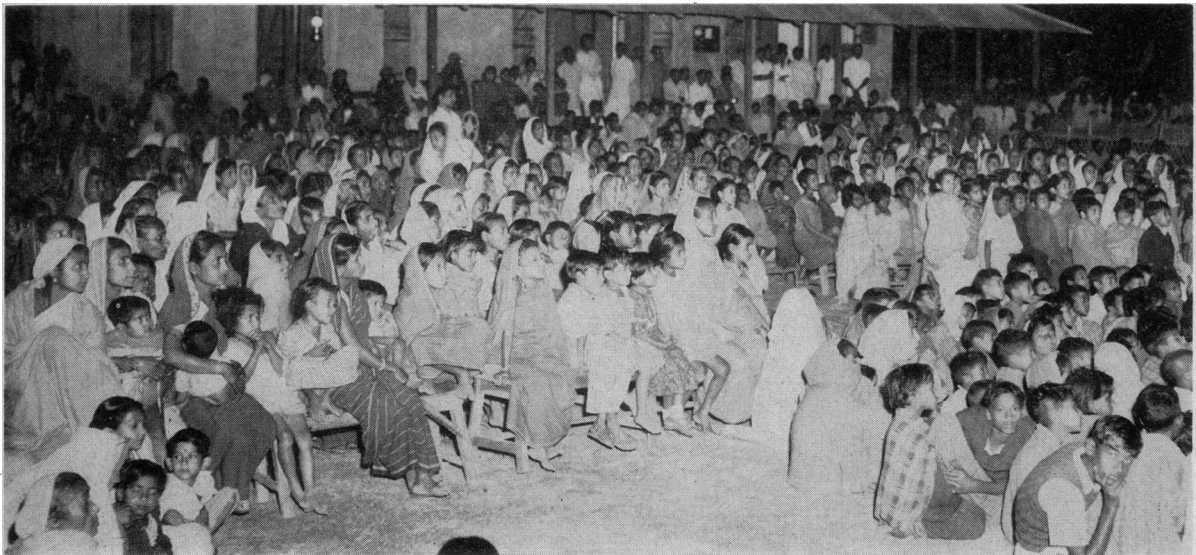


# *Epidemic Crisis* in East Pakistan

**April-July, 1958**

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**A crowd of 2,000 women and children saw a health show in a village near Comilla, East Pakistan. Health shows were used to further a mass vaccination campaign during the 1958 smallpox epidemic. About 30 million Pakistanis were inoculated.**

**E**PIDEMICS of smallpox and cholera began in October 1957 in the Eastern Province of Pakistan, and by April 1958 about 1,500 people were dying each week. The Province's public health services, desperately short of money, staff, and equipment, were hard pressed. In the first 6 months of 1958, the smallpox cases reported were 44,736 and deaths, 20,444. The cholera cases reported were 10,438 and deaths, 6,684.

On April 9 the Chief Minister delegated responsibility for all matters pertaining to the epidemic to a citizens committee of 60 persons, while everywhere volunteers began a vast, spontaneous, uncoordinated vaccination effort. Twenty-one nations, the World Health Organization, and several voluntary agencies sent East Pakistan a total of 8,243,000 cc. of dry vaccine and 18,284,025 cc. of lymph vaccine for smallpox, and 2,475,600 cc. of vaccine for cholera. Five international teams came to give epidemiological assistance.

Ten days after an appeal for help, the first shipment of smallpox vaccine arrived from the United States. By the middle of May, 40 percent of the 46 million population of East Pakistan had been vaccinated, which meant a vaccination rate of more than 1 million per week, and the supply of vaccine was satisfactory. In June, 2 million people a week were inoculated; the number of new cases dropped to 300 a week from a peak of 3,000 a week in May; and a practical means of eliminating the disease in East Pakistan was being developed. Late in June the monsoon began. By July cholera had disappeared, smallpox became less severe, vaccinating had almost ceased (figs. 1 and 2), and by the end of the month the international teams had left the Province.

About 30 million people were vaccinated in the first 6 months of 1958, a substantial achievement in any country, but under the conditions prevailing in East Pakistan, it was remarkable.

### **The Setting**

The 46 million people of East Pakistan live on the delta of the Ganges and Brahmaputra Rivers. Most of them are Moslems, and many of the women are still kept in purdah.

The Province is almost entirely agricultural. Dacca, the capital, with 600,000 people, and Chittagong, with 300,000, are the only sizable cities. The land consists of silt deposited by the rivers, and when the monsoon breaks in June much of the land, only a few feet above river level in the dry season, disappears under water. The Province is crisscrossed by waterways, varying from a few yards to more than a mile in width, and outside the towns and villages, boats are the easiest and most common means of travel.

