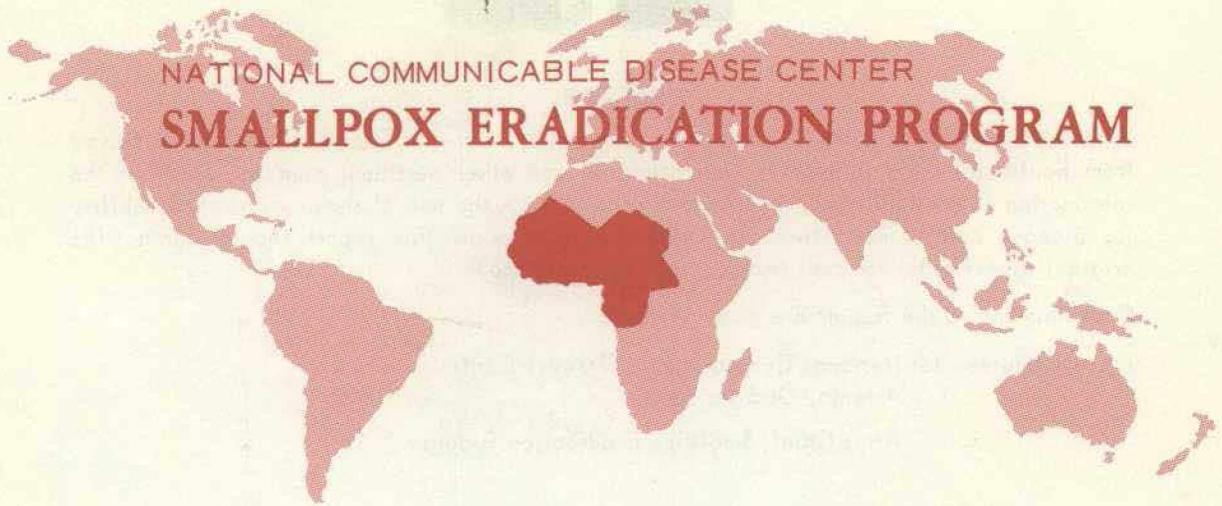


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July 1968



THE SEP REPORT

- I. INTRODUCTION
- II. SMALLPOX ERADICATION IN WEST AND CENTRAL AFRICA
- III. MEASLES CONTROL IN WEST AND CENTRAL AFRICA
- IV. ERADICATION NOTES
- V. SPECIAL REPORT

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

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PREFACE

Summarized in this report is information pertaining to the SEP and information received from health officials, university investigators and other pertinent sources. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

Contributions to the Report are most welcome.

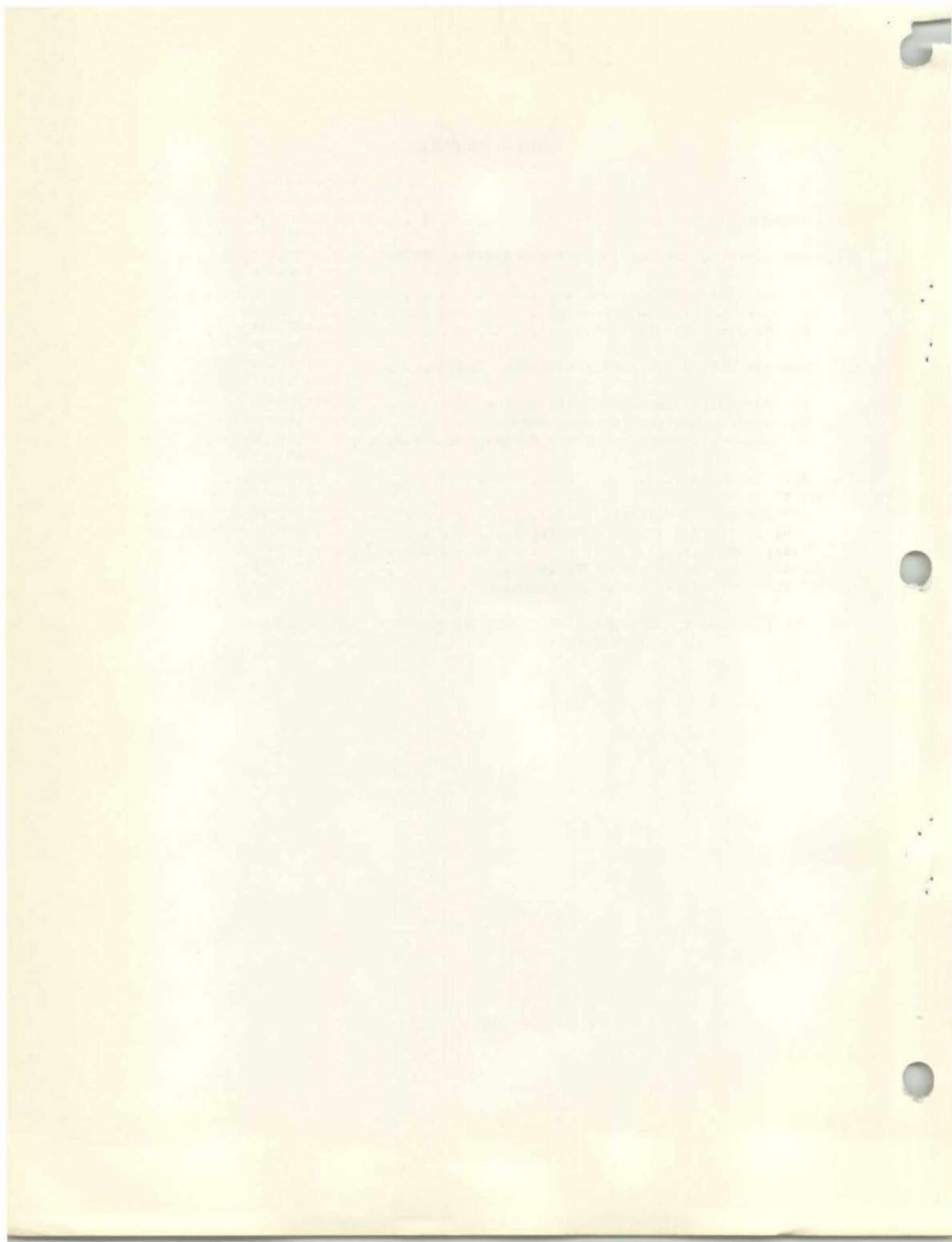
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I. INTRODUCTION

Since the last issue of the SEP Report, a distinct suppressive effect of vaccination on the occurrence of both smallpox and measles has appeared in the 19 country West and Central African Region. Both are described in this issue. The results reflect laudably on the vigorous and effective efforts of the respective Ministries of Health responsible, and also on the collaboration and assistance of the two health unions OCCGE and OCEAC, the World Health Organization, and the USAID-USPHS technicians participating.

They also encourage an intensification of efforts to consolidate the gains made, and to take advantage of a unique opportunity, now emerging, to rid the area of smallpox within the next twelve months. In this regard the example of malaria eradication elsewhere in the world bears remembering; the elation of early success too frequently gave way to frustration in eliminating residual foci of disease, to discouragement of interest and relaxation of effort. As a result some countries, once close to malaria eradication, have suffered a resurgence of malaria to pre-eradication levels. The same need not occur with smallpox eradication.

In the West and Central African Regional Smallpox Eradication and Measles Control effort, rapid and effective mass vaccination campaigns have begun to reap gratifying reductions in the occurrence of both diseases. However, intensified disease surveillance, case detection, and outbreak containment concurrently with continuing mass vaccination efforts must play an increasingly predominate role if the objectives of smallpox eradication and measles control are to be reached.

II. SMALLPOX ERADICATION IN WEST AND CENTRAL AFRICA

A. Morbidity Trends

The incidence of reported smallpox in the 19 countries of West and Central Africa during the first quarter of 1968 fell sharply below previous levels for this period of the year. The usual dry season resurgence of smallpox in January and February appears to have been largely aborted this year. Incomplete reports for April, usually a month of peak smallpox incidence, suggest an unprecedented low level of smallpox occurrence in the area.

