Rural health report / Northern Nigeria, Ministry of Health.

NORTHERN NIGERIA

MINISTRY OF HEALTH

RURAL HEALTH REPORT 1963

Including:—

Annual Report of the Sleeping Sickness Service for 1963

Annual Report of the Medical Field Units for 1963

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RURAL HEALTH REPORT,
Northern Nigeria, 1963

This report attempts to provide information on rural health matters in Northern Nigeria to serve a number of different needs, and it is hoped that this will be appreciated by critical readers.

It includes what will probably be the last Annual Report of the Sleeping Sickness Service to be completed by Dr. M. P. Hutchinson, who writes with unquestioned authority; and it includes the Annual Report of the Medical Field Units, somewhat disguised by gleanings from the past.

An excellent account of the origins and early work of the Medical Field Units was provided by Mc Letchie, their architect, in 1954; ten years later it seems appropriate to review the development of rural health work in the Region up to the present time, and to attempt to set down some information which has already been published, some which would otherwise disappear into the archives, and some which has never been reported.

The needs of doctors recently recruited to the Region have very much been borne in mind, and it is hoped that the requests of national, international, public and private organisations for information on diseases and control programmes will to a large extent be met, together with the needs of persons from various parts of the globe desirous of information for a thesis or an essay.

However, if this report fails to elicit further information or comment from those who could substitute knowledge for ignorance, or scientific deduction for speculation, and if it fails to stimulate enquiry and investigation within the Region, then it will have failed.

REFERENCE: Mc Letchie, D.L. (1954) Trans R. Soc. Trop. Med. Hyg. 48, 156

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September, 1964

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MAPS.

1. INTRODUCTION

In view of the changes which have occurred in recent years in the activities of Rural Health Staff, and in the personnel likely to read this report, a review of past developments is given as an introduction.

1.1. The development of major rural health activities

As in other West African countries - Ghana provides a close parallel - the Medical Field Units evolved as a result of the successful control of the vast epidemic of sleeping sickness which reached its peak in 1935 (when approximately 100,000 cases of "S.S" were treated in N. Nigeria).

1.1.2. In order to deal with this epidemic a large number of staff, some with very little education indeed, were recruited; they were trained almost exclusively to diagnose and treat sleeping sickness and became very proficient in this, but little more was expected of them at the time.

1.1.3. Subsequently, many sleeping sickness staff were left behind by the teams at static posts, which became dispensaries; these men learned to treat simple complaints in addition to sleeping sickness and to do simple preventive work. This was the beginning of the 'polyvalent rural health worker'.

1.1.4. By 1946 the epidemic of sleeping sickness had been brought under control (although 10-20,000 cases were still being treated annually), and the scope of the rural health staff was widened by the institution of the Medical Field Units. The staffs of both services were recruited from the ranks of young men with considerably better education than had previously been possible, and they were trained, along with a number of Native Authority candidates for Dispensary Attendant posts, at the Medical Field Units Training School established at Makurdi.

1.1.5. During their early years the Medical Field Units were administered together with the Sleeping Sickness Service, whose senior staff of various grades strengthened the newer organisation. In these days a main objective was to ascertain by morbidity surveys the incidence and pattern of endemic diseases - malaria,

bilharzia, filariasis, intestinal helminths, yaws, venereal diseases, leprosy, smallpox. etc. Treatment was carried out whenever possible but the day of the organised campaign against a specific disease came later. However, very considerable effort from both services was required at various times to deal with epidemic outbreaks of louse-borne typhus (Kano, 1946), louse-borne relapsing fever (1947-49), cerebro-spinal meningitis (1949-51), and smallpox.

1.2. Development of mass campaigns; the International Agencies.

Once considerable epidemiological information was available, attention was turned towards controlling diseases other than sleeping sickness by means of organised campaigns; the introduction of insecticidal spraying against malaria mosquitoes, Dapsone for leprosy treatment, and penicillin for yaws, finally provided the means whereby such a control, aiming at eradication, might possibly be achieved, whilst the survey and anti-epidemic work had given field staff experience and confidence in handling people en masse.

1.2.1. The cost of running and supervising effective campaigns from her own resources against all three of these diseases would have been very difficult for Nigeria. However, by this time the World Health Organisation had emerged as a stimulating force in encouraging well-prepared mass campaigns against major causes of mortality and morbidity, and it was able to offer skilled planning advice from a pool of international experts. Nigeria, on her part, could provide what few other countries could - a trained field organisation.

1.2.2. Acting upon the recommendations of W.H.O., (the advisory body), UNICEF ("United Nations International Childrens' Emergency Fund") was prepared to give material assistance for the development of such campaigns.

1.2.3. The Malaria Control Campaign began as a pilot project in Western Sokoto, at Birnin Kebbi, in 1953. About the same time came the expansion of the leprosy control campaign using once-weekly out-patient treatment with Dapsone tablets; this was not immediately spectacular in its effects, but raised the number of patients recorded as under treatment from about 12,000 in the pre-Dapsone era of 1951 to 264,000 by 1961.

1.2.4. Nigeria's most spectacular benefit from assistance by International Agencies was in the development of the Yaws Eradication Campaign ("Project Nigeria 1"), which covers parts of all three Regions (now four) and opened in Northern Nigeria on 13th July, 1954, at Orakam, in Idoma Division of Benue Province. Approximately 2½ million persons in the Region are now 'protected' in the main area covered by the campaign (see map 1).

1.2.5. The World Health Organisation advises on the planning of these projects and has provided experts for the yaws and malaria campaigns, whilst UNICEF provides transport, equipment, insecticides and drugs. In each case eradication of the particular disease was the agreed aim incorporated in the plan of operations; only where eradication is considered possible in the foreseeable future with current techniques is UNICEF prepared to assist in a mass campaign against a specific disease.

1.2.6. However, increasing assistance is now being offered for development of other health projects such as maternal and child welfare, environmental sanitation, training of para-medical staff, and provision of safe rural water-supplies.

1.2.7. An important project run entirely by the Ministry of Health is the simulium control campaign for protection against onchocerciasis ("river blindness") in Abuja Emirate, commenced in 1955; in a limited area on a routine basis control continues in the absence of an entomologist, with considerable success.

1.3. Health Centres

At the end of the 1940s the time seemed ripe to experiment with the effect of giving Medical Field Units permanent bases which would serve defined areas on a broad health front. Accordingly rural health centres were built at Argungu in Sokoto Province, and at Kankiya in Katsina Province, and were opened in 1953. They were sited in each case some 30-40 miles from a hospital for evacuation of seriously ill patients, and were intended primarily for the improvement of rural health by the development of preventive medicine, providing at the same time the curative facilities of a superior dispensary. (Achievement of the prime objective has for various reasons been a slow process.)

1.4. The Rural Health Development Project

In 1958, the Northern Region Ministry of Health began to consider means of consolidating the valuable work of the Yaws Campaign - which by its spectacular results had created much goodwill amongst the local population and rendered them relatively receptive to ideas of improved public health. Plans were discussed with UNICEF, and a WHO Sanitary Engineer surveyed the situation in 1959. In December 1960 UNICEF voted 93,000 dollars for supplies for the first two years of the Project, although technical discussions with WHO were prolonged and the Plan of Operations was not actually signed until July 1962.

1.4.2. This Rural Health Development Project (Nigeria 23), in conformity with the long-term policies which are pre-requisites of WHO and UNICEF assistance, was designed as the basis for a country-wide improvement of rural health which might take 50 or more years to develop fully, but would begin and continue along well-ordered lines; this is implicit in the full title - "Plan of operation for the improvement of rural health services in Northern Nigeria, the strengthening and expansion of training of sanitation and health staff, the creation of a health education department, and the improvement of environmental sanitation" - and its scope extends beyond the schedule of the officer in charge of rural health, embracing also so-called "urban health" and maternity and child welfare. The Rural Health Development Project however, commenced as a field project in the area where the incidence of yaws was maximal before the Yaws Campaign, namely in Idoma and Igala Divisions, and it has been variously referred to as the "Yaws Consolidation Project" and the "Igala-Idoma" Scheme.

1.5. Training

Formal training of Medical Auxiliaries in the Northern Region began at Zaria in 1938, when 15 "Dispensary Attendants" commenced a one-year course under the auspices of the Sleeping Sickness Service. In 1942 this school moved to a model dispensary in the newly-created village of Takalafiya (literally "Walk in Health") adjacent to Anchau of "Corridor" (tse-tse-free) fame. The Annual Report of 1944 records "Training of D.A.s for S.S., Mines and N.A. Dispensaries continued at Anchau under the A.M.O.". This included refresher training of experienced S.S. staff, who took part in the first organised work against C.S.M. in Zaria Province in 1944.

1.5.2. In 1947 a training school for S.S. and M.F.U. Assistants was established at Makurdi for 75 students; the best of those passing out from this course attended further training of 10-12 months duration in laboratory work at Kaduna, where short laboratory and general refresher courses and an advanced course were also held during the ensuing years (1950-51 Annual Report).

1.5.3. Another training school for N.A. Dispensary Attendants was also opened in 1947 at Kano.

1.5.4. On 1st April, 1957, the Makurdi School closed, after training 550 students from all Regions during the 10 years of its operation.

1.5.5. The new Medical Auxiliaries Training School ("MATS") opened at Kaduna in July of the same year with 36 Government students for the 2-year basic course, plus 24 candidates for a 3-months leprosy course.

1.5.6. By 1958 the MATS, with adequate institutional facilities for the first time, was able to take over training of all Medical Auxiliaries, and the last qualifications from the Dispensary Attendants Schools at Kano and Zaria were obtained in this year. These two schools had provided 1-year practical courses, with no teaching of microscopy or other laboratory techniques.

1.6. Problems of evolution of the Rural Health Services.

The MATS "Basic Course" of today consists of 6 months anatomy and physiology followed by 15 months clinical teaching. It caters for the basic needs of Government M.F.U. and S.S. trainees - who have still to learn a great deal of practical work when they leave the School - but has two disadvantages in being geared down to the level of the average Native Authority candidate who forms the bulk of the 80-per-year intake, and in being almost wholly institutional. Staff for the leprosy inspectorate are required to take an additional 6-months training in leprosy which is run in parallel with the "Basic Course" when required. Until this year a minimum of 5 years field work after qualifying from the "Basic Course" was required for admission to the Leprosy Inspectors' Course.

1.6.2. Tse-tse Control Staff, on the other hand, spend the majority of their two-year training period working in the field on tse-tse investigation and control, with a period of about 5 months intensive institutional training at the old Field Station of Katabu, situated in

tse-tse infested woodland 15 miles from the counter-attractions of Kaduna City. Their training is, of course, economically geared to the precise requirements of their work, and is given by the ordinary Staff of the Tse-tse Control Section.

1.6.3. The early development of the Sleeping Sickness Service has now given rise to an anomalous situation, in which the higher ranks of Assistants in this pioneer service are filled by old men recruited in the days before educated boys literate in English were freely available; they are now senior to younger recruits of superior education and in many cases of greater potential, who are naturally impatient of their promotion prospects.

1.6.4. The most recently developed Leprosy Service has for some time been regarded as the plum for promotion prospects; those who were lucky enough to be selected for it were often promoted rapidly to fill the initial vacancies at the top, whilst their contemporaries in other sections were still 2nd class Assistants whose difference in merit was not always equal to the difference in rank.

1.7. <u>The function of rural health staff today</u>

Government rural health staff in N. Nigeria today are called upon to perform a considerable variety of functions, in most of which they develop the necessary skill after completion of their basic training.

1.7.2. It is inevitable at this stage of some of the campaigns that some of these skills should be rather narrow and not to everyone's taste or ability. In the Malaria Campaign some men are required to develop considerable accuracy in the microscopical examination of blood films for malaria parasites, or in the collection and dissection of mosquitoes, whilst others operate in a less technical and more administrative capacity in charge of spraying circuits - sometimes irreverently referred to as "chasing spraymen all about". In the early stages of the Yaws Campaign little was required of some staff other than the giving of injections and dividing the population into those over and those under 15 years of age.

1.7.3. Sleeping sickness staff still need to be largely single-purpose workers during the season when they are engaged on survey work, although during the rains they may be available for more general duties. The Government Leprosy Service, which is almost entirely supervisory, is completely specialised in its function.

1.7.4. In the area of the Yaws Campaign now, however, the medical field unit assistant does need to be a multi-purpose health worker; he is expected to keep accurate records of the progress of the yaws re-surveys, to vaccinate and assess the results of vaccination, to diagnose leprosy and arrange for treatment, and in the near future he will probably embark on tuberculin-testing and B.C.G. vaccination. He should also record any other condition of interest, treating patients as best he may with the limited drugs he can carry to the villages, and be a health educator in respect of a wide field of health matters.

1.7.5. The Tuberculosis Unit based at Jos is a specialised medical field unit under the direction of the Tuberculosis Specialist, in which the main activities are mass tuberculin-testing and administration of B.C.G. Vaccine; MFU staff are also seconded to the Leprosy Section for full-time taking and examination of smears, to a few Medical Officers of Health for school health work, to the five dispensaries manned by government staff, and to the Pilgrim Inoculation Centre at Maiduguri. They may also be called upon in large numbers to deal with any epidemic emergency which may arise - in recent years mainly smallpox and cerebro-spinal meningitis - and in small numbers for work in connection with onchocerciasis and simulium control, and bilharziasis.

1.7.6. Where a medical field unit is based on a rural health centre the various staff need to cover the maximum range of skills and, as will be the case when the health centres open shortly at Ankpa and Otukpa, they should work in close liaison with "Urban" health staff, including community nurses and midwives.

1.8. Rural Health Staff in relation to general trends

At the W.H.O. Rural Health Seminar held at Enugu in November, 1963, at which representatives were present from 20 African Countries, both French and English speaking, there was much discussion on:

(a) Integration of mobile field units with rural health centres

(b) Conversion of the single-purpose mass-campaign rural health assistant into a "polyvalent multi-purpose health worker".

1.8.2. (a) appeared as a firm recommendation of the Seminar - "All the services to the local population should

radiate from the rural health centre and the mobile field unit should therefore be integrated into it".

1.8.3. In Northern Nigeria medical field units have been based on the two health centres opened in 1953 from their inception, although both of these are outside the endemic areas of sleeping sickness and yaws; and (a) is an ideal basis for the later stages of the yaws campaign which is now being followed at Ankpa and Otukpa. The question of integrating sleeping sickness units in this way has yet to arise, when health centres come to be built in main sleeping sickness areas, and the policy in such cases is likely to be influenced by accommodation and communication requirements.

1.8.4. (b) did not emerge as such in the printed summary of the discussion, but much was said in favour of this policy.

1.8.5. However, experience in N. Nigeria does not suggest that the time is ripe for universal 'polyvalence' in the Rural Health Services. The medical auxiliary who will:

(a) Carry out ordinary dispensary treatments;

(b) Run a weekly leprosy clinic, keeping his books in good order and following up defaulters;

(c) Adequately investigate and report on local outbreaks of disease;

(d) Retain his skill in the identification of trypanosomes in gland punctures, carry out efficient local re-surveys and treat and follow up cases of sleeping sickness;

(e) Carry out or supervise vaccinations;

(f) Effectively organise the work of yaws scouts and investigation of infective yaws cases;

(g) Be a persuasive health educator;

is a rarity, if he exists at all.

1.8.6. In much of their respective endemic areas, sleeping sickness and yaws are still too important for abandonment of organised team re-surveys. Junior staff working in ones and twos with a minimum of supervision, usually find their interest flagging for those aspects of their work which require more energy and initiative than examining and treating patients who come to them. The follow-up and record-keeping of sleeping sickness cases treated by non-specialist staff, for example at hospitals, is usually poor; such personnel have too many other duties which keep them fully occupied. Leprosy <u>supervisory</u> staff

have as much work as they can manage efficiently at most clinics in the North, and they will be required to focus their energies on leprosy control for many years to come, although every Dispensary Attendant is trained, and usually obliged, to run a leprosy clinic at his dispensary. In his paper to the Enugu Seminar, the Eastern Region Rural Health Adviser, Dr. K.S. Seal, wrote "Leprosy Inspectors and Medical Field Unit Inspectors in charge of Divisions have become interchangeable". But even here it is later admitted "A weakness of the leprosy control system run by the Dispensary Attendant is that the tracing of defaulters is neglected". However, we have dug our toes in, so to speak, on the integration of leprosy clinics with the work of dispensary attendants, desiring leprosy to be regarded by everyone as an ordinary, moderately infectious disease with no stigma attached to it. We hope that our single-minded supervisory staff will overcome any apathy amongst dispensary attendants for follow-up.

1.8.7. Yaws consolidation, in the sense of placing yaws scouts at dispensaries to carry out case-finding surveys under the instruction of dispensary assistants, was abandoned as unworkable; and the effectiveness of vaccinations left to the initiative of Native Authority vaccinators, who are based at many dispensaries, is negligible compared to that of teams properly organised in the charge of more responsible staff with a definite programme to carry out.

1.8.8. The time will doubtless come when it will no longer be advantageous to maintain separate sections to deal with different diseases, or to have individuals at integrated health centres assigned to deal mainly with single diseases; but it seems probable that for some years many of our staff will need to focus their energies <u>at a given time</u> mainly on single diseases by team effort. Looking ahead to the time when more generalised 'polyvalence' may be practicable, it may however be useful to broaden the experience of suitable younger staff in the near future.

2. Organisation of the Preventive Services Division (Rural Health)

Following upon the departure of various Senior Staff in recent years, there has been a gradual re-organisation; the Officers in charge of the Leprosy Service, Medical Auxiliaries Training School and, (for preventive activities) the Tuberculosis Unit are now responsible to the Senior Health Officer, Rural Health, instead of directly to the Principal Medical Officer, Preventive Services Division. The present organisation is shown diagrammatically on page

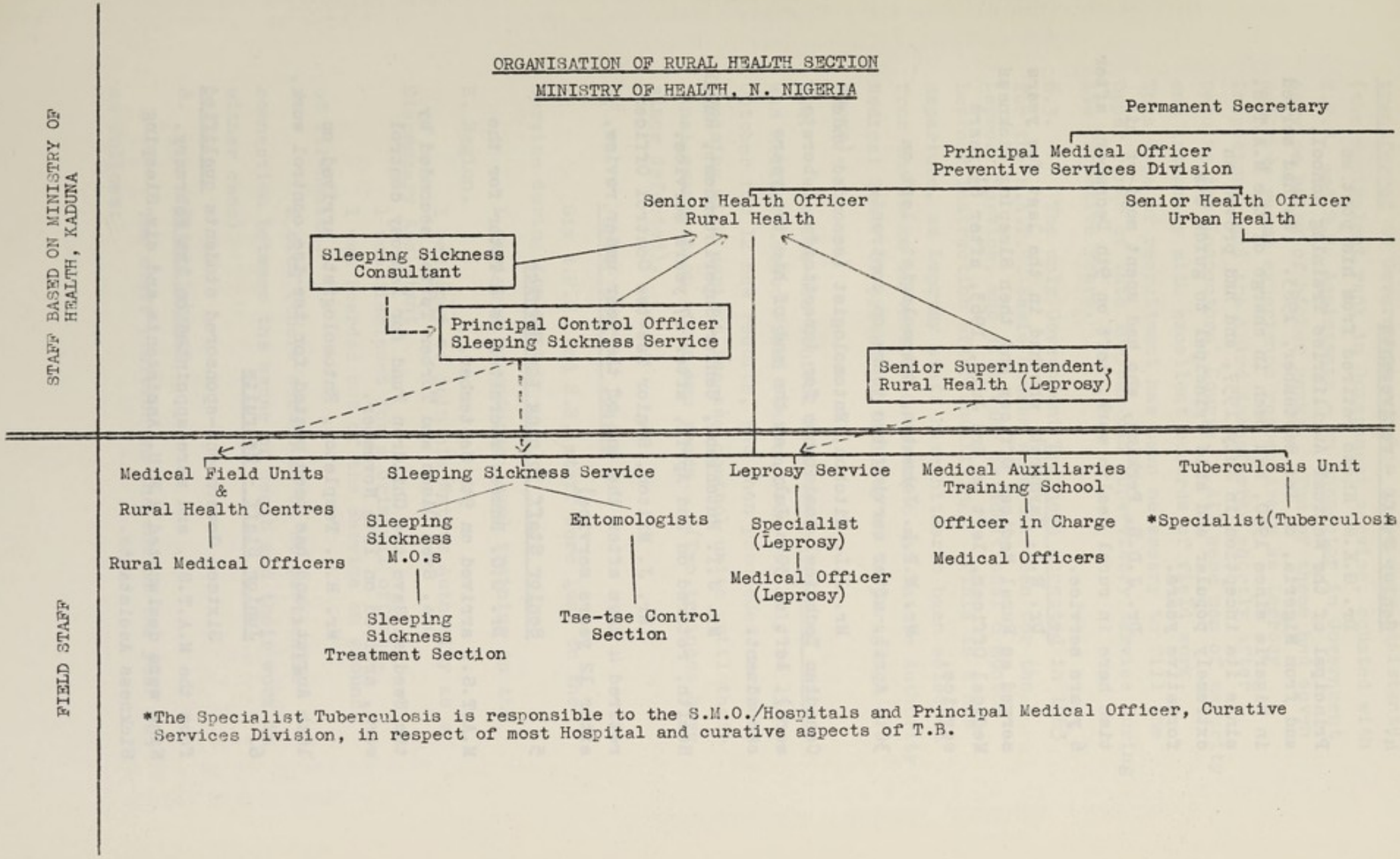
2.2. The Senior Health Officer (Rural Health) is advised on sleeping sickness matters by the Sleeping Sickness Consultant seconded under U.K. Technical Aid, who is based at Kaduna; and on leprosy matters by the Specialist (Leprosy), based at Jos. Much of the head-quarters executive work of the Sleeping Sickness Service (and some of that of the M.F.U.s) is dealt with by the Principal Control Officer, Sleeping Sickness Service; and the executive work of the Leprosy Service is carried out by the Senior Superintendent Rural Health, Leprosy, at Kaduna. The experts on Sleeping Sickness and Leprosy are thus practically free from administrative duties.

3. Senior Staff - general

By mid-year Government Medical Officers in the field on Rural Health duties reached the record low figure of one (at Idah). The R.M.O. Kankiya had to be withdrawn to the Medical Auxiliaries Training School, and the R.M.O. at Argungu had to take over Birnin Kebbi Hospital. As yet neither of these centres has a full-time Medical Officer again, but the Staff position has nevertheless improved, as one R.M.O. has been posted for sleeping sickness work, and another one has been recruited specifically as a Sleeping Sickness Medical Officer. This should help to offset the impending retirement of the Sleeping Sickness Consultant at the end of 1964.

3.2. Nigerians now occupy nearly all the technical posts in the Rural Health Services, the exceptions being the Principal Control Officer, S.S.S., the Senior Superintendent, Rural Health, Leprosy, and one Senior Superintendent of Rural Health.

ORGANISATION OF RURAL HEALTH SECTION
MINISTRY OF HEALTH, N. NIGERIA



*The Specialist Tuberculosis is responsible to the S.M.O./Hospitals and Principal Medical Officer, Curative Services Division, in respect of most Hospital and curative aspects of T.B.

4. Senior Staff - retirements

Dr. G.K.M. Khomo retired from his post as Principal of the Medical Auxiliaries Training School, and from Nigeria, on 1st September, 1963. He had served in Nigeria since 1950, had been in charge of the M.A.T.S. since its inception in July 1957, and had proved an extremely popular and able Principal to guide its formative years.

Dr. J.D.B. Perkins, who had spent most of his time here in rural health work, left on 9th December, after 6 years service.

Dr. R.J. Hayhurst, who had in the last few years served as Rural Medical Officer and then Sleeping Sickness Medical Officer, left on 3rd July, 1963, after 6½ years service.

Mr. M.R.L. Johnston, Entomologist, left on 30th April, after serving two tours on contract.

Mr. J.L. Hitchon, Entomologist (seconded under Canadian Technical Assistance for insecticides Laboratory work), left on 30th July, at the end of his two years secondment.

Mr. J.I. Hutchison, Senior Superintendent, Rural Health, retired on 2nd April, after 17 years service.

(Mr. J. Milton, Senior Tse-tse Control Officer, retired 4 days after the end of the year under review, after 12 years service)

5. Senior Staff joining the Service

Dr. G.G. Bhure, recruited as a Tutor for the M.A.T.S., arrived on 9th September.

Drs. Sven Olsen and Torben Tøfte, seconded by the Swedish Save the Children Fund for leprosy control work, arrived on 11th November.

Mr. R.G. Templeton, Entomologist, arrived on 16th August, and has been posted for tse-tse control work.

6. Junior Staff - Recruits

Sixteen Government-sponsored students qualified from the M.A.T.S., and were appointed on 1st February. Nine were designated M.F.U. Assistants and six Sleeping Sickness Assistants.

6.2. Three Native Authority Leprosy Inspectors transferred to Government service as Leprosy Assistants (the equivalent rank in Government service, equated with M.F.U. and S.S. Assistants - an Inspector in Government service being of higher rank). Two of these had seven and five years experience respectively as Leprosy Inspectors, and the third transferred shortly after passing the Inspectors' Course. All were men of maturity and integrity with excellent records of field work. This type of recruitment has been necessary to fill the upper ranks of this 10-year old supervisory service during its formative years.

6.3. The only Government Trainees accepted in 1963 for the M.A.T.S. Basic Course were thirteen for the Leprosy Service, who will take an additional 6 months Leprosy Instruction after qualifying. (This is a new departure, as Leprosy staff have hitherto been selected from the ranks of various Government and Native Authority Medical Staff of proved suitability as in paragraph 6.2. above).

6.4. A Tse-tse Control Assistants training course was held at Katabu Field Station from 1st July to 15th October for 12 new recuits, who then proceeded on field training with various tse-tse control units until their final examination after two years. (Two trainees have since defected).

7. Junior Staff - losses

Six M.F.U. and S.S. staff were lost to the Service during the year.

1 resigned to undergo legal training in the E. Region.

1 resigned to join his Native Authority as a Dispensary Assistant.

1 was dismissed for a criminal offence.

1 was boarded out of the service on grounds of ill-health.

2 died (there seemed to be no particular connection between the cause of death and their work in either case).

8. Establishment

The staff position as the end of the year was as follows:

	Establishment	Actual	Under Training	Remarks
Senior Health Officer	1	1		
M.O.s of H., Rural Medical Officers	6	1		
S.S. Medical Officers	2	2		
S.M.O. Leprosy	1	-		
Senr. Specialists, Leprosy (or Specialists)	2	1		
Medical Officers, Leprosy	2	-		2 Swedish Tech.Ass.Med.Offrs. Lep.not held against estab.
Principal, M.A.T.S.	1	1		
Medical Officers (Lecturers)	2	2		
Entomologists (MFU and SS)	5	3		One seconded to Malaria Unit
Principal Control Officer	1	1		
Senior Supts.,Supts & Assist.Supts.Rural Health	25	22		Includes staff at MATS. etc.
Medical Field Unit Inspectors	15	15		
Medical Field Unit Assistants	123*	99	10	Trainees due qlfy. Jan. 1964
Senr. Supts., Supts and Assist. Supts, Rural Health, Sleeping Sickness Service	10	9		
Sleeping Sickness Inspectors	12	12		
Sleeping Sickness Assistants	140*	127	12	Trainees due qlfy. Jan. 1964
Senr. Control Officers, Cont. Officers and Assist. Cont. Off.	22	13	5	Last expatriate Cont. Offr. retires 4th Jan., 1964.
Senr. Tse-tse Cont. Inspectors & Tse-tse Control Inspectors	10	7		
Tse-tse Control Assistants	78	66	12	Trainees due qlfy. 1965
Senr. Supt., Supts and Assist, Supts., Rural Health, Leprosy	16	9		
Leprosy Inspectors	15	9		
Leprosy Assistants	15	6	13	Trainees due qlfy. 1965

(Plus Artisans, Storekeepers, Laboratory Attendants etc.)

* Two M.F.U. Assistants and 2 S.S. Assistants were undergoing a leprosy training course with a view to converting to Leprosy Assistants if successful at the examination in April 1964.

9. TRAINING

9.1. General

Combined training of Government and Native Authority recruits by the 2-year Basic Course has continued at the Medical Auxiliaries Training School (M.A.T.S.). See comments under paragraph 1.6.

9.1.2. The new 3-storey School Block and 4-storey Hostel, of modern design, were opened by the Premier of the Northern Region, Alhaji Sir Ahmadu Bello, on 18th April. The old buildings are being used by another Ministry, except for the "Town Dispensary" (which is still the main centre for clinical teaching) and the old Hostel.

9.1.3. There are now 4 tiered classrooms of 40 students capacity each, 3 laboratories, and 6 "Tutorial" rooms, (of which one is used as a museum, another as a model Dispensary and a third for visual aids).

9.1.4. Residential capacity has been increased from 75 to 153.

9.1.5. Class size averages 45 students, and there are two parallel sets of classes for the Basic Course which now caters for an intake of 90 students per year - a total of four classes altogether (2 first and 2 second year).

9.2. Courses completed

Seventy-three students qualified out of 74 who took the Basic Course Final Examination in January 1963, but 17 of these were Mission students who trained elsewhere than at M.A.T.S. The figures were as follows:

Sponsoring Authority	No. who sat the examination	No. successful
Government	16	16
Native Authorities	40	40
Missions	18	17
	74	73

9.2.2. In addition:

(a) 33 N.A. Dispensary Assistants underwent a Refresher Course (May to October);

(b) 78 N.A. Leprosy Attendants were trained at the 12th and 13th 3-month courses.

(c) 32 Assistant Leprosy Inspectors qualified in April after a 6-months Course. (A further course commenced in November 1963).

9.3. Teaching Staff

At the end of the year Teaching Staff at MATS consisted of:

3 Medical Officers
4 (Senior Supts. / Supts. / Assistant Supts.)
6 M.F.U./S.S. Assistants
1 Laboratory Technician
4 Leprosy Assistants.

9.3.2. A number of changes were made, and technical staff who had spent many years at M.A.T.S. were exchanged for others who came direct from experience of field work.

10. MEDICAL FIELD UNITS/RURAL HEALTH CENTRES

Nos. 1 and 6 Medical Field Units based on Makurdi (40 M.F.U. Assistants and higher ranks) continued Yaws re-survey work in Benue, Kabba, Plateau, Adamawa, Sardauna and Zaria Provinces, combining this with vaccination and leprosy case-finding. The Igala and Idoma teams came under the technical supervision of the Rural Medical Officer Idah; they will be separated from the Makurdi base altogether as no. 6 M.F.U., as from 1st April, 1964. It is hoped to introduce regular tuberculosis prophylaxis into the work of the Teams after a limited trial. Receptivity to such measures varies, and in some areas even smallpox vaccination is reported to be making the yaws resurvey work difficult, indicating the need for caution.

10.2. No. 3 M.F.U. and the Rural Health Centre, Argungu (9 M.F.U. Assistants and higher ranks) continued general rural health duties in Western Sokoto. The normal sphere of operations of this Unit is Argungu Emirate and the areas covered by 4 adjacent Dispensaries of Gwandu Emirate, but in time of need it operates widely, and early in the year the Rural Medical Officer was made responsible for organising the control of cerebro-spinal-meningitis in the whole of Sokoto Province, with additional staff and transport seconded from other M.F.U. and S.S. Units.

10.2.2. A trial of a new sulphonamide drug, RO 4-4393, was made (see para. 23.8). In addition to Dispensary supervision, mass vaccination, and treatment of local measles epidemics, an effort was made by the Health Centre Staff to organise a "Clean up the Town" campaign, similar to those organised elsewhere with success. however, in

spite of the existence of the Health Centre here for a decade, ultra-conservatism prevailed, and the Townspeople proved that they were not yet ready for such community efforts in the field of health. There were 24 deliveries at the Health Centre during the year. Maternity and child welfare clinics are still largely attended by sick people, rather than being attended regularly before sickness develops.

10.3. No. 4 M.F.U., Keffi (13 M.F.U. Assistants and higher ranks). This has continued Yaws resurveys in parts of Benue and Kabba, combined with mass vaccinations, as for Nos. 1 and 6 Units.

