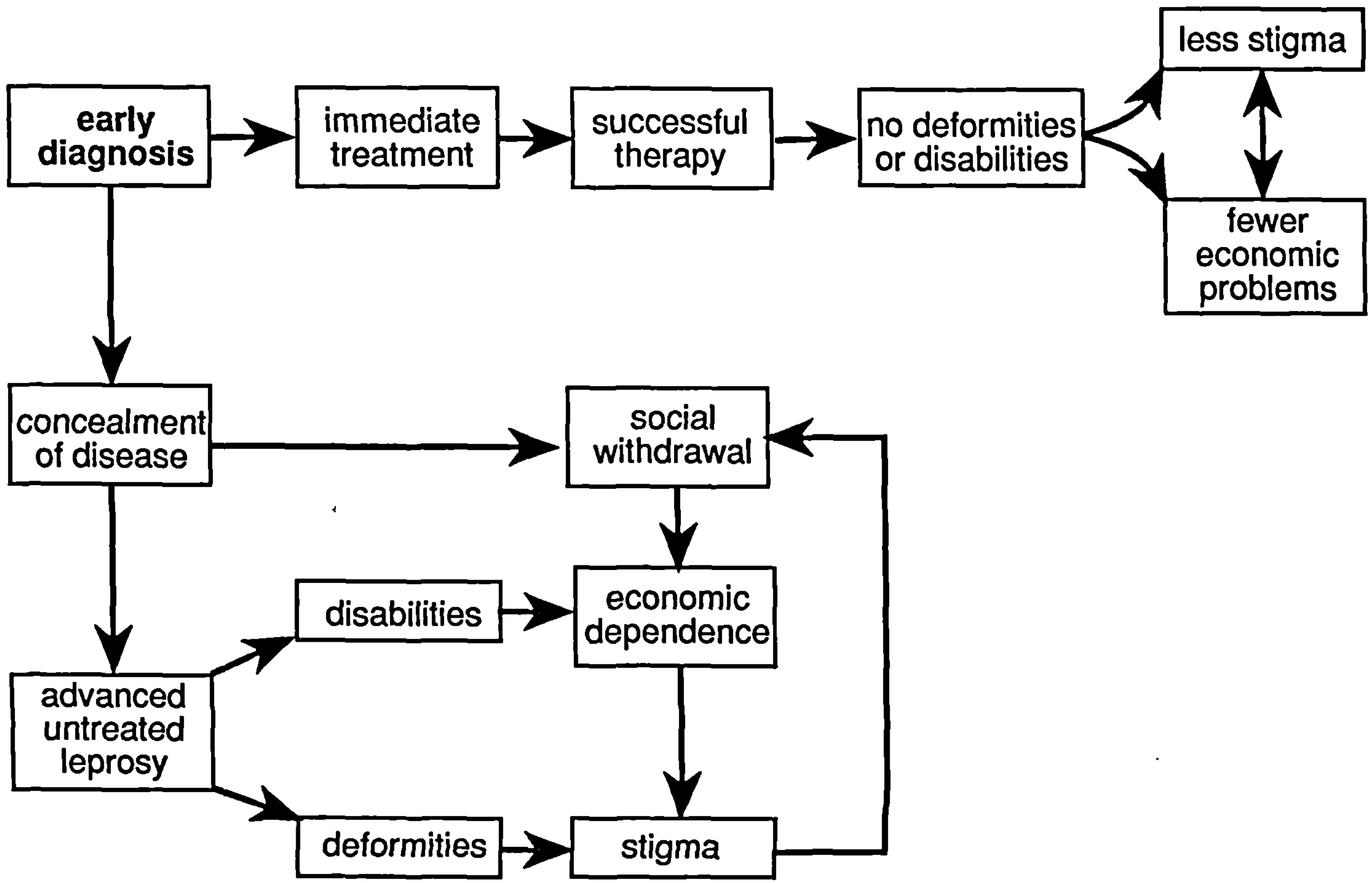
The poverty associated with leprosy has been acknowledged by Iliffe (1987) who devoted a whole chapter to leprosy in his book 'The African Poor', and stated 'Some leprosy sufferers were among the poorest people of post-colonial Africa' (p 227).

The greater frequency of economic than social problems for leprosy patients was shown in a study in Zaria, Northern Nigeria, of the socio-economic impact of leprosy. There were fewer examples of ostracism than in this study, but most patients reported a reduced income (Reddy et al, 1985). The greater tolerance of leprosy in Northern Nigeria is well-known and is discussed in Chapter Six.

The case studies included some long-stay patients who no longer required hospitalisation, but who could not be discharged, because they had no home due

Fig.11.1

Contrasting Outcomes of a Diagnosis of Leprosy: The Role of Disability in Economic Dependence and Stigma



to rejection by family. Case study 12 was typical of the patients in the former leprosy colonies who were segregated in the pre-dapsone years, and lost contact with their families. They became socially and economically dependent on the hospital. Although leprosy stigma remains this extreme situation has almost disappeared with the out-patient treatment available since 1950, and such cases were rare by the 1980s: most were elderly patients.

Children were usually less affected by stigma, and regarded leprosy like any other disease and expected a complete recovery. Relatives would take them for treatment, and if they were admitted would visit the hospital periodically and provide money, food and clothing. As the degree of disability increases with age most children with leprosy had few disabilities, which probably explains why they experienced less stigma.

Although there were gender differences in certain social characteristics of leprosy, especially in-patient admissions, the sample is too small to show whether there were differences in the degree of hardship and ostracism suffered by males and females.

CONCLUSION

It can be argued that the continuing occurrence of new cases of leprosy in Cross River State, after decades of control measures, is partly attributable to the adverse attitudes towards the disease and its sufferers, which are rooted in indigenous beliefs. These attitudes have hindered efficient case-finding and case-holding.

The possibility of being ostracised still exists and is greatly feared, but patients' experiences, for instance with leprosy patients increasingly marrying non-patients, show that for most the fear is exaggerated. Nevertheless the traditional beliefs contribute to patients becoming stigmatised in their own perception, what Waxler (1981) calls 'learning to become a leper.' This leads to attempted concealment, poor compliance with treatment and almost inevitably to deformity and disability. The disabled leprosy patient is much more likely to become 'a leper', and suffer social and economic problems leading to rejection.

Nevertheless, probably less than half of the leprosy patients in the south of the region suffer any degree of social rejection, and some of the problems are a function of economic rather than direct social factors. The patient who avoids deformity and disability through early diagnosis and regular treatment, is least likely to suffer economic and social problems.

Chapter Seven showed that there has been an improvement in the attitudes towards leprosy patients since pre-colonial times, and the case studies support this. But this chapter shows that efforts are required to reduce still further the fear and superstition associated with the disease. Health education aimed at encouraging early reporting and regular treatment, should lead to a lower rate of disability in the patient and a reduction in leprosy transmission in the community. The former would reduce the social and economic problems of patients in the shorter term, and the latter should ensure the eradication of leprosy in the longer term.

CHAPTER TWELVE

LEPROSY IN AREAS ADJACENT TO CROSS RIVER STATE

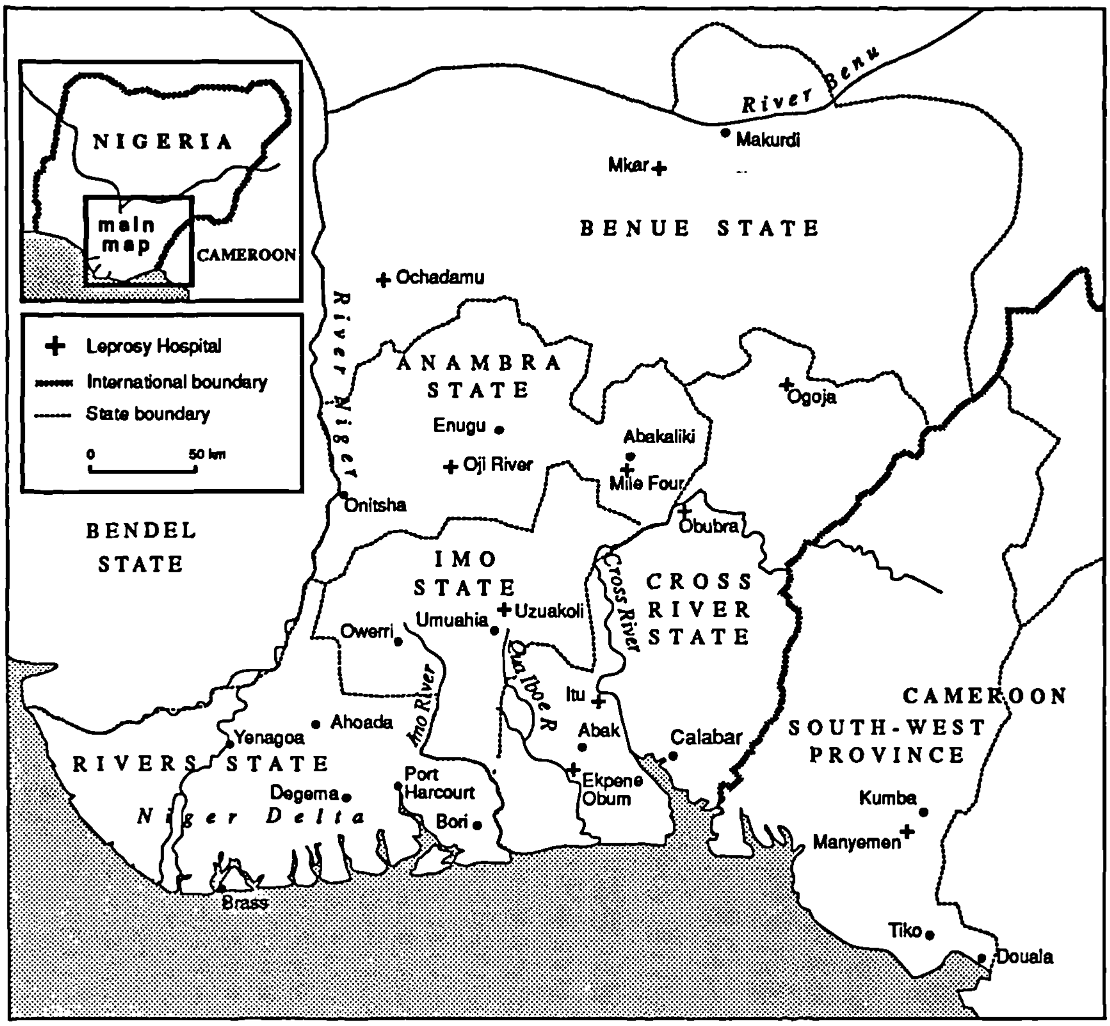
The question is raised whether the distribution pattern of leprosy in Cross River State (CRS), with higher rates in the north than the south in the mid-1980s, continued into adjacent areas. The claim by some patients, that they were infected with leprosy outside CRS, also prompts a study of these areas. The effect of leprosy rates in adjacent areas on the control programme in CRS is discussed therefore because of the potential risk of increased transmission either by returning indigenes or by immigrants.

> 'In the context of health, geography has to be viewed both regionally and nationally. Disease does not usually respect frontiers though it can be stopped at a frontier by resolute action, as in the case of some of the major communicable diseases. This is where detailed knowledge of geography becomes not just helpful but indispensable.'
> (p vi, G.T. Stewart in Howe, 1977)

DATA

The sources of leprosy information in areas adjacent to CRS are numerous and the quality varies, according to the amount of leprosy control work. Four different state governments and four voluntary agencies are involved in Nigeria, as well as the government and voluntary agencies in the Cameroun. Figure 12.1 shows the areas considered in this chapter.

Fig. 12.1
Cross River State and Neighbouring Areas



No fieldwork for the collection of primary data was conducted in these areas, although all but Cameroun were visited. Information was obtained through personal meetings and correspondence. The data is therefore piecemeal, and the interpretation is more impressionistic than for CRS.

REPUBLIC OF THE CAMEROUN

To the east of Cross River State lies the South West Province, one of ten administrative regions of the Cameroun Republic. Until 1961 this Province was a UN Trust Territory administered by Britain. The English language remains in use, and many of the social and commercial links forged with Nigeria before independence in 1961 have been maintained. It is similar in area to CRS, but has a population of approximately one eighth.

The area of CRS which is adjacent to Cameroun is an unsettled forested upland, in contrast to most of the southern part of CRS which has high rural population densities and land shortages, prompting emigration to areas which include the Cameroun Republic. Annang people especially have moved to cocoa plantations in SW Province (Ekpenyong, 1984), and people from CRS regularly fish in Cameroun waters and camp along the shores. Hospital records and patient interviews showed that a number of CRS leprosy patients have returned from Cameroun with leprosy, and it is confirmed that there are Nigerians from CRS among the registered leprosy cases in South West Cameroun (Dr. Oberlechner, personal communication, 1990). Several CRS patients interviewed believed that they were infected in Cameroun, and that leprosy was worse there than in Nigeria. Of course, due to the long incubation period of leprosy, these patients could have been infected before they moved to Cameroun. But is there any basis for the patients' belief that they were more likely to have been infected in Cameroun than in CRS?

Leprosy control in SW Province is organised similarly to CRS, with a mixture of government and voluntary agency involvement. The government controls most rural clinics, and a Swiss voluntary agency administers a leprosy settlement and hospital, a rehabilitation unit, several out-patient clinics, and provides training for government leprosy workers.

In 1987 it was reported that there were areas of inadequate coverage of leprosy control activities, where out-patient clinic registers had not been checked for some years, and where there were limited case-finding activities. Financial problems and staff shortages were given as reasons, against the background of national economic problems (Annual Report, Manyemen Hospital, June 1989).

Reorganisation of the leprosy service was in progress in 1990, with the purpose of integrating leprosy with the rest of the health service, and the general and leprosy hospitals in Manyemen became a single institution. Multidrug therapy had been implemented by the hospital for its own in- and out-patients in 1985, and by 1991 most existing cases and all newly diagnosed cases were receiving it. This was not the case for the patients of government clinics.

For the whole of SW Province the data source is the 1987 figures from the WHO (Declercq et al, 1989), the year closest to the last year for which CRS figures are available (Table 12.1). To provide a more detailed examination of the situation within SW Province and to make comparisons with CRS, the reports of the leprosy hospital control service at Manyemen are also analysed, although these are for the later period, from 1989 to 1991.

TABLE 12.1

Population and Leprosy Rates in SW Cameroun and CRS

	South West Province 1987	CRS 1986
Population	0.75M	6.2M
Total registered cases	1,160	7,130
Registered case rate per 1000	1.54	1.15
Total new cases	51	475
New case rate per 1000	0.68	0.77

(Sources: Declercq et al, 1988; CRS Ministry of Health, 1987)

The figures show that in 1987 the SW Province had a higher registered case rate than CRS in 1986, but the new case rate was lower. A previous chapter has shown that by 1987 CRS had a lower registered rate than 1986, due to discharges in the north of the state, although figures for the whole state were no longer available. So it would seem that there was a higher registered case rate in the SW Province than in CRS in 1986 - 87.

Case-detection surveys in the late 1980s by the Manyemen Leprosy Hospital team found many new cases. School and village surveys during 1988 examined 8000 people and detected 22 new cases, a rate of 2.75 per 1000, which is many times higher than the published case-detection rate for the Province or country. Surveys in 1989 examined over 10,000 adults and children in schools and villages and detected 30 new cases, a rate of almost three per thousand. In 1990 a combined TB/Leprosy survey in an area previously thought to be leprosy-free detected several child cases of leprosy, but in other areas the doctor's visits to some clinics in 1988 had led to large scale discharges (Manyemen Hospital Annual Reports, 1989; 1990). At the leprosy hospital clinic out-patient totals decreased between June 1988 and June 1989, but numbers were little changed in 1990, and long term patients at the hospital settlement decreased, due to successful treatment with MDT (Table 12.2).

TABLE 12.2

Leprosy Patients at Manyemen Hospital 1989 - 90

	Out-Patients				Settlement In-patients
	Total	Discharges	New Cases		Total
June 1989	345	45	26		67
June 1990	341	46	26		49

(Source: Hospital Annual Reports 1989; 1990)

Although it seems likely that some areas of SW Province, like CRS, have less leprosy than others, the case-finding surveys and the review of registered patients indicate that leprosy remains endemic. The leprosy doctor working in the region since 1977 wrote in 1990:

> 'Leprosy seems to be on the decline, but still exists. During one survey this year we found even new cases among children. So we cannot say the disease is under control' (Oberlechner, personal communication 23.8.90)

The information suggests that a Nigerian migrant worker is probably at a similar risk from leprosy transmission in SW Cameroun as in CRS.

RIVERS STATE

Rivers State lies to the west of CRS, bordering the LGAs of Ikot Abasi, which has one of the lowest rates of leprosy in CRS, and Ukanafun. Rivers State is smaller than CRS, and has lower rural population densities than adjacent areas of CRS. It is low lying and much of the area comprises the Niger delta, with riverine creeks and swamp flooded during the wet season. It has a large and rapidly growing capital, Port Harcourt. There is considerable population movement from CRS into Rivers State. This includes migration for paid employment especially in the capital, and short-term migration for fishing and palm-wine tapping. There is little migration from Rivers State into CRS. If leprosy is more prevalent in Rivers State, CRS migrants could be at greater risk of being infected there than in CRS.

