

Data Analysis: Trans fats, saturated fats, and coronary heart disease

Necessary background knowledge:

- 1) Function and structure of lipids (Question #7 Lecture)
- 2) Evaluating scientific evidence (The nature of science lecture/notes)
- 3) Scatter graphs and best fit lines
- 4) Calculating percent change

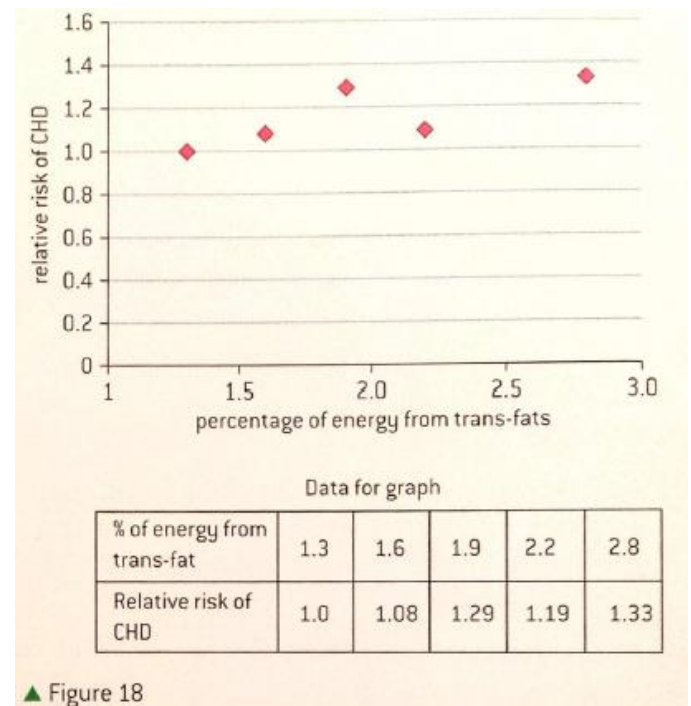
The Nurses' Health Survey is a highly respected survey into the health consequences of many factors. It began in 1976 with 121,700 female nurses in the USA and Canada, who completed a lengthy questionnaire about their lifestyle factors and medical history. Follow-up questionnaires have been completed every two years since then. Details of the methods used to assess diet and diagnose coronary heart disease can be found by reading a research paper in the American Journal of Epidemiology, which is freely available on the internet: Health Study. American Journal of Epidemiology 161:672-679. Doi:10.1093/aje/kwi085.

To assess the effects of trans-fats on rates of CHD (coronary heart disease), the participants in the survey were divided into five groups according to their trans-fat intake. Quintile 1 was the 20% of participants with the lowest intake and quintile 5 was the 20% with the highest intake. The average intake of trans-fats for each quintile was calculated, as a percentage of dietary energy intake. The relative risk of CHD was found for each quintile, with Quintile 1 assigned a risk of 1. The risk was adjusted for differences between the quintiles in age, body mass index, smoking, alcohol intake, parental history of CHD, intake of other foods that affect CHD rates and various other factors. Figure 18 is a graph showing the percentage of energy from trans-fats for each of the five quintiles and the adjusted relative risk of CHD. The effect of trans-fat intake on relative risk of CHD is statistically significant with a confidence level of 99%. A confidence level of 99% tells us that if we ran the same experiment 100 times, we would expect to get the results we got 1 time if trans-fats had no effect on CHD.

- 1) Suggest reasons for using only female nurses in the survey.

- 2) List the 6 items mentioned that the risk of CHD was adjusted for.

- 3) Explain why the risk for a nurse in a given quintile should be adjusted up or down for one of the 6 risk factors mentioned.



4) State the trend shown in the scatter graph above.

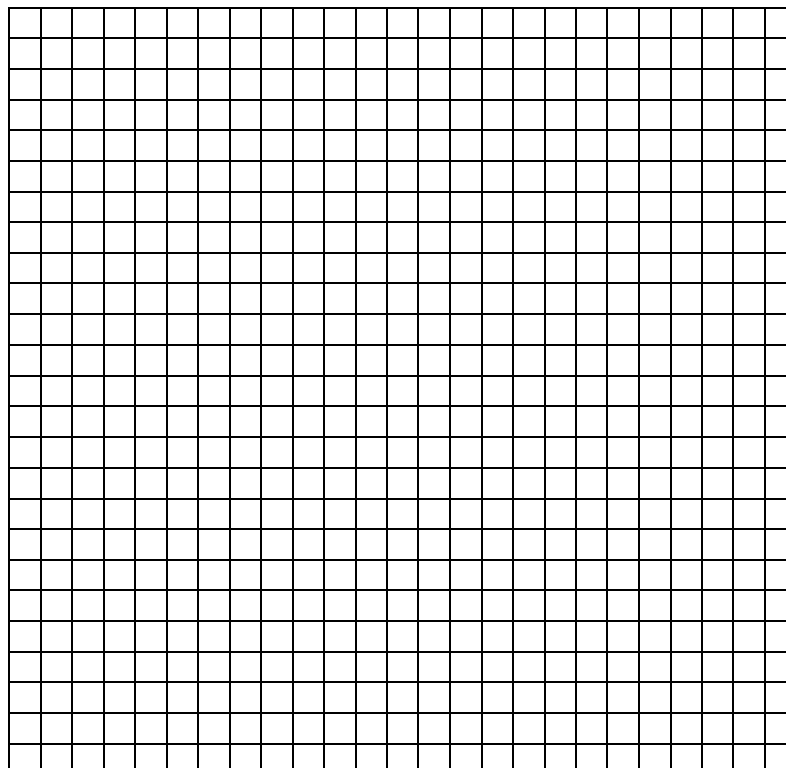
5) Calculate the increased risk for CHD for each quintile. Show your work!

Data-based questions: Saturated fats and coronary heart disease

Populations ranked by % calories as saturated fat		E. Finland	W. Finland	Zutphen	USA	Slavonia	Belgrade	Crevalcor	Zrenjanin	Dalmatia	Crete	Montegiorgio	Veilika	Rome	Corfu	Ushibuka	Tanushimaru
% Calories as saturated fat		22	19	19	18	14	12	10	10	9	9	9	9	8	7	3	3
Death rate/ 100,000 yr ⁻¹	CHD	992	351	420	574	214	288	248	152	86	9	150	80	290	144	66	88
	All causes	1727	1318	1175	1088	1477	509	1241	1101	758	543	1080	1078	1027	764	1248	1006

▲ Table 2

6) Make a scatter graph of the data table above. Include best fit lines. Think about strategies for representing this data in the clearest possible way. For example: using different colors, keys, etc.



- 7) Compare the results for East and West Finland

- 8) Compare the results for Crete and Montegiorgio

- 9) Is there a correlation between dietary saturated fat and coronary heart disease?

- 10) Is there evidence that dietary fat causes heart disease?

- 11) Justify your answer to the last question. Justifications have 3 components: 1) theory or established knowledge, 2) data from analysis related to the theory or knowledge, and 3) Explanation of HOW the data is related to the theory or knowledge.

Guiding Question: How does dietary fat affect coronary heart disease?

Our Claim:

Our Evidence:

Our Justification of the Evidence:

Use your scientific knowledge and analysis to support your interpretation