During the first quarter of 1967, over 3,851 cases were reported; similarly during the period 1960-67, the average first quarter accumulation of reported cases numbered 3,303. In contrast only 2,338 cases were reported during the first quarter of 1968 representing a 29.2 percent reduction over the 1960-67 average.

The 1968 experience is compared with that of 1967 and the average monthly distribution for the period 1960-67 in Figure 1. The average annual number of cases reported to the World Health Organization during 1960-67 was 10,009, with the highest incidence of disease occurring in April. The monthly distribution for 1967 parallels this although a somewhat earlier peak incidence was observed (the secondary peak in July results from conversion of the original four-weekly totals to monthly totals). This year peak incidence occurred in February two months earlier than usual and reached a level only half that of the 1967 peak. In March, 1968, only 469 cases were reported, which is 30.2 percent of the number reported in 1967, and 33.6 percent of the average March total during the period 1960-67.

This trend contrasts with experience in the remainder of Africa where reported cases in the first quarter of 1968 paralleled those in 1967. Data submitted to the World Health Organization for the first 12 weeks of 1968 showed 965 cases, virtually unchanged from the 1,020 cases reported for the same period in 1967.

EDITOR'S NOTE: The reduction in smallpox incidence for the first quarter of 1968 is the first grossly apparent change in the long term regional trend of smallpox occurrence in the West and Central African Area since the 19 country regional smallpox eradication effort began operations in January, 1967. It appears this effect became manifest first by the end of January, 1968, by which time over 25,000,000 vaccinations had been given. The total population of the 19 countries approximates 116,000,000 persons.

The decline in incidence during the first quarter coupled with the expected seasonal decline during the second and third quarters should result in uniquely low levels of smallpox occurrence during August, September, and October, 1968. This suggests an unparalleled opportunity for interrupting smallpox transmission in the region by intensive case detection and outbreak containment during the August-October period. Intensive efforts to identify and contain smallpox outbreaks by selective vaccination in infected areas could result in eliminating the disease well in advance of the scheduled completion of mass campaigns. To accomplish this however, special efforts will be required to improve disease surveillance, to mobilize all available resources for case detection and "firefighting" vaccination activities around identified cases. This probably can be accomplished without disruption of ongoing mass vaccination efforts, by mobilizing, equipping, and training (in multiple pressure vaccination) temporary lay volunteer vaccinators to supplement the "firefighting" efforts of established mobile and fixed preventive medical services in all infected areas, and by designating volunteer "surveillance guardians" to rapidly report the existence of all suspicious cases of rash disease.

B. Current Disease Reporting

Table 1 presents by country, the weekly distribution of smallpox cases reported to the World Health Organization. Reports received as of 13 June 1968 reveal 2,670 cases of smallpox reported from the West and Central African Area. This compares with a total of 4,283 reported for the same period in 1967, representing a reduction of 44.6 percent. The 1968 data through March are reasonably complete. April reporting is complete except for Nigeria and Liberia. A large epidemic in Niger accounts for a high proportion of the April cases reported to date.

In the remainder of Africa, a total of 2,684 cases of smallpox have been reported through June 13, 1968 as compared with 1,747 cases for a similar period last year (Figure 2).

C. Smallpox Vaccination Data - Vaccinations near 50 million mark

The estimated cumulative total number of smallpox vaccinations administered in the West and Central African Area from 1 January 1967 through 30 June 1968 is 45,978,079 or 39.6 percent of the estimated 1968 population in the 19 country region. Smallpox vaccination data are shown for specified periods in Table 2. The revised cumulative total for calendar year 1967 is 22,366,866. During the first quarter of 1968, 11,865,738 vaccinations were given. Provisional data only are shown for April, May and June as reports have not been received from all countries.

III. MEASLES CONTROL IN WEST AND CENTRAL AFRICA

A. Measles Morbidity Trends and Vaccination Data

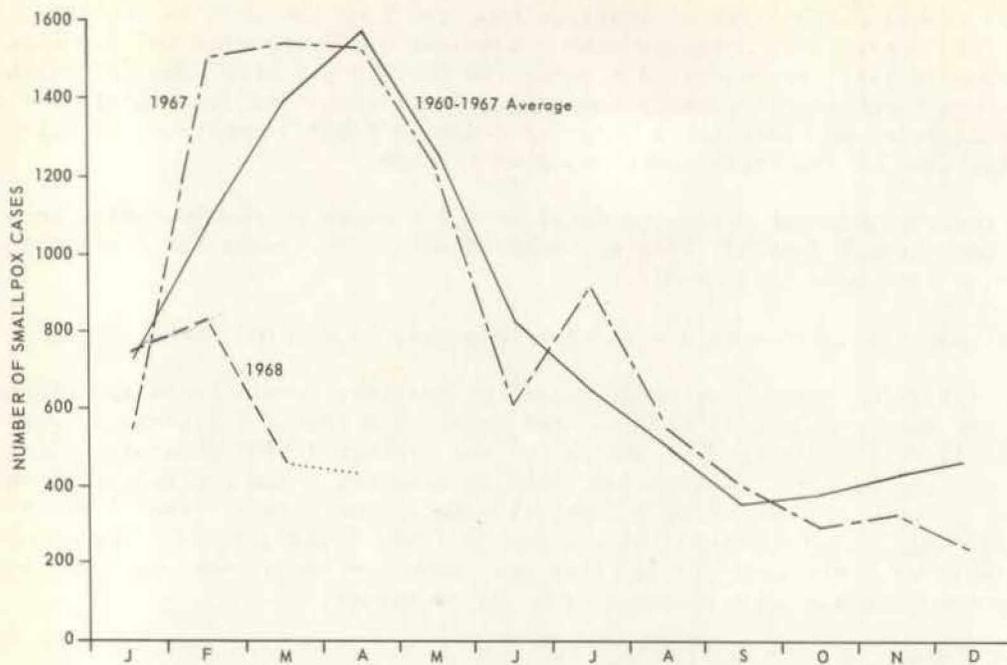
Table 3 shows a revised cumulative total of 4,395,137 vaccinations given during 1967 in the West and Central African Area. During the first quarter of 1968, 1,951,575 vaccinations were given. Complete reports have not been received for April, May and June of 1968, however, estimates have been projected on the basis of previous performances during 1968, yielding an estimated total of 8,204,099 measles vaccinations as of 30 June 1968.

According to provisional reports received, 216,799 cases of measles were reported during calendar year 1967; 69,971 of these during the first quarter. Provisional data during the first quarter of 1968 shows 35,942 cases reported, a decrease of 48.6 percent.

B. Measles Control in Urban Areas

Figures 3 and 4 present the short-term effects of successful mass measles vaccination campaigns in Ibadan and Lagos. In both cities a dramatic reduction in measles reports occurred following vaccination campaigns; however, approximately six to nine months later a gradual increase in reported cases was observed. As shown in Figure 3, Ibadan experienced an increase in reported measles in January 1968, six months after the mass campaign. A maintenance measles vaccination cycle was initiated and measles reports declined again in February and March. More current data are not yet available.

FIGURE 1.
 AVERAGE NUMBER OF SMALLPOX CASES PER MONTH FOR THE PERIOD 1960-1967
 AND THE NUMBER OF SMALLPOX CASES PER MONTH FOR 1967 AND 1968*
 WEST AND CENTRAL AFRICA



SOURCE: World Health Organization, provisional data.
 * - The data for April 1968 are SEP estimates.