During the fieldwork period there was no active leprosy control and no leprosy hospital in the state, one of the few states in Nigeria without one. Leprosy figures were therefore unobtainable from the usual local sources. The following assessment depends upon WHO figures for 1982 and 1990. These would have been estimated and submitted by the Federal Government and are of questionable reliability.

The figures show that Rivers State was reported to have one of the lowest leprosy rates in Nigeria in 1982, ranking it sixteenth out of nineteen Declercq et al, 1988). The WHO 1990 figures (Gelin et al, 1991) report an increase in leprosy cases, unlike most other states, and Rivers was ranked 13th by prevalence, close to CRS (Table 12.3).

TABLE 12.3

Area, Population and Leprosy Rates in Rivers State and CRS 1982

	Rivers		CRS	
Area (sq km)	18,090		28,361	
	1982	1990	1982	1990
Population	2.6M	3.6M	5.7M	7.3M
Registered Cases	837	1,095	8,313	2,263*
Leprosy Rate per 1,000	0.32	0.30	1.46	0.31*
Rank	16	13	11	12

* these figures omit registered cases in Akwa Ibom State, which was part of CRS until 1987, and which is omitted from the published table.

(Source: Gelin et al, 1991)

These low leprosy rates reported for Rivers in recent years contrast with the high rates which were well documented during the colonial period in riverine and inland parts of the region. The large number of patients from the region of present-day Rivers, who were attending Itu and Uzuakoli leprosy settlements in the 1930s prompted surveys. These revealed very high leprosy rates, and led to the subsequent establishment of treatment centres during the 1930s and '40s. For instance in the area around Ahoada (Fig 12.1) a prevalence rate of 28 per thousand was reported in 1937, and 43 per thousand in 1949 (Seal, 1957). Also it was reported that there was 'much leprosy in Ogoni', the area immediately west of Ikot Abasi in CRS. This prompted a petition in 1947 to the Resident in Calabar, which requested the provision of leprosy clinics (Calprof Papers, Batch 2, 2464/2. Engu Archives). Similarly, the 1953 Calabar Provincial Report (Rhodes House Library) commented on the centres of 'heavy leprosy infection' (p 43) in Owerri and Rivers Provinces, which caused concern for the adjacent areas of Calabar Province, now mostly CRS.

In 1957 Seal reported on surveys in the area which coincides with Rivers State. He observed few new cases in the areas where leprosy work had already been conducted for twenty years but where leprosy treatment was newly introduced, high disease rates were revealed.

> 'There is little doubt that surveys will reveal a prevalence rate of at least 50 per thousand and this is likely to be representative of many of the creek villages still to be reached by treatment facilities.'
> (Seal 1957, p 41).

In 1961 leprosy was diagnosed during yaws surveys and re-surveys. Re-surveys in Ahoada and Ogoni reported leprosy cases decreasing and few new cases, but initial surveys in Brass Division were finding new cases, and new leprosy treatment centres were subsequently opened (Seal, 1962).

The surveys and the provision of new treatment centres and maintenance of existing ones ended during the Civil War, 1967 to 1970, which disrupted health and other services. Case-finding surveys re-commenced in the state in 1973 and by 1980 had reportedly examined nearly half a million people and detected 1,110 new untreated cases. An attempt was made to re-establish leprosy services (Rivers State Leprosy Report, unpublished 1980), but had not succeeded by 1987. The riverine nature of the State, with the problem of access to many areas, makes the provision of health services especially difficult and expensive.

Leprosy doctors in Imo State and CRS report receiving cases regularly from Rivers throughout the 1980s, and in 1987 the Leprosy Advisory and Co-ordinating Committee (LACC) of the Eastern Zone expressed its concern at the poor level of leprosy control in Rivers State. This writer attended a meeting when the committee planned to send a delegation to the State Ministry of Health in Port Harcourt to discuss the problems of leprosy control in the state (LACC Eastern Zone meeting, minutes 13.2.87). The reported increase in leprosy cases in 1990 (Table 12.3), unlike most states, may result from increased leprosy work in Rivers, but confirmation of this would require further investigation.

Ekpene Obum records confirm that long standing and new cases regularly report from Rivers State, although the true numbers are greater than records show because addresses are not always recorded for patients from outside the state (Table 12.4).

TABLE 12.4

New Cases of Leprosy From Rivers State Reporting to Ekpene Obum: 1980 to 1987

1980	9 out of total of 71 new cases admitted
1981	3 out of total of 68 new cases admitted
1982	4 out of total of 51 new cases admitted
1983	no record
1984	2 out of total of 56 new cases admitted
1985	2 out of total of 29 new cases admitted
1986	3 out of total of 53 new cases registered
1987	1 out of total of 75 new cases registered

(Source: Ekpene Obum Hospital Records, 1980 - 87)

Most of these cases were salaried workers, unlike the patients from CRS who were mostly illiterate farmers, traders and fishermen. Several reported having relatives and neighbours with untreated leprosy. It appears that the more prosperous leprosy patients were travelling out of Rivers State to find treatment, while a reservoir of infection remained in their communities.

Historical evidence combined with recent evidence that leprosy patients from Rivers travel to neighbouring States for diagnosis and treatment, suggest that there are higher leprosy rates in Rivers State than are reported by the Federal Government. The low reported rates reflect the lack of leprosy control work since the Civil War, rather than true low leprosy rates. It is important for the success of leprosy programmes in neighbouring areas like CRS, that Rivers State establishes an effective leprosy service.

ANAMBRA STATE

Anambra State lies to the west of the CRS LGAs of Obubra and Ogoja. It is two thirds of the size of CRS but has a similar total population. Like CRS, Anambra has areas of very high rural population densities, but has no large uninhabited area like south-eastern CRS. The population is principally Igbo.

The area benefited from the excellent leprosy control programmes established during the 1930s and 1940s to deal with the severe leprosy epidemic among the Igbo in parts of the former Eastern Region of Nigeria. There are two hospitals for leprosy, at Oji in the west and Abakaliki in the east. Oji River Hospital was established in 1936, and in 1950 became the headquarters of the Nigerian Government Leprosy Control Service. Its leprosy work was weakened after the Civil War when it became a general hospital, but in 1990 attempts were being made to upgrade its leprosy work. At Abakaliki leprosy work was started in 1946 at Mile Four Hospital by the Roman Catholic Mission, and used the system of voluntary segregation villages and rural out-patient clinics.

TABLE 12.5

Area, Population and Leprosy Rates in Anambra State and CRS 1982

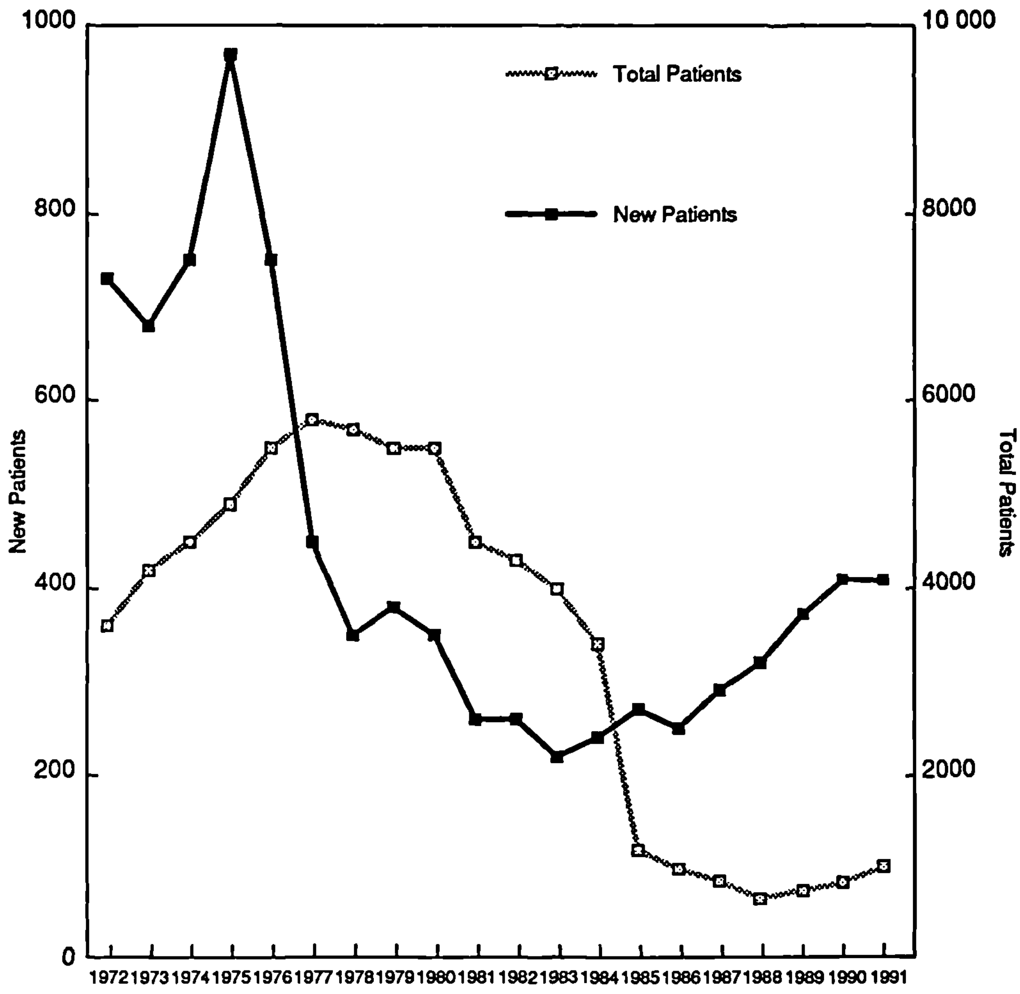
	Anambra	CRS
Area (sq km)	19,233	28,361
Population	5.7M	5.7M
Registered Cases	7,190	8,313
Leprosy Rate per 1,000	1.39	1.46
Rank in Nigerian States	12	11

(Source: Declercq et al, 1989)

Table 12.5 shows that in 1982 leprosy rates for CRS and the whole of Anambra were similar. However, leprosy in the eastern area of Anambra State, centred on Abakaliki, has most bearing on CRS, and this is examined.

Multidrug therapy for leprosy was introduced earlier in the Abakaliki area than any other area considered in this chapter; in 1978 for multibacillary cases and in 1984 for most paucibacillary cases. The effect has been a dramatic reduction in the numbers of registered patients since 1984 (Table 12.6, Fig 12.2).

Fig. 12.2
Abakaliki Leprosy Control Area - Total Registered Patients and New Cases 1972 - 91



(Source: Mile Four Hospital Reports 1986 to 1992)

TABLE 12.6

Leprosy Cases Under Treatment Organised from Mile Four Leprosy Hospital Abakaliki 1982 - 1991

Year	Total Registered Cases	New Cases
1982	4,563	not available
1983	4,268	230
1984	3,399	265
1985	2,371	294
1986	1,156	285
1987	872	290
1988	682	320
1989	715	371
1990	817	412
1991	962	413

(Source: Annual reports, unpublished, various years, Mile Four Hospital)

New cases are reported to have declined in the late 1970s, and reached a plateau in 1981. Although the numbers examined for leprosy in case-detection surveys tripled in 1986 over 1985, the number of new cases diagnosed did not increase suggesting a decline in incidence. The subsequent increase in new cases since 1988 is thought to be due to further expansion of case-finding activities, combined with a greater community awareness of the improved leprosy treatment, encouraging more and earlier self-reporting of cases from within the area and beyond.

Figure 9.3 has shown that with the implementation of MDT, the new case rate may rise at first, then remain stable for several years, before steadily declining over several decades.

The Abakaliki control area of Anambra State covers four Local Government Areas: their combined population and leprosy rates are compared with the two neighbouring LGAs of CRS (Table 12.7).

TABLE 12.7

Population and Leprosy in Neighbouring LGSs of Anambra and Cross River States 1986

	Abakaliki Control Area	Ogoja and Obubra
Population	1.17M	0.75M
Registered Cases	1,156	3,091
Registered Cases per 1,000	0.99	4.12
New Cases	285	139
New Case Rate Per 10,000	2.44	1.85

(Sources: Mile Four Hospital Report and CRS Ministry of Health Annual Report, both unpublished, 1986).

The much lower registered case rate in the Abakaliki area in 1986, compared to Ogoja and Obubra, is a result of the success of the earlier implementation of MDT. Chapter Eight has shown that the introduction of MDT in Ogoja in 1985 led to a rapid decline in the number of registered cases, to one tenth by 1991.

There is little migration from CRS into Anambra, but there is movement of Igbo people from congested areas of Anambra State into Ogoja in CRS, because of the availability of land. Are such migrants a likely source of leprosy transmission in CRS? The higher new case rates of leprosy in Abakaliki suggest this, but they are probably due to more active case finding than in the northern area of CRS rather than markedly higher incidence. It is reasonable to conclude that immigrants from the Abakaliki area are no more likely than local people to be a source of infection in CRS. The dramatic reduction in the number of patients under treatment in the Abakaliki area in the past decade indicates that there is effective leprosy control in the area, and it is unlikely to pose a threat to the control programme of the adjacent areas of CRS.

However the leprosy inspector for the northernmost area of Ogoja LGA believed that some Igbo cases were coming to CRS specifically for leprosy treatment to avoid the heavy stigmatisation of leprosy among their own people. Such reporting across state and LGA boundaries owing to stigma, may distort the pattern of distribution which registers reveal, and should be taken into account in the planning of control programmes.

IMO STATE

Imo State lies to the west of six LGAs in CRS; from north to south they are Obubra, Akampka, Ikono, Ikot Ekpene, Abak, and Ukanafun. The last three are occupied by Annang people, and a previous chapter shows that these areas recently had relatively high new case rates for leprosy, although the number of registered cases was low. Chapter Eight showed that Obubra and Akampka had moderate leprosy rates, close to the mean for the whole state. The true rates for Ikono were deduced to be higher than recorded, because of patients reporting outside the LGA due to poor control activity in the area.

The question is whether the moderate leprosy rates in the areas of CRS adjacent to Imo continue across the border. As there is regular cross-border movement in both directions especially to markets, untreated leprosy cases in Imo could provide a potential source of infection for CRS people.

Imo State is relatively small in area, but has a high population density, and is occupied, like Anambra, by Igbo people. It was in the heart of the former Eastern Region and the centre of much of the action throughout the Civil War. Chapter Six has shown that the area became well known for leprosy research and control in the 1940s and '50s, centred on the leprosy hospital at Uzuakoli during an epidemic of mild tuberculoid leprosy. A decline in the epidemic was reported even before the use of dapsone, which accelerated the decline, and by the early 1960s leprosy was reported to be well under control (Chaper Seven).

Before the Civil War Uzuakoli supervised treatment throughout the state in 111 clinics plus segregation villages (Dr. S. G. Browne, personal communication, 1985). The leprosy work was interrupted during the Civil War, since when it has been organised by the Ministry of Health in most of the state, with two voluntary agency hospitals, Uburu and Uzuakoli acting as referral centres. Officially there were 96 government leprosy clinics in 1986, and Uburu supervised the treatment at a further 25 rural clinics in two LGAs which border CRS, and has conducted case-finding surveys since the Civil War. Uzuakoli had no formal responsibility for rural out-patient clinics.

TABLE 12.8

Area, Population and Leprosy Rates in Imo State and CRS 1982

	Imo	CRS
Area (sq km)	10,675	28,361
Population	4.7M	5.7M
Registered Cases	5,906	8,313
Leprosy rate per 1,000	1.27	1.46
Rank	13	11

(Source: Declercq et al, 1989)

The intention of overseas voluntary agencies to facilitate the introduction of MDT in Imo led to a review of the State leprosy service in 1986 and 1987 by a team led by the senior leprologist at Uzuakoli.

It was already known that since the Civil War most leprosy patients in the State had not been examined by a leprosy doctor, that drug supplies had been irregular, and that disease complications had been left untreated. During the review an attempt was made to visit every listed leprosy clinic, except those supervised by Uburu, and to examine the registered patients (Ponniah and Longmore, 1987). Only fifty eight clinics could be traced and visited. 503 patients were examined, 326 (69 per cent) of whom were discharged. The report of the visits to the six LGAs bordering Cross River indicates severe neglect of leprosy control work:

> 'the previous health superintendent had not visited any of the clinics ...... it seemed none of the patients were receiving treatment .... the roads are very poor .... during the rainy season it is impossible for the patients to be seen .... there were no cards available .... nobody has been posted to those clinics .... inadequate registers and poor patient records .... most of the clinics have attendance figures well below the number of cases registered .... the paramedical worker was not present and no-one knew where he was .... one of the clinics had only one patient and she was discharged .... the health superintendent admitted to doing the journey between clinics as little as possible because of cost and difficulty '

The findings of this review cast doubt on the reliability of the official state figures, represented by those in Table 12.8. Table 12.9 summarises the findings of the review in the LGAs adjacent to CRS (Fig 12.3), comparing the number of cases confirmed to be receiving treatment with the numbers registered, and also gives the numbers of new cases from these LGAs reporting directly to Uzuakoli Hospital during 1986.

