

## YAWS ERADICATION CAMPAIGN IN NSUKKA DIVISION, EASTERN NIGERIA A Preliminary Review

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### SYNOPSIS

Nsukka Division in Eastern Nigeria was chosen as the starting point for a yaws eradication campaign undertaken by the Government assisted by WHO and UNICEF. Yaws was found to be hyper-endemic, and a policy of total mass treatment was therefore adopted. The objectives of the campaign, the field organization and methods of operation, and the clinical findings and treatment schedules used are described.

A total of 383 769 persons were examined and treated with penicillin; of these 12 221 were infectious cases, 42 553 were late cases, and 328 995 were latent cases and contacts. It is believed that over 95% of the population was seen. Resurveys at intervals of six months showed a dramatic fall in the reservoir of infectious cases.

The campaign was also used to stimulate better rural health services, and a network of local health centres was built by the people themselves.

### Introduction

#### *Topography*

Nsukka Division occupies the most northerly portion of Onitsha Province in Eastern Nigeria. It lies about 7°N. and 7.3°E., and has a rainy season lasting from May to October, with an average rainfall of 70 inches (approximately 1800 mm). Maximum and minimum absolute shade temperatures are 99°F (37.2°C) and 62°F (16.7°C), respectively.

Vegetation is mainly Guinea savannah, but there are patches of relic high forest and high forest outliers along the stream banks. Palm trees are present in fairly large numbers.

#### *The people*

The estimated population of the Division is 445 096 (1953 census), of whom 75% are Ibo, the remaining 25% being of Okpoto and Igala origin. They are spread over some 1314 square miles (approximately

3400 km<sup>2</sup>), with an average density of 342 people per square mile (132 per km<sup>2</sup>). The population density is highest in Enugu-Ezike (643 per square mile, or 248 per km<sup>2</sup>).

The main occupation is farming, and Nsukka is one of the largest agricultural Divisions in the Eastern Region. The people are very likeable, with a keen sense of humour, and are co-operative in any scheme of progress.

Housing conditions and sanitary standards are still primitive. Most compounds consist of a variable number of mud-walled houses with the roof made of stick rafters and grass-thatching cover. The huts are dark, badly ventilated, and difficult to keep clean. There is usually no furniture, except a square wooden stool and occasionally a table. The bedstead is usually a mud platform with a small fireplace underneath it; it is covered with a mattress of palm branches or a raffia mat. During the evening, the family sits closely huddled round the fire in the centre of the room.

For administrative purposes, the Division is divided into four Districts—namely, Igbo-Etiti, Igbo-Eze, Isi-Uzo, and Uzo-Uwani Districts. Local government was introduced early in 1954, replacing the former Native Authority Organization. The local government bodies consist of the Nsukka County Council (a central body responsible for hospitals, ambulance service, drugs and equipment for health centres, water, roads, and education), and four district councils. The latter are responsible for environmental sanitation and for the local health centres, dispensaries, and maternity homes in their respective areas. Seventy-one local councils with minor health responsibilities, such as the notification of infectious diseases, also exist in the Division.

The social and political village group (or town) in each District is made up of quarters (or villages), hamlets, kindreds, extended families (sub-kindreds), compounds, and households, each of these being a subdivision of the preceding entity. An understanding of this organization in each village group is essential to the everyday work of the yaws eradication unit. As described below, the success of adequate preliminary propaganda and coverage of population throughout the campaign depended upon contacting all communities at the sub-kindred and kindred levels through the intermediary of their local councillors, elders, and title holders.

Owing to its hyperendemicity, yaws is well known and recognized by the people. They realize that it is mainly a disease of childhood, but that a few adults may also develop it. Hyperkeratosis, periostitis, the Dupuytren type of finger contractures, and rheumatic pains, are all attributed to previous yaws infection. Gangosa is, however, attributed to witchcraft. Yaws is locally known by the name "okija" or "ikete". Before the mass campaign, treatment was given by travelling private practitioners, and was usually inadequate, achieving mainly the temporary aesthetic effect of drying up the wet skin lesions.

## **Inception of the Yaws Campaign in Nsukka Division**

### **General preliminary analysis of problem and plan of operation**

Yaws occurs in all five provinces of the Eastern Region. Through the survey activities of the Nigerian Medical Field Units since 1947, the prevalence of yaws and other endemic diseases in a number of widely scattered areas is known. Very useful groundwork was achieved by the medical field units long before the inception of the yaws campaign. This made it possible to pass rapidly from the planning phase to the mass campaign proper.

As a result of discussions with the World Health Organization (November 1952), a plan of operations for a yaws eradication project was evolved between the Government of Nigeria and WHO and the United Nations Children's Fund (UNICEF). Nsukka Division of Onitsha Province was chosen as the starting-point. For this purpose the full staff of a medical field unit (one medical officer, one superintendent, and twenty auxiliaries) was mobilized in September 1953. The first consignment of UNICEF penicillin (procaine penicillin G in oil with 2% aluminium monostearate (PAM)) did not reach Eastern Nigeria until mid-February 1954, and that became the actual "target date" for the beginning of the campaign. This interval was used as the planning phase.

### **Planning phase: Field organization, training and surveys in area of operation**

The five months prior to the receipt of the penicillin were employed as follows:

Medical field unit staff were trained to:

- (a) carry out a household census before the survey;
- (b) diagnose yaws according to the nomenclature recommended by WHO in 1952;<sup>3</sup>
- (c) record findings accurately and according to a certain coding;
- (d) carry out treatment aseptically and speedily;
- (e) view yaws as a community problem, to be attacked as such.

All the staff had had several years' field experience with the Sleeping Sickness Service or a medical field unit, or with both.

As much information as possible on the epidemiology of yaws in various parts of the Division was collected by means of detailed spot surveys on a household basis. This house-to-house approach is essential for study and training purposes. It serves to illustrate certain epidemiological problems in the various households; gives as high a coverage of the population as possible; facilitates the tracing of absentees and teaches the people the

necessity of 100% attendance; reduces the selection factor likely to occur if the examinations were performed in a clinic or centre; and facilitates future follow-up.

A period was then spent becoming acquainted with the geography and social and political organization in the Division, and spreading information concerning the unit's future activities through talks to and meetings with local councillors, village heads, elders, and schools at the kindred level of each community. The efficacy of the treatment to be given was emphasized, and also the fact that, to be successful, the campaign had to be supported by 100% active participation and coverage of the population. The necessity of future regular resurveys was emphasized throughout this planning phase, and, of course, throughout the campaign. To this end, the various district councils were strongly advised to recruit and employ a team of young literate men from their areas, who would be trained in resurvey work after the initial treatment surveys. These local auxiliaries are called "yaws scouts". This advanced planning for resurveys proved very satisfactory later on.