10.4. No. 5 M.F.U. and Rural Health Centre, Kankiya (11 M.F.U. Assistants and higher ranks). The Rural Medical Officer was withdrawn at the end of August to M.A.T.S., and overall charge of a Rural Health Centre passed for the first time to an "Urban" Health Superintendent (who was the most senior of the various staff posted to the Centre).

10.4.2. The local response to the Health Centre here has always been positive, and it has therefore been able to fulfil the functions for which it was provided - especially the improvement of environmental hygiene. Town drainage, walling of dangerous borrow-pits and provision of pit latrines are measures which the people have accepted and have been prepared to provide for themselves with the advice and co-operation of Health Staff.

10.4.3. Compulsory registration of births and deaths continued in Katsina Province, with no significant change in the crude rates from last year.

The mortality rates are obviously far too low to be true, and the classification of causes very inaccurate, but the Katsina system is an invaluable advance on anything else of this nature we can show. An epidemic with hundreds of fatalities such as that reported in Southern Gwandu in para. 25.2 would probably have been cut short by medical assistance in the presence of such a system.

10.4.4. Kankiya is now a field training centre for students from the School of Hygiene, Kano, and it is used as the centre for the World Health Organisation "D.D.V.P." insecticide vapour trials against malaria mosquitoes.

10.5. Other Health Centres

Health Centres constructed by Government, with equipment supplied by UNICEF, were completed at Ankpa and Otukpa in 1962, and will be opened shortly now that UNICEF water-supply equipment has arrived. These two centres are quite elaborate, and will serve as the main centres of environmental health activity in Igala and Idoma respectively, in connection with the Rural Health Development Project mentioned in the introduction (see para. 1.4.)

10.5.2. Up to the present the term "Health Centre" has been used mainly in a restricted sense in Northern Nigeria, implying a government institution providing dispensary and maternity and child welfare facilities, plus an office for development of environmental hygiene. However, in conformity with W.H.O. and UNICEF terminology, local authority units which provide similar facilities should now be designated "Local Authority Health Centres".

11. THE TUBERCULOSIS UNIT

11.1. The present Unit was established at Jos in 1961. It now consists of a Specialist, a Nursing Superintendent, a Superintendent of Rural Health and 12 rural health assistants, with a headquarters in the grounds of the General Hospital.

11.2. There are 4 wards with 89 beds, the nursing staff of which are under the direct supervision of the Specialist; X-ray facilities of the General Hospital are used - there is no mass X-ray machine at present.

11.3. Five out-patient clinics in the Jos area are held fortnightly by the Nursing Superintendent from Jos, and these provide out-patient treatment for 260 patients (December 1963).

11.4. Laboratory facilities at Jos are confined to direct examinations of smears and culture of tubercle bacilli, but 110 drug sensitivity tests were performed during the year on Jos patients by the W.H.O.-assisted Federal Laboratory at Lagos. Forty-three valuable hospital beds are occupied by patients harbouring drug-resistant bacilli; these people have little chance of recovery, but it is some consolation that this potential public menace is safely sequestered.

11.5. In pursuance of the first-phase policy of protecting those population groups most at risk, 110,271 Heaf tests were carried out during the year, and B.C.G. vaccination was given to 91,580 persons. Four provinces - Sokoto, Katsina, Kano and Bornu - remain to be tackled in this way during 1964, and the next phase of our attack is under consideration.

11.6. A comparative survey carried out amongst the tin-mines workers and other groups on the Plateau suggested a considerably higher tuberculosis risk amongst the mines workers.

12. THE RURAL HEALTH DEVELOPMENT PROJECT

12.1. The origins of this have already been described in the Introduction (para. 1.4.).

12.2. As its full title (para. 1.4.2.) indicates, this Project covers a wider field than that of the Senior Health Officer, Rural Health, but brief mention will be made here of all its aspects.

12.3. The Igala-Idoma part of the R.H.D.P.

The first phase of this aspect of the Project aims to provide, for a population of about 360,000, a medical administrative unit with 3 Government Health Centres each surrounded by 8 or 10 Native Authority dispensaries (totalling 26) serving contiguous areas, and constituting a large bloc in the heart of the worst yaws endemic area.

12.3.2. There would thus be one Government Health Centre for every 120,000 persons, and one dispensary for every 14,000 persons. Six dispensaries are to have Maternity Units attached, and assuming that Health Inspectors or Assistants are posted to them they will in fact constitute the "Local Authority Health Centres" mentioned in para. 10.5.2.

12.3.3. This building schedule is linked to an environmental sanitation programme, the spearhead of which is the provision of water-supplies. The necessity for these is illustrated by the position at Otukpa, where the nearest surface water is five miles away, and the water-table is at a depth of 500-600 feet. It is planned to encourage here the orderly development of a model village;

people should be attracted by water supplied from bore-holes (for which UNICEF is providing equipment), and by the adjacent Health Centre facilities, and it is hoped that these will induce them to submit happily to the discipline imposed by town planning and improved housing design.

12.3.4. Participation in the Project can be summarised as follows:

(a) Government - overall supervision and running of the Project; training of staff; provision and staffing of 3 Health Centres.

(b) Native Authorities - provision of Local Authority Health Centres and dispensaries and their staff according to a schedule, and co-operation in all Public Health measures initiated by the other parties.

(c) WHO - planning advice and provision of Advisory Personnel (W.H.O. Sanitary Engineer at present).

(d) UNICEF - provision of equipment etc. for Government and Local Authority Health Centres, dispensaries, water-supplies and environmental sanitation measures; provision of transport for the Health Centres.

12.3.5. Progress

By the end of 1963 the first 2 government health centres were ready for opening as soon as the UNICEF water-supply equipment should arrive and be installed (this is now being done).

12.3.5.2. There are now 6 dispensaries out of the 10 scheduled for the Ankpa area, two having been opened during 1963. In the Otukpa area two dispensaries already under construction will bring the total up to the eight required, and one of the three maternity and child welfare units required is also under construction. The Igala Native Authority in particular has made an excellent provision of trained M.C.H. staff, with 3 Community Nurses and 7 Gr. II Midwives already qualified, and a further 7 Gr. II Midwives under training.

12.3.5.3. The development of a comprehensive environmental sanitation programme in this area began with the arrival of Mr. V. Pinto, W.H.O. Sanitary Engineer, in July 1963. His survey report of the Ankpa area provides detailed basic information for development of the programme.

12.3.5.4. A few points from the Report should be mentioned:

Population density, 30 per sq. mile.

Child mortality rate (0 - 15 years), 358 per 1,000

90% of the population relies on streams for water-supply; wells are scarce, as the water table is low; some villages are over 5 miles from the nearest water-source. However, collected roof-rainwater is used during the rainy season.

Latrines are available to 25% of the population, but only 1.6% of all households have satisfactory latrines. The health hazard posed by indiscriminate dafaecation is considerable, but local beliefs and customs will necessitate considerable efforts and research into health propaganda methods, if a programme of mass latrine construction is to succeed. Local housing is deficient particularly in respect of lighting and ventilation.

A town plan for Ankpa has been prepared.

12.4. Training of staff

This aspect of the Plan of Operations is primarily concerned with:

(a) Community Nurses - improvement of facilities of the Kaduna Training Centre with an increase in student capacity. By the end of 1963, 31 community nurses, 19 Native Authority and 12 Government, had qualified, and a further 18 were under training. Qualified grade II Midwives are given a 6 months midwifery refresher course at the General Hospital, followed by 12 months clinic and domiciliary work based on the Community Nurses Training Centre. This is of mud construction and simulates the conditions under which these girls will work after qualifying.

(b) Health Staff (meaning so-called "Urban" Health Staff, i.e. those trained in environmental sanitation) - the improvement of institutional facilities at the Kano School of Hygiene and the development of practical field training, especially in the Igala-Idoma Project area and in the environs of Kankiya Rural Health Centre. The Kano School now accommodates 72 students in a 2-storey hostel with modern facilities. During the 4-year period 1960-63, 104 students qualified from the 2-year course for Health Assistants (70 Native Authority and 34 Government-sponsored), and a further 48 are expected to qualify in February 1964. Recruitment for the 3-year Health Inspectors Course has been disappointing; only seven candidates, all Government-sponsored, qualified during 1960-63. The 16 Health Assistants who have been

undergoing their field training in the Igala-Idoma area have benefitted from field and classroom instruction by the W.H.O. Sanitary Engineer stationed at Idah.

12.5. Health Education

The establishment of a Health Education Unit as envisaged has been held up by shortage of suitable staff who could be spared from other duties; it will probably be set up in a small way in Zaria during 1964.

ENDEMIC DISEASES

13. TRYPANOSOMIASIS
(By Dr. M.P. Hutchinson, Sleeping Sickness Consultant).

13.1. General Review

There has been no major change in the pattern of routine work carried out by the treatment staff. Their duties include team surveys and surveys carried out by assistants attached to fixed treatment centres. The regular examination of all labourers and their families in the mines and timber camps have continued in the endemic areas around the base of the Jos plateau. The number of prophylactic injections of pentamidine has been increased by the inclusion of local labour in the scheme. The need for continued control remains in view of the presence of infection in some of the surrounding villages, the greater contribution of local people to the labour force and the potentially dangerous conditions of man-fly contact that still exist within the mining concessions.

13.1.2. The Maiduguri Railway Extension Project is now well advanced and most of the construction work that remains to be done is to the east of Buni. Regular six-monthly pentamidinisation of all labour has followed preliminary examination and prophylaxis on first employment. It is intended that the prophylactic campaign should now be allowed to run down, new contracts east of Buni not being included. All who are still under pentamidine protection will continue to receive it until the end of their present phase of work.

13.1.3. Voluntary cases have also been treated at Dispensaries and Hospitals, whether Government, Native Authority or Mission. The returns are given under the relevant headings for each Province later in the report.

13.1.4. In more and more areas, the team surveys have tended to concentrate on selected village groupings at risk. For this reason, the figures for infection rates cannot be compared with previous returns for complete districts.

13.1.5. For the year, the total returns may be analysed as follows:

	Number Examined	Number of Cases New	Clinical	Relapse	Total Cases	% S.S.
Mobile Team Resurveys	1,240,252	880	73	109	1,062	0.08
Dispensary Resurveys	326,417	294	39	46	381	0.11
Mines, etc. Surveys	50,233	27	-	-	27	0.05
Voluntary Dispensary Cases	-	506	176	236	918	-
Voluntary Hospital Cases	-	155	103	93	351	-
		1,864	391	484	2,739	

13.1.6. The number of cases diagnosed by the teams was considerably lower this year, although still in excess of the figure for 1961. The Piti and Kogin Kano foci accounted for much of the difference in 1962; both these foci remain active and continue to produce new cases but the total returns from them have been reduced by the repeated surveys.

13.1.7. Map 1 shows the areas which produced the greater part of the cases reported during the year. Compared with 1962, the only new feature is the appearance of the small but explosive epidemic east of Gombe in an area originally considered outside the main endemic zone. This outbreak, which has developed in less than two years, is related to a very limited focus of fly (G. tachinoides) which had become established in a forestry plantation and had spread to small mango plantations nearby in what is otherwise open farmland. A house-to-house survey was carried out. The limited fly focus was treated by insecticidal spraying and a further medical survey will be undertaken this dry season. The small outbreak occurred quite silently and was not reflected in any rise in voluntary attendances at the nearest hospital only 8 miles away.

13.1.8. The focus on the Kogin Kano, described last year, was found to have spread to two neighbouring village areas in the next district. Pentamidine prophylaxis was undertaken early in the year and will be repeated this dry season to cover the larger population now found to be at

risk. In addition, insecticidal spraying has been carried out as a vector control measure and is described under the Control Section. This focus of infection is of particular importance as it lies astride the main Kano-Zaria road.

13.1.9. The other focus of importance, mentioned in the 1962 report, was that in south-east Zaria Province at the base of the Jos plateau and centred on the Piti area. This focus continued to occupy a considerable number of staff, both medical and tse-tse control; new cases continue to occur in spite of the very thorough search in the compound by compound surveys. Gland punctures were performed on over 12% of the population examined, a comparable proportion with that from the previous survey. Fly had tended to re-invade the sprayed area during the year, especially from the west and north. The very considerable increase in the number of Fulani settling in the area and the vast increase in the number of head of cattle, all make the possible spread of fly in this small area more likely. Spraying has been repeated for the third season and has been extended down the R. Gurza as there was evidence this year of a spread of trypanosomiasis westward into the areas of new farmland only recently opened up in Kauru District. The picture there is a constantly changing one and local conditions are developing comparable with those that occurred between 1956 and 1961 on the R. Madachi, a tributary of the R. Mariri, and led to an epidemic outbreak in the surrounding compounds with an infection rate of 22% at the time of the survey in 1961-62. The search for new farmland is resulting in a very rapid opening up of the wood-land to the westward and the creation of new points of close man-fly contact with the vector habitats becoming more restricted. The whole of this area is in a state of change and will require constant vigilance as the conditions for the vector are being altered all the time and in some areas are being made temporarily more dangerous to man.

13.1.10. Benue Province continues to provide over one third of all the cases reported from N. Nigeria. Within the Province, Wukari and Tiv Divisions constitute the most important areas with south-west Tiv showing the most clear cut focus. To the east, the riverine area along the R. Benue up to Lau in Adamawa continues to provide new patients while the more isolated focus in Kungana on the Yola-Takum road is still active; indeed, two surveys were undertaken of the second area and more fresh cases were found after the rains than before. It is considered that the small community involved will require to be brought

under pentamidine prophylactic coverage this year; vector control measures are hardly feasible in the area.

13.1.11. The remaining two most important spheres of activity are in Bauchi, around the upper tributaries of the R. Gongola where there is an extensive riverine focus involving parts of a number of districts, and the equally dangerous focus all around Bida Town in Niger Province.

13.1.12. As can be seen from Map 1, all these focal areas are widely separated. Survey results from the areas between reveal only very low levels of infection.

13.2. Therapy

Although combinations of Antrypol and Tryparsamide remain the standard treatment for early, previously untreated, cases, Melarsen is being used in increased quantities in N. Nigeria. It is now employed for the treatment of those patients who have relapsed following previous treatment with other drugs or who are in a late stage of the disease when first seen. (Both MelB and MelW are valuable drugs but can contribute little to the therapeutic picture here; the vast majority of patients in N. Nigeria are treated under field conditions which are utterly unsuitable for the administration of either of these drugs.) Following satisfactory results from trials with Melarsen spread over six years, the drug was introduced into wider use in 1955. Since that time the number of patients receiving Melarsen has risen from 21 in 1955 to 762 in 1963, representing one quarter of all those treated in this year. With the increasing number of patients being treated with this drug, the number relapsing after its administration has also risen but the proportion is still only about one third of that relapsing after the standard courses of treatment - and this is in spite of the fact that those receiving Melarsen in the first place constitute a poorer risk by the very nature of the conditions of selection.

13.3. Deaths

The returns for deaths among sleeping sickness cases are very unreliable as such deaths are seldom reported, the disease being a rural one. Those notified, therefore, represent the barest minimum.

13.3.2. During the year, 26 deaths were traced among known sleeping sickness cases but undoubtedly these figures are but a small proportion of the true total. For instance, 12 alone were traced during the course of the

back check of old cases in the Piti area, although none had been reported officially. The distribution of reported deaths among S.S. patients was as follows:

Benue	4	
Niger	1	
Kano	4	(2 from S.S.; 2 from other causes)
Wamba	4	(2 from S.S.; 2 from other causes)
Zaria	12	(all from the Piti area - 3 definitely and 4 probably from S.S.; 5 from other causes)

13.4. Provincial Distribution

In the following table the proportional distribution of cases, notified during 1963, is shown by Province, the figures for the previous five years being included for comparison:

Province	1958	1959	1960	1961	1962	1963
Adamawa	2.3%	2.7%	2.3%	2.0%	3.9%	3.4%
Bauchi	12.1%	10.6%	9.8%	11.1%	6.2%	12.6%
Benue	33.1%	31.9%	36.5%	38.3%	39.1%	34.6%
Bornu	0.5%	2.1%	1.4%	0.9%	1.2%	0.2%
Ilorin	0.2%	0.0%	0.0%	0.0%	0.0%	0.6%
Kabba	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
Kaduna C.T.	0.5%	0.3%	0.3%	0.4%	0.5%	0.6%
Kano	15.9%	17.5%	13.7%	6.1%	12.0%	9.8%
Katsina	1.2%	1.7%	1.0%	1.5%	2.2%	1.1%
Niger	9.2%	11.0%	8.7%	7.3%	6.4%	6.6%
Plateau	11.5%	8.4%	11.4%	19.5%	8.5%	8.4%
Sardauna	-	-	0.1%	0.0%	0.0%	0.8%
Sokoto	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Zaria	13.3%	13.8%	14.8%	12.8%	20.0%	20.8%

13.4.2. There is little change in the order, Benue continuing to provide over one third of the total number of cases notified. Bauchi has risen from fifth to third place, largely due to the new small outbreak in Yamaltu District of Gombe Emirate. In Zaria Province the focus in the south-east continues to provide the bulk of the cases.

13.5. Adamawa Province

	Number Examined	S.S. Cases	% S.S.
Team Resurveys	44,360	88	0.2
Voluntary Cases at Hospitals		5	
TOTAL S.S. CASES		93	

13.5.2. During the year the greater part of Wurkum District on the north bank of the R. Benue was surveyed but no unexpected focus of infection was detected. With this exception, elsewhere surveys were concentrated on selected village areas along both banks of the R. Benue in Muri

Division and in the Kungana area of Bakundi District where long-established foci exist and where annual checks have been carried out over the last three years.

District	Number Examined	S.S. Cases	% S.S.
Wurkum	35,366	9	0.02
Muri (selected village areas)	3,529	28	0.79
Jalingo " " "	1,774	15	0.84
Bakundi 1. (Kungana & Kwossa)	1,911	16	0.85
Bakundi 2 " "	1,780	20	1.12

13.5.3. Since only selected areas were examined in Muri and Jalingo, the figures for infection rate cannot be compared with those given in last year's report. New cases were found in each of the known foci, such as around Amar and Kamberi, but in smaller numbers than at the previous survey. Nevertheless, since anti-tsetse measures are hardly practicable in this extensive but scantily populated focus along both banks of the R. Benue as far east as Lau, the detection of this number of fresh cases after only one year emphasises how vital it is that annual surveys should continue. Pentamidine prophylaxis is not advised (unless the situation should deteriorate) since there is a very considerable, constantly changing, population along the river banks of fisherfolk and travellers over whom there is very little control.

13.5.4. The situation around Kungana itself continues to provide cause for anxiety. This is a dangerous focus lying on the main Yola-Takum road. It will be noted that more cases were diagnosed in the second survey after the rains than in that undertaken earlier in the year. The same team undertook both so that the standard of diagnosis was presumably the same. The incidence of new cases after only one farming season was therefore alarming. Here, with a well-defined community and a fairly static one, the question of pentamidine prophylaxis will have to be considered during the coming year. The Tiv migration into and through this area is an added factor that must be taken into account.

13.6. Bauchi Province

	Number Examined	S.S. Cases	% S.S.
Team & Dispensary Resurveys	291,969	252	0.08
Mines Examinations	20,194	4	0.02
Railway Extension Exam.	11,320	8	0.07
Voluntary Cases at Hospitals and Dispensaries		77	
TOTAL S.S. CASES		341	

13.6.2. The number of cases for the Province shows a very considerable rise over the 1962 figure, due solely to the increased number revealed by surveys (252 as compared with 104 in 1962). The continued decline in voluntary attendances at Hospital and Dispensary further emphasizes how valueless such returns are as an indicator of the true situation in the field.

13.6.3. Bauchi Division

(a) Bauchi Emirate

District	Number Examined	S.S. Cases	% S.S.
Lame	51,416	25	0.05
Ganjua	25,417	22	0.09
Jama'a (selected village areas)	9,182	24	0.26
Bula " " "	7,305	37	0.51
Duguri " " "	2,056	20	0.97
Zungur " " "	6,853	22	0.32

The situation in Lame District continues to be satisfactory. This covers much of the area in which there are numerous mining camps which are kept under constant observation by S.S. staff attached to Rishi and Pengel Dispensaries (see below).

The survey of Ganjua District is still continuing, the figures up to the end of the year covering the northern part of the District.

During the year, the specialised survey continued along the R. Duguri, R. Majuju and R. Bagel in order to define more clearly the extent of the riverine focus which runs through several Districts but involves only a small part of each. The correlation of data regarding the distribution of cases by compound, together with a careful mapping of the area for all fly foci, is making it possible to build up for the first time an accurate picture of this focus. Undoubtedly, there is a tendency for the disease to increase here although at present it appears to be contained - if only precariously. This area will need to be kept under the closest observation for some time to come.

(b) Dass N.A.

	Number Examined	S.S. Cases	% S.S.
Dass (selected areas)	14,907	1	0.006

Only a part of Dass was examined; the object was to survey all that area adjacent to the R. Bagel in order to see whether there was any evidence of a continuous focus

between that present to the east near Dull and Zungur and that further west and up-stream near Rimin Ziam in Jama'a. The absence of cases was therefore reassuring. Certain sites were noted where the fly situation was potentially dangerous if once infection was introduced into the area. The value of the present survey methods is to pinpoint such places which can then be kept under periodic examination as an indicator of whether or not a fuller survey is required.

(c) Ningi Chiefdom

District	Number Examined	S.S. Cases	% S.S.
Warji	20,763	23	0.11
Ciroma	7,752	10	0.12

These two Districts, although only examined in 1962, were resurveyed and Ningi Town itself was also included. The surveys were a preliminary to the commencement early in 1964 of the Tsetse Control Project in the area by insecticidal spraying. The foci are limited in both Districts but have proved persistant, fresh cases being diagnosed at each survey with monotonous regularity. It is hoped that the tsetse control project, involving the R. Bunga and its tributaries and including the R. Galala on the Bauchi-Kano Provincial border, will finally bring these foci under control.

13.6.4. Gombe Division

(a) Gombe Emirate

District	Number Examined	S.S. Cases	% S.S.
Yamaltu (part)	10,368	63	0.6

The small but explosive outbreak in Yamaltu District was the most striking event of the year. The area was covered two years ago during the survey undertaken 10 miles on either side of the Bornu Railway Extension track. At that time, one patient was found positive at the village of Kanawa, some 8 miles east of Gombe Town. Sleeping Sickness had not been reported from this locality before. Following a complaint by Gombe N.A. this year about the presence of tsetse in the small Kanawa N.A. Forest Plantation which lies astride the Gombe-Dadin Kowa road, a resurvey of the area revealed 63 new cases in those hamlets closely related to the plantation. One hamlet within 200 yds. of it had an infection rate of 13% and there was evidence of recent

depopulation. G. tachinoides were present in large numbers in the plantation but appeared most concentrated by the road bridge; it would seem that they were depending almost entirely on man for their food supply. The plantation was established about 25 years ago. Local enquiries revealed that fly had been noticed for about 10 years but had only become a definite nuisance over the last 4 years. The stream, running through the plantation, provides one of the only sources of surface water in the dry season for Kanawa and some of the hamlets of Kwadam. There is therefore a very close and frequent man-fly contact at this point, swelled to even greater proportions on market day when so many stop to wash or rest by the bridge. This fly focus and the pockets of fly found in relation to groups of mango trees further down the stream are all isolated by several miles of open river from the main fly focus on the R. Gongola.

With one exception, all the cases were early with large soft typical cervical glands and no changes in the cerebro-spinal fluid. The one exception was a very late case who originally had worked as a well-digger in Bauchi Division until his sickness had caused him to seek local treatment and he had come to live with his mother near Kanawa. He provided the only possible link between the known endemic area to the west and this new isolated focus. The disease otherwise appeared comparatively avirulent but highly transmissible since there was no evidence that cases had been missed two years ago. One forest guard and two labourers in the plantation together with one man working on the road were among those infected. The infection of the forest guard provided a further link with other N.A. plantations and surveys of two of these revealed fly also present there. However, local medical surveys did not reveal the establishment of any new focus of infection, and the other plantations did not provide the same set of circumstances giving rise to the most close and personal fly contact experienced by the Kanawa bridge.

Owing to the isolated and limited nature of the fly focus, control by spraying was clearly indicated and this was carried out at the end of the year. The population will also be surveyed now to eliminate the few cases that will inevitably have developed between the time of the survey in July 1963 and the time that spraying could be carried out which was after the harvest in December.

This outbreak has been dealt with at length as it serves as a salutary reminder of how such outbreaks can occur silently and unexpectedly. Such man-made fly foci are constantly being created either as forest or firewood plantations or plantations of mango, cola, tukuruwa and the like. Only a few may provide all the other factors necessary for an outbreak of sleeping sickness, such as the type of man-fly contact that exists and the factors influencing the possible introduction of infection from outside. Yet, it is almost impossible to foresee which foci are going to create a problem; those that do so may develop quietly. For instance, this outbreak only 8 miles from Gombe, had not been reflected in the number of cases attending voluntarily at the Hospital there and, indeed, the survey showed that many of the positive cases would not have sought treatment for a considerable time while yet remaining highly infective to fly.

(b) Tula - Tangale - Waja Federation

District	Number Examined	S.S. Cases	% S.S.
Waja	8,146	1	0.01
Kaltungo	8,616	0	0.00
Biliri	816	0	0.00

The surveys were undertaken of selected areas to check on reports of fly and the presence of suspected cases of sleeping sickness. The results have so far been reassuring and no new focus was confirmed.

13.6.5. Katagum Division

District	Number Examined	S.S. Cases	% S.S.
Sokwa	15,569	0	0.00
Shira	64,666	1	0.001
Udubo	25,625	2	0.007

The situation in this area remains very satisfactory. The effect of the Tsetse Eradication Scheme, carried out by the Tsetse and Trypanosomiasis Unit of the Ministry of Animal and Forest Resources, is being well reflected in the survey findings. The successful completion of its programme along the R. Jamari or Katagum will further protect the human population in this area.

13.6.6. Railway Extension Scheme

Routine examination of all new labourers and their families was continued by staff allocated to this task and based on Bauchi, Gombe, Jerikwam, Tongo, Ashaka

and Buni. All labour received pentamidine on first employment and then every six months. During the year 11,236 pentamidine inoculations were given to labourers and some of the families. Vaccination was carried out on first inspection.

It is noteworthy that this year 8 cases were detected amongst new entrants or their families and this may partially reflect the recent slight increase in Bauchi and the outbreak near Gombe. No case has been confirmed among those receiving regular pentamidine.

13.6.7. Mines Examinations

The mines camps in the Rishi and Pengel areas of Lame District are examined every three months. During the year 20,194 examinations were carried out and 4 new cases were diagnosed. Only one small mining group near Pengel continues to receive pentamidine prophylaxis every six months, in all 150 inoculations being given. The situation in this mining area is at present satisfactory and the recent full survey of the District confirms the general impression. However, with such a migrant population, there can be no relaxation of the present regulations regarding routine examination since the points of man-fly contact are sufficiently widespread to present many potential foci of infection if the disease were allowed to silently re-establish itself.

13.6.8. Voluntary Cases

Voluntary cases were recorded from the following Hospitals and Dispensaries:

	New	Clinical	Relapse	Total
Bauchi Hospital	8	6	9	23
Gombe "	1	2	1	4
Azare "	1	3	4	8
Rishi Dispensary (S.S.)	-	1	-	1
Pengel " (N.A.)	1	6	-	7
Nabardo " "	3	-	1	4
Ningi " "	13	2	10	25
Giade " "	-	1	2	3
Katagum " "	-	1	1	2
Gadau " "	1	-	-	1

13.7. Benue Province

	Number Examined	S.S. Cases	% S.S.
Team Resurveys	204,155	140	0.06
Dispensary Resurveys	121,804	176	0.14
Mines Examinations	5,348	0	0.00
Voluntary Cases at Hospitals and Dispensaries		631	
TOTAL S.S. CASES		947	

13.7.2. Team Resurveys

(a) Tiv Division

District	Number Examined	S.S. Cases	% S.S.
Mbawa	4,984	12	0.24
Mbatie	9,277	6	0.06
Mbagwen	9,256	4	0.04
Mbayongo	11,707	2	0.02
Mbaduku	11,771	4	0.03
Nyiev	9,732	11	0.11
Mbayion	673	1	0.15
Gambe Tiev	10,521	8	0.07
Gambe Ya	6,457	5	0.07
Saghev	4,668	4	0.08
Abinsi	2,563	0	0.00
Shangev Tiev (selected area)	5,895	15	0.25
Gboko Prison	1,397	1	0.07

There was a considerable drop in the number of patients diagnosed through team surveys; this was largely due to the selection of Clan Areas that were scheduled for re-examination. Only in Shangev Tiev was a selective survey undertaken to check on the known focus in the vicinity of the R. Nyumula which was sprayed last year. Few cases are to be found east of the R. Katsina Ala but unfortunately attendances were least good in these areas, dropping to 60% in Gambe Ya. In addition, the survey of Abinsi, which includes a chain of riverine communities on both banks of the R. Benue, was poorly attended with only about one half of the population being examined. In the Clan Areas bordering Obodu District of Ogoja Province (E. Nigeria), attendances have been good and it has been reassuring to find so few cases in this region which at one time constituted an important focus. Only in Kbawa and Nyiev along the main road north from Makurdi the overall infection was between 0.1 and 0.3%.

(b) Wukari Division

District	Number Examined	S.S. Cases	% S.S.
Takum (part)	26,023	38	0.14

This survey, which is still in progress, shows the same steady level of infection as previously noted; there is one small but noticeable pocket by the R. Donga; the greater part of the cases however come from the south-west of the District.

(c) Lafia Division

District	Number Examined	S.S. Cases	% S.S.
Doma	29,909	6	0.02
Assaikio	39,114	19	0.05
Obi	20,208	4	0.04

13.7.3. Dispensary Resurveys

Division	Dispensary	Number Examined	S.S. Cases	% S.S.
Tiv	Abinsi	6,248	3	0.04
	Katsina Ala	10,864	19	0.18
	Igbor & Aliede	11,475	82	0.72
	Shangev Ya (Agio)	35,250	34	0.09
Wukari	Donga	6,520	15	0.23
	Takum	417	1	0.23
	Ibi	4,315	10	0.23
	Bantaje	4,513	3	0.06
Idoma	Bagaji	21,392	6	0.02
Nassarawa	Odegin-Beki	20,810	3	0.01

13.7.3.2. The continued high returns from Igbor and Aliede show that the focus in that area is still active. In fact, the south-west corner of Tiv Division continues to provide the greater proportion of cases. The low figures for Takum are due to the fact that the S.S. Assistant attached to that Dispensary was instructed to assist the Takum Resurvey Team on the days that he was not undertaking treatment at the Dispensary. Separate Dispensary resurveys were therefore not carried out.

13.7.4. Mines Examinations

Regular three-monthly examinations of all the labour in the mining camps in Nassarawa Division were undertaken by the S.S. Assistant attached to Odegin-Beki N.A. Dispensary. No positive case was detected in 5,348 examinations of labourers and their families. This, combined with the very low returns from Dispensary resurveys in the area, suggests that trypanosomiasis has declined to a very low level in the region.

13.7.5. Voluntary Cases

Voluntary cases were reported from the following Hospitals and Dispensaries in Benue Province:

Division	Hosp./Disp.	New	Clin.	Rel.	Total
Tiv	Makurdi Hospital	6	10	11	27
	Mkar Hospital (SUM)	13	19	8	40
	Mbaakon Disp. "	1	2	0	3
	Gboko Disp. (N.A.)	41	10	14	65
	Abinsi " "	15	8	9	32
	Katsina Ala "	19	2	6	27
	Shangev Ya "	46	9	16	71
	Igbor & Aliede"	52	4	13	69
Wukari	Wukari Hospital	15	16	7	38
	Takum Hospital (SUM)	39	0	34	73
	Donga Dispensary (N.A.)	23	14	14	51
	Takum " "	17	4	3	24
	Ibi " "	12	2	6	20
	Bantaji " "	6	6	2	14
Idoma	Oturkpo " "	0	0	0	0
	Bagaji " "	27	9	7	43
Lafia	Lafia " "	13	5	3	21
	Keana " "	1	0	0	1
	Awe " "	3	1	3	7
Nassarawa	Gitata " "	2	0	2	4
	Odegin-Beki "	1	0	0	1

The figures show no change over those for 1962, the proportion registered as relapses being identical. Tiv and Wukari Divisions continue to provide the bulk of new cases.

