Math 203 – Statistics Project

For this report, you are to form yourselves into groups of size up to four. The exact size and composition of the group is up to you.

Goal: To find, read, understand, and critique a statistical study on a medical topic.

Topics: More than one group may share the same topic but no sharing whatsoever is allowed *between* groups. The following topics are suggested; other topics may be chosen *with approval* of the instructor. If in the process of searching for information about one of these topics, you find information about a closely related (but different) topic (which interests you), you may use it. In any event, the precise statement of your topic will depend on the article you find.

- Does being overweight increase one's risk of cardiovascular disease?
- Does reducing ones caloric consumption prolong one's life? (Some studies have been done on animals other than humans.)
- Is marijuana smoking addictive?
- Is tobacco smoking addictive?
- Does use of chewing tobacco cause oral cancer?
- Does having an abortion increase a woman's risk of breast cancer?
- Does regular exercise decrease one's risk of cardiovascular disease?
- Does consumption of dietary fiber reduce one's risk of cardiovascular disease?
- Does taking vitamin A pills reduce one's risk of getting cancer?
- Does daily consumption of aspirin decrease one's blood pressure?
- Does daily consumption of aspirin decrease one's risk of colon cancer?
- Does daily consumption of a modest amount of alcohol decrease one's blood pressure?
- Is dietary aluminum intake associated with Alzheimer's disease?

- Does daily consumption of vitamin C pills reduce one's incidence (or severity) of the common cold or influenza?
- Does home fluoride application improve one's dental health?
- Does excessive fluoride intake damage one's bones?
- Does low frequency electromagnetic radiation (e.g. from proximity to power lines) have any negative health effects?
- Does consumption of alcohol by pregnant mothers reduce the birth-weight of their children?
- Does the smoking of tobacco by pregnant mothers reduce the birth-weight of their children?
- Does passive smoking have negative health effects?
- Does increasing one's calcium intake reduce one's risk of osteoporosis?
- Does exposure to asbestos increase one's risk of getting lung cancer?

What type of article should the group look for? You must find an article which reports on a statistical study. **The article must be a primary source!** Surveys (which comment on other people's work) are *not* acceptable as your main article, but you could refer to them as secondary resources. Indeed this might make your job much easier. Do not use metastatistical studies (which merge data from several sources). Almost invariably such studies are bad science.

How should the group find an article? You may start by looking at newspapers, magazines etc and try to locate an article that way if you wish. However, I recommend the following approach.

- Start by querying a web search engine. If you do not know how to use the World Wide Web, now is a good time to learn. You can go to Love Library and use the computers there; the reference librarians will be happy to help you. I will too if you come to my office.
  - If you do your work early in the morning, the computer will respond faster.
  - Start with the National Library of Medicine's search engine, PubMed, which can be found at the NCBI webpage `http://www.ncbi.nlm.nih.gov/`.

(The trailing period is not part of the URL.) You can also