

STATUS OF SMALLPOX ERADICATION PROGRAMMES  
IN THE EASTERN MEDITERRANEAN REGION

by

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Epidemiology

During the 1950's, with the exception of Yemen, where no information was available, all of the twenty-two countries of the Eastern Mediterranean Region were reporting the presence of smallpox in varying degrees. The number of cases reported annually ranged from a high of 84 000 cases in 1956, with a case fatality rate of 75%, to a low of 1 000 cases in 1964, with a 20% case fatality rate. As the bulk of the cases in the Region is reported from Pakistan, the pattern of annual incidence follows more or less the pattern of that country, showing a peak every seven or eight years and seasonal variations with a peak in March-April-May.

During the eradication era, the year 1969 witnessed a reduction in the number of reported cases of smallpox in the Region to about 5 900. This year, up to 1 November, about 5 500 cases have been reported, and it is expected that this figure will not exceed 6 000 cases by the end of the year. This is a decrease of over 50%, when compared to the 12 000 cases reported in 1968 and a similar number of cases in 1967 (Fig. 1).

This reduction is mainly due to the sharp drop in reported cases in East Pakistan, where, against 9 000 cases in 1968, only about 2 000 were reported in 1969, and about 1 500 in 1970. This decrease is partly due to long-term cyclical variation, partly to increased surveillance activities and partly to the conduction of an organized mass vaccination campaign in some of the more vulnerable districts.

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This year, only four countries in the Region have reported cases of smallpox. For the first ten months of 1970, Pakistan accounts for 66%, Afghanistan for 8%, Ethiopia for 9% and Sudan for 17% of the total number of cases in this Region. An increase in the number of cases was reported in Afghanistan, Ethiopia and Sudan, whereas Pakistan acknowledges a slight decrease in incidence, when figures for 1969 and 1970 are compared.

The major increase is, however, due to the Sudan epidemic this year, which resulted, until the end of October, in about 900 cases, as compared to 130 cases reported for the whole course of last year (Table 1).

However, the actual number of cases ought to be higher than that reported, because much is yet to be achieved regarding the development of the reporting system in all of the endemic countries. In West Pakistan, for example, even after the regularization of the reporting system, still only 60% are officially notified. The rest are discovered on investigation. In non-operational areas of West Pakistan, the recorded number of cases represents only 10% of the true incidence.

The age distribution of cases presents a different picture in Asian and African endemic countries of the Eastern Mediterranean Region. While in Afghanistan and Pakistan, over 75% of cases have occurred in the under 15 year age group, in the Sudan, only 40% of cases are recorded in this age group. No significant difference is observed as regards sex distribution of the cases.

As to previous vaccination history of reported cases, it is interesting to note that in Afghanistan and the Sudan, 95% of reported cases occur in unvaccinated subjects, while in Pakistan East and West, reports show that between 10 and 15% of the cases exhibit a scar attesting to previous vaccination. How many represent a scar of successful smallpox vaccination and how many are secondary to bacterial infection remains to be investigated.

In the course of years, smallpox has been reintroduced into some of the non-endemic countries of the Region, such as Kuwait, Saudi Arabia, and Dubai. However, these outbreaks have been successfully contained, thus preventing the disease from re-establishing itself.

#### Status of Eradication Programmes

There are eight WHO-assisted projects in the Eastern Mediterranean Region. Four are in countries endemic for smallpox - Pakistan, Afghanistan, Ethiopia and Sudan; four others - Saudi Arabia, Somalia, Southern Yemen and Yemen, do not for the moment report the presence of cases of smallpox, but are nevertheless always at high risk of introduction. All these countries have been engaged in active eradication programmes for two or three years except Ethiopia which has just recently initiated eradication activities.

Other countries of the Region have been free from smallpox for the last few years, though still at risk. They are currently engaged in routine surveillance and smallpox vaccination activities, mostly through their basic health services. Only some technical guidance, some vaccine and small amounts of supplies and equipment are being provided to them on request.

### Surveillance

The surveillance component of the eradication programmes has gained more and more importance in the course of time and has proved to be the only way to minimize the hazards of spread of the disease from its point of origin. In all endemic countries, as a part of the programme, full-time surveillance teams have been established and trained to cope immediately with any outbreaks, and to carry out containment measures. This activity, however, is not yet fully developed. Out of 30 000 cases reported during the first three years of the global smallpox eradication programme, only 1 000 cases have been epidemiologically investigated. This is too low a figure to be considered of any epidemiological importance.

This year, however, the proportion of investigated cases has risen appreciably. In Afghanistan, nearly 100% of all reported cases, in Pakistan 90 to 96% of cases reported from operational areas and in Sudan, 70 to 75% of all cases are now being investigated and containment measures taken accordingly. This is encouraging although still, much needs to be done to improve the quality of this activity.

