



"NEGATIVE" EPIDEMIOLOGICAL ENQUIRIES WITHIN THE FRAMEWORK OF THE
SMALLPOX ERADICATION PROGRAMME

by

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In the smallpox eradication programme, surveillance operations are considered to be of vital importance. Since it is clear that a mass vaccination programme can only in exceptional circumstances completely cover all social levels of a population in a relatively short time, the success of any eradication programme will depend apart from mass vaccination, on the priority accorded to surveillance operations. Here an offensive strategy is involved, in contrast to the defensive strategy of mass vaccination. Surveillance consists of finding and extinguishing the fire at the point where it has broken out in order to prevent its spread. The aim of surveillance is to search for smallpox cases and to make a prompt enquiry into every suspect case reported in order to verify the diagnosis, to determine the source of infection and to track down other cases so that necessary containment measures can be taken. This requirement, the need to enquire into all smallpox cases notified, even doubtful ones, often results in "negative" enquiries, i.e. enquiries regarding cases which are not smallpox.

We felt it would be interesting to review the experience in Togo from January to September 1969 with respect to the investigation of reported cases of suspect smallpox, some of which were indeed smallpox, and many of which resulted in "negative" enquiries.

Summary of the investigations carried out

Between January and September, 1969, 33 investigations were conducted (Table 1) and in 14, cases of smallpox were found. In 18 investigations, other skin complaints were diagnosed and on one occasion the case reported could not be found as the notification was late and the nurse had not noted down sufficiently exact information to locate the patient.

Of the 33 investigations, 17 arose from ordinary notifications made by health units, nine of which led to the detection of 20 smallpox cases. Sixteen enquiries resulted from information provided from persons other than the dispensary nurses and physicians. Five of these enquiries led to the detection of 61 smallpox cases. Actually, more than 33 enquiries were made, since some enquiries led us to make investigations outside the focus reported and others to make a systematic search throughout an area, as in the case of enquiry No. 13.

The seasonal pattern of occurrence of smallpox cases, as originally reported, is similar to the actual pattern of occurrence of cases as determined after investigation. There is, however, one important difference - from data obtained by routine notification, cases appeared to be occurring throughout the entire nine-monthly period when, in fact, no cases are believed to have occurred after May.

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SMALLPOX CASES BY MONTH - TOGO - JANUARY-SEPTEMBER, 1969

	Number of cases									Total cases
	J	F	M	A	M	J	J	A	S	
Routine Notification	6	5	4	1	1	0	1	1	1	20
Routine and <u>other</u> notifications	7	9	6	22	5	1	2	1	3	58
<u>After</u> investigation	11	9	2	53	7	0	0	0	0	82

Through routine reporting sources, 21 cases were notified, one or more cases having been notified in all months except June. All except eight of these were confirmed as smallpox. Through other sources, 36 cases were notified of which 25 were eventually confirmed. In the course of the investigations, however, 43 additional cases were found.

Results of "negative" enquiries

In all there were 18 "negative" enquiries in which other skin complaints were diagnosed. Table 2 shows the distribution of diagnoses according to the source of notification. These complaints may be regarded as ones which can lead to confusion with smallpox.

Chickenpox is well in the lead, with 89 cases, including two associated with scabies. It is followed by measles (15 cases) and yaws (15 cases); next comes scabies (18 cases, two associated with chickenpox) and vaccinia. The entry "various" includes one case with skin abrasions and one case with a dermatosis of undetermined nature which in no way resembled smallpox or chickenpox.

Only chickenpox appears to be a serious source of confusion to the personnel of the health services. However, we feel that if the physicians in charge of health units would check the cases more often, chickenpox would be less frequently reported as smallpox. The personnel of the dispensaries and even the uninitiated can generally differentiate measles, yaws and scabies from smallpox. In many instances, however, we had the impression that the people themselves knew that smallpox was not involved but simply wanted medical assistance for a complaint whose abnormal frequency in their farms or villages was a source of concern. As medical assistance is given in the event of smallpox through vaccination and care for the sick, why should it not be available for as common a complaint as scabies? To this must be added the fact that the population has been "sensitized" by the programme in regard to the question of smallpox, and people now have a tendency to suspect smallpox in the event of any vesicular eruption. Have we not often told the people that failure to notify a single case of smallpox, even a doubtful one, would slow up the programme and would discredit our country in the eyes of other countries?

Description of certain "negative" enquiries

Brief accounts of several "negative" enquiries are set forth below.