The medical field unit was converted into a self-contained yaws eradication unit in respect of transport, stores, drugs and equipment.

### **Expansion Phase: Mass Campaign Proper**

#### **Objectives**

With knowledge of the local problem and taking into account the lessons of previous campaigns in Sierra Leone<sup>2</sup> and Bosnia, Yugoslavia,<sup>1</sup> the aim of the Nsukka unit has always been to adapt itself to a well-proved system of operations which would enable it to achieve the following essentials:

(a) active participation of the people, leading to over 95% coverage in the initial treatment surveys;

(b) rapid coverage;

(c) regular resurveys; and

(d) development of, and building into and around the yaws eradication programme, better general rural health services.

#### **Problem and policy**

Since earlier pilot surveys had revealed the prevalence of active yaws to be high throughout most of the Division, the policy adopted has been that of total mass treatment, that is, a mass clinical survey and simultaneous "blanket" treatment designed to cover the population. Each individual receives either therapeutic or suppressive treatment based on a clinical assessment of each case.

Survey findings in each village throughout the Division support this policy (see Tables II-V).

These clinical surveys show that over large areas more than about 70% of the population are yaws cases (infectious cases, other active cases, or latent cases with a history of yaws), and less than about 30% show no clinical signs and deny having had yaws. Admittedly grouping into "latent cases with a history of yaws" is open to criticism. It has, however, been the experience of other workers that 60% seropositivity is actually expected in such hyperendemic areas. On the other hand, some of the "contacts" (most of whom are children) in clinical surveys may be true latent cases or may be incubating the disease.

The density of population has previously been emphasized. Villages in this Division generally consist of a number of family groups (i.e., kindreds) packed into groups of closely knit compounds. Moreover, the Ibo population is far from stable, and much movement goes on throughout the year.

As mass serological examinations cannot be considered in routine mass treatment, the above-mentioned epidemiological, sociological, and environmental considerations in a densely populated area like Nsukka Division reduce the problem of definition of contacts to an academic one, since all community members are at risk. The difficulty of the latent group is now mainly solved by the practical definition given to "latent cases and contacts" in relation to the three treatment policies recommended in the paper by C. J. Hackett & T. Guthe appearing on page 869 of this number.

To have adopted any other policy in Nsukka Division would, with little doubt, have imperilled the whole project, with no ultimate saving in the expenditure of penicillin. Total mass treatment, as shown in the resurvey results, has rapidly brought the disease under control. It has been economical of time, supplies and manpower. Moreover, it has enjoyed universal popularity with consequent maximum co-operation from the people, both in attendances at the initial treatment surveys and also subsequently in laying the foundation of and implementing the consolidation phase and organization of rural health services.

The Northern Region mobile yaws units have carried out yaws control in the Idoma and Igala Divisions which border on Nsukka Division. Such inter-regional co-operation and integration of policy has considerably reduced the risks of reinfection in both projects.

### **Field organization, and survey and treatment methods**

By May 1954 the unit's staff had increased to: 1 medical officer, 2 field unit superintendents, 34 field unit assistants, 2 leprosy inspectors, 3 clerical workers, 4 drivers, 54 "yaws scouts", and 3 "court messengers".

*Survey and treatment: initial stage*

During the first two months of the campaign, three different methods of survey and treatment were applied:

(1) Preliminary census-taking of the village, followed by survey and treatment on a household basis. Attendances were practically 100%. Work proceeded smoothly, although comparatively very slowly. Registration of names was carried out.

(2) "Multiple-centres" approach. As previously explained, villages in this division can be divided into their varying components of quarters, kindreds, and sub-kindreds. Examination and treatment centres were built in each of the quarters and the various kindreds or sub-kindreds asked to attend on different days in the respective centres. No preliminary census was carried out, and no names were registered, but the clinical manifestations seen and the treatment given were recorded. Work proceeded smoothly and the speed of work was more than doubled. Attendances were also maximal, being 95% or over.

(3) "Single-centre" or "clinic" approach. Only one centre was set up, which the various quarters of the village were asked to attend on different days. A preliminary census was not made and names were not registered, but again the findings and treatment were recorded. The speed of coverage was only slightly higher than with the multiple centres system. Work was eventually slowed down because the people from the various quarters were compelled to walk longer distances, and several extra working days were employed waiting for the remaining stragglers.

*Intensification of mass treatment*

Throughout the planning phase and the initial stage of the treatment campaign, all personnel worked as one team under the maximum guidance and supervision, while the examinations were carried out by the medical officer. However, a nucleus of field unit assistants soon became proficient in examining and classifying cases according to the required dosage, while the rest of the staff were trained in other tasks. Thus the three senior officers were able to devote themselves to supervisory duties. From April 1954, the multiple-centres method of surveying was adopted. The criterion on which the number of centres per village depended was that no person should need to walk more than 1-1½ miles (approximately 2 km) from house to centre. The work was greatly facilitated by the density of the population. The unit was then re-organized into three teams—A, B, and C.

Since the average population of a Nsukka village is 3000 or more, teams A and B usually move in together, but in different convenient centres, and deal with the bulk of the population. Team C follows to search for

and deal with the stragglers, enabling teams A and B to move to other population groups.

Each week the unit spent five working days (Mondays to Fridays) in the field; Saturdays were employed on routine duties, e.g., statistics, penicillin expenditure returns, office correspondence, propaganda meetings, maintenance of vehicles, and so on.

The average monthly coverage of 15 000 in previous months was thus increased to 20 000 in June and to 40 000 in July, and maintained at the latter figure. Attendances in all villages have been satisfactory. Although the aggregate attendance works out at only 86% of the official census population, it is believed that the census is an overestimate and that the attendance was over 95% of the actual population. Resurveys have shown that there were few absentees.

Mass treatment, begun in February 1954, was completed in May 1955. A total of 383 769 people were examined and treated in initial treatment surveys, a monthly average of 25 451. These figures do not take into account resurveys undertaken at intervals of three to six months after the initial treatment surveys.