### Mass Vaccination

Another component of the eradication programme is mass vaccination which is being carried out systematically, in varying degrees, in the different projects. The main principle, common to all projects, is to concentrate on one area, and gradually proceed locality by locality, rather than to disperse the activities throughout the territory to be covered. This technique ensures maximum supervision of the work and a better flow of supplies and equipment, as well as more rapid reporting of activities. Mass vaccination is accomplished by vaccinators forming teams, the teams being part of units and a few units making a group, headed respectively by team, unit and group supervisors. Assessors usually follow the vaccination teams for concurrent assessment.

Some projects, like East and West Pakistan, are employing over 1 000 vaccinators; Sudan and Afghanistan are employing 400 to 500 each; other projects count no more than 50 vaccinators, each with a corresponding number of supervisors, assessors and other auxiliary staff.

Table 2 shows the number of vaccinations performed in the different projects during the last four years. Bifurcated needles and freeze-dried smallpox vaccine are being used in all vaccination programmes. The daily output of the vaccinators varies, depending on the climatic and geographical conditions, quality of supervision, morale of the vaccinators, pay scales, etc. The highest output registered is in Afghanistan, where 100 to 150 vaccinations per day per vaccinator are recorded. In most of the other projects, an average of about 100 vaccinations per vaccinator is being recorded except in East Pakistan and Sudan, where as low an output as 50 vaccinations per day per vaccinator has been reported.

During the last few years, over 60 million vaccinations have been recorded in the Region, representing about 25% of the total population of the Region. This number of vaccinations, if effective, should be sufficient, considering that all but five of the countries in the Region are presently smallpox-free and if done in a

logical way, the whole of the population could be covered every four years. Unfortunately, 100% of all vaccinations in Cyprus and Jordan, and 85 to 95% of all vaccinations in Iran and the United Arab Republic, as well as Iraq and Syria, were performed with glycerinated vaccine, a product the use of which is no longer recommended. In addition, some countries are using locally produced freeze-dried vaccine of uncertain stability. This leads us to believe that in the non-endemic countries noted, the number of vaccinations resulting in immunity is much lower than the recorded number of vaccinations.

### Vaccine Production

To cope with the deficiency noted above, the smallpox vaccine production laboratories in the Region, located in Addis Ababa, Amman, Baghdad, Cairo, Dacca, Damascus, Murree, Teheran and Tunis, have been offered consultation as well as necessary supplies and equipment. Batches of vaccine have been tested in WHO Reference Laboratories, and there is good hope that in the near future, all national laboratories in the Region will be able to produce vaccine of satisfactory potency and stability in quantities sufficient to meet the needs of the countries.

### Laboratory Diagnosis

The development of facilities for laboratory diagnosis of smallpox is still in the initial stages. In only a few countries are there facilities and trained personnel which are capable of performing virus isolation on the chorioallantoic membrane of chicken embryos, at present the most reliable method of diagnosis. However, the establishment of national and regional Reference laboratories in Cairo, Dacca and Teheran is in the planning stage.

Specimens from only 260 suspected cases during the last four years were submitted for laboratory diagnosis. As eradication programmes progress and the number of cases decreases appreciably, each suspect case gains importance and laboratory diagnostic facilities should develop accordingly.

### Conclusion

Financial resources and manpower are still limited and administrative and logistic problems are in existence in several countries of the Region. Some are also experiencing political disturbances, whilst others are victims of natural calamities, or else suffer from other unexpected epidemics of other quarantinable diseases.

Still, success is within reach, and the task is not really a difficult one; all it requires is a realistic approach, enthusiasm and the willingness of all concerned.

TABLE 1  
REPORTED SMALLPOX CASES - EASTERN MEDITERRANEAN REGION

Country	1967	1968	1969	1970 end October
Afghanistan	334	739	250	451
Ethiopia	466	426	197	485
Pakistan East	6 377	9 229	2 041	1 466
Pakistan West	6 084	1 836	3 527	2 148
Sudan	9	106	130	929
Yemen	3	-	29	-
Trucial Oman	10	2	-	-
Kuwait	41	-	-	-
Saudi Arabia	-	-	-	12*
Total	13 324	12 338	6 174	5 491