Fig. 12.3

Imo State - Local Government Areas 1986

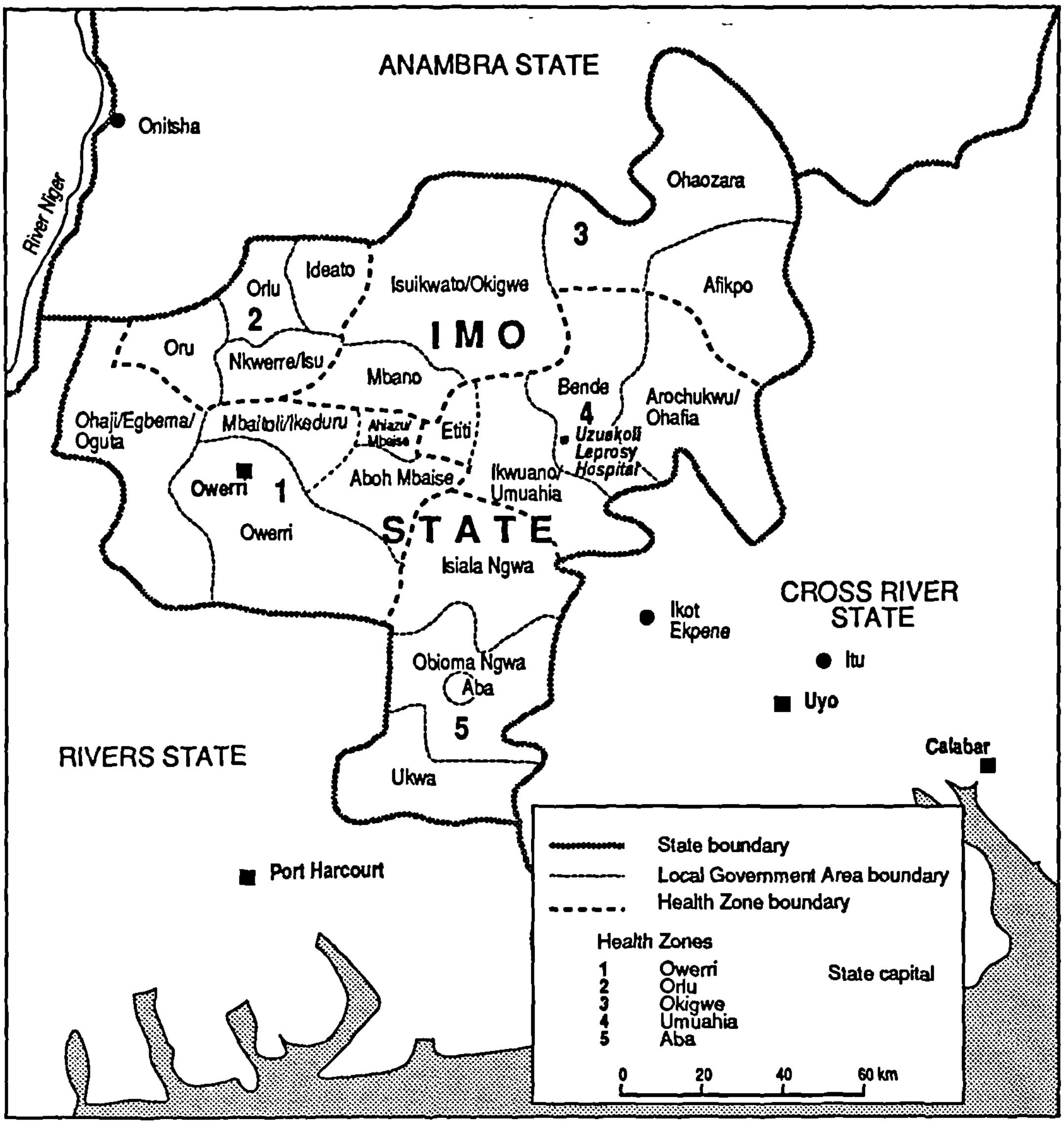


TABLE 12.9

Results of Leprosy Clinic Review, Imo State, 1986 and 1987

LGA	Registered Cases	Patients receiving treatment	New Cases
Umuahia	197	not known	8
Arochukwu	183	not known	5
Bende	552*	under 497	12
Isiala Ngwa	35	over 8	0
Obioma Ngwa	123	unknown	0
Ukwa	42	unknown	2

*includes Uzuakoli leprosy hospital

(Source: Ponniah and Longmore, 1987)

The review reported that the degree of neglect varied across the state, and the conclusion was that the number of registered patients was far in excess of those receiving regular treatment.

This does not necessarily mean that there is little leprosy in the state. The new cases from other parts of Imo which reported to Uzuakoli were all self-reporting, as there was no active case-finding, and may represent a hidden leprosy problem. Uburu reported 48 new cases in 1985, from the two LGAs of Ohaozara and Afikpo next to CRS. This is a new case rate of 0.77 per ten thousand, which is the same as the mean for the whole of CRS for 1986 (Chapter Nine), and slightly lower than the rate of 0.81 for neighbouring Obubra LGA.

Reports from Uburu in Table 12.10 show the changing patient numbers over the years, reflecting the effects of the wartime interruption of control activities, the 1970s recovery and case-finding, and the subsequent reduction probably resulting from effective control measures.

TABLE 12.10

Uburu Leprosy Control Centre: Registered Cases, Various Years 1966 to 1985

Year	Registered Cases
1966	1463
1967	2000
1970	300
1976	980
1980	651
1985	376

(Source: reports for Uburu, various years, unpublished)

While the overall leprosy situation for Imo State in the 1980s is unclear, the new cases reported for the areas adjacent to CRS show that the disease is still occurring. The inadequate control programme in Imo could be a threat to the future successful eradication of leprosy in CRS. In view of the mobility across the state border, the higher leprosy incidence rate and poor leprosy control in Imo may be a factor in the relatively high new case rates in the adjacent Annang areas and Ikono, which have been difficult to explain (Chapter Nine).

BENUE STATE

The eastern half of Benue State lies to the north of CRS, adjacent to the northern LGAs which had high leprosy rates in CRS during the mid-1980s. There is little population movement reported across this border. Did the high level of leprosy in northern CRS during the 1980s continue across the border into Benue, and are the recent well-organised control measures of northern CRS matched in Benue State? The quality of leprosy control in Benue could have an impact on the ultimate success of leprosy eradication in CRS.

According to the WHO (Declercq et al, 1989) Benue was ranked highest in Nigeria for leprosy numbers and rates in 1982, with 34,000 total cases (Table 12.11). The figures show that the leprosy rate in the adjacent Local Government Areas of Obudu and Ogoja in 1982, prior to the review of the registers and the subsequent implementation of MDT, was even higher than the Benue State rate.

TABLE 12.11

Area, Population and Leprosy Rates in Benue State and CRS 1982

	Benue	CRS	Obudu and Ogoja
Area (sq km)	74,339	28,361	5,082
Population	3.8M	5.7M	0.41M
Registered Cases	34,050	8,313	4,590
Leprosy rate per 1,000	8.96	1.46	11.17
Rank	1	11	-

(Sources: Declercq et al, 1989; Ministry of Health, Calabar, 1983)

There are further reports of high leprosy numbers in Benue State in 1988 and 1990 (Gelin et al, 1991)(Table 12.12). At a national leprosy meeting in 1988, the Benue Ministry of Health reported 29,700 patients being treated in 614 clinics and two leprosy hospitals (Aida, Benue State Leprosy Report, 1988, unpublished). This is a large decrease in numbers from 1982, but still represents a high a rate of leprosy. The 1990 figures reported by WHO (Gelin et al, 1991) showed a further reduction of registered cases to 19,600, with a prevalence rate reduced to 3.86, and Benue was ranked third in Nigeria.

TABLE 12.12

Benue State: Registered Cases of Leprosy Various Years

Year	Cases	Source
1982	34,050	WHO (Declercq et al, 1989)
1988	29,700	Aida, 1988
1990	19,600	WHO (Gelin et al, 1991)

It has not been possible to obtain an assessment of the reliability of the Benue State figures from anyone in the field. The 1990 WHO leprosy figures are known to be unreliable for other states of Nigeria. The 1988 Benue State Ministry report referred to above (Aida, 1988), complained of severe shortages of trained staff, transport, laboratory and field equipment, and drugs, which limited the effectiveness of the state leprosy programme. Such a weak leprosy control service is unlikely to have been capable of reducing the number of registered cases by over ten thousand between 1988 and 1990. Furthermore, the Annual Report from neighbouring Moniaya in CRS for 1990 stated:

> 'The people walk overnight from Benue State to reach our clinics in Northern Ogoja.'
> (p 3)

This also suggested inadequacies in the leprosy control service in Benue State.

There are two leprosy hospitals in Benue State, at Ochadamu in the western half, and Mkar in the eastern half which is north of Cross River State. A review of patients registered at the Mkar Hospital clinic in May 1991 reported that there were 477 patients in 1990, the number had hardly changed since 1988 (Table 12.13), and the number of new cases remained high. A striking feature is the high multibacillary rate in both registered and new cases. There is no report of the estimated population served by the hospital, and therefore no rates can be calculated.

Without data for the individual LGAs of Benue it is impossible to identify the pattern of leprosy distribution within the state. Unless the reported figures are greatly inflated above the true figure, they suggest that there is a continuation of high rates across the border from the northern part of CRS. High rates and/or a poorly functioning control service mean that there is a potential problem of leprosy being transmitted in CRS by infected people involved in cross-border movement, however slight. This potential is increased by the high multibacillary case rate, reported from the review at Mkar.

TABLE 12.13

Mkar Hospital, Registered and New Leprosy Cases, 1988 - 1990

	1988	1989	1990
REGISTERED			
Paucibacillary	128	79	70
Multibacillary	338	409	407
TOTAL	466	488	477
NEW CASES			
Paucibacillary	84	64	53
Multibacillary	69	65	68
TOTAL	153	129	121

(Source: Netherlands Leprosy Relief Association, Consultancy Report, Annex 6, unpublished, 1991)

CONCLUSIONS

Analysis of reported leprosy rates and an assessment of the level of leprosy control in the areas adjacent to CRS allow tentative conclusions to be reached which fall into two categories: the relationship of leprosy rates in CRS with the rates in adjacent areas, and the potential impact of leprosy transmission in these areas on the success of the control programme in CRS.

The available evidence points to similar leprosy rates continuing from CRS across the borders into the Cameroun Republic and Anambra and Benue States. However, to the south west of CRS, in the States of Rivers and Imo, the poor recovery of leprosy services since the Civil War has resulted in a lack of data, and a continuation of similar leprosy rates across the borders cannot be demonstrated.

The data available and the high level of leprosy control in South West Province of Cameroun and Anambra State suggest that there is no greater risk of leprosy transmission in CRS from the movement of people across these borders. Both regions have active leprosy programmes which are implementing MDT, comparable with the adjacent areas of CRS.

The reports of high rates of leprosy in Benue State, and the poorly resourced control programme there, give cause for concern for the long term effectiveness of leprosy control in northern CRS, although there is limited population movement across the border. Similarly, Rivers and Imo States, both of which once had very high leprosy rates, and which now have poor leprosy control services pose a potential threat to successful control in CRS, especially because of the high degree of mobility across these borders.

Senior leprosy control staff in the states of CRS, Anambra, Imo and Rivers are linked through regular meetings of the Leprosy Advisory and Co-ordinating Committee (LACC) for the eastern zone of Nigeria, and are therefore able to register, if not address, the issue of poor leprosy control within the zone, and its implications for the member states. But there is no formal or informal mechanism for co-ordination of leprosy control in the larger region which includes Benue State and the Cameroun Republic.

Waddy showed in 1958 that

> 'disease, both epidemic and endemic, does not pause at the artificial political frontiers of West Africa, and that international co-operation is necessary if it is to be combatted successfully.'
> p 107

This chapter and previous ones have shown that MDT implementation is proceeding at different rates in different areas of CRS and Nigeria. At the present stage of transition to universal implementation of MDT, there is a potential risk of leprosy transmission by people from areas of poor control moving across borders into areas where leprosy is successfully under control. This potential risk emphasises the need for a co-ordinated, universal and speedy implementation of MDT in all leprosy-endemic areas, if eradication is to be achieved in the not too distant future.

CHAPTER THIRTEEN

CONCLUSION

REVIEW OF FINDINGS

Globally leprosy remains a particular problem in its original endemic areas of India and tropical Africa, and also in parts of Latin America, all of which coincide with the economically poorest areas of the world. The study has shown that active transmission is continuing in the study region even after more than sixty years of attempts at control and more than forty years of modern therapy. It occurs against a background of a population also suffering from poor nutrition and frequent ill-health with multiple infections.

The most striking feature of the spatial pattern of known leprosy in the region is the north-south contrast, with low leprosy rates and small numbers of cases in the southern Local Government Areas (LGAs), and very high rates and large numbers of cases in the north. In the mid-1980s the registered case rate in Obudu in the north was a hundred times higher than in Eket in the south. Even after the successful reduction in the number of registered cases in the north, due to the introduction of new treatment regimens and a review of registers, a large number of new cases has continued to present. Until this shows a steady decline, it is too early to say that leprosy is under control (ILEP, 1992).

In finer detail it is possible to identify four areas of the region with different leprosy profiles which may signal different endemicity. These are:

1 The northern three LGAs with recently reduced registered rates due to MDT implementation, but continuing high incidence rates,

2 The middle areas with only moderate registered and incidence rates, perhaps due to dapsone treatment over a long period and/or increasing resistance in the population,

3 The north west Mainland, where the high registered rates of the pre-Civil War period have decreased, but the decline in incidence is lagging behind,

4 The south east Mainland, which has low registered and incidence rates, and where leprosy may be close to eradication.

Explanations offered for this spatial variation hinge on the relatively greater poverty and later opening up of the northern part of the region. It remains economically peripheral to the south, with a narrower economic base, and leprosy control measures were introduced twenty years later. It may also have been exposed to leprosy later, which could also help to account for the higher leprosy rates, if resistance to the infection is still being built up in the population (May, 1958).

The earlier introduction of leprosy control measures in the south led to an early decline of the disease, which was subsequently accelerated by the introduction of dapsone in 1950. Even before the introduction of the more recent treatment regimens, the extremely low rates in the south east of the Mainland by the 1980s, suggest that leprosy is almost eradicated there. In Oron there may no longer be endemic leprosy; the sporadic cases may have been infected elsewhere. In adjacent areas of the Mainland it is likely that the Civil War delayed progress in leprosy control, but this does not fully explain the difference in rates because leprosy was already more prevalent in at least some of those areas before the Civil War. An explanation for the variation in the Mainland area remains elusive. Therefore, although the spatial approach has succeeded in identifying variations in known leprosy prevalence and incidence, which can provide pointers for health care action, the explanations for them remain speculative and inconclusive.

The main features of the epidemiology of leprosy throughout the region are the high child rates, especially in the north, the equal gender ratio, and the high paucibacillary rate. The last is typical for Africa and for dark skinned people. The high child rates indicate active transmission, and suggest that the home is a significant source of infection, even though few cases in the south reported known family contacts.

The equal gender ratio, which is not universal, supports the theory of a similar male and female inherent susceptibility to leprosy, which similar male/female rates in children here and elsewhere also support. It also suggests that there is similar exposure to the risk of leprosy infection for men and women in the study region. This may be due to the similar levels of mobility outside the home, which is not found in the regions of the world where women have less leprosy. The large disparity in the in-patient gender ratio, with many more males admitted to leprosy hospitals, results from socio-economic factors, as there was little evidence of more severe leprosy in men.

The study has shown that leprosy is still feared in the region, especially among the Annang people in the south. The adverse attitudes lead to social and economic problems for many individual patients. They have an impact on control operations through concealment of leprosy and high defaulting rates, obscuring true case rates and assisting disease transmission. The role of stigma in perpetuating the leprosy problem in the region should not be underestimated. Nevertheless, it has been shown that changes in leprosy treatment, with the availability of increasingly effective therapy, have been followed by an improvement in attitudes and a gradual erosion of the stigma.

IMPLICATIONS FOR LEPROSY CONTROL

High child rates in the region permit the prediction of a continuing incidence of leprosy into the next century, because of the long incubation period. They emphasise the need for continued vigilance even after the reduction of the total case-load through MDT.