**TABLE I. YAWS CASES FOUND IN INITIAL TREATMENT SURVEYS, NSUKKA DIVISION, EASTERN NIGERIA, FEBRUARY 1954 TO MAY 1955**

District	Number examined and treated	Estimated population*	Attendance (%)	Active cases			Latent cases and contacts
				infectious	late	total	
Igbo-Eze	117 315	122 359	95.9	5 888	15 367	21 255	96 060
Igbo-Etiti	119 874	145 403	82.4	1 531	10 002	11 533	108 341
Isi-Uzo	108 318	127 496	85.0	3 899	13 525	17 424	90 894
Uzo-Uwani	38 262	49 838	76.8	903	3 659	4 562	33 700
Total: Nsukka Division	383 769	445 096	86.2	12 221	42 553	54 774	328 995

\* Based on 1953 census

### Operation of a sub-team

#### *Preliminary work*

Preliminary propaganda, with education of the leaders of the community, was carried out by the medical staff, often after working hours. This work should not be passed to the administrative department, whose officers are

already occupied with problems of their own. Their assistance should, however, be sought if opposition in a community is sensed. It is a medical need and problem that is being explained, and the best person to do it and to win the willing co-operation and confidence of the people is the doctor. Once knowledge spreads of the rapid effect of penicillin on yaws and other diseases, propaganda is rendered considerably easier.

At the meetings, of which several days' notice is given, the immediate object of the campaign and its advantages to the village are explained, emphasizing that the treatment is modern, effective, harmless, and free. The necessity of full attendance by the community, healthy or otherwise, is conveyed by explaining that the penicillin injection not only rapidly cures yaws but also acts as a "cleansing" agent for other conditions latent in the body and that, unless the whole family attends and receives treatment, it cannot be considered "cleansed". Such simplified explanation does carry weight in rural communities. As gonorrhoea is very prevalent, the possible beneficial effects of penicillin on fertility of women is mentioned. It is important to explain why the treatment is "free"—that it has been paid for with the tax revenue that the people themselves have contributed in the past. The post-campaign activities aim at improving and expanding existing medical health facilities, and together with the resurvey work, should also be mentioned, even at this early stage; this prevents the impression that the doctor has come and given injections quickly, never to return again or to take any interest in their problems. It is the policy of the Eastern Region Medical Department to ensure, wherever possible, continuity of service of its officers throughout both the campaign and post-campaign activities in an area.

Arrangements are made for the construction of palm-frond shelters to house the examination and treatment centres in the most suitable sites, and for the attendance of the villagers by kindred groups on specified days. The various councillors and other influential members are made responsible for spreading the information and ensuring full attendances of their own kindreds.

#### *Lay-out of working place, treatment tables, and duties of a team*

The working procedure of the team is explained in some detail in the Annex.

#### **Nomenclature of yaws**

The nomenclature recommended at the First International Symposium on Yaws Control in 1952 was adopted for both training and recording purposes, with one main modification.<sup>4</sup>



This nomenclature does not take into consideration a lesion which has throughout been classified as being due to yaws—that is, the Dupuytren type of flexure contracture of the fingers. The prevalence is high and both sexes and all ages are affected (though the prevalence is highest in the higher age-groups). The condition is usually bilateral and, although the fifth digits are the first ones to be involved, it frequently involves all the fingers. The flexing and eventually ankylosis of the proximal interphalangeal joints, with some ulnar deviation, and hyperextension of the distal two phalanges is a constant pattern. It is not accompanied by muscular atrophy or other neurological changes. A serological study of the lesion showed that there is a difference in the incidence of positive seroreactions between the group with the Dupuytren type of contracture and the control group; this is highly significant. It occurs in both the secondary and tertiary stages. A paper by Walters & Zahra will be published on this subject in due course.

## **Recording**

### *Mass survey and treatment*

Two forms have been found satisfactory throughout the campaign: a daily work sheet and a form for summarizing findings in the villages at the completion of the survey.

It has been our experience that auxiliary personnel will master a coding in letters more quickly and accurately than one in numbers, which cannot convey the same association of ideas. For example, “B” for bones or “N” (nose) for gangosa are much more quickly and permanently remembered than, say, 7 and 6 (*b*), respectively. A twelve-letter code, based on the initial letters of clinical manifestations, was therefore devised, and in a very short time the whole unit spoke one common “language”.

### *Penicillin expenditure*

Three simple forms were used to record the daily, weekly, and monthly expenditure of PAM. Supervision of staff during mass treatment and storage and accounting of all penicillin stocks (including return of all empty vials to stores) were the responsibility of the senior officer. It is essential that such daily, weekly, and monthly returns be recorded regularly.

## **Dosage schedules employed**

The therapeutic agent throughout has been procaine penicillin G in oil with 2% aluminium monostearate (PAM), containing 300 000 units per ml and standardized to meet the minimum specifications laid down

by WHO Expert Committee on Venereal Infections and Treponematoses.<sup>4</sup> A single-injection system of treatment is employed.

The dosage schedule in use from mid-February to 12 August 1954 was as follows (in ml):

<i>Age-group (years)</i>	<i>Infectious cases</i>	<i>Late cases</i>	<i>History &amp; latent cases</i>	<i>Contacts</i>
Under 2	2	2	1	0.5
2-10	3	3	2	1.0
11-18	4	4	2	1.5
19 and over	6	6	4	2.0

On the recommendation of the WHO Senior Medical Adviser to the Yaws Control Project, the following schedule (also shown in ml) became operative as from 12 August 1954 to the end of the campaign in mid-May 1955:

<i>Age-group (years)</i>	<i>Infectious and history &amp; latent cases</i>	<i>Late cases</i>	<i>Contacts</i>
0-5	1	2	0.5
6-15	2	3	1.0
16 and over	4	6	2.0

While it is still early to comment on the relative merits of these two schedules, the experience of the unit has been that a more advisable schedule for mass treatment campaigns would be one that ensures a more adequate dosage to those in the important age-group of 0-18 years (whether active or contacts), but with a reduced dosage for the latent cases with a history of yaws and for the late cases (some of which are inactive) over 18 years of age. The four age-groups are easily identified and give a better picture of the epidemiology of the disease. The PAM dosage recommended in the article by C. J. Hackett & T. Guthe on page 879 takes these considerations into account, and has been used by medical field units in Eastern Nigeria since August 1955.