----- 1968
 - - - - 1967
 _____ 1960-1967

FIGURE 2.
 SMALLPOX CASES BY FOUR-WEEK PERIOD
 AFRICAN REGION (EAST AND SOUTH)

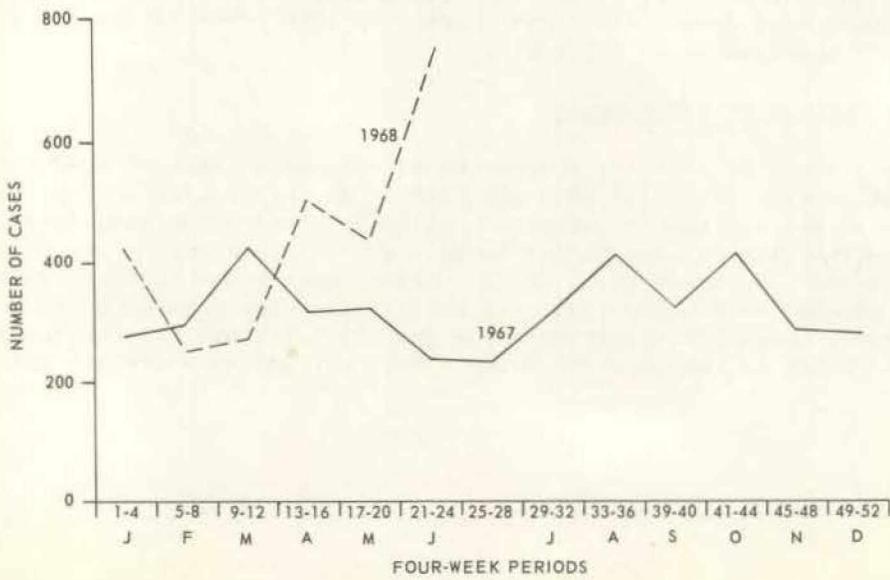


Table 1. Smallpox Cases Reported to World Health Organization
West and Central Africa Area
(Reports Received by 13 June 1968)

+ Mauritania

5

| Month | Week No. | Cameroon | C.A.R. | Chad | Congo (B) | Dahomey | Gabon | Gambia | Ghana | Guinea | Ivory Coast | Liberia | Mali | Niger | Nigeria | Senegal | Sierra Leone | Togo | Upper Volta | Total |
|------------------------|----------|----------|--------|------|-----------|---------|-------|--------|-------|--------|-------------|---------|------|-------|---------|---------|--------------|------|-------------|-------|
| JAN. | 1 | - | - | - | - | 1 | - | - | - | 1 | - | - | - | 4 | 26 | - | 3 | 4 | - | 39 |
| JAN. | 2 | - | - | - | - | 5 | - | - | - | 13 | - | - | - | 103 | 19 | - | 26 | - | 16 | 182 |
| JAN. | 3 | - | - | - | - | 2 | - | - | - | - | - | - | 1 | - | 84 | - | 73 | 2 | - | 162 |
| JAN. | 4 | - | - | - | - | 6 | - | - | - | - | - | - | 20 | 61 | 42 | - | 10 | 37 | - | 176 |
| JAN. | 5 | - | - | - | - | 5 | - | - | - | - | - | - | - | 14 | 131 | - | 24 | 21 | - | 195 |
| FEB. | 6 | - | - | - | - | 68 | - | - | - | 2 | - | - | - | 5 | 241 | - | 42 | 28 | - | 386 |
| FEB. | 7 | - | - | 1 | - | 33 | - | - | - | - | - | 5 | - | 1 | 91 | - | 17 | 9 | - | 157 |
| FEB. | 8 | - | - | - | - | - | - | - | - | - | - | - | 6 | 45 | 133 | - | 1 | 3 | - | 188 |
| FEB. | 9 | - | - | - | - | 17 | - | - | 1 | - | - | - | - | 11 | 31 | - | 27 | 18 | - | 105 |
| MAR. | 10 | - | - | - | - | 39 | - | - | - | - | - | - | - | 3 | 54 | - | 8 | 7 | - | 111 |
| MAR. | 11 | - | - | - | - | - | - | - | - | - | - | - | - | 29 | 68 | - | 18 | 3 | - | 118 |
| MAR. | 12 | - | - | - | - | - | - | - | 1 | - | - | - | - | 7 | 23 | - | 6 | 26 | - | 63 |
| MAR. | 13 | 13 | - | - | - | 27 | - | - | 2 | - | - | - | 1 | 8 | 55 | - | 65 | 5 | 1 | 177 |
| APR. | 14 | 2 | - | - | - | 11 | - | - | - | 15 | - | - | 27 | 177 | 37 | - | 2 | 5 | - | 239 |
| APR. | 15 | - | - | - | - | - | - | - | - | - | - | - | 1 | 18 | - | - | 14 | 17 | - | 50 |
| APR. | 16 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5 | 7 | 10 | 26 |
| APR. | 17 | - | - | - | - | 12 | - | - | - | 1 | - | - | - | 16 | - | - | 2 | 6 | - | 37 |
| MAY | 18 | - | - | - | - | 5 | - | - | - | - | - | - | - | 14 | - | - | - | - | 10 | 29 |
| MAY | 19 | - | - | - | - | 16 | - | - | - | - | - | - | - | 17 | - | - | - | - | 2 | 35 |
| MAY | 20 | - | - | - | - | 4 | - | - | - | - | - | - | - | 31 | - | - | - | 5 | - | 40 |
| MAY | 21 | - | - | - | - | 8 | - | - | - | - | - | - | - | 7 | - | - | - | 6 | - | 21 |
| MAY | 22 | 2 | - | - | - | 21 | - | - | - | - | - | - | - | 40 | - | - | - | - | - | 63 |
| JUNE | 23 | - | - | - | - | 3 | - | - | - | - | - | - | - | 3 | - | - | - | - | - | 6 |
| JUNE | 24 | - | - | - | - | 2 | - | - | - | - | - | - | - | 26 | - | - | - | - | - | 28 |
| JUNE | 25 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total to Date | | 21 | 0 | 1 | 0 | 285 | 0 | 0 | 4 | 32 | 0 | 5 | 56 | 640 | 1035 | 0 | 343 | 209 | 39 | 2670 |
| Total same Period 1967 | | 3 | 0 | 4 | 0 | 497 | 0 | 0 | 28 | 92 | 2 | 3 | 116 | 978 | 2504 | 0 | 443 | 92 | 61 | 4823 |
| Total 1967 | | 72 | 0 | 86 | 0 | 813 | 0 | 0 | 114 | 384 | 2 | 6 | 164 | 1181 | 4753 | 0 | 1698 | 304 | 90 | 9667 |

Table 2. Smallpox Vaccinations for Specified Periods by Country
(Provisional Data for 1968)

| Country | Cumulative Total 1967 | First Quarter 1968 | April | May | June | Cumulative Total 1 July 1968 |
|--------------|-----------------------------|--------------------------|------------------|------------------|------------------|------------------------------------|
| Cameroon | 1,783,499 | 416,396 | 162,861 | 140,000* | 140,000* | 2,642,756 |
| C.A.R. | 380,560 | 146,202 | 19,458 | 41,000* | 41,000* | 628,220 |
| Chad | 1,386,214 | 324,420 | 114,285 | 109,000* | 109,000* | 2,042,919 |
| Congo (B) | ** | 144,432 | 48,000* | 48,000* | 48,000* | 288,432 |
| Dahomey | 702,136 | 275,285 | 64,240 | 100,653 | 88,000* | 1,230,314 |
| Gabon | 222,177 | 27,272 | 14,697 | 10,000* | 10,000* | 284,146 |
| Gambia | 230,750 | 104,767 | | | | 335,517 |
| Ghana | 1,318,253 | 464,624 | 171,463 | 245,466 | 200,000* | 2,399,806 |
| Guinea | 201,090 | 793,901 | 195,941 | 166,348 | 200,000* | 1,557,280 |
| Ivory Coast | 1,580,373 | 461,251 | 134,747 | 148,000* | 148,000* | 2,472,371 |
| Liberia | 2,660 | DATA NOT AVAILABLE | | | | 2,660 |
| Mali | 1,027,787 | 581,025 | 107,254 | 231,082 | 183,000* | 2,130,148 |
| Mauritania | | DATA NOT AVAILABLE | | | | |
| Niger | 1,590,473 | 372,875 | 148,937 | 139,493 | 132,000* | 2,383,778 |
| Nigeria | 9,559,590 | 6,316,241 | 2,108,000* | 2,108,000* | 2,108,000* | 22,199,831 |
| Senegal | 382,633 | 468,974 | 157,641 | 125,000* | 125,000* | 1,259,248 |
| Sierra Leone | ** | 301,693 | 170,509 | 133,600 | 121,000* | 726,802 |
| Togo | 605,150 | 100,390 | 47,191 | 103,635 | 50,000* | 906,366 |
| Upper Volta | 1,393,521 | 565,990 | 163,974 | 182,000* | 182,000* | 2,487,485 |
| Total | 22,366,866 | 11,865,738 | 3,829,198 | 4,031,277 | 3,885,000 | 45,978,079 |

