



190F
Fall 2018

Foundations of Data Science

Lecture 35

Case Study: Health

Announcements

Introduction

(Excerpt 2:45)

Malcolm Gladwell

- Author (Blink, The Tipping Point) & journalist (New Yorker)
- "Revisionist History will go back and reinterpret something from the past: an event, a person, an idea. Something overlooked. Something misunderstood."
- You should listen to the whole episode:
Season 2, Episode 10

The Diet-Heart Hypothesis

Cardiovascular Disease

- *Atherosclerosis* narrows arteries due to plaque buildup.
- #1 cause of death and disability in the developed world.
- Cardiovascular disease (CVD) is the leading global cause of death: 17.3 million deaths per year.
- The causes are not known, but there are associations with high blood pressure, diabetes, smoking, obesity, family history, age, inactivity, and an unhealthy diet.

Diet & Cardiovascular Disease

- 1.7M deaths worldwide are attributed to low fruit and vegetable consumption by the WHO (2011).
- High intake of salt is linked to high blood pressure.
- High intake of processed foods is linked to obesity.
- Eliminating trans fats is widely recommended.
- Added sugar is linked to high blood pressure & obesity.
- High intake of alcohol is associated with CVD risk.

The Diet-Heart Hypothesis

Hypothesis:

- Replacing saturated fat (e.g. dairy) with polyunsaturated fat (e.g. plant-based oil) reduces risk of heart disease.

Justification:

- This replacement reduces serum cholesterol.
- Serum cholesterol is associated with heart disease.
- "Clinical trials that used polyunsaturated fat to replace saturated fat reduced the incidence of CVD." (AHA, 2017)

Hypothesis Testing

Designing an Experiment

Hypothesis:

- Replacing saturated fat (e.g. dairy) with polyunsaturated fat (e.g. plant-based oil) reduces risk of heart disease.

What evidence would support this hypothesis?

Minnesota Coronary Experiment (1968-1973)

(Excerpt 11:10)

