

Country report: Typhoid fever and other Salmonellosis in Mexico

S1-4

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Abstrak

Menurut laporan resmi epidemiologi kasus di Mexico, penyakit infeksi yang disebabkan kuman *Salmonella* masih merupakan masalah kesehatan masyarakat yang penting, meskipun mortalitas karena penyakit diare (termasuk salmonellosis) terus menurun selama 30 tahun terakhir ini. Pada tahun 1994, angka mortalitas untuk penyakit ini dilaporkan sebesar 113 dan 72 per 100.000 penduduk untuk anak Balita dan orang tua. Terjadi penurunan sebesar 59% dari angka kematian karena penyakit infeksi saluran pencernaan, sedangkan mortalitas karena salmonellosis menurun dari 0.64 menjadi 0.3 per 100.000 penduduk semua umur. Hal ini mungkin terjadi karena usaha penerangan tentang kesehatan secara intensif yang dilakukan untuk pencegahan terhadap kolera. Prevalensi tertinggi dari demam tifoid dan paratifoid ditemukan pada kelompok umur 25-44 tahun. Angka kejadian demam tifoid untuk saat ini adalah sebesar 9,8 per 100.000, suatu angka yang lebih rendah dibandingkan dengan 17 per 100.000 pada tahun 1988. Hal ini berlawanan dan sangat berbeda bila dibandingkan dengan angka kejadian untuk demam paratifoid dan salmonellosis yang lain, yang mengalami kenaikan yaitu dari 102 pada tahun 1988 menjadi 163 per 100.000 penduduk. Selain *S. typhi*, serotipe utama yang menjadi penyebab dari 34 kejadian luar biasa yang dilaporkan sejak tahun 1982 hingga 1993 adalah: *S. typhimurium*, *S. enteritidis*, *S. newport* dan *S. paratyphi A*.

Abstract

In Mexico, according to official epidemiological cases report, infections by *Salmonella* continue to pose an important threat to public health, although mortality due to diarrheal illness (including salmonellosis) has steadily diminished during the last 30 years. In 1994, these mortality rates were 113 and 72 per 100,000 inhabitants, in children less than 5 years old and in the elderly, respectively. Between 1990 and 1994, deaths due to intestinal infections diminished 59%, and mortality rates due to salmonellosis decreased from 0.64 to 0.3 per 100,000, at all ages. This was probably due to the intense campaigns promoting health measure, to reduce the incidence of cholera. Typhoid fever and other salmonellosis, including paratyphoid, are most prevalent in the 25-44 year-old age group, and happen mainly during the warm and rainy months of March to August. The present incidence rate for typhoid fever is 9.8 per 100,000; an incidence that has been steadily declining since 1988, when it was 17 per 100,000. In contrast, the present rate for paratyphoid and other salmonellosis of 163 per 100,000, represents an increase since 1988, when it was 102 per 100,000. Aside from *S. typhi*, the main serotypes isolated from 34 outbreaks, between 1982 and 1993, have been: *S. typhimurium*, *S. enteritidis*, *S. Newport*, and *S. paratyphi A*.

Introduction

The incidence rates are presented per 100,000 inhabitants of the Mexican Republic which, in 1996, had a reported official population of 93,181,633. The data are as reported by the *Sistema Nacional de Vigilancia Epidemiológica de la Secretaría de Salud, México* (The National System for Epidemiological Surveillance of the Mexican Ministry of Health). Further information can be obtained at: <http://www.ssa.gob.mx>.

The incidence rates were obtained from the general open population, that seeked medical care at government-supported clinics and hospitals, as well as from

the population affiliated to the *Instituto Mexicano del Seguro Social* (Mexican Institute for Social Security); the latter representing about one-third of the total population. These figures depict a lower estimate due to underreporting, since not all cases are properly diagnosed, and others are treated without medical care or by private physicians.

Typhoid fever in Mexico (1988-1996)

Figure 1 shows the incidence of typhoid fever in Mexico, during the last nine years. As can be seen, there is a sharp decline (almost two-fold) between the years of 1989 and 1993 which, interestingly, coincides with the advent of extensive nationwide-televised health campaigns to prevent cholera, to halt the spread of the Peruvian epidemic. This was a generally observed phenomenon: between 1990 and 1994, deaths caused by intestinal infections diminished 59%, and mortality rates due to salmonellosis decreased from 0.64 to 0.3 per 100,000, at all ages.

