



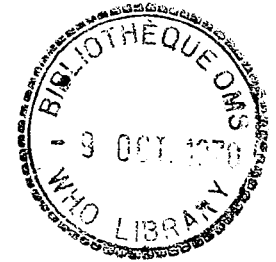
EPIDEMIOLOGICAL INVESTIGATIONS - SMALLPOX ERADICATION
PROGRAMME IN TOGO - 1969

INDEXED

by

Georges F. Glokpor
Chef, Division de l'Epidémiologie,
Ministère de la Santé, Lomé, Togo

&
Andrew N. Agle
Operations Officer, USAID,
Smallpox/Measles Programme, Togo



Attempts to limit smallpox outbreaks in Togo, at the end of 1968 were quite successful but, at the beginning of 1969, few outbreaks persisted in foci infected during the last quarter of 1968. Intensive surveillance activities were undertaken which permitted the rapid elimination of the remaining foci. Because the vaccination campaign had encompassed the entire country, the containment operations were relatively easily accomplished and transmission was interrupted by May 1969.

No further cases have been detected for over a year.

Surveillance and containment activities conducted during 1969 are described in this paper.

Surveillance activities

With the exception of one zone, notification of cases was more prompt and case detection better than in previous years. The notification network is based on the Public Health Service's facilities throughout the country: 190 dispensaries and polyclinics and 15 hospitals for 1 800 000 inhabitants and 56 000 km². Additional notifications received from other sources lent appreciable support to the detection of cases. In all, 45 suspected outbreaks were notified or detected in the course of field investigation, of which 25 were caused by smallpox. Seventeen of the 45 outbreaks were notified through routine reporting channels; 19 were reported by other sources and nine were detected by field investigation. Routine notifications usually include only those patients who themselves had come to the dispensary or hospital, or inhabitants of the affected areas who came to report the cases to the sanitary officer. "Other sources" providing reports included radio-club presidents, village chiefs, the circonscription's administrative chief, a social worker, a bureau of social welfare, mobile vaccination teams, malaria spraying teams, geographic reconnaissance teams from the health service, and public rumours.

All reports received were immediately followed up by field investigations. In two instances (outbreaks 14 and 34), investigators were not able to locate the reported cases. Although not confirmed, the cases are included in the official reports. A total of 45 investigations were thus effected during the year despite the small size of the investigation team whose members had additional duties to perform.

The issue of this document does not constitute formal publication. It should not be reviewed, abstracted or quoted without the agreement of the World Health Organization. Authors alone are responsible for views expressed in signed articles.

Ce document ne constitue pas une publication. Il ne doit faire l'objet d'aucun compte rendu ou résumé ni d'aucune citation sans l'autorisation de l'Organisation Mondiale de la Santé. Les opinions exprimées dans les articles signés n'engagent que leurs auteurs.

In several instances, special area-wide village by village investigations were conducted to uncover possible unreported cases. Following a smallpox outbreak of undetermined origin which occurred in Nuatja sub-division in February, a mobile team of 15 agents from the malaria programme systematically investigated the region seeking additional smallpox cases and vaccinating all smallpox susceptibles encountered. At the time of the outbreak in Vogan zone, mobile agents from the Tabligbo sub-division led a systematic search along the Anfoin/Tabligbo road as well as along the border between Tabligbo circonscriptions and Vogan. This search led to the discovery of smallpox outbreaks 4 and 29, in January and April. Following the discovery of smallpox cases in Dahomey in July, the first of which was detected by a Togo dispensary, a systematic investigation was conducted by a temporary mobile team along the entire border with Dahomey. However, no cases were found. Special searches were also effected in the circonscriptions of Lomé, Tsévié, Tabligbo and Anécho, all of which still harboured smallpox cases at the end of 1968, in order to evaluate the level of immunity of the population, to look for cases of smallpox, and to give supplementary vaccinations.

A weekly bulletin of infectious diseases was published which, in addition to the periodic reports, described the most significant investigations during the year. A comprehensive review of "negative" investigations was published in September 1969, and in October 1969, a special study, of smallpox transmission in a hospital in Lomé.