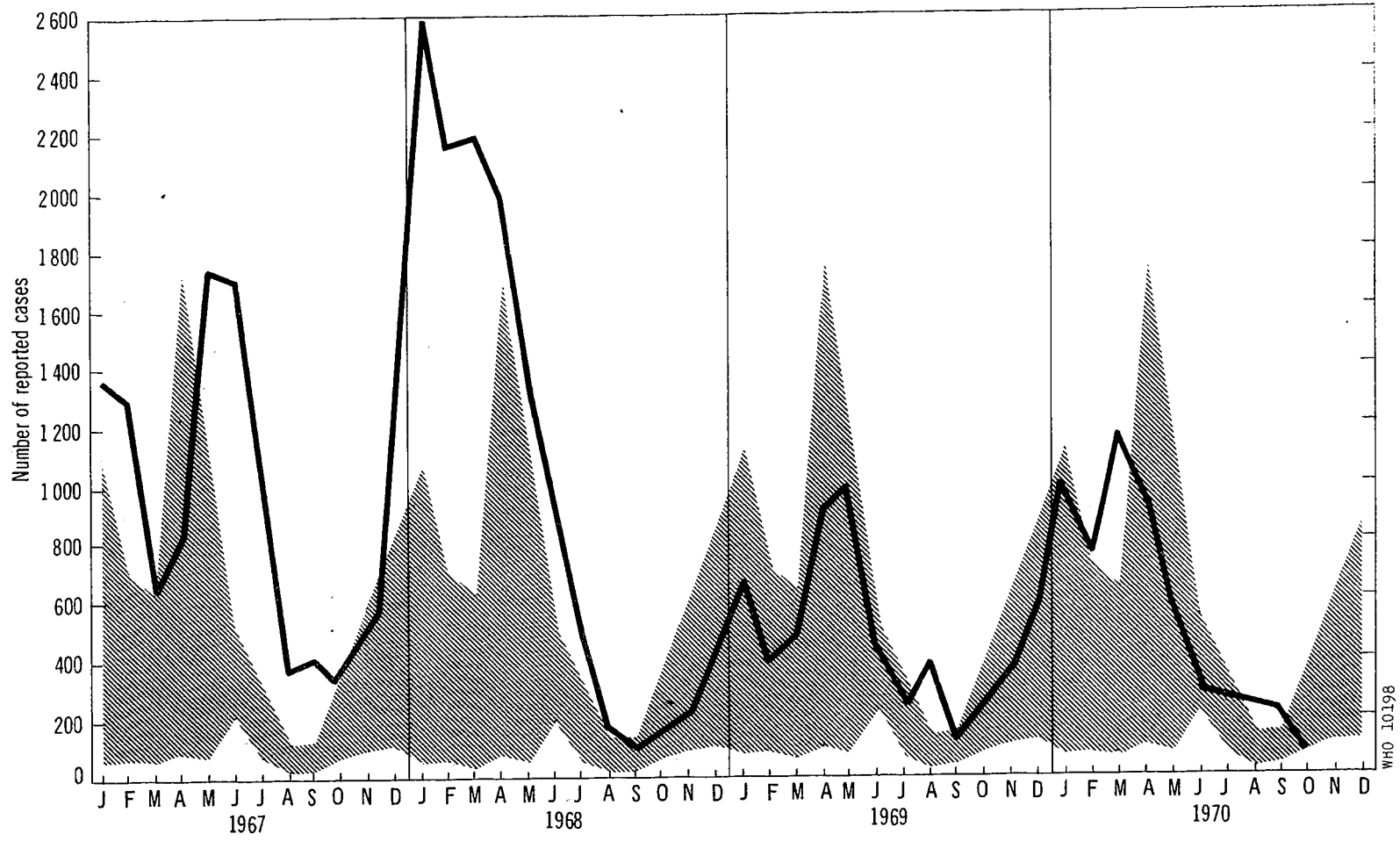
\* On board a Pakistani ship anchored at Jeddah

Source: Smallpox Surveillance Report

TABLE 2  
PRESENT STATUS OF VACCINATION PROGRAMMES

Country	Population 1970 (000)	1967		1968		1969		1970		
		Vacc. (000)	%	Vacc. (000)	%	Vacc. (000)	%	First Quarter (000)	Second Quarter (000)	Third Quarter (000)
Afghanistan	13 644	880	6	1 627	12	1 291	9	750	837	1 583
Pakistan East	61 929	27 735	47	34 079	55	22 326	36	958	3 460	963
Pakistan West	51 156	22 681	44	15 428	30	22 254	44	7 401	4 661	1 863
Saudi Arabia	6 178	-	-	199	3	247	4	34	43	152
Southern Yemen	1 370	-	-	116	8	33	2	133	81	65
Yemen	3 800	-	-	13	-	141	4	203	258	323
Sudan	15 610	825	6	2 058	13	3 644	23	559	920	423
Ethiopia	24 747	-	-	1 439	6	1 240	5	-	-	-
Somalia	-	-	-	-	-	-	-	82	73	167

FIG. 1  
SMALLPOX IN THE EASTERN MEDITERRANEAN



The grey area represents the range between the highest and lowest incidence reported during 1960-1966

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