The spatial variations in leprosy rates suggest that there are different areas of the region requiring special priorities from the leprosy service:

1 The 3 LGAs of the north, with continuing high new case rates,

2 LGAs where leprosy rates are probably higher than reported:

   (a) Akampka and Odukpani,

   (b) The south west,

3 The south east where isolated foci of leprosy persist.

1 The priority in the north, where the caseload was successfully reduced in the 1980s through MDT, should be to consolidate the achievements, and aim for an eventual reduction in the new case rate. This should be through education and active casefinding, especially through contact tracing. This should prevent disability by early treatment, and reduce the pool of infection and therefore cut further transmission. Meanwhile it has to be recognised that new cases will present for several years, representing persons infected in the past, and resources must therefore be provided to maintain vigilance.

2 Information on cases of leprosy depends on the health care service to provide diagnosis and treatment, and to maintain records. This study has shown that the variable quality of the service has to be taken into account in interpreting the spatial pattern of reported leprosy.

(a) The low rates of known leprosy in the central part of the region, in Akampka and Odukpani LGAs, can be interpreted as a result of the inadequate leprosy service rather than true low leprosy rates. The small number of cases registered locally, compared with the number from here who attend for treatment in Calabar, points to a likely pool of untreated cases and indicates an urgent need for additional resources to be allocated for leprosy control in these areas. It is acknowledged that Akampka and Odukpani are particularly poor and inaccessible, and that resourcing the leprosy service there has high costs, but the overall prospects for eradication in the region depends on control throughout.

(b) There is also the need for an improvement in the leprosy service in the five LGAs of the Mainland which had higher new case rates than the adjacent areas to the south and east. Patients reported outside the LGAs, to the leprosy hospital, due to inadequate facilities locally. Location of the residence of all new cases reporting to the hospital from these LGAs would be the first step in determining where treatment facilities should be provided, to encourage early voluntary reporting.

3 The isolated occurrence of new cases in those southeastern LGAs close to eradication gives no cause for complacency, but indicates the possibility of transmission continuing indefinitely. Early detection and treatment should be a priority, achieved through examination of contacts.

The existence of stigma against leprosy in all sectors of society needs to be acknowledged and taken into account in planning leprosy control. It helps to explain the lack of political will to tackle the leprosy problem, the shortage of resources provided, and the lack of Nigerian doctors willing to work in the field. Control programmes should include health education as an obvious strategy to address the problem of stigma. Appropriate education needs to be aimed at health professionals in their training (McDougall, 1986), as well as the public.

Information about the causes and symptoms of leprosy should also be aimed at Traditional Medical Practitioners (TMPs). Biomedicine is too expensive and inaccessible for most rural Africans, who find most of their health care needs met by indigenous medicine. A number of patients in the Mainland area reported consulting TMPs in the early stages of their disease, who had been unable to recognise leprosy, therefore causing delays in diagnosis and treatment. It is widely acknowledged that Traditional Medicine is unable to cure leprosy, but it is proposed here that TMPs should be taken into account in leprosy programmes, and trained to recognise leprosy symptoms in order to refer cases to the leprosy service. This accords with the stated policies of the Nigerian Government, and with WHO recommendations for greater integration of indigenous and biomedical systems if the rural poor of the developing world are to benefit from 'Health for All by 2000'.

There is much controversy over the issue of integration (Velimirovic, 1992), and in Nigeria it has hardly begun. Joseph and Phillips (1984) have discussed a potential role for medical geographers in the investigation of utilisation patterns of traditional medicine and its incorporation in national health care. A local pilot study on the training of TMPs in the region to recognise and refer leprosy cases could provide a useful model for the integration of other health sectors, while promoting the earlier detection of leprosy cases.

As well as spatial variation in leprosy rates, it has already been shown that there were variations in the quality of the leprosy service. This was largely the result of whether the source of provision was a voluntary agency or the Government alone. The close co-operation between voluntary agencies and Government in leprosy control in the region has a long and successful history. Three international voluntary organisations have provided resources in different measure to several parts of the region. Others parts have been entirely dependent on government funding, and have suffered shortages which have been especially serious with the higher cost of multidrug therapy.

These inequalities need to be recognised and addressed, by Government and voluntary organisations, especially as they are being exacerbated by externally imposed Structural Adjustment Programmes which have increasingly limited Government expenditure on health, here and elsewhere (Weil et al, 1990). There is therefore an increasing role for support from international organisations for the leprosy service in leprosy-endemic debtor countries, especially in Africa.

The study has shown the damaging effects of the Nigerian Civil War on the leprosy service in the former Eastern Region, in which there had been justifiable optimism in the early 1960s. The shortage of resources for leprosy control after the war compounded the effects of the suspension of treatment during the conflict. The loss of control shows the necessity of sustained action in the fight against leprosy, and points to the need for special attention to the status of leprosy in other endemic regions affected by conflict. Uganda comes to mind; discussions have already been held by the author with medical personnel in Uganda, and an invitation has been extended to investigate the leprosy situation there in the context of the prolonged conflict of the 1980s.

SCOPE OF THE STUDY AND FURTHER RESEARCH

The large scale of this study, in spatial and historical terms, presented certain advantages and disadvantages, and may require justification. The fact that the region was part of the former Eastern Region of Nigeria, which had prominence in Africa in the field of leprosy research and control for forty years, provided a unique background and source of historical data. The subsequent silence in the literature, caused by the Civil War, required a review of the whole period, to attempt to explain the persistence of leprosy. The single administrative region of the former Cross River State in the 1970s and 1980s provided data which showed the large and intriguing disparities in leprosy rates which were the basis for the study.

Although it is fairly uniform in its broad human and physical geography, the region is large enough to have experienced variation in economic development and in the history of leprosy treatment, and this variation provided pointers to the explanation for the disparities in leprosy. However, the size of the region meant that it was impossible to focus equally on all areas during fieldwork, and some were relatively neglected; but most attention was given to the Mainland, now Akwa Ibom State.

Some of the issues for further investigation are suggested here. They vary in scale from the local to the regional, and in time from the cross-sectional to the longitudinal. They fall under the headings of epidemiological, ecological and sociological, and include the two medical geography traditions of disease ecology and health care.

A cross-sectional study of all new cases diagnosed in a year in a selected area, say the new State of Akwa Ibom, using a computer data base, would provide information which would be valuable in local health care planning, and in broader research on the transmission and aetiology of leprosy. If the study could be a longitudinal one, the data would show the spatial and epidemiological characteristics of the decline of the disease in the population, and provide a comparison with other areas. The number of cases would probably be approximately 200, and the study is therefore feasible.

Many unanswered questions remain on the ecology of leprosy, which is generally believed to be a two factor disease according to Jacques May's analysis, and direct person to person transmission has always been assumed. Eventually it may be found to be less simple than this, because *M. leprae* has never been cultivated *in vitro*, and does not fulfil Koch's postulates for the bacillus to be recognised as the cause of the disease.

So far it has been impossible to unequivocally prove either a third factor in the disease or extra-human sources of the bacillus, but the many cases with no known contacts support the increasingly reported view that there are zootic and/or environmental sources of leprosy infection. The Armadillo has already been implicated as a source for human infection in Texas and Louisiana, and leprosy infection has been found in two primate species indigenous to West Africa (Meyers et al, 1992). It is unlikely that the latter could account for many, if any, cases in the study region, but no work has been done to investigate this assumption. As the ultimate eradication of human leprosy would have to take into account potential animal reservoirs, there is a justification for surveys of zootic leprosy in the habitats of the mangabey monkey and chimpanzee in the study region.

The possibility of environmental sources of *M. leprae* in soil and vegetation should not be overlooked. Research strongly suggests that *M. leprae* has been found in sphagnum moss in Norway, and in soil and water in Bombay (Irgens, 1981; Kazda et al, 1986). The present study suggests that areas suitable for the investigation of evidence of *M. leprae* in the environment should include those parts of Eket and Ikot Abasi Local Government Areas where leprosy remains only in limited foci.

There is a question whether the people in the areas of continuing high new case rates have a different immune status from those in other areas of the region, due, for example, to nutritional factors or mobility patterns or exposure to specific environmental mycobacteria. There has been increased interest in environmental mycobacteria and their potential ability to influence a person's immune response on subsequent encounters with leprosy bacilli (Grange, 1991). The study area lends itself to a comparative investigation of the characteristic environmental mycobacteria in the areas of contrasting leprosy endemicity in the north and south.

It is acknowledged that such ecological research, on zootic leprosy and environmental sources of mycobacteria and their immunological impact, is beyond the scope of the medical geographer working within the discipline, and requires collaboration with biological and medical scientists.

The role of stigma has been shown to be profound in the region, and caused ethical problems preventing the examination of the home environment of patients, which limited the scope of this study. An understanding of the cultural basis of the attitudes to leprosy in different ethnic groups could lay the foundations for an educational programme to reduce the stigma. A study of patient beliefs about causes of their own illness, and how such beliefs affect health care behaviour, may lead to strategies which would help to prevent concealment of symptoms in the early stages of the leprosy, and defaulting after the start of treatment.

Such studies should take into account gender factors to discover, for instance, the characteristics which lead more male patients to seek treatment as in-patients, and to default. An understanding of gender differences in patient behaviour would help the leprosy service to make optimum use of resources, through targeting. Women may be especially important in leprosy transmission due to their greater contact with children. There is also scope to examine the specific ways in which leprosy affects women in the region, medically and socially; such studies on women and tropical diseases have recently been promoted (WHO, 1992; Wijeyaratne et al, 1992).

The problem of defaulting from leprosy treatment in the region is serious and is partly due to stigma, but has been aggravated by the economic hardship of patients who are unable to afford the transport to attend clinics. There is a need for investigation into the relationships between social and economic factors in defaulting, and on the impact of Structural Adjustment Programmes on leprosy control in general.

Spatial studies alone are inadequate, and further perspectives from, for example, social anthropology are needed to investigate the issues of gender, stigma and health care behaviour.

HIV/AIDS

The HIV/AIDS pandemic has direct relevance for leprosy. It has extended the research being conducted on the immune system, which is likely to increase the understanding of the human response to *M. leprae*. The reports that HIV increases the patient's susceptibility to opportunistic infections which include *M. tuberculosis* and environmental mycobacteria, have increased the interest and research on mycobacteria as a serious cause of human illness (Grange, 1991), and is likely to increase the knowledge about *M. leprae*.

Because HIV is a major risk factor for tuberculosis, concern has been expressed about its potential effect on increased incidence of leprosy, increased prevalence of multibacillary leprosy, and downgrading from paucibacillary to multibacillary leprosy. Little work has yet been reported, but initial results from Malawi and Zambia suggest that the picture is not as bleak as was feared. The long incubation of leprosy may be an advantage; HIV/AIDS patients succumb earlier to infections which have a faster multiplication rate. However there is some evidence to suggest that cured leprosy patients who are HIV positive may be at greater risk of relapse. The sample studied so far is small, but vigilance is advised (Ponnighaus et al, 1991; Fine, 1992).

Meanwhile, HIV transmission is a risk during the slit-skin smear test procedure carried out in the bacteriological assessment of a leprosy patient, and strict guidelines have been recommended to protect patients and operators (WHO 1987, cited in *Leprosy Review* Vol 58 207-8).

Low rates of HIV/AIDS have been reported in Nigeria compared with certain other areas of Africa, but increasing incidence of HIV in new cases of leprosy has been reported in the north of the study region, allegedly imported from Cameroun, (Moniaya Hospital Annual Report, 1991). The recently combined TB/Leprosy control programme in the region may now need to test for HIV in its own patients, although this presents a costly challenge. The special geographical contribution to such a study could be in identifying the source of HIV infection, and tracing and predicting the pattern of its diffusion through the population in the region.

A longitudinal study to monitor the bacillary status of leprosy patients, diagnosed as HIV positive either before or during leprosy treatment, would provide insights into the interaction between the two infections and suggest guidelines for a treatment and surveillance policy. Since it is HIV II which occurs in Nigeria, unlike Central and East Africa with HIV I, such a study would complement the large scale LEPRA project in Malawi.

Economically and clinically HIV may yet prove to be a problem for the eradication of leprosy in that it may divert funding from leprosy research and control (Lucas 1993).

DECLINE AND ELIMINATION OF LEPROSY

The improvements in leprosy treatment in the past decade have led to a re-evaluation of the global leprosy problem, and the adoption of a resolution for its elimination. For two decades until the mid-1980s the global estimate of the number of leprosy cases was between 10 and 12 million. For 1991 this was revised downward to 5.5 million (Noordeen et al, 1992).

On the surface the new estimate is encouraging, but its significance requires comment. With the introduction of shorter course MDT, a case of leprosy has been re-defined to refer only to a case with clinical symptoms requiring chemotherapy (WHO, 1988a). Therefore the new estimate includes cases receiving treatment and those not yet diagnosed, but excludes cured cases which previous estimates would have included because of life time treatment. The reduction of registered leprosy cases which led to the revised estimate resulted from a combination of the shorter treatment, the elimination of names of inactive cases which had not already been discharged, and the late effects of treatment with dapsone. The decrease in the number of registered cases is therefore an administrative artefact, and is not a decrease in the true incidence or true prevalence of leprosy (Fine, 1992).

The reduced registered case figures and the reduced global estimate based on them should not be misinterpreted as victory in the fight against leprosy; this could lead to complacency and reduced funding for leprosy control, especially in the countries most affected and with fewest resources.

In May 1991 the World Health Assembly adopted a resolution (WHA44.9)

> '... committing WHO to the goal of global elimination ofleprosy as a public health problem by the year 2000, defining elimination as the reduction of prevalence below one case per 10,000 population.'
> (Weekly Epidemiological Record, May 1992, p 160)

The prospect of elimination is exciting, but what does it mean and how great is the challenge? The definition poses certain problems: the commitment is not to eradication, nor even to the reduction of incidence. The total global population is used as the denominator for the calculation of the target prevalence, but this creates a distortion because of the very uneven geographical distribution of leprosy. If 'elimination' using this criterion is achieved, it could still leave heavily populated endemic countries like India and Nigeria with large numbers of leprosy cases. For any elimination/eradication goal to be realistic it should address the geographical distribution of the disease.

It has already been shown that the reduction of registered prevalence has been attained by the introduction of shorter course therapy. With the possible introduction in future of a one month regimen to replace the six/twenty four month regimens now recommended, the registered cases on treatment would soon be reduced to less than one sixth. The 1993 world prevalence rate of 7 per 10,000 could therefore be cut to 1 per 10,000, and the 'elimination' target could thus be achieved. But the number of new cases requiring diagnosis and treatment would not necessarily decrease. ILEP (1992), has commented on the significance of new case figures and has stated

> 'until this figure shows steady decline, it is too early to say that leprosy has been brought under control.'
> (p 376)

The WHO target is therefore misleading. If it is achieved it will not change the status of leprosy very much. If it is not achieved, how will the failure be regarded, who will be responsible, and how will it affect morale among fieldworkers?

The WHO places heavy emphasis on MDT as a 'robust technology' in its recent statements on the goal of elimination. The value of MDT is not disputed here, indeed, every leprosy patient deserves this therapy (Yuasa, 1991). But the emphasis ignores two important facts. One is that there has been no indication that a declining incidence of leprosy inevitably occurs with the implementation of MDT alone. It has not happened yet in the north of the study area, nor in India where data were examined after MDT campaigns operating for over eight years (Gupte, 1992). The second fact is that leprosy had been decreasing in developed and less developed countries prior to MDT (Berhe et al, 1990; Feenstra, 1992; Fine, 1992) and this study has shown that leprosy began to decline in the area even before dapsone monotherapy was available.

Where the decline of leprosy incidence has coincided with the implementation of MDT, as reported from some areas, it may also be accounted for by other factors operating, such as social and economic improvements. Fine (1992) goes so far as to say that:

> 'In fact there is little, if any, evidence that treatment of leprosy cases has ever been responsible for declines in incidence in any country in the world. On the other hand, we are all aware of evidence that leprosy incidence declines with improving socio-economic standards - although whether the responsible factor is soap, or nutrition, or living conditions, or crowding, or clothing, or intercurrent infections, no one knows.'
> (p 75)

In spite of its long history, the early identification of the pathogen and the existence of an effective cure, the aetiology of leprosy remains as obscure as when Jacques May (1958) described it as a:

> '... baffling disease, for nothing - whether in relation to agent, host, or culture - really explains satisfactorily the geographical pattern of occurrence.'
> (p 151).

It may be that leprosy will be eradicated before the secret of its aetiology is detected. Its eradication from some parts of the world provides hope that global eradication may eventually be achieved. If leprosy is a two factor disease like smallpox, it is even more probable. But the timescale is longer than for smallpox because of the long incubation period, and is likely to extend well beyond the end of the century. It may be that drugs alone will never achieve eradication, and it will await the socio-economic improvements which caused its disappearance from the developed world.

Meanwhile, in the absence of obvious indications of significant economic development in leprosy endemic countries like Nigeria, the urgent task is to combine the efforts of medical and social scientists to ensure that every leprosy patient receives the best possible treatment as soon as possible to reduce the level of physical and psychological suffering.