Results of the investigations

Nineteen cases were reported by the established reporting sites and 64 additional cases by other sources (Table 1). Only 11 of the 19 cases reported by the established reporting network were confirmed on investigation to be cases of smallpox; however, seven additional cases were found in affected villages experiencing smallpox. Of the 64 cases reported by other sources, 25 were confirmed as smallpox but 21 additional cases were found in the villages where outbreaks were detected. Finally, 19 additional cases were discovered by the field teams in the village by village searches in the endemic areas.

Fully 20 outbreaks comprising 132 cases were investigated which were found to be due to other causes (Table 2). Most were outbreaks of chickenpox, although outbreaks of measles and yaws were also noted. Miscellaneous refers to one case with cutaneous abrasions in the scabbing stage and to one case of an undetermined dermatitis with no resemblance to chickenpox or smallpox.

If we had relied solely on routine notifications for appraisal of our smallpox situation, (as virtually all countries have in the past), we would have recorded only 19 cases and these scattered throughout the year (Table 3). One might conclude that smallpox transmission had continued throughout the year and was either under-reported or that cases were being imported from other countries. By seeking reports from these sources and by investigating all such reports, a very different conclusion is drawn, specifically, that smallpox transmission appears to have been interrupted in May 1969, after the recurrence of 83 cases. Notification is, therefore, only a signal which must be followed by prompt field investigation which alone makes possible a determination of the nature of the problem and of its true amplitude. Even "negative" investigations are of significant value.

Nature of the outbreaks of smallpox recorded in 1969

Togo experienced 83 cases of smallpox in 1969 as opposed to 784 cases in 1968. All 83 cases occurred between January and May 1969 and represented 25 outbreaks with an average of 3.3 cases per outbreak (Table 4).

The smallpox outbreaks occurred for the most part in the southern region of the country, the region which had harboured cases since the last quarter of 1968. The majority of recorded cases occurred in already known former foci of infection. Three of the sub-divisions experienced only a single outbreak each and a total of four cases. In Sokodé sub-division,

a suspect case of smallpox in Sotouboua was reported for the week ending 11 May, during which time the investigation team was participating in a seminar outside the country. Upon return, the team was not able to find the patient who had recovered and left. No precise information could be obtained regarding the patient but the rapid evolution of the disease suggested that the diagnosis of smallpox was highly unlikely. During 1968, this sub-division recorded only two isolated cases of smallpox in April and May. The sub-division of Nuatja which had experienced no cases of smallpox after May 1968, recorded in February 1969, one outbreak of two cases. The sub-division of Tsévié had only one case of smallpox detected in January by the mobile vaccination team in Abobo where one case of smallpox had occurred in October 1968.

Three of the sub-divisions were more heavily afflicted accounting for 22 outbreaks and 79 cases. The sub-division of Tabligbo recorded nine outbreaks of smallpox with 24 cases. The sub-division of Lomé experienced four outbreaks with seven cases of smallpox. One case which was reported could not be verified as the notification was late and the dispensary nurse had not taken precise information necessary to locate the suspected case: a mobile team systematically searched the region to no avail. All outbreaks in Lomé sub-division occurred on small farms; none occurred in the capital city itself. The sub-division of Anécho recorded nine outbreaks of smallpox with 48 cases, all of which occurred in Vogan circonscription.

No outbreaks occurred in the large urban population centres, but rather in rural localities.

Two-thirds of the outbreaks with 55 per cent. of the smallpox cases were recorded in localities of less than 200 inhabitants; 16 per cent. of the outbreaks with 17 per cent. of the cases were recorded in localities of from 200 to 499 inhabitants; two outbreaks were recorded in two localities - both in Vogan zone - of from 500 to 999 inhabitants. Two outbreaks, one of which was not verified, occurred in two semi-urban localities of from 1000 to 4999 inhabitants with only one case of smallpox in each of these localities. The localities most often affected were small, isolated farms which were not vaccinated during the vaccination campaign. The campaign had been conducted at assembly points and these villages were generally inaccessible by motor vehicle. Most of these small localities did not appear on the list established on the basis of the general census of 1958-1960. These findings supported earlier observations made in 1968 that vaccination campaigns conducted by the assembly point method may omit small farms and isolated hamlets and that it is these small localities that may sustain smallpox transmission after the campaigns. Two surveys conducted in 1968 and 1969 confirm this observation. These surveys showed a reasonably high vaccination coverage in the large population centres and a very low coverage in small localities. This fact emphasizes the necessity for mobile vaccination teams in certain regions to search for small farms and isolated hamlets. This is especially true in the Nuatja circonscription where the farms are scattered and in the maritime region of Togo where farmers move often and where isolated farms are established in the brush near villages whose names they bear and where certain groups change name according to the name of their present chief. In other instances, cases occurred in families or individuals who fled the vaccination teams when others were being vaccinated.