13.8. Bornu Province

	Number Examined	S.S. Cases	% S.S.
Gashua Town (Bedde Emirate)	13,757	5	0.03

Gashua Town was not included last year in the survey of Bedde Emirate owing to the objections of the Native Authority. The survey of the Town was arranged finally at the end of the dry season and was carried out successfully. Although the results are satisfactory, yet the finding of a few cases here and the presence of G. tachinoides on the Komadugu Yobe suggest that the risk of further increase is not negligible. The pockets of infection found during the survey last year near Gorgoram, Sugam and Zabudum are due to be rechecked this dry season.

13.9. Ilorin Province

Team Resurvey	Number Examined	S.S. Cases	% S.S.
Lafiagi - Pategi Division	30,077	17	0.05

During the year those areas of Lafiagi and Pategi which lie within about 10 miles of the R. Niger were examined. No unexpected focus of infection was discovered but the area continues to reveal a low grade endemic, characteristic of all this riverine terrain.

13.10. Kabba Province

Team Resurvey		Number Examined	S.S. Cases	% S.S.
Kwara Fed.	Eggan	1,072	0	0.0
	Kupa-Abugi	3,715	14	0.3

Continuing down the right bank of the R. Niger, at the end of the year Eggan and parts of Kupa were resurveyed. The last survey in 1953 in Kupa had revealed 22 new cases. On this occasion, the number found was 14, of whom 9 came from Abugi town itself. This area has always been recognised as an endemic area and the present findings confirm the static situation at present existing.

13.11. Kano Province

	Number Examined	S.S. Cases	% S.S.
Team Resurveys	283,779	177	0.62
Dispensary Resurveys	34,257	14	0.04
Voluntary Cases at Hospitals & Dispensaries		77	
TOTAL S.S. CASES		268	

13.11.2. Team Resurveys

District	Number Examined	S.S. Cases	% S.S.
Gaya	86,650	3	0.003
Dutse	31,450	12	0.03
Wudil	91,867	7	0.007
Tudun Wada (selected areas)	2,089	5	0.23
Kiru " "	24,442	45	0.18
Rano " "	5,493	30	0.54
Kura " "	16,689	69	0.41
Karaye " "	25,099	6	0.007

The results of the resurvey of Gaya District were very satisfactory and the continued presence of a small focus at Karamakama, feared to be the case last year, was not confirmed. At last the combined vector control measures and the repeated medical surveys appear to have gained the upper hand in this hitherto obstinate focus and for the first time the situation can be cautiously considered reassuring here.

13.11.2.2.The main activities of the team surveys were concentrated in the areas involved in the Kogin Kano focus i.e. parts of Kiru, Kura, Rano and Tudun Wada Districts. For the first time this focus is being considered and dealt with as a single entity. In the past, control by medical surveys has been patchy in that various parts of the focus have been included at different times during the full District resurveys, not necessarily carried out the same year.

13.11.2.3. In March, Rantan, Gargai and Kuki village areas of Kiru District and Munture hamlets in Rano District on the opposite bank of the Kogin Kano were resurveyed and 61 new cases diagnosed. Co-operation was excellent and the campaign was welcomed. Attendances were extremely good. Quite a large number of persons were away on "cin rana" but using the special register there was no difficulty in checking on these people on their return. The final attendance was around 97% of the estimated population figure and in its turn exceeded the N.A. Census by over 12%; 7,684 persons received prophylactic pentamidine. During the rains, a resurvey was carried out in G. Babba and Ciromawa village areas of Kura District, immediately down stream, to check on the situation there even though no case had been diagnosed at the previous survey 18 months before. It was disconcerting, therefore, to find 49 new cases in G. Babba. A full investigation revealed that the previous survey had not been well attended and, in addition, the small hamlet under G. Babba, called Kuran, lying on the opposite bank of the Kogin Kano, had not been included as there was some doubt at the time as to whether it was under Kiru District. In Kuran now the infection rate was 9.9% and it was clear that this hamlet had been infected for more than two years; the only advanced cases in the whole group were from this village. Probably, infection was carried from this place to the G. Babba watering site opposite where in the dry season there is a limited focus of G. tachinoides depending almost entirely on man for food supply. All this again draws attention to the weakness of confining surveys to administrative as opposed to epidemiological groupings.

13.11.2.4. Further surveys have been carried out along both banks of the Kogin Kano to define exactly the present extent of the spread which now reaches across the new Kano-Zaria road up as far north as the R. Bingi. After the harvest spraying was undertaken to eradicate fly from the main all-season focus between Munture and G. Babba and it also involved the side tributaries from as far south as Kuki up to the R. Bingi in Ciromawa village area, north of Kwari hamlet. A second full survey and pentamidinisation will be carried out this dry season. It is hoped that further prophylaxis after this will not be necessary but the spraying programme will have to be repeated for at least two further seasons, the final outcome naturally depending on the results of the annual resurveys.

13.11.3. Dispensary Resurveys

S.S. Assistants, attached to Dispensaries, carried out the following resurveys in their areas:

Hospital/Dispensary	Number Examined	S.S. Cases	% S.S.
Hadejia Hospital	3,752	1	0.02
Madachi Dispensary (N.A.)	7,310	1	0.01
Taura Treatment Centre (S.S.)	7,415	4	0.05
Karamakama " " "	15,780	8	0.05

13.11.4. Voluntary Cases were reported from the following Hospitals and Dispensaries in Kano Province:

Hospital/Dispensary	New	Clin.	Rel.	Total
Birnin Kudu Hospital	2	-	-	2
Hadejia Hospital	10	2	6	18
Madachi Dispensary (N.A.)	5	2	10	17
Guri Dispensary "	0	3	3	6
Taura Treatment Centre (S.S.)	13	9	9	31
Karamakama " " "	1	0	2	3

With the exception of those from Madachi, all figures show a reduction on the 1962 returns.

13.12. Katsina Province

	Number Examined	S.S. Cases	% S.S.
Team Resurveys	109,743	23	0.02
Dispensary Resurveys	14,979	1	0.006
Voluntary Dispensary Cases		6	
TOTAL S.S. CASES		30	

13.12.2. Team Resurveys

District	Number Examined	S.S. Cases	% S.S.
Kankara (part)	10,536	17	0.16
Kusawa "	12,277	2	0.01
Danja	86,930	4	0.004

13.12.2.2. The resurvey of those village areas in Kankara District where cases were found last year, produced a new batch showing that this focus has still been active and will continue to need watching. The greater part of the District, however, is free of infection.

13.12.2.3. The resurvey of those villages in Musawa District where cases were found in 1961 in relation to the R. Bunsuru, gave a satisfactory result this year. Similarly, the full resurvey of Danja District did not reveal any silent focus which it had been feared might be

found following the Dispensary resurvey report last year from the region of the R. Jare. However, fly has reappeared here and respraying was carried out.

13.12.3. Dispensary Resurvey

Dispensary	Number Examined	S.S. Cases	% S.S.
Bakori	14,979	1	0.006

13.12.4. Voluntary Cases were reported from only one Dispensary.

Dispensary	New	Clin.	Rel.	Total
Bakori	4	1	1	6

13.13. Niger Province

	Number Examined	S.S. Cases	% S.S.
Team Resurveys	34,791	41	0.12
Dispensary Resurveys	15,305	33	0.21
Voluntary Cases at Hospitals and Dispensaries		107	
TOTAL S.S. CASES		181	

13.13.2. Team Resurveys

District	Number Examined	S.S. Cases	% S.S.
Bida Town	13,080	9	0.07
Badeggi	8,823	22	0.25
Agaie Emirate	12,779	10	0.07
Gwari N.A. Prison, Minna	89	0	0.00
Bida Asylum	20	0	0.00

13.13.2.2. Even at the second attempt the resurvey of Bida Town was a complete failure due to lack of co-operation and the figures are valueless. Only about 50% of the people were examined. In view of the well-established focus all around the town - in Lemu, Jima Doko and parts of Badeggi Districts - and because so many of the people of these Districts visit Bida for the market and, conversely, many of the Bida citizens visit the surrounding areas, it is certain that a number of undetected cases exist within the town. This lack of control, therefore, undermines the value of any control measures undertaken in the surrounding districts. However, in view of the decline in attendances for medical inspection, it is clear that further surveys of the urban population can no longer be considered; under present conditions they contribute nothing toward the control of the disease and waste the

time of the staff which could be more profitably used elsewhere. It is hoped that the Native Authority concerned will appreciate the implications of this and their own responsibility in the event of any deterioration in the medical situation.

13.13.3. Dispensary Resurveys

Dispensary	Number Examined	S.S. Cases	% S.S.
Minna Hospital	1,378	2	0.14
Doko Dispensary (N.A.)	4,704	24	0.51
Kuta Dispensary "	3,699	3	0.08
Kaffin-Koro " "	1,673	3	0.18
Abuja " "	3,851	1	0.02

It will be noted that two-thirds of the cases came from Jima-Doko District, immediately to the south of Bida Town.

13.13.4. Voluntary Cases

Hospital/Dispensary	New	Clin.	Rel.	Total
Minna Hospital	1	5	2	8
Bida Hospital	14	28	5	47
Kuta Dispensary (N.A.)	6	0	7	13
Kaffin-Koro " "	12	2	1	15
Doko " "	7	8	3	18
Abuja " "	3	3	0	6

Again particular note should be taken of the continued high figures for Bida and Doko. A large proportion of those attending at Bida had come from Jima-Doko District and to a lesser extent from Lemu District. But a significant number were from among Bida residents.

13.14. Plateau Province

	Number Examined	S.S. Cases	% S.S.
Team Resurveys	12,075	31	0.25
Dispensary Resurveys	33,134	26	0.06
Mines Exam., P.W.D. etc.	6,453	7	0.11
Voluntary Cases at Hospitals and Dispensaries		166	
TOTAL S.S. CASES		230	

13.14.2. Team Resurveys

Division	District	Number Examined	S.S. Cases	% S.S.
Akwanga	Wamba	2,375	7	0.29
Lowland	Doka	3,905	5	0.12
Lowland	Kanam	2,364	0	0.00
Lowland	Mirriam	3,431	19	0.55

13.14.2.2. The resurvey of parts of Wamba District shows that the disease has by no means disappeared from the local community and emphasises the continued need for rigorous control of the mining activities in the area since these, by their very nature, provide the ideal conditions for a possible flare up to occur if the prophylactic campaign were ever relaxed. The increasing number of local labour, compared with past figures, being employed in some of the mines camps only underlines this point the more.

13.14.2.3. In Lowland Division, Mirriam District still provides an active small pocket in an area where in general the disease has declined to negligible proportions. Only along the base of the Plateau escarpment has the disease lingered on and tended to flare up from time to time; indeed one such small outbreak has come to light in a more recent survey early in 1964. Dry season pockets of fly remain in relation to the numerous narrow gorges made by torrents on their swift descent to the plain below.

13.14.3. Dispensary Resurveys

Division	Dispensary	Number Examined	S.S. Cases	% S.S.
Akwanga	Wamba	2,170	5	0.23
	Nassarawa Eggon	11,354	4	0.03
	Andaha	4,814	2	0.02
	Gwongwon T.C.	594	1	0.16
Jos	Zagun	5,664	12	0.21
Lowland	Doka Kasuwa	7,679	2	0.02
	Tunkus	859	0	0.00

13.14.4. Voluntary Cases

Hospital/Dispensary	New	Clin.	Rel.	Total
Jos Hospital	(no return)			
Jengre Hospital (S.D.A.)	(no return)			
Vom Hospital (S.U.M.)	32	-	-	32
Wamba Dispensary (N.A.)	12	3	4	19
Andaha " "	6	4	9	19
N. Eggon " "	4	3	4	11
Zagun " "	35	10	9	54
Doka Kasuwa" "	22	6	3	31

13.14.4.2. During the year the S.S. Assistant was withdrawn from Tunkus N.A. Dispensary as the numbers of cases attending voluntarily there have continued so low over the last two years as to no longer justify the full-time services of an assistant at this centre. The area will be kept under periodic review by means of team resurveys.

13.14.4.3. The number of cases reported from Zagun Dispensary has declined this year, due entirely to the

establishment of a treatment centre at Piti (in southern Zaria Province); the greater part of the new patients recorded at Zagun over the last three years have come from this epidemic focus just over the provincial boundary. The S.S. Assistant conducted resurveys in the Rukuba area in conjunction with the work of the Epidemiological Unit in Piti immediately adjacent.

13.14.5. Mines Labour Examinations etc.

Mining Camps	Total Labour & Families exam.	6,132
	Number receiving pentamidine	4,781
	Number of S.S. diagnosed	7
P.W.D. Road Lab.	Number examined	321
	Number of S.S. diagnosed	0

13.14.5.2. For the first time, two of the positive cases diagnosed during the mines examinations were from among those who had been on regular pentamidine for 2 and 4 years respectively. This is the first confirmed report in over 17 years during which over 100,000 inoculations have been given. Nevertheless, it is a disquietning trend and the situation will need to be kept under careful observation. The control of the disease in this dangerous area depends entirely on the success of the pentamidine prophylactic campaign. The increased number of injections given this year is solely due to the number of local labour now included in the scheme. The presence of a low grade endemic in some of the villages makes their inclusion all the more vital now that the amount of local labour employed has proportionately increased to such an extent.

13.15. Sardauna Province

Team Resurvey	Number Examined	S.S. Cases	% S.S.
Gashaka District (selected areas)	8,154	21	0.27

This survey was a continuation of that undertaken in the Kungana-Beli area of Bakundi District, Muri Division, Adamawa, immediately adjacent. The spread up the R. Taraba from the latter area had occurred after 1950 as originally foreseen. A well-established focus exists at Jamtari, a new incidence of 1.4% being found in January and a further 1.1% being detected at resurvey 11 months later. Jamtari lies on the Beli-Serti road. (The effect of the opening of the road through Bakundi District and into Gashaka District has been to stimulate a drastic regrouping of the population with an increasing number of settlements appearing along the road; many of

these belong to people who have moved in from the outlying areas (as for example the repositioning of most of the Kungana hamlets). However, the population has also increased considerably in all this area, to which increase the Tiv migration from the west has contributed not a little.

13.16. Zaria Province

	Number Examined	S.S. Cases	% S.S.
Team Resurveys	214,165	254	0.12
Dispensary Resurveys	94,428	130	0.14
Mines Examinations	6,918	7	0.10
S. Gida Resettlement Area	1,059	0	0.00
Voluntary Cases at Hospitals and Dispensaries		183	
TOTAL S.S. CASES		574	

13.16.2. Team Resurveys

District	Number Examined	S.S. Cases	% S.S.
Makarfi	59,180	9	0.01
Zongon Katab (remainder)	70,432	7	0.01
Kauru	23,179	8	0.03
Lere (remainder)	20,196	53	0.26
Kagoro	19,462	3	0.01
Moroa	12,172	4	0.03
Epid. Surveys of Piti area, Lere (part 62-63 and that of 63-64)	9,544	170	1.78

13.16.2.2. The resurvey of Makarfi District gave satisfactory results. Although fly had been reported once again in the upper reaches of the R. Kamanda, no sleeping sickness was found in the area; the river was resprayed.

13.16.2.3. With the exception of Talo and Damakasuwa Kurama which were included in the Epidemiological Survey of the Piti area, the full scale resurvey of Zongon Katab District did not reveal any other focus, a few cases being found only at Ribam which also lies next to the Piti area.

13.16.2.4. In Kauru District to the west of the Piti area of Lere District, only 8 cases were discovered of whom 6 came from the southern part close to the common border.

13.16.2.5. The remainder of Lere District was covered and fresh cases were found in the southern village areas, immediately north of Piti, and in the other small old established focus near Kahugu. Around Lere itself the situation remains satisfactory.

13.16.2.6. Comments on the results of the Epidemiological Surveys of the Piti area are made in a later section.

13.16.3. Dispensary Resurveys

District	Dispensary	Number Examined	S.S. Cases	% S.S.
Lere	Lere	6,247	9	0.14
	Warsa (Piti) T.C.	337	6	1.70
Kauru	Gyeshare	6,523	21	0.32
Jema'a	G. Waya (Old Jema'a)	22,540	24	0.11
	Sabon Gida	26,355	40	0.15
	Fadan Wate	8,509	21	0.24
	Kafanchan Hospital	23,917	9	0.03

13.16.3.2. The small resurvey from the Warsa Treatment Centre covered a group of Rukuba compounds which had not been included in the previous Epidemiological Survey.

13.16.3.3. The findings from Gyeshare were disturbing. The full team resurvey of Kauru District, as previously mentioned, had only revealed 8 cases of whom 6 came from the Gyeshare area. However, the Dispensary resurveys revealed 21 new cases of whom 10 came from hamlets immediately west of the Piti area. A small part of Kauru District down the R. Gurza was included in the 1963-64 Epidemiological Survey and the spread of infection into this area was confirmed.

13.16.3.4. In Jema'a District, south of the line of the Kagoro Hills, Dispensary resurveys continue to reveal a low grade endemic level throughout the area where the mines activities are centred, again emphasizing the importance of constant vigilance. For the same reason, the inhabitants of the Sabon Gida Resettlement Area continue to receive annual examination and pentamidinisation, 968 being inoculated during the year out of a total of 1,059 examined. No confirmed case of sleeping sickness was found among those receiving regular pentamidine but it should be noted that there was an approximate 25% change-over in the population during the year.

13.16.4. Mines Labour and Other Special Examinations

Mines camps are visited monthly and all new labour is examined and given pentamidine, this then being repeated every six months. As already mentioned, the number of local inhabitants being employed or having occasion to visit the paddocks has increased very greatly. In the past these people have not received pentamidine; their numbers were small and there was little control over the period for which they worked. Now they contribute an

appreciable proportion of the labour force at certain times of the year.

Mines Camps	Labour and Families examined	5,942
	No. of S.S. cases diagnosed	5
	Number receiving pentamidine	4,123
P.W.D. Road Labourers	Number examined	538
	Number of S.S. Cases	0
Timber Extraction Labourers	Number examined	438
	Number of S.S. Cases	0

13.16.5. Voluntary Cases have been reported from the following Hospitals and Dispensaries in Zaria Province:

Hospital/Dispensary	New	Clin.	Rel.	Total
Zaria Town Dispensary (N.A.)	0	1	2	3
Wusasa Hospital (C.M.S.)	(no return)			
Lere Dispensary (N.A.)	9	14	10	33
Gyeshare " "	15	4	5	24
Takalafiya" "	0	0	0	0
Zonkwa Treatment Centre (S.S)	1	0	0	1
Warsa (Piti) " " "	27	7	15	49
Gidan Waya (Old Jema'a) "	6	4	7	17
S. Gida Dispensary (N.A.)	8	2	2	12
F. Wate " "	10	0	13	23
Kafanchan Hospital	10	5	6	21

13.16.5.2. The total figure for voluntary cases is raised this year because of the establishment of the Warsa Treatment Centre in the Piti area following the 1962-63 Epid. Survey. The results have justified the measure; it has been possible to keep a much closer watch on the area throughout the rains and to determine exactly whence any new voluntary cases came. In the past, such cases would have gone to Zagun; last year it proved almost impossible to cross check during the main survey those cases who had reported voluntarily at Zagun during the previous season, the information or names being inadequate or incorrect; patients attending a dispensary outside their own area tend to give the Chief's village as their home or their father's name for the houseowner. This year it was possible to check at once when a patient first attended at Warsa as all the compounds were listed and numbered, and a direct reference could be obtained. It is essential that this treatment centre at Warsa should continue, and its work will need to be kept under the closest scrutiny.

13.16.6. Epidemiological Surveys of the Piti area (Southern Zaria)

	No. Exam.	New	Clin.	Rel.	Total
1962-63 Survey (remainder not included in 1962 Annual Report)	1,560	22	4	15	41
Strangers and Fulani	593	14	2	0	16
1963-64 Survey Total	6,604	60	8	43	111
Strangers and Fulani	787	1	0	1	2

13.16.6.2. In the 1962 Annual Report, detailed comments were made on the 2nd Epidemiological Survey in the Piti area. At the end of 1963, a 3rd Survey was carried out, all compounds being individually visited. Within the area covered by the spraying programme of early 1963, there were 42 new peripheral positive cases. In addition, during the year a further 22 had been diagnosed and treated at the Treatment Centre established at Warsa. Throughout the year, regular fly checks continued at the fixed points and roving patrols surveyed other areas of special interest. Fly were caught frequently at the points on the periphery of the sprayed zone to the west, adjoining the unsprayed foci on the Rivers Mariri and Gurza and their tributaries downstream. The only focus of fly that appeared to be definitely established within the sprayed area was on the R. Bururu where G. tachinoides were found. It is of interest that two fresh cases were also discovered in the nearest group of compounds. No fly was found around Piti Hill and few cases were now found in the old villages around the base. Far more of the new patients came from compounds in relation to the R. Gurza and its tributaries.

13.16.6.3. In the survey this year, the attendances were further increased within the Piti area itself, indicating a greater degree of confidence on the part of the people to come forward. Although the population, as shown by the N.A. Census figure, was supposed to have declined, there was no evidence of this; in fact and, indeed, there has been a steady rise since the time of the 1st special survey. To consider the Piti V.A. only:

Piti V.A.	N.A. Census	Number Examined.
1961-62	2,213	2,438
1962-63	1,918	2,804
1963-64	1,775	3,232

The number examined in this last survey probably represents around 95% of the available population. The N.A. Census, although fairly accurate over the number of adult tax-paying males, was particularly misleading regarding dependants. However, using the special register compiled after the last survey, a careful cross-check was made of every compound and the opportunity was taken to check also on as many of the old cases, diagnosed over the last three years, as possible. For this reason, the number of relapses shown this year is disproportionately high; from personal inspection over 100 persons were asked to report for lumbar puncture and from these, 44 previously treated cases were taken for retreatment in the light of their cerebro-spinal fluid changes. (A further 8 were classed as new clinical cases on the strength of the results of diagnostic lumber puncture, trypanosomes not having been found in gland juice or stained blood film.) In the ordinary course of events, it might have been some time before the majority of the previously treated cases would have sought retreatment on their own.

13.16.6.4. The special survey was extended this year to include all Janji, parts of G. Kurama and Jama'a Iya Village Areas in Lere District, and parts of Majagada and Binawa in Kauru District. The results showed that a noticeable spread of infection had occurred westward down the R. Gurza and it is clear that the increase in this area dates from only the last two years. The woodland in this area has but recently been opened up by the Kuramas in search of new farmland. The changes were particularly marked around the Rivers Gora and Turumi, tributaries of the R. Gurza, and the fly focus is tending to become more localised and dangerous in consequence. The fresh cases occurring in this area (including those diagnosed by the S.S.A. from Gyeshare) are shown on the accompanying map. Because of this very obvious spread, the third annual spraying programme has been extended to take in the tributaries down to the R. Kunanzi beyond the main limit of spread. On the R. Mariri, there has been no comparable extension westward.

13.16.6.5. The value of the Treatment Centre at Warsa has been particularly in the control of all new S.S. cases occurring from the area between the 2nd and 3rd special surveys. A considerable amount of general treatment was

given by the Centre and also by the Survey Team, and this has been appreciated. Within the Piti area, there has been an obvious improvement in general health and state of nutrition as compared with the findings in the 1961-62 survey. Nevertheless, the number of new sleeping sickness cases still occurring has been disappointing; each of the special surveys has only reduced the incidence by about one half over that of the previous year. In spite of all this detailed work, the focus will remain one that requires annual rechecking for a number of years. The population movements, the rapid expansion westward in search of new farmland and the very great increase in the number of Fulani cattle entering the area and remaining, all contribute to make a fluid situation. Spraying was undertaken early in 1964 again. The treatment centre will be maintained in the area after the team has completed the treatment of the cases recently diagnosed.

Piti Focus

Surveys	1961-62 No.Exam.	% SS	1962-63 No.Exam	% SS	1963-64 No.Exam	% SS
Lere District						
Piti	2,438	8.2	2,804	3.6	3,232	1.7
Gurza	477	3.2	1,204	3.6	1,397	1.3
Janji	127	5.5	578	2.4	594	2.5
Jama'ar Iya	-	-	-	-	275	2.8
G. Kurama	-	-	-	-	105	0.9
Zongon Katab District						
Damakasuwa	245	9.8	390	1.3	419	1.6
Talo	193	2.6	430	0.7	441	0.5
Ribam	473	0.6	-	-	-	-
Kauru District						
Parts of Binawa and Majagada	-	-	-	-	873	1.0

14. TSETSE CONTROL

(By Mr. J.O. Steiner, Principal Control Officer, Sleeping Sickness Service).

14.1. General review; the development of tse-tse control in N. Nigeria.

The Tsetse Control Section forms an integral part of the Sleeping Sickness Service, and works in the closest possible liaison with the Survey and Treatment section, the two being to a very large extent, interdependent.

14.1.2. Close and frequent consultation is maintained with the West African Institute for Trypanosomiasis Research, and with the Veterinary Tse-tse Control Unit of the Ministry of Animal and Forest Resources; since its establishment in 1953, the latter has become responsible for control of the species which are vectors of animal trypanosomiasis. The two units work in close collaboration in those areas where vectors of both diseases are present together.

14.1.3. The five Provincial Units which make up the Control Section can trace a direct and unbroken line of descent from the original Tse-tse investigation started by Sir Walter Johnson at Sherifuri, in 1922. This work, which continued at Gadau and Anchau, resulted in the perfecting of clearing techniques which were then sucessfully applied in the endemic areas of the North.

14.1.4. Clearing is planned to kill the tse-tse by artificially altering its habitat. In order to breed, and indeed to survive at all, the species of tse-tse known to be the vectors of human trypanosomiasis, must have shade and humidity. Such conditions obtain ideally in the smaller rivers and streams of Northern Nigeria. By clearing the riverine trees, the shade is removed, and the humidity dispersed by the hot sun and dry harmattan winds. The flies' natural habitat is thus destroyed, and it can no longer survive.

14.1.5. Numerous forms and variations of clearing were devised, the two most effective methods finally employed being "Ruthless" and "Partial". Ruthless clearing consisted in removing and destroying all riverine vegetation, leaving the banks completely denuded. In partial clearing, although all the smaller trees, shrubs, thicket and creepers are removed, many high branching trees especially those of economic value, can be spared.

14.1.6. Two distinct types of control were evolved. "Protective clearings" were aimed at safe-guarding the people from localized attack by tse-tse at river crossings and watering places, where man-fly contact is very high. The river was cleared ruthlessly each side of the contact point in an attempt, not necessarily to kill the fly, but to drive it back out of easy striking distance of its potential hosts. The second type of control was far bigger in scope; "Eradicative clearings" were designed to exterminate fly from a large area of country. Within the defined area, all rivers and streams capable of supporting tse-tse, were partially cleared. The last two miles of each river system, however, were subject to ruthless clearing to form a barrier. This was introduced to prevent re-invasion from the uncleared rivers beyond, which could otherwise take place during the rainy-season via the pools of shade left in partial clearing.

14.1.7. The "KKZ", which was the largest eradicative scheme undertaken, entailed clearing over 3200 miles of rivers in 12 years. In this scheme, the final barriers were permanently demarcated and then stumped. Today, these barriers are completely bare two miles straight stretches of river, standing as safe-guards from re-invasion of this vast fly free area, whilst the original clearings they protect, are being allowed to regenerate. In many areas, clearings became extremely popular not only as an anti-tsetse measure, but as an aid to farming. Not only were the highly fertile river banks cleared ready for cultivation, but in destroying the habitat of the tse-tse, that of the depredatory birds and monkeys suffered a like fate. Rice farming in particular rapidly gained popularity in cleared areas, particularly in Benue Province.

14.1.8. Although at the time of clearing every effort was made to destroy the tree stumps by fire, many survived and within a few years regenerated to such an extent that the cleared rivers became overgrown and once more formed ideal habitat for re-invading tse-tse. To overcome this difficulty the clearings are annually reslashed, until eventually the trees die or can be stumped out. This stumping i.e. digging out the tree roots, is extremely expensive and can only be undertaken in exceptional cases such as the KKZ scheme referred to.

Generally, reslashing becomes the responsibility of the Native Authority of the area, whilst our Control staff carry out periodical checks to ensure the work is being carried out.

14.1.9. Failure of Barriers to prevent re-invasion of control areas has occurred on more than one occasion. In these cases it is believed, not that tse-tse have been able to fly across the barriers, but that they have been carried mechanically. It has frequently been observed that tse-tse can be carried great distances by cattle, man or motor vehicles. A particular instance of this mechanical re-invasion has occurred in Southern Zaria where the cattle of semi-settled Fulani are held responsible for the periodic re-introduction of fly into a controlled area. In this instance it has been necessary to apply insecticidal control to the same area on three separate occasions.

14.1.10. Since the introduction of insecticidal control in 1958, economic necessity has dictated its ever increasing use in preference to our traditional clearing. This can best be illustrated by example. One mile of river in Zaria Province was cleared in 1940 for £11; assuming the same output of work per man, the cost today would be £140, whereas insecticidal control might be achieved for as little as £8 per mile.

14.1.11. Already, however, our new concept of control by insecticides is being challenged. In parts of the Region, particularly the Benue Valley, where more humid conditions prevail, the tse-tse populations are found to be dispersing from the dense shade and high humidity afforded by the riverine vegetation, and invading what are apparently no less attractive habitats offered by villages, markets and farm-crops. In some southern areas of Kabba and Benue Provinces, one of the species of tse-tse which is a vector of Sleeping Sickness, is found living in close association with domestic pigs, far from riverine habitat. We shall be working in close collaboration with W.A.I.T.R., who are carrying out research in this field, to devise and apply new methods of control to these habitats, as yet considered non-typical.

14.1.12. Much of the work of the Tse-tse Control Section has been carried out in isolated areas of country which had been depopulated or drastically reduced by epidemics of Sleeping Sickness. By the effective use of control these areas have once more been made habitable and productive.

Many of the Re-settlement Schemes of recent years, such as those at Anchau, Sabon Gida, Shendam and Kontagora, were made possible only after the areas had been made tse-tse free, allowing settlers and their domestic animals to occupy new farm-lands without fear of attack by tse-tse. During the twenty years from 1938-58 over 6600 miles of river were made tse-tse free by clearing.

14.1.13. A complete description of work carried out in all fields of tse-tse control in the Region, has been given by Glover in his book "The Tse-tse Problem in Northern Nigeria", which is invaluable to anyone interested in following-up these brief notes.

14.2. Tse-tse Control during 1963.

During the year the Entomologist who had been working with the Epidemiological Unit left the Service and was replaced by an English graduate. The Entomologist provided under Canadian Technical Assistance completed his secondment, and as no replacement was available, work on Insecticide Testing had to be put in abeyance. The results of his work will be available to anyone working in this field in the future. A recommendation has already been made to request assistance for the establishment of an Insecticides Testing Unit, to work on the problems involving both riverine and woodland tse-tse.

14.2.2. During the wet-season a training course for tse-tse Control Assistants was commenced at Katabu. Training continues in the field.

14.2.3. Kano Province.

14.2.3.1. Hadejia River Valley Project: This Project aims at eradication of tse-tse fly from the fertile Hadejia Valley, in order to permit safe settlement and full agricultural development in the area; endemic and epidemic Sleeping Sickness has hitherto prevented this. Material assistance from USAID made it possible to proceed with spraying operations during the 1961 - 62 dry season.

14.2.3.1.2. Good progress was made. The 1962-63 Spraying Season started on 10th December, as soon as the Valley had dried enough to carry traffic, and continued until 27th April. During this time 79 square miles were blanket-sprayed, using 20.5 tons of 75% DDT (WP). Frequent checks of the previous years work revealed no fly in those areas which had been treated with insecticide.

During the year DDT, pressure sprayers and vehicles supplied by USAID, began to arrive. By the beginning of the 1963-64 Season practically all the equipment which had been ordered was available. Of the four technical experts who were to be supplied under the USAID agreement, only one, an Entomologist, has been recruited. Since his arrival in April he has been familiarizing himself with the country and with our work to-date, and has been assigned to conduct advance surveys of the Valley east of Hadejia.