Since there are no stones in the alluvial soil, buildings and roads are made of bricks. Every village, hamlet, or row of houses has one or more water tanks, formed where clay has been removed to make bricks or to raise the land to a level above the flood waters. These water tanks are the center of village life, where people come to bathe, wash clothes, urinate, defecate, and collect water for cooking and drinking.

### **Public Health Service**

East Pakistan had departments of medical care, public health engineering, and public health which were responsible to the Minister of Health through the Secretary.

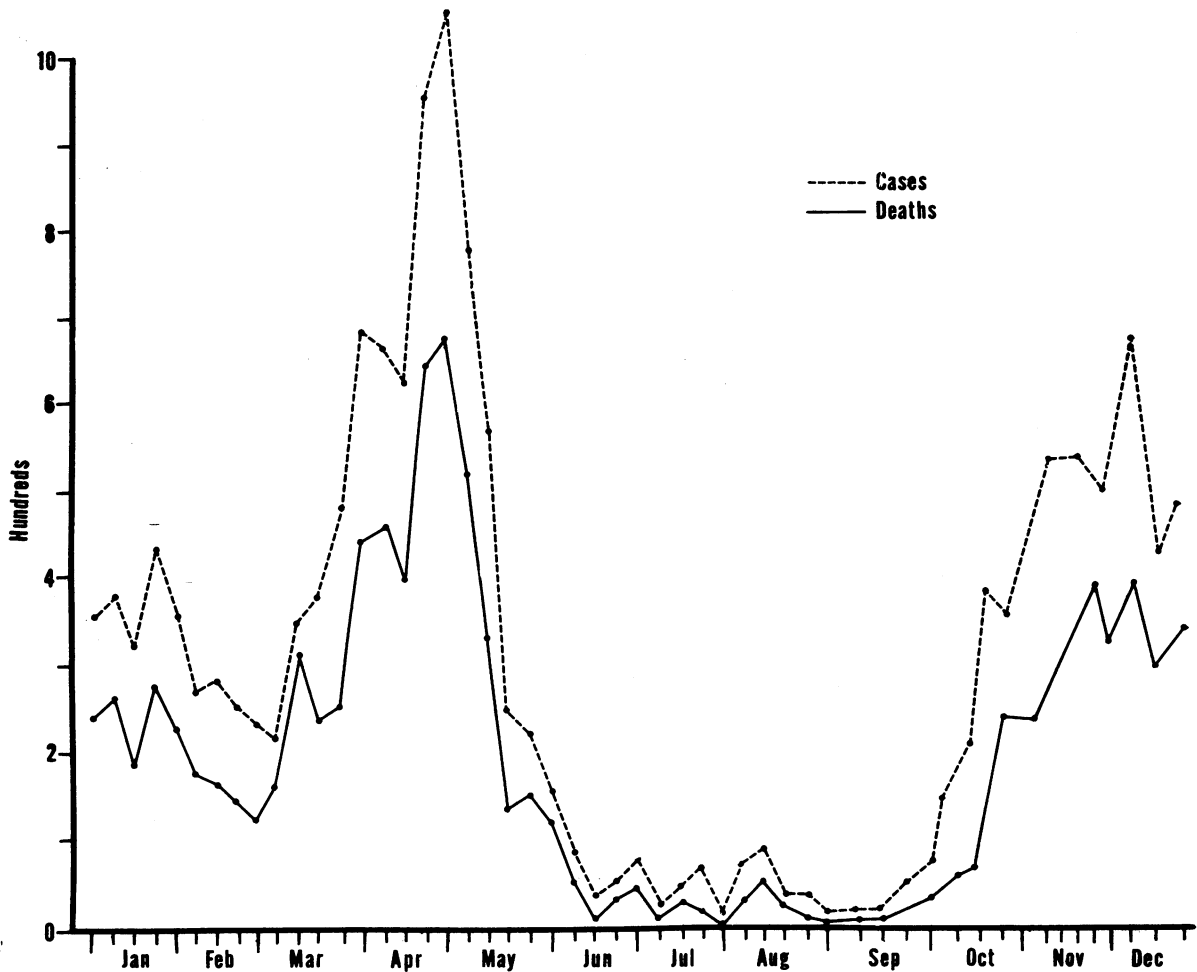
The Department of Public Health which faced the smallpox and cholera epidemics was small. It consisted of a director, 4 assistant directors, 5 district health officers, 12 doctors working on a BCG program financed by UNICEF, 3 doctors helping a village aid project, a small malaria unit, and vaccine laboratories. The department's budget in 1958 was 5 million rupees (\$1 million).