Enquiry No. 4. Towards the end of January, the United States of America statistician adviser working with the programme, reported during his evaluation survey in the District of Anécho that he had discovered some 30 smallpox cases in the Dévémé farms. This was disturbing, since in this area, there had been two vaccination cycles in 1968 (March-April and September-December). Beginning on 29 January, a field investigation was conducted while, at

the same time, a containment team began work. A total of 36 patients with a vesicular eruption was found. In most cases a clinical diagnosis of chickenpox was evident. Moreover, the vaccination history of the patients was reassuring: 33 of the 36 patients bore unmistakable vaccination scars, the most recent dating from 1968. However, a thorough examination was made: scabs and blood samples were obtained from 23 patients and, later on, the 23 patients were vaccinated. Laboratory examinations of the scabs and serum, performed in Accra, were negative for smallpox; vaccination after the scabs were separated revealed 70 per cent. major reactions. Clearly, these were cases of chickenpox.

Enquiry No. 7. In the course of a surveillance tour at Agouévé (Lomé District) on 3 March, we went to the dispensary to obtain information regarding the smallpox situation in the village. The male nurse attached to the clinic was away but his assistant told us that it was thought there might be a case of smallpox in the village. We looked at the register of out-patient consultations: no case of smallpox had been recorded in February and March, but two cases of chickenpox had been noted, one on 12 February and the other on 1 March. We asked the assistant to take us to see this last case.

The patient, a 38-year-old man, had been isolated by his family in a hut at the entrance to the compound. He was a welder in the Department of Mines at Lomé, going to work in the morning at Lomé and coming back to Agouévé at night. He had made no other journeys.

His whole body was covered with a rash. The rash was said to have appeared on 28 February and to have been preceded on 27 February by diarrhoea, high temperature, headaches and some joint and back pains. The temperature was said not to have gone down when the rash appeared and on the evening before our visit, it was said to have still been high. The rash consisted of irregularly shaped vesicular lesions, varying greatly in size and ranging from completely formed vesicles with clear fluid to a few small papules with tiny transparent vesicles on top of them and fine papules which hardly stood out from the skin, all this interspersed with a few large vesicles resembling phylctenae. The vesicles were very superficial.

On his arm, the patient had two large old vaccination scars and two vaccination scars smaller than the other two; the last of them the result of a vaccination eight months before at Dadja, where vaccination by jet injector had been given by the regular vaccination team.

The patient stated that a fortnight before the beginning of his illness, he had been in contact with a woman living in the same quarter who had a rash which had since disappeared. We went to the woman's house and found that the rash had completely cicatrized and that the scars were beginning to disappear. She also showed us scars from recent vaccinations.

In the patient's place of residence there were 18 adults, four schoolchildren and seven children under five years of age, only two of whom, aged one and two months respectively, had never been vaccinated.

We concluded that this was certainly a case of chickenpox in an adult and the nurse at the dispensary had indeed diagnosed it correctly. When we rechecked the entries, we found that one patient corresponded to the case of chickenpox registered on 1 March and the other person from whom he contracted the infection was the case of chickenpox registered at the clinic on 12 February.

Enquiry No. 8. On 12 February the team of agents responsible for travelling through certain regions in search of smallpox cases and administering additional vaccinations reported that they had discovered a case of smallpox in the farm of Apédokoé-Godogan, District of Lomé, in a girl aged 7 years. On the same day we went to the farm to look into the case. It was a farm I had visited on 7 February in conjunction with programme evaluation. The patient had been vaccinated nine days previously, at the same time as the other inhabitants of the farm. Her body was covered with lesions of impetigo, especially on the hands and wrists, the lower limbs and the buttocks. On the left arm there was a pustular vaccinal lesion, as well as three

pustular lesions half way up the back of the thighs, and two others on the buttocks. These lesions were of the same age as the vaccinal lesion on the arm. The diagnosis reached was disseminated vaccinia superimposed on impetigo.

Enquiry No. 12. During January 1969 the nurse at the Aképé Dispensary informed his chief medical officer at the district capital of two cases of suspected smallpox in two brothers, aged 18 and 22 years, who were said to have been vaccinated twice the year before, the first time by the dispensary nurse in September 1968, and the second time by the jet-injector vaccination team during October 1968. The chief medical officer only notified us of these two cases in his monthly report for January, which reached us on 14 February.

A smallpox epidemic had occurred in Aképé canton, with two cases at Aképé itself during June, a focus of 14 cases at Attidjin during October 1968.

The nurse at the dispensary was well acquainted with the smallpox eradication programme, since he had formerly been head of a vaccination team. His active surveillance work had enabled us in 1968 to detect smallpox outbreaks in the canton and bring them rapidly to an end.

