

the light of experience, to the control measures used and the effect these had on lowering the cost of the exercise.

THE AREA AND THE PEOPLE

These were described in detail in the first paper. The maps in figures I and II demonstrate the general configuration of the tribal trust lands in the area and indicate both the irrigation schemes and the areas in which the epidemic occurred. The population was widely scattered over the entire area and obtained their water from rivers, wells or occasionally from standing pools. People were generally healthy and well fed, but were persuaded only with difficulty to use latrines. In many places

**Further Report on Cholera
in Manicaland**

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BY

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The report on the first outbreak of cholera in the Manicaland province of Rhodesia (January-May, 1974) predicted that the disease would return sooner rather than later (Cruickshank, *et al.* 1975). In fact notwithstanding an extended period of freedom from overt infection (May-June, 1974) the disease probably never left the area, and by July, 1974 the endemic pattern had re-established itself. This paper describes the progress of the disease in its epidemic and endemic forms for the year following that previously described, and emphasises in particular the modifications made, in

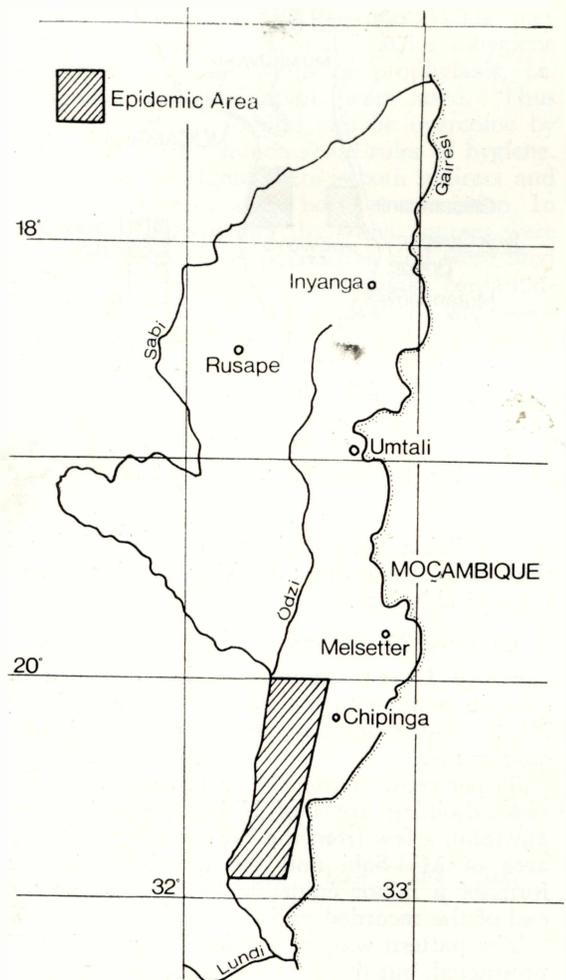


Fig. 1.—Area involved in relation to the main centres of Eastern Rhodesia.