The administration of public health was decentralized so that local authorities based in the Province's 17 districts and in the municipalities employed their own staffs with financial assistance from the department. Only 5 dis-

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Figure 1. Cholera cases and deaths, East Pakistan, 1958



district health officers were directly responsible to the director of public health; the other 12 were controlled indirectly through financial assistance.

Each district of 800,000 to 5 million people is divided into 1 to 5 subdivisions, which are in turn divided into police areas, or thanas, governed by union boards. The boards pay chowkidars, the village police, who also report births, deaths, and notifiable diseases when they visit the police stations twice a week.

The thanas also have trained sanitary inspectors who train their own small staffs of health assistants and vaccinators. They are responsible to the district health officer, and, in theory, carry out all health duties. East Pakistan has about 400 sanitary inspectors, 1 per 100,000 population. Few diagnoses of infec-

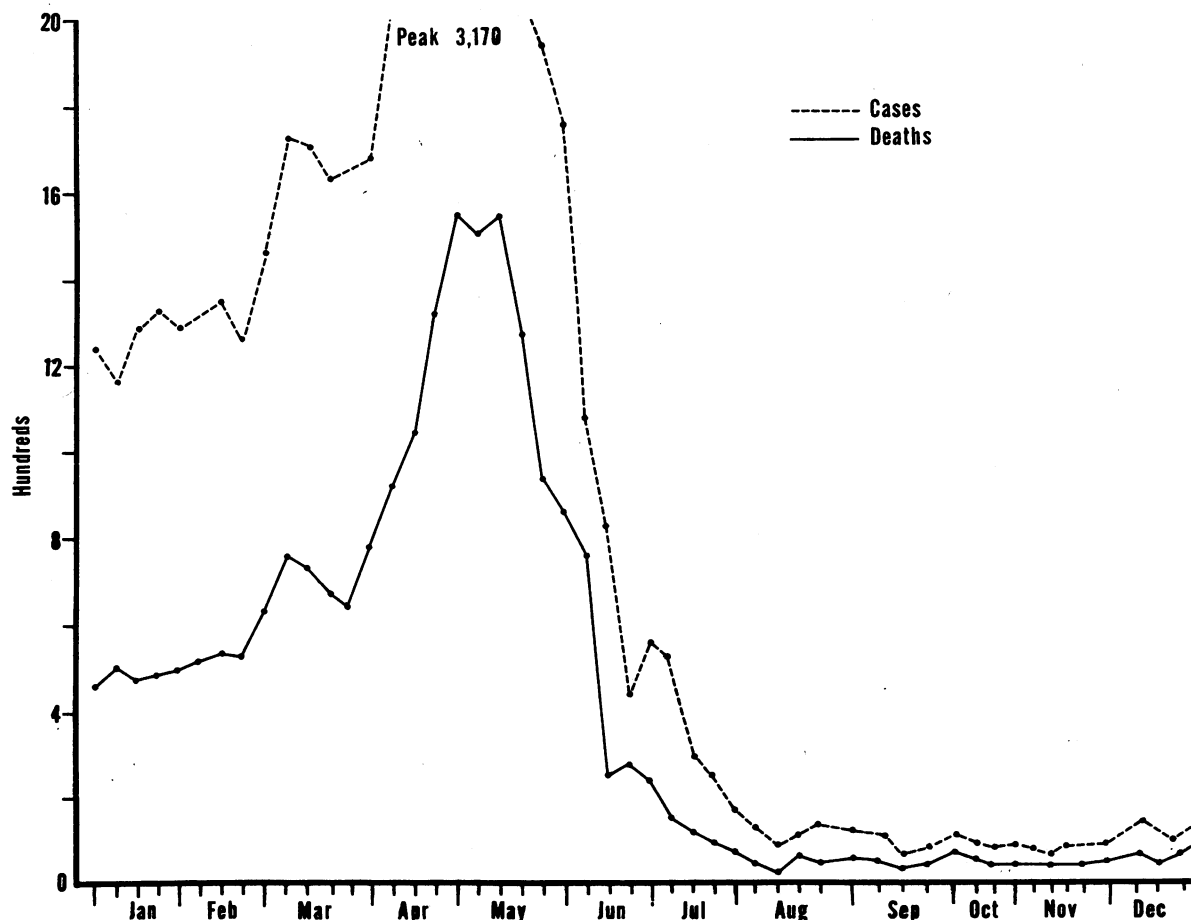
tious diseases or causes of death are made by qualified medical practitioners.

#### International Teams

The International Cooperation Administration and U.S. Information Service teams already in Pakistan dropped other duties to combat the epidemics. The ICA teams, six men from U.S. Operations Mission, West Pakistan, and six from U.S. Operations Mission, East Pakistan, concentrated on organizing and operating antiepidemic activities. The five-member USIS team took over health information tasks with the collaboration of the ICA health educator.