No major allergic reactions following penicillin treatment have occurred in the Nsukka campaign. Adrenaline ampoules and anti-histaminic drugs form part of the equipment of each team. A negligible number of encysted abscesses have, however, been seen following PAM injection. These, being encysted, may take months before they open to the surface; however, once they are incised and evacuated, healing takes place rapidly. The contents are a greenish-white liquid mixed with some blood. No bacteriological examination of the "pus" has been made. *Pseudomonas aeruginosa* (*Bacillus pyocyaneus*) is, however, suspected as a secondary invader from the skin into traumatized tissue. Skin sterilization is practised by rigorous scrubbing of the part with soap and water, after which the soap is washed off with more water, and finally a light swabbing with 1% Cetavlon is

applied. The need to shake the PAM bottles thoroughly before use is repeatedly emphasized to the assistants.

### **Clinical Findings and Special Investigations**

With the exception of a few villages along the trunk road to Enugu, the prevalence of active yaws was hyperendemic (over 10%); in parts of Igbo-Eze District it was holoendemic (over 20%).

As mentioned above, all survey findings were recorded on a special form. Summaries for each village in the four districts of the Nsukka Division are given in Tables II, III, IV, and V.

The clinical surveys called attention in a striking manner to the following points:

(1) Infectious lesions were, on the whole, restricted to childhood, with a family preponderance. The highest prevalence of infectious lesions found among children (0-10 years) was 28% in the village of Eteh.

(2) There was a high proportion and variety of active non-infectious manifestations, both early and late; such lesions as plantar and palmar hyperkeratoses (predominantly early and responding well to treatment) were frequent; flexure contracture of the fingers of the Dupuytren type (? due to diffuse tenosynovitis) and bone changes (early and late) were found; and there was a marked scarcity (or absence) of active gummatous and ulcerative lesions. Joint lesions (ganglion, hydrarthrosis) were also scarce. The prevalence of gangosa was negligible.

(3) There is an urgent need for clarification of (a) the etiology and pathology of the progressive and deforming contracture of the fingers, and (b) the type of plantar hyperkeratosis caused by yaws. The difficulty in differentiating between some types of plantar hyperkeratosis due to the various stages of yaws and those probably due to simple trauma with or without other factors becomes apparent with field experience. Bone changes, such as the sabre tibia and other long-standing inactive bone deformities, do not require the same penicillin dosage as active bone lesions; their cause has still to be determined.

Special investigations comprised:

(1) Study of the etiology of the Dupuytren type of flexure contracture of the fingers. (Such disabling lesions must obviously cause great financial loss in agricultural communities like those of Nigeria.)

(2) A clinical trial to determine the comparative efficacy of PAM and benethamine.

(3) Collection of a comprehensive photographic series of yaws lesions.

**TABLE II. SUMMARY OF YAWS FINDINGS AT INITIAL TREATMENT SURVEY, IGBO-ETITI DISTRICT, NSUKKA DIVISION, EASTERN NIGERIA**

Village	Population seen	Nigeria census 1963	Attendance (%)	Infectious cases (all ages)		Infectious cases (0-10 years)		Late cases		History & latent cases		Contacts	
				number	%	number	%	number	%	number	%	number	%
Obimo-Ikwoka	4 922	4 996	98.5	179	3.6	175	13.0	1 026	20.8	2 669	54.2	1 048	21.2
Edem	6 336	6 551	96.7	178	2.8	166	9.0	1 044	16.4	3 319	52.3	1 795	28.3
Nrobo	2 653	2 615	101.4	123	4.6	119	20.0	460	17.3	1 703	64.1	367	13.8
Abbi	4 244	4 080	104.0	96	2.2	86	11.2	1 048	24.6	2 456	57.8	644	15.1
Ugbene	5 574	5 672	98.3	214	3.8	199	18.0	1 250	22.4	3 539	63.5	571	10.2
Nibo	5 658	5 377	108.9	108	1.8	83	7.0	739	12.6	2 960	50.5	2 051	35.0
Uvuru	3 285	4 210	78.0	78	2.4	69	9.9	566	17.2	2 060	62.7	581	17.6
Ibagwa-Ani	5 068	6 625	76.5	102	2.0	78	6.0	577	11.4	2 932	57.8	1 457	28.7
Okpuje	2 150	3 194	67.3	52	2.4	36	8.1	288	13.3	1 329	61.8	481	22.3
Okutu	1 779	1 514	117.5	50	2.8	43	9.3	249	14.0	1 042	58.6	438	24.6
Nkpologu	3 419	3 680	92.9	140	4.0	128	16.2	551	16.1	2 030	59.3	698	20.4
Error-Uho	2 259	2 579	87.6	38	1.6	35	5.2	335	14.8	1 326	58.7	560	25.2
Akpugo-Udueme	784	881	89.0	11	1.4	11*	4.2	177	22.5	366	46.6	230	29.3
Ukehe	10 575	12 167	86.9	—	—	—	—	39	0.36	477	4.5	10 059	95.0
Umunko	1 654	1 703	97.1	1	0.06	—	—	33	2.0	180	10.8	1 440	87.0
Ekwegbe	4 871	6 515	74.8	14	0.28	6*	0.4	104	2.1	914	18.7	3 839	78.8
Ngalakpu	628	801	78.4	—	—	—	—	6	0.95	45	7.1	577	91.8
Umana	755	933	80.9	1	0.13	—	—	20	2.6	99	13.1	635	84.1
Opi	7 826	13 417	58.3	66	0.84	45*	1.5	377	4.8	1 994	25.4	5 429	69.3
Ohodc	3 810	4 467	85.3	8	0.21	2*	0.14	61	1.6	332	8.7	3 409	89.4
Ozalla	3 630	4 372	83.0	4	0.11	—	—	49	1.3	336	9.2	3 241	89.2
Leja	3 729	4 282	87.1	10	0.26	10*	0.73	60	1.6	428	11.4	3 231	86.6
Ohebe	1 686	1 853	90.9	—	—	—	—	28	1.6	132	7.8	1 526	90.7
Ochirna (Ikola)	1 120	1 045	107.2	4	0.35	4*	0.84	7	0.62	44	3.9	1 065	95.0
Aku	14 471	20 809	69.5	28	0.19	13*	0.23	380	2.6	2 383	16.4	11 680	80.7
Ede	4 135	6 391	64.7	9	0.21	4*	0.26	83	2.0	536	12.9	3 507	84.8
Nsukka	12 653	14 674	86.2	17	0.13	10*	0.2	485	3.8	3 448	27.2	8 703	68.7
	119 874	145 403	82.4	1 531	1.2	1 322	1.1	10 002	8.3	39 079	32.6	69 262	57.7

