Multiple Epidemic Events

Cuba and the Insurrection Against Spain (1895-1898)
• In the early part of 1895, Cuban revolutionaries rose up against the Spanish authorities on the island and a conflict continued on a largely guerrilla footing until the entry of the US into the war in the form of the Spanish-American war
• Monthly mortality per 10,000 population among the civilians of 7 major towns and cities in Cuba between 1895-1898 - including the capital Havana - during the period of the Insurrection there was a marked rise in the average monthly mortality rate of approx. 120 deaths/10,000 population, then a reduction during the Spanish-American War then a rise again until US occupation in January 1989
• Major epidemics of Yellow Fever, Smallpox and Enteric (Typhoid) Fever during the conflict of the Cuban Insurrection
• To what extent did the Cuban Insurrection impact upon these epidemics?
• High correlation coefficients = high degree of similarity in terms of time series behaviour → units are highly integrated in terms of disease activity
• Low values of the correlation coefficient = low degree of similarity in terms of time series behaviour → units weakly integrated in terms of disease activity
• During times of peace in Cuba, prior to the Insurrection, small levels of association between towns and cities is found for smallpox - weakly integrated
• During war time in Cuba, during the Insurrection, high levels of association between towns and cities is found for smallpox - strongly integrated ecological system
• All these diseases have a short incubation period, meaning the susceptible population is quickly used up

Tuberculosis as a War Epidemic
• Bacterial disease (Mycobacterium tuberculosis) - most common, bacteria for which humans are the natural reservoir - and Mycobacterium bovis - bovine tuberculosis which can be transmitted to humans, such as through the consumption of contaminated milk
• Transmission route: aerosol - coughing, sneezing, particularly associated with crowded, unventilated conditions
• Incubation period: months/years/lifetime - very long
• Estimated that worldwide approximately 1/3 of the population is infected with mycobacterium tuberculosis - but most will not be affected by clinical disease
• Only within certain environmental conditions does it manifest in clinical disease
• Impact of war on tuberculosis:
  1. Environmental conditions enhance transmission (overcrowding - critical to transmission, e.g. air raid accommodation shelters, concentration camps and refugee camps)
  2. Social conditions reduce resistance to infected individuals (protein-calorie malnutrition - enhanced danger of the development of clinical disease in malnourished populations - e.g. in war severing of food supply lines, rationing of food)
• Concentration camps are extreme examples of both of these factors
• But also occurring in circumstances such as besiege situations - e.g. in the Franco-Prussian War, the Prussians besieged Paris and cut off food supply lines into the city, leading to nutritional deprivation, underpinning a major tuberculosis at that time in Paris
• Distinct spikes of tuberculosis activity is associated with times of war
• During the Cuban Insurrection, tuberculosis was a major problem
• In the pre-Insurrection period, typical monthly mortalities from tuberculosis in Havana were in the order of 100-150 deaths/month.
• During the course of the war, tuberculosis mortality rises to 250-300 deaths/month - during the war, the Cuban Insurrectionists were gaining support from the rural population in the countryside, in the form of food and munition.
• In order to curb this support, the Spanish authorities re-concentrated the population of rural Cuban areas - gathering the rural population up and relocating them into various urban areas where they could be monitored, removing any support for the Cuban revolutionaries in the countryside.
• First example of population re-concentration as a military strategy in the modern war - the idea was subsequently used by the British in the Boer War, setting up concentration camps in South Africa and most famously by the Germans in WWII with the setting up of concentration camps.
• By the end of 1896 when the strategy was instituted, some 400,000 rural civilians (1/4 of Cuban population) had been moved to urban areas.
• The conditions were at best dire - one US Public Health Personnel in Havana described one place set aside for rural populations in 1897:
  • ‘Los Fosos consists of large wooden building about 150 feet in length and 60 feet in width... 500 people in and around this building, and of that number over 200 were found lying on the floor sick and dying’
• Evidence of differential timings of infectious disease outbreaks in Havana during the Cuban Insurrection - e.g. peak of Yellow Fever occurred in the early period of the Insurrection, while Smallpox occurred in the mid-period of the Insurrection, contrasting with bacterial diseases like Enteric Fever and Tuberculosis (gradual buildup of mortality over time, peaking in the later period of the Insurrection, due to longer incubation periods).

Epidemic Transmission in Civil Populations - Summary
• The Military-Civilian Interface: ‘Spanish’ Influenza (1918-1919)
  • Rapidity of spread was a reflection of the dramatic developments in global connectivity in the late 19th and early 20th centuries
  • Military demobilisation was crucial in the initial seeding and subsequent global diffusion of the virus
  • Influenza spread at such a speed that the contagious wave of disease progression was to swamp any hierarchical component
• Multiple Epidemic Events: Smallpox, Yellow Fever and Enteric Fever in Cuba (1895-1898)
  • Insurrection of 1895-98 resulted in a higher degree of epidemiological integration than seen in the pre-war period
  • Different diseases, with different epidemiological parameters, may operate at different stages of a war
• Tuberculosis as a War Epidemic
  • Associated with environmental and nutritional conditions relating to (i) disease transmission and (ii) reactivation of latent infection
  • Unlike many viral diseases with short incubation periods and lasting immunity in exposed populations, wartime influences on tuberculosis activity may extend for many years after the end of active hostilities.