* Estimate based on previous performances during 1968

** Program was not operational in 1967

Table 3. Measles Vaccinations for Specified Periods by Country
(Provisional Data for 1968)

| Country | Cumulative Total 1967 | First Quarter 1968 | April | May | June | Cumulative Total 1 July 1968 |
|--------------|-----------------------------|--------------------------|----------|----------|----------|------------------------------------|
| Cameroon | 941,836+ | 68,509 | 37,939 | 16,000* | 26,000* | 1,100,284 |
| C.A.R. | 94,518 | 25,878 | 4,363 | 7,000* | 7,000* | 138,759 |
| Chad | 202,795 | 46,843 | 17,852 | 16,000* | 16,000* | 299,490 |
| Congo (B) | ** | 72,604 | 24,000* | 24,000* | 24,000* | 144,604 |
| Dahomey | 177,679 | 61,366 | 15,175 | 20,569 | 19,000* | 293,789 |
| Gabon | 37,923 | 5,991 | 2,575 | 2,000* | 2,000* | 50,489 |
| Gambia | 63,150 | 22,550 | | | | 85,700 |
| Ghana | 190,514 | 95,593 | 33,629 | 56,782 | 37,000* | 413,518 |
| Guinea | 13,432 | 106,536 | 24,311 | 27,101 | 31,000* | 202,380 |
| Ivory Coast | 303,547 | 125,150 | 4,465 | 32,000* | 32,000* | 497,162 |
| Liberia | ** | *** | | | | |
| Mali | 310,774 | 115,686 | 3,140 | 29,000* | 29,000* | 487,600 |
| Mauritania | | DATA NOT AVAILABLE | | | | |
| Niger | 220,001 | 40,343 | 8,808 | 646 | 10,000* | 279,798 |
| Nigeria | 1,217,706 | 808,294 | 269,000* | 269,000* | 269,000* | 2,833,000 |
| Senegal | 108,729 | 138,822 | 43,737 | 45,000* | 45,000* | 381,288 |
| Sierra Leone | * | 50,845 | 18,000* | 23,044 | 18,000* | 109,889 |
| Togo | 173,322 | 15,506 | 8,522 | 22,206 | 9,000* | 228,556 |
| Upper Volta | 339,211 | 151,059 | 61,523 | 53,000* | 53,000* | 657,793 |
| Total | 4,395,137 | 1,951,575 | 577,039 | 653,348 | 627,000* | 8,204,099 |

+ Cumulative since June 1965

* Estimate based on previous performances during 1968

** Program not operational in 1967

*** Program not operational during first quarter 1968

FIGURE 3.
 NUMBER OF MEASLES CASES ADMITTED TO FOUR HOSPITALS
 IN IBADAN, NIGERIA, JANUARY 1967 TO MARCH 1968

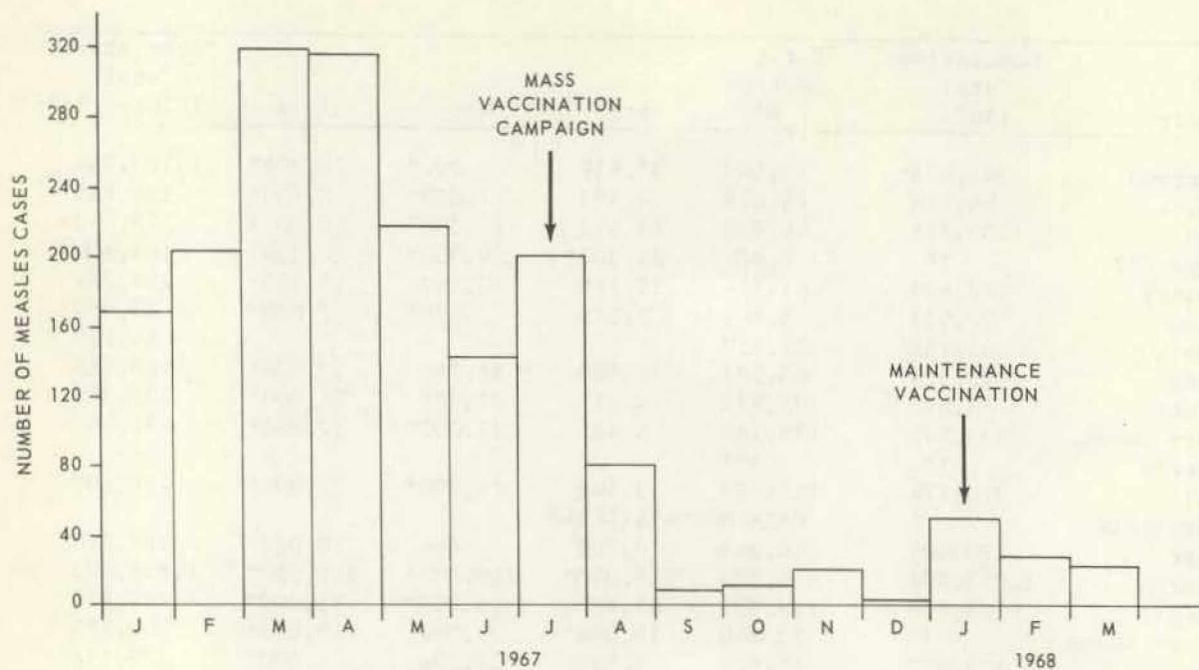
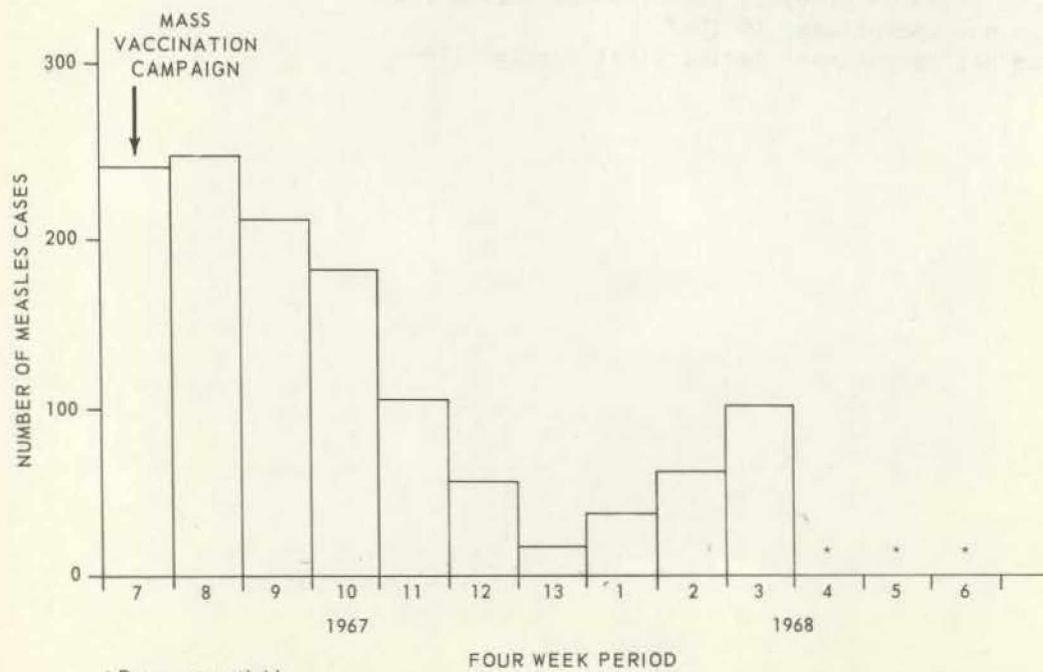


FIGURE 4.
 NUMBER OF MEASLES CASES SEEN AT THE LAGOS INFECTIOUS DISEASE HOSPITAL
 BY FOUR WEEK PERIODS FOR SPECIFIED TIME PERIOD
 LAGOS, NIGERIA, AFRICA



C. Measles Control in Larger Geographic Areas

Figure 5 depicts measles reports since 1964 by geographic area in The Gambia. In each area, measles reports decreased to zero or near zero within two weeks of the end of the mass vaccination campaign. In March 1968, only 30 cases of measles were reported in The Gambia; all were from the unvaccinated areas of MacCarthy Island.

