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In this lecture, we'll describe the Framingham Heart Study, one of the most important epidemiological studies ever conducted, and the underlying analytics that led to our current understanding of cardiovascular disease.

To motivate how the study affected our understanding of blood pressure today, we describe the case of Franklin Delano Roosevelt, FDR for short, who was the President of the United States from 1933 to 1945.

He was the longest-serving president of the United States, and he led the country during difficult times -- the Great Depression, and World War II.

He died while President on April 12, 1945.

Before the presidency, FDR's blood pressure was 140/100.

Today, healthy blood pressure is considered to be less than 120/80.

So therefore, 140/100 is today considered high blood pressure.

One year before his death, his blood pressure was 210/120.

Today this is called hypertensive crisis, and emergency care is needed.

On the other hand, FDR's personal physician said a moderate degree of atherosclerosis although no more than normal for a man of his age.

Two months before his death, his blood pressure was 260/150, and the day of his death was 300/190.

There were early misconceptions in the first half of the 20th century about blood pressure.

High blood pressure, dubbed essential hypertension, was considered important to force blood through arteries, and it was considered harmful to lower blood pressure.

Today, of course, we know better.

In the words of Daniel Levy, the Framingham Heart Study director, "today presidential blood pressure numbers like FDR's would send the country's leading doctors racing down hallways, whisking the nation's leader into the cardiac care unit of Bethesda Naval Hospital." So how did we learn?

In the late 1940s, the US government set out to better understand cardiovascular disease.

The plan was to track a large cohort of initially healthy patients over their lifetimes.

A city was chosen, the city of Framingham, Massachusetts, to be the site for the study.

Framingham has an appropriate size.

It's not too large, it's not too small.

It has a stable population that doesn't move too much.

And the doctors and residents were quite cooperative.

So in 1948, the Framingham Heart Study started.

The study included 5,209 patients, aged 30 to 59.

Patients were given a questionnaire and an examination every two years.

During this examination, their physical characteristics were recorded, their behavioral characteristics, as well as test results.

Exams and questions expanded over time, but the key in the study was that the trajectory of the health of the patients was followed during their entire lifespan.

In this class, we will build models using the Framingham data to predict and prevent heart disease.