\* 0-15 years

TABLE III. SUMMARY OF YAWS FINDINGS AT INITIAL TREATMENT SURVEY, UZO-UJWANI DISTRICT, NSUKKA DIVISION, EASTERN NIGERIA

Village	Population seen	Nigeria census 1953	Attendance (%)	Infectious cases (all ages)		Infectious cases (0-15 years)		Late cases		History & latent cases		Contacts	
				number	%	number	%	number	%	number	%	number	%
Ukpata	1 520	1 971	77.1	88	5.8	83	13.2	170	11.2	978	64.3	284	18.6
Adaba	1 920	2 087	91.9	17	0.88	17	2.1	203	10.5	1 184	61.6	516	26.8
Umuloikpa	4 318	5 142	83.9	52	1.2	40	2.2	340	7.8	2 909	67.3	1 017	23.5
Omor	5 962	7 196	82.8	92	1.5	88	3.5	621	10.4	3 677	61.6	1 572	26.3
Igbakwu	1 905	2 365	80.5	12	0.62	12	1.5	150	7.8	1 057	55.4	686	36.0
Anaku	3 522	4 368	80.6	145	4.1	138	9.4	291	8.2	2 373	67.3	713	20.2
Umumbo	3 290	3 539	92.9	20	0.60	18	1.2	219	6.6	1 712	52.0	1 339	40.7
Omerum	2 184	2 938	74.3	6	0.27	6	0.66	144	6.6	796	36.4	1 238	56.6
Ifite	4 040	7 904	51.1	125	3.0	115	10.6	250	6.1	2 479	61.3	1 186	29.3
Omueji	1 082	1 274	84.9	29	2.6	25	5.8	136	12.5	573	52.9	344	31.7
Omasi	1 124	1 541	72.9	92	8.1	82	20.0	205	18.2	601	53.4	226	20.1
Adani	2 088	2 457	84.9	13	0.62	10	1.7	233	11.1	1 122	53.7	720	34.4
Ogrugru	2 942	3 672	80.1	85	2.8	72	6.9	440	14.9	1 481	50.3	936	31.8
Ojo	565	983	57.4	24	4.2	24	11.8	97	17.1	344	60.8	100	17.6
Igga	1 505	2 136	70.4	81	5.3	76	12.4	123	8.1	865	57.4	436	28.9
Asaba	295	265	111.3	22	7.4	22	20.5	37	12.5	187	63.3	49	16.6
	38 262	49 838	76.8	903	2.3	828	5.4	3 659	9.5	22 338	58.3	11 362	29.6

**TABLE IV. SUMMARY OF YAWS FINDINGS AT INITIAL TREATMENT SURVEY, IGBO-EZE DISTRICT, NSUKKA DIVISION, EASTERN NIGERIA**

Village	Population seen	Nigeria census 1953	Attendance (%)	Infectious cases (all ages)		Infectious cases (0-15 years)		Late cases		History & latent cases		Contacts	
				number	%	number	%	number	%	number	%	number	%
Eteh	10 992	11 367	96.7	1 250	11.4	998 *	28.0	1 766	16.0	5 955	54.0	2 021	18.4
Enugu-Ezike	57 096	61 162	93.3	3 731	6.5	2 980 *	15.3	7 973	13.9	29 149	51.0	16 243	28.4
Itchi	5 747	6 020	95.4	133	2.3	127	4.8	708	12.3	3 098	53.9	1 808	31.4
Unadu	3 401	3 827	88.9	50	1.47	46	3.0	500	14.7	1 715	50.4	1 136	33.4
Ibagwa-Aka	9 418	9 512	99.0	139	1.4	127	3.0	1 094	11.6	4 692	49.8	3 493	37.0
Error-Agu	2 425	2 094	115.8	52	2.1	50	5.0	376	15.5	1 349	55.6	648	26.7
Ihohoro-Iheakpu	6 718	7 210	93.1	113	1.6	94	3.0	749	11.1	3 343	49.7	2 513	37.4
Ovoko	8 048	8 114	99.1	132	1.6	114	3.0	706	8.7	3 471	43.1	3 739	46.4
Ihaka	6 713	6 547	102.5	100	1.5	84	3.1	572	8.5	2 825	42.0	3 216	47.9
Obukpa	6 757	6 506	103.8	188	2.7	160	5.8	923	13.6	3 202	47.3	2 444	36.1
	117 315	122 359	95.8	5 888	5.1	4 780	4.07	15 367	13.0	58 799	50.1	37 261	31.7

\* 0-10 years

**TABLE V. SUMMARY OF YAWS FINDINGS AT INITIAL TREATMENT SURVEY, ISI-UZO DISTRICT, NSUKKA DIVISION, EASTERN NIGERIA**

Village	Population seen	Nigeria census 1953	Attendance (%)	Infectious cases (all ages)		Infectious cases (0-15 years)		Late cases		History & latent cases		Contacts	
				number	%	number	%	number	%	number	%	number	%
Ezimo	4 930	3 712	132.8	216	4.3	191	8.4	725	14.7	2 656	53.8	1 333	27.0
Amala	3 410	3 702	92.1	115	3.3	103	6.2	431	12.6	1 615	47.3	1 249	36.6
Obollo-Afor	7 040	7 787	90.4	184	2.6	160	4.9	742	10.5	3 675	52.2	2 439	34.6
Umundu	1 438	2 059*	69.8	39	2.7	37	5.6	209	14.5	688	47.8	502	34.9
Igugu	206	690	29.8	1	0.48	1	1.1	26	12.6	132	64.0	47	22.8
Imiliki	6 228	7 208	86.4	168	2.6	155	5.4	906	14.5	3 563	57.2	1 591	25.5
Orba	10 882	13 370	81.3	277	2.5	250	5.1	1 265	11.6	5 454	50.1	3 886	35.7
Eha-Alumona	15 365	19 580	78.4	249	1.6	212	3.2	1 848	12.0	8 333	54.2	4 935	32.1
Mbu	6 575	8 371	78.5	190	2.8	173	5.5	922	14.0	3 769	57.3	1 694	25.7
Ogbodo-Aba	2 369	2 299	103.0	70	2.9	67	5.5	307	12.9	1 422	60.0	570	24.0
Obollo-Orye	4 630	7 463	62.0	179	3.8	169	7.0	575	12.4	2 461	53.1	1 415	30.6
Obollo-Eke	7 471	7 824	95.4	168	2.2	162	4.4	728	9.7	4 246	56.8	2 329	31.1
Leke	5 287	6 791	77.8	390	7.3	376	16.3	905	17.1	3 221	60.9	771	14.5
Eha-Amufu	25 694	29 434	87.2	1 348	5.2	1 252	11.5	3 210	12.4	15 372	59.8	5 764	22.4
Ikem	6 793	7 206	94.2	305	4.5	283	9.5	726	10.6	4 583	67.4	1 179	17.4
	108 318	127 496	84.9	3 899	3.5	3 591	3.3	13 625	12.48	61 190	56.5	29 704	27.43

\* Census taken by the unit gave a population of 1448.