In Dahomey, Figure 6 the incidence of reported measles in the past year has been markedly lower in areas covered by smallpox-measles vaccination teams.

EDITOR'S NOTE: The data presented confirm that mass vaccination programs for measles can be successful in the African setting and that transmission can be markedly reduced in given areas for at least short periods of time. Resurgence of disease can be expected approximately six months after completion of a successful program in urban areas; therefore, frequent maintenance vaccination cycles will be required to successfully prevent resurgence of urban measles amongst rapidly accumulating susceptibles added to the population by birth. Inadequate data is at hand to determine what, if any, significant differences exist between urban and rural patterns of measles resurgence after mass measles vaccination.

IV. ERADICATION NOTES

A. Epidemic Investigations

1. Nigeria

Smallpox Epidemic in Gerere Hamlet, Sokoto Province - Nigeria

Gerere Hamlet, Kalgo District, is located in the far west section of Sokoto Province, North-Western State, Nigeria. The Hamlet has a population of 203 people consisting of both semi-nomadic cattle herders and sedentary farmers.

Kalgo District was vaccinated by Smallpox Eradication Program teams in November 1967. At that time 58,745 vaccinations were given; the 1963 census estimated a population of 65,722. An assessment survey after the mass campaign revealed 96.9 percent coverage for the District. Although vaccination teams did not actually visit Gerere Hamlet, they set up a vaccination site eight miles from the village. The villagers were asked to walk to the collection point. A subsequent investigation disclosed that only seven of the 203 people were vaccinated by the Smallpox Eradication Program team.

During the first week of January of 1968 a 5-year-old female in the semi-nomadic population acquired smallpox, probably from an epidemic area fifty miles north of Gerere Hamlet. This introduction resulted in four generations of smallpox in the patient's compound before smallpox developed in other areas of the village. Of 24 people living in the index compound, 15 were susceptible to smallpox. Twelve of the 15 developed smallpox as the disease spread through six generations over a three-month period of time.

A total of 62 cases of smallpox developed in the population of 203 people between January 1 and April 7, a period of 15 weeks (Figure 7). While the great majority of the cases occurred in children under the age of 14, Table 4 shows the age specific attack rates in susceptible individuals were actually higher in the older age groups. Therefore,