The international teams sent to the Province performed a variety of jobs. The nine

Figure 2. Smallpox cases and deaths, East Pakistan, 1958



officers from the Communicable Disease Center, Public Health Service, trained all the public health physicians in East Pakistan in antiepidemic measures, tested the potency of vaccines, investigated outbreaks of cholera, did epidemic surveillance early in the vaccination campaigns, and later evaluated the success of the vaccinating.

The nine-man U.S. Navy medical research team from Formosa set up a laboratory in the Institute of Public Health for the diagnosis of cholera and conducted bacteriological surveys in affected villages. They also evaluated the potency of the vaccines being received and worked on the production of smallpox vaccine in eggs, the production of dry vaccine, and improved methods of vaccine production from cows.

The six members of the team from the U.S.S.R. collaborated in the studies of cholera,

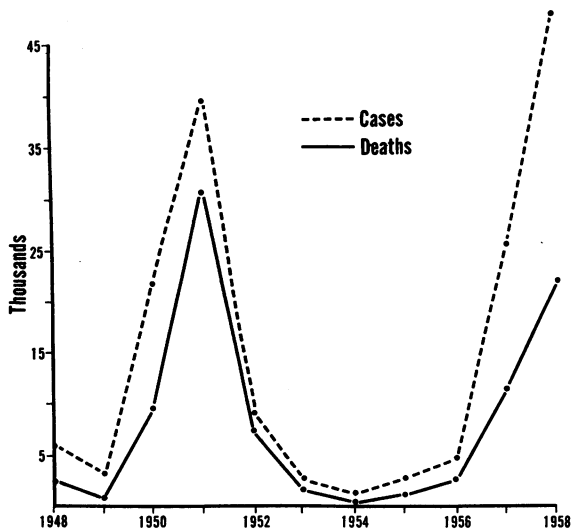
advised the Department of Public Health on smallpox, and were interested in testing the value of bacteriophage in the treatment and prevention of cholera.

The 20-member team from Afghanistan performed vaccinations in the Dacca, Chittagong, and Chandpur areas.

#### Smallpox in the Eastern Province

Epidemics of smallpox have occurred at intervals of a few years in East Pakistan (fig. 3). The epidemics are highly seasonal. Each year the Department of Public Health has made and distributed vaccine and has vaccinated on a large scale. The 5 to 16 million vaccinations reported per year from 1948 to 1957 would indicate that the population had a high degree of immunity. In spite of these reports, a major epidemic occurred.

**Figure 3. Smallpox cases and deaths, East Pakistan, 1948-58**



The vaccine routinely used was made by the vaccine laboratory in the Institute of Public Health and distributed in small cylindrical bottles stoppered with a cork. The vaccinator "wetted" the cork with vaccine, dabbed the arm, and made a circular scratch with a lancet sterilized in flame kindled by igniting cotton wool dipped in methylated spirits. For a primary vaccination this was done in two places on each arm. The vaccine was said to be potent for 7 to 10 days without refrigeration.

In a small way I checked on this procedure in two suburbs of Dacca, where people had been vaccinated 3 to 7 days before with vaccine kept for a week without refrigeration. Among 129 people, I saw only 2 whose vaccinations were not effective. Both were adults who had been previously vaccinated.

The CDC and the U.S. Navy teams recorded their evaluations of the situation in a series of reports which provide much of the data cited in this paper. In May, the CDC epidemiologists, each paired with a Pakistani doctor who acted as guide and interpreter, visited the various districts to inquire into the morbidity situation and to check the vaccination status. Vaccination rates were estimated by inspecting the scars on samples of the populations. The data had to be collected in great haste and for this reason are not suitable for analysis in great

detail, but nonetheless probably give a fair indication of the true situation. Seventeen percent of the sample group were found never to have been vaccinated, 22 percent to have old scars only, 41 percent to have been revaccinated in 1958, and 20 percent to have had primary takes in 1958. In a population of 46 million, this represents a substantial number of vaccinations.

Generally, the epidemiologists of the team felt that the statistics available on morbidity gave a true picture of the trends, even if the totals were not strictly accurate. They analyzed the number of deaths reported, since this figure was more likely to be accurate than the number of cases reported.

Briefly, they found that most of the deaths were in children under 10 years of age. They also discovered that chances of acquiring smallpox were related to vaccination history. Of 685 patients they studied, 19 had been vaccinated within the past 10 years, 207 had been protected for more than 10 years, and 459 had never been vaccinated.

The geographic distribution of cases was not uniform. The northeastern districts almost escaped the epidemic, the east central ones suffered heavily in 1957, and the western ones had the peak of their epidemic in 1958. In the Rajshahi and Dinajpur Districts, the CDC officers traced the spread of the infection along the railroad.