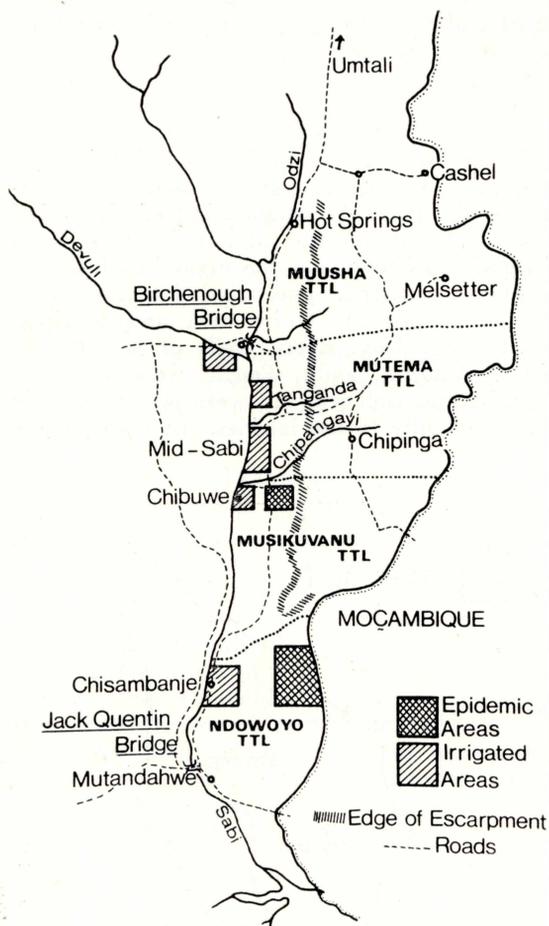


Fig. 2.—Detail of the affected area.

the available water subserved manifold functions at the same time; drinking, cooking, washing and ablutions.

GENERAL DESCRIPTION OF THE OUTBREAK

Figure III(a) summarises the incidence of cases in relation to the time of year and figure III(b) the particular areas from which the cases came.

85 per cent. of the 219 cases came from the two adjoining areas of N'dowoyo and Musikavanhu, a few from the European agricultural area of Mid-Sabi and the remainder in the form of a minor epidemic in Mutema at the end of the recorded period.

The pattern was, as previously, endemic and protracted, but there were at least two explosive epidemics, in October and in January, and probably a third in May.

Neither changes in temperature level nor in the relative humidity was significantly associated with the case incidence nor the onset of the epidemics which occurred just before, during and just after the rains. Long low incidence periods were recorded both during cold and the hot weather.

The ratio of male to female patients was roughly equal in all age groups.

Ten patients died after admission to hospital, four within 24 hours of admission from circulatory collapse.

THE EPIDEMICS

(a) October, 1974 Area A — see map.

On October 20th reports were received that a large number of cholera cases were occurring in a remote area approximately 30 miles east of Chisambanje close to the frontier with Mozambique in N'dowoyo tribal trust land and that some deaths had resulted. The disease had appeared on October 13th and by the time the first report was received (October 21st) and the area visited there had been 31 admissions to St. Peter's Hospital, Chisambanje and a probable 20 deaths in the kraals.

The area is a thoroughly inhospitable one. The kraals are scattered, the country rough and penetrable only with difficulty even in 4-wheel drive vehicles. The water supply consisted of two boreholes and three seasonal streams. In the week preceding the appearance of the disease the boreholes had ceased to function and the streams had dried up. Two shallow water holes had been dug in the sandy bed of the nearby Honde river and from these water was carried to the kraals sometimes over considerable distances. One of the holes, the least "sanitary" was reserved for cattle and for "bachelors", and from the other the women drew their water, at the same time doing their laundry, and bathing themselves and their children. The suddenness of the epidemic caused much fear and panic.

Thirty-six cases reached or were taken to hospital between the 13th October and the 29th; only one died — within two hours of admission.

The epidemic was quickly controlled (a) by prophylactic treatment of the contact population of approximately 800 with sulphadimethoxine — (b) by chlorination of the waterholes. Only five further cases occurred over the next week and each came from a different kraal. Since then only one case has been reported from the area.

(b) January, 1975 Area B—see map

Sixteen cases occurred over about a week in the Musikavanhu tribal trust land. Fortunately the area is ready of access to the main road and therefore hospital facilities and reports were received as soon as the first cases occurred. All cases were treated expeditiously and there were no deaths. Water was normally supplied from a borehole but this had broken down and run dry, and water had to be fetched from a stream four kilometres away. The contact population were treated with sulphonamide and an attempt was made to chlorinate the stream water. This was not easy due to the very variable flow, and eventually water was supplied chlorinated in 44 gallon drums until the borehole was recommissioned. The outbreak ceased abruptly and there have been only one or two sporadic cases from the area since.

(c) April, 1975 Area C—see map.