### Resurvey

As already mentioned, from the very inception of the campaign, the unit set itself the task of building up a comprehensive and efficient resurvey organization and stimulating the development of, and building into and around the yaws eradication programme, better general rural health services.<sup>1,2</sup>

The Nsukka local authorities were requested to employ "yaws scouts", who, under the medical officer's training and supervision, would play a necessary part in follow-up. Up to the present 54 "yaws scouts" have been recruited and trained. They are young adults, literate or semi-literate, belonging to Nsukka and chosen from as many different and representative villages as possible. They receive 1-2 months' preliminary training (a) carrying out a house-to-house census; (b) recognizing all active cases, early or late, and finding their immediate contacts; (c) tracing absentees from the initial treatment surveys.

Resurveys are systematically carried out in previously treated villages at intervals of three months where attendances had not been maximal; otherwise six-monthly intervals are considered adequate and practical.

Rapid and satisfactory resurveys are made by grouping the "scouts" into two or three teams, all working in the same area and supervised by field unit assistants. Each "scout" is detailed to cover an allotted section of a village at the rate of 200 persons per day; he is accompanied and guided by the local councillor or the elder of the group of families visited. The "scouts" then convene the cases, contacts, and absentees from the initial treatment surveys to an accessible place on a specified date, when their findings are checked by a senior officer who treats or re-treats active cases and contacts. Three or four villages on the same route following the "scouts' work can be covered in one day by the senior officer in a fortnightly trip for this purpose. As soon as a group of villages has had its first resurvey, one "scout", well acquainted with the area, remains behind on "patrol duties" to carry out a further rapid and less intense resurvey.

Bonuses are paid to "scouts" who find large numbers of infectious cases; the source of the "bonus" funds is derived from fines imposed on them for such reasons as absenteeism, slackness, or indiscipline.

Fig. 1 illustrates the prevalence of infectious yaws found at the initial treatment surveys and that found at six-monthly resurveys. These data are also given in Tables VI, VII, VIII and IX.

The first and second six-monthly resurveys of villages in Igbo-Eze District, where the initial prevalence throughout was hyperendemic, showed a marked fall in the prevalence of infectious cases.

The prevalence of infectious yaws (percentage of total population attending) at initial treatment surveys varied from a maximum of 11.5% to a minimum of 1.5%; the average prevalence of infectious cases for all villages in the district was 5%.





**TABLE VI. PERCENTAGE OF INFECTIOUS YAWS CASES FOUND IN IGBO-ETITI DISTRICT, NSUKKA DIVISION, AT INITIAL TREATMENT SURVEY AND RESURVEYS**

Village	Initial treatment survey *	Resurvey *	
		at 6 months	at 12 months
Obimo-Ikwoka	3.6	0	0
Edem	2.8	0.25	0.3
Nrobo	4.6	0.26	0.26
Abbi	2.2	0	0
Ugbene	3.8	0.02	0.05
Nibo	1.8	0.03	0
Uvuru	2.4	0	0
Ibagwa-Ani	2.0	0.41	0.12
Okpuie	2.4	0.65	0.15
Okutu	2.8	0.35	0.2
Nkpologu	4.0	0.15	0.07
Error-Uno	1.6	0.14	0.14
Akpugo-Udueme	1.4	0	0

\* Infectious cases expressed as percentage of population examined.

**TABLE VII. PERCENTAGE OF INFECTIOUS YAWS CASES FOUND IN UZO-UWANI DISTRICT, NSUKKA DIVISION, AT INITIAL TREATMENT SURVEY AND RESURVEY**

Village	Initial treatment survey *	Resurvey *	
		at 6 months	at 12 months
Ukpata	5.8	0.4	0
Adaba	0.88	0.05	0
Umulokpa	1.2	0.09	0.02
Omor	1.5	0.07	0.06
Igbakwu	0.62	0.05	0
Anaku	4.1	0.22	0.17
Umumbo	0.60	0.1	0
Omerum	0.27	0.11	0
Ifite	3.0	0.26	0.14

\* Infectious cases expressed as percentage of population examined.

**TABLE VIII. PERCENTAGE OF INFECTIOUS YAWS CASES FOUND IN IGBO-EZE DISTRICT, NSUKKA DIVISION, AT INITIAL TREATMENT SURVEY AND RESURVEYS**

Village	Initial treatment survey *	Resurvey *	
		at 6 months	at 12 months
Eteh	11.4	0.52	0.09
Enugu-Ezike	6.5	0.09	0.06
Itchi	2.3	0.3	0.3
Unadu	1.5	0.1	0.06
Ibagwa-Aka	1.4	0.2	0
Eror-Agu	2.1	0.04	0.15
Ihohoro-Iheakpu	1.6	0.02	0.05
Ovoko	1.6	0.01	0
Ihaka	1.5	0.01	0
Obukpa	2.7	0.04	0.01

\* Infectious cases expressed as percentage of population examined.

**TABLE IX. PERCENTAGE OF INFECTIOUS YAWS CASES FOUND IN ISI-UZO DISTRICT, NSUKKA DIVISION, AT INITIAL TREATMENT SURVEY AND RESURVEY**

Village	Initial treatment survey *	Resurvey *	
		at 6 months	at 12 months
Ezimo	4.3	0.11	0.06
Amala	3.3	0	0.10
Obollo-Afor	2.6	0.16	0.06
Umundu	2.7	0.4	0
Imiliki	2.6	0.17	0.01
Orba	2.5	0.08	0.02
Eha-Alumona	1.6	0.15	0.14
Mbu	2.8	0.03	0.01
Ogbodo-Aba	2.9	0	0
Obollo-Orye	3.3	0.1	0.09
Obollo-Eke	2.2	0.14	0.13
Leke	7.3	0.2	0.37
Eha-Amufu	5.3	0.28	0.16
Ikem	4.5	0.26	0.46

\* Infectious cases expressed as percentage of population examined.

During the first and second six-monthly resurveys the prevalence of infectious cases (percentage of population re-examined) fell to 0.1% and 0.05% respectively for the area. The highest at the first six-monthly resurveys was 0.5%, and the lowest practically nil. As for the actual numbers seen and treated, 5888 infectious cases were treated out of an examined population of 117 315 at the initial treatment survey, and 121 infectious cases were treated out of an examined population of 89 171 at the first resurvey.