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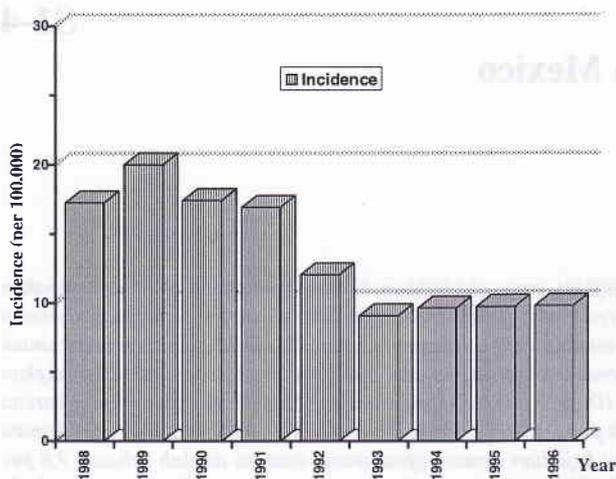


Figure 1. Typhoid fever incidence in Mexico (1988-1996)

The rate for typhoid fever in 1996, of 9.8 per 100,000, means that almost 1 in 10,000 Mexicans acquired the disease during that year. The mortality rate is considered to be 1% or less.

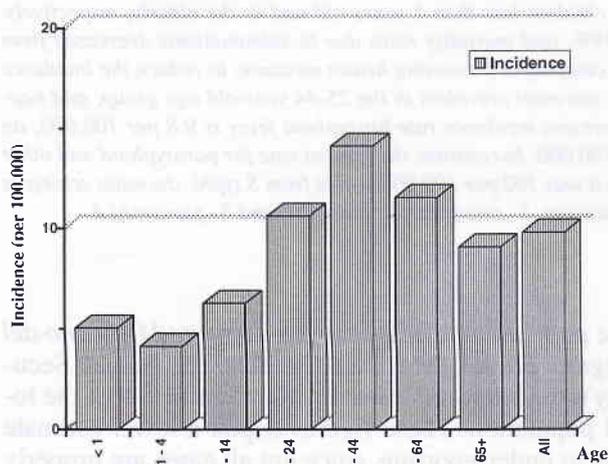


Figure 2. Typhoid fever incidence in Mexico by age group 1996

Figure 2 shows the incidence of typhoid fever per age group, as compared to all age groups considered. The 25-44 year-old age group was most affected: their higher risk is probably due to their increased likelihood for consuming food away from home.

In addition, typhoid fever happens mainly during the warm and rainy months of March to August; although during some years the highest rates have been prevalent into October, as in 1995, presumably due to a longer duration of the rainy season. The number of cases per month, during 1995, were: January, 764;

February, 703; March, 812; April, 944; May, 786; June, 954; July, 977; August, 677, September, 739; October, 839; November, 320; and December, 371. It can clearly be appreciated that number of cases were definitely lower in the dry and colder months of November through February. No clear prevalence at particular geographical sites can be observed throughout the years.

Typhoid fever is mainly diagnosed on the basis of clinical symptoms and serology (Widal test). The treatment is based on third generation cephalosporins and new generation fluoroquinolones.

Paratyphoid fever and other salmonellosis in Mexico (1988-1996)

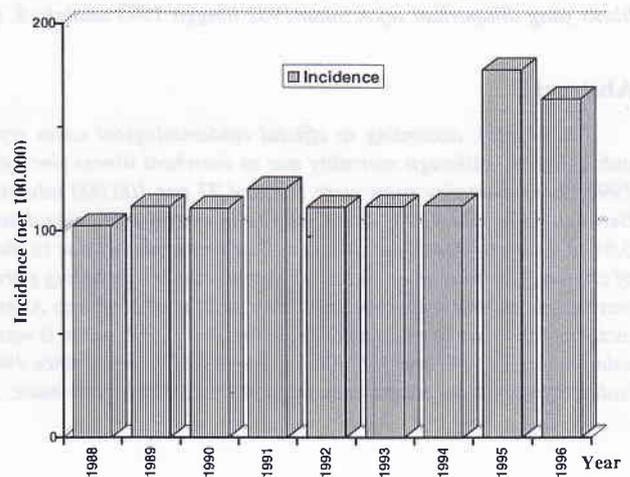


Figure 3. Paratyphoid and other salmonellosis in Mexico (1988-1996)

Figure 3 shows the incidence of paratyphoid fever and other salmonellosis, during the last nine years. As can be observed, the rate increased substantially from 1988, when it was 102, passing by 1994, when it was 111, to 161 in 1995, and 163 in 1996. This could simply be the result of a general worldwide trend¹. Figure 4 depicts the incidence per age group, as compared to all age groups considered. Again, as for typhoid fever, the highest rates were found in the 25-44 year-old age group; probably because of their increased likelihood to consume meals away from home.