This conclusion reviews the findings of the study, and discusses their implications for the control of leprosy in the region and the prospects for its eradication. The scale and scope of the study are reviewed and suggestions made for further research related to the problem of leprosy in the region and elsewhere. The

HIV/AIDS pandemic has emerged during the period of study, and its implications for leprosy are examined. During the course of this study there have been significant developments in the treatment of leprosy and a major revision of the WHO estimate of the world leprosy problem. This revision, and the recent WHO policy statements on leprosy are considered in the light of findings in the study region.

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APPENDIX I

Questionnaires used in Fieldwork

NON - PATIENTS

SURVEY OF ATTITUDES TO SERIOUS DISEASES

Please answer the following questions. Do not give people's names.

I. Name the four worst diseases.

(a) .... (b) ....

(c) .... (d) ....

II. Give the reasons why you think each is very serious.

(a) ....

(b) ....

(c) ....

(d) ....

III. Do you know anyone who has had these diseases?

(Yes or No) (a) .... (b) ....

(c) .... (c) ....

IV. Who have you known? (Friend, neighbour, close relative, distant relative, classmate. No Names)

(a) .... (b) ....

(c) .... (d) ....

V. Do you know anyone who has had leprosy?

(Yes or No) ....

VI. Who? (No Names) ....

VII. Do you know anyone who has had mental disorder?

(Yes or No) ....

VIII. Who? (No Names) ....

NON - PATIENTS

LEPROSY QUESTIONNAIRE

1. Your ethnic group/ clan ....
2. Your religion ....
3. a) Your age group................b) male or female..........
4. Standard of education ....
5. Occupation ....
6. Place of residence now ....
7. Have you ever known anyone suffering from leprosy?
   a) close relative...... b) close neighbour......c) distant person...... d) no one......
8. How does leprosy look? ....
   ....
9. Would you be willing to befriend a person who is being treated for leprosy? a) of oourse.......b) definitely not........
   c) not sure..........
10. Leprosy is caused by a) dirty surroundings......B) insect bites....
   c) polluted water......d) bad food.......e) living close to animals......f) a germ in the body.......g) unlawful behaviour......
   h) witchcraft.......i) close contact with a leprosy sufferer........
11. Do you think <u>you</u> could catch leprosy from another person? a) easily..
   b) only with close and prolonged contact.....c) I could never catch it.......d) don't know........
12. Leprosy can be cured a) in one week.......b) in one month..........
   c) in 6 months........d) in one year.......e) in two years..........
   f) in 10 years........g) never.............h) don't know............
13. How many people may have leprosy in Cross River State?
   a) less than 100.....b) several hundred.......c) several thousand....
   d) a million.........e) don't know............
14. "Leprosy sufferers usually die of some other disease, not leprosy".
   a) true.........b) false.........c) don't know...........
15. What else do you know about leprosy in Nigeria, past or present?
   ....
   ....
   ....

M.I.B. 1987.

GUIDELINES FOR SURVEY OF COMMUNITY CHIEFS BY RESEARCH ASSISTANTS (a)

ENVIRONMENT.

1. Name of ethnic group? and language?

2. Name of village and district?

3. Vegetation of Area?

4. Staple diet - garri or yam etc.?

5. Main protein - fish or meat?

6. Nearest periodic market?

   Name
   Distance from village
   Frequency
   Day
   History of market - old or new, area served
   by market - how large?

7. Routes - main routes from village - where to?

   - By road or river
     Old or recent
     Draw simple map or plan with village in centre.

8. Main occupations of village population

9. Presence of clinic/dispensary/pharmacy/ - in village? Private / govt

   or distance to nearest one?

   Where is it? (Name the place)

10. Is anyone in the village known to be or thought
    to be suffering from TB? How Many?

11. Ask village head the population of the village/Community.

GUIDELINES FOR SURVEY OF COMMUNITY CHIEFS BY RESEARCH ASSISTANTS (b)

LEPROSY

1. List words used for leprosy in local language and their English translation (name it)

   List words used for leprosy sufferers in local language and their English translation (for example, nicknames)

2. How were leprosy sufferers treated socially in traditional times?

   Isolation - how?

   water supply
   sleeping
   marrying
   burying
   Feeding

3. How would leprosy sufferers be treated socially today? fear? shame?

   Isolation?

4. What are the local beliefs on the causes of leprosy?

5. How do people recognise leprosy?

6. How long has leprosy been known in the district?

7. Are any people native to the village known to have suffered from leprosy in the past? Give numbers for each group.

	1-16 years	16-40 years	40 + years
Males			
Females			

8. .... Presently suffering from leprosy. Give numbers for each group.

	1-16 years	16-40 years	40 + years
Males			
Females			

9. Where would people go first for leprosy treatment?

   a) clinic (name) or
   b) hospital (name) or

   c) Local native doctor

10. If native doctor can be interviewed:

    (a) how does he recognise leprosy?
    (b) what treatment?
    (c) Are there different treatments for different forms of leprosy?
    (d) what causes leprosy?

11. How many km. to nearest leprosy clinic (Name it)

12. Where is the nearest leprosy hospital. (Name it)

ADULT OUT-PATIENT SURVEY (ACTIVE CASES)

Serial No: ....   Date: ....

Clinic: ....

Clan Group: ....

Sex: M .... F ....

Age: 0-15 ... 16-25 ... 26-40 ... Over 40 ...

School Education: None ... Primary School ... Secondary School ...
Higher ... Other ...

Case: TT ... BT ... B ... BL ... LL ...

No. of Deformities: ....

Treatment: Monotherapy ....
Pauci MDT ....
Multi MDT .....

Period of Treatment: Up to 6 Months .....
Up to 2 Years .....
Up to 5 Years .....
Over 5 Years .....

Ever Defaulted: Yes ... No ...

Relatives Receiving Leprosy Treatment:

None ..... Parent ..... Brother/Sister ..... Child .....
Other .....

Living in Own Village: Yes ..... No .....

Why Not:

Present Work: Farming/Fishing ..... Trading ..... Skilled Craft .....
White Collar ..... None .....

Work Before Suffering Leprosy: .....

Effect of Leprosy on Income: No change ..... Reduced ..... Increased .....

Married State before Leprosy:

Married ..... Single ..... Divorced .....

Married State Now:

No change	....
Wife/Husband has left	....
Wife/Husband has sent me away	....
Husband has taken another wife	....
Husband/Wife is sending me for treatment	....
Husband/Wife does not know of my leprosy	....

Any Friends or Relatives you know to be suffering from Leprosy but not

Receiving Treatment: Yes ..... No .....

What will you advise them:

Do you know how this disease is caused

Supernatural	....
Poor living conditions	....
Contact with Leprosy sufferers	....
Germs	....
Don't know	....

Do you agree that Leprosy is curable

Yes ..... No .... Partly ... Don't Know ...

Length of delay between Leprosy onset and receiving treatment

Up to 6 months ..... 6 months to 1 year ....
1 - 2 years .... 2 - 4 years ....
over 4 years ....

Reasons for delay

Belief in self-healing	....
Ignorance it was leprosy	....
Native treatment	....
Ignorance there was cure	....
No access to treatment	....

Do people know you have leprosy?

Close family yes ... no ... Other relations yes ... no ...
Any other people yes ... no ...

M I Brightmer
December 1987

IN-PATIENT SURVEY

Patient Name/Number .... Date: ....

Any Relatives as I-P: Parent .... Brother/Sister .... Child ....
Other ....

Any Relatives as O-P: Parent ... Brother/Sister .... Child ....
Other ....

Number in I-P Family Group: 2 ... 3 ... 4 ... 5 ... 6 ...

Sex: M ... F ... Status: Married ... Single ... Divorced ...

Age: 0-15 ... 16-25 ... 26-40 ... Over 40 ...

School Education: None ... Primary School ... Secondary School ...
Higher ... Other ...

Place: Ward ... Compound Ward ... Compound ... Village ...

Case: TT ... BT ... B ... BL ... LL ... RFT ... No Leprosy ...

No. of Deformities: ....

When Diagnosed:
In last 6 months ....
In last 2 years ....
In last 5 years ....
Over 5 years ....

Type of Present Treatment: Duration:
Monotherapy ....
Pauci MDT ....
Multi MDT ....
None ....

Ever Defaulted: Yes ... No ...

Date of this Admission as I-P: ....

Duration of Stay:
Up to 1 week ....
Up to 1 month ....
Up to 1 year ....
Up to 5 years ....
Over 5 years ....

Is this the first admission: Yes ... No ...

When first admitted: ....

Reason for seeking this I-P admission:
Newly Diagnosed ....
ENL ....
Ulcer ....
Surgery ....
Artificial Limb ....
Pregnancy ....
Other ....

Any delay in reporting for admission:
None ....
Up to 1 month ....
Over 1 month ....
Upto 1 year ....

Reasons for Delay
Did not know where to come ....
Farm or Family commitments ....
Afraid of People knowing ....
No leave due ....
No money ....

Expected duration of stay:
Up to 1 week ... More ... Up to 1 month ... More ...
Up to 1 year ... More ...

Method of Feeding:
Self ... Relation ... Hospital Allowance ... Central ...

Source of Financial Support:
Own work at home ... Paid work at Hospital (Specify) ...
Relations ... Church ... Miscellaneous Gifts ...
None ...

Expected Financial Support on Discharge:
Own Work ... Relations ... None ...

Place of Residence when discharged: ....

Leprosy Clinic to be attended on discharge: ....

M I Brightmore
December 1987

APPENDIX II

Documents used for official data collection

MINISTRY OF HEALTH CROSS RIVER STATE LEPROSY SERVICE

UNICEF STATISTICAL RETURN FOR QUARTER|YEAR|ENDING

MH|LCS/5

Local Government Area	No. of Leprosy Clinics	No. of Leprosy Settlements	No. of Patients at Beginning of Period	New Patients Admitted	Newly Registered Patients				Patients Remove From Register					No. of Patients at end of Period
					Transfered in	Released re- Admitted	Defaulters re- Admitted	TOTAL	Discharged	Tranfered Out	Deaths	Defaulters	TOTAL	
Abak														
Akamkpa														
Calabar Municipality														
Eket														
Etinan														
Ikom														
Ikono														
Ikot Abasi														
Ikot Ekpene														
Itu														
Obubra														
Obudu														
Odukpani														
Ogoja														
Oron														
Ukanafun														
Uyo														

MINISTRY OF HEALTH
CROSS RIVER STATE RURAL HEALTH SERVICES

..............................HOSPITAL/CLINIC

LEPROSY INSPECTOR'S MONTHLY REPORT

Month of ...., 19...

GPC L 312

CLINIC: AGE GROUP	Under 15Yrs				Above 15Yrs				Total at End of
CLASSIFATION	PB		MB		PB		MB		
SEX	M	F	M	F	M	F	M	F	MONTH
Number of patients on treatment at end of last month									
Less: Discharge during month									
Defaulters during month..									
Deaths during month									
Transfers ..									
Plus: New Patients during month ..									
Re-admissions during month:-	-	-	-	-	-	-	-	-	-
(a) Relapses ..									
(b) Defaulters									
(c) Transfers									
Total at end of month									
New Patients Adults: Lepromatous .									
Tuberculoid .									
Borderline .									
Indeterminate ..									
Children: Lepromatous ..									
Tuberculoid ..									
Borderline									
Indeterminate ..									
TOTAL									
Total out-Patients at end of month									
Total In-Patients at end of month									
Contacts examined ..									
Persons Placed on Observation									
Defaulters:									
(a) Tuberculoid .									
(b) Lepromatous									
(c) Borderline									
(d) Indeterminate									

Signed ....

Rank ....

Date ....19..

Lep. 3

GOVERNMENT OF CROSS RIVER STATE OF NIGERIA

MINISTRY OF HEALTH, RURAL HEALTH SERVICES

LEPROSY PATIENT'S CHART

Division .... Clinic Area .... Reg. No. ....

Name .... Sex .... Age ....

Address .... Home Town ....

No. of Children/Contacts .... Type of Leprosy ....

Date of Admission ....

Family History ....

Personal History ....

Duration of the Disease ....

Findings ....

....

REMARKS/HEALTH EDUCATION ....

.... Signed .... Date ....

	R	L
E		
H		
F		

Date	Bact. Results
Date	Bact. Results

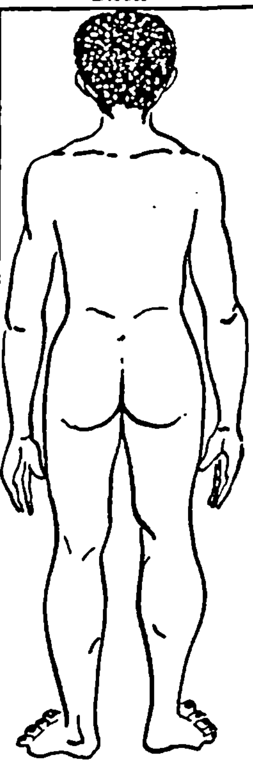
	R	L
E		
H		
F		

Date	Bact. Results
Date	Bact. Results

Date of Discharge ....

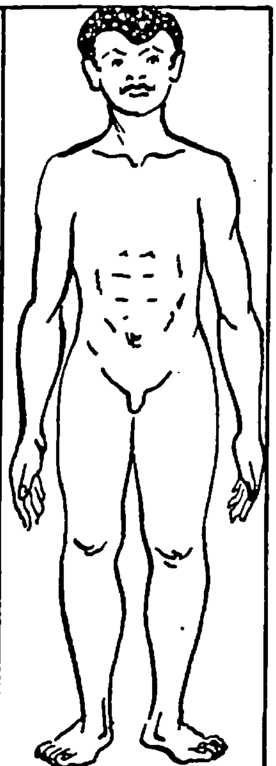
REMARKS :

BACK



Key-Lesions

FRONT



Ulcers X Nodules

NATIONAL LEPROSY CONTROL PROGRAMME NIGERIA

LEPROSY RECORD CARD

Ferm CCI
Clinical Card

1. NAME	2. Treatment Centre	Number
		Date

Father's/Husband's Name	M	F	Age	3	T	B	L	I	B.I	M.I.%	Activity
	☐	☐		☐		☐	☐	☐			

Occupation	Year of birth	TT	T	BT	BB	BL	LI	LL	I	Disability grade, eyes R	eyes L	hands R	hands L	feet R	feet L
		☐	☐	☐	☐	☐	☐	☐	☐						

L G Area	Ethnic Origin		
District	Compound Head	Onset disease / Site first Lesion	Onset treatment / Contact known
Town/Village	Place of birth		
Address/Location	Home clinic distance (Km/miles)		

	Readmitted	Discharged	Transferred	Out of control	Relapsed
1.					
2					Died
3.					