Broste Thesis Figure 6

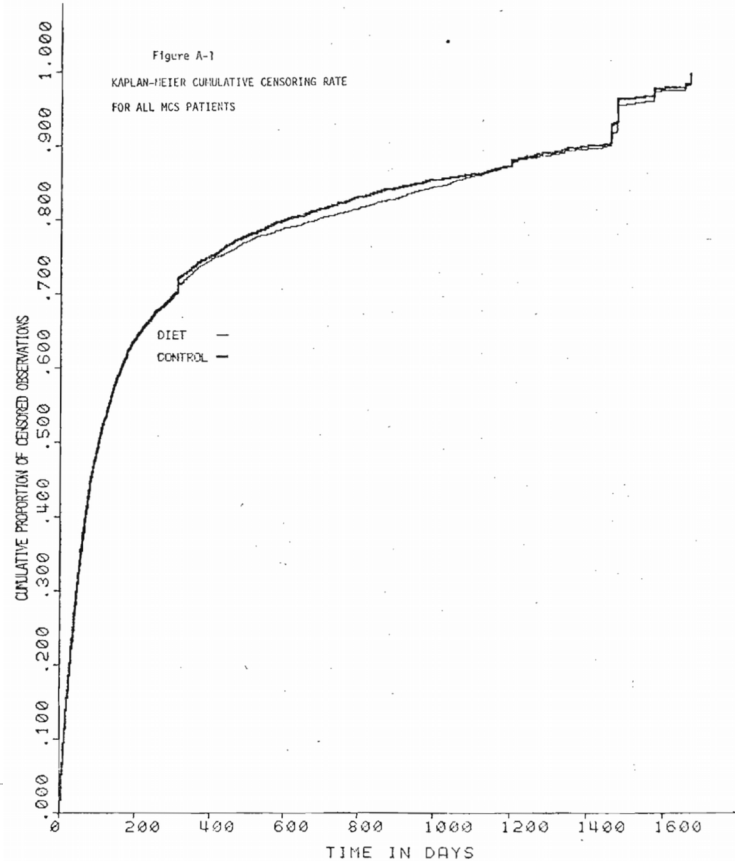
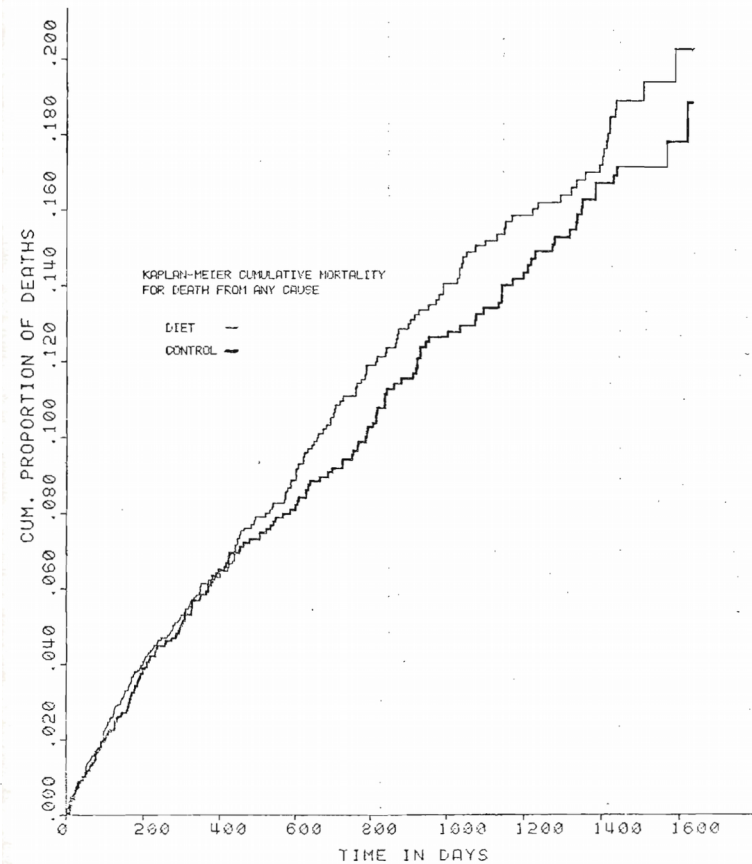
Number of Deaths by Age and Randomization Group

Age	Diet			Control		
	Randomized	Died	%	Randomized	Died	%
LT 35	1367	3	0.2	1337	7	0.5
35-44	728	3	0.4	731	4	0.5
45-54	767	14	1.8	816	16	2.0
55-64	870	35	4.0	896	33	3.7
GE 65	953	190	19.9	958	162	16.9
TOTAL	4685	245	5.2	4738	222	4.7

(Demo)

(Excerpt 3:35)

Broste Thesis Figures



Other Clinical Trials

Controlled Experiments

- Wadsworth Hospital and Veterans Administration Center in Los Angeles evaluated a diet [using] corn, soybean, safflower, and cottonseed oils, all high in polyunsaturated linoleic acid, to replace saturated fat in the control diet (*846 men; mean age of 65 years; 30% had CVD; 8 year duration*).
- Oslo Diet-Heart Study evaluated changing to a low saturated, high polyunsaturated fat diet (*412 men with prior MI*).
- British Medical Research Council compared a diet containing soybean oil, 86 g/d, with a diet with saturated fat from animal products (*393 men with prior MI*).

Finnish Mental Hospital Study

"The Finnish Mental Hospital Study compared a diet high in polyunsaturated fat, mainly from soybean oil, with a diet high in saturated fat in 1222 patients at 2 psychiatric hospitals. In 1 hospital, the high polyunsaturated fat diet was given first, followed by the saturated fat diet; in the other hospital, the diets were given in the reverse order (*1222 patients; 6 years*)."

- Non-blind & conditions evaluated at different times.
- "The amount of sugar in the diet varied by almost 50%."
- "The use of psychiatric drugs with known cardiovascular side effects differed substantially between groups."