14.2.3.1.3. With the large amount of equipment now available to the Project, and in the continuing absence of the USAID Engineer who it was planned would maintain this equipment, it became necessary to seek assistance elsewhere. The Ministry of Works kindly agreed to second a Mechanical Superintendent to the Project for a period of six months. Basic workshop equipment and staff were acquired and a repair depot set up in the Valley by him.

14.2.3.1.4. Mr. Milton who had been in charge of the Field Work retired at the end of the year, Mr. T. Yuwa taking over from him.

14.2.3.1.5. The 1963-64 Spraying Season commenced on 11th December, after an initial start it was anticipated that 100 hand sprayers would eventually be in operation. Trials were also to be carried out with a mounted pressure sprayer.

14.2.3.1.6. In the absence of USAID Control Officers, additional Ministry staff were seconded to the Project from other Units.

14.2.3.2. Kiru District: Following the pentamidine campaign in the infected areas (see para.13.11.2.3.) an intensive scheme of insecticidal treatment of all rivers was commenced in November. Using a 5% suspension of 75% DDT (WP), by the end of the year over 140 miles of river had been sprayed, and the work was then expected to take a further month to complete. Fly rounds will be set up after spraying, and a close check kept on the area during the rains.

14.2.3.2.2. In view of the Kano Unit's commitments in the Hadejia River Valley Project, the Kiru spraying was carried out by the Zaria Unit.

14.2.4. Zaria Province:

Regular fly checks were kept throughout the year on the KKZ Eradication Area. Localized re-spraying of parts of the headwaters of the Rivers Kamanda and Jare was again carried out. This is now becoming an annual routine exercise. Fly are almost certainly re-introduced through the agency of cattle belonging to Fulani, who have settled in the area. The re-appearance of fly each year in the R. Jare headwaters is not convincingly accounted for, but it is possibly due to their following people returning from Funtua market. Headwaters of fly infested rivers lie close to the north east of Funtua. Annual Reslashing of the ruthless barriers of the KKZ area and those of the R. Shika clearings, was carried out, using Government funds.

14.2.4.2. Work at Pitti in S. Zaria has been fully described elsewhere in this report.

14.2.4.3. Annual reslashing of clearings in Kaduna Capital Territory was completed with funds supplied by the Administrator. This tse-tse free area was extended north, towards Rigachikun, by the use of insecticides.

14.2.5. Bauchi Province:

In Zaranda, the fly infested streams were treated with DDT. emulsion. At the same time the R. Tsamiya was cleared. This is the river referred to in the epidemiological section of the last annual Report, as being the suspect source of most of the infested fly in the area. The results of the combined operation were immediate; no fly have been recorded during subsequent checks. This joint attack by clearing and spraying may well prove useful in other areas.

14.2.5.2. Annual reslashing of the Bauchi Town clearings was continued. The Forestry Authories were advised against the practice they have started, of planting trees along-side the banks of our cleared rivers. These would soon develop into secondary habitat.

14.2.5.3. Reslashing of clearings elsewhere in the Province was carried out as a routine measure.

14.2.5.4. In Bula and Zungur Districts where a large number of S.S. cases has been diagnosed, plans for the control of G.tachinoides by drastic pruning of riparian mangoes are being proposed.

14.2.5.5. Tse-tse surveys have been carried out in Darazo district where Sleeping Sickness had been notified. A repeat survey will be made in this area, which is once again, one involving habitats encouraged by the local cultivation of mango and guava.

14.2.5.6. In Yamaltu District where a serious outbreak of Sleeping Sickness was disclosed in June, the source of infected flies was traced to the forest Reserve at Kanawa. The forest itself and the rivers in the affected area were treated with DDT. emulsion and the area is now reported fly-free.

14.2.5.7. The forestry authorities were advised to destroy a small reserve at Dadin-Kowa, which was no longer being used, and constituted a potentially dangerous habitat at this major ferry point.

14.2.5.8. All other previously controlled areas in the Province were checked against re-invasion.

14.2.6. Benue Province:

Following the successful spraying of the atypical habitats of G.tachinoides, described in the last annual Report, the areas of the Rivers Mu and Nyumula remained fly free until well into the dry season. As could be expected fly then started to penetrate into the barrier areas, from the heavily infested upper reaches of river beyond the barriers. Localized re-spraying soon eliminated these intruders.

14.2.6.2. Large scale fly and vegetation surveys are being conducted over the remaining part of Shangev Tiev not included in our present controlled area. It is planned to establish insecticidal control over this area, which will link up the individual controlled areas of the Province into a single, more easily protected reserve.

14.2.7. Niger Province:

Control Work in the Bida area, which had been carried out by a small Unit from Zaria Province, under the direction of an Entomologist, had to stop in March, after his retirement. Following the recruitment of a second Entomologist it is now planned to set up a seperate Niger Province Control Unit, under his direction. The new Unit will be based at Bida. Its primary task will be to ensure Bida town itself is completely fly-free. Trials will then have to be carried out to evaluate a method of

eradicating fly from those rivers where insecticides alone have failed. A combination of the two methods, clearing indigenous vegetation and spraying agricultural tree crops, may prove a solution.

15. YAWS

15.1. On 12th July the W.H.O./U.N.I.C.E.F.-assisted Yaws Campaign completed its ninth year of operation in the Northern Region. Fifty-five out of the Regional total of 136 M.F.U. staff were engaged almost wholly on yaws control, combined with vaccination against smallpox and reporting of leprosy cases, throughout the year. Some comparative figures for 1960-63 are given in Table 1.

15.2. Initial treatment surveys

There was no I.T.S. during the year in Northern Nigeria, and it is very doubtful whether any areas in the Region still require such treatment.

15.2.2. Referring to the 1962 Annual Report, it should be pointed out that the paragraph on I.T.S. is misleading, as the figures given include those for I.T.S. in Muri Division, which was not completed until March of that year, in addition to those for Tangale-Waja and Borgu Native Authority areas (in Bauchi and Ilorin Provinces respectively). The complete figures for I.T.S. in Gombe and Borgu Divisions are as follows:

Division	N.A. Area	Persons Examined	All Active	Infectious No.	Infectious %
Gombe	Gombe (Nafada District	4,030	-	-	-
	Tangale-Waja	24,474	?	98	0.4
Borgu	Borgu	12,337	22	21	0.17
	TOTAL	40,841	?	119	

15.2.2.2. The I.T.S. in Tangale-Waja covered only certain villages of 3 Districts. If one assumes that all the infectious cases were in fact located (and found) in these villages, this would give 98 cases in a total population of 95,000 (1953 Census), a District incidence of 0.1% possibly more comparable with District incidences as usually recorded, than the figure of 0.4% in the table.

15.2.2.3. Additional spot surveys in the remaining Districts of Borgu Division, covering 15,890 persons, failed to reveal any infectious yaws cases. The W.H.O. S.M.O. Yaws did not consider resurvey to be required in any of these areas.

TABLE 1.

		1960	1961	1962	1963
Totals for all Teams	Persons examined	1,812,325	2,432,555	1,754,696	1,502,770
	All active	22,919	27,200	17,273	15,409
	Infectious	6,063	4,847	2,016	1,191
	Contacts	-	119,750	43,476	27,336
	Treatments given	651,170	277,355	165,236	42,772
Resurvey Teams	Persons examined	1,492,700	2,300,280	1,650,173	1,502,770
	All active	19,413 (1.3%)	26,003 (1.1%)	16,545 (1.0%)	15,409 (1.0%)
	Infectious	3,515 (0.24%)	4,342 (0.19%)	1,700 (0.1%)	1,191 (0.08%)
	Contacts	-	119,750	43,476	27,336
	Treatment given	333,189	145,753	61,236	42,772
I.T.S.	Persons examined	319,625	132,275	104,523	-
	All active	3,506	1,197	728	-
	Infectious	2,548	505	316	-
	Treatments given	317,981	131,602	104,000	-
Treatment Centres	All active	Disps. began to be provided with penicillin for Yaws, Oct. 1960	-	3,616	3,422
	Infectious		2,739	1,430	1,356
	Contacts			1,558	2,292
	Treatments given			5,174	5,714
Grand Totals	All active	-	-	20,889	18,831
	Infectious	6,063	7,586	3,446	2,547
	Contacts	-	-	44,934	29,628
	Treatments given	-	-	170,410	48,486

15.3. Resurveys

15.3.1. Resurveys have continued at a slightly slower pace than in 1962, judging by the numbers of people examined. However, instructions were issued that vaccinations should be performed on as many people as possible instead of selected groups, which may account for some slowing of the work. A number of teams seem to have done particularly well in sending cases of leprosy for treatment. Intervals between resurveys have varied with nos. 1 & 6 MFUs from one to three years, whereas with no. 4 MFU based at Keffi the periods have been four months to two years, several Districts having been resurveyed at intervals of less than a year.

15.3.2. Approximately one and a half million persons were examined; 1,191 infectious and 15,409 active cases were recorded, and it can be observed that the percentage figures for active and infectious cases found at resurvey have continued to fall. (Figures are for resurveys only):

	1960	1961	1962	1963
No. All Active	19,413	26,003	16,545	15,409
%	1.3%	1.1%	1.0%	1.0%
No. Infectious	3,515	4,342	1,700	1,191
%	0.24%	0.19%	0.1%	0.08%

15.3.3. Since the departure from Nigeria of the W.H.O. S.M.O. Yaws based at Enugu, Dr. Van der Hoff, in July 1962, resurveys have continued with practically no professional inspection and direction. The Senior Health Officer, Rural Health, was able to make a visit of about a week to study the teams at work, and many differences were found between the methods of survey and vaccination and of recording results between the various sub-units, and between individual teams of such sub-units. Some of these variations were the result of intelligent adaptation of methods to the local circumstances, but in other cases lack of expert supervision had allowed the working system to deteriorate. This is partly reflected in many of the reports, which have recently been the subject of close scrutiny by a M.F.U. Assistant posted to Kaduna for this purpose in September 1963. The vaccination returns have been unsatisfactory from a number of teams, and suggest the need for closer supervision and field instruction in all aspects of the work, as inconsistency in yaws resurvey itself is not so easily detectable from the reports.

15.3.4. Checking the incoming monthly reports, correlating the resurvey figures with previous results, and taking intelligent action on them, is a very considerable task, and only a small proportion of the required direction of activities can be initiated from Kaduna. However, a few interesting examples of follow-up are given below.

15.3.5. Thirty infectious cases were recorded from Kumbo Village Area ("V.A.") in Donga District of Wukari Division, out of 2,617 persons examined (1.15%). The local Team Leader, asked to comment on this, has now investigated and reports that there are a few remote hill villages with some cave-dwellers (?) which have never been surveyed at all, and that people coming down from these places to Kumbo village area are likely to account for this persistent pocket of infection. Whether it will be possible to carry out an effective treatment survey in this small area remains to be seen; a Senior Nigerian Officer has commented (of presumably the same area) "Only explorers would attempt to climb those hills!" The people are law-abiding and have not been worried by the march of time or the tentacles of authority.

15.3.6. The 6th resurvey report on Orokram District of Idoma Division showed 8 infectious cases out of 980 persons examined in Nkalagu V.A. The previous "yaws history" of this village is as follows:

	Date	No. seen	%	Infectious cases	%
1st Resurvey	July 1957	1,431	98%	12	0.8%
2nd Resurvey	Aug. 1958	1,185	99%	2	0.1%
3rd Resurvey	Aug. 1959	1,147	98%	0	-
4th Resurvey	Sept.1960	1,258	99%	0	-
5th Resurvey	Oct. 1961	1,440	100%	0	-
6th Resurvey	Aug. 1963	980	95%	8	0.8%
"Special" Resurvey	Mar. 1964	1,175	98%	3	0.3%

15.3.6.2. This report was queried not only because of the sudden re-appearance of infectious yaws after 4 years, but because of the apparent reduction in population by about 25%. The "Special" resurvey carried out in March 1964 brought to light a further 3 infectious cases, but the tax census was confirmed as only 1,193, and the reason for the apparent fall in population is not yet determined.

15.3.6.3. However, it is of interest to note that the Rural Medical Officer Idah cycled to a nearby hamlet under Ai-Odo V.A., in adjacent Otukpa District (in connection with the above query), and was shown by the Village Head to a compound harbouring 6 infectious cases in children;

these comprised 4 with multiple papillomata and 2 with acuminate micropapillomata. Two further cases were found at the "Special" resurvey of this hamlet two weeks later:

Hamlet	No. of Compounds	Persons Examined	%	Infectious Cases	%
Ipelo	14	566	99%	8	1.4%

15.3.6.4. This localised pocket of infection would not be revealed in the usual report, in which the figures would be grouped under Ai-Odo V.A., the yaws history of which is as follows:

	Date	No. seen	%	Infectious cases	%
1st Resurvey	July 1957	8,724	94%	284	3.2%
2nd Resurvey	July 1958	9,161	99%	132	1.4%
3rd Resurvey	July 1959	8,037	95%	36	0.4%
4th Resurvey	Aug. 1960	8,238	98%	12	0.1%
5th Resurvey	Nov. 1961	9,293	100%	2	0.02%
6th Resurvey	May 1963	6,410	100%	8	0.12%

15.3.6.5. However, it would hardly be practicable to break down the figures into "Hamlets" for routine reporting in order to reveal this sort of development. In many parts of the riverain area a considerable proportion of compounds are in any case widely scattered, often surrounded by their own farms, and there is sometimes very little physical division between village areas; a householder within the apparent physical boundaries of one V.A. may pay tax and have social allegiance in another one - quite different from the relatively well-defined communities further north.

15.3.6.7. In these figures for Ai-Odo V.A. there appears again (as in 15.3.6.2. above) to be a drop in the population, amounting to 31% from 1961 to 1963. Further scrutiny of the return for Otukpa District (in which Ai-Odo lies), suggests that the population of the whole District has fallen, according to the tax census figures for the population examined, from 24,000 in November 1961 to 17,000 in 1963. However, examination of the H.Q. Card Index shows:

(a) The population of Alai Achagbaha V.A. appears to have risen from 1,800 to 10,000

(b) Ai Onwuno V.A. appears to have been omitted from the 6th resurvey altogether.

15.3.6.8. (a) and (b) above are two points which have only come to light in the process of compilation of this report. Possible reasons for apparent population fluctuations are:

(a) Actual alterations in the boundaries of various village areas.

(b) Failure of Team Leaders to obtain reliable information as to the extent of the V.A.s. This could result from imperfect scrutiny of tax registers, imperfect tax registers, or from their not being available.

(c) Genuine increases or decreases in the population, including abandonment of compounds.

(d) Inadequate supervision of team leaders by experienced staff.

15.4. Dispensary Returns

15.4.1. In his 3rd quarterly report for 1960 the W.H.O. S.M.O. Yaws stated - "In October 1960 a start will be made to provide all the dispensaries with UNICEF penicillin, standard recording forms and a register." Prior to this, yaws appears to have been treated for a year or so at dispensaries in Idoma followed by Igala and Wukari, but returns began to come in with improving regularity as from January 1961.

15.4.2. Dispensaries are now organised for the treatment and recording of yaws cases in Abuja Emirate (no resurveys here), and in all the areas under resurvey except for Jema'a Federation, (Zaria Province), Muri Division of Adamawa, and the adjacent Chamba and Gashaka-Mambilla Native Authority area of Southern Division, Sardauna Province. Dispensary returns of infectious cases treated are compared with the resurvey returns for the same areas during the same year:

Year	Dispensary Returns		Team Resurvey returns	Grand total
	No. of cases	% of grand total		
1961	2,598	54%	2,194	4,792
1962	1,332	54%	1,148	2,480
1963	1,356	55%	916	2,272

15.4.3. The proportion of infectious cases reported at dispensaries in areas under resurvey has thus been remarkably constant at just over half of the total, emphasising the importance of the static treatment centre at the present time. However, whereas in the early days of dispensary treatments there was a good deal of supervision from M.F.U. staff (many of the cases being seen by such staff each week on fixed treatment days), latterly there have been far fewer checks on the accuracy

of diagnosis; until an expert has been able to visit many of these 100 or so Dispensaries, especially those which report fair numbers of infectious cases, the true position will remain in doubt.

15.4.4. Attempts are now made at H.Q. to correlate resurvey figures with returns from Dispensaries serving the same areas, in order that discrepancies may be investigated, as this is the best that can be done from a distance. There does in fact seem to be a reasonable relationship in most cases.

15.5. General Remarks

It is satisfactory to note the continued decline in infectious yaws cases discovered - a tendency which includes both cases discovered by resurvey and those reported from dispensaries. The dispensaries figure for 1963 is the first complete return of this nature, (staff having been despatched to individual dispensaries to obtain any outstanding returns during the early part of 1964). This figure is nevertheless lower than those for the preceding years, confirming the trend.

15.5.2. Resurveys are expensive in man-power and money, and when the results (in terms of infectious cases treated) are compared with those of the dispensary service, which is already available, it might be wondered whether they are still necessary; the answer may, I believe, be a very local one, depending partly upon accessibility of and maximum distances to dispensaries, but most particularly upon the local tendency (or otherwise) to recognise yaws at an early stage and proceed for treatment. In the village of Ipelo in Idoma Division, where the Rural Medical Officer found 6 obvious infectious cases in children in one household, he was told that the dispensary 8 miles away was too far! (para. 15.3.6.3.) In the face of such evidence - which could doubtless be multiplied by close enquiry - the need for continued resurveys in areas of high original endemicity at ITS is obvious.

15.5.3. "Consolidation" in the form of a cessation of team resurveys, placing the yaws scouts under the direction of Dispensary Assistants to carry out house-to-house visiting in the locality, was abandoned as unworkable in prevailing conditions. The results were akin to those experienced with Native Authority Vaccinators working in a similar way; with the staff available, it requires the stimulus of team effort under a capable leader to obtain a reasonably effective day's work.

15.5.4. We have always looked to the W.H.O. Yaws Adviser for guidance on general policy in the past. However, in the absence of such a one, instructions have been issued to cease resurveys in those Districts of Muri Division - one of the last to have ITS - where few or no infectious cases were found at ITS, and similar measures have been contemplated for parts of the area served by the Keffi-based MFU where cases have not been recorded for some years.

15.5.5. Instructions have also been given that "Special" resurveys should in future be carried out 3 months after the finding of a group of infectious cases; these are to be limited to the village area or hamlet concerned, or to whatever seems appropriate to the local officer investigating, and should be effected whether the group of cases was reported by a resurvey team or from a dispensary. This should be repeated at 3-month intervals - to pick up secondary cases - until no more infectious cases are found. It is also hoped that mapping of such cases will become a commonplace - as with sleeping sickness survey work - but many MFU staff have little experience of this at present.

15.5.6. The possibility of adding anti-tuberculosis work to the functions of the teams in certain areas is also under consideration; this would not only be a most valuable public health measure in itself, but would probably increase the interest of the people in the resurveys and improve attendances, as well as improving the morale of the Teams for what has become in many cases a dull routine involving hard working conditions with relatively little to show for it.

15.5.7. In general, it is felt that mechanical routine which has developed in the yaws campaign should now give way to some intelligently directed efforts focussed where they are most needed, and with the arrival in Enugu of a replacement for the W.H.O. S.M.O. Yaws, this prospect seems happily near.

16. BILHARZIA

16.1. S. haematobium

S. haematobium has long been known in Northern Nigeria as an infection of the majority of populations living near perennial or seasonal lakes, borrow-pits, rivers and streams.

16.1.2. Infection rates as judged by single-specimen urine examinations are usually highest in children between the ages of 5 and 15 years, and decline progressively with age as in other countries, although the absence of ova in the urine of older people merely indicates that ova are not being excreted, rather than that adult worms are not present.

16.1.3. Morbidity from this infection appears to be remarkably low, and it excites very little public interest, although its symptoms and its relationship to water are recognised in one of its Hausa names - "sanyin fadama" - "cold from the marsh" (like "sanyin mata" - "cold from woman" = gonorrhoea).

16.1.4. However, cases of phosphatic incrustation, urethral stricture and fistulae (especially perineal), ureteric dilatation and hydro-nephrosis, and severe rectal involvement, do present at hospital with evidence pointing strongly to S. haematobium infection as the cause of the condition. The possibility has not been excluded that many people die quietly at home of renal failure due to ureteric involvement by the parasite, and its general economic importance is not known. Military experience is that infected soldiers fail to stand up to severe tests of endurance, and the Army is very reluctant to accept infected recruits.

16.2. S. mansoni

S. mansoni infection has until recently been regarded as uncommon, and little has been heard of its morbidity. Infection rates up to 8% - as on the Biu Plateau - were considered high. However, in recent years a stool concentration test has been used for certain field surveys, and an incidence of 78% was found in 1960 at Bacita. This is on the Higer flood plain near Jebba, in the area where sugar-cane is now being irrigated on a large scale, and where a sugar-refinery has been established. The incidence revealed here by ordinary

faecal smears was 30%; the incidence of S. haematobium by single-specimen examination was 46% (see appendix H.)

16.2.2. In December 1963 surveys were undertaken at irrigation projects along the river Yobe, which separates Nigeria from the Niger Republic to the north and empties into Lake Chad (see map 9). The investigations were completed in 1964, but are reported here for convenience.

16.2.3. S. mansoni infection was confirmed at Yo and Daiya amongst both irrigation staff (25/162 or 15% infected), and the local population (13/128 or 10% infected). It is thought that the local population acquires its infections in the neighbourhood of Yo, and it seems probable that most of the infections of irrigation staff have also been acquired there. However, there are other areas in the Province where this could have occurred, and serial investigations on new staff would be required to prove the point conclusively.

16.2.4. It was disturbing to find that at Yo there was liver enlargement in 18% and splenic enlargement in 17% of 70 adult villagers examined; amongst the Agricultural staff the figures were 2 and 4 respectively out of 24 examined (8% and 17%); these had been in the area for 4 years or less. At Abadan hepatomegaly was found in 4/32 (12%) of the local population and splenomegaly in 3/32 (9%). Although there are other likely causes for this, the possibility of bilharzial cirrhosis already existing in this area has to be borne in mind. At Bacita it was noteworthy that in spite of the 78% incidence of S. mansoni, enlargement of liver and spleen in adults was extremely uncommon, suggesting a low intensity of infection. Both of these areas are adjacent to good fishing-grounds, and one would not anticipate that protein malnutrition would contribute to liver disease in either of the local populations.

16.2.5. There is little doubt that S. mansoni is much more common than formerly supposed, and when looked for by rectal biopsy (as in the Military Hospital in Kaduna), or by stool concentration test, is likely to be diagnosed with increasing frequency. However, concentration tests have not been regarded as a practicable routine in hospital laboratories up to now, and, probably quite rightly in many parts of the country, this parasite is not often considered as a possible cause of mild dysenteric symptoms.

16.3. Treatment of bilharzia

Stibophen is the drug most frequently used, and is usually given to out-patients as recommended by the manufacturers, in a course lasting one month - about 60 mls. for adults and 45 mls. for a 10-11 year old child. Its effectiveness has been put to the test in two widely-separated areas of the Region, and it is probably curative in 70-80% of children.

16.3.2. In 1952 Dr. J. Haworth (now with W.H.O., Geneva) recorded from Biu, Bornu Province, the treatment of 34 schoolchildren with this drug, using 17.5 mls. in 19 days, (less than we usually give now). 12/17 or 71% of those who reported for follow-up were 'cured' at 8 weeks, although the large proportion of absentees leaves the issue in doubt. Another trial was carried out by the writer in 1958 in Gwandu Emirate of Sokoto Province at Massama, 40 miles from the Argungu Rural Health Centre. Of 42 children who completed the course (30-60 mls. according to age), 37/38 or 97% were "negative" at 8 weeks, and 29/36 or 81% were still"negative" 15 weeks after the completion of treatment; even if the 6 children not examined at 15 weeks were all "positive", the 3½-month 'cure' rate would still be 69% (29/42).

16.3.3. By contrast, sodium antimony gluconate, "Triostam", proved disappointing on unselected children in the same trial. A total dosage of 16.2 mg./kilo body weight was given to 44 children in 6 daily injections, and to 45 children in 4 daily injections. 18 weeks later only 5/40 (12.5%) and 5/43 (11.5%) in the respective groups were apparently free from infection, and the fact that 81% of the children of the stibophen group failed to show viable ova at the same time ruled out reinfection as being responsible for this failure, the cause of which - against most other published evidence - remains an enigma. The assessments in this trial consisted of 3 successive daily urine examinations carried out by the writer personally.

16.3.4. However, using "Triostam" 60 mg. daily for 6 days in 1952, Dr. Haworth obtained a "cure" at 13 weeks in 22/33 or 63% of Biu schoolchildren. As 48 children were actually treated, the minimum possible "cure" rate at 3 months was 22/48 or 45% - still very different from the results at Massama.

16.3.5. In this connection, the remarks of Foster and Lundtang-Hansen (Trans. Roy. Soc. Trop. Med. & Hyg., vol. 58 No. 2) may be pertinent; they report the almost complete failure of "Triostam" to cure 107 cases of S. mansoni infection treated by them, against all other published evidence except one small series of European patients. They suggest that there may be different reactions to chemotherapy by different strains of schistosomes, and this theory would certainly fit the apparently inconsistent results of chemotherapy in Nigeria, described above. Trial of increased dosage of "Triostam" is suggested; reported side-effects at Massama were nil - all the children completed their courses and appeared greatly to enjoy the whole procedure - and they were rare and mild in the series of Foster and Lundtang-Hansen. However, alarming if temporary cardiac complications have been observed in a few adult patients treated in hospital with this drug, and children may be more tolerant of it than adults - as indeed they are of most other drugs.

16.3.6. Tartar emetic may well be the most effective drug to use against Nigerian schistosomes, but I am not aware of any proof of this, and it has in any case found very little favour in this country. It is dangerous in the treatment of the occasional advanced case that is seen, even if chemotherapy is indicated at such a stage; for early or mild infections its unpleasant side-effects render its use impracticable in most instances, and even unethical in the absence of evidence that bilharzia is an important cause of serious morbidity.

16.3.7. "Nilodin" has been tried without success - I quote from the Annual Report of the Senior Health Officer, Rural Health, for 1954-55:

> "The .. trials of .. Nilodin were continued at Kankiya, Argungu Maiduguri and Potiskum". (see map 9).
> "Varied doses were given to a very considerable number of persons of different ages, .. even the largest doses recommended by the manufacturers proved ineffective, relapse occurring after a short interval .. whether or not the sources of infection were treated with molluscicide .. Toxic reactions at the doses given were not inconsiderable, especially with 'Nilodin' .. "

16.3.8. Which cases should be treated? The tendency amongst experienced professional staff is to treat patients with well-marked acute symptoms of bilharzia,

but to ignore the parasite in those with mild symptoms, and when the passage of ova is an incidental finding.

16.3.8.2. D.M. Forsyth, writing in the East African Medical Journal (Vol. 40, No. 3 of December 1963), recommends that in E. Africa, except on rare occasions, neither S. mansoni nor S. haematobium infection should be treated in patients who are liable to reinfection. This may well be the best advice to follow in Northern Nigeria, and it would invoke a considerable saving on drugs. However, for patients with severe symptoms and considerable haematuria, few doctors here would be prepared to refuse chemotherapy in the absence of good evidence from this country to support such inaction. It is interesting to note that Forsyth only considers treatment in hospital, with "Triostam" (for choice) or "Astiban", and regards these as dangerous drugs; out-patient treatment with stibophen as in Nigeria is not mentioned.

16.3.8.3. A theoretical basis for treating patients with severe symptoms, who are liable to reinfection, is as follows: if severe infection results from a heavy 'dose' of cercariae over a short period of time, then we hope that the cured patient may be fortunate and receive only a small dose of cercariae at his next exposure; this would re-establish infection with a few worms whose living presence would protect him (as proved in some animals) from further infection, and with whom he could live in harmony, like most other people in the endemic areas (?)

16.3.8.4. There has been a tendency in the past to indulge in mass treatment of schoolchildren surveyed and found to be infected, as this does seem to be popular with Native Authorities and Schoolmasters, and school surveys are a regular medical auxiliaries' activity. This treatment practice is now discouraged.

16.4. The snail vectors

Bulinus physopsis and Biomphalaria species are obviously as widespread as the distribution of the parasites they transmit, but they are often remarkably few in number and difficult to track down. Their appearances and disappearances are also somewhat unpredictable to amateur snail-seekers. There is a firm impression from the Argungu area that B. physopsis spp. thrive best where there is a good deal of contamination from human faeces; where there is no vegetation along pools in a river bed, they may only be

found where such contamination is obvious, but in thick vegetation lining rivers or static water, they can often be found in moderate numbers at some time of the year. Borrow-pits completely covered with pistia were not in this area favoured by the population for bathing etc. or associated with B. physopsis, although they may breed mansoniodes mosquitoes on a disturbing scale.

16.4.2. At Bacita, where the writer remained for about 2 weeks in October 1960, B. physopsis spp. were found only in tens and only in the stream near the communal washing-place, together with a very few Biomphalaria, but some of both types emitted cercariae resembling those of human schistosomiasis (as well as three other unidentified types).

16.4.3. There is a strong impression that infection rates with bilharzia - 80% of both types at Bacita - bear little relation to numbers of vector snails, although of course one is always uncertain how many more snails are present but not found. Given a perennial or seasonal body of static or slowly moving water which is used by the local population, it seems that bilharzia will be transmitted whether or not snails can be found at any particular time. It is possible that the smallness of the numbers of snails in this country compared to the enormous numbers which thrive in Egyptian canals, is responsible for a low level of transmission resulting in the typical mild infections seen here.

16.5. Molluscicides

Molluscicides has at various times and places been carried out using copper sulphate and sodium pentachlorophenate ("NaPCP") on a small scale. However, literature on the subject and local experience both suggest that eradication of vector snails by such methods is unlikely. Control by repeated application to borrow-pits at least twice yearly is certainly possible, as at Massama (para 16.3.2.), but without considerable investigation of snail ecology and population fluctuations over a period of time it could be very uneconomical. Furthermore it would be of little value unless all the likely sources of infection for a given population could be treated, and the whole exercise would require a considerable number of trained staff to cover any worthwhile area of the Northern Region. On the other hand, if it should come to light that really severe manifestations of bilharzia are being seen in some particular group of people who can

easily be investigated - for example school-children - it might well be practicable to organise regular molluscicide of some small source of infection.

16.5.2. Copper sulphate is well-established as a safe and simple treatment for small bodies of static water with little or no vegetation, but its brief duration of action is likely to render it quite ineffective in killing snails deep inside thick vegetation, where diffusion would take a long time, as in many of our borrow-pits and lakes.

16.5.3. NaPCP is the only practicable and well-proven molluscicide for flowing water, and under favourable conditions retains its molluscicidal properties for days or weeks - a very valuable asset. Its destructive effect on vegetation is usually also of considerable benefit, but its general toxicity and in particular the lethal effect upon fish can be a grave disadvantage. A degree of bilharzia control could have been effected in Argungu Town, but the use of NaPCP was not permitted in a few much-used borrow-pits containing thick vegetation, and Bulinus physopsis in moderate numbers; the Local Authority was more interested in the fish than in the possibility of bilharzia control.

16.5.4. An experiment was carried out at Argungu in 1959 in which groups of fresh snails from an untreated source were given 8-hour exposures to water from two borrow-pits treated with about 15 p.p.m. of NaPCP. Up to the 12th day there was still 100% kill (12/12 in two groups) by the treated waters, with survival of all 6 control snails. On the 16th day water from one borrow-pit only killed 3/10, although it was still 10/10 in the other group, and thereafter the supply of fresh B. physopsis was exhausted. The treated water contained a very large amount of suspended matter, part of which could not be removed by centrifuging or filtration and interfered with the methylene blue test for NaPCP.

16.5.5. All this experiment proved was that in this particular cloudy water NaPCP remained lethal to B. physopsis for between 12 and 16 days. It is now well-known that in clear water in bright sunlight NaPCP rapidly loses its molluscicidal effect, and the uninterrupted sunshine enjoyed during the irrigation season at Yo, for example (see para 16.6.4) combined with the crystal-clear water which is used, does not lead us to suppose that, should snail control be desired here, it could easily be achieved with this chemical.