Predominant type of Lesions

4a NUMBER			4b INFILTRATION		
☐ single	☐ few	☐ many	☐ nil	☐ slight	☐ marked
DISTRIBUTION			NODULES		
☐ asym.	☐ part. sym.	☐ sym.	☐ nil	☐ few	☐ innume-rable
ELEVATION			EYES		
☐ marked	☐ moderate	☐ nil	☐ normal	☐ maderosis	☐ cataract
			VISION		
☐ border only	☐ centre only	☐ whole lesion	☐ normal	☐ diminished	☐ blind
HYPOPIGMENTATION			EARS		
☐ marked	☐ moderate	☐ slight	☐ normal	☐ infiltrated	☐ nodular
DEFINITION			NOSE		
☐ good	☐ moderate	☐ poor	☐ normal	☐ obstruction	☐ collapse
Central healing			MOUTH		
☐ marked	☐ moderate	☐ nil	normal	☐ Infiltration	☐ ulcer
BORDER			VOICE		
☐ Narrow	☐ broad	☐ satellite lesions	☐ normal	☐ hoarse	loss of teeth upper incisors
LOSS OF SENSATION	in lesions		TRUNK		
☐ marked	☐ moderate	☐ slight	☐ normal	☐ testicular atrophy	☐ gynaeco-mastia
REACTION Present ☐ Absent ☐	☐ neuritis	☐ lagoph talmos	☐ anaemia	☐ E.N.L	☐ iritis
GENERAL CONDITION ☐ good	☐ moderate	☐ poor	Self Report ☐ / Survey ☐	Contact ☐ Examination	Referred by --------

5a NERVES	Gr. Auric. R	Gr. Auric. L	Ulnar R	Ulnar L	Median R	Median L	Rad. cut. R	Rad. cut. L
Size								
Tenderness								
Loss of sensation								
Muscle Weakness	facial						high radial	

5b NERVES	Peroneal R	Peroneal L	Tib. post R	Tib. post L	Sup. Peroneal R	Sup. Peroneal L	Others R	Others L
Size								
Tenderness								
Loss of sensation								
Muscle Weakness								

Note:- when marking nerves: use following symbols:-
—; ±; +; + +; (According to degree of severity)

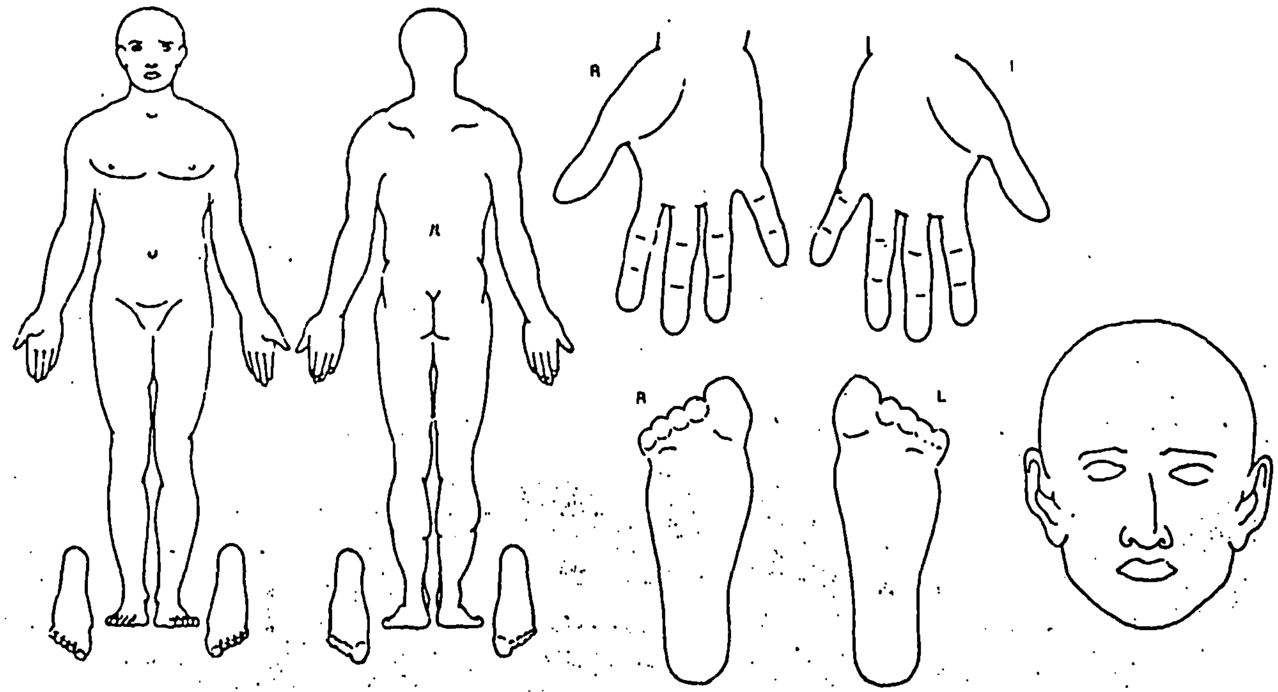
Form CC1
Clinical Card (cont)

Contact examination | Contact examinations (continued)

Name	Relationship	Attended examination					Name	Relationship	Attended examination				
		19...	19....	19 ..	19....	19.....			19....	19....	19.....	19....	19....

CLINICAL NOTES

Form CC1
Clinical Card (cont)



Follow up

Date or period												
Drug prescribed												
Total attendance												
Total absence												
No. lepr. reactions type												
No. lepr. reactions II												
Smear B.I/M.I												
Clinical results												
Ulcer												
Footwear												
Disability grade												

Q. I. C. LEPROSY HOSPITAL

EKPENE OBOM, ETINAN

SURNAME	FIRST NAMES		NUMBER	
ADDRESS			DATE OF BIRTH	
NAME OF NEXT OF KIN		RELATIONSHIP	SEX	M.S.W.
ADDRESS OF NEXT OF KIN				
PLACE OF ORIGIN	TRIBE	OCCUPATION	RELIGION	

HOSPITAL HISTORY

ATE ATTENEDED OR ADMITTED	REFERED BY	LEP. CONTROL SUPT. OR INSPECTOR	DATE DISCHARGED	DISCHARGED TO

OPERATIONS

DATE	SURGEON	OPERATION	CODE NUMBER

APPENDIX III

Supporting papers

Lepr Rev (1987) **58,** 69–78

SPECIAL ARTICLE

Leprosy in Cross River State, Nigeria

IRENE BRIGHTMER
Geography Division, Derbyshire College of Higher Education, Western Road, Mickleover, Derby DE3 5GX

Accepted for publication 17 June 1986

Summary This spatial study of leprosy was stimulated by reports of medical workers in the State that serious and advanced cases of the disease are appearing, and that possibly there are pockets of infection which need to be identified and taken into account by the State's Leprosy Control Programme.

A preliminary examination of the spatial pattern of leprosy in the State is presented here, and shows higher prevalence rates for the disease in the areas of sparsest population. The work is continuing, and will attempt to explain these distribution features.

An account is given of some prevailing local attitudes to leprosy and their consequences for the control of the disease. The structure of the control service (State and Federal) is outlined, and constraints limiting its effectiveness are discussed.

Introduction

Cross River State, one of the 19 states of the Federal Republic of Nigeria, is located in the south-eastern corner of the country, adjacent to the Republic of the Cameroons. It encompasses about 29,000 km^2 between latitudes 4 N and 7°N. In the last official census of the country in 1963 the recorded population was 3·5 M, and official projections estimate a current population (1986) exceeding 6 M.[1]

The state lies wholly within the tropical zone but the northern area, the Obudu Plateau, over 1200 m high, is temperate. There are two seasons: the rainy season from May to October and the dry season from November to April, but along the coast no month is completely dry. Summer rainfall totals 3500 mm in the south-east and decreases northwards, but there are no water shortage problems. During the dry season, the relatively cool and very dry dust-laden Harmattan wind blows from the north, its effect decreasing towards the coast.

The economic mainstay of the State has always been its agriculture except on the coast where fishing is important, and the population of the state is predominantly rural. The staple food crops are roots (yam and cassava), supplemented by maize and plantains. Cash crops, especially palm oil, rubber and cocoa are produced by small farmers in the south, and also by large scale plantations mainly in Odukpani and Akamkpa. Since most of the state lies within the tsetse fly belt, meat is

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expensive. Fish is available in the south and is preferred but is rare in the north. Protein and iron deficiency are common nutritional problems among all sections of the population. Malnutrition, especially seasonally, is very serious in many village communities.

Petroleum is drilled offshore near Eket but has done little to transform the economy of Cross River State. Revenues go direct to the Federal Government and the industry employs only a few personnel who form a privileged enclave in Eket, a town with poor transport links with the rest of State, and without reliable mains water or electricity. One major impact of oil has been the disruption of the traditional fishing industry of the coastal area, sending fishermen further afield to less disturbed and less polluted waters, especially eastwards to the Cameroons.

Calabar is the State capital and the main industrial and employment centre in the State. There is a limited flow of people from the rest of the state for employment and education, but it has none of the usual "shanty town" developments of other African cities, and its growth is relatively controlled. However, severe overcrowding does exist in the older parts of the city due to natural rates of population increase among the indigenous Efik people.

The State is divided into 17 Local Government Areas for administration from the State capital each with its own Headquarters (map 1). These LGA headquarters in the densely populated south are dynamic towns with industries and factories of their own. Those in the sparsely populated north of the state are hardly more than villages with only the basic administrative functions which include the Leprosy Control Units. The southern part of the State has some of the highest rural population densities in West Africa and this pressure on agricultural resources has led to regular outmigration especially of young males. Their destinations are less populated areas of their own State, notably Akamkpa and also the Cameroons and formerly Fernando Po offshore, all for the purpose of agricultural labouring. The migration is far from permanent, being seasonal or at most of only a few years' duration. Such movements are significant in leprosy control, especially in view of the movement across the international border with the Cameroons, recently re-opened (February 1986). These agricultural labourers as well as the increasingly mobile offshore fishermen are represented among the leprosy cases studied.

The leprosy problem

There are 8000 registered cases of leprosy in Cross River State and it is by no means one of the worst states of Nigeria. In 1975 it was ranked only 8th out of the 19 states of the Federation for leprosy prevalence rates,[2] and one state had a rate 10 times higher. The average prevalence rate for the state is approximately 1·3 registered cases per thousand people. This relatively low figure requires qualification on two grounds. It has been estimated that actual cases in CRS are double the number registered (whereas in some northern states in Nigeria it is believed that actual cases are half of those registered).[3] The explanation is probably related to the heavy stigmatization of leprosy in CRS (see below). The second qualification is that the 1·3 per thousand average prevalence masks great variations within the State. Prevalence rates calculated (Table 1) and mapped for each LGA (Figure 1) help to demonstrate this, but there are also known to be pockets of high prevalence within LGA's but these await further identification and study. Meanwhile, the map and table show rates by LGA varying from only 0·12 in Eket in the coastal area to 10·90 in Obudu. This reflects the popular perception of leprosy among people in the south of the State that 'it is much worse in the north'.

It is easy to recognize the association in the State of areas of highest leprosy prevalence with areas of lowest population density, and vice versa (Figures 1 and 2). A similar association has been noted elsewhere in Africa as well as in Nigeria.[4] The explanations for such an association are not obvious. Population density may be a direct or indirect variable in the situation. Indirectly it may indicate the function of better infrastructure, modernization, better housing, higher standard of living etc. which are to be expected in areas of denser settlement and which have also been associated

Table 1. Cross River State: leprosy prevalence per 1000 population by local government area, 1984.

Rank	LEA	Prevalence
1	Obudu	10·90
2	Ogoja	10·11
3	Ikom	4·89
4	Etinan	1·29
5	Akamkpa	1·29
6	Obubra	1·04
7	Calabar Municipality	0·83
8	Ukanafun	0·43
9	Odukpani	0·43
10	Itu	0·42
11	Abak	0·34
12	Ikot Ekpene	0·33
13	Ikono	0·28
14	Ikot Abasi	0·27
15	Uyo	0·26
16	Oron	0·21
17	Eket	0·12

with improvements in the leprosy situation. So population density here may be a surrogate for economic development.

Etinan, ranked highest in population density Table 3, may be expected therefore to have the lowest prevalence rate and may seem an anomaly in having a prevalence of 1·29 per 1000. But the map (Figure 3) shows that it has the only leprosy hospital in the south of the State and so it attracts patients from all the neighbouring LGA's as well as from Rivers State, which is particularly poorly served with leprosy services. So this inflates both prevalence and also incidence rates for Etinan LGA. Similarly, the clinic in Calabar attracts patients from neighbouring LGA's due to its accessibility and also for the anonymity it offers and so its prevalence rate is inflated.

The number of new cases registering in the whole State in 1984 was in excess of 300. This gives an overall incidence rate of 0·05 new cases per 1000 population. The rate varies between LGA's and approximately matches the rank order of prevalence rates. However, there is a higher than expected incidence rate in Ikot Ekpene, which requires further investigation, especially as new cases were reporting not only to the local unit but also to the Etinan leprosy hospital right into 1986.

Of the total new cases, one quarter were diagnosed as lepromatous. Children under 15 years represented two fifths of all new cases. The numbers of male and female new cases were similar. (But a noticeable feature is the dominance of total female patients registered in the State. They make up 60% of all registered cases under 40 years, but in the 40+ age group male and female cases are equal. Conversely, male in-patients outnumber female in all age groups.)

Attitudes to leprosy

The inbred fear of leprosy combined with the traditional belief in the supernatural cause of the

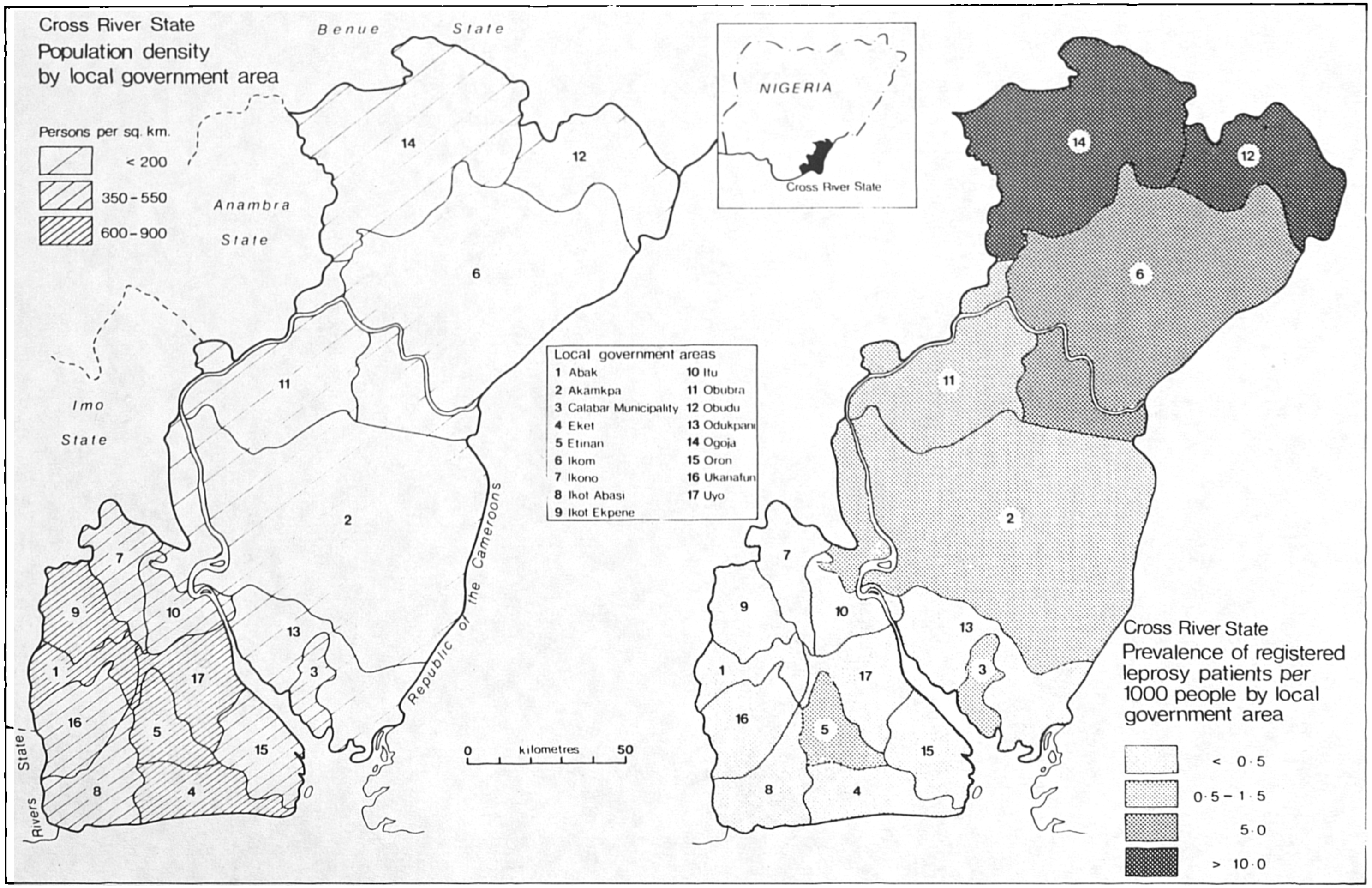

Figure 1. Note that neither population density nor leprosy prevalence rates for CRS are mapped in sequential uniform classes due to the nature of the data.

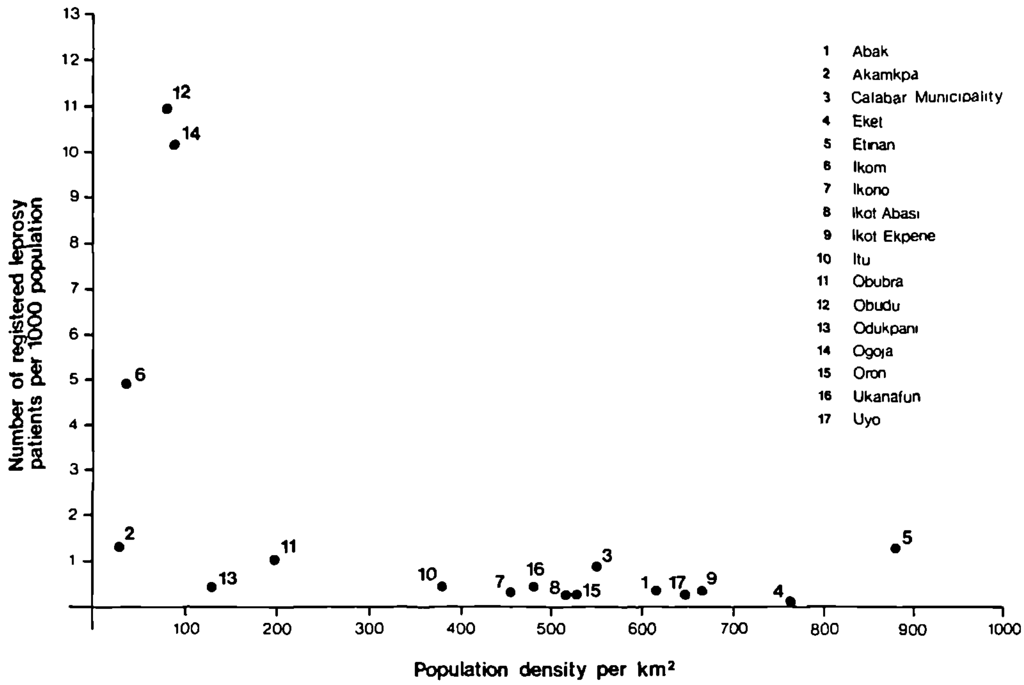

Figure 2. Prevalence of leprosy and population density by Local Government Area, 1984.

disease mean that it is severely stigmatized in CRS and this adversely affects the control programme in a number of ways. Frequently there is late reporting of new cases, the patient hiding the condition for as long as possible. By the time the case is reported many contacts may have been infected and the disease may have advanced in the patient to cause irreversable deformity. During this time the patient is likely to have been treated by native medicine which may have caused further injury, or the patient may have received treatment for skin conditions other than leprosy due to poor diagnosis. This reflects the low level of education with reference to leprosy both of paramedics and doctors, and is a cause for concern in some quarters in the State and has led to a compulsory leprosy module being recently introduced at the University of Calabar Medical School.