A cluster of 16 cases were reported from the Mutama tribal trust land between the 8th and 30th April. They came from comparatively few kraals all of whose inhabitants drew water from the banks of the Tanganda river.

EPIDEMIOLOGICAL FEATURES

(a) Source of the disease. Evidence continued to suggest that the asymptomatic carrier or occasionally the convalescent patient was responsible for the maintenance of the endemic disease in the population. Intermittent sulphonamide

prophylaxis would keep the area free of disease—relaxation of the regime resulted in the appearance of new cases.

(b) Transmission. The actual means of transmission from person to person in the endemic form of the disease remains unsolved. As in the first phase nearly 50 per cent. of cases came from kraals in which no other cases occurred at all, and in less than 20 per cent. were there five or more cases per kraal. Two or more members of one family contracted the infection within the usual incubation period (1-5 days) on only 11 occasions. On 10 of these the disease in both affected family members were diagnosed on the same day indicating a common source. Medical and nursing staff were often exposed to direct contact risk perforce due to field circumstances i.e. close contact with vomitus, stool, contaminated clothing; mouth to mouth respiration, etc. While they employed where possible strict hygiene measures, no other forms of prophylaxis, i.e. antibiotics or vaccination, were used. Thus direct spread via fomites can be overcome by straightforward common sense rules of hygiene.

On the other hand there is both indirect and direct evidence of water borne transmission. In the first two epidemics the water sources were common to the local population and were used for such diverse purposes as to make contamination inevitable. Decontamination was asso-

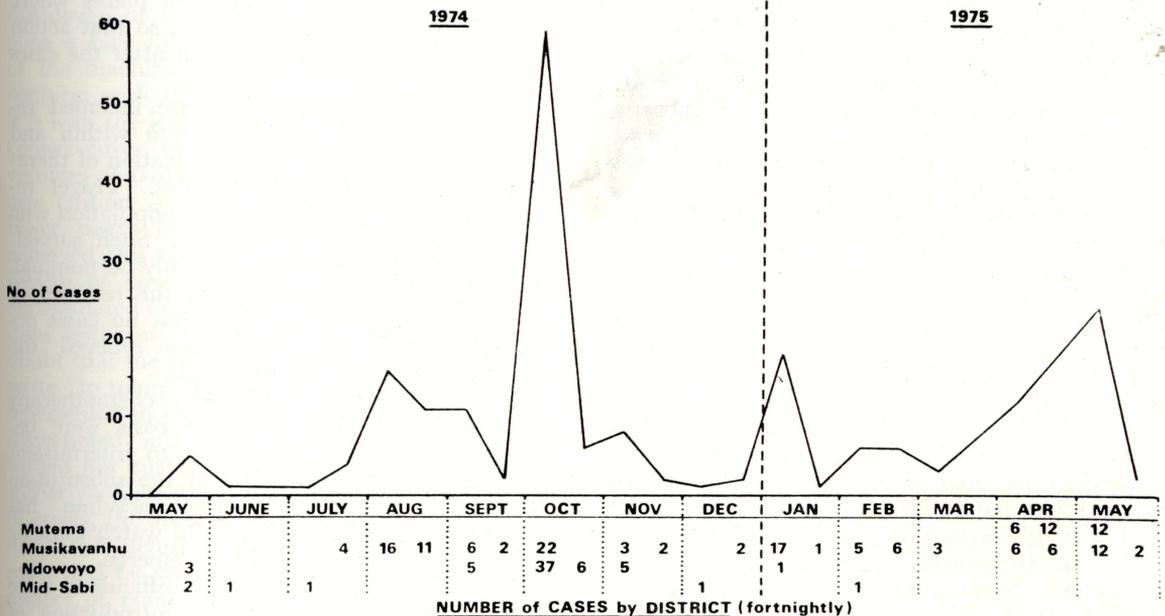


Fig. 3.—Case incidence summarised fortnightly and the districts from which they came.

ciated with abrupt cessation of the infection. During the Mutema outbreak the Tanganda river was sampled using a modified Moore's swab (Sang. personal comm.) on two occasions. On one, *Vibrio cholerae* el tor was isolated. These findings do not of course explain the patchy distribution of cases, the greater proportion of which are subclinical.