16.6. Bilharzia and irrigation

As part of the economic development of the Region there are now 12 main irrigation projects in Northern Nigeria involving upwards of 11,000 acres of land. Investigation of the health problems they may create has so far been limited, but with the rapid expansion which is taking place they demand increasing consideration.

16.6.2. The majority of people living in areas where irrigation is feasible pass through a phase of infection with S. haematobium, and the question of increasing its incidence scarcely arises. The possible development which we are concerned to detect is increased intensity of bilharzial infection giving rise to increased morbidity. As S. mansoni is generally regarded as the more dangerous infection of the two, it is receiving the greater attention, limited though this may be.

16.6.3. Investigation by the writer at Bacita in October 1960, over a period of 2 weeks, failed to disclose a single snail of vector type (Bulinus or Biomphalaria), in the irrigation system of the small pilot plot. Infected snails of both types were found at the village washing-place, where a well-used path crossed a stream; other evidence also pointed to this as the main source of infection and tended to exonerate the irrigation system altogether.

16.6.4. At Yo the clear river flows from July to February or March, and irrigation is restricted to 4 months from November to February. In mid-December B. physopsis specimens were easily found by the writer in small numbers in the main canal, but were not detected elsewhere during a brief search. Specimens were found in the river (source of the irrigation water) at several points, and some from Abadan were seen to be infected. No specimen of Biomphalaria was seen, but leaking boots and pressure of time prevented a proper search; it is still believed that transmission of S. Mansoni occurs in this river. It is considered most unlikely that the 900 acres under irrigation have up to the present contributed to infection with either species of schistosome - the short irrigation season, the unsuitability of the main canal for defaecation and washing, and the present condition of the field canals, encourage this view.

16.6.5. At the time of the investigations both at Bacita and at Yo, the irrigation systems were of relatively small extent and ecologically immature, and small numbers of workers and their families were associated with them. Further development and ageing of the systems may change conditions to favour transmission of bilharzia, and might favour the intense transmission which creates such medical and economic problems elsewhere in the world. Up to now bilharzia in Nigeria has fortunately not resembled the severe disease which develops in countries such as Egypt and the Sudan with extensive, long-established irrigation systems, or which occurs in some other irrigated areas where the parasite is of recent introduction.

16.6.6. Conjecture however, is no substitute for investigation, and the Ministry of Health has a formidable task to establish that no major scheme is increasing the hazards from bilharzia; our present advice is the reduction of family contact with dangerous waters, by carefully planned housing and provision of preferred bathing-places.

17. ONCHOCERCIASIS

17.1 F. H. Budden (late Specialist Ophthalmologist), and R. W. Crosskey (late Entomologist), have provided excellent documentation respectively for onchocerciasis(1, 2, 3, 4, 5) and its vector S. damnosum (6, 7, 8, 9) in Northern Nigeria, and their published papers, together with that of Davies(10) are freely drawn upon in the following accounts. References are given following para. 18.3.12.

17.2 Onchocerciasis - general considerations.

It was not until 1952 that onchocerciasis was recognised as an important cause of blindness in Northern Nigeria, although onchocercal eye lesions had been reported in the Belgian Congo in 1932 and in the Gold Coast in 1945. Investigations were carried out in parts of each Province between 1951 and 1954; the present information on distribution of the disease is summarised in map 7 taken from Budden's paper 2B but with the Illo focus (see below) added. The following extracts are also taken from this paper:

17.2.2 "Areas were classified as:

(a) Heavily infected areas in which :

(i) Onchocerciasis is by far the commonest cause of blindness.

(ii) Corneal lesions and iridocyclitis usually obscure the fundus of persons blind due to onchocerciasis.

(iii) Many microfilariae are commonly found in the anterior chamber of persons with reduced vision.

(iv) The number of microfilariae in the skin is high.

(b) Moderately infected areas in which :

(i) The incidence of onchocercal blindness and that due to all other causes is approximately equal.

(ii) The incidence of onchocercal blindness due to choroido-retinal lesions and anterior segment lesions is also approximately equal.

(iii) A few microfilariae are occasionally found in the anterior chamber of persons with visual defect.

(iv) The number of microfilariae in the skin of infected persons is moderate.

(c) Lightly infected areas in which :

(i) The proportion of blindness which is due to onchocerciasis is low.

(ii) The onchocercal lesions causing blindness are mostly choroidoretinal.

(iii) Microfilariae are rarely, if ever, seen in the anterior chamber.

(iv) The concentration of microfilariae in the skin of infected persons is low.

(d) Non-endemic areas in which, if onchocerciasis occurs, it is only found in a very small proportion of patients, and these patients give a history of residence in areas where onchocerciasis is endemic."

17.2.3 "As has been reported elsewhere in Africa (e.g. HUGHES and DALY, 1951) the incidence of infection tends to be higher in men than in women. The incidence of reduced vision and blindness is also higher in men and increases dramatically with increase in the incidence of infection in the community. Where, however, this is light (standardized infection rate 1-250 per 1,000) the standardized blindness rate due to onchocerciasis is only 1 per 1,000, blindness being limited to elderly people; therefore under these conditions onchocercal blindness is not a serious economic problem. However, where the incidence of infection is heavy (standardized infection rate 501-750 per 1,000) the standardized blindness rate due to onchocerciasis is 57 per 1,000, and approximately one-sixth of the male population over 30 years of age is blind."

17.2.4 "The distribution of endemic onchocerciasis is of course limited by the distribution of the Simulium vector, and the close relationship between these is demonstrated by comparing the map showing the distribution of the disease with that showing the distribution of S. damnosum produced by CROSSKEY (1956). In fact, at every place where naturally occurring S. damnosum breeding has been discovered and where onchocerciasis has been looked for, the latter has been found to be endemic in the local population. It is, therefore, reasonable to assume that onchocerciasis also occurs amongst communities living in proximity to those other known and suspected breeding grounds which are described by CROSSKEY (loc. cit.)

The northern limit of the disease in Nigeria at about 13° North, appears to be determined by the limit of S. damnosum breeding, for - with the exception of a very small artificially created breeding ground at Jega, Sokoto Province - all the most northerly foci of S. damnosum breeding are known to be associated with the disease. This finding is different from that of LEWIS (1953) in the Northern Sudan. He reported S. damnosum breeding unaccompanied by onchocerciasis, and suggested that this might be attributed to climatic conditions preventing the completion of the development cycle of O. volvulus in the fly.

No obvious correlation has been found between the biting rate of S. damnosum and the incidence and intensity of infection in the human population. At Bulki, one of the most heavily infected villages surveyed, no S. damnosum has been caught during three visits at different seasons of the year, whereas at Abuja where the infection rate is only moderate, fly are abundant. A similar situation has been reported in the relationship between tsetse and sleeping sickness."

17.2.5 Budden estimated that ocular onchocerciasis was the cause of blindness in approximately 20,000 people in the Region, and recorded blindness rates of up to 10% in the most heavily infected villages. He used a standard of "economic blindness" - inability to count fingers at a distance of 3 metres or more - 2A.

17.2.6 "Depopulation due to hyper-endemic onchocerciasis has been reported from the Gold Coast (WADDY, 1951). During the course of the present survey, a history of evacuation of villages due to blindness was given by the native chiefs in most of the heavily infected areas visited; for example, the District Head of Buru (Southern Bornu) gave the names of 11 villages in his District which had been completely evacuated during the past 10 years because of the "blinding disease." Many persons, blind due to onchocerciasis who were examined during the course of this investigation, stated that they used to live in one of these now extinct villages, thus confirming the District Head's report." "Villages appear to be completely evacuated when the blindness rate exceeds about 10%. In these places blindness is named by the local people as the cause of the evacuation."

17.2.7 In areas of light endemicity, blindness was found only in a few old people, suggesting that control measures short of complete eradication of the disease might be of great value applied to areas of heavy endemicity.

17.2.8 A crude skin-snip survey was carried out in February 1958 during a brief visit by the writer to Giris and Illo, respectively on, and two miles from, the south bank of the River Niger, 12 miles downstream from the Dahomey border. The results shown below extend the known distribution of endemic onchocerciasis up the Niger to include this area:-

Village	infection-rates with microfilariae. Males		Females	
Giris	40/115	35%	6/115	5.2%
Illo	56/118	47%	8/56	7%

No rocky streams were reported here, and the Niger itself flows in a wide flood plain from the Dahomey border and for many miles down-stream, but there had been no entomological investigation of simulium breeding in this remote area accessible only by canoe.

17.3 Onchocerciasis - clinical manifestations.

Budden[12] considered that the following eye lesions were "associated with the occurrence of onchocerciasis in the community and with the presence of onchocercal infection in the individual."

"a). The pannus described by Hissette "(affecting the lower half of the cornea and spreading upwards, in sharp distinction to that of trachoma which starts at the upper margin and spreads downwards).

"b). fluffy opacities in the substantia propria;

"c). iridocyclitis with fine pigment deposits;

"d). choroido-retinal lesions as described by Hissette (1935) and Ridley (1944).

" Other corneal opacities, iris atrophy, plastic iritis and optic atrophy were considered to be of little diagnostic value."

17.3.2 Where incidences of nodules and 'lizard-skin' have been recorded by the writer, they have not appeared to follow the incidence of positive skin-snips in a recognisable way; but there is no assessment of intensity of infection in connection with the results shown below (see map ..6..):-

Date	Place	skin-snips		nodules		moderate-severe 'lizard-skin'	
Feb. 1958	Illo, Gwandu Emirate, Sokoto Province.	56/118	47%	uncommon		31/118	26%
Nov. 1959	Fenagun, Lafiagi Emirate, Ilorin Province.	8/46	17%	3/46	6.5%	6/52	11.5%
"	Wawa (Borgu Emirate, Ilorin Province)	14/51	27%	1/49	2%	5/49	10%
"	Garafini (Borgu Emirate, Ilorin Province)	8/31	26%	2/30	7%	1/30	3%
"	Dogongari (Borgu Emirate, Ilorin Province)	31/62	50%	16/61	26%	1/61	1.6%
"	Awuru (Borgu Emirate, Ilorin Province)	42/64	66%	21/65	32%	4/65	6%
"	Waje (Borgu Emirate, Ilorin Province)	20/33	60%	5/32	16%	0/33	-
"	Koroyin (Borgu Emirate, Ilorin Province)	17/29	59%	13/29	45%	1/29	3.4%

The incidence of nodules was not stated in the Illo report, but they were certainly uncommon and inconspicuous; it was the unsupported observation of 'lizard-skin' which provoked the survey in this apparently unlikely area. In Borgu Emirate on the other hand, nodules were relatively common and lizard-skin rare, in association with positive skin-snips.

17.3.3 In this connection it may be worth recalling the paper of M.S. Israel[13]. 48 nodules were removed from untreated patients in Kaduna, Northern Nigeria, and examined histologically. 21 or 44% of these showed only dead segments of O. volvulus, whilst all of the remaining 27, or 56%, showed a large proportion of disintegrating worms. The suggestion is that in Northern Nigeria healthy worms lie freely in the subcutaneous tissues, and that nodules are merely incidental in

the disease, being formed as a tissue reaction to autolytic products of dying worms. If this is so, then as a therapeutic measure for individual Nigerian patients, surgical removal of nodules is likely to be of very limited value, and even this only for a small proportion of them; & as a mass measure - adopted with success in parts of Central America - 'denodulization' need not be considered here, even if it should ever be practicable.

17.3.4 Depigmentation of the skin overlying the tibia, leaving rounded islands of normal pigment against a background of complete leucoderma, as occurs in yaws on the wrists, is a frequent observation in some endemic areas of onchocerciasis, and has been attributed to onchocercal infection (Stanley Browne, [15]).

17.3.5 Pruritis is one of the main symptoms of this disease in Nigeria, and resultant vicious scratching can produce severe secondary infection and cause great difficulty in the diagnosis of leprosy. However, Woodruff et al.[14] describe how 34 out of 75 infected persons in Uganda denied having any skin irritation. There was no relationship between severity of infection and pruritis, and indeed the most heavily infected patient of the series categorically denied any irritation; in the remaining 41 patients pruritis was the most outstanding symptom. No record of similar investigation in this country has been traced.

17.4 Onchocerciasis - treatment.

Ophthalmologists have pioneered work on onchocerciasis in Northern Nigeria, and their treatment schedules have changed with experience. The early use of antrypol alone gave way to hetrazan followed by antrypol, but 4.6 gms. of the latter are now preceded by a combined course of hetrazan and "Phenergan." Hetrazan appears to minimise reactions to subsequent antrypol treatment, whilst reactions to hetrazan are controlled by the concurrently administered anti-histamine drug.

17.4.2 The current dosage schedule is given in Appendix J, and an account of experience with antrypol, and toxic effects following its use in Nigeria, is given in Appendix K.

18 SIMULIUM DAMNOSUM AND ITS CONTROL.

S. damnosum is the main vector of onchocerciasis in Northern Nigeria. S. bovis also bites man avidly in a few localised areas of the Region, and in one of these - Izom, in Abuja Division - is suspected of acting as a subsidiary vector, but it is relatively unimportant.

18.2 The distribution of S. damnosum is best described by extracts from R. W. Crosskey's paper[8]. Map .A.. refers.

18.2.2 "S. damnosum, by virtue of the unusual and specialized requirements of the immature stages, shows a sporadic distribution, each focus being generally distinct and centred upon a suitable river or river system. On map .A.. each S. damnosum focus is shown by a solid black circle, and the over-all picture of fly distribution is indicated by the stippled areas of the map. There are many areas within the stippled parts in which S. damnosum either does not occur or has not been found; nevertheless the stippled areas with their boundary lines represent broadly the pattern of fly distribution in Northern Nigeria."

18.2.3 "S. damnosum foci vary greatly in their extent and their degree of isolation; they tend to become very sporadic in the far north towards the limits of the fly's range. Many of the foci of the central plateau area are of minor extent. Some well-isolated foci are, however, heavily infested and give rise to a heavy intensity of onchocerciasis, as occurs, for instance, in the Hawal valley on the border of Bornu and Adamawa Provinces. In two particular areas, the north-east of Niger Province (shown by the triangle on Map ..B..) and the Cameroons Trusteeship area of Southern Adamawa Province" (now Southern or Chamba Division of Sardauna Province) "numerous infested rivers form a network and thereby give the fly an almost continuous distribution over a very large area."

18.2.4 "Fly foci occur principally where the rivers leave the upland areas and traverse the escarpments to reach the low-lying plains. Hence foci tend to be more numerous on the periphery of hilly country, rather than in the centre; it is particularly on the edges of the hill areas and on the steep escarpments that suitable rapids occur. In places, for instance central Abuja Emirate (Niger Province), the change from hill to plain is remarkably sudden and the character of the rivers alters from swift and rocky to placid and muddy very abruptly, the limits of the fly following this demarcation."

18.2.5 "In Northern Nigeria S. damnosum foci always appear to be centred on a perennially-flowing river of moderate or large size, although in the late dry season the flow may be so reduced as to be scarcely detectable; in some cases flow may have ceased altogether in one part of a river's length, but may just continue as the merest trickle (sufficient to maintain fly breeding) in another. Dry season survival appears to be assured by continuous breeding on a small scale in those rivers that just manage to maintain a flow, however, reduced, throughout the drought period.

18.2.6 "Fly foci therefore occur mainly in areas where the dry season is not too severe, and where adequate rainfall keeps the rivers flowing throughout the year; they are most prevalent where the dry season is of 5 month's duration or less, and the annual rainfall is more than 45 inches. No foci are known from the far north where the dry season is 7 months long, or the annual rainfall under 30 inches."

18.2.7 "S. damnosum is associated with areas of low to moderate population density; all fly foci that have so far been surveyed for onchocerciasis have shown the presence of the disease. In Northern Nigeria onchocerciasis occurs even in the most northerly fly foci."

18.3 Simulium control projects

18.3.1 Abuja: The most important control scheme was commenced in Abuja Emirate in March 1956. Early results have been described by Crosskey,[10] and Davies[11] has published an assessment of the first 5 years of operation. It was designed primarily as a pilot project to assess the feasibility of simulium control here, and covers about 1,200 square miles of hilly country with a population of approximately 32,000; Abuja Town with 4,000 population is included, and three rivers are involved.

18.3.2 43 catching stations were established, with 3-4 catchers visiting each station for 15 minutes once or twice weekly from June to December each year; at other times the flies are very scarce.

18.3.3 Up to 1959 dosage of DDT was usually calculated, according to the estimated flow at each treatment point immediately before larviciding, to give a concentration of 0.5 p.p.m. In 1960, preparation was made for handing over the local running of the project to technical staff of the Tse-tse Control Section under a Nigerian Tse-tse Control Officer, and the rivers were treated by a constant-dose technique. This was based on the average flow data for May - July 1959 at each of the eight treatment points, and was designed to give an average of 0.5 p.p.m. of para-para DDT. The limits of fluctuation of the actual concentration proved to be 0.11 to 6.6 p.p.m. in 1960.

18.3.4 Davies[11] showed that the fly density had been reduced in Abuja Town by 84 - 98%, and over the whole area by 83 - 96%, of the pre-control density. He also demonstrated a reduction in the incidence of onchocerciasis by 30% in males and 40% in females, compared with one of 16% in males only in a 'control' (untreated) area.

18.3.5 In 1959 the scheme cost approximately £1,700 for insecticide and £500 for labour and transport maintenance.

18.3.6 Some comparative fly-round data (in fly-boy-hours) are given below:

	Project area			Abuja Township		
	1955	1960	1963	1955	1960	1963
June	3.29	0.18		3.06	0.03	
July	8.28	0.13		19.29	0.02	
August	15.96	0.67		12.95	0.13	
September	16.75	1.60		27.00	0.61	
October	8.53	2.44		10.73	2.63	
November	2.89	1.0		3.11	1.51	
December	1.19	0.56		0.10	0.35	

The overall fly density in 1963 was 0.31 FBH compared to 0.83 in 1962.

18.3.7 At Lokoja control measures commenced in 1958 after onchocerciasis had been reported in a number of senior Government officials. In 1959 "Didimac" DDT emulsion replaced the use of DDT Technical (tediously melted down over a fire) in diesel oil, for the treatment of 25 miles of the River Mimi. 5½ gallons were applied over a half-hour period at each of 3 treatment points, once weekly from June 1st for 12 weeks.

18.3.8 In 1961 the management of this standard procedure, and the supervision of fly-boys, was entrusted to the Health Superintendent ("Urban") at Lokoja. It is considered that a useful degree of simulium control has been achieved here at an estimated cost (in 1960), of £230 for insecticide and £45 for labour.

18.3.9 The Hawal River Valley. An attempt has now been made to eradicate S. damnosum from this relatively isolated breeding focus, which is highly endemic for onchocerciasis; blindness rates of 5% due to the disease have been recorded.

18.3.10 A government entomologist carried out detailed simulium surveys of the area in 1960 and 1961, but proposals for eradication by the Ministry of Health had to be shelved because of inability to provide a supervising entomologist. However, the Church of the Brethren Mission at Garkida, a mile or so from the river Hawal, undertook to attempt eradication from its own resources, which included the temporary assistance of two Peace Corps personnel. Dry season larviciding was carried out early in 1963 according to the recommendations of the government entomologist, who paid a final visit to the area in February. (The flow was assumed to be 2 cu. ft. per second). Following this attempt flies were absent from most catching points, but it appeared that breeding was occurring in the Zur, an

untreated tributary of the Hawal. This is to be treated during the 1964 dry season, in addition to the Hawal, in what will probably be the final effort which the Mission can afford to make.

The Hawal is unsuitable for wet-season control, such as that at Abuja, and it has been considered that eradication, if it should prove possible, is the only practicable proposition here.

18.3.11 Kaduna. In 1955 S. damnosum was recorded in Kaduna in densities of 4 - 6.3 FBH during the period August - November. Larviciding began in 1956 using 1 p.p.m. of DDT in diesel oil once weekly for 12 weeks, during the period February - April when the river was low. Some reduction in density occurred from 1956-58 inclusive, when larviciding was carried out; but in 1959, when it was only possible to give one application, (using Didimac), as late as June 10th, the 'reduction' in fly density was greater still! Since 1960 larviciding has not been undertaken, and observed fluctuations in simulium density have continued without ever rising to the pre-control levels of 1955, or even to that of 1957 when larviciding was carried out.

18.3.12 Since July 1962 occasional fly checks have shown continued density fluctuations, without revealing a situation which calls for further control efforts. Fly density observations for the seven years of fairly complete records are given below:

Table 1

	1955	1956	1957	1958	1959	1960	1961
July	no record	no record	1.05	0.71	0.45	0.16	no record
August	4.38	0.41	1.44	0.97	0.05	0.60	2.12
September	4.66	1.08	3.03	1.60	0.28	0.88	no record
October	6.29	2.00	4.50	0.50	0.33	1.93	0.39
November	4.09	0.96	0.68	0.14	0.21	0.50	0.12
	precontrol	c o n t r o l			partial control	no control	

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13.	Israel, M.S.	(1959)	Trans. R. Soc. Trop. Med. Hyg.	53, 142
14.	Woodruff, A.W.etal.	(1963)	Trans. R. Soc. Trop. Med. Hyg.	57, 50
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19. ANKYLOSTOMIASIS.

19.1 Incidence.

When worms have been examined, Necator Americanus has usually been identified. The infection is widespread, and the real incidence probably varies from about 3% in parts of the far north to more than 70% further south - see Appendix H. The extremes as shown by a concentration method (filtration and sedimentation used primarily to detect ova of S. mansoni), have been 3% in a 'random sample' on the northern border at Yo, near Lake Chad, to 74% in a 'random sample' at Dogongari near the Niger Dam site; these are fairly reliable figures. However, the concentration tests more than doubled the incidence found by direct smear, and it is likely that real infection rates of over 60% are not uncommon.

19.2 Intensity of infection; morbidity.

Worm-loads were estimated during some early surveys, (McLetchie, 1954[1]). In Bornu and Plateau Provinces average worm-loads were less than 10, and in Tiv Division less than 20 per infected person, and there was no correlation between hookworm and anaemia. In 1960 the Rural Medical Officer Kankiya attempted to correlate Hb. level (measured somewhat crudely by the Tallquist method), with ankylostomiasis, in schoolchildren in Katsina Province; worm loads were not estimated. At the lower Hb. levels, 2% (6/306) of infected children and 1.5% (9/612) of uninfected children gave Hb. readings of less than 50%, whilst 10% (30/306) of infected children and 4% (24/612) of uninfected children gave readings of 50-60% Hb. However, at the highest levels it was the infected children who were better off, and again it was not felt that any clear relationship between Hb. level and hookworm infection had been established.

19.2.2 The writer is not aware of any descriptions of 'hookworm disease' from Northern Nigeria, and the general impression is that ankylostomiasis is an unimportant cause of mass morbidity here. It is quite possible that unnecessary attention has been paid to the infection, which is liable to be treated by medical auxiliaries and others on sight or suspicion, sometimes perhaps under pressure to satisfy a patient complaining of symptoms for which no other cause suggests itself. However, large numbers of ankylostomes have been seen by the writer in the upper intestines of some old persons. These were in severely anaemic patients - Hb. 20% - 30% by the Sahli method - who died shortly after admission to a Hospital in the far north.

There was much intestinal extravasation of blood, and the anaemia and death were considered to have been caused by the parasites. It seems likely that these old people, unable to walk far, were victims of a vicious circle of reinfection.

[1] McLetchie, D.L. (1954) Trans. R. Soc. Trop. Med. Hyg.

19.2.3 Anaemia severe enough to cause a complaint of pain across the chest (angina of effort) has frequently been seen in adults in dispensary as well as hospital practice; the diagnosis is easily confirmed by the extreme pallor of the conjunctivae, and the condition is often rapidly improved by hookworm treatment and oral iron. Even dispensary patients who are unlikely to get the high-protein diet given to hospital cases, have regained a healthy colour and lost their angina of effort, although admittedly only a few such cases have been seen a second time.

19.2.4 It is therefore considered that ankylostomiasis, although not detected as a cause of mild to moderate anaemia in the mass, is nevertheless an important cause of severe anaemia in the individual, at least in some areas and perhaps more especially in old persons whose habits may predispose them to superinfection.

20. ASCARIASIS.

20.1 Incidence.

Survey figures for the incidence of ascariasis are given in Appendix H. It is more common in the southern part of Ilorin Province (40% in Ilorin schools, 16% in the general population of Erin-Ile), than in indigenous people in the far north, where it is almost unknown in Argungu and where the 1951-52 Bornu surveys found only 0.55% (18 cases in 3,259 stools examined). In 1963 concentration tests at Yo, on the northern border, showed an 11% incidence in the local population, but the irrigation project here may have affected transmission.

Morbidity.

The writer is not aware of any worm load estimations having been done in respect of ascariasis here. However, senior medical staff now at Kaduna are agreed that the infection is rarely a cause of surgical or other serious complications in the Region, and worm loads are presumed to be low. Colicky pain and gastro-intestinal disturbances can however be caused by very few worms (one large and one small, one in the case of the writer's cook, on one occasion), and are sufficient reason for treating cases when diagnosed. The writer is not aware of any firm evidence from the Region of respiratory symptoms due to pulmonary migration of ascaris larvae; possibly infections are insufficiently heavy for such manifestations.

21. TUBERCULOSIS

21.1 Preventive Measures

A summary of survey results by Heaf testing from the inception of the Tuberculosis Unit, Jos, in 1961, up to the end of 1963, is given in Appendix L. Preventive measures now constitute the most important part of our attack on the tuberculosis problem, and B.C.G. vaccination has been offered to the following groups most at risk:-

(i) Newborn babies (Jos Maternity Unit)

(ii) Infants: a) At Infant Welfare Clinics in Plateau Province.
b) At other Infant Welfare Clinics during the periods when T.B. Unit Staff are working in the area.

(iii) All schoolchildren; teachers and their families.

(iv) Hospital and public health auxiliary staff.

(v) Government and Native Authority employees and their families.

(vi) Contacts of tuberculosis patients.

21.1.2 Heaf testing is carried out with the standard Heaf multiple-puncture apparatus, using P.P.D. Details of present technique and interpretation of results are given in Appendix M.

B.C.G. vaccine is now given to all negative and first degree reactors; up to June 1963 only negative reactors were vaccinated. Cases of active tuberculosis giving reactions of only second degree have been noted, and it has not been considered prudent to administer vaccine to this group.

21.1.3 The Heaf test has been a standard procedure in Nigeria for many years, but a small-scale comparison of the results of Mantoux testing and Heaf testing, carried out during the minefields survey by the Specialist, suggests that the problem of non-specific sensitivity is magnified by the Heaf test to an extent which requires further consideration in this Region; the W.H.O. Report "Tuberculin sensitivity surveys in Northern and Eastern Nigeria" (Brazzaville, 1963), has shown that non-specific sensitivity already constitutes a serious difficulty using the more sensitive Mantoux test.

21.1.4 By the end of 1963 Sokoto, Kano, Katsina and Bornu Provinces remained to be covered by this programme, carried out largely by M.F.U. Assistants touring from their Jos Headquarters, but with coverage for Kaduna and Kano Cities provided by locally-supervised M.F.U. Staff. Statistics of work done during the year, and the totals since the campaign began, are given in Appendix L.

21.1.5 Contact tracing is carried out at all the out-patient clinics mentioned in para 21.1.7 below.

21.1.6 Results of the survey of minesfield workers and others in the Jos area are included in Appendix L.

21.1.7 The infant welfare centres visited in Plateau Province are at Jos, Kuru, Barakin Ladi (Hospital), Ganawuri, Zagun (Dispensary) and Ex-Lands (Dispensary). The Medical Field Unit Team visits these places the day following a routine visit by the Health Sister, who announces the impending arrival of the Team. Except at Jos it was found impracticable to combine the Health Sister's Clinic with B.C.G. vaccination, as large numbers of mothers brought their children from distances of 10 miles or more when they learned of the Team's visit; the Health Sister was unable to deal with all of these. The Jos Centre is visited twice weekly, and the remainder about every two months.

21.2 Curative measures

In-patient treatment is carried out at Jos (89 beds), and also at other Government Hospitals.

21.2.2 A number of Mission Hospitals have also set aside beds for this purpose; a total of have now been approved by the Specialist as satisfying the conditions for the free issue of drugs for free treatment of tuberculosis by the Missions concerned.

21.2.3 The Jos Unit supervises out-patient treatment at Barakin Ladi Hospital and at Bukuru, Vom, Miango and Bisichi Dispensaries; it is also given by Medical Officers at Hospitals and Health Centres at their discretion.

23 CEREBRO-SPINAL MENINGITIS

23.1 Archibald[1] has published an admirable account (up to June 1962) of the latest epidemic cycle of meningitis in the Region. Horn[2] has described the previous cycle of 1949-50, and the paper of Waddy[3], and several other published articles on the epidemic cerebro-spinal meningitis in West Africa, are also pertinent to the situation in Northern Nigeria.

23.1.2 It is already very much on record, therefore, that epidemic cycles of meningitis recur during the dry season at varying intervals, (ten years between the last two cycles); that they occur mainly in the northernmost Provinces, and the epidemic wave moves from east to west with maximum incidences in successive years in Kano, Katsina and Sokoto Provinces in that order; and that sulphonamide treatment of patients by medical auxiliaries is conspicuously successful

23.2 Diagnosis.

Laboratory proof of the diagnosis is not often achieved, and in hospital practice, if lumbar puncture is done at all, the drip of cloudy cerebro-spinal fluid is usually an adequate indication to commence chemotherapy. However, microscopical examination of cerebro-spinal fluid before treatment has been undertaken at some Hospitals; at the end of January, 1960, Dr. Olewiler of the S.U.M. Hospital Bambur, Adamawa Province, reported "Meningococcal meningitis was not seen in large numbers and most of the deaths were cases of meningitis caused by H. influenzae or pneumococci, confirmed by Spinal fluid examination." In respect of the 1962-63 dry season, Dr. Doyle (Specialist Physician) has stated that of patients with meningitis whom he saw in Kano, about 40% had pneumococci in the cerebro - spinal fluid. The Adamawa report covered the year before the peak of the mild epidemic wave in that province, which occurred in April 1960. The information in respect of Kano covers a period after the epidemic peak there, (also in April 1960.

23.2.2 This appears to be the extent of knowledge of the organisms responsible for meningitis in Northern Nigeria, either during or between epidemics usually ascribed to meningococcal infection; as with all subjects covered in this report, further information from any source will be most welcome. For Ghana, Waddy[3] reported that 10% of C.S.F. examinations in a short series showed non-meningococcal meningitis, but that this was not representative of typical epidemic conditions.

23.3 Clinical features.

In respect of the 1949-50 outbreak, Horn[2] stated: "In

Katsina the vast majority of the cases were mild or moderately severe in character; severe cases did, however, predominate in one small area in the south. This is thought to be due to immunity acquired in the previous severe outbreaks. In Sokoto, Pankshin and Azare Hospitals, 85-90% of admissions were typical cases of moderate severity, showing the classical signs of head retraction or nuchal rigidity. In the Birnin Kebbi Medical Area, which was not much affected last year, the cases in the earlier part of the epidemic were typical, but as time went on, the picture was dominated more and more by the fulminating types, especially septicaemic. During the peak period, cases were almost exclusively of this type. The usual history was that the patient, usually a child, had been taken suddenly ill, complaining of severe pain in a limb, and had been seized with severe diarrhoea and vomiting. When seen, the most striking things about these fulminating cases were the profound prostration and the complete absence of any signs of meningitis. Rashes were not often seen. Most were conscious on admission but some were profoundly unconscious on admission. Many of these proved to be hyper-pyretic, rectal temperatures of up to 110 degrees F. being recorded on several occasions. These hyperpyretic cases were almost invariably fatal within a very few hours of the onset of the illness and accounted for most of the deaths."