### Vaccinating During the Crisis

After the Chief Minister handed over epidemic control to the citizens committee, local nonmedical groups in every district took over the vaccinating. The medical colleges in Dacca were closed, and doctors and students spread out over the entire Province as volunteer vaccinators. They worked for 2 or 3 months, received only a bare subsistence allowance, and undoubtedly vaccinated many people, 300,000 in Dacca alone.

But their efforts were uncoordinated, and 200 or 300 ardent workers, even with the assistance of official vaccinators and 400 sanitary inspectors, could not protect 46 million people. The average vaccinator, working from house to house and stopping to persuade reluctant people, cannot average more than 100 inoculations



**At a roadblock in Comilla all passers-by are vaccinated against smallpox.**

a day. Travel on foot between villages and 1- to 3-day trips to and from Dacca lower the daily average substantially.

After 3 weeks of consideration, the Government and the epidemic control committee finally agreed on the following course of action: vaccinate 80 percent of the people within 6 months, stamp out the remaining traces of infection in the next 6 months, enforce the law requiring children to be vaccinated, and attempt to revaccinate the population every few years through an improved health service. The Government also agreed that during the initial phase, 1 volunteer per 1,000 people would be raised and trained through the local committees and that the Department of Public Health would be strengthened in time to undertake the second and succeeding phases.

The Government appealed for these local volunteers, 1 for each 1,000 persons, a total of 45,000. The task was great, but the scheme had the advantage that the people of each village or group of hamlets could be vaccinated by someone who knew them. Traveling expenses for such volunteers would be minimal and much of the resistance, especially from women in purdah, would be overcome. Doctors, students, and sanitary inspectors could instruct the volunteers instead of doing the vaccinating themselves.

By this time in May, more than 3,000 cases

and 1,300 deaths from smallpox and 600 deaths from cholera were reported every week. Already nearly 20 million persons had been vaccinated, and more than a million more were being vaccinated every week, but still this task was not being done quickly enough, and coverage was not sufficient. Therefore, a joint Pakistan-ICA-USIS team planned an additional campaign to cover the Province, district by district, over a 6-month period.

The team began work in the Tippera District. In the subdivision of Comilla they used a bagpipe band from the Frontier Force to attract crowds to the stadium for health shows. Crowds of thousands attended two evening mass demonstrations and a number of enthusiastic youths volunteered to be trained as vaccinators. But the volunteers were of little use; a hundred turned up the first day to do the vaccinating, a handful the next day, and only one on the third day.

Although the operation was a failure in the number of vaccinations performed, the team found out which types of health information campaigns were practical, the willingness of the people to collaborate, the difficulties of travel, the local resources, and the most feasible ways of distributing vaccine and training volunteers.

In subsequent programs, audiences, mostly all male, at the night health shows ranged from 2,000 to 10,000. In Dinajpur the women were persuaded to attend by dividing the field in two with a bamboo fence to separate the sexes.

The teams spent daylight hours meeting with committees, giving speeches over a loudspeaker mounted on a car, and distributing pamphlets. Frequently, as the teams drove along a lonely road bordered by fields of jute or rice stretching for miles, they stopped the cars and blew the horns. At the sound, figures wearing enormous sun hats popped out of the fields of rice or jute and a few started to run toward the car. In 5 minutes a fair-sized crowd assembled to hear a talk on smallpox and vaccination.

Brahmanbaria, another subdivision of Tippera, with a population of 1 million, provided a heartening contrast to the experience in Comilla. The Pakistan-ICA-USIS team could spend only a day there consulting with the subdivisional officer and the subdivisional health officer, a sanitary inspector. These two men

had only a jeep, very little money, and a handful of sanitary inspectors and vaccinators to cover a large territory with few roads. However, they looked for volunteers who were disciplined, intelligent, educated, and available in large numbers. They found them in the school children.

The children easily picked up the vaccination technique from their teachers, who were trained by the sanitary inspectors. The teams of children, supervised by their teachers, worked in the villages around their schools. They did not need transportation and were welcomed by everyone, including women in purdah. When the CDC team made its evaluation a month later, they found that more than 80 percent of the population sampled had been vaccinated.

The successful campaign in Brahmanbaria demonstrated that mass vaccination is not basically a medical undertaking but a layman's job of organization, propaganda, and logistics. In subsequent months this was proved over and over; wherever the administrative officers took personal charge, the vaccinating was effective, but where they were uninterested, the campaigns were failures.

### **The Vaccine**

Most of the vaccine sent to East Pakistan was the lymph type, requiring refrigeration. The Government of East Pakistan requisitioned the only cold-storage facility in Dacca to store it as it arrived by air. Batches packed in dry ice often arrived with the dry ice surviving and, whenever possible, were forwarded with the packing undisturbed to field stations. Some dry ice was still unevaporated when packages reached places a day's journey from Dacca.