Origin of the outbreaks

Origins of the outbreaks are shown in Table 5. Sixteen of the 25 outbreaks comprising 67 cases of smallpox developed in previously known endemic foci. The cases were either the last cases in outbreaks recorded during the last months of 1968, or resulted from imported cases from such foci. Four outbreaks with eight cases resulted from hospital transmission and in five outbreaks with eight cases, the origin could not be traced. As previously noted, two outbreaks with one case each could not be verified.

The source of infection of 34 cases of smallpox is shown in Table 6. The 47 cases which occurred during April in Vogan zone as well as the two non-verified cases were excluded from this table. Four-fifths of the cases were contracted in the village where the patient resided, 14 per cent. were contracted outside the village but in the same circonscription; no case was transferred from one circonscription to another. There were no cases imported from other countries. However, one case in a child from Dahomey was diagnosed in July. On 16 July, a family brought a four-year old daughter from their home in Dahomey for consultation at a dispensary in Tabligbo. The dispensary nurse recognized smallpox in the child, vaccinated the family and patients who were in the dispensary at the time, and then took the child and her family to their home across the river. Dahomean officials were immediately notified. On arrival in the village, they found that the child had died and discovered other cases of smallpox in the area.

Three-fourths of the cases were contracted in the home of the patient. Three patients contracted infection at the Tabligbo hospital and subsequently infected five other persons after returning home. Thus, in all, eight of 24 cases in Tabligbo sub-division could be attributed directly and indirectly to hospital transmission. This emphasizes the important role played by the hospital in the dissemination of smallpox when adequate isolation and disinfection measures are not applied.

Description of selected investigations

Nuatja sub-division

Nuatja sub-division, which had not experienced smallpox cases since May 1968, reported two cases of smallpox at the end of January 1969. These cases had been reported to the sub-division by the Chief of the village. The cases occurred in an isolated farm, north of Nuatja and 10 km west of the principal north-south highway. Nuatja itself is 100 km from Lomé. About 20 persons, primarily children under 14 years of age, live in the six huts which comprise the farm. The farm had been settled by people from Dahomey after the last vaccination campaigns in the circonscription. The two cases of smallpox, two brothers, were isolated next to the farm. Their meals were brought to them by one of their wives who bore a vaccination scar. Neither of the cases had ever been vaccinated. The first case was a 25-year old man whose rash had begun approximately on 11 January. The second case was the 16-year old brother of the first case. His rash was in the pustular stage and had first appeared about 13 January. Neither the cases nor persons present at the farm had left the farm except for trips to the fields where they sometimes remained for several days. The outbreak had begun early in December 1968, and there had been four previous cases, one a brother of the two reported cases who was the source of infection of the reported cases. Because the four cases had recovered and returned to the fields, they could not be questioned. The chief doctor of Nuatja later interrogated the four previous cases all of whom had scars of smallpox, but could not obtain precise information which would enable the identification of the source of infection for the first case.

During vaccination of the inhabitants, it was found that the majority had never been vaccinated. Those few with scars had been vaccinated at an assembly point for mass vaccination some distance away. Because of the low vaccination coverage of the farm's population and of the undefined source of the first case, a mobile team from the malaria programme was sent to search systematically the area for additional smallpox cases and to vaccinate the population. The team vaccinated 10 818 persons but found no additional cases.

Tabligbo sub-division - Adon-Kondji

The smallpox outbreak in Adon-Kondji was reported by telegram by the Tabligbo Medical Centre where the three most recent cases had been hospitalized on 6 January. Investigations were conducted on several occasions between 7 and 28 January. In all, six farms were visited and seven cases with two deaths discovered.