A second result of the prevailing attitude to leprosy is in poor patient compliance with therapy, once diagnosed. Two factors are involved here, in addition to the usual one of the long duration of treatment. For outpatients to make monthly clinic trips for drugs may be expensive in money and in time, especially during the season of intense agricultural activity. It may also lead to awkward questions being asked of a patient who wishes to hide the condition. The other factor relates to the patient's own perception of the cause of the disease which, in nearly every case interviewed, revealed a suspicion of witchcraft by a named jealous neighbour or relative. Enormous doubts can arise about the efficacy of the pills especially when you see or feel little change in your condition and when you believe someone intends you evil and has already called on the power of witchcraft to give you leprosy and sustain the condition by preventing the ulcer from healing, etc. Even when patients are shown evidence of bacilli numbers decreasing they are frequently sceptical. Doctors, nurses and leprosy control officers can become very disheartened with their patients' lack of cooperation.

The third result of the stigma attached to the disease is the effect it has on the staffing of the leprosy control service in the State, which is generally undermanned and under-resourced. Even the monthly salary supplement of 10 Naira (approximately £5) which is paid to all workers in leprosy (and TB) as 'danger money', does little to alleviate the problem. There are 136 medical doctors in government service in the State, mostly indigenous Nigerians, but the 4 doctors involved in leprosy work are all ex-patriates. (The medical course module in leprosy at the University of Calabar may remedy this situation for the future however.) Nevertheless, there are some highly dedicated workers who are committed to their patients even though they receive little encouragement thanks to the poor career structure, which at present offers them few incentives to remain in leprosy control work. But another staffing problem arising from stigma is the opportunity it provides for blackmail.

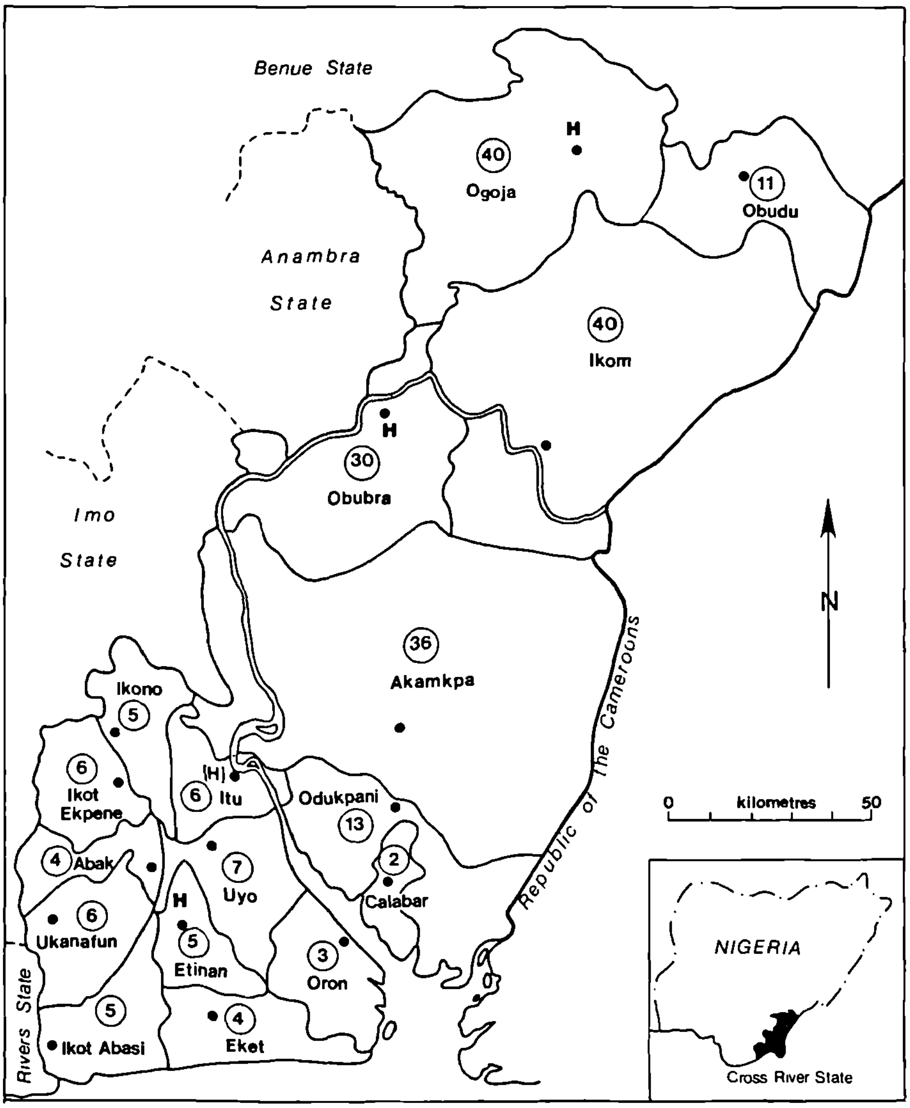

Figure 3. Cross River State: Leprosy Control Service. ○, number of leprosy clinics in LGA; H, Leprosy hospital; ●, LGA Headquarters: location of leprosy control unit; (H), former leper colony at Itu (1928–68).

Patients wishing to receive treatment but to conceal their disease may be forced to pay sums of money by unscrupulous control officers. As well as placing severe hardship on the patient, it may also prevent referral to a hospital of a case in need of special attention.

Only when the stigma against leprosy are removed by education of the public, the patients and the medical profession, will these three major constraints on the efficient operation of the leprosy control service in the State be eradicated.

CRS Leprosy Control Service

Leprosy was not recognized as a serious medical problem in CRS until 1926 when a Scottish missionary doctor at the General Hospital in Itu began to treat a few patients with hydnocarpus oil he obtained from India, the first doctor in Nigeria to do so. The famous missionary, Mary Slessor, had also cared for leprosy cases in this area earlier in the century. But after 1926 and the news of a treatment, cases appeared as if from nowhere and in the first 6 months 400 outpatients were under treatment with weekly injections. This led to the establishment in 1928 of the first African colony of leprosy patients. This was on a sandbank in the Cross River at Itu, a long established river port in the tropical forest, trading with Europe and also a centre of missionary activity. From the beginning there was a government grant supporting it, although it remained under the control of the Church of Scotland Mission, and during its existence received support from BELRA (now LEPRA), the Mission to Lepers (now the International Leprosy Mission) and Toc H. In 1928 suitable land was allocated by local chiefs and construction work began by the 800 patients. BELRA supplied the hydnocarpus oil from India and also supplied literature on leprosy and provided other help. By 1931 there were 1100 in-patients and several hundred outpatients.[5]

Hydnocarpus oil was the principal method of treatment until 1951 when every patient was put onto the sulphone treatment in addition. Some 28,000 were to receive treatment at Itu, an average 4300 patients each year before it was destroyed by bombs in Nigeria's civil war. Some former Itu patients and staff are to be found as staff in the existing 3 leprosy hospitals in the State and even further afield.

The Itu Leprosy Colony became a model for colonies elsewhere in Nigeria and Africa and also revealed the seriousness of the leprosy problem in the area. Three more hospitals were to be established by European missions within the State (Figure 3, Table 2), and from the late 1930's and into the late 1950's a large number of segregated villages were established by local communities. All

Table 2

Hospital location	Foundation	Date	Doctors	Patient beds	Facilities
Etinan	Qua Iboe Mission	1932	2	173	Lab., Theatre, Shoemaker, Limbmaker
Mbembe, Obubra	Church of Scotland Mission	1959	weekly visit	30	Lab., Shoemaker's workshop unstaffed since 1984
Ogoja	Roman Catholic Mission	1943	1 since 1985	63	Lab., Physio., Shoemaker

Table 3. Cross River State: population density by local government area, 1984.

Rank	LGA	Density per km^2
1	Etinan	880
2	Eket	763
3	Ikot Ekpene	664
4	Uyo	648
5	Abak	614
6	Calabar Municipality	548
7	Oron	526
8	Ikot Abasi	517
9	Ukanafun	479
10	Ikono	451
11	Itu	379
12	Obubra	196
13	Odukpani	129
14	Ogoja	87
15	Obudu	80
16	Ikom	35
17	Akamkpa	28

of these are now officially abandoned but some became the site of a leprosy clinic and one became the Leprosy Hospital at Mbembe.

The current leprosy control service is administered by the State Ministry of Health from Calabar through the Leprosy Control Units located in the 17 LGA Headquarters (Figure 2) and in the 3 specialist leprosy hospitals. These all submit monthly and annual returns for the State and Federal Health Ministries and for UNICEF and the WHO. They also administer the leprosy clinics which are scattered throughout each LGA and which are mostly convened on a monthly basis for examination of new patients, distribution of drugs, discharges and referral to hospitals. Regular village, school and plantation surveys were also administered from these 17 Leprosy Control Units until the severe economic constraints which have damaged the whole control service especially since 1980.

Reporting structure of Leprosy Control Services

UN agencies

↑

Federal Ministry of Health (Lagos)

↑

State Ministry of Health (Calabar)

Report to European Missions

3 Leprosy Hospitals & Leprosy Control Units (in 17 LGA Headquarters)

↑

223 Clinics

Outside the reporting structure there is also a Leprosy Advisory and Coordinating Committee, both at National level (inaugurated 1982) and 3 at regional level (the Eastern Zonal Committee dates back to 1980 and incorporates Cross River State). These Committees meet at regular intervals to plan strategies for leprosy control within their zones, and they organise training workshops. Recurrent themes in their deliberations include the issues of an inadequate supply of trained personnel, poor funding of the service and the problem of defaulters.

In each LGA headquarters there is a Leprosy Control Unit ideally staffed by one Leprosy Control Assistant and one Leprosy Control Attendant, but at the end of 1984 there were only 12 assistants and 11 attendants and since that date there have been further cutbacks in government employment which have affected the Service. The structure also provides for a State Consultant Leprologist but the post has never been filled.

The constraints on operating an effective leprosy control service at present are not a lack of administrative structure because that exists, as has been shown. The problems are lack of sufficient trained personnel and of transport for their movement from headquarters to clinics, and also frequent drug shortages. Lack of motor vehicles and spare parts, and of river boats means that in many LGA's the leprosy control personnel remain in headquarters, unable to visit regularly the monthly clinics or follow up defaulting patients or carry out surveys, and the consequences are that even when drugs are available they are not distributed. All of these have serious implications for the future of leprosy in the State.

During the colonial period and the early years of independence walking, bicycles and canoes were the main means of transport. Then came two events which changed the face of CRS: the Civil (Biafran) War 1967–70 which was centred here and in neighbouring states, then the subsequent oil boom. The Civil War seriously disrupted the smooth operation of the Leprosy Control service in the region, as well as destroying the hospital at Itu and scattering its patients. The oil boom helped Nigeria in the 1970's to recover from the economically devastating effects of the war. Roads were built, cars and motor cycles were imported, and with cheap fuel the use of bicycles declined. Therefore, resourcing a mobile unit of the medical service, which leprosy units must be in this rural state, became much more expensive. It has now become nearly impossible in the 1980's with the drop in oil prices which is ruining Nigeria's heavily oil-dependent economy. Thus, the leprosy control service of CRS is one more casualty of the world oil recession.

Transport problems explain the drugs shortage, especially the shortage of Dapsone. Medical supplies are available from Lagos, but there is no centralized distribution system. Each state in the Federation has a high degree of autonomy and is responsible for payment and collection of its own medical supplies. With a shortage of reliable vehicles, trips to Lagos (800 km) for supplies are erratic. Supplies of expensive drugs for MDT present yet another problem, and clofazimine especially was being reported to be in short supply in 1984, and subsequently.

Conclusions and recommendations

Leprosy control has a low priority in the State medical service, for many reasons. As has been shown it is short of staff and transport and a regular drug supply. The present vertical administrative structure is unlikely in the near future to receive the appropriate resources, especially transport, to enable it to function adequately in its task of finding new cases, providing the most appropriate treatment (such as multiple drug therapy) on a regular, supervised basis, and following up defaulters.

A fresh approach is required and it is suggested that this will contain at least three essential ingredients. These are, firstly, a massive education and re-education programme which will contribute to the destigmatization of the disease among all strata of society. People must also be convinced that leprosy can be cured and that early reporting is essential. Paramedics, medical doctors and native doctors (who have official recognition and registration in Nigeria) must become familiar with the diagnosis and treatment of the disease.

Secondly, a steady and reliable flow of all necessary drugs must be assured. A means must also be found of making the new multiple drug therapy more widely available and this will require the development of techniques to make it simple to administer.

The third component of a new approach must be the involvement of people at the village level. It may be that a new control strategy will depend upon educated people implementing it in their own communities through village meetings, surveys and with reference to existing medical services.

The leprosy problem in Cross River State is not insurmountable. The control of the disease and its eventual eradication only needs some fresh thinking and commitment.

Acknowledgments

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Correction

In this paper (Brightmer, 1990) the leprosy figures for 1986 were mistakenly calculated against the population projections for 1985.

The resulting leprosy rates are therefore shown higher by 2.4 per cent, and in the case of Calabar by 2.9 per cent. However, the distribution patterns, and rank of the LGAs by population density and leprosy rates are not affected.

For the analysis presented in this thesis the calculations have been corrected.

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New cases of leprosy in the Cross River Region, Nigeria

M IRENE BRIGHTMER
Geography Division, Derbyshire College of Higher Education, Mickleover, Derby DE3 5GX

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Summary Rates of leprosy cases newly reporting during 1986 are examined for a region of south-eastern Nigeria. Figures reveal that in the part of the region which was designated in 1987 as a new state, half of the administrative units had new case reporting rates higher than in adjacent areas, while the other half had very few cases reporting in 1986. Possible explanations are offered and the implications of the pattern for leprosy control in the new state are examined.

The Region

The Cross River Region was one of the nineteen states of the Federation of Nigeria until 1987, and was known as Cross River State. In September 1987 it was carved into two states, the larger northern and eastern portion retained the name of Cross River State, and the smaller but much more populous southern and western portion (locally known as the 'Mainland') became Akwa Ibom State, (Figure 1). Until the Civil (Biafran) War in 1967, it was part of the Eastern Region of Nigeria which had been important in the world of leprosy research and control for forty years. The leprosy hospitals at Itu and Uzuakoli were known beyond Nigeria for the pioneering work conducted there by leprologists of international repute.

The region lies between latitudes 4°N and 7°N. The southern one third, which includes the whole of the new state, lies below 100 metres in altitude. Akampka Local Government Area (LGA) in the east includes the Oban Hills which rise to 1070 metres, and in the extreme north-east the Obudu Plateau rises to 1841 metres. All areas of the region are cultivable and habitable. Annual rainfall in the south is 3500 millimetres; it decreases northwards but there are no water shortage problems. Population densities vary greatly, with the highest densities in the south throughout the new state, but with areas of scattered and sparse population in the north, which is thought to have suffered disruption and depopulation during the period of the Atlantic slave trade.

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Figure 1. South-eastern Nigeria.

Leprosy control

Two specialist leprosy hospitals are located in the Cross River Region at Etinan and Ogoja. (Uzuakoli lies outside the region in the neighbouring state of Imo, and the leprosy hospital at Itu lies in ruins since the Civil War.) They provide surgery and treatment of complications for inpatients, as well as diagnosis and chemotherapy for outpatients. Outpatient diagnosis and chemotherapy is also provided at 223 leprosy clinics throughout the region, usually held monthly, and from where complications are referred to the hospitals. Periodic visits are made to some of the clinics by the hospital doctors. By 1986 the WHO (1982) recommended multidrug therapy (MDT) was in limited use in the region. It had been used selectively at the leprosy hospital in Etinan in the south since 1984, and in 1986 implementation began in the north of the state in Ikom, Obudu and Ogoja LGAs.

