# Did European Diseases Cause a Demographic Collapse? Matthew Wiecek

## Introduction to the Topic

When European explorers encountered the native peoples of the Western Hemisphere, they introduced a cocktail of new diseases. These diseases included smallpox, tuberculosis, measles, typhoid fever, typhus and more. Europeans were intimately familiar with these diseases; they'd been dealing with recurring epidemics for thousands of years. When these diseases arrived in the Western Hemisphere, they did what infectious diseases had always done, and became devastating epidemics. The exact death toll has been a matter of debate for the better part of a century. This essay will provide an overview of the debate.

## Using Historical Records

Historical records include censuses, and the accounts explorers and missionaries wrote about their travels. Censuses consist of Spanish colonial officials counting the number of indigenous peoples in their lands. Censuses are available after colonial administrations were fully set up, which means that they are counting population after the first epidemics, not before. Explorers and missionaries left descriptions of their travels and the people they met. They often provided an estimate of the number of people who lived there. Since all of this data is from after the first epidemics, it is necessary to estimate the fraction of the population that was killed by those epidemics, and use that to estimate the population at European contact. This is what historians who have studied this problem have done.

In the Carribean, Angel Rosenblat used the accounts of Spanish missionaries and explorers to estimate the population of Hispaniola before European contact (Rosenblat 1992). He turns to the accounts of the priest and missionary Bartolome de Las Casas, in his books *Historia de las Indias* and *Apologetica Historia*, the accounts of Fernandez de Oviedo, and letters written by the Dominican monks in Hispaniola. Rosenblat argues for a relatively small pre-contact population, mentioning that only scattered small settlements are described (Rosenblat 1992:58). Similarly, in Nicaragua, David Radell estimated the population and the impact of the slave trade on the population by using the accounts of Las Casas, Oviedo and Herrera, found in letters to the Crown, royal decrees, and their books (Radell 1992).

In Florida, Henry Dobyns used descriptions of native cities, written by Europeans, to estimate the population at European contact (Dobyns 1983:190-212), and his sources include explorers and officials such as Pedro Menendez de Aviles, John Sparke, Panfilo de Narvaez, Hernando de Soto, and Jacques le Moyne's drawings.

## Using Cultural Ecology

The ability of the land to produce food provides further evidence of population. Each landscape has certain food resources available, in certain amounts, can feed a certain number of people. Native cultures in many regions of the Western Hemisphere also practiced agriculture, which increases the population capacity of the land considerably. An archaeologist can use knowledge of the food resources available in an ecosystem, and their agricultural practices, to estimate what their population should have been given the amount of food available. Evidence of food eaten typically consists of plant remains, animal bones and food residues on the inside of a cooking pot. Since evidence is available from before European contact, this provides information both before and after epidemics reduced

population. For one example, when Henry Dobyns estimated the pre-contact population of Florida, he started by assessing the carrying capacity of the land, and the productive capacity of native agriculture there (Dobyns 1983).

Far to the south in South America, William Denevan estimated the change in population of the Amazon by estimating the population of each habitat individually, and then synthesizing them into a regional estimate (Denevan 1992). He used information about landscape and available food resources to estimate the total population that the land could support, and then estimated pre-contact population based on that. He notes that there were very few sources of plant protein in the Amazon, with nothing like the corn-beans-squash diet seen in North America (Denevan 1992:208). Instead, cultivated plants in the Amazon were primarily starchy tubers, and protein instead had to come from fish and game (Denevan 1992:208). Protein has a big influence on population, so this is an important factor in estimating the population of a specific area within the Amazon (Denevan 1992:209).

## Using Archaeology

In her book Vectors of Death, Ann Ramenofsky used archaeology to determine the effect of epidemics on the population of the Middle Missouri, upstate New York and the Lower Mississippi Valley (Ramenofsky 1987). One kind of evidence she used was the size of houses and settlements. She used anthropological field research on contemporary Native Americans to find out how many people lived in each house at European contact. She then multiplied that number by the number of houses in each settlement at each point in time to determine the population (Ramenofsky 1987:18-19). This approach, studying present Native Americans to learn about past Native Americans, works best in the American Southwest and Mexico. There, the pre-contact cultures are still around, and anthropologists can study them (Ramenofsky 1987:17). In his study of population decline in Florida, Henry Dobyns also used archaeological evidence of settlements, in combination with Spanish, French and English accounts (Dobyns 1983).

## Evidence from Geography

Since 2008, Richard Nevle, Dennis Bird, Robert Dull and William Ruddiman have found evidence that settlements and farms were abandoned on a large scale after the arrival of Europeans into the Western Hemisphere (Nevle and Bird 2008, Dull et al 2010, Nevle et al 2011). They used charcoal as evidence of change in forest cover.