Most of the infectious cases found at the resurveys were absentees from the initial treatment surveys; the rest were found among those previously treated as contacts, as latent cases with a history of yaws, and as infectious cases, in that order of frequency. The number of true relapses could not be obtained since medical histories from most villagers were unreliable; however, true relapses appeared to be negligible.

These satisfactory results are evidence of adequate initial coverage. They stress, however, the necessity for regular and systematic resurveys.

The development of a network of local health centre units throughout the Division, described below, helps to ensure a long-term follow-up.

### **Other Diseases**

Throughout the campaign, leprosy inspectors have been attached to the unit, and 1760 new cases of leprosy (i.e., cases who had previously never attended leprosy clinics) were found, of which 176 lepromatous cases and 1584 tuberculoid. A record was also kept of other community diseases observed, such as guinea-worm, onchocerciasis and malnutrition.

As much treatment, both palliative and specific, as feasible was given concurrently with that for yaws, and immunization against yellow fever by scarification was carried out in certain villages. Throughout the campaign, mass vaccination against smallpox and further mass immunization against yellow fever were also carried out.

### **Promotion of Better Rural Health Services**

The yellow fever immunization, the smallpox vaccination, the yaws eradication work, and the proposed introduction of a rural health centre following the yaws campaign (and the influence that it would exert) all combined to offer a unique opportunity for stimulating public interest in preventive medicine, as well as assisting the consolidation and expansion of the existing medical projects and facilities.

This opportunity was seized upon, and an Area Demonstration on Rural Hygiene Scheme in the Division was formulated. Backed by the impressive

results of the yaws campaign and by a health education campaign directed towards such groups of the community as local councillors, elders, and women, to whom the health needs of the Division were repeatedly explained, the maximum active participation of the people in this project was obtained. The capital expenditure for building an appreciable network of local health centres, as well as the recurrent expenditure for their maintenance and for the employment and training of the health personnel, have come from the Nsukka local authorities. The people have also contributed community development work towards these centres. UNICEF is contributing part of the equipment.

The commitments of the Regional Government comprise the provision of a team of key personnel, such as a medical officer of health, a health superintendent, a health sister, a nucleus of experienced junior staff, as well as the advisory services of the Nigerian research institutes. Their duties are to ensure maximum supervision of the local health centres, to train and guide the local health personnel, and to stimulate the people into initiating and gradually adopting a more progressive curative and preventive service. A relatively high standard is aimed at, since the Division is being used as the model and practical training ground for rural health personnel from other parts of the country. Just as important, the project is being used to stimulate the pride and interest of other local authorities to start on similar lines.

In the past there has been no co-ordinated policy on rural hygiene. Dispensaries, maternity homes, and health staff were scattered throughout the Division. Because of this and because of inadequate supervision, they have proved uneconomic and inefficient. The present policy is to concentrate medical and health staff in one unit to ensure more co-operation between them and facilitate supervision. With this end in view, local health centres are being created.

These local health centres consist of a good standard dispensary, a standard 4-bed maternity home with adequate facilities for antenatal and child welfare clinics, a health office, and model quarters for their staff. A small building is also incorporated in or near the health centre for the treatment of leprosy out-patients.

Seven local health centres have been built and staffed in Nsukka; the standard of other existing dispensaries and maternity homes is also being improved. The functions of these centres are:

- (a) to serve as a headquarters for medical and health staff in the area and as a base from which to launch campaigns against community diseases;
- (b) to provide a dispensary service with regular clinics for the people;
- (c) to provide a maternity service, with antenatal and child welfare clinics;
- (d) to serve as a centre for environmental sanitation in the area;

(e) to serve as a practical teaching unit for dispensary attendants, midwives, sanitary overseers, etc.; and

(f) to obtain some vital statistics.

An ambulance service also links the local health centres with the central hospital and carries serious cases to hospital.

The emphasis of all the foregoing is on prevention, but a link between this and the curative side is not neglected.

Along with the above, considerable developments in spheres related to health are going on—the improvement on a large scale of water supplies and agriculture, and community development on roads, bridges, etc., all of which act as an example and stimulus to other local authorities.

### Conclusion

In conclusion, we may say that the rapid reduction of the reservoir of infectious yaws cases, the mass immunizations performed and the active participation of the local authorities in consolidating the gains of these campaigns and in opening up modern adequate rural health services together constitute the first sound milestone on the road to better health in Eastern Nigeria.

### ACKNOWLEDGEMENTS

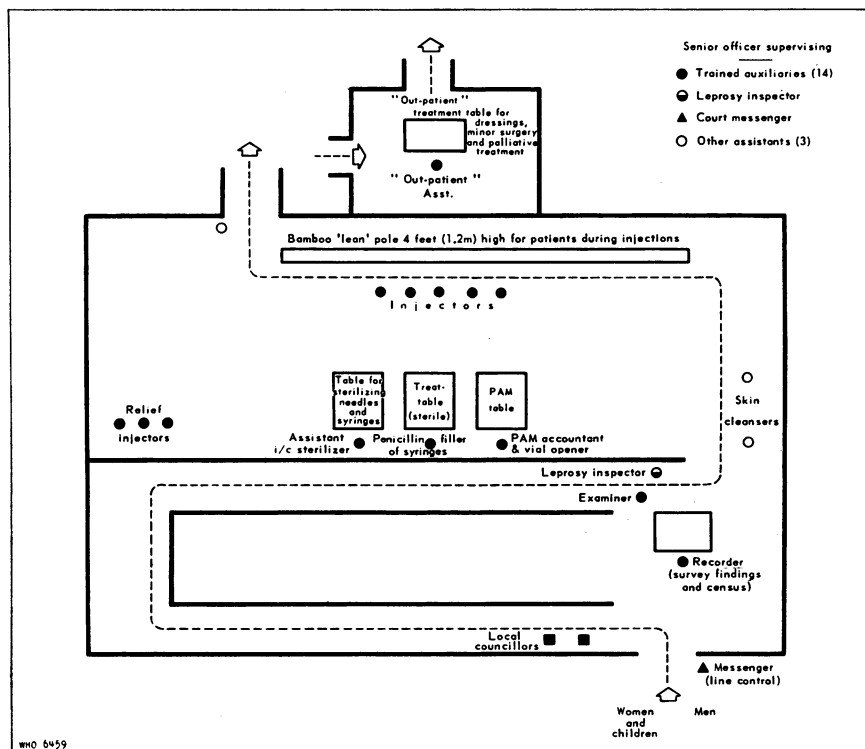
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### Annex

#### ROUTINE WORKING PROCEDURE OF A YAWS ERADICATION TEAM OF 10-14 MEMBERS (Fig. 2)

A palm-frond shelter or enclosure is built in the heart of the quarter of the village, the presence of shade from trees being important. It comprises an examination "room", an injection "room", and an "out-patient" compartment for dressings and palliative treatment, more than ample light and space for smooth work and traffic from one end to the other being provided throughout. The system has been aptly described as the "sausage machine".