23.3.2 The peak of the last epidemic cycle was reached in Katsina Province in April 1961, and in respect of this Dr. Butter, Rural Medical Officer Kankiya at the time, reported: "The greater part of the reported cases were mild forms of C.S.M.: a smouldering onset with general malaise, a slight rise of temperature, some somnolency, headache and slight neck stiffness. With the usual dose of sulphamezathine tablets these patients were practically symptom-free within 48-72 hours and could be discharged on the fifth day. Cases with questionable diagnosis (complaints of general weakness, headache and fear for meningitis), have never been withheld from treatment and were isolated. These dubious cases can be estimated to have constituted about 20% of all reported and isolated cases. Fulminating cases with sudden onset, soporosness or unconsciousness and significant stiffness in neck and back were uncommon. A high initial dose of sulphamezathine solution i.-m. gave often a remarkable improvement of the general condition within 18 hours. Diseases such as pneumonia and measles were seldom labelled as meningitis."

23.3.3 In respect of his Ghana experience, Waddy[3] remarked that all types of clinical picture were observed, and that mild and fulminating types were both common. In contra-distinction to the findings of Horn (para 23.3), Waddy noted that fulminating cases were more common in the <u>early</u> stages of an epidemic, and related this to the higher mortality in the early stages. Another type characterised by a smouldering onset with headache the only sympton, suddenly producing the classical syndrome in severe and frequently fatal form, is also mentioned.

23.3.4 The writer's limited experience is of mild cases presenting considerable diagnostic difficulty, with absence of demonstrable neck stiffness in the presence of meningeal involvement. This was in Adamawa Province at a time when a major epidemic seemed likely, and when there were unconfirmed rumours of many cases occurring in remote areas. There was also a widespread epidemic of a usually mild febrile illness frequently resembling influenza.

23.3.4.2 Patients were seen complaining of fever (confirmed), headache, and pain in the neck, but regardless of whether the spinal fluid proved to be clear or cloudy, only one (unmistakeable case) of the dozen or so examined had demonstrable muscle rigidity. Two brothers of 7 - 10 years both presented almost identical clinical pictures, but only one had cloudy C.S.F. (These lumbar punctures were done during a tour partly on bicycle and foot and the fluids were not examined microscopically). One constant clinical distinction finally emerged - those with cloudy C.S.F. walked rather stiffly, and were unwilling to move the head and neck freely of their own volition, although with the patient relaxed there was no difficulty in the gentle performance of full passive neck movements (head touching knee), and Kernig's sign was negative. (There is, of course, no proof that any of these patients had meningococcal meningitis).

23.4 Mortality rates from meningitis.

In respect of the 1949-50 epidemic, Horn[2] reported that the apparent mortality rates in the Birnin Kebbi area decreased steadily from 25% at the beginning of the epidemic to 12% at the end - "in the face of the fact that fulminating cases with their high mortality rate, tended more and more to predominate as the epidemic reached its full flood." (Contrast Ghana findings - para 23.3.3). He compared this with U.K. mortality rates, and concluded that the apparent fall in mortality was due to over-reporting of C.S.M. - that nearly half of the patients in treatment centres were suffering from other conditions; junior staff had been strictly warned to treat all sick persons who presented themselves for treatment, as cases of meningitis. Horn felt at the time that the true mortality rate was about 20%.

23.4.2 The apparent mortality rates for the recent epidemic cycle, according to a statistical table at the Ministry of Health, Kaduna, are shown below by half-years; July - December, of course, covers the early part of each epidemic season - the dry season:

DEATHS FROM MENINGITIS, NORTHERN NIGERIA.

	1959	1960	1961	1962	1963
Jan. - June	227 9.4%	2448 6.9%	1,100 8.4%	1752 7.5%	367 12.8%
July - Dec.	30 14.4%	73 10.9%	46 10.5%	58 14%	42 20%
Total:	257 9.8%	2521 7.5%	1,146 8.5%	1810 7.6%	409 13.3%

23.4.3 The most accurate figures submitted in recent years are probably those of the Rural Medical Officers Kankiya (1960) and Argungu (1963), both of whom toured treatment centres extensively; they recorded mortality rates in Katsina Province and Argungu Emirate of 11.2% and 12.4% respectively, (see Appendix N), which are more likely to be truly representative than any other figures available.

23.4.4 The persistently lower mortality rate in each first half-year, is a noticeable feature of the table in para 23.4.2. The more obvious possibilities to account for this, at a time when an epidemic is at its height are:

i) Seasonal variation in virulence of the meningococcus.

ii) Seasonal variation in the proportion of cases due to viruses, or to other bacteria, especially the more lethal pneumococcus.

iii) Seasonal variation in the resistance of the population.

iv) Increased awareness of the disease towards the end of the epidemic, with earlier treatment and better organised facilities for it.

v) The treatment, as an epidemic proceeds, of increasing numbers of persons not suffering from meningitis, some of whom may merely feel that the moment is opportune to apply for a course of the famous "M & B" tablets.

23.4.5 However, bearing in mind the remarks of Horn (para 23.4), diagnostic difficulties (para 23.3.4.2 ? exceptional), and the fact that reported cases in rural areas are rarely confirmed by a doctor (para 23.2), it is clear that scientific evidence on which to base any conclusion is not yet available.

23.5 Treatment

During the 1949-50 epidemic, the favoured treatment, for very practical reasons, was intra-muscular injection of a sulphonamide suspension (sulphadiazine for choice) containing 1 gm. in 6 mls. of distilled water. 10 mls. of the suspension were given morning and evening for 5 days, supplemented by an initial dose of soluble sulphonamide in severe cases. The treatment was painful and unpopular, but gave excellent results and, with a total dosage of only 10-15 gms. per patient, effected a considerable economy over oral treatment which was used and abused in remoter provinces.

23.5.2 During the recent epidemic cycle, standard oral treatment was at first by sulphadimidine tablets, $2\frac{1}{2}$ gms. thrice daily (adult dose). However, as from October 1962 tablets of a long-acting sulphonamide, sulphaphenazole, were used; the adult dose was $1\frac{1}{2}$ gms. twice daily in the first 24 hours, followed by $\frac{1}{2}$ gm. twice daily for up to 5 days. Treatment for unconscious, vomiting or seriously ill patients throughout this epidemic cycle has consisted of "Solumezathine" by intra-muscular injection, 2 gms. three times daily.

23.5.3 Some doctors, especially at mission hospitals, have used penicillin by injection with success - one would like to know whether with greater success, in the presence of many pneumococcal cases, than would be achieved using the current sulphonamide treatment.

23.6 Prophylaxis

Prophylaxis of meningitis in Nigeria was described by Archibald[1]. The idea was initiated by Machiavello[4] in the Sudan where mass prophylaxis at village level with a single dose of sulphadimidine, on the first appearance of a case of meningitis, appears to have protected the village for the remainder of the dry season. Such success is obviously more likely in isolated villages than in those to and from which there is much movement of population, as in the case of those with large markets or near main roads.

23.6.2 A more manageable suggestion for a vast and widespread population (such as that in Northern Nigeria) was made by Waddy[3]; he suggested the administration of sulphonamides (or penicillin) to the comparatively few house contacts of wet-season cases, to eliminate the presumed carriers in these households. This might decrease the number of carriers who would otherwise keep the epidemic going from one dry season to the next. However, it seemed likely that these measures might merely prolong an epidemic cycle without producing any real benefit.

23.6.3 Acting on the carrier-case assumption above, contact prophylaxis has been offered widely during the recent epidemic cycle in this Region. Up to October 1962 a single adult-equivalent dose of 2 gms. of sulphadimidine was offered to all household contacts of meningitis cases, and also to the entire population of small hamlets especially when several cases occurred together. From October 1962 until December 1963 the standard dose was $\frac{1}{2}$ gm. of sulphaphenazole for those over 10 and $\frac{1}{4}$ gm. for those under 10 years of age; on the advice of visiting W.H.O. Consultants the doses were raised in December 1963 to 1 gm. and $\frac{1}{2}$ gm. respectively; administration was also confined to household contacts only, in view of the information that sulphonamide-resistant strains of meningococci from the Niger Republic had been identified (in Marseilles). It would be a major disaster if sulphonamide resistance should become common in meningococci, and this is likely to be encouraged by widespread administration of small doses.

23.7 Evaluation of standard meningitis prophylaxis in Argungu Emirate, 1963

Early in the 1962-63 epidemic season small, simple and durable treatment cards were introduced in Sokoto Province, at the suggestion of one of the local Medical Officers. This has facilitated a partial analysis of the epidemic in retrospect:

1 case occurred in each of				96	villages/hamlets			=	96 cases
2 cases	"	"	"	34	"	"		=	68 "
3 cases	"	"	"	15	"	"		=	45 "
4 "	"	"	"	6	"	"		=	24 "
							Total		233 cases
5 or more cases occurred in				25	"	"	totalling		202 "
			Total	176					
							Grand total		435 cases

23.7.2 There were 3 possible examples of 3 cases, and 11 of 2 cases occurring in the same compound, shown below:

TABLE 1.

Village	Interval between first two cases in one compound	Interval between first and third cases
Dankal	31 days	
Boraye	same day	
Sauwa i)	10 days	
ii)	19 days	
iii)	45 days	
iv)	same day	1 day
v)	2 days	18 days
Gulma	5 days	10 days
Kuri Babba	same day	
Massama	2 days	
Gunki	1 day	
Rindima	65 days	
Manna	same day	
Kukoki	same day	

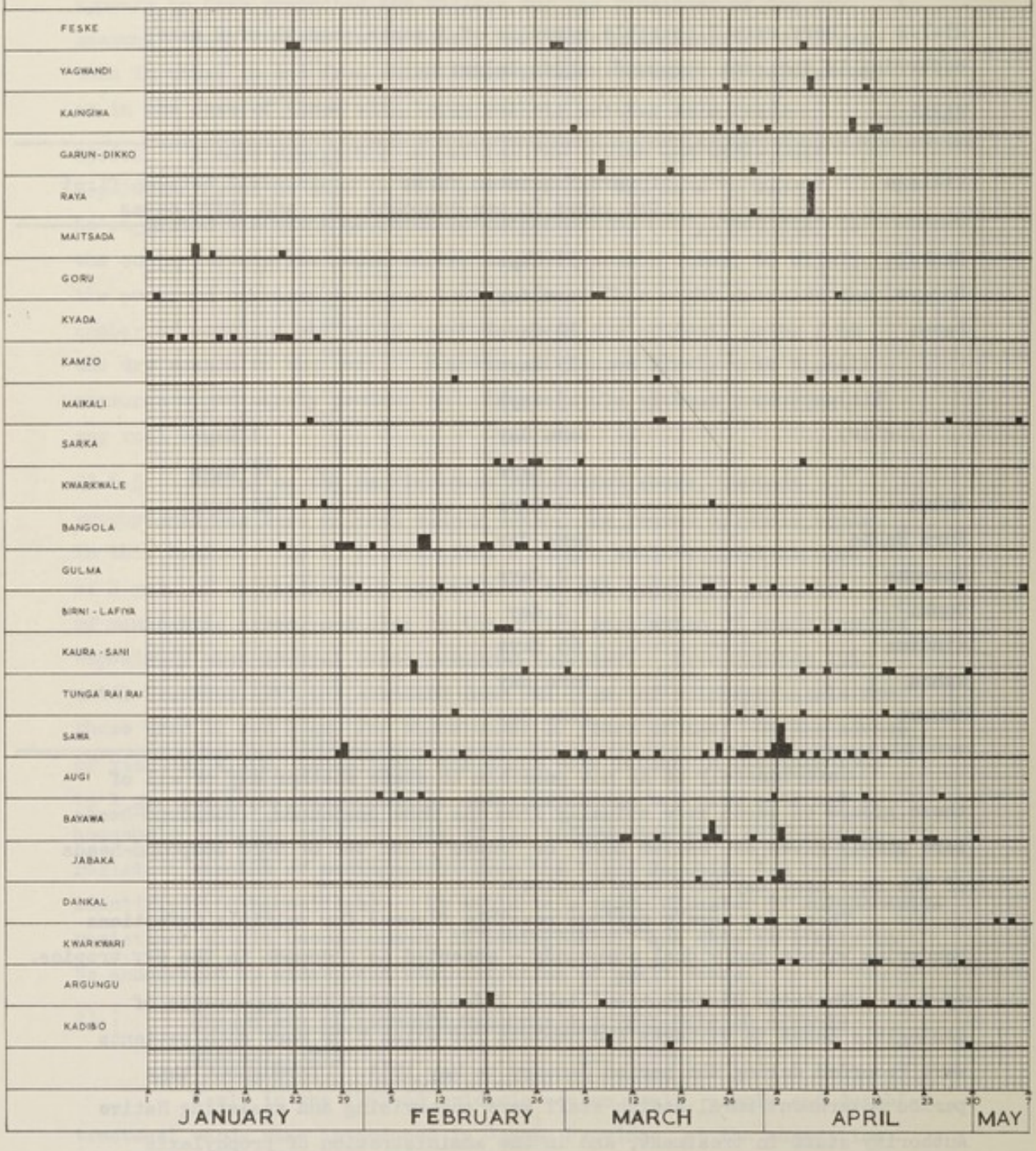
Unfortunately it is not possible to state whether any or all of these groups of cases were actually from the same compounds; compound-heads were simply given as "Mallam Bube" or "Umaru", and two or more compound-heads of the same name may have been involved.

These are merely maximum possible figures for multiple infections occurring within individual compounds - accepted as uncommon in the dry tropics.

23.7.3 The 'time distribution' table 2 demonstrates the appearance of meningitis cases in villages and hamlets for which 5 or more such patients were recorded during the period January to May 1963. Throughout this period Government rural health staff were supervising and assisting Native Authority staff in treatment, and in the administration of prophylaxis according to the standard instructions mentioned in para 23.6.3. A Rural Medical Officer was based at Argungu specifically charged with meningitis control, and it is unlikely that more favourable conditions for prophylaxis in rural areas will occur anywhere in the Region.

TABLE

DISTRIBUTION IN TIME OF CASES REPORTED AS CEREBRO-SPINAL MENINGITIS
IN ARGUNGU EMIRATE SOKOTO PROVINCE JAN – MAY 1963
VILLAGES FROM WHICH 5 OR MORE CASES WERE TREATED.



However, it is somewhat difficult to know what interpretation, if any, should be put upon these findings, as there were no 'control' villages, and indeed only geographically alternate villages could be regarded as adequate controls; leaving these out of a programme of prophylaxis would of course sabotage the whole scheme, and unless the cases in an epidemic should happen to be very widely and evenly distributed, there would seem to be no answer to the problem of adequate controls in a prophylactic trial of this nature.

23.7.4 The possibility cannot be denied that prophylaxis administered to contacts of the 96 cases in villages with only one case each, may have prevented the occurrance of further cases in those villages. However, it is at least obvious from table 1 that in 24 villages (Raya is excluded), sulphaphenazole as administered under exceptionally favourable field conditions failed to prevent the occurrence of further cases. Sawa was the village worst affected, with 33 cases reporting on 26 different days over a period of 11 weeks. Field records show that just over 8,000 tablets (8,000 adult prophylactic doses at that time) were administered in this village on 19 different days, or enough for the whole population over.

23.7.5 Writing of standard prophylaxis using an adult-equivalent dose of 2 gms. of sulphadimidine (the former method) Archibald[1] did not detect any very obvious effect on the spread of the epidemic in 1961 and 1962. The recent evidence from Argungu does not offer scientific proof of anything, but it is considered that it strongly suggests there is small value in prophylaxis of epidemic meningitis as attempted in Northern Nigeria during recent years.

23.8 Other prophylactic drug trials

A supply of an experimental drug, RO4-4393 (Roche) was kindly made available by the manufacturers, and a trial in the prophylaxis of meningitis was made with it in Felende, a village of 1,400 inhabitants near Argungu. In a dosage of 1 gm. weekly for persons over 6 years and ½ gm. weekly for those under 6 years, it proved acceptable and well-tolerated, and during the trial period of 15 weeks no cases of meningitis were recorded from Felende. However, the attack rate in the surrounding districts was only 3 per 1,000 and the absence of satisfactory 'control' villages (see para 23.7.3) prohibits any firm conclusions with regard to efficacy of this promising drug.

23.8.2 The last 20 cases of meningitis of the season were treated with a single injection each of a solution of this drug by Dr. Perkins at Argungu. This at least was completely successful in all but 2 patients, who were admitted moribund and whose deaths appeared to be inevitable.

EPIDEMIC MENINGITIS - REFERENCES

1. Archibald, H.M. (1962) I. Trop. Med. Hyg. 65, 196.
2. Horn, D.W. (1951) Report on the epidemic of cerebro-spinal fever in the Northern Provinces of Nigeria, 1949-50, Government Printer, Kaduna, 1951.
3. Waddy, B.B. (1957) I. Trop. Med. Hyg. 60, 179 and 218.

Paragraph Contents Page no.

24. SMALLPOX

24.1 Notifications:

24.1.1 There was no serious outbreak during the year. Notifications during the year amounted to 1495 cases with 124 deaths, which represents a case mortality of 9%.

24.1.2 Notifications per Province were as follows :-

Province	Population 1963 census	Population per sq. ml.	Cases	Deaths
Adamawa	1,583,585	76	4	0
Bauchi	2,465,457	94	89	3
Benue	2,629,198	95	285	32
Bornu	2,925,854	64	47	3
Ilorin	1,070,706	60	41	6
Kabba	1,209,231	110	52	8
Kano	5,764,778	347	151	9
Katsina	2,529,257	268	413	5
Niger	1,431,668	50	9	1
Plateau	1,360,519	121	61	8
Sardauna	804,585	63	2	0
Sokoto	4,272,056	118	225	27
Zaria	1,558,067	88	116	12

24.1.3 As is customary, the majority of cases occurred in the more northerly provinces though there was an unusual number of cases in Benue. The seasonal incidence also followed the familiar pattern with a sudden increase in cases in January and the monthly numbers maintained thus till July when the rains are properly established; smallpox ceased to be a public health problem for the remainder of the year. The maximum number of cases reported in a month was 349 in March and the minimum was 3 case each in October and November.

24.1.4 A review of the total numbers of smallpox cases notified over the past 15 years shows an irregular but very definite decrease both in incidence and case mortality. The peak figures in the early fifties have never been approached since; in 1950 a total of 10,472 cases with a mortality of 21% was reported. Owing to lack of information, it is not easy to provide an explanation for this but two possibilities can be put forward. There may have been a change in virulence of the smallpox virus.

An outbreak in Benue Province in 1962 provided cases which were described as 'of a mild alastrim type' and it is very probable that the virus in circulation at the present time is of a relatively low virulence. The other possibility is that, as a result of the gradual building of native authority vaccination staffs, the level of immunity of the population has reached a more effective level. This is conjectural to say the least, but there is no doubt that native authorities now act much more promptly to deal with outbreaks and vaccinate contacts. In addition the population as a whole is more willing to seek vaccination as a routine prophylactic against smallpox. However concealment of cases is still practised, even in an urban community like Zaria City.

24.1.5 It is unfortunate that there is a great dearth of information on smallpox in this Region over the past 10 years, not only on the clinical features but on epidemiological information such as the age groups and vaccinal state of those effected. In 1949 and 1950 for example information collected in a Katsina district showed that 90% of all deaths occurred under the age of 10 years, thus emphasising the great need for concentrating on vaccination of infants and children. An effort should be made to collect such information in future.

24.2 Control:

24.2.1 2,208,354 Vaccinations were reported from all Government and Native Authority health offices. Just over half of these were inspected and 80% were said to have been successful. No great credence is ever placed on these figures and it is regrettable that nothing is done either to establish their accuracy or to make the returns more credible. Vaccine lymph is still in general use and with the great distance that it has to be transported to its destination in each province and then the manner it is carried in the field to the population, it is most unlikely that a success rate of 80% was in fact achieved. 100,141 tubes of lymph were used which works out at 22 vaccinations per tube, a reasonable figure; Medical Stores issued 160,000 tubes over the same period. Very regrettably the supply of dried smallpox vaccine is inadequate to allow general use.

24.2.2 Ever since the formation of the Medical Field Units 20 years ago, localised mass vaccination campaigns have been carried out wherever these units were stationed. In recent years attempts have been made to organise native authority health departments to carry out similar campaigns at the provincial level. Adamawa Native Authority commenced a mass vaccination campaigns in 1957; unfortunately no records of the results of this work are available to the writer.

24.2.3 In August 1962, Zaria Native Authority formed four vaccination teams, each team consisting of one senior vaccinator or recorder and two male and one female vaccinators. Compound-to-compound vaccination commenced in the Zaria urban area and surrounding district. By June 1964, 118,542 people had been vaccinated, 55% of them children under 15 years. This was about one-tenth of the total population in Zaria emirate. A 75% vaccination success rate was achieved. After completion of the urban area, the teams were forced to separate to the four quarters of the emirate as the Native Authority was under pressure from various districts to provide a vaccination service. Since then reports of their work have been irregular and incomplete.

24.2.4 The only other emirate in Zaria Province is Jema'a and in March 1963 one vaccination team of four men and one woman was formed to deal with the estimated population of 400,000. By the end of the year 20,788 people had been vaccinated, more than half of them children under 15 years. The success rate is not available.

24.2.5 Obviously the establishment of both these mass vaccination organisations is inadequate to cover Zaria Province within three years, the desired time limit, but their formation does represent a step in the right direction towards effective and economical control and eventual eradication of smallpox. The main problem in dealing with Native Authority vaccination teams is to secure effective supervision of the work; at present this can only be supplied by Government staff and this in turn raises the perennial problem of the relationship between Government and Native Authority staff which cannot be gone into here. Suffice to say there are at

least 383 Native Authority employees designated as vaccinators in the 1964-65 estimates - and there are many more with other titles who also carry out the functions of Vaccinators - who receive emoluments exceeding £33,000 at 1963 rates of pay and it would seem only rational that this considerable outlay should be more purposefully directed now and incorporated into any national eradication campaign that may be instituted in the future.

25 OTHER EPIDEMIC DISEASES.

25.1 Two epidemics of unidentified disease were reported by A. Perkins, Rural Medical Officer, Argungu. The first of these was in Illo District south of the River Niger in Gwandu Division, and it occurred in October and November 1962, but was not 'investigated' until this remote area (where not even a Land Rover has ever set tyre), was visited by the R.M.O. in January 1963. His report for January is quoted:-

25.2 "Confirmation was obtained of the lethal effect of the epidemic which swept the banks of the Niger in October and November ("Ciwon Gabbas"). Many compounds were visited in which were freshly dug graves. In one compound there were eleven graves and one survivor. In the local lock-up both the jailor and his prisoner were buried within. Approximately 120 persons died in the neighbourhood of Illo itself and about 438 in the whole District. From reports from other areas it appears that at least 1,000 people must have died altogether. As mentioned in the December report, it appears to have been an epidemic form of pneumonia, and no Medical Officers were informed until the outbreak was almost over. In view of the pre-occupation with C.S.M. precautions, only a Medical Field Unit Inspector could be spared to visit the area when the information was first received, and he arrived to find the epidemic almost over.

25.3 The second epidemic occurred in Argungu town and environs; a diagnosis of true cholera seems most unlikely in view of the relatively circumscribed nature of the epidemic, and its self-subsidence. The R.M.O's Report for May 1963 is quoted:-

25.3.2 "Since 10th May we have had 26 cases with 6 deaths of an illness which conforms exactly in every detail to the text-book descriptions of cholera. The death-rate would probably have been 75% without the prompt administration of intravenous salines in the last 20 cases, in which we have had only 3 deaths. Ages range from 7 to 60 and the patients are usually well-nourished. Symptoms before collapse range from 2 days to 2 hours. Number of stools and vomits range from 30 to just one, and are of the classical copious rice-water type without colic. A typical case is carried with a history of copious watery stools for 6 hours, and vomiting for 2 hours. The patient is slightly comatose, the skin is grey, rough, stone cold and wringing wet. The fingers are shrivelled, the eyes sunken and the abdomen scapoid. A loud succussion splash is always present when vomiting is at its height."

25.3.3 "Most cases respond dramatically to copious infusion with normal saline and 5% glucose intravenously. Sulphonamides are given by injection and various pressor substances (prednisolone does not appear to be any more effective than methedrine).

25.3.4 "Of the first 20 cases, 18 came from Argungu Town. Amongst the last 6, 3 are some distance away. All the Argungu cases have been charted on the Argungu street plan, and their food and drink recorded.

The street plan shows that 75% live near the river. The questionnaire disclosed that about 80% had drunk the untreated river water before onset of the disease. But there were one or two cases with no apparent connection with the river. One was a prisoner whom I am informed had never been out of the prison for a week before his sudden death from this pseudo-cholera. There is a good well in the prison, and none of the other prisoners was in the least affected."

25.3.5 "We have been unlucky in obtaining stools for examination."

"In the meantime, the N.A. Police have been posted at the two main watering-points on the river, and all the wells in the town have been chlorinated. The morbidity-rate remains fairly constant at 1-2 daily."

25.3.6 "A further 7 cases were reported in June with 2 deaths, the cases coming mostly from a hamlet 3 miles from Argungu, and one solitary case from a village 14 miles away on the Birnin-Kebbi Road.

25.4 Food-poisoning.

An outbreak of food-poisoning occurred in Argungu Town at the end of Ramadan, when over a dozen cattle were slaughtered in the streets without any meat inspection formalities. From 3 to 7 days later many severe cases of food-poisoning occurred, with 5 known deaths.

APPENDIX A

MINISTRY OF HEALTH, NORTHERN NIGERIA

Sleeping Sickness Service, Annual Report
1st January - 31st December 1963

VOLUNTARY CASES TREATED AT DISPENSARIES.

Province	S.S. Dispensaries			N.A. Dispensaries			Total of all S.S. Cases				Other diseases treated at S.S. Dispensaries
	New	Clinical	Relapse	New	Clinical	Relapse	New	Clinical	Relapse	Total	
Adamawa	-	-	-	-	-	-	-	-	-	-	
Bauchi	-	1	-	18	10	14	18	11	14	43	6,155
Benue	-	-	-	278	74	98	278	74	98	450	
Bornu	-	-	-	-	-	-	-	-	-	-	
Ilorin	-	-	-	-	-	-	-	-	-	-	
Kabba	-	-	-	-	-	-	-	-	-	-	
Kaduna C.T.	4	5	5	-	-	-	4	5	5	14	
Kano	14	9	11	5	5	13	19	14	24	57	4,095
Katsina	-	-	-	4	1	1	4	1	1	6	
Niger	-	-	-	28	13	11	28	13	11	52	
Plateau	-	-	-	79	26	29	79	26	29	134	3,799
Sardauna	-	-	-	-	-	-	-	-	-	-	
Sokoto	-	-	-	-	-	-	-	-	-	-	
Zaria	28	7	15	48	25	39	76	32	54	162	6,622
TOTAL	46	22	31	460	154	205	506	176	236	918	

APPENDIX B

MINISTRY OF HEALTH, NORTHERN NIGERIA

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VOLUNTARY CASES TREATED AT HOSPITALS

Province	Government Hospitals			Mission Hospitals			Total for all Hospitals			
	New	Clinical	Relapse	New	Clinical	Relapse	New	Clinical	Relapse	Total
Adamawa	-	-	-	2	3	-	2	3	-	5
Bauchi	10	11	14	-	-	-	10	11	14	35
Benue	21	26	18	53	21	42	74	47	60	181
Bornu	-	-	-	-	-	-	-	-	-	-
Ilorin	-	-	-	-	-	-	-	-	-	-
Kabba	-	-	-	-	-	-	-	-	-	-
Kaduna C.T.	-	2	-	-	-	-	-	2	-	2
Kano	12	2	6	-	-	-	12	2	6	20
Katsina	-	-	-	-	-	-	-	-	-	-
Niger	15	33	7	-	-	-	15	33	7	55
Plateau	-	-	-	32	-	-	32	-	-	32
Sardauna	-	-	-	-	-	-	-	-	-	-
Sokoto	-	-	-	-	-	-	-	-	-	-
Zaria	10	5	6	-	-	-	10	5	6	21
TOTAL	68	79	51	87	24	42	155	103	93	351

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DISPENSARY AND TEAM RESURVEYS

Province	Dispensary Resurveys						Team Resurveys					
	Number Examined	S.S. Cases			Total S.S.	% S.S.	Number Examined	S.S. Cases			Total S.S.	% S.S.
		New	Clinical	Relapse				New	Clinical	Relapse		
Adamawa	-	-	-	-	-	-	44,360	60	13	15	88	0.2
Bauchi	12,510	1	-	-	1	0.008	279,459	233	7	11	251	0.08
Benue	121,804	147	15	14	176	0.14	204,155	113	17	10	140	0.06
Bornu	-	-	-	-	-	-	13,757	5	-	-	5	0.03
Ilorin	-	-	-	-	-	-	30,996	15	2	-	17	0.05
Kabba	-	-	-	-	-	-	4,818	11	3	-	14	0.29
Kaduna C.T.	-	-	-	-	-	-	-	-	-	-	-	-
Kano	34,257	8	1	5	14	0.04	283,779	165	5	7	177	0.06
Katsina	14,979	1	-	-	1	0.007	109,743	23	-	-	23	0.02
Niger	15,305	21	10	2	33	0.21	34,791	38	3	-	41	0.11
Plateau	33,134	21	1	4	26	0.07	12,075	27	3	1	31	0.25
Sardauna	-	-	-	-	-	-	8,154	16	3	2	21	0.24
Sokoto	-	-	-	-	-	-	-	-	-	-	-	-
Zaria	94,428	97	12	21	130	0.13	214,165	174	17	63	254	0.12
TOTAL	326,417	296	39	46	381	0.11	1,240,252	880	73	109	1,062	0.08

APPENDIX D

MINISTRY OF HEALTH, NORTHERN NIGERIA

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SLEEPING SICKNESS EXAMINATION AND PENTAMIDINISATION OF
MINES, P.W.D., TIMBER CAMPS AND RAILWAY EXTENSION LABOURERS AND FAMILIES

Province	No. of Mines Labour & Fams. Examined	No. with S.S.	No. given Pent.	No. of P.W.D. Labour. Examined	No. with S.S.	No. of Timber Ext. Labour. Examined	No. with S.S.	No.of New Rly.Ext.Lab. & Families re-exam. & given Pent.	No. with S.S.	No.of Rly. Ext.Labour. & Families re-exam. & given Pent.	No. with S.S.	Total Labour.& Families Examined	Total No. with S.S.	% S.S.	Total No. given Pent.
Adamawa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bauchi	20,194	4	150	-	-	-	-	2,830	9	8,401	-	31,514	13	0.04	11,381
Benue	5,348	-	-	-	-	-	-	-	-	-	-	5,348	-	-	-
Bornu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ilorin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kabba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kaduna C.T.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kano	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Katsina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Niger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plateau	6,132	7	4,781	321	-	-	-	-	-	-	-	6,453	7	0.11	4,781
Sardauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sokoto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zaria	5,942	5	4,123	538	2	438	-	-	-	-	-	6,918	7	0.10	4,123
TOTAL	37,616	16	9,054	859	2	438	-	2,830	9	8,401	-	50,233	27	0.05	20,285

No. receiving Pentamidine:

1. Resettlement Area (S. Gida)	968	
2. Villages in Kogin Kano S.S. focus	7,684	
		8,652
TOTAL NUMBER RECEIVING PENTAMIDINE		28,937

APPENDIX V

MINISTRY OF HEALTH, NORTHERN NIGERIA

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PROVINCIAL DISTRIBUTION OF ALL CASES OF SLEEPING SICKNESS

Province	Team Resurveys	Disp. Resurveys	Mines, P.W.D., Timber ext. Rly. Ext. Surveys	S.S. Disps.	N.A. Disps.	Mines Disps.	G'ment Hosps.	Mission Hosps.	Total S.S. Cases	% of Total Figure
Adamawa	88	-	-	-	-	-	-	5	93	3.4
Bauchi	251	1	13	1	42	-	35	-	343	12.6
Benue	140	176	-	-	450	-	65	116	947	34.6
Bornu	5	-	-	-	-	-	-	-	5	0.2
Ilorin	17	-	-	-	-	-	-	-	17	0.6
Kabba	14	-	-	-	-	-	-	-	14	0.5
Kaduna C.T.	-	-	-	14	-	-	2	-	16	0.6
Kano	177	14	-	34	23	-	20	-	268	9.8
Katsina	23	1	-	-	6	-	-	-	30	1.1
Niger	41	33	-	-	52	-	55	-	181	6.6
Plateau	31	26	7	-	134	-	-	32	230	8.4
Sardauna	21	-	-	-	-	-	-	-	21	0.8
Sokoto	-	-	-	-	-	-	-	-	-	-
Zaria	254	130	7	50	112	-	21	-	574	20.8
TOTAL	1,062	381	27	99	819	-	198	153	2,739	100.0