Leprosy rates in the Cross River Region in 1986, i.e. the original Cross River State), are examined here using the local clinic and hospital registers. 'Registered cases' refers to cases which had already been diagnosed with active leprosy prior to 1986, were still receiving chemotherapy and recorded on treatment registers. (In 1959, 3000 untreated cases of leprosy were found when 536,256 people were examined in this and the adjacent region during routine yaws surveys.[2]) It has been estimated that registered cases in this part of Nigeria represent only one half the true number,[1] as the stigmatization of leprosy

Table 1. Cross River Region. Leprosy by local government area 1986. Population density and rates of registered active leprosy cases on chemotherapy

LGA	Pop. (1000s)	Pop. dens. km^2	Dens. rank	Reg. lep. patients	Lep. rate per 1000	Lep. rank
Abak	325	630	5	120	0·37	10
Akamkpa	190	28	17	266	1·4	4
Calabar Mun.	188	563	6	126	0·67	7
Eket	580	781	2	53	0·09	17
Etinan	473	901	1	495*	1·05	5
Ikom	200	37	16	1285	6·43	2
Ikono	324	463	10	82	0·25	14
Ikot Abasi	419	530	8	128	0·31	12
Ikot Ekpene	438	679	3	128	0·29	13
Itu	273	458	11	99	0·36	11
Obubra	420	201	12	417	0·99	6
Obudu	130	82	15	764	5·88	3
Odukpani	224	132	13	91	0·41	9
Ogoja	313	89	14	2674	8·54	1
Oron	551	540	7	120	0·22	15
Ukanafun	390	491	9	163	0·42	8
Uyo	607	664	4	119	0·20	16
Total	6045	211 (mean)		7130	1·18 (mean)	

* Figures for Etinan are inflated by cases reported to the Etinan Leprosy Hospital from other LGAs and from outside the region.

patients especially in the south of Cross River, discourages reporting of cases. 'New cases' refers to cases newly diagnosed in 1986 and never treated before. Almost all leprosy cases in the region were self-reporting. There were no mass surveys nowadays as previously, nor even systematic contact-tracing. It is unlikely that there are variations between LGAs in the degree of reliability in the clinical diagnosis of leprosy.

RATES OF REGISTERED CASES

I have previously examined the pattern of registered leprosy cases for the region using the 1984 figures and compared the rates with the population distribution.[3] The pattern corresponded with that of other observers who have remarked on the apparent association in tropical Africa of areas of higher leprosy rates coinciding with areas of sparser population density.[4] The same pattern of an apparent association occurs in 1986 using the figures of already registered cases (Table 1). However, an association noted elsewhere between low leprosy rates and higher altitude does not occur in the region. The highest leprosy rates per thousand people in Cross River are in Obudu which is the area of highest land.

DISTRIBUTION PATTERN OF CASES NEWLY REPORTING IN 1986

However, a more complex pattern emerges when new cases reporting in 1986 are examined (Table 2 and Figure 2). The mean new case rate for the whole region in 1986 is 0·79 per 10,000, ranging from a low of 0·07 in Oron in the extreme south, to a high of 6·23

Table 2. Cross River Region. Leprosy by local government area 1986. New case rates

LGA	New cases	New cases per 10,000	Rank
Abak	23	0·71	6
Akamkpa	5	0·26	11
Calabar	12	0·64	7=
Eket	6	0·10	15
Etinan	4	0·08	16
Ikom	78	3·90	2
Ikono	18	0·56	9
Ikot Abasi	9	0·21	12=
Ikot Ekpene	28	0·64	7=
Itu	14	0·51	10
Obubra	35	0·83	5
Obudu	81	6·23	1
Odukpani	3	0·13	14
Ogoja	104	3·32	3
Oron	4	0·07	17
Ukanafun	38	0·97	4
Uyo	13	0·21	12=
Total	475	0·79 (mean)	

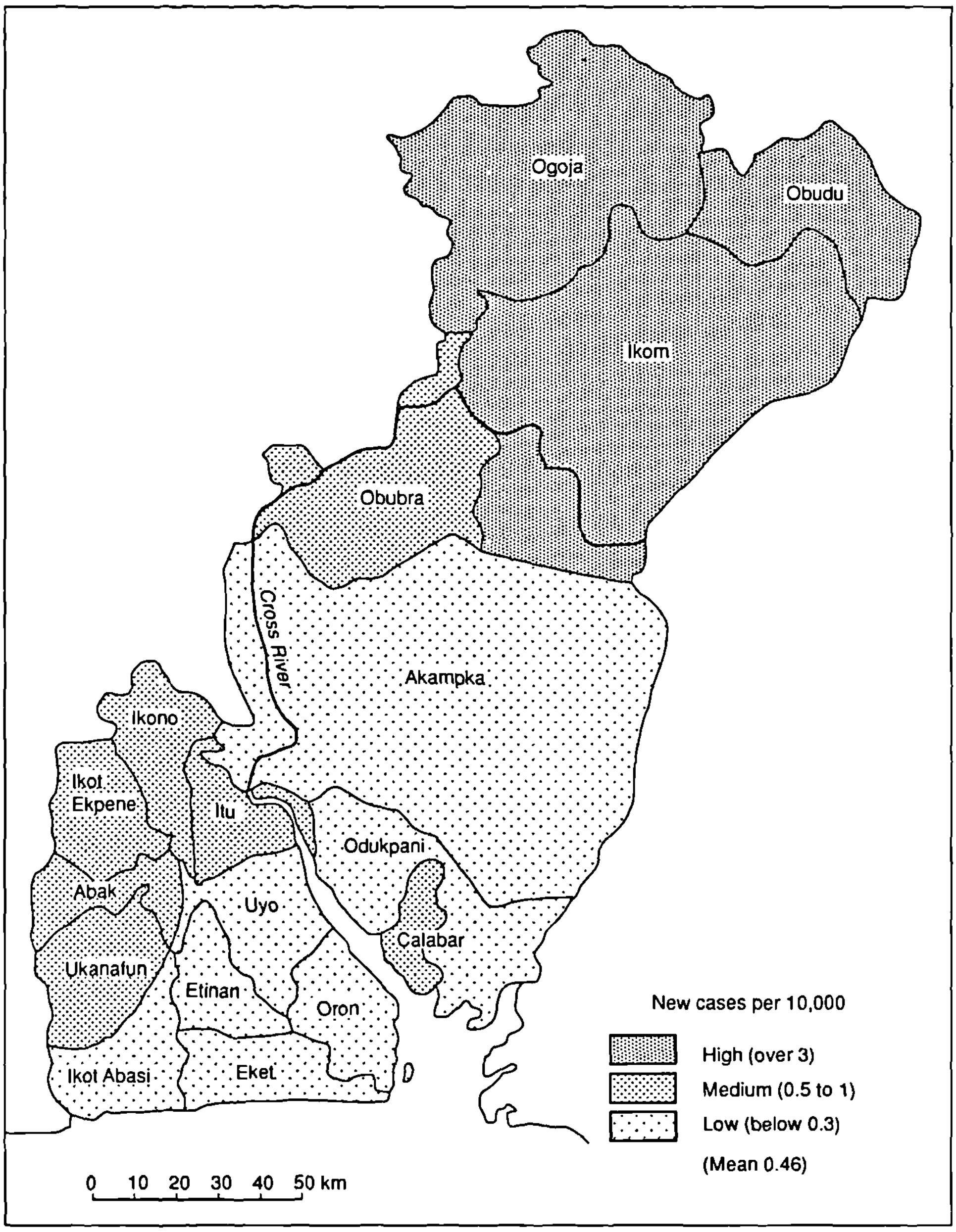

Figure 2. Cross River Region, Nigeria. Leprosy cases newly reported in 1986.

in Obudu in the extreme north. Another two LGAs are well above the mean, seven are around the mean and the rest are well below the mean.

The ten LGAs with a new case rate above and around the mean fall into four categories:

1 Ogoja, Obudu and Ikom in the north, which also have much higher than average rates of already registered cases;
2 Obubra which has a rate of registered cases close to the mean;
3 Calabar the state capital, where numbers are higher because cases report from outside the locality wishing for anonymity, because of the fear of ostracism; and
4 five LGAs in the south which all have very low rates of registered cases.

The last group will be examined for their significance for leprosy control.

For the ten southern LGAs of the whole region, in the 'Mainland', i.e. the new state of Akwa Ibom, the Etinan Leprosy Hospital registers and local clinic returns have been examined, and the cases newly reported and registered in 1986 are identified by their LGA of *residence* (rather than of registration, which is how Ministry statistics are recorded, thus inflating figures where the leprosy hospitals are located, as noted in Table 1). The new case rates are tabulated (Table 3) and mapped (Figure 3) separately from the rest of the Cross River Region.

The number of confirmed leprosy cases from the Mainland reporting for the first time in 1986 either to local clinics or the leprosy hospital was 157, a mean rate of 0·358 per 10,000, about half that for the whole of the Cross River Region, whereas the rate of registered cases for the Mainland was less than one third of the rate for the whole region, i.e. 0·34 compared with 1·18 per 1000. New case rates per 10,000 for individual LGAs varied from 0·08 in Etinan to 0·97 in Ukanafun. The five LGAs with highest rates have only 40% of the population of the new state but have 77% of the cases newly reporting in 1986.

Forty-five of the new cases in the Mainland reported to the leprosy hospital, where

Table 3. Cross River Region Mainland Area. Leprosy 1986 by local government area. Population and new cases, actual and expected

LGA	Pop (1000s)	% Total pop.	Actual new cases	Expected* new cases	Ratio actual to expected
Abak	325	7·44	23	11·60	1·98
Eket	580	13·24	6	20·65	0·29
Etinan	473	10·80	4	16·85	0·24
Ikono	324	7·40	18	11·54	1·56
Ikot Abasi	419	9·57	9	14·93	0·60
Ikot Ekpene	438	10·00	28	15·60	1·79
Itu	273	6·23	14	9·72	1·44
Oron	551	12·58	4	19·62	0·20
Ukanafun	390	8·90	38	13·88	2·74
Uyo	607	13·86	13	21·62	0·60
Total	4380	157			

* Number of cases expected if all the local government areas had the same new case rate per 1000 population.

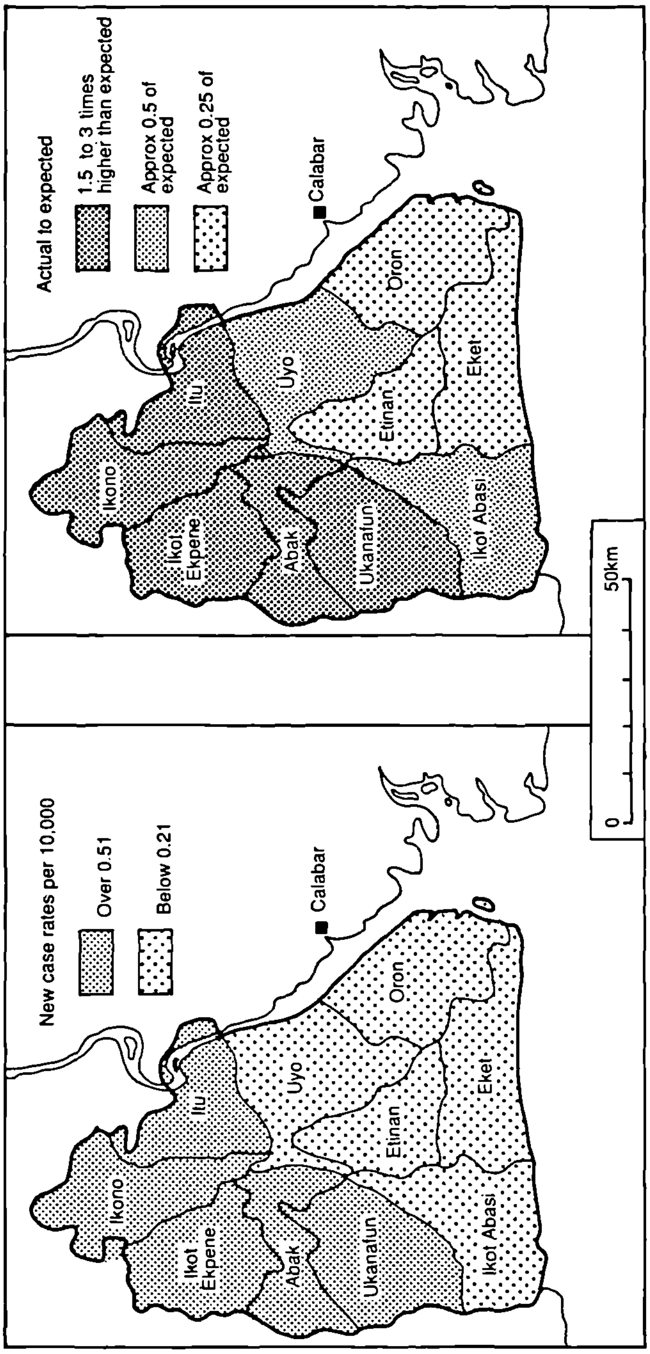

Figure 3. Cross River Region, Mainland Area. New leprosy cases in 1986.

classification records show that approximately one third (16 cases) were multibacillary, one of whom was under fifteen years of age. Two thirds (29 cases) were paucibacillary and eight of these were under fifteen years of age.

Discussion

Although leprosy rates overall were fairly low in the Cross River Region in 1986, there was a pattern of locally high rates of leprosy, with contrasts between rates of registered cases and rates of new cases.

The higher new case rates in the north and west of the new state area where existing registered rates are low, require special comment. The stigmatization of the disease especially by the Annang people who occupy most of the area may be one contributing factor; fieldwork has shown there is less stigmatization among the other main ethnic group of the Mainland. The effect of the disruption of leprosy control services during the Civil War (1967–70) should not be underestimated. These LGAs (excluding Itu) bordered the Ibo heartland of Biafra, and the formerly well-organized clinic system collapsed here in the early months of the conflict. There were also large-scale and frequent movements of refugees into and out of the area throughout the war, under conditions favourable for the transmission of disease. The famous leprosy hospital at Itu was bombed and thousands of patients dispersed, many never re-appearing anywhere for treatment.

Fieldworkers are believed to be reliable in respect of diagnosis and it is reasonable to assume that the figures represent true differences between leprosy rates within the new state area rather than variations in the certainty of the clinical diagnosis. The forty-five new cases which reported directly to the leprosy hospital were diagnosed by the experienced leprologist. That same leprologist made several visits during the year to clinics in Abak, Ikot Ekpene, Itu and Ukanafun, because of the frequency of cases from here reporting to the hospital, and confirmed the clinic diagnoses. The much higher than expected number of new cases in Ukanafun reflects a revival of leprosy control work there during 1985 and 1986; the newly reported cases in 1986 represent a backlog of untreated cases. This revival was initiated by the leprologist as a response to the number of leprosy cases from that LGA taking the trouble and expense to report to the Etinan Leprosy Hospital. There is every reason to believe that a similar backlog may exist in Ikono where leprosy control has lapsed in recent years and from where new patients also travel to the Etinan Leprosy Hospital.

Recommendations

The pattern revealed suggests that for effective leprosy control in the new state priority needs to be given to the five northern and western LGAs, where a greater number of previously untreated cases were reporting in 1986, and where more than one third were diagnosed as multibacillary. Although a few cases report each year from the other 5 LGAs, the low numbers of the previous years support the 1986 figures in suggesting that leprosy has almost disappeared, at least from Eket, Etinan and Oron.

Any new action against leprosy which the Akwa Ibom Ministry of Health might wish to take should begin in the north and west, and include the following priorities:

1 contract tracing, especially of all registered multibacillary cases;
2 the appointment and training of additional field staff for rural clinics, especially in the five northern and western LGAs;
3 the widespread implementation of MDT, based upon a guaranteed regular supply of drugs; and
4 a programme of health education, especially in the schools and communities of the LGAs with the highest rates of leprosy. This should emphasize the curability of leprosy and the availability of free treatment, and attempt to reduce the stigma of the disease.

The creation of the new state with its additional resources, reorganization and raised morale gives a good reason for optimism that with appropriate policies and serious commitment leprosy can be eradicated from this part of Nigeria in the not too distant future.

Acknowledgments

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INTERNATIONAL INEQUALITIES IN LEPROSY PREVALENCE AND TREATMENT.

Abstract

Leprosy appears to be a disease of poverty, although the mechanism for the association is unknown. Since 1950 chemotherapy using the sulphone, dapsone, has been used worldwide, and a substantial decline in prevalence has been recorded.

In 1982 a new and more expensive multiple drug therapy was recommended by the World Health Organisation, which has been implemented only partially. Where it has been used systematically there have been dramatic results, raising hopes that leprosy will be eradicated in the not too distant future.

However, multiple drug therapy requires precise diagnosis of leprosy type, careful record keeping and accurate administration of drugs, as well as guaranteed regular supplies. These are all impeded by the poor infrastructure, low literacy levels, inadequate health services and limited resources of the developing countries.

Therefore, although medical progress means that poverty need no longer be accompanied by leprosy, poverty and underdevelopment are perpetuating the disease in certain areas of the world, especially in Africa.