According to the manufacturers, the vaccine would remain potent 2 to 3 days without refrigeration, but in our experience, most of it involuntary, the vaccine was effective for a week or more in temperatures of 80°-100° F. The packaging of the vaccine from the United States was bulky; 50,000 doses occupied the same space as a million doses of the local product, and this was a big handicap, for refrigerators were very scarce.

In addition to the vaccine sent to Pakistan,

the vaccine laboratory of the Institute of Public Health obtained an adequate supply of calves and, by May, was turning out 1 million doses a week. A laboratory in Lahore, West Pakistan, supplied 500,000 doses weekly. The U.S.S.R. team suggested two Soviet dry vaccine plants were available should the Pakistan Government wish to accept them. The Navy team made a dry vaccine from a chick embryo growth with an apparatus used by the Department of Agriculture to prepare rinderpest vaccine. The United States, through ICA, offered a dry vaccine plant capable of processing 500,000 doses a week, and the Pakistan Government accepted it.

Dry vaccine remains potent without refrigeration much longer than the wet type, and its advantages where travel is difficult and refrigerators are scarce are obvious.

Vaccination stylets were in short supply, so at first the needles which came with the vaccine from the United States were used with vaccine from other countries. Then the United States team suggested using a large steel sewing needle which would be given to the person who was vaccinated with it. The needles are valued by the people in Pakistan, and their use eliminated channels of cross-infection and the nuisance of sterilizing instruments. In June ICA sent 11 million sewing needles.

The technique of vaccination was streamlined. We stopped swabbing the arm before inoculation because of the shortage of cotton wool and alcohol and no cross-infections were reported. The bandage at the inoculation site was also eliminated. With wet vaccine, the bottle was given a shake and the dampened cork applied to the arm. The dry vaccine bottles lacked stoppers, so the needle was dipped in the bottle and a drop taken out.

The method taught was the multiple pressure technique of vaccinating, but some vaccinators made punctures, some, long scratches, some, elaborate crosshatchings, and some did as they were taught. All methods seemed to work if the vaccine was fresh and potent. In the campaign we accepted no contraindicators to vaccination, for the risk of infection was too great.

The diversified sources of the vaccine gave us a chance to compare the potency and various

fashions of packaging. The Navy team has reported on comparisons of potency.

For vaccine to be used under conditions similar to those in East Pakistan, the following requirements are recommended for convenience in handling. The vaccine should be dry. Each ampoule or bottle of vaccine should contain about 1 day's supply, approximately 100 doses. The bottle should be sturdy, flat bottomed so that it can stand alone, and have a mouth wide enough to make the transfer of the diluent easy.

The diluent containers should not be stoppered with corks or screw tops which leak during shipment by air. A minimum of glass-cutting should be required to open them. The device holding the stopper in place should be simple to remove. The fluid should be transferable without syringes or pipettes.

Bottles for the reconstituted vaccine should have stoppers which can be used as applicators. Special applicators are easily lost. Some substance should be added to prevent growth of contaminating bacteria.

The instructions and the expiration date with the name of the month, rather than the number, should be written in a language familiar to the person using the vaccine. The expiration date should be on each bottle. The package containing the bottles should be strong, easy to open, and include all essential items so that it is ready for distribution.

### The Cholera Epidemic

In East Pakistan cholera appears in dry weather, reaches a peak in May, and disappears with the first rains. The Province normally has several hundred deaths from cholera each week in May (figs. 1 and 4).

The vaccine in present use requires two injections of 0.5 ml. and protects only for 6 months, but in India, it is customary to give one dose of 1.0 ml. Semiyearly immunizations were simply not practical in East Pakistan.

Although many inoculations were given, the Department of Public Health concentrated on distributing drugs to treat cholera. However, medical staffs are spread very thinly over the Province and transportation for them or for patients is scarce. A trip to a hospital might

mean carrying a patient many miles by bullock cart over the rice paddies, so that the chances of a patient being seen by a medical person were very small. In the middle of the outbreak, a visit was paid to the cholera ward in Barisal, which was found empty, although stricken villages were reported from all sections of the surrounding district.