MINISTRY OF HEALTH, NORTHERN NIGERIA

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SUMMARY OF S.S. CASES FOUND AT RESURVEYS

Type of Resurvey	Number Examined	New	Clinical	Relapse	Total S.S.	% S.S.
Team	1,240,252	880	73	109	1,062	0.08
Dispensary	326,417	296	39	46	381	0.11
Mines, P.W.T., Timber Ext.	38,913	18	-	-	18	0.04
Railway Extension	11,320	9	-	-	9	0.08
TOTAL	1,616,902	1,203	112	155	1,470	0.09

SUMMARY OF VOLUNTARY S.S. CASES TREATED AT HOSPITALS AND DISPENSARIES

Cases attending at:	New	Clinical	Relapse	Total
Hospitals	155	103	93	351
Dispensaries	506	176	236	918
TOTAL	661	279	329	1,269

APPENDIX G

YEARLY RECORD OF ALL CASES OF SLEEPING SICKNESS TREATED IN NORTHERN NIGERIA FROM 1946 TO 1963

RESURVEY AND VOLUNTARY SLEEPING SICKNESS CASES

Year	TEAM RESURVEY			DISPENSARY RESURVEY			MINES, TIMBER EXT. P/D & RLY. EXT. RESURVEY			TOTAL OF ALL RESURVEY CASES			VOLUNTARY S.S. CASES			GRAND TOTALS OF ALL CASES
	No. Examined	No. of S.S. Cases Discovered	Inf. Rate %	No. Examined	No. of S.S. Cases Discovered	Inf. Rate %	No. Examined	No. of S.S. Cases Discovered	Inf. Rate %	No. Examined	No. of S.S. Cases Discovered	Inf. Rate %	Att. Disp.	Att. Hosp.	Total Vol. Cases	
1946	354,206	3,481	0.98	115,578	1,080	0.93	35,446	227	0.64	505,230	4,788	0.94	8,153	3,220	11373	16,161
1947	627,088	2,609	0.41	86,007	791	0.91	35,422	140	0.39	748,517	3,540	0.47	7,934	2,521	10455	13,995
1948	570,976	3,860	0.67	264,525	1,828	0.69	12,725	36	0.28	848,226	5,724	0.67	5,506	2,345	7,851	13,575
Jan.1949-March'50	596,059	1,645	0.27	386,236	1,823	0.47	3,907	9	0.23	986,202	3,477	0.35	5,792	2,022	7,814	11,291
1950 - 51	536,543	1,899	0.35	264,479	1,067	0.40	20,571	109	0.52	821,593	3,075	0.37	2,839	1,187	4,026	7,101
1951 - 52	689,747	1,548	0.22	310,019	1,109	0.35	18,552	65	0.35	1,018,318	2,722	0.26	3,307	1,191	4,498	7,220
1952 - 53	628,607	1,140	0.18	402,761	925	0.23	12,843	26	0.20	1,044,211	2,091	0.20	2,712	1,257	3,969	6,060
1953 - 54	587,541	1,475	0.25	829,668	1,767	0.21	36,251	91	0.25	1,453,460	3,333	0.23	2,402	878	3,280	6,613
1954 - 55	959,238	2,240	0.23	657,533	1,241	0.18	56,451	150	0.26	1,673,312	3,631	0.21	2,179	1,114	3,293	6,924
1.4.55 - 31.12.55	794,077	1,960	0.24	224,775	450	0.20	53,772	102	0.19	1,072,624	2,512	0.23	1,544	841	2,385	4,897
1956	1,319,510	1,798	0.13	431,683	880	0.23	82,169	144	0.17	1,833,362	2,822	0.15	2,207	882	3,089	5,911
1957	1,135,764	1,660	0.14	463,367	885	0.19	89,124	112	0.12	1,688,255	2,657	0.15	1,701	687	2,388	5,045
1958	1,274,833	1,630	0.12	395,934	779	0.19	46,946	47	0.10	1,717,713	2,456	0.14	1,660	746	2,406	4,862
1959	1,127,912	1,643	0.14	361,911	727	0.20	38,069	43	0.11	1,527,892	2,413	0.15	1,543	580	2,123	4,536
1960	1,203,365	1,263	0.10	367,265	510	0.13	58,881	45	0.07	1,629,511	1,818	0.11	1,420	551	1,971	3,789
1961	1,397,201	744	0.05	291,228	408	0.14	43,783	22	0.05	1,732,212	1,174	0.06	1,111	593	1,704	2,878
1962	1,201,720	1,534	0.12	326,101	466	0.13	42,296	9	0.02	1,570,117	2,009	0.13	938	362	1,300	3,309
1963	1,240,252	1,062	0.08	326,417	381	0.11	50,233	27	0.05	1,616,902	1,470	0.09	918	351	1,269	2,739

RESULTS OF M.F.U. HELMINTH SURVEYS, NORTHERN NIGERIA

Date	Province	N.A. Area	Place	Age group	Urine examinations for S. haematobium			Stool Examination						
					No. examined	+ ve	%	No. examined	S. mansoni + ve	S. mansoni %	Ankylostomes + ve	Ankylostomes %	Ascaris + ve	Ascaris %
1951	Bornu	Biu	Biu	Schools	201	138	69%	201	13	6.4%	55	27.0%	10	5.0%
1952	"	"	"	Central School	140	*110	79%	140	18	13.0%	17	12.0%	0	-
1950	"	"	Burutai	All	323	216	67%							
1950	"	"	Kwajaffa	All				1,303	53	4.1%				
1951	"	"	KwayaTerra	All	575	162	28%	581	35	6.0%	97	17.0%	7	1.0%
1951	"	"	Sakwa	All	702	192	27%	638	52	8.1%	156	24.0%	28	4.4%
"	"	"	"	5 -						5.5%				
"	"	"	"	8 -						15.2%				
"	"	"	"	11 -					52	11.1%				
"	"	"	"	16 -						17.6%				
"	"	"	"	21 -						6.5%				
"	"	"	"	31 -						2.1%				
1952	"	"	Shani	All	729	432	59%	698	18	2.6%	173	25.0%	167	23.0%
1952	"	Bornu	Alla Marte Nzine	All	394	115	29%	198	1	0.5%	19	9.6%	0	-
1954	"	"	Damaturu	All	1,396	294	21%	1,396	"incidence exceedingly small" (A.Rpt. 54-55)		262	19.0%	10	0.7%
1951	"	"	Damboa	All	251	97	38%	233	0	-	11	4.7%	1	0.4%
1951	"	"	Maiduguri	Schools	722	222	31%	722	+8	1.1%	109	15.0%	3	0.4%
1952	"	"	"	"	712	156	22%	710	1	0.1%	102	14.0%	4	0.6%
1964	"	"	" (Schools)	7 -				86	(0)					
				11 - 16				93	(@12)	13.0%				
				Total				179	(12)	6.7%	(43)	24.0%	(9)	5.0%

Urine examined on 2 successive days after exercise, and negative specimens examined further by miracidiascope.

+ 5 of these 8 children came from Biu.

@ only 3 of these 12 children were indigenous to Maiduguri town; 3 came from Biu.

RESULTS OF M.F.U. HELMINTH SURVEYS, NORTHERN NIGERIA

Date	Province	N.A. Area	Place	Age group	Urine examinations for S. haematobium			Stool Examination						
					No. examined	+ ve	%	No. examined	S. mansoni + ve	S. mansoni %	Ankylostomes + ve	Ankylostomes %	Ascaris + ve	Ascaris %
1963	Bornu	Borno Yo and Daiya	Local population	Random Sample	See below			130	See below		(4)	3.0%	(14)	11.0%
			≠Irrigation Staff	"	"			165	"		(41)	25.0%	(14)	9.0%
1963-1964			Local pop.	2 -	21	3	14%	4	(1)	25.0%				
		Yo and Daiya (S.mansoni)	≠Irrig.Staff	2 -	4	0	-	9	(0)	-				
		Yo, Daiya Abadan and Arege (S.haematobium)	Local pop.	5 -	151	96	64%	28	(1)	4.0%				
			≠Irrig. Staff	5 -	1	0	-	10	(2)	20.0%				
			Local pop.	16 +	247	81	33%	95	(11)	12.0%				
			≠Irrig. Staff	16 +	75	12	16%	144	(23)	16.0%				
			TOTAL		499	192	38%	290	(38)	13.0%				
1952	Bornu	Dikwa	Ngala	All	424	17	4%	410	0	-	47	11.5%	2	0.5%
1952	"	"	Wulgo	All	456	50	11%	405	0	-	23	5.7%	1	0.2%

≠ Irrigation Staff came from many different areas of Nigeria.

RESULTS OF M.F.U. HELMINTH SURVEYS, NORTHERN NIGERIA

Appendix H
3.

Date	Province	N.A. Area	Place	Age group	Urine examinations for S. haematobium			Stool Examination						
									S. mansoni		Ankylostomes		Ascaris	
					No. examined	+ ve	%	No. examined	+ ve	%	+ ve	%	+ ve	%
1955	Ilorin	Borgu	Kaiama	All	964	143	15%	916	0	-	294	32.0%	21	2.3%
1959	"	Borgu Survey	Niger Dam Site Awuru	Random Sample	62	4	6%	48	(2) 0	4% -	(29) 12	60% 25%	(2)	4.0%
"	"	"	Dogongari	"	61	3	5%	53	(5) 2	9% 4%	(39) 18	74% 34%	(2)	4.0%
"	"	"	Garafini	"	27	1	4%	26	(2) 0	8% -	(12) 4	46% 15%	(1)	4.0%
"	"	"	Koroyin	"	28	1	3.6%	18	(1) ND	6%	(8) ND	44%	(1)	6.0%
"	"	"	Waje	"	32	1	3%	31	(5) 0	16% -	(13) 3	42% 10%	(0)	-
"	"	"	Wawa	"	45	11	24%	47	(5) 2	11% 4%	(26) 8	55% 17%	(0)	-
"	"	"	TOTAL		255	21	8%	223	(20) 4	9% 2%	(127) 45	57% 22%	(6)	2.7%
1956	"	Ilorin	Erin-Ile	All	1,861	168	9%	1,861	0	-	169	9.0%	308	16.0%
1955	"	"	Ilorin	Schools	851	259	30%	851	5	0.6%	68	8.0%	344	40.0%
1956	"	"	"	"	1,325	211	16%	1,325	16	1.2%	157	11.0%	530	30.0%
1959	"	Lafiagi	Bacita & Egbangi	Random Sample	46	13	28%	34	(23) 3	68% 9%	(22) 11	65% 32%	(4)	12.0%
"	"	"	Bacita	4-8 yrs	12	8	66%	10	(5) 4	40% 50%	(6) 4	60% 40%	(0)	-
"	"	"	Bacita	8-13 yrs	15	13	87%	15	(14) 9	93% 60%	(7) 2	47% 14%	(1)	7.0%
"	"	"	Bacita	Sugar estate employees	21	9	43%	21	(13) 5	62% 24%	(16) 9	76% 43%	(4)	19.0%
"	"	"	Fanagun	Random Sample	49	26	53%	46	(41) 16	89% 35%	(31) 14	67% 30%	(3)	6.5%
"	"	"	+Totals Bacita area	All ages over 3 yrs	164	75	46%	146	(114) 44	78% 30%	(96) 46	66% 32%	(14)	10.0%
1954	"	"	Lafiagi	All	2,074	409	19%	2,073	"Incidence of S.mansoni infinitesimal"(A.Rpt.)		409	20.0%	167	8.0%
"	"	Pategi	Pategi	Rice-farmers	201	85	42%	201	3	1.5%	46	23.0%	11	5.0%
"	"	"	"	Non-rice-farmers	199	65	32%	199	5	2.5%	54	27.0%	25	13.0%

+ The "Totals Bacita area" include a few persons examined in addition to those along the preceding 5 lines.

RESULTS OF M.F.U. HELMINTH SURVEYS, NORTHERN NIGERIA

Date	Province	N.A. Area	Place	Age group	Urine examinations for S. haematobium			Stool Examination						
					No. examined	+ ve	%	No. examined	S. mansoni		Ankylostomes		Ascaris	
									+ ve	%	+ ve	%	+ ve	%
1955	Katsina	Daura	Daura	Schools	133	12	9.0%	133	0	-	8	6%	2	1.5%
"	"	"	Sandama	"	49	2	4.1%	49	0	-	12	24%	0	-
"	"	"	Zango	"	65	2	3.1%	65	0	-	3	46%	1	1.5%
"	"	Katsina	Bakori	"	53	8	15.0%	53	4	7.5%	1	2%	0	-
"	"	"	Bindawa	"	45	19	42%	45	0	-	6	13%	3	7%
"	"	"	Ceranci	"	61	27	44%	27	0	-	11	40%	0	-
"	"	"	Dandume	"	64	30	47%	64	0	-	11	17%	6	10%
"	"	"	Daudawa	"	42	4	9.5%	42	0	-	7	17%	0	-
1957	"	"	Dutsin Ma.	"	173	104	60%							
1955	"	"	Funtua	"	335	34	10.0%	34	2	5.9%	6	18%	1	3%
1950	"	"	Kankiya	0- 2	M 38 F 45	M 0 F 0	M - F -							
"	"	"	"	2- 5	51 57	14 13	27% 23%							
"	"	"	"	5-10	73 59	49 30	67% 51%							
"	"	"	"	10-20	66 14	43 4	65% 29%							
"	"	"	"	20+	84 83	39 15	46% 18%							
				Total	312 258	145 62	46% 24%							
1954	"	"	"	All				2,196			725	23%		
1958	"	"	"	J.P. Sch.	135	90	67%	135			16	12%		
"	"	"	"	S.P. Sch.	56	38	67%							
1955	"	"	Malumfashi	Schools	120	59	49%	120	0	-	9	7.5%	4	3.3%
1960	"	"	Northern part of Emirate	"	1,152	175	15%	1,152	Not stated		306	27%	Not stated	
1959	"	"	Not stated	"	1,082	491	45%	1,082	Not stated		282	26%	Not stated	

RESULTS OF M.F.U. HELMINTH SURVEYS, NORTHERN NIGERIA

Appendix H
5.

Date	Province	N.A. Area	Place	Age group	Urine examinations for S. haematobium			Stool Examination						
									S. mansoni		Ankylostomes		Ascaris	
					No. examined	+ ve	%	No. examined	+ ve	%	+ ve	%	+ ve	%
1958	Niger	Abuja	Abuja	Schools	414	23*	5.5%	414	4	1.0%	81	20.0%	85	21.0%
"	"	"	Bwari	"	69	0	-	69	0	-	31	44.0%	36	52.0%
"	"	"	Dangara	"	54	0	-	54	0	-	23	43.0%	2	3.6%
"	"	"	Gerki	"	70	4	8.0%	70	0	-	25	36.0%	4	8.0%
"	"	"	Gwachipe	"	68	0	-	68	0	-	42	62.0%	4	5.8%
"	"	"	Jiwa	"	71	0	-	71	0	-	51	72.0%	7	10.0%
"	"	"	Kabo	"	67	0	-	67	0	-	18	27.0%	35	52.0%
"	"	"	Kuje	"	65	0	-	65	0	-	34	52.0%	7	18.0%
"	"	"	Kwali	"	70	0	-	70	0	-	21	30.0%	6	9.0%
"	"	"	Paiko	"	71	0	-	71	0	-	35	49.0%	7	10.0%
"	"	"	Total	"	1,019	27	2.6%	1,019	4	0.4%	361	35.0%	193	19.0%
1960	"	"	As above	Schools	1,099	38	3.5%	1,099	29	2.6%	351	32.0%	262	24.0%
1956	Sokoto	Argungu	Argungu	Girls Sch.	32	22	69.0%	32	0	-	3	10.0%	0	-
"	"	"	"	J.P. Sch.	107	85	79.0%	107	0	-	21	19.0%	0	-
1952	"	"	"	S.P. Sch.	87	78	90.0%	87	0	-	47	54.0%	0	-
1956	"	"	"	S.P. Sch.	76	49	64.0%	76	0	-	27	35.0%	0	-
1957	"	"	"	All Schools				522	0	-	157	30.0%	2	0.38%
1958	"	"	Fanna	School	59	15	25.0%	59	0	-	35	59.0%	0	-
"	"	"	Kamba	"	117	31	26.0%	117	0	-	49	42.0%	0	-
1952	"	"	Gulma	All	1,043	687	67.0%	1,043	0	-	275	26.0%	0	-

* 16 of these 23 cases were from Abuja "Junior Secondary School".

APPENDIX J.

Current onchocerciasis treatment schedule at the Ophthalmic Unit, Kaduna.

Day of treatment	"Banocide"	"Phenergan"
1	50 mgm. x 2	25 mgm. x 2
2	" x 3	" x 3
3	100 mgm. x 3	" x 3
4	150 mgm. x 3	" "
5	200 mgm. x 3	" "
6	300 mgm. x 3	" "
7	400 mgm. x 3	" "

"Banocide" is then continued at the dosage of day 7 for a further 2 weeks; "Phenergan" is stopped at any time after the 7th day if all apparent reaction has ceased.

Day 22)
) - Antrypol 0.1 gm., test dose.
Week 3)

Week 4, - Antrypol 0.5 gm.

Weeks 5 - 8 inclusive, Antrypol 1 gm. (Total dose 4.6 gms).

APPENDIX K.

Onchocerciasis and Antrypol in Northern Nigeria.

In 1961 a questionnaire was distributed to Government and Mission doctors who were believed to have experience of treating onchocerciasis with Antrypol and the answers to this are the basis of the following paragraphs.

Courses given. 10 doctors used both Banocide (diethylcarbamazine) and Antrypol as a routine; 2 sometimes used Banocide especially in heavy infections to reduce the toxic manifestations of subsequent Antrypol treatment; and one always used Antrypol alone.

Test doses of 0.2 - 0.5 gm. of Antrypol rarely gave rise to any symptoms or to albuminuria, and some doctors had ceased giving them as they seemed to serve no useful purpose.

Most of the Antrypol courses consisted of injections of 1 gram at intervals of 5-7 days to a total dosage of 3 - 7 grams. 5-6 grams seemed to be the most popular total dose.

Results. Most doctors who were able to give an indication of their results suggested excellent cure rates (by skin snip examination) at the end of a combined course of Antrypol and Banocide. There were only 2 comments on the long-term results. One doctor long resident in Muri Division of Adamawa stated that 100% of those seen 3-4 months after the course were negative by skin snips, and some were still negative after 5 years; his Antrypol dosage varied from 3 to 5 grams, smaller doses being given for the heavier infections. Another working near Jos stated that the majority of nurses treated were still cured after 4 years; his Antrypol courses totalled 4.2 gms. each. Both of these doctors used Anthisan in conjunction with Banocide before beginning treatment with Antrypol.

Toxic effects. 6 doctors did not consider routine urine-testing necessary during treatment; of 7 who did, one had never seen more than a trace of albuminuria which he ignored, whilst one withheld one injection and 4 stopped treatment altogether if there was more than a trace of albuminuria. The Muri doctor made the interesting observation that he only withheld one injection because the urine always cleared by the

following week in the absence of other pathology.

4.2 Dermatitis was not always attributed to the use of Banocide rather than Antrypol. Exfoliative dermatitis was recorded by three doctors only one of whom committed himself to an opinion as to its aetiology, suggesting that it was due to the death of adult worms and microfilariae.

4.3 Exacerbation of eye lesions was mentioned in two replies, but whether due to Antrypol or Banocide was not clear. Absence of exacerbation of eye lesions was specifically mentioned by 2 doctors both of whom "sometimes" used Banocide in conjunction with Antrypol; between them they had treated about 1,500 cases with the latter.

4.4 9 doctors stated that they were not aware of any deaths caused by their treatment with Antrypol. However, in 1959 Government staff under the Ophthalmologist undertook mass treatment of onchocerciasis in a heavily infected population in Adamawa Province. Several patients developed serious toxic manifestations and a few of these died in a nearby Mission Hospital; this experience affected the Government attitude towards the use of Antrypol against onchocerciasis generally, and in field conditions in particular.

4.5 Moderate to severe general symptoms - especially prostration and diarrhoea - were recorded in 7 replies, and only two failed to mention such developments; one of these was from the doctor near Jos who had treated about 1,00 patients, and the other from the Muri doctor who treated about 250 patients annually. The latter pointed out that patients were carefully examined before treatment was given, and any with hepato-splenomegaly and a positive Napier (formolgel) test were not treated with Antrypol at all; he had also started using Anthisan in high dosage along with Banocide for a week before giving Antrypol, and on this regime had not seen any reactions at all at the time of his reply.

5 <u>The experience of Antrypol in relation to sleeping sickness.</u>

Antrypol has been used continuously since the late 1920s in the treatment of sleeping sickness in Nigeria. Lester found that about

1 in 20,000 persons were sensitive to the drug and developed an immediate serious, and occasionally fatal, reaction to a full dose; it was for this reason that a test dose was insisted upon - not in order to detect albuminuria. Over the last 20 years, the maximum single dose has been 0.5 gm., although seven weekly injections with a maximum dose of 1 gm. are used in Ghana for early cases, and in E. Africa for T. rhodesiense infections. These courses have always been considered safe, and in Nigeria at any rate, because of the practical difficulties, examination of the urine has not been insisted upon. A poor state of nutrition was thought to have contributed to some intolerance of Antrypol in Sierra Leone in 1942, when used in a drug course which had been found relatively free from toxicity in Nigeria.

5.2 Diarrhoea and vomiting can occur after a full dose of Antrypol, the latter appearing within a few minutes. In some areas debilitating foot pains can develop and eventually lead to superficial desquamation of the skin of the soles and palms. Dr. M.P. Hutchinson (who has kindly provided the information for paras 5.1 and 5.2) saw this happen after two 1-gm. doses during an early drug trial; there has never been any indication that Antrypol gives rise to optic atrophy - this is regarded as a complication of arsenical theraphy and is most prone to occur in late cases with considerable C.S.F. changes.

5.3 An experienced doctor has reported two cases of circulatory collapse after a test dose, but added that one of these subsequently completed the course without further incident. Two Sleeping Sickness Superintendents recalled that, during the height of the sleeping sickness epidemic, serious reactions were seen in the south-east of Zaria Province following treatment with this drug. These effects included vomiting, diarrhoea, dermatitis, pain in the palms and soles, joint pains and some deaths; (3 deaths half an hour after the injections were presumably due to drug sensitivity). It was later realised that the area concerned is one of high endemicity for onchocerciasis, and these otherwise mysterious reactions are believed to have been due to the effect of the drug on coincident infection with O. volvulus.

APPENDIX L.

Heaf testing and B.C.G. vaccination statistics

*	Population group	Year	No Heaf-tested	Positive No.	Positive %	No. Negative	No. given B.C.G.
	Newborn	1961	-	-		-	925
	infants	1962	-	-		-	1,192
	(Jos)	1963	-	-		-	1,606
							3,723
TUBERCULOSIS UNIT	Infants at	1961	5,851	293		5,558	14,719
	clinics in	1962	-	-		-	12,481
	Plateau Province	1963	-	-		-	22,392
			5,851	293	5%	5,558	49,592
	School-children	1961	26,021	5,474		20,547	20,547
	(whole Region)	1962	84,386	29,391		54,995	54,995
		1963	102,951	37,975		64,976	64,976
			213,358	72,840	34%	140,518	140,518
	Contacts and adults	1961	17,418	9,216		8,202	8,201
	at special risk	1962	7,487	4,490		2,992	2,712
	(whole Region)	1963	5,914	3,857		2,057	2,057
			30,819	17,513	57%	13,251	12,970
	3 year total		251,434	91,553	36%	159,876	207,352
M.O.H. KANO	Newborn infants (0-6 months)	1963	-	-		-	1,663
	Schoolchildren (5-14 years)		1,965	1,105	56%	752	752
	Contacts and adults at special risk		205	115	56%	72	72
M.O.H. KADUNA	Newborn infants (0-3 months)	1963	-	-		-	95
	Infants at child welfare clinics		312	36	11.5%	215	215
	Schoolchildren		3,744	2,515	67%	942	942
	Contacts and adults at special risk		571	353	62%	147	147
Regional Totals - 1963	Newborn infants		-	-		-	3,364
	Infants at child welfare clinics		312	36	11.5%	215	22,607
	Schoolchildren		108,660	38,595	35%	66,670	66,670
	Contacts and adults at special risk		6,690	4,325	65%	2,276	2,276
	1963 Totals incl. mines survey		117,068	43,813	37%	69,710	95,466

APPENDIX M

Details of Tuberculin Testing technique and interpretation of results by the Tuberculosis Unit

Antigen used — Glaxo-Allenbury's P.P.D. in 2 mil. vials, 2 mgm/ml. strength.

Apparatus used — Heaf 6-needle multipuncture apparatus.
Forearm cleaned with ether.
One loopful of antigen is placed on the forearm; the skin is stretched tightly; needles released to 2 m.m. depth for adults and 1 m.m. depth for children under 5 years.

Reading — taken on 3rd - 5th day:-

1st degree - 5-6 individual indurated papules.
2nd " - coalescence of indurated papules forming a ring.
3rd " - single indurated area over puncture site.
4th " - bleb, pustule or ulcer formation.

APPENDIX N

Some statistics for meningitis in Northern Nigeria since 1959

1.

Year	Cases	Deaths
1959	2,610	257
1960	36,285	2,448
1961	13,476	1,146
1962	23,693	1,810
1963	3,067	409
Total	79,131	6,070

11. Report of Rural Medical Officer Kankiya for period November 15th, 1960 to June 17th 1961: (see para 23.4.3)

a) 6,980 cases reported with 533 deaths - apparent mortality rate 7.7%

b) Results of careful evaluation of records spread over the whole epidemic and over all parts of the Province (Katsina), gathered from isolation camp record books:

1,903 cases evaluated, with 212 deaths - mortality rate 11.2%

c) Analysis by age and sex of the 1,903 evaluated records:

1058 Male Patients

Age	Number of cases and percentage		Number of deaths and percentage	
Under 1 year	39	1.9%	4	11%
1 - 4 years	285	15.0%	38	13%
5 -14 years	454	24.1%	55	12%
15-44 years	241	12.7%	21	9%
45 years and over	39	2.0%	4	10%
TOTAL	1058	55.7%	122	11.5%

845 Female Patients

Age	Number of cases and percentage		Number of deaths and percentage	
Under 1 year	20	1.0%	6	30%
1 - 4 years	205	10.8%	23	11%
5 -14 years	404	21.2%	36	9%
15-44 years	193	10.1%	16	9%
45 years and over	23	1.2%	9	39%
TOTAL	845	44.3%	90	10.7%

111. Figures from Rural Health Centre Argungu for period January to May 1963 (see para 23.4.3) in Argungu Emirate:

435 cases recorded with 52 death - mortality rate 12.0%

APPENDIX O

RURAL HEALTH SERVICES IN NORTHERN NIGERIA

Distribution of responsibilities; Native Authority Medical & Health Services

1. The general health of the population in rural areas is mainly the responsibility of the Native Authorities; Government is directly responsible for specific disease control programmes (except Leprosy), and training of Staff.

2. The Native Authority Contribution to Rural Health

2.1 Dispensaries, staffed mainly by Dispensary Assistants with two years training (provided by Government at the Medical Auxiliaries Training School, Kaduna, ("MATS"), followed by a qualifying examination. These men are now required to have completed their primary education before acceptance; but there are still many Dispensaries staffed by men of lesser education, variously trained before the MATS came into existence.

2.2 Maternity and/or Child Welfare Units with a maximum of five beds staffed by Gr. II Midwives, (occasionally by Gr. I Midwives or Community Nurses). These are usually closely associated with Dispensaries.

2.3 Health Staff, usually based on a Dispensary, comprising

Health Inspectors
Health Assistants
Vaccinators

2.4 Leprosy Clinics run by persons of less than full primary educational standard, trained by Government in the vernacular for three months; these are supervised most immediately by N.A. Inspectors of full primary educational standard trained by Government for six months.

3. The Adequacy of Present Coverage

3.1 For those who knew the Region 10 years ago, N.A. Dispensary coverage in many areas now seems quite good, with the number approaching 600, supplemented by Mission Dispensaries; however, by the standards of a Malaria pre-eradication Programme the number needs to be trebled.

3.2 Coverage by M. & C.W. Units lags far behind; the best provision occurs in the more southerly part of the Region - Ilorin, Kabba and Benue Provinces - but the total number of such units is only 20.

3.3 Health Staff are reasonably adequate for the demands made upon them up to recent years.

3.4 The number of Leprosy Clinics in many areas is adequate by our targets of a few years past; however, the present feeling is that eradication of Leprosy will only be achieved by providing treatment within 2-3 miles of patients' homes, which will require continued expansion of facilities beyond the 1,550 treatment centres (including 400 provided by Voluntary Agencies), at present available.

4. The Government Contribution to Rural Health

4.1 Technical supervision of the Native Authority Health Services

4.1.1 This is the responsibility of the Medical Officer in charge of the Area; in a few instances there may be a special Rural Medical Officer who undertakes this supervision, (and there is a special supervisory service for Leprosy).

4.1.2 These supervisory duties include:

a) Inspection of Dispensaries (including checking of clinical work of the D.A.) and submission of recommendations to the Native Authority.

b) Advising the N.A.s on their financial provision for Health work.

c) Advising the N.A.s on their ordering of supplies.

d) Advising the N.A.s on the selection of candidates for training.

4.1.3 Leprosy work is supervised on a Provincial basis by professional and technical Government Staff who carry out most of the assessments and discharges of Leprosy patients.

4.2 Financial Assistance to Native Authorities

This takes the form of Capital Grants of half the expenditure on construction of approved Dispensary and/or Maternity Units, and Maintenance Grants of £100 per annum for dispensaries which the Medical Officer in charge of the area certifies to be satisfactorily run. Half of the salaries of qualified Health Staff (this means Health Inspectors and Health Assistants, and excludes Dispensary Assistants, Leprosy Staff, etc.), is also reimbursed.

4.3 Specific Disease Control Programmes

The most important of these are:

4.3.1 Sleeping Sickness: there is a separate section with an establishment of 375 permanent Professional and Technical personnel.

This Section also deals with Simulium control in a small way.

4.3.2 Malaria: there is again a separate section, but most of the technical staff are seconded from the Medical Field Units. Most of its work has been in conjunction with a limited WHO and UNICEF assisted campaign, now a training ground for what will eventually become the major campaign against a single disease.

4.3.3 Tuberculosis: there is a separate unit, concentrating mainly on BCG Vaccination, but all the staff are seconded from the Medical Field Units except the Specialist himself.