As for typhoid, the highest incidences were found in the warm and rainy months of March to August; with some years extending into October. For 1995, the total cases per month were: January, 14,012; February, 10,878; March 10,430; April, 12,466; May, 12,639; June, 14,091; July, 16,806; August, 13,114; Septem-

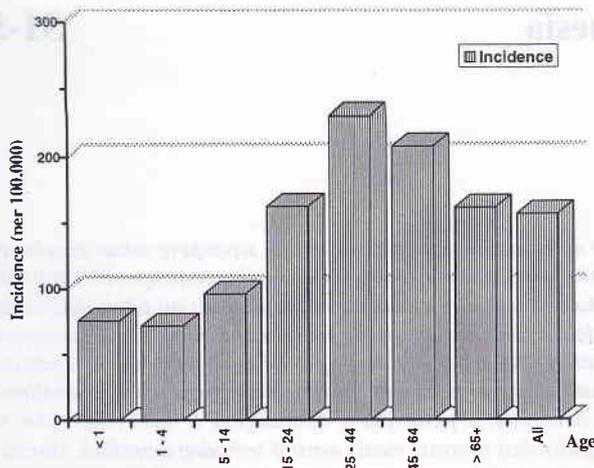


Figure 4. Paratyphoid and other salmonellosis in Mexico in 1996

ber, 12,092; October, 13,971; November, 9,648; and December, 7,492. As for typhoid fever, the number of cases drop in the cooler months of November to February. Again, there is no clear correlation of higher incidence rates with particular geographical sites, throughout the years.

Paratyphoid fever and other salmonellosis are diagnosed mainly on the basis of clinical symptoms, and stool cultures are sometimes performed. Paratyphoid is also diagnosed based on serology. Antibiotic treatment is applied for paratyphoid, as in the case of typhoid fever. No antibiotic treatment is recommended for other non-typhoidal enteritis.

Microbiology

In a comprehensive study, 10,703 *Salmonella* strains isolated in Mexico between 1982 and 1993, were characterized (2). Out of 119 different serotypes, the most frequent clinical isolates, i.e. from blood, feces, and bone cerebral-spinal fluid, were: *S. typhimurium* (20%), *S. enteritidis* (15%), and *S. typhi* (10%). From 563 hemocultures alone, the most frequent were: *S. typhi* (63%), *S. enteritidis* (13%), and *S. typhimurium* (12%).

Out of 34 outbreaks studied, the greatest number were due to *S. typhi*, with 12; followed by *S. typhimurium*, *S. enteritidis* and *S. newport*, with 9, 6, and 2, respectively. Interestingly, there was an outbreak due to *S. paratyphi* type A. In general, a gradual increase in the frequency of *S. enteritidis* has been observed.

Comparison with world rates

The 1996 reported incidence of typhoid fever, and of paratyphoid fever and other salmonellosis, of 9.8 and of 163 per 100,000 inhabitants, respectively, for the Mexican Republic, are much lower than the estimates for the general worldwide population reported in 1995 (1). In this report, typhoid fever was estimated at 16.6 million cases, annually, with nearly 600,000 deaths. Assuming a world population of 7 billion, the morbidity rate would be 237 per 100,000. On the other hand, the global incidence of other non-typhoidal salmonellosis, causing acute gastroenteritis and diarrhea, was estimated at 1.3 billion cases per year, with 3 million deaths. Thus, the morbidity rate would be 18,571 per 100,000, or nearly one-in every five individuals.

It seems difficult, at this point, to make a close estimate of how much lower are the incidence rates in Mexico, as compared to the global situation. How much is due to underreport, as mentioned previously, or to a shift in the epidemiological profile in the country, towards chronic-degenerative disorders, should be a matter of future and more extensive research.

Corollary

As a molecular biologist or as an epidemiologist, it would be fascinating to learn more about the modes of transmission and reservoirs for pathogens, thus allowing us to understand better the host and environmental factors that determine susceptibility to infection, and their relationship with human lifestyles and habits. To achieve this, improved epidemiological data is paramount; this indeed holds for Mexico, and probably for many other parts of the world.

This shall be accomplished with the aid of more rapid, accurate, and less expensive diagnostic methods; a goal that requires a concerted multidisciplinary effort from scientists throughout the world. Thus, the field of molecular epidemiology of enteropathogens, including, of course, the salmonellae, promises many exciting happenings in the years to come.

References

1. Pang T, Bhutta ZA, Finlay BB, Altwegg M. Typhoid fever and other salmonellosis: a continuing challenge. Trends Microbiol 1995; 254: 253-5.
2. Gutiérrez-Cogco L, González-Bonilla C, Giono-Cerezo S, Beltrán LG. Frequency of *Salmonella* serotypes identified in 10,703 strains in Mexico from 1982 to 1993. Rev Lat-Am Microbiol 1994; 36: 221-6.