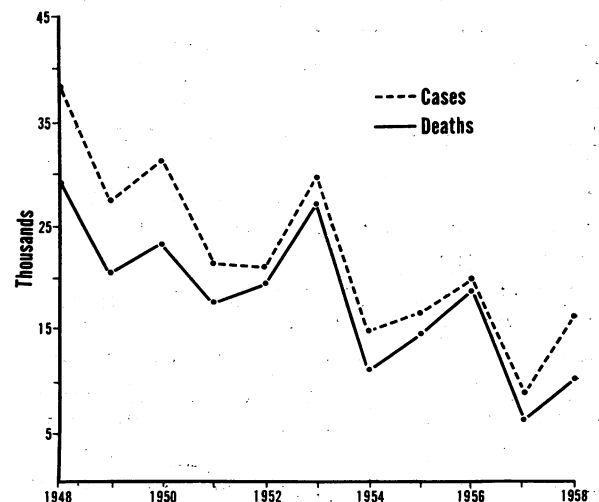
The Department of Public Health sent mobile teams to affected villages, but since reporting of the outbreaks took several days, the patients were either dead or convalescent by the time the teams reached them. Often, many people in a village became ill at once; a week or 10 days later another village some distance away would be stricken.

Cholera reporting since 1948 appears to be inadequate; cases about equaled deaths, although in 1958 the fatality rate was 40 percent.

Diagnosis can be difficult and in 1958, physicians called almost every case of diarrhea a case of cholera. The U.S.S.R. and Navy teams studied cases in hospitals and concluded that perhaps 50 percent of the cases in the cholera wards were due to other infections.

Both teams had difficulty finding fresh cases; patients admitted to the hospitals were convalescent and had already been treated in a variety of ways. The Navy team isolated *Vibrio cholerae* from nine patients in a cholera ward and five apparently healthy contacts in a Dacca

Figure 4. Cholera cases and deaths, East Pakistan, 1948-58





suburb. The isolates had these characteristics in common: they fermented sucrose and mannose but not arabinose, were positive in the cholera red test and negative in the Voges-Proskauer and hemolysis tests, and serologically were of the Ogawa type.

Preventive measures against cholera in other countries depend on safe water, good hygiene, and efficient sewage disposal. The Pakistan Government, with ICA help, is trying to provide piped water in the larger towns, large-bore tube wells in the smaller ones, and smaller tube wells for the villages. However, it may be 10 years before the general population has wells and the average villager is persuaded to abandon his tank for washing and drinking water.

### Epidemiology of Cholera

Bengal has the unenviable distinction of being the home of cholera and quite possibly is the only place on earth where the infection can exist all year round decade after decade. Cholera is endemic only in Asia. The U.S.S.R. team, which had been operating in China, stated that all the epidemics in the U.S.S.R. and China were imported from outside those countries. In the Indian subcontinent, the disease is found all year round only in Bengal.

Cholera first appeared on record in severe epidemic form in 1817 in the Calcutta area. Four times in the 19th century it appeared in a series of waves around the world, and these major pandemics were traced back to Bengal. There are possibly smaller foci elsewhere in southeast Asia, but the Bengal area, which the 1947 partition divided between India and Pakistan, is the only major endemic focus. If cholera could be eliminated there, it seems likely that it would disappear entirely from the world. However, the epidemiology of the disease has not been worked out completely, although obviously it is associated with unhygienic conditions.

Why is cholera endemic in so limited an area? A possible answer lies in the nature of the country—the flat, waterlogged land, the dry season and the monsoon season, and the water tanks which are centers of community life. The paths of spread of the cholera pathogen in an average Bengal village are numerous, but all

are insignificant compared with the massive potentialities of these tanks.

The distribution of cholera in East Pakistan supports the theory that the tanks are related to the maintenance of the infection. In the northern districts and the higher areas where tanks are not so common, cholera apparently occurs only during the epidemic dry season. In the low southern districts, where tanks surround every hamlet, the disease persists year round.

Traditionally, cholera disappears in Bengal with the onset of the monsoon. During the 1958 monsoon season outbreaks of cholera reported in Noakhali and Faridpur, upon investigation, seemed to be genuine, indicating the infection to be endemic there in spite of the monsoon. With the appearance of the dry weather in October 1958, the cholera soon shot up alarmingly to a maximum of 700 cases a week, but the rains in January 1959 were heavier than usual, and almost immediately the cholera dwindled. In February 1959 a local epidemic in Comilla occurred, but following some unseasonable rains, the disease again disappeared. In March the whole area had heavy rainfall and the cholera sank to an extremely low level for this time of year.

*V. cholerae*, recently isolated, can grow in a decidedly alkaline media. It is difficult to concede that this unusual cultural requirement is purely nonadaptive, so it is natural to look for some environment where the pressures of natural selection result in the production of such a characteristic.

One can speculate on these facts. If the tanks are the basic reason the infection is localized to Bengal, the disease spreading from there to other parts of the world, then possibly changes in the alkalinity of the water in the tanks might account for epidemiological differences between the dry and wet seasons as well as the requirements of the organism. Perhaps the first rains stop the main avenue of transmission by altering the pH of the water in the tanks.

