Water sampler

Samson SY Wong, FRCPath, FHKCPath
Member, Education and Research Committee, Hong Kong Museum of Medical Sciences Society

Among the collection of artefacts at the Hong Kong Museum of Medical Sciences, some are less glamorous than others. One example is a home-made water sampler that comprises nothing more than a glass flask tied to a lead sinker and an iron basket (Fig 1). When lowered to the desired depth, the stopper of the container was opened by means of a string. This simple equipment was used by the old Bacteriological Institute to obtain a sample of local sources of potable water to test quality including measurement of bacterial counts. Technically, there is nothing complicated about the item, but it reminds us of one of the key roles of a public health laboratory.

When the Bacteriological Institute was established in 1906 in the wake of the 1894 plague outbreak (during which the aetiological agent of plague was discovered in Hong Kong), one of its key duties was the surveillance of plague and ectoparasites in captured rats. In the first Government Bacteriologist Annual Report of 1902, 117 839 rats were examined in 1 year for evidence of plague.[1] The report also reviewed the causes of death as revealed by postmortem examination at the Government Public Mortuary. From 1906 onwards, bacteriological examination of public water supplies began. Water was collected from Pokfulam, Taitam, and Cheung Sha Wan supplies, as well as from well and nullah water.[2] From the start of monitoring, the microbiological quality of potable water in Hong Kong has been maintained at a very high quality. The provision of a safe water supply has no doubt played a crucial role in reducing the incidence of waterborne infections in Hong Kong.

FIG 1. A home-made water sampler for testing water quality used by the old Bacteriological Institute

Two classic waterborne infectious diseases, enteric fever (consisting mainly of typhoid and paratyphoid fevers) and cholera, featured in the earliest *Report of the Government Bacteriologist*. It was noted that "a very severe outbreak of this disease [cholera] occurred during 1902 in Hongkong",[1] with 379 fatal cases being examined at the Government Public Mortuary. In the same year, seven fatal cases of typhoid fever were examined.[1] With the availability of a safe potable water supply, and hence lesser reliance on well water and other surface waters that are prone to faecal contamination, the annual incidence of both cholera and typhoid/paratyphoid fevers has substantially reduced over the years (Fig 2).[3,4] The annual number of cholera cases, for example, has remained a single digit since 2003.[4]

As the local transmission of cholera and typhoid/paratyphoid fever becomes rarer, the epidemiology of these two diseases also changes. Instead of being a waterborne disease, cholera has become primarily a food-borne infection in Hong Kong, often associated with the consumption of raw or undercooked seafood.[5] Indeed, while waterborne outbreaks of cholera remain a significant public health problem in developing countries, the majority of domestic cases of cholera in developed countries are now food-borne infections.[6] Similarly, for typhoid and paratyphoid fevers, the majority of cases in developed countries are the result of food-borne transmission.[7] Although domestic transmission of these infections still occurs in Hong Kong, an increasing proportion of cases in recent years have been imported.[7] In 2009, 80% of all notified cases of typhoid in Hong Kong were imported, especially from Indonesia and India.[8]

The provision of a safe potable water supply is one of the most cost-effective interventions to prevent communicable diseases. The reduced incidence of waterborne diseases in Hong Kong over the past century bears testimony to the relationship between water, sanitation, hygiene, and health.

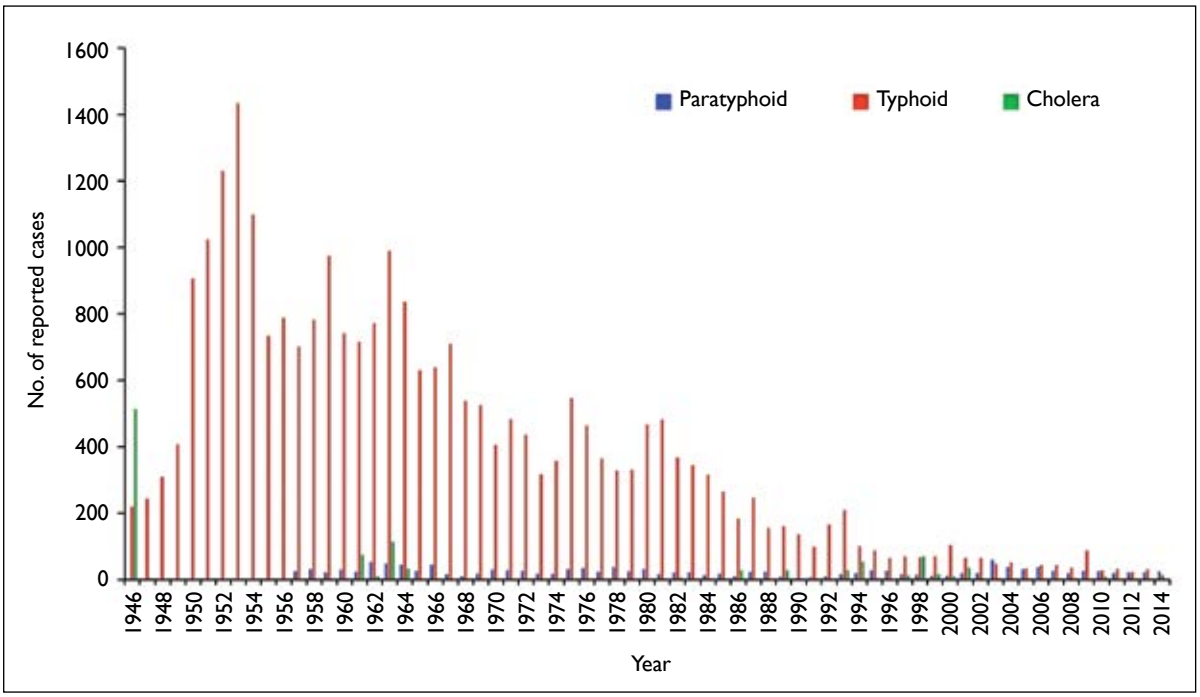

FIG 2. Reported cases of typhoid fever, paratyphoid fever, and cholera in Hong Kong from 1946 to 2014 (cases of typhoid and paratyphoid fever were grouped together before 1957)

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