Adon-Kondji is a small farm composed of six huts, inhabited by 25 persons. At the beginning of November 1968, a non-vaccinated five-year old child, after having spent over two weeks in another village, returned to Adon-Kondji with a high fever and subsequently developed typical smallpox. From this case the disease spread to other members of the family: two siblings, a grandfather, and the child's father, who in October had refused to let his family be vaccinated. A four-year old sister of the first case developed fever on 31 December 1968, and died on 2 January. The last case, vaccinated during the incubation stage became ill on 14 January 1969. The outbreak limited itself to this one family, the other inhabitants of the farm having all been vaccinated in October 1968. Visits to farms surrounding Adon-Kondji revealed no other cases of smallpox. Mobile vaccination teams discovered a recently recovered smallpox case, a female peddler, who had left the village shortly after her recovery, but no definite contact with the child could be established.

Tabligbo sub-division - Dékandji

The only case in this outbreak occurred in an area from which two smallpox cases had been reported in December 1968. Investigation of this case was begun on 4 January 1970.

The patient, a 32-year old man from Dahomey, came to Dékandji eight months before to farm with his brother. None of the other farm workers had had smallpox and all 20 had been vaccinated on 17 December 1968; they had visible scars of vaccination as well as vaccination certificates. The patient stated that he had been vaccinated at the same time as the others and had a vaccination certificate; however, he had no vaccination scar. Vaccinated approximately one week after contact with smallpox, he developed a high fever on 24 December and a rash on 27 December. The majority of the inhabitants of Dékandji (population 300) were vaccinated in November-December 1968, at which time the vaccinators had discovered two smallpox cases with onsets of illness on 19 November and on 8 December. The reported case who became ill on 24 December appears to have been related to one of the two previous cases, but no precise relationship could be established.

Tabligbo sub-division - Djrèkpo, Séwavi Gbèdè-Kopé, Saba-Kondji

Three outbreaks in different localities with a total of four cases shared a common source. They were reported by the Tabligbo Medical Centre where two of the cases had been hospitalized.

The first was a 25-year old construction worker living in Djrèkpo but working in Tabligbo. His illness began on 10 February. He had never been vaccinated. When the vaccination teams visited Djrèkpo he was working in Tabligbo, and when they vaccinated the Tabligbo construction workers, he had been sent to a site outside Tabligbo. The patient with the exception of his daily trip to Tabligbo, had not travelled and there had been no other smallpox cases in Djrèkpo nor among other construction workers in Tabligbo. The second case, a 26-year old woman living at Séwavi-Gbèdè-Kopé, became ill on 11 February. Here too, from preliminary investigation the source of infection could not be determined. She denied knowing anyone with recent smallpox, and no other case was discovered on the farm whose inhabitants had been vaccinated for the most part at the end of 1968 and revaccinated upon discovery of the case.

The sources of these two cases remained unknown but the investigation was pursued. During an interview at the Séwavi-Gbèdè-Kopé farm, parents of the second case again denied knowledge of other smallpox cases. However, a carpenter whose workshop was at the farm, pointed out that in Saba-Kondji was a sister of the second case who also had smallpox. At Saba-Kondji it was confirmed that the 22-year old unvaccinated sister had become ill on 9 February. On 28 January, she had encountered her sister (second case) at the market in Tabligbo and, learning that a nephew had been hospitalized in Tabligbo, they had both visited him. The child had smallpox. The source of the case in Djrèkpo could not be precisely traced. He was, however, a friend of the second case's husband, with whom he worked at the construction site.

The fourth and last case of the outbreak occurred on 6 March, the 50-year old mother of the third case. She had been vaccinated on 1 March during the incubation period. Thus, there were four cases whose source was one hospitalized case at the Tabligbo Medical Centre.

Tabligbo sub-division - Lakata region

On 30 May, Tabligbo sub-division notified two cases of smallpox in Lakata. These cases had originally been reported the previous evening by the President of the Radio-Club of Lakata. The investigation began on 2 June and included five farms.

Lakata-Kondji is a small village of 35 fishermen and farmers, located 25 km from Tabligbo on the shore of the Mono River which serves as a border with Dahomey. The region is swampy, normally difficult to reach, and totally inaccessible during the rainy season. The nearest dispensary is 15 km away. A mobile agent from the health service visits the region as a rule once a month. Vaccination teams had been through the area during the month of December 1968.