We had some doubts as to the authenticity of these cases but the reliability of the dispensary nurse and his knowledge of smallpox and the eradication programme suggested that there might have been some shortcomings in the vaccinations, i.e. poor vaccine or poor vaccination technique.

On 15 February we went to Aképé to investigate. The nurse stated immediately that he was doubtful of the diagnosis of smallpox but that the density of the rash on the face of the younger brother had given him some anxiety. He took us to the home of the two patients, whose close friends and relations he was keeping under close surveillance.

The first case, an 18-year-old man, had become ill on 20 January. Examination showed several scars on the body. They were recent and superficial and were beginning to disappear. They were not deep, except for two on the face, and were of various sizes and not very numerous, being more common on the face than elsewhere, almost completely absent on the hands, more numerous in the hollow of the arm than on the hands and on the inside of the thighs than on the feet. On the left arm there were several vaccination scars; two large ones which seemed to have resulted from vaccination a long time before; a scar in the middle part of the arm between the first two, of punctiform shape, which appeared to be a recent scar from a jet-injector vaccination; and, finally, a fourth scar of small size which seemed to be less recent than the third, which was said to have resulted from multiple-puncture vaccination performed by the dispensary nurse.

The second case, a 22-year-old man, whose illness began on 13 January, was unfortunately not at home so that we could not examine him. He was said to have already left for the fields. The nurse, however, stated that his vaccination history was similar to that of his younger brother and that the rash had been of the same kind but with fewer pocks than the first case.

Everything led us to believe that chickenpox rather than smallpox was involved. Furthermore, the vaccination history of these two brothers, who had been regularly and often vaccinated and whose last two vaccinations had been given less than six months before, made the diagnosis of smallpox most unlikely.

Enquiry No. 16. A WHO adviser reported towards the end of February 1969 that her servant's child was suffering from smallpox, at Tohoun, District of Nuatja. The health assistant of the Nuatja Health Subdivision was informed and proceeded to Tohoun on 3 March. Together with the nurse from the Tohoun Dispensary he went through the various quarters of the village without finding any cases of smallpox or even of chickenpox. No smallpox cases had been recorded in the village since May 1968. Thanks to information given by the father, the child was found. He had fallen while running and presented superficial skin abrasions on the chest and abdomen

which were now scarring over. A visitor had told the father that these abrasions were a sign of smallpox.

Enquiry No. 21. A telegram dated 12 April, informed us of a focus of six smallpox cases at Tokpo, District of Anécho, which had been reported by an itinerant agent (auxiliary personnel of the basic health services responsible for visiting once monthly all the houses in a given geographical area). Investigation showed that clinically these were typical chickenpox cases. Moreover, these six patients had scars from vaccination carried out in 1968 and were able to produce vaccination cards bearing their names.

Enquiry No. 26. On 5 May, spraying operators of the National Malaria Service working in the Anécho District reported suspect smallpox cases at Apéyémé, Akodessewa and Kpota. Field investigation made on 6 May revealed two cases of chickenpox in one village and a focus of 15 cases of measles in another. All cases showed scars of recent vaccination.

Enquiry No. 30. This retrospective enquiry concerning a death suspected to have been caused by smallpox was the most interesting and difficult and is reported in some detail.

On 25 August, the Chief Medical Officer of the Health subdistrict of Lomé notified us in his report for the week 18-24 August of a death suspected to be due to smallpox, which had been reported from the Sanguéra dispensary. The death was reported to have occurred in a 13-day-old infant who became ill on 11 August, developed a rash on 15 August and died on 17 August.

On 26 August, we went to Sanguéra to make an enquiry on the spot. First, we questioned the dispensary nurse concerning the case reported and he then accompanied us to the Mlaganikopé farm, where we met the father, grandfather and grandmother of the dead baby. The mother was said to have gone to Sanguéra market, where we found her later and examined her.

Since we were unable to see all the inhabitants on the farm, particularly two children whom we had been told were suffering from a rash, we asked the father of the family to bring together the inhabitants on the farm for a vaccination session on 4 September. This second visit enabled us not only to carry out the vaccinations, but to examine the 43 inhabitants to verify their vaccination histories.