FIG. 2. LAYOUT OF WORKING PLACE OF YAWS ERADICATION TEAM



About 1500 of the people are called up by kindreds (a census may or may not have been taken already) through their local councillors and elders. They are lined up by the latter, and by the court messengers. Treatment, however, is not given to the local councillors until all their people have been assembled and dealt with. Two lines are formed facing the entrance to the examination room, men in one line and women with children in the other. This prevents the women and children from being pushed to the back and subsequently returning to their houses without being seen. Each line then moves in six at a time, i.e., six men followed by six women and children, and so on.

Young children are stripped of all clothing and adults retain only a loin cloth; the women retain only the usual short underskirt. They present themselves in turn before the examining doctor or assistant, who examines the patient systematically from head to foot, not forgetting the inspection of hands and fingers (both sides), armpits, soles of feet, genital region (for children), and the medial view of tibiae, in order to eliminate confusion from the bulge of the leg muscles. A pole is fixed in the ground next to the examiner to give support to the patient when the soles of the feet are

inspected. The findings of the examiner are called out in a workable code with which the recorder is fully conversant, for example, "female 17 years, "S", infectious, 4 ml"; "S" denotes early skin lesion. The dose is chalked on the back of the patient over the right scapular region. Since a dry piece of chalk cannot be used for long because of the grease and dirt which quickly collect on it, it is previously soaked in water, and then used lightly. The chalked dosage may not at first show clearly, but the figure soon dries and becomes distinct. A leprosy inspector sits next to the yaws examiner, and recognizes and registers any leprosy cases, who are told of the treatment to be received from the nearest leprosy clinic.

The patient is then directed to the treatment "room", where the right buttock is scrubbed vigorously with a nail brush and soap and water by a trained assistant; a second assistant washes the soap off with water and finally swabs the part lightly with a pad containing 1% Cetavlon solution.

The patient then passes to a bamboo "lean" pole with his face to the wall. An assistant administers the prescribed dosage, as chalked on his back, deeply and intramuscularly into the upper and outer quadrant of the right buttock. Babies and children under 5 years are lifted up and held by a trained assistant. The patient is then directed to the exit, unless he requires treatment for ulcers, abscesses, etc., in the "out-patient room".

One sterilized needle is used for each injection. It is then returned to the assistant, who first removes any oil and penicillin remaining on the outside of the needle with a piece of lint and any remaining in its bore by blowing air through it under pressure from a 2-ml syringe. The needles are then sterilized by boiling for 20 minutes. (The safest method of sterilization of syringes in the field is by boiling for 20 minutes at the beginning and end of the day's work, after thorough cleansing and removal of any adherent oil and penicillin.)

The assistant accounting for the daily issue of penicillin cleans the top of each bottle with spirit, removes the metal and rubber caps, and places the bottles, 10 at a time, on the table. Another assistant, who wears a rubber apron and gloves and has scrubbed up, pours 8-10 ml into the syringe barrel, to which a needle is already attached. He then replaces the plunger and lays down the syringe ready for the injector's use. Emptied vials are drained one into the other. In this way 11-11.5 ml are obtained for each 10-ml vial.

To carry out efficiently the treatment of a daily average of 1000 patients, at least 100 needles and 8 10-ml Record syringes are required. Record syringes of 10-ml capacity are recommended. Larger syringes hurt the hands, delay work, and rapidly tire the injectors. Injectors should be allowed a brief rest after every 40 injections, hence the need for relief injectors, as shown in the diagram. The markings on syringes disappear, or become unreadable, after about 12 weeks' use. Needle wastage is about 1 per 1000 injections. VIM needles No. 18 have been used throughout.



Penicillin wastage is approximately 150-200 ml per 1000 patients, with the syringe-filling method described above.

The "injection table" is treated as sterile, and the filler and injectors scrub up to the elbows during treatments and touch nothing except their syringes. All staff in the treatment "room" are capped and gowned, irrespective of their special duty.

## RÉSUMÉ

Le district de Nsukka en Nigérie orientale a été choisi comme point de départ d'une campagne contre le pian, entreprise par le gouvernement, avec la collaboration de l'OMS et du FISE. Dans cette région, le pian actif était hyperendémique (prévalence supérieure à 10%), parfois holoendémique (prévalence supérieure à 20%). Durant la phase préparatoire de la campagne, du personnel a été formé et préparé diverses tâches: recensement des malades de maison en maison, diagnostic selon la nomenclature recommandée par l'OMS, traitement par injection de PAM (pénicilline-procaïne avec 2% de monostéarate d'aluminium). Ce personnel avait déjà acquis de l'expérience dans la lutte contre la maladie du sommeil ou avait collaboré au travail des équipes médicales rurales.

Les enquêtes cliniques montrèrent que dans certaines régions 70% de la population était atteinte de pian, à un degré quelconque; environ 60% de la population de certaines circonscriptions donnait des résultats positifs aux épreuves sérologiques.

Un traitement systématique d'ensemble a été appliqué. De février 1954 à mai 1955, 383 769 personnes (soit environ 95% de la population) ont été examinées et traitées.

Dès le début de la campagne, on a créé une organisation chargée d'effectuer des contrôles post-thérapeutiques. Une cinquantaine de jeunes gens ont été préparés, en 1-2 mois, à suivre les résultats du traitement et à dépister les personnes qui n'y avaient pas été soumises. Dans chaque village traité, les contrôles ont été effectués tous les 3 ou 6 mois. Les contrôleurs étaient groupés en équipes, travaillant dans le même secteur sous la surveillance d'un membre de l'unité de lutte antipianique.

Six mois après le début du traitement, le nombre des cas contagieux avait considérablement baissé. Le contrôle régulier de toute la population est considéré comme nécessaire au succès de la campagne. Celle-ci a eu pour effet d'encourager l'amélioration des services sanitaires ruraux.

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