In Lakata-Zongo at the beginning of March, a child (case 1) contracted smallpox and died. Several days after his death, his father (case 2) feeling ill, left secretly during the night with his family for Lakata-Kondji in order to be near a healer who lives on an isolated farm 100 metres from Lakata-Kondji and who was said to know of a plant capable of curing smallpox. Case 2 died on 21 March; two of his children, a seven-year old girl (case 3) and a 10-year old boy (case 4) contracted the disease during April, but both recovered. A 20-year old daughter (case 5) became ill on 20 May. Following the appearance of the last case, the family returned home. Subsequently, however, in Lakata-Kondji, a 17-year old girl, with whom the family stayed became ill on 25 May. This outbreak, thus, involved six smallpox cases, two of whom died.

The entire Lakata-Zongo population had been vaccinated in December, as were the inhabitants of Lakata-Kondji, with the exception of the above-mentioned family and a girl absent during the vaccination campaign. This girl was case 6, the only case occurring outside the family. The healer bore old smallpox scars and had always been vaccinated during campaigns. In fact, it was he who had indicated villages in which additional vaccination was required.

Towards the end of 1968, a smallpox outbreak had occurred in the Lakata area. Vaccination teams had reported six smallpox cases and one death during December in a village, Attisso-Kopé, situated half way between Lakata-Kondji and Lakata-Zongo.

This outbreak originated in Amouzouhoé, a village adjacent to Attisso-Kopé. Case 2 and his son (case 1) regularly visited this village, where the child was probably infected. According to the date of onset, the disease had to have been contracted in mid-February. Although the last case of smallpox in Attisso-Kopé had supposedly recovered and was no longer contagious by the end of January, villagers confirmed that additional cases had occurred after the teams left, thus maintaining transmission until at least the middle of February.

In brief, the smallpox outbreak in Lakata extended from March through May resulting in six cases and two deaths. The epidemic occurred in a region of difficult accessibility. Despite travel by the cases and contacts, the outbreak, with the exception of one case, was limited to the family which had escaped vaccination. The outbreak did not spread to the recently vaccinated population in the area where the family stayed.

This outbreak illustrated how slowly smallpox may be transmitted in an affected community. In one household, living in close contact, the first case appeared near the beginning of March while the last cases did not develop until May despite the fact that eight of the nine family members were unvaccinated. Additionally, it is clear that there is a need to revisit identified foci at least every two weeks until the outbreak has definitely been terminated in order to discover new cases which may have occurred in those not vaccinated during the campaign or vaccinated during the incubation period.

Lomé sub-division - Togblé-Dékamé

During the week of 19 January, the Infectious Disease Unit of the hospital in Lomé reported one smallpox case which had been brought to the hospital by her mother. The investigation of this case was conducted first in the Lomé hospital to examine the case and question her parents, then in Togblé-Dékamé, the child's home, and finally in Agouévé where a case from the same outbreak was transferred.

The distribution and characteristics of the vesicular eruption on the seven-year old child left no doubt as to the diagnosis of smallpox. The illness had begun on 8 January. Both her mother and sister had recovered from smallpox in early December. Located 20 km from Lomé, Togblé-Dékamé is composed of a series of farms with a population of 278. It lies north-east of the town of Agouévé in a swampy region of difficult accessibility during the rainy season. Examination of the inhabitants revealed two persons who bore smallpox scars. The majority of the children had never been vaccinated. The vaccination campaign in this area had been conducted by assembly points and only able-bodied adults had appeared for vaccination. The investigators learned that an additional smallpox patient, who had been transferred to Agouévé for care, had become ill two to three days after the first case's hospitalization. This last case, a six-year old girl, had been kept in a house in Agouévé where she had been attended for one week by the dispensary nurse. He had not yet, however, notified the case to the chief doctor. Her rash appeared on 14 January. Like most of the other children in the area, she had never been vaccinated.

Lomé sub-division - Attisso-Kopé

The first case of this outbreak was reported by the Infectious Disease Unit of the hospital in Lomé. The patient, an unvaccinated 25-year old woman became ill on 16 February and was hospitalized on 17 February. She reported that a neighbour had died from smallpox several days before she became ill, and that she had visited the smallpox case and had attended his funeral. An investigation was immediately undertaken at the farm. In the neighbour's house a second smallpox case who had become ill on 9 February was discovered. Despite repeated investigations, however, the source of infection of the first case could not be determined. The last case of the outbreak, a five-year old daughter of the hospitalized case, occurred at the beginning of March. The child had been vaccinated 13 days before onset of illness.