## Uses of Epidemiology

Since this is a question of the impact of epidemics on population, epidemiology has an important role to play here. Many of the researchers described above described the behaviour of disease, and how it relates to the areas they are studying.

Henry Dobyns started his book by describing basic characteristics of the diseases that affected the New World. He then argued that anthropologists have long been making a mistake by assuming that there is continuity between precontact and present cultures, and that because of devastating epidemics there was massive culture change before contact.

Daniel Shea, in his study of Peru, used a model that accounts for the facts that depopulation varied by region, and that the rate of depopulation changes as the population decreases (Shea 1992). First, he argues that epidemics would not spread as quickly in Peru as Mexico. In central Mexico a disease can

spread in all directions, whereas in Peru, which is very narrow, it can only spread in one line. In addition, Peru is far more mountainous, which restricts movement. He then says that larger populations will be hit harder by epidemics than smaller ones.

In estimating the rate at which the population declined, and estimating the population before European contact, he took a different approach. Previously, historians used a series of percentages. Shea used a mathematical model that was based on natural logarithms instead of percentages. It also accounted for the fact that, as the population declines, the rate of change decreases with it. Population loss is faster when the population is high, and slower when the population is low. He also creates a stratified sample by examining the rate of decline in individual regions, and then bringing those regional estimates together.

Ann Ramenofsky used the key principles of epidemiology as the foundation of her argument regarding the spread of disease (Ramenofsky 1987). First, she discusses in depth the factors that determine how an infectious disease spread. One fact is that, when a person catches a disease, they are infectious for a specific period of time after that, and not infectious after that. Being on a ship crossing the Atlantic quarantines a person, preventing them from spreading a disease until they're ashore again and in contact with new people (Ramenofsky 1987:167). Another factor is that a disease's spread is limited by the ability of people to move around. She argued that, initially, only diseases that could survive the long trips from Europe and spread through poor transportation systems would cause epidemics. Later, new diseases would come over from Europe as travel time decreased and transportation improved (Ramenofsky 1987:167).

Ramenofsky also argued that the New World was not suitable for the evolution of infectious human diseases because large nucleated settlements were widely scattered (Ramenofsky 1987:169), and transportation between settlements was too poor to transmit diseases (Ramenofsky 1987:167).

## Criticisms

The research that uses census data has been criticized on the grounds that 16$^{th}$ century colonial censuses were not reliable counts. William Sanders and David Henige, in separate publications (Sanders 1992 and Henige 1998), argued that there was census fraud in both directions. The Spanish wanted as much tax income as possible, so they inflated the number of natives as much as they could get away with. The natives wanted to pay as little tax as possible, so they deflated their numbers as much as they could get away with. As the native population decreased, the tax based decreased, and this put extra pressure on the Spanish to increase the number of taxable natives and maintain their income. Daniel Shea also pointed out that later censuses were more exact than previous censuses, which may skew results (Shea 1992:177).

Another criticism is that these estimates can have a very high margin of error. When historians take census numbers, and use a series of multipliers to increase them, each step multiplies the margin of error. Rudolph Zambardino argued that this makes the margin of error so wide that the results are meaningless (Zambardino 1980). Daniel Shea also argued that Cook's range of multipliers has no meaning (Shea 1992:177).

Spanish colonial authorities did not count accurately, even when it would have been easy. David Henige uses a room in Peru as an example. This room was there for a long time, it didn't change, and it didn't move anywhere. Several people saw the room, and had time to have a long look at it. They came up

with wildly varying estimates of its size (Henige 1998:97-99). This makes it clear that colonial writers did not necessarily count accurately.

Researchers ignored the roles of warfare and migration. Natives were known to be highly mobile, moving into another area to avoid taxes (Henige 1998:185). They also engaged in endemic warfare (Henige 1998:149). Both of those can lead to population loss in a specific area that has nothing to do with disease.

## Conclusion

For a hundred years, there has been a lively debate about the pre-contact population of the New World, and the loss of population due to epidemics. It is agreed that epidemics had a major impact on the population, and that the pre-contact population was quite high. Evidence from history, archaeology, cultural ecology and geography all agree on that. The exact numbers vary, though, from the low estimates of Kroeber and Rosenblat and others, to the very high estimates of Cook, Borah, Simpson and Dobyns and others. This attests to the importance of a careful reading of the existing literature, as well as new archaeological research. More excavated sites from that time period would add to the demographic data needed to resolve this dispute. This is no idle matter, either: knowledge of the past experiences of the indigenous peoples of the New World is necessary for harmonious coexistence today. Finally, this ties in with recent research into the causes of the Little Ice Age. Several scientists have argued that this demographic collapse depopulated villages and farms, enabling forests to reclaim them, and that those expanded forests removed enough carbon from the atmosphere to cause the Little Ice Age (Nevle and Bird 2008, Dull et al 2010, Nevle et al 2011). It is therefore clear that this line of inquiry has potential for a productive future.

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