The mother of the dead baby, who was in her twenties, was said to have experienced a rash about four days after childbirth. The rash was made up of scattered vesicular lesions occurring over the whole body. The disease was said to have developed over a period of roughly a week, without any noteworthy general symptoms, since she was able to get on with her work. Examination showed four small recent scars on the face. The biggest, barely three millimetres in diameter, was situated in the right paranasal region. Two other similar ones, practically next to one another, were situated at the root of the left nasal ala and the smaller of them was disappearing. Finally, there was a fourth scar in the middle of the chin. She also had three vaccination scars on the left arm, the last of them less than a year old, but before her pregnancy. Furthermore, she presented scabies lesions on the anterior surface of the elbow and the dorsal part of the interdigital spaces. An 18-month-old child she was carrying was also suffering from scabies.

The baby was said to have been born at home, without medical assistance, on the farm of Mlaganikopé. Labour was said to have been normal and the child healthy. Suddenly, when the baby was 11 days old, a rash appeared which the grandfather said had been preceded 24 hours before by high temperature, although the mother asserted that the temperature had only gone up when the rash appeared. The child was taken to the dispensary, about two kilometres away, on the day when the rash appeared, i.e. 15 August. The eruption was said to have been made up of vesicles smaller than those on the mother's body but more numerous and covering the whole body. No more details could be obtained regarding the nature and development of the eruption on the various parts of the body. It was stated to have appeared roughly a week after the

mother's rash had appeared. The child was said to have received no medication before the illness. He was given an antibiotic by the dispensary nurse but died when 15 days old on 19 August, a date of death different than that originally supplied by the nurse.

Three other typical cases of chickenpox were seen among the inhabitants of the farm; a four-year-old girl whose very recent lesions had cicatrized; a six-year-old boy whose lesions, all very recent, were cicatrizing; and a fifteen-year-old boy who was still suffering from chickenpox, in the initial stages, with small papules and vesicles.

Finally, a fourth case of chickenpox, the last scabs of which were drying out, was examined at a farm near Mlaganikopé.

This was a difficult investigation because it was retrospective and had to do with a case we were unable to examine since the baby was dead before we received the notification. Other epidemiological factors also had to be considered.

Although smallpox had occurred between October and December 1968 in the Sanguéra farms, no cases occurred on Mlaganikopé farm. The most recent cases in the farms near Mlaganikopé had occurred on 22-23 November. Following these epidemics several successive vaccination campaigns, particularly by malaria eradication agents using bicycles, were carried out in the region. Since the beginning of the year, no cases of smallpox had been reported in the region and for three months no cases of smallpox had occurred in the whole country. The migration routes of the people of this region are essentially towards neighbouring Ghana, which has itself been free of smallpox for a long time. Furthermore, there was said to have been no travel by members of the family or visits by strangers in the weeks preceding the onset of the rash.

The vaccination status of the inhabitants of the farm was excellent; the last vaccination having been carried out less than a year before. Only one child, less than one year old, out of the 43 persons examined, had not been vaccinated.

There was an epidemic of chickenpox on the farm and in the immediate vicinity. The mother of the dead baby seemed to be one of the first links in the epidemic chain. The size of the lesions, their number, their short-lived and benign evolution and above all, the vaccination history of the woman concerned, led us to make a diagnosis of chickenpox in her case.

It seems to us that the diagnosis of smallpox must be discarded. If it had been smallpox, the child would have had to be infected 10-16 days before the rash appeared, which would make the date of infection somewhere between 30 July and 5 August, i.e. during the last six days of his intra-uterine life or at birth. There had been no case of smallpox in the neighbourhood during that period and an intra-uterine infection can only pass from the mother across the placental barrier, but the diagnosis of smallpox had had to be rejected in the case of the mother.

The child may have had chickenpox as the mother had no immunity to confer on the baby since she herself contracted the disease only four days after giving birth to the child. Transplacental transmission during uterine life and during the incubation period in the mother cannot be entirely discounted. Cases of congenital smallpox have been reported but we have no knowledge of cases of congenital chickenpox having been reported in the literature.

Generalized vaccinia seems impossible since the mother had been vaccinated before her pregnancy. The presence of vesicles eliminates measles and there was no evidence of congenital syphilis. Drug intoxication can also be discarded since the baby had not been given drugs.

In brief, the mother contracted chickenpox a few days after childbirth, a week before the baby developed a rash. In the epidemiological context (absence of cases of smallpox in the district for the previous eight months and in the rest of the country for three months), the satisfactory vaccination status of the people of the district, the epidemic of chickenpox in and very near the farm together with the nature of development of the eruption make it necessary to reject the diagnosis of smallpox.

Conclusions

Even when negative, we have found the enquiries to be of considerable interest and value:

(1) They have enabled us to check the vaccinal status of the population in the areas visited and to administer additional vaccinations where necessary.