Lomé sub-division - Alinka

During the last week in May, the Agouévé dispensary reported one case of smallpox, a three-year old boy from the farm, Alinka. Because of a high fever, the child was brought daily to the Agouévé dispensary from 23 to 28 May, when the nurse noticed a suspicious vesicular eruption. He sent the child home and revaccinated the other persons living in the same house; he then notified the chief doctor. Investigations were conducted both in Alinka and in Agouévé.

Alinka, located in a swampy area, is difficult to reach during the rainy season and is without a road for vehicles. Its 410 inhabitants live in small farms, one of which was the home of the case reported in Agouévé. His uncle and grandmother, both bearing vaccination scars, confirmed the existence of recent smallpox cases at the farm, an uncle and an aunt of the case in Agouévé. The uncle had contracted the disease in Togblékopé, but had returned to the farm before becoming ill. His sister contracted smallpox from him. A visit to neighbouring farms revealed no additional smallpox cases but it was found that vaccination teams had never visited the region. During the most recent vaccination campaign the region's inhabitants were requested to go to an assembly point some distance away to be vaccinated; only adults responded, so that more than half the children had never been vaccinated. A mobile team was directed to vaccinate the entire region farm by farm; this team found no additional cases of smallpox in the area. This outbreak of three cases of which only the last one was notified, seems to have been related to a known former focus of infection in nearby Togblé.

Anécho sub-division - Zooti-Soko

A smallpox outbreak in Zooti was reported at the beginning of March by the chief medical officer of Anécho sub-division. Case 1, a child, was brought to the Attitongou dispensary by his mother.

The investigation began on 5 March at the dispensary in Attitongou where directions were obtained to locate the case's home at Zooti-Soko. Zooti, composed of a series of villages and farms, is situated 2.5 km west of Attitongou, in a fertile region, where from June to October 1968, an outbreak of smallpox had occurred. An outbreak of 40 cases in three villages, including Zooti-Soko had been detected in September. Numerous additional cases occurred in surrounding areas.

In the villages visited before arriving at Zooti-Soko, the people knew of no smallpox cases. However, in Zooti-Soko, everyone knew about a case, a 10-month old child who had experienced typical smallpox. Investigation revealed that there had been smallpox cases in the village throughout 1968. In one of the neighbouring houses, two men had experienced smallpox but had recovered several months earlier. During January and February, three other cases of smallpox had occurred in the home of the reported case.

To avoid repetition of this kind of transmission, the nurse from Attitongou was encouraged to return to the village at least twice at two week intervals. No additional cases were discovered on subsequent visits.

Anécho sub-division - Vogan Zone

During the week of 13 April, rumours alluding to a smallpox epidemic in Vo-Asso reached the Health Centre at Vogan. The technical officer responsible for the region visited Vo-Asso and found numerous foci of infection. He also learned that the health inspector for the region had been absent from his post for two months. All the health inspectors and members of the anti-yaws team were sent to the affected zones in order to undertake surveillance and containment measures. The entire region was searched farm by farm. During the week of 13 April, 33 cases of smallpox were detected and 12 during the following week. In all, the outbreak included 47 cases with six deaths. The last two cases occurred at the end of April in people who had refused vaccination during containment operations.

The outbreak began in Djikounou in a woman who became ill on 7 February 1969. From there the smallpox spread to Vo-Asso where the first case became ill on 20 February. In March the number of cases increased rapidly and eight other localities were subsequently affected. There were, in all, 30 cases in March with a peak in incidence during the week of 17 March; five cases occurred during the week of 7 April and eight cases during the week of 14 April. In the week of 21 April there was one case and the outbreak ended with a case which occurred on 29 April.

It is probable that the outbreak resulted from continuing transmission in foci remaining from 1968. In September 1968, an outbreak of 121 cases had occurred, followed by an additional 89 cases from October to December. The technical officer in the area, instead of vaccinating susceptibles and actively searching for additional cases of smallpox, left his post without informing anyone. It is thus likely that several chains of transmission had continued in the region until areas of low vaccination coverage were reached where conditions were favourable for a large-scale outbreak. The 1969 outbreaks, although occurring in the same region as the 1968 outbreaks, affected only the localities untouched by the 1968 epidemics.