Studies are in progress to see if there is a positive correlation between the pH of the tank water in different periods of the year and the incidence of cholera. Preliminary studies in the dry season have already shown that tank



**A physician from the Communicable Disease Center and his companion, a Pakistani physician, prepare to give inoculations against cholera.**

water commonly has a pH much in excess of 8, which would favor the cholera organisms. Following a few days of dry weather, the pH before dawn is between 7.0 and 7.5 and by evening can be as high as 9.5 or 10.0. It is known that pH in such waters is largely dependent on the activity of algae that produce either oxygen or carbon dioxide according to the degree of light available, and that considerable changes take place between night and day. The rainfalls theoretically could reduce the pH both by the clouds reducing the sunlight and, even more, by dilution or making the water muddy. During the dry season, all ponds become almost saturated with algae. On rainy days, the pH does not commonly rise above 8.4, the optimum for *V. cholerae*. If it should be proved that the pH is altered markedly by the monsoon or heavy rains, a reasonable explanation can be given for the known facts of the epidemiology of the infection as well as the cultural requirement of the organism.

Whether cholera has long-term carriers is not yet clear. The Soviet team said they had found

people excreting organisms for 2 months and in one instance for 1½ years. However, it is difficult to test the pathogenicity of organisms recovered from carriers. It would not be necessary for carriers to excrete organisms for more than 3 months for the organism to survive permanently in south Bengal.

At present, hope of controlling and eradicating cholera depends on providing safe drinking water and convincing people of the importance of hygienic measures. Immunization is a weak barrier and the value of bacteriophage remains unproved. In East Pakistan the trend of the disease is downward (fig. 4), which gives hope that environmental changes might be leading to its extinction.

#### **Epidemiology of Smallpox**

Smallpox in southeast Asia was clearly described by Chinese writers 4,000 years ago, and, according to 3,000-year-old scripts such as the *Susruta*, Indian Ayurvedic physicians were also familiar with it.

The history of smallpox in East Pakistan is marked by substantial epidemics which last for about 3 years, recurrence at intervals of 5 or 6 years, and seasonality. Substantial 3-year epidemics occurred in the early 1940's, the beginning of the 1950's, and in 1957-58. Smallpox is a disease of the early months of the year. Its Bengali name, *basanta*, means "the spring-time."

The apparent explanation of the recurring epidemics is that smallpox is following the same cyclic type of pattern as measles in the Western countries. An epidemic leaves few susceptibles so that another cannot occur until a fresh crop of susceptibles appears. This concept is supported by the fact that most deaths are among children under 10 years of age, and 40 percent of the mortality is among those under 5 years.

But the matter is not so simple. Even in the worst epidemics in East Pakistan, the total number of cases is under 100,000 a year, while the babies born each year are counted in millions. For the infection to immunize enough people during an epidemic to produce a cyclic pattern, a considerable number of inapparent

infections would have to be postulated for each case of smallpox.

This happens in many other infections but, as far as I know, it has not been demonstrated in smallpox. However, the fluctuations in the immunity status of the population necessary for cyclic epidemics are probably provided by other factors, the vaccinator and his vaccine.

Each year millions of vaccinations are performed by the public health services, but the number depends on the epidemic conditions of that particular year. Ten million persons may be protected if there is an epidemic scare but only 2 or 3 million in nonepidemic years. Immunity given by vaccination in step with the epidemics may produce the cycles that are so prominent in East Pakistan.

Smallpox is easy to prevent; vaccination is simple and can be done by illiterate people. The vaccine is cheap and can be mass-produced. It should be possible for each country in south-east Asia to vaccinate 90 percent of its people within a year and to repeat the operation every 3 to 5 years. The resulting level of immunity would probably cause the disease to disappear completely.

## **FDA Warning on Irregular Use of Diabetes Test Papers**

The use of certain chemically treated diabetes test papers by women to determine the fertility cycle may be injurious, according to the Food and Drug Administration. Some of these test papers contain the chemical tolidine, which has not been adequately tested for its effects on the sensitive tissues of the female reproductive system.

The papers are marketed for use by diabetics, who are able to determine the presence of sugar in the urine by moistening the paper with a small amount of urine. The chemically treated papers change color if sugar is present. No question has been raised about the safety of this procedure for diabetics.

It has been reported, however, that the secretions of the cervix also contain enough sugar during the ovulation period to cause the test paper to change color. This has resulted in publicizing the use of test papers for determining the fertile period of the menstrual cycle.

The Food and Drug Administration emphasized that the use of the chemically treated papers to determine the fertility cycle should be discontinued until appropriate tests have shown that the procedure will not cause injury to sensitive tissues.