FIGURE 5.
 REPORTED MEASLES CASES BY FOUR-WEEK PERIOD
 AND GEOGRAPHIC AREA, THE GAMBIA, 1964-1968

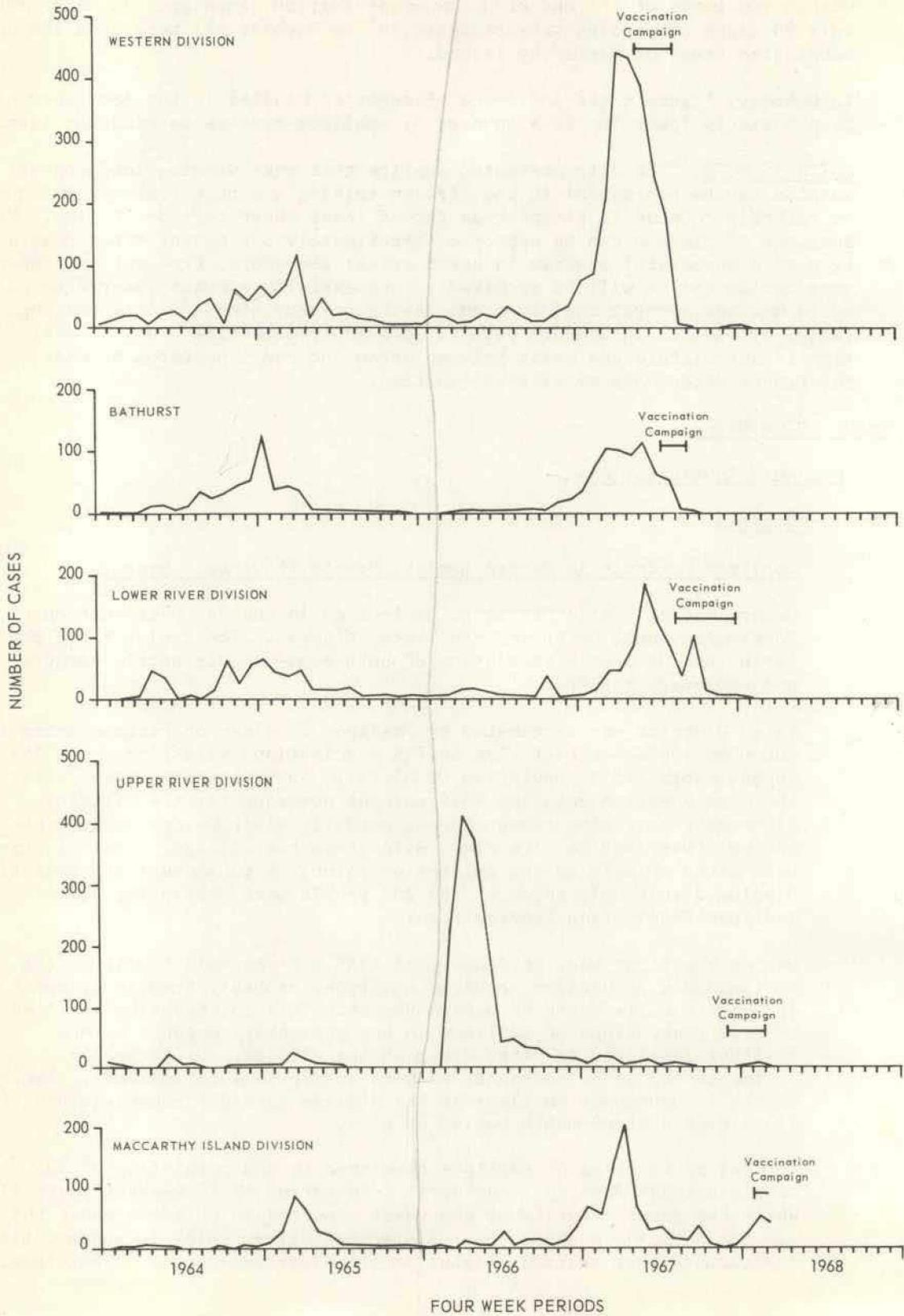


FIGURE 6.
MEASLES ATTACK RATES IN VACCINATED AREAS AND
NON VACCINATED AREAS BY MONTH, DAHOMEY

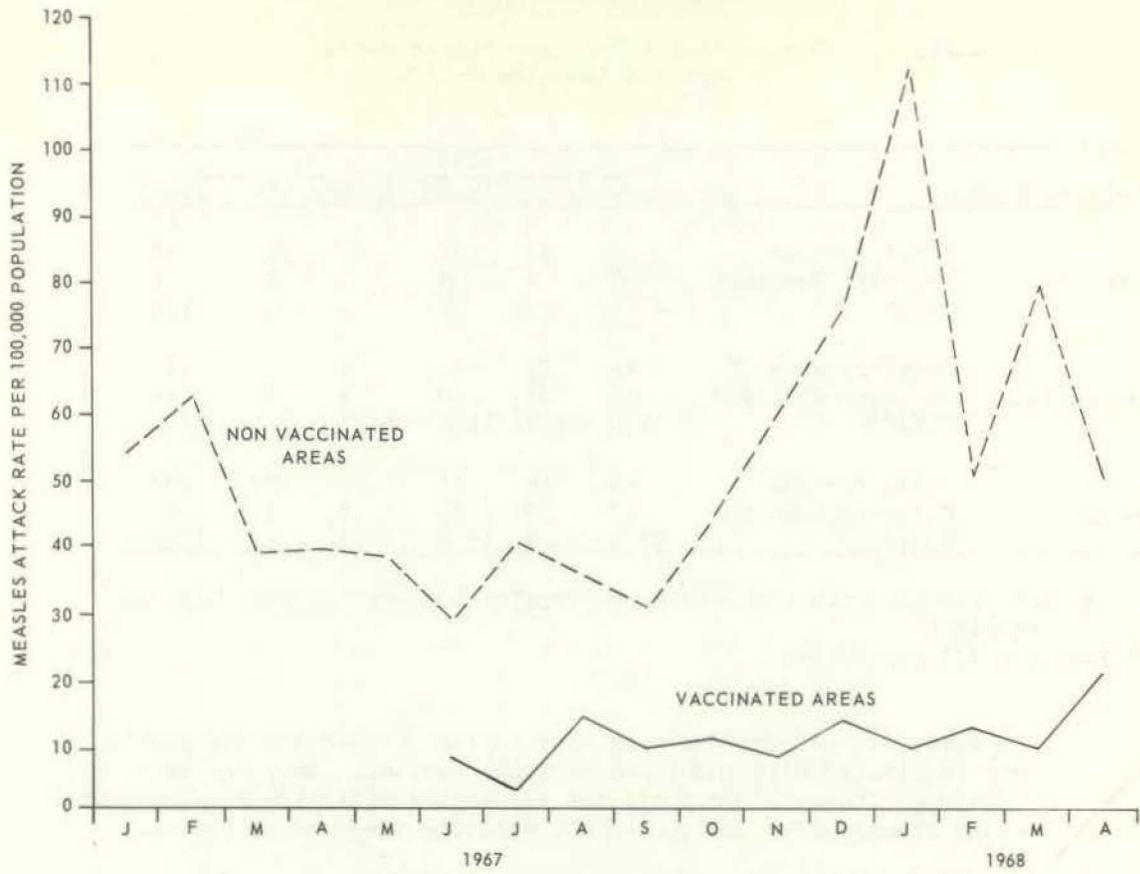
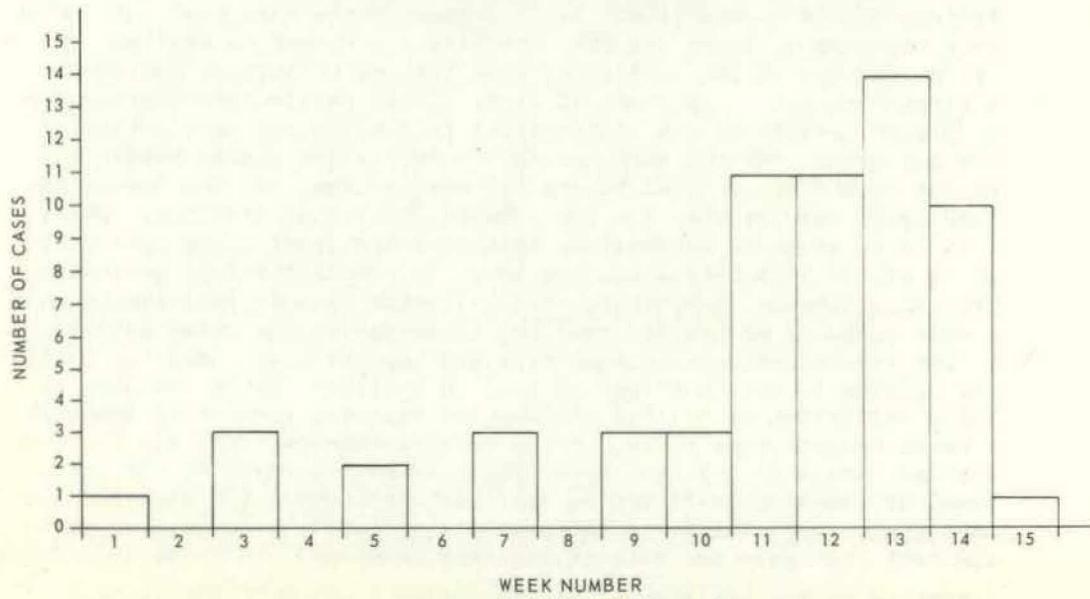


FIGURE 7.
SMALLPOX CASES IN GERERE HAMLET, KALGO DISTRICT,
SOKOTO PROVINCE, NORTH-WESTERN STATE, NIGERIA
JANUARY 1 - APRIL 7, 1968



the impression that this was a "pediatric outbreak" reflects the age specific immunity status rather than any predisposition to smallpox by the pediatric population.

Table 4. Gerere Hamlet Smallpox Attack Rates by Age and Immunity Status

| Immunity Status | | AGE | | | | | Total |
|-----------------|-------------------|------|------|-------|-------|-----|-------|
| | | 0-4 | 5-14 | 15-29 | 30-44 | 45+ | |
| Immune* | Total Persons | 0 | 11 | 37 | 27 | 11 | 86 |
| | No. with Smallpox | 0 | 1 | 0 | 0 | 0 | 1 |
| | Rate** | - | 9.1 | - | - | - | 1.2 |
| Susceptible | Total Persons | 43 | 53 | 14 | 6 | 1 | 117 |
| | No. with Smallpox | 17 | 29 | 10 | 5 | 0 | 61 |
| | Rate** | 39.5 | 54.7 | 71.4 | 83.3 | - | 52.1 |
| Total | Total Persons | 43 | 64 | 51 | 33 | 12 | 203 |
| | No. with Smallpox | 17 | 30 | 10 | 5 | 0 | 62 |
| | Rate** | 39.5 | 46.9 | 19.6 | 15.2 | - | 30.5 |

* Includes persons with vaccination or vaccination scar or past history of smallpox

** Rate per 100 population

On March 20, vaccinators were sent to the village and the population was vaccinated with lanolated smallpox vaccine. Only two persons developed "takes". On April 6th the entire village was revaccinated using freeze-dried vaccine by the multiple pressure technique.

COMMENT: This investigation is noteworthy for several reasons.

1) It results from a very commendable effort on the part of the Nigerian Smallpox Eradication Program to investigate and evaluate all smallpox reports from previously vaccinated areas both to control such outbreaks and to ascertain why they occurred and whether the Program should be modified. 2) It documents the fact that islands of poor coverage do occur and they constitute a threat to smallpox eradication because of the ability of such islands to support smallpox transmission for long periods of time. This particular coverage gap developed because of the difficulties in finding and vaccinating nomadic groups and the difficulties in motivating stable population groups to travel great distances for vaccination. 3) The investigation again demonstrates the low communicability of smallpox. While this is an asset in controlling epidemics and eradicating smallpox, it is also a liability since smallpox can remain for long periods of time in a limited geographic area. In this case 12 individuals in a single compound maintained smallpox transmission for three months. 4) The investigation confirmed previous reports that lanolated smallpox vaccine is not an effective tool in smallpox control because it lacks sufficient stability. Because of frequent reports of impotent vaccine and low take rates, it has been recommended that all lanolated vaccine should be replaced by a freeze-dried vaccine. 5) The high level of immunity conferred by smallpox vaccination (54 persons) and smallpox or variolation in the past (32 persons) is re-emphasized by the fact that only one case of smallpox developed in these 86 persons.