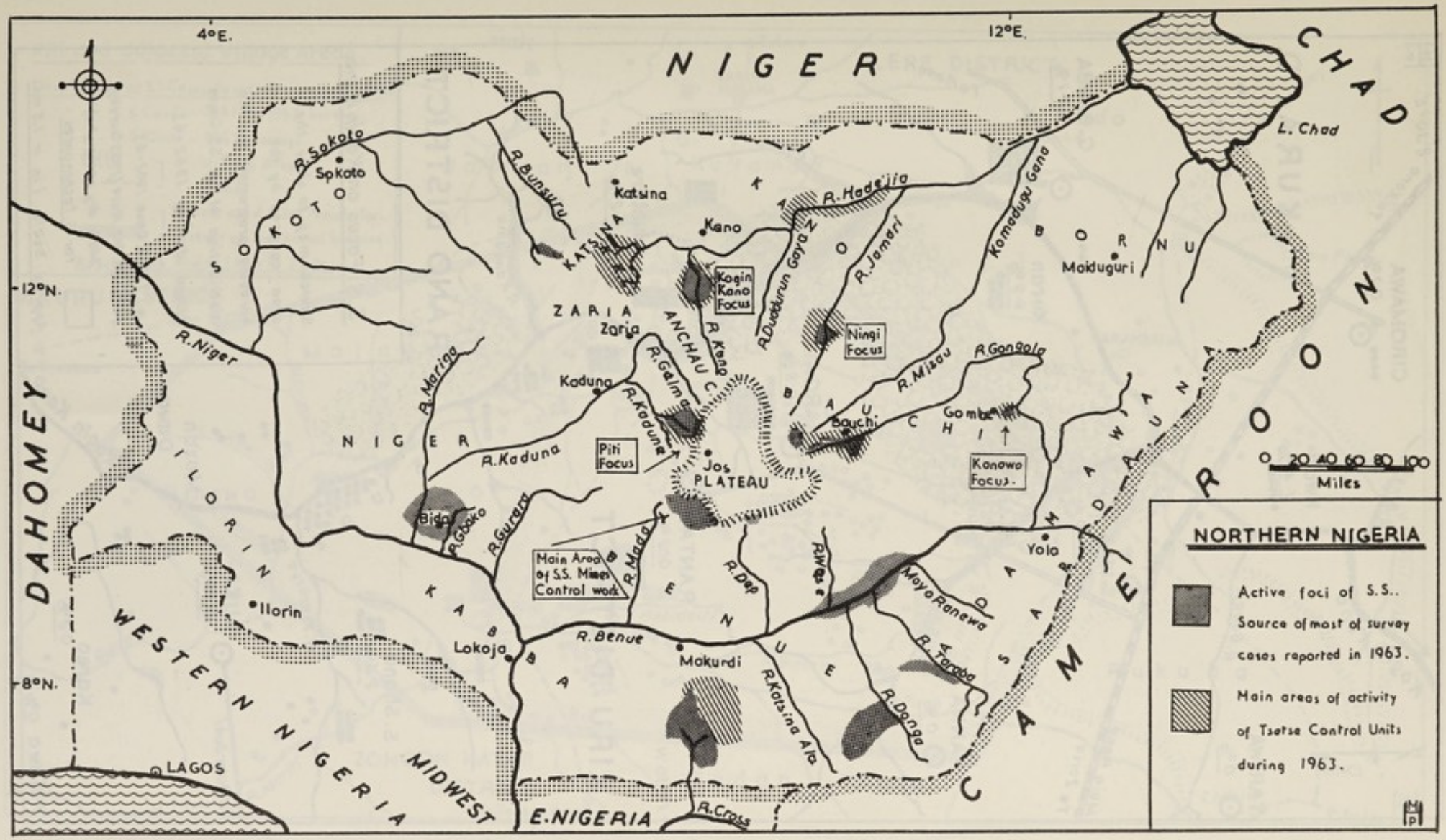
4.3.4 Yaws: two Medical Field Units are wholly engaged on the WHO/UNICEF - assisted Yaws Campaign and its developments, (e.g. mass vaccination against smallpox).

4.3.5 It may be noted that diagnosis and treatment of Sleeping Sickness is carried out at their Dispensaries by some N.A. Dispensary Assistants who have acquired the necessary skill by attachment to Government S.S. Team.

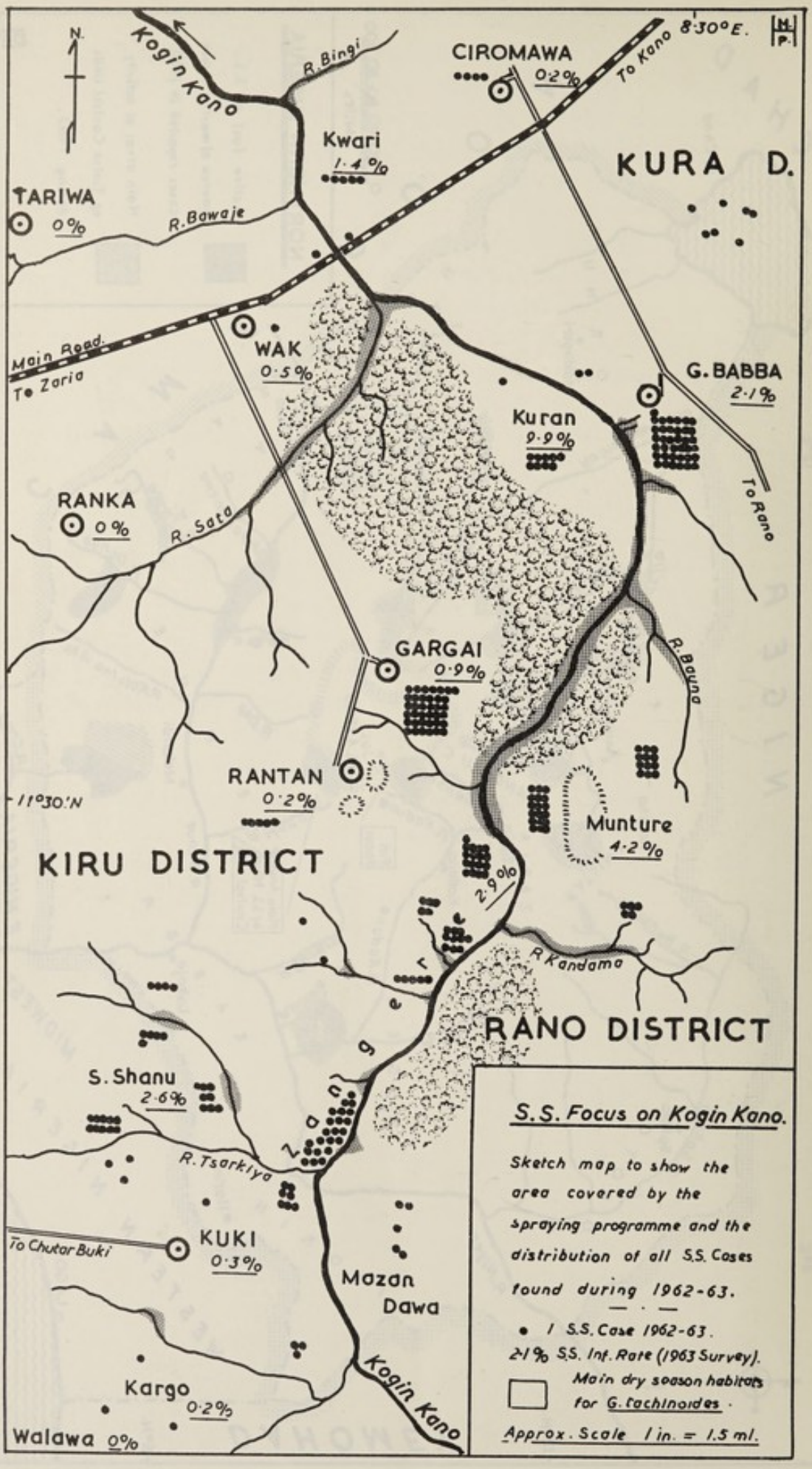
4.4 The Medical Field Units and Rural Health Centres

4.4.1 The Medical Field Units, consisting of personnel with the same training as Native Authority Dispensary Assistants, under the direction of a Rural Medical Officer whenever possible, are available for epidemic control - especially of cerebro-spinal meningitis and smallpox - or other special assignments.

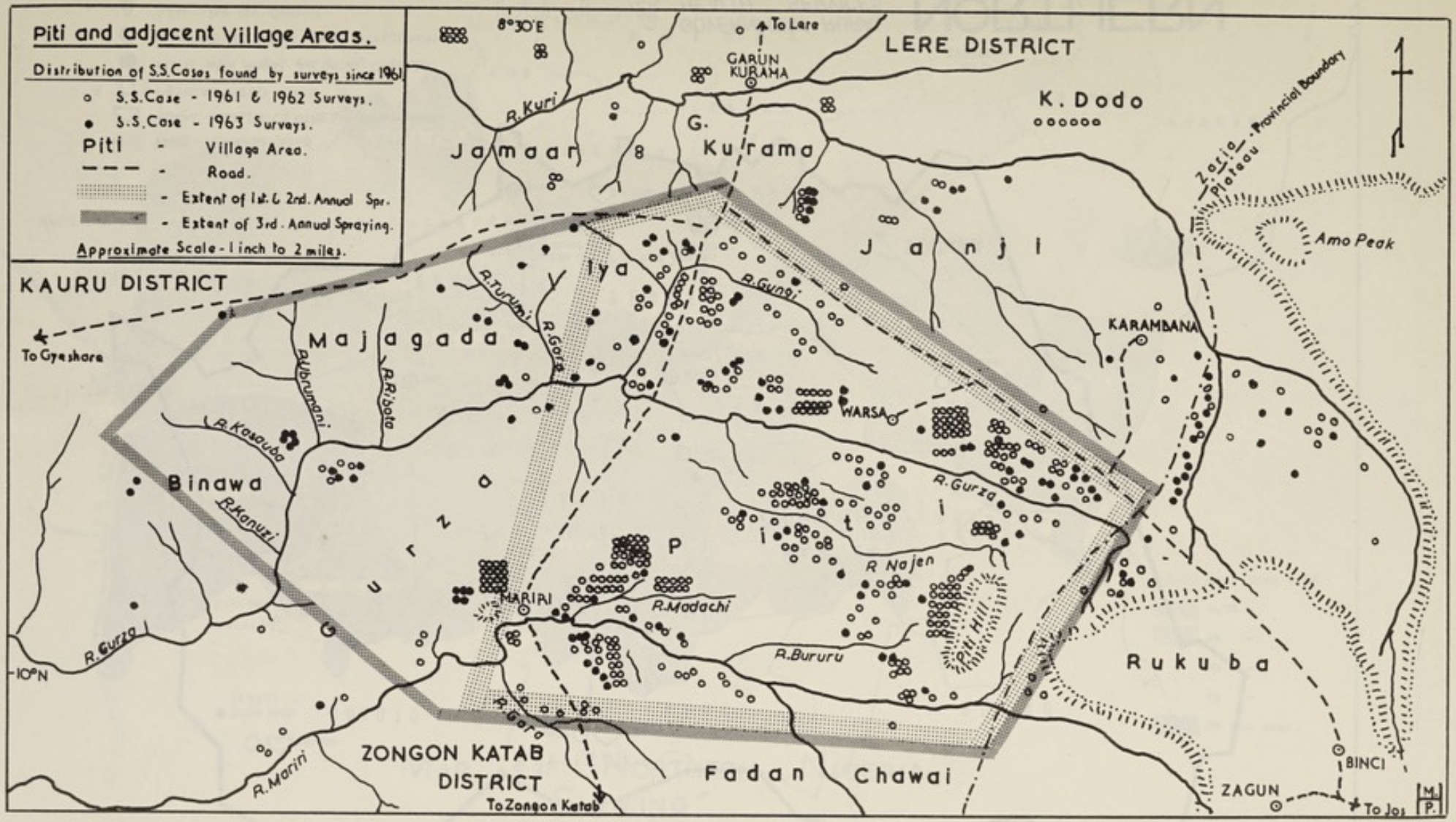
4.4.2 Fully operative Government Rural Health Centres are two in number, (at Kankiya and Argungu). They provide a Dispensary with simple laboratory facilities, lying-in accommodation for normal deliveries, a Clinic for maternity and child welfare, and a Health Office to encourage environmental hygiene. Two more centres have already been built, and equipped by UNICEF, in the Yaws Campaign Consolidation area.


4°E.
12°E.
NIGER
CHAD
L. Chad
Sokoto
R. Sokoto
R. Bunsuru
Katsina
Kano
R. Hadejia
R. Jamari
Komadugu Gana
Maiduguri
BORNU
12°N.
R. Niger
DAHOMEY
ILORIN
WESTERN NIGERIA
MIDWEST
E. NIGERIA
ZARIA
Zaria
ANCHAU C.
R. Kano
Kogin Kano Focus
R. Dudurun Goya
Ningi Focus
R. Misau
R. Gongola
Gombe
Bauchi
Kaduna
R. Galma
R. Kaduna
R. Mariga
NIGER
Piti Focus
Jos PLATEAU
Kanowa Focus.
Bida
R. Gbako
R. Guram
Main Area of S.S. Mines Control work
R. Madda
R. Dep
R. Benue
Lokoja
Makurdi
R. Katsina Ala
R. Donga
R. Taraba
Mayo Ranewa
Yola
R. Benue
R. Cross
LAGOS
8°N.
0 20 40 60 80 100
Miles
NORTHERN NIGERIA
Active foci of S.S.. Source of most of survey cases reported in 1963.
Main areas of activity of Tsetse Control Units during 1963.

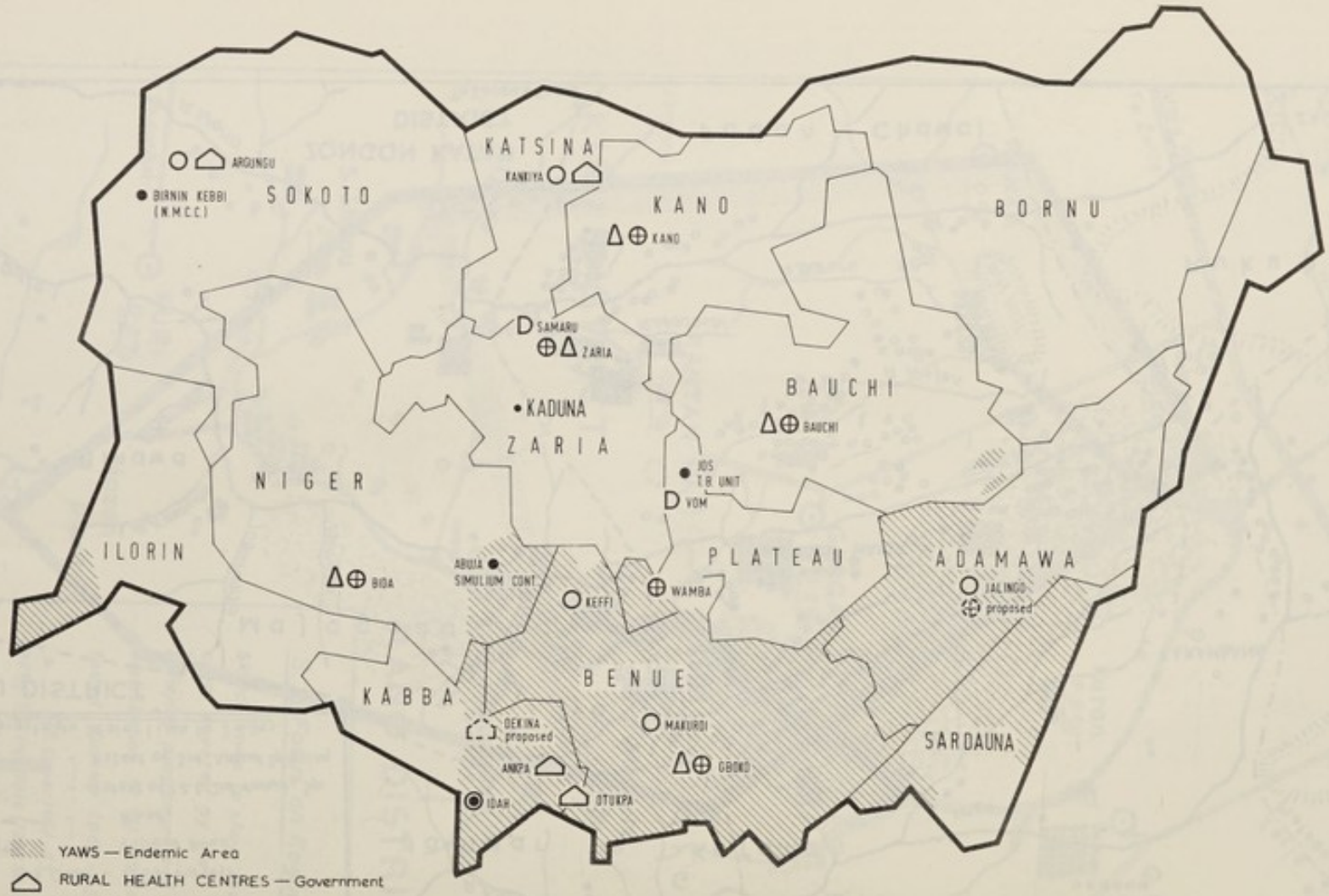
Map 1.


N.
Kogin Kano
R. Bingi
CIROMAWA
0·2%
To Kano
8°30'E.
Kwari
1·4%
KURA D.
TARIWA
0%
R. Bawaje
Main Road
To Zaria
WAK
0·5%
G. BABBA
2·1%
Kuran
9·9%
To Rano
RANKA
0%
R. Sata
GARGAI
0·9%
R. Bauna
RANTAN
0·2%
11°30'N
Munture
4·2%
KIRU DISTRICT
2·9%
R. Kandama
RANO DISTRICT
S. Shanu
2·6%
R. Tsarkiya
KUKI
0·3%
To Chutar Buki
Mazan Dawa
Kargo
0·2%
Walawa
0%
Kogin Kano
S.S. Focus on Kogin Kano.
Sketch map to show the area covered by the spraying programme and the distribution of all S.S. Cases found during 1962-63.
• 1 S.S. Case 1962-63.
2·1% S.S. Inf. Rate (1963 Survey).
Main dry season habitats for G. tachinoides.
Approx. Scale 1 in. = 1.5 ml.

Map 2.

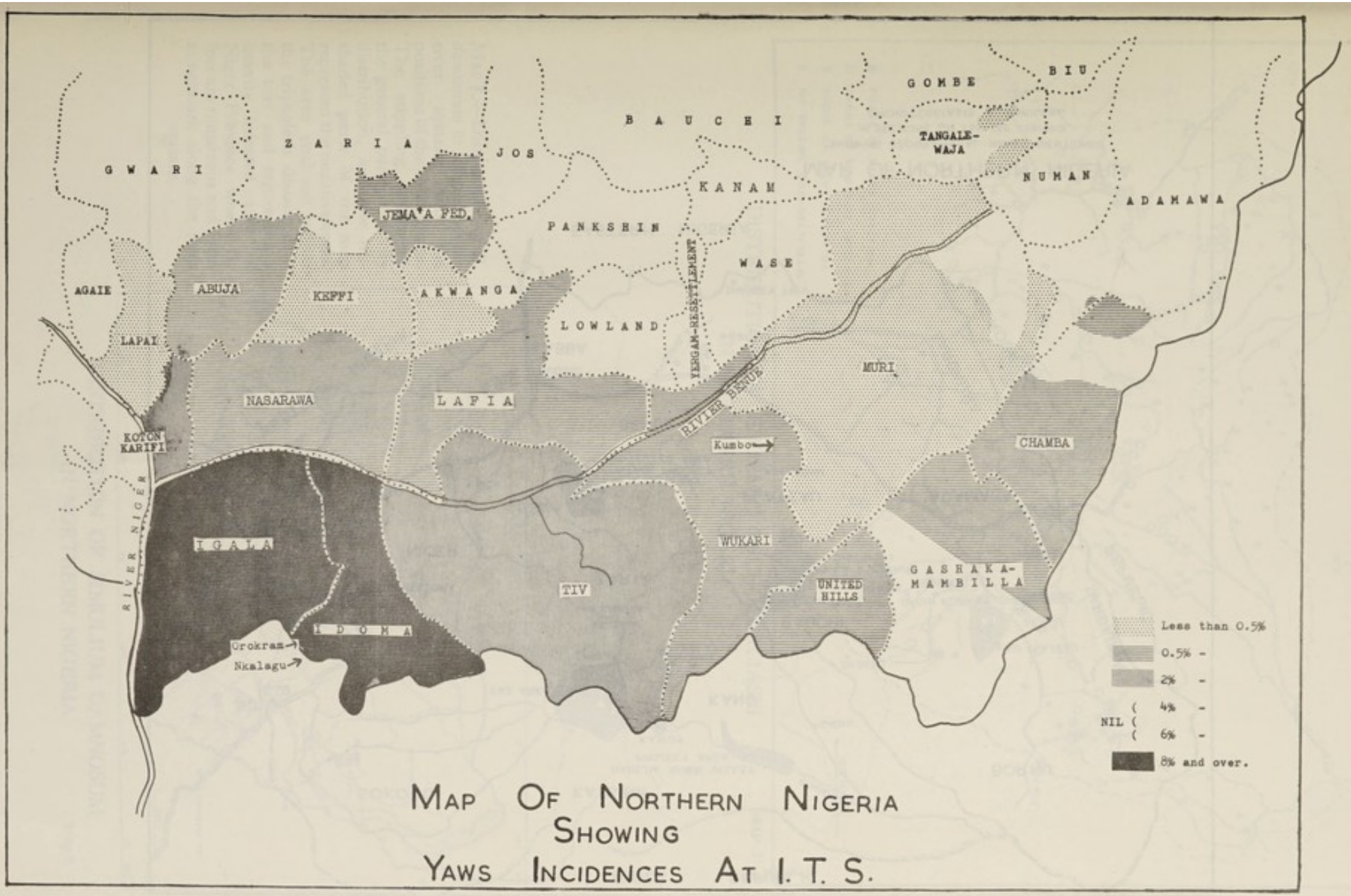

Piti and adjacent Village Areas.
Distribution of S.S.Cases found by surveys since 1961.
S.S.Case - 1961 & 1962 Surveys.
S.S.Case - 1963 Surveys.
Piti - Village Area.
Road.
Extent of 1st. & 2nd. Annual Spr.
Extent of 3rd. Annual Spraying.
Approximate Scale - 1 inch to 2 miles.
8°30'E
To Lere
GARUN KURAMA
LERE DISTRICT
K. Dodo
R. Kuri
Jamaar
G. Kurama
Zaria - Provincial Boundary
Plateau
Amo Peak
Janji
KAURU DISTRICT
To Gyeshare
Majagada
Iya
R. Turumi
R. Gora
R. Gunga
KARAMBANA
R. Bubrumgani
R. Ribata
WARSA
R. Kasauba
Binawa
R. Kanuri
Gurza
Piti
R. Gurza
R. Najen
MARIRI
R. Madachi
R. Bururu
Rukuba
10°N
R. Gora
ZONGON KATAB DISTRICT
To Zongon Katab
R. Marini
Fadan Chawai
BINCI
ZAGUN
To Jos
M P

Map 3.

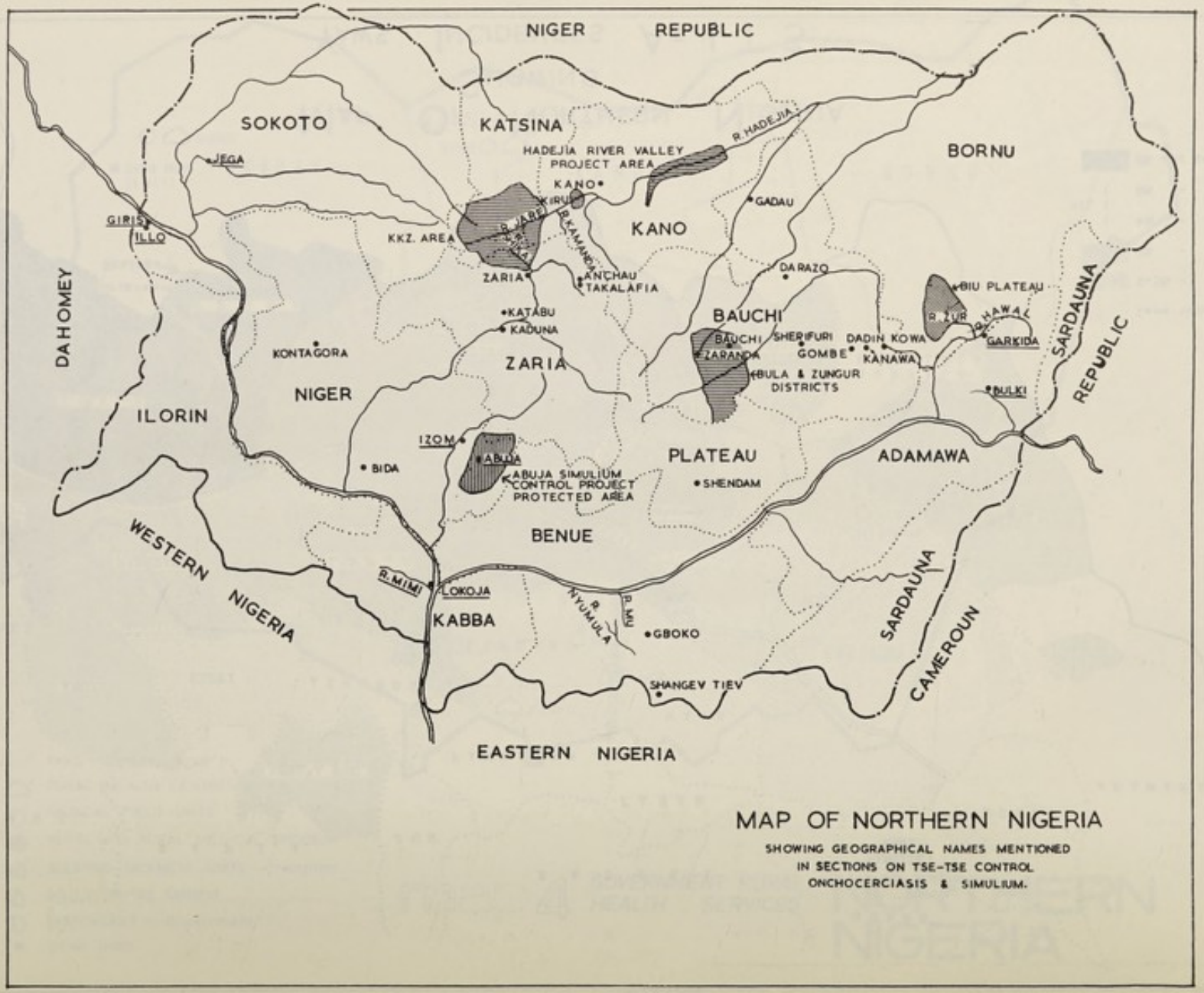


map 4 GOVERNMENT RURAL HEALTH SERVICES

NORTHERN NIGERIA

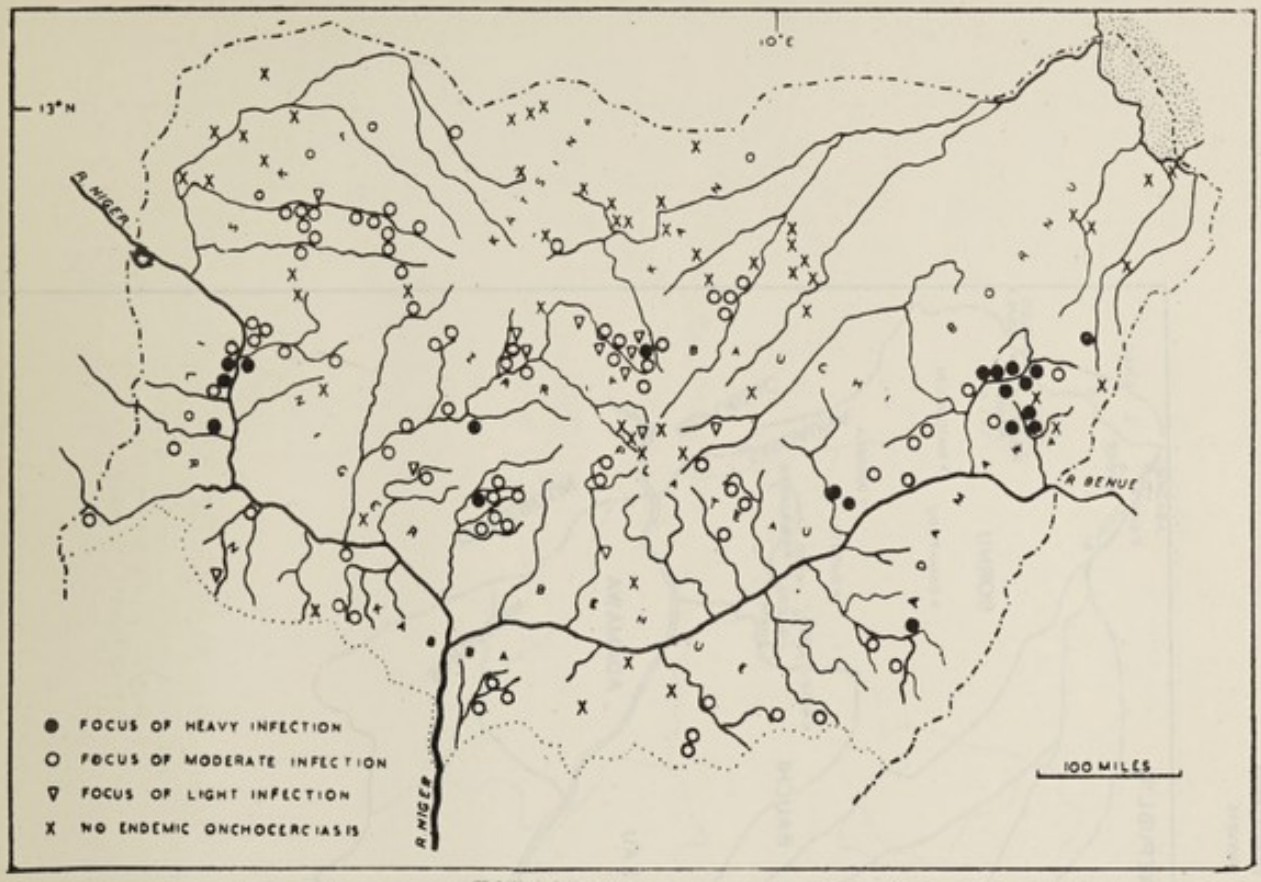


MAP OF NORTHERN NIGERIA
SHOWING
YAWS INCIDENCES AT I. T. S.



MAP OF NORTHERN NIGERIA

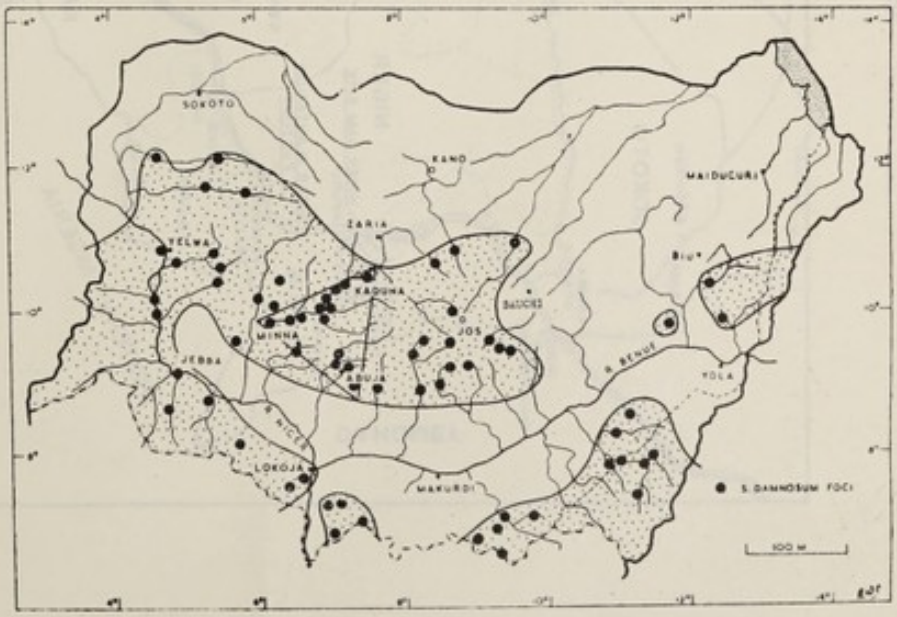
SHOWING GEOGRAPHICAL NAMES MENTIONED IN SECTIONS ON TSE-TSE CONTROL ONCHOCERCIASIS & SIMULIUM.



DISTRIBUTION OF ENDEMIC ONCHOCERCIASIS IN NORTHERN NIGERIA

MAP 7

MAP 7.—Distribution of *S. damnosum* in relation to the river system and the positions of the chief towns. The stippling represents the general pattern of fly distribution, and the unshaded parts of the map represent the negative areas. The area enclosed within the triangle is discussed in the text and represents a heavily infested area of Niger Province where fly foci are numerous and form a network along the river system.



DISTRIBUTION OF SIMULIUM DAMNOSUM IN NORTHERN NIGERIA

Map 8

MAP OF NORTHERN NIGERIA

SHOWING LOCATION OF MORBIDITY SURVEYS

SEE APPENDIX H