Containment operations were difficult in Vogan zone where vaccination has been traditionally resisted. However, energetic measures were taken by the authorities which permitted effective containment of the outbreak. The circonscription was declared infected with smallpox; public meetings and markets were prohibited; communications with adjacent areas

were subjected to sanitary passport regulations; and lifting these measures was dependent upon the vaccination or revaccination of the circonscription's population. Moreover, police came to reinforce sanitary regulations and to accompany the vaccination teams.

The vaccination campaign was begun the week of 13 April. Only two cases occurred in subsequent weeks; and these were persons who had refused vaccination during the containment operations.

During the last two weeks of April, 45 420 vaccinations were given, and 248 854 vaccinations from May to September. As a result, this is probably one of the best vaccinated areas of the country. A survey conducted during July and August showed that the vaccination coverage for the region was 92.7 per cent. while before the containment operations it had been only 59.7 per cent. For the age group less than five years, vaccination coverage was 85.9 per cent., whereas prior to containment activities it had been only 15.7 per cent.

Conclusion

Epidemiological investigation plays an integral role in the strategy of smallpox eradication. Only by confirming the diagnosis in each suspected case and by tracing the sources of infection can the true magnitude and extent of the problem be determined. By applying containment operations at each point in the chain of transmission, the spread of smallpox can be interrupted and this, of course, is the ultimate goal of the eradication effort.

In a country like Togo, it is important that notifications from the health infrastructure be supplemented by additional sources of notification to locate cases. Routine notifications through health channels identified only nine of the 25 outbreaks, while seven outbreaks, which ultimately accounted for 46 cases, were notified from various other sources.

The smallpox eradication programme, at the end of the attack phase, and especially when assembly points were used in vaccination campaigns, must pay particular attention to small farms and isolated villages: these small localities, generally poorly covered by the vaccination campaigns, may sustain smallpox transmission for long periods. Two-thirds of the smallpox outbreaks and over half of all cases recorded in 1969 in Togo occurred in localities of under 200 population where vaccination coverage was below 50 per cent.

From these investigations, it also is apparent that it is most important to make additional visits to former identified foci. Residual cases may develop in persons vaccinated during the incubation period or in persons who escaped containment activities. These cases, if undiscovered, can spread the disease beyond the immediate area.

TABLE 4. DISTRIBUTION OF SMALLPOX OUTBREAK AND
CASES - 1969 - BY SANITARY SUB-DIVISION

Sanitary sub-division	Number of outbreaks	Number of cases	Average number of cases per outbreak
Sokodé	1	1*	1.0
Nuatjé	1	2	2.0
Tsévié	1	1	1.0
Tabligbo	9	24	2.7
Lomé	4	7*	1.7
Anécho	9	48	5.3
TOTAL	25	83	3.3

* Case not verified.

TABLE 5. DISTRIBUTION OF OUTBREAKS AND CASES OF SMALLPOX
BY ORIGIN OF THE OUTBREAKS

Origin of outbreaks	Number of outbreaks	Number of cases
Former foci	16	67
Hospital contamination	4	8
Unknown origin	5*	8*
TOTAL	25	83

* Two cases not verified.

TABLE 6. SOURCE OF INFECTION FOR 34 CASES OF SMALLPOX

Source of infection	Number of cases per sub-division						
	Lomé	Anécho	Tabligbo	Tsévié	Nuatja	Total	Percentage
The case's home village	6	1	19	-	2	28	82.4
Outside the village but in the same circonscription	-	-	5	-	-	5	14.7
Outside Togo	-	-	-	-	-	-	-
Unknown	-	-	-	1	-	1	2.9
TOTAL	6	1	24	1	2	34	100.0
Hospital	-	-	3	-	-	3	8.8
Family	5	1	17	-	2	25	73.6
Visitor	-	-	1	-	-	1	2.9
Person visited	1	-	2	-	-	3	8.8
Unknown	-	-	1	1	-	2	5.9
TOTAL	6	1	24	1	2	34	100.0

FIG. 1. NUMBER OF SMALLPOX OUTBREAKS PER SUB-DIVISION, 1969