(Reported by the Ministry of Health, Nigeria and NCDC, SEP staff.)

2. Brazil

a. Smallpox Epidemic - Município of Parambu', Ceará-Brazil

Of the 72 cases of smallpox notified in the State of Ceará during the week ending 20 January 1968, 67 occurred in the município of Parambu'. This outbreak of smallpox was investigated by epidemiologists of the Smallpox Eradication Campaign who documented 98 cases occurring in Parambu' between 19 November and 20 January. Epidemic control measures were instituted upon discovery of the outbreak and 14,593 vaccinations were performed between 18 December and 14 January (the estimated population of the município is 16,000). The first case in the outbreak occurred November 19 and the epidemic curve is shown in Figure 8.

With almost 15,000 vaccinations performed between 18 December and 14 January, the outbreak appeared to be under control when a new focus of cases was discovered in the village of Monte Sião where 12 cases occurred during the week ending 20 January. These 12 cases occurred in persons that were not previously vaccinated and had missed vaccination when the locality was covered because they were in the fields away from the village. A vaccination team was sent back to the village, and on 20 and 21 January, all unvaccinated persons were sought out to be vaccinated.

The 98 cases are presented below by age group and sex. Two-thirds of the cases involved persons less than 15 years of age and only 7.3 percent occurred in those greater than 30 years of age. The youngest case in the outbreak involved a child 8 months of age.

Table 5. Smallpox Cases by Age Group and Sex
Parambu'-Ceará*

| Age Group (Yrs.) | Number of Cases | | | Percent of Total |
|---------------------|-----------------|-----------|-----------|------------------|
| | Male | Female | Total | |
| <1 | 2 | 2 | 4 | 4.1 |
| 1-4 | 10 | 10 | 20 | 20.6 |
| 5-14 | 19 | 21 | 40 | 41.2 |
| 15-29 | 13 | 13 | 26 | 26.8 |
| 30-44 | 3 | 2 | 5 | 5.2 |
| 45+ | 2 | 0 | 2 | 2.1 |
| Unk. | 1 | 0 | 1 | - |
| Total | 50 | 48 | 98 | 100.0 |

* Includes two cases from the neighboring município of Tauá who had contact with cases of smallpox in the village of Monte Sião in the município of Parambu'.

Of the 98 patients, 94 had never been vaccinated, including ten who were vaccinated for the first time less than one week before the onset of their disease. These 10 were all vaccinated during the epidemic control procedures and were most likely already in the incubation period. Of the four patients vaccinated previously, only one, a 35-year-old male had developed a "take". His previous

vaccination was in 1940 when he was a child. Of the other three, two were vaccinated in 1958 and one in 1967, all without "takes".

SOURCE: Boletim Semanal da Campanha de Erradicacao da Variola No. 4 (1968), 27 January 1968, Ministerio da Saude, Rio de Janeiro, Brasil.

b. Smallpox Epidemic - Município of Livramento, Paraíba-Brazil

A vaccination team of the Smallpox Eradication Campaign discovered an outbreak of smallpox in the município of Livramento in the State of Paraíba in February, 1968. When the team arrived to initiate a mass vaccination program of the município as part of the attack phase of the Campaign they learned of the epidemic. The município of Livramento is 135 kilometers west of Campina Grande, the largest city in the State and has an estimated population of 6,156 of which 90 percent is considered rural. During the weeks ending 17 and 24 February, 1968, 72 cases were notified from this município.

The subsequent epidemiologic investigation showed that the outbreak actually began during the last week of September, 1967 (Figure 9). The outbreak reached a peak during January and early February. During February, 8,989 vaccinations were performed and the outbreak appears to have been controlled. No additional cases have been notified during the last four-week period ending 23 March 1968.

The age and sex distribution of the 72 cases is presented below.

Table 6. Smallpox Cases by Age Group and Sex
Município of Livramento, Paraíba

| Age Group (Yrs.) | Number of Cases | | | Percent of Total |
|---------------------|-----------------|--------|-------|------------------|
| | Male | Female | Total | |
| 0-4 | 9 | 4 | 13 | 18.1 |
| 5-9 | 7 | 11 | 18 | 25.0 |
| 10-14 | 4 | 8 | 12 | 16.7 |
| 15-19 | 2 | 10 | 12 | 16.7 |
| 20-29 | 2 | 4 | 6 | 8.3 |
| 30+ | 7 | 4 | 11 | 15.3 |
| Total | 31 | 41 | 72 | 100.0 |

Of the 72 cases, 66 had never been vaccinated, (five were vaccinated for the first time less than ten days before their onset of symptoms). Of the six cases previously vaccinated, only two reported having "takes", one in the year 1930 and the other in the year 1960.

SOURCE: Boletim Semanal da Campanha de Erradicacao da Variola, No. 12 (1968), 30 March, 1968, Ministerio da Saude, Rio de Janeiro, Brasil.

FIGURE 8.
SMALLPOX CASES BY WEEK OF ONSET, MUNICIPIO OF PARAMBÚ-CEARÁ, BRAZIL
WEEK ENDING 25 NOVEMBER 1967 - 20 JANUARY 1968

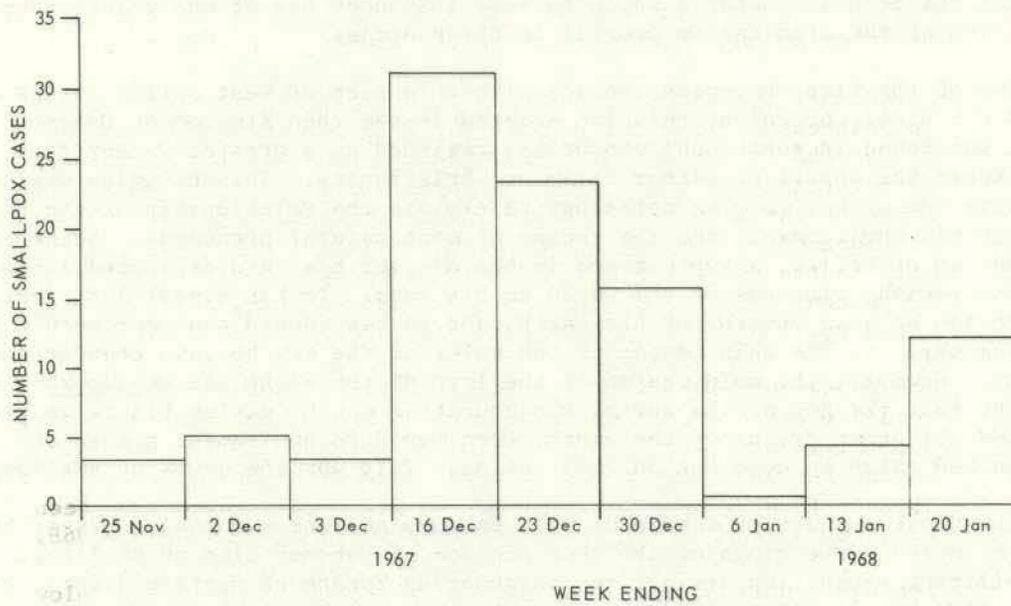
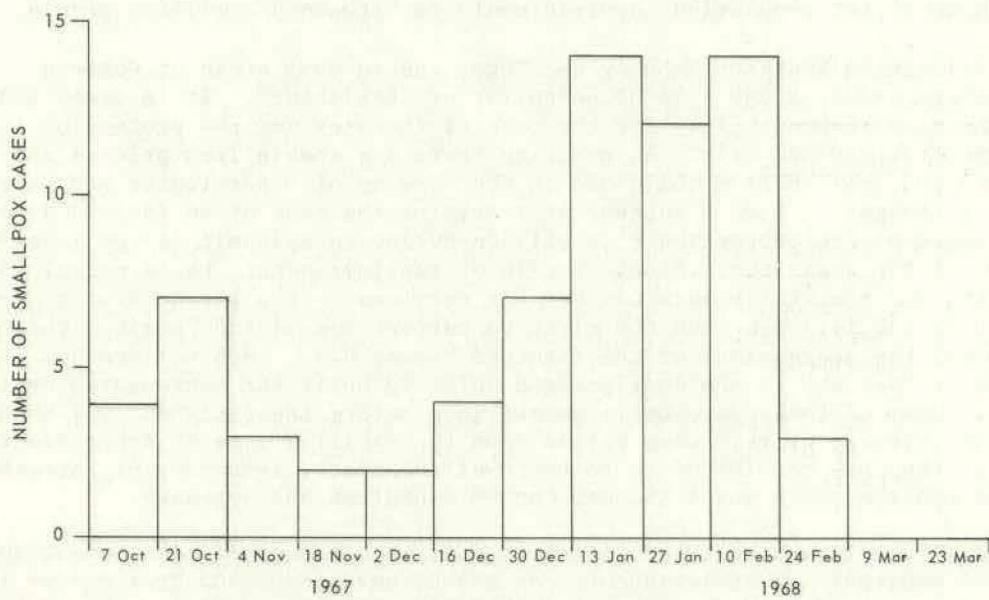


