

Title : Cholera and Enterobacteriaceae Study in  
Chiengmai (Endemiolgy and Epidemiology  
of Enteric Infection in Chiengmai)

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Period covered by Report : 1 December 1963 to 1 May 1966

This study has been completed and a final report made. An abstract of the final report is included to conserve space.

#### ABSTRACT

This study, from its inception, has had as its objective the investigation of many of the factors which influence the endemic and epidemic status of enteric infection in chiengmai, a city in Northern Thailand. This is particularly important because most of the comparable epidemiological work in the country has been confined to the Bangkok area. Since climatic conditions, terrain and sociological factors differ markedly in the north, it would be reasonable to assume that epidemiological patterns might vary as well. While such knowledge is of immediate benefit to the local health officers in effectively directing appropriate control measures, the long range value may be for the military establishment which finds this an area in the critical border region into which nonimmune and unexposed troops may be required to travel or reside.

Throughout this work efforts were made to deal with enteric pathogens rather than indicators of fecal pollution such as coliform bacilli. Extensive use was made of millipore filter technics and enrichment cultures. All of the sources of water tested contained some evidence of fecal pollution and all but treated, municipal water yielded either salmonella, shigella or cholera vibrios from late April till early September. This coincides with the late hot, dry season and about two thirds of the rainy season. Only during the same time interval were flies from the markets found to harbor these organisms; but the flies carried ova and cysts of the same parasites found in the populace all year long. Cockroaches, on the other hand were not significant vectors of enteric pathogens or parasites in the market places. Ice cream and ice, likewise, contained occasional salmonella organisms during the early and mid-rainy season. Fresh fruit and vegetables were shown to harbor Ascaris and Endemoeba histolytica as well as salmonella and shigella, particularly during the interval from April to September. Survival studies on the surface of vegetables and fruit have demonstrated that Vibrio cholerae E1 Tor-Ogawa persisted for 12 hours to 6 days with a mean of 2.3 days and Shigella flexneri III lasted one to six days with a mean of 3.2 days while Salmonella typhosa survived from one to six days with a mean of 3.8 days. Survival was restricted to a large extent by lower pH of the produce. Survival in water from several different sources for all three organisms was somewhat longer in water with low bacterial population and rain-diluted water; and greatly reduced in waters showing high, initial bacterial counts.

The epidemiological importance of the April through September interval is further illustrated by the healthy carrier rate which rose to greater than 50% in the period of June and July. On the other hand the parasite rate of 68% was not seasonal. Likewise 17% of the rats examined harbored organisms which agglutinated Salmonella Polyvalent O serum. on what appears to be a nonseasonal basis. This ordinarily dangerous epidemiological situation is probably less serious with the indigenous population because results from a serum survey of over 1200 school children tested for antibodies has demonstrated that as high as 90% of the children tested have a titer of 1-40 or greater against salmonella O antigens of groups C and E and between 20% and 40% for groups A, B and D.

One aspect of enteric infection on which the serological data does not touch is the infantile diarrhea. 38% of the cases were of bacteriological origin; and 88% of these were caused by enteropathogenic Escherichia coli. Ten different serotypes were recovered and no one type predominated at any one time of the year.

A comparison of disease incidence over a two year period, as measured by admissions at the two hospitals in the community, indicates that typhoid and paratyphoid cases are well distributed throughout the year while infantile diarrhea incidence peaks in December and January with a secondary peak in the May-September interval. This latter prevalence corresponds with that interval when cases of enteritis, food poisoning and dysentery are most frequently encountered. On the other hand amoebic dysentery is most common in the late hot, dry season of April, May and early June. This case incidence data, when compared with weather data, show some correlation with the rising mean temperature, and particularly with the mean minimum temperature and the developing rainy season. This appears to be associated less with the decreasing water sources than with greatly increased water intake and increasing carelessness in the selection of liquid sources. In addition increased survival of the enteropathogens in the rain-diluted water along with spread by the rains contribute to the seasonal incidence.

The scope and extent of the hazard for nonimmune and previously unexposed personnel looms great. While the salmonella and shigella as well as cholera threats follow a generally seasonal pattern, the danger of parasitic infection is constant. Influencing factors include the high parasite carrier rate and low level of hygiene practiced in the community, the use of nightsoil for fertilizer as well as water pollution and high rate of fly contamination. As a consequence all uncooked food and most water sources represent a constant potential threat.