(2) They have reassured us that smallpox was absent in the areas visited, and at the same time, they have encouraged the people to report all suspect cases, knowing that special assistance would be provided promptly.

(3) Other public health problems have been brought to our notice. In one case, we discovered a focus of 15 contagious yaws cases, present among the children of two neighbouring villages without a medical post. As a result we sent a team to administer penicillin treatment to the patients and their contacts. In another case, an epidemic of measles was found. Finally, these enquiries made clear to us the importance of scabies in most regions of the country, particularly in those where there is a serious water shortage.

(4) The enquiries aroused the interest of the population in public health problems and provide us with an opportunity to give health education concerning the problems encountered.

For this reason we feel that, whatever the source of information, the central survey team should promptly respond to any notification by making a field enquiry so as not to let any possible smallpox cases escape. It is only by such a prompt response, particularly during the maintenance phase that imported smallpox cases can be detected and rapidly contained.

TABLE 1. RECAPITULATION OF INVESTIGATIONS

Serial No.	Place of enquiry	Month of enquiry	Cases notified		Results (No. of cases)		Comments
			Ordin. notification	Other notification	Small-pox	Other	
1	Togblé-Démé (Subd. Sanit. (Lomé))	January	1	-	2	-	-
2	Adonkondji (Tabligbo)		5	-	8	-	-
3	Dékandji (Tabligbo)		-	-	1	-	-
4	Dévémé (Anécho)		-	1	-	36	Chickenpox
5	Adékpé, Kpédomé (Nuatja)	February	-	2	2	-	-
6	Attissokopé (Lomé)		1	-	3	-	-
7	Agouévé (Lomé)		-	1	-	1	Chickenpox
8	Apédokoé-Godogan, Aflao (Lomé)		-	1	-	1	Vaccinia/impet.
9	Djrèkpo, Awoutékondji (Tabligbo)		1	-	1	-	-
10	Séwavi-Gbèdèkópé (Tabligbo)		1	-	1	-	-
11	Sabakondji (Tabligbo)		1	-	2	-	-
12	Aképé (Tsévié)		1	-	-	2	Chickenpox
13	Agouévé-Massouhoin (Lomé)	March	1	-	1 (?)	-	Case not found
14	Zooti-Tonoukondji (Anécho)		1	-	1	-	-
15	Yaokopé (Sakodé)		1	-	-	1	Chickenpox
16	Tohoun (Nuatja)		-	1	-	1	Skin abrasions
17	Kolina (Sokodé)		1	-	-	1	Chickenpox
18	Atakpamé/Akparé (Atakpamé)		-	1	-	1	Chickenpox
19	Kodohoé (Tabligbo)	April	-	-	4	-	-
20	Wowoèkópé (Tabligbo)		-	-	2	-	-
21	Tokpo, Anfoin (Anécho)		1	-	-	6	Chickenpox
22	Vogan (Anécho)		-	21	47	-	-
23	Alinka, Togblé (Lomé)	May	1	-	1	-	-
24	Lakata (Tabligbo)		-	2	6	-	-
25	Sè-Ana (Tabligbo)		-	1	-	1	Chickenpox
26	Sévagan, Akodésséwa, Apéyémé (Anécho)		-	1	-	2	Chickenpox Measles
					15		
27	Koépédo, Déminé (Tsévié)	June	-	1	-	15	Yaws
28	Adidogomé, Klouvikopé Anécho-Ville (Anécho)	July	-	1	-	11	Chickenpox
29	Alokoégbé (Tsévié)		1	-	-	1	Skin disease of ? nature
30	Mlaganikopé, Sanguéra (Lomé)	August	1	-	-	1 2	Chickenpox Chickenpox/ scabies
31	Mlaganikopé, Sanguéra (Lomé)	September	-	1	-	1	Chickenpox
32	Wataklassoukópé, Aflao-Totsi (Lomé)		-	1	-	22	Chickenpox
33	Amétonoukondji (Tabligbo)		1	-	-	6 1	Scabies Chickenpox
TOTAL			20	36	82	128	-

TABLE 2. RESULTS OF "NEGATIVE" ENQUIRIES

Illness	Source of notification		Total	
	Ordinary Notification	Other Notification	No. of cases	Percentage
Chickenpox	12	75	87	67.9
Chickenpox-scabies	2	-	2	1.6
Vaccinia-impetigo	-	1	1	0.8
Measles	-	15	15	11.7
Yaws	-	15	15	11.7
Scabies	-	6	6	4.7
Various	1	1	2	1.6
TOTAL	15	113	128	100.0