FIGURE 9.
SMALLPOX CASES BY WEEK OF ONSET, MUNICIPIO OF LIVRAMENTO, BRAZIL
TWO WEEK PERIODS ENDING 7 OCTOBER 1967 TO 23 MARCH 1968



V. SPECIAL REPORT: CULTURAL RESISTANCE TO SMALLPOX VACCINATION IN WEST AFRICA

During the course of the present smallpox eradication program in West Africa, enthusiasm and acceptance of vaccination has been a norm rather than an exception. However, in three adjacent countries of this large area, encompassing the southern portions of Dahomey, Togo, and Western Nigeria, a strong cultural resistance to vaccination has been encountered which in some instances has strongly influenced the operation of the eradication program in these areas.

At the time of the first European contact with this part of West Africa in the late 1600's a highly organized religion existed in the then Kingdom of Dahomey which, it was found in subsequent centuries, resisted to a greater extent than other cultures the appeal of either Islam or Christianity. This religion was a polytheistic one with a complex mythology to explain the relationship of the individual to his environment, and the causes of most natural phenomena. According to this system of belief, a supreme god in the distant past had delegated authority over the various kingdoms of the world to his sons. To his eldest and first born son he gave control of the earth, and to his second and next born control of the sky. As the main weapon of the ruler of the sky he gave thunder and lightning. However, the main weapon of the lord of the earth was smallpox. It was thought that the god of the earth, who nourished man by giving him maize and millet, and all other grains of the earth, when moved to punishment caused the grains men had eaten to come out on their skins. This was the cause of smallpox.

Between the first contact of Europeans with Dahomey and the eventual takeover by the French in 1892, two kings of the then Kingdom of Dahomey died of smallpox, and one military expedition against the neighboring Yoruba of Western Nigeria had to be recalled because of an epidemic of smallpox among the invading troops. Smallpox thus played a prominent role in early Dahomean life both religiously and historically.

Today, among the tribes in Dahomey which once comprised this former kingdom, among neighboring tribes in Togo, and, in addition, among many Yoruba in Western Nigeria, the belief that smallpox represents a supernatural phenomena or a divine visitation by a god still exists. Smallpox is viewed as a punishment for wrongdoing, either on the part of an individual, a family, or a village; and the proper corrective measures are ceremonial and sacrificial, not vaccination. A conservative estimate of the population involved would be between 3-5 million people.

In every village in Southern Dahomey and Togo, and in many areas of Western Nigeria, there exists today a local herbalist or "fetisheur". It is these individuals who have responsibility for the care of the sick and the protection of the village from medical ills. In addition there are specialized priests who have been raised and trained from childhood in the service of a particular god. Since smallpox is thought to have a supernatural origin, the care of an individual case of the disease or the protection of a village during an epidemic is the sole jurisdiction of the fetisheur. Should a case of smallpox occur, he is consulted immediately, and the family must pay for his services. If a person dies of the disease, only the fetisheur has the right to perform burial and "purify" the household, and all the possessions of the diseased become his. Each village has its own shrine or "fetish" to the smallpox god which is built and consecrated by the fetisheur. Many of these were built generations before the fetisheur was born, and care and worship of them were passed down the familial line to the present day fetisheur. They are considered to be the dwelling place, temporary or permanent, of the god and the place where the god can be consulted and appeased.

It is generally believed that the fetisheur can, of his own volition, cause an epidemic of smallpox. That fetisheurs can and do save scabs and crusts from active smallpox cases for the purpose of variolation has been proven. Most fetish-

eurs are themselves protected from smallpox by variolation. In treating a case of smallpox, the fetisheur usually administers oral potions of herbs and then vigorously applies lotions of palm oil to the skin causing the otherwise intact lesions to break open. It is the material from these lesions that the fetisheur collects and saves for future use according to general belief. The nature of the potions used in the treatment are carefully guarded, as are, in addition, the rituals followed when a fetish is consecrated and when a person who has died of smallpox is buried.

Resistance to vaccination experienced during the course of the smallpox eradication program has been encountered on two levels. First, it has occurred when the villagers themselves have opposed vaccination because the smallpox outbreak in their village was viewed as a social or supernatural stigma and not as a medical phenomena where vaccination, or any other medical practice could furnish a meaningful approach. Secondly, it has occurred when the fetisheurs have actively resisted vaccination because it represented a threat to their standing in the community. In the eastern portion of Togo near the Dahomey border, entire villages fled en masse before the Togolese teams as a result of having been pre-warned by the fetisheur. In Western Nigeria a vaccination team was met with drawn knives when publicity posters circulated prior to the campaign asked the population to make war on smallpox. The word for smallpox in the local language was identical to the name of the local earth-god, and the population was highly incensed, feeling they were being asked to make war on one of their own dieties. Schoolteachers and local official in both Dahomey and Western Nigeria have been threatened with smallpox or worse by fetisheurs if they assisted vaccination teams with health education and publicity. Resistance to vaccination in all such areas has created, in addition, difficulties in surveillance and reporting of smallpox: cases are usually hidden due to the fear that a vaccination team may be summoned by local authorities if the cases are known.

In spite of such resistance several instances have occurred in the three countries where local beliefs, ingrained though they might have been, were overruled in favor of vaccination. In the village of Hon in Southern Dahomey cases of smallpox had been occurring continually over a nine-month period. At the time the village was first visited by the SEP medical officer, the chief of the village, after facing smallpox continually for nine months had lost confidence in his fetisheur. He thought the fetisheur had become old and tired, and had lost his power. The chief was then willing to accept vaccination for his village and actively assisted in the vaccination activities. In a nearby village where more than 100 cases and 40 deaths had occurred over a four-month period, the fetisheur and his assistants consulted a Grand Priest of the smallpox cult who resided in the capital city, Cotonou. After carrying out his instructions to the letter and finding no decline in the number of cases in their village, they were willing to be vaccinated and were among the first in line when the vaccination team arrived.

Preparatory meetings with the chiefs of villages about to be vaccinated have been found to be effective in increasing the subsequent turnout and participation of the population. Meetings with the fetisheurs, though much more difficult to arrange, are planned for the future and hopefully will be even more productive.

SUMMARY

While cultural resistance to smallpox vaccination has not been frequent in West Africa, regions exist in Togo, Dahomey, and Western Nigeria where large populations view smallpox as a supernatural phenomenon. Proper sacrifices and ceremonies must be carried out by the local fetisheur and vaccination is both opposed and feared. Such deeply ingrained resistance to vaccination can be overcome. New approaches are needed to convert and enlist the aid of fetisheurs, and to encourage the population to accept vaccination and report known cases of the disease.

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(Presented by Dr. Bernard Challenor at the 1968 Epidemic Intelligence Service Conference, National Communicable Disease Center, Atlanta, Ga. 30333.)

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