CONTROL MEASURES

(1) Local In-patient rehydration facilities were provided as before in rural, mission and emergency hospitals manned by nurses or medical assistants. Senior health assistants were trained to give on the spot I.V. therapy where severely ill patients could not be moved to treatment centres.

No attempt, apart from isolation of cases, was made to curtail or restrict the normal activities of the treatment centres in either their out- or in-patient activities.

Attending relatives and friends were swabbed and if necessary treated. The contact populations of the kraals from which the patients came were prophylactically treated with Depomide (2G stat, 500 mgms daily for three days).

Excreta and disposable items were buried in deep pits with chloride of lime. Bedding, clothing and other fomites were soaked for 12 hours in phenolic disinfectant, rinsed and sun-dried.

All cases were confirmed bacteriologically by the rapid field diagnostic method (Craig, Cruickshank, Ellis & Farrell, 1974).

The treatment regime was adjusted for greater economy and Depomide (sulphadimethoxine) in doses of 1G daily for five days was substituted for tetracycline as soon as oral therapy became possible. No relapses occurred and rectal swabs were negative on completion of treatment. A saving of 94 per cent. in treatment cost was achieved (\$1.49 per patient on tetracycline compared to nine cents per patient on Depomide).

(2) General control. Road blocks, always difficult and at times dangerous to man, were not re-introduced. Nor was any limitation placed on international movement at recognised frontier crossing points.

Modifications were also made to the prophylactic treatment of seasonal workers employed in agriculture, mainly on cotton picking. Previously 500 mgm daily of sulphadimethoxine had been given to this population for the duration of their stay in the area. This was changed. On entering the area all persons were given 2G of the sulphonamide and then 500 mgm on each of the following three days.

The course was repeated before leaving the area and nothing was given during the intervening period. The costs of prophylactic treatment were thus reduced to 80 per cent. (\$1.79 per worker to 18 cents per worker), and gave equally satisfactory results.

Sanitary teams in charge of health assistants worked in the affected area directed by the Senior Health Inspector of the district and in conjunction with the Health Education Officer. These teams directed the improvement and maintenance of existing safe water supplies, the construction of safe water supplies where these did not exist and the organisation of emergency water supplies in areas where this was necessary by means of chlorination or distribution of drums for boiling water. They were also responsible for the supervision of latrine construction and of a Health Education programme which stressed the importance of the measures necessary for the prevention and control of the disease.

COMMENT

The "trigger" for the re-emergence of the disease in clinical form is not known.

The "trigger" for the epidemics was indirectly climatic. Water supplies in all instances became progressively restricted until a single source was used by everyone in the area for all purposes for which water is used. It is an object lesson, perhaps, that in endemic areas careful watch should be kept on places where safe water supplies may run out, so that action can be taken before rather than after the cases appear.

New approaches in this phase included relaxation of travel restriction both within and without the area, and the modification of therapeutic and prophylactic regimes. Travel restriction is irksome to the local population who do not understand its necessity. Such surveillance at the best of times can only be nominal. Shortage of personnel dictated the removal of the road blocks but the fact that no cases occurred outside the area have relieved the anxiety caused by their removal.

The efficiency of prophylactic chemotherapy was confirmed. However, the costs were becoming prohibitive. Reversion to intermittent sulphonamide prophylaxis and the substitution of sulphadimethoxine for tetracycline has proven successful though careful watch must be taken in case resistance should emerge.

Endemic cholera is normally difficult to trace and eliminate. However, the introduction of adequate sanitation and safe water supplies will

prevent outbreaks and will sooner or later eliminate the disease. Of particular importance is associated health education. There is no doubt that the local populace recognises the disease and its possible consequences but the educators must convince them of the need for strict control measures however irksome they may be; then there should be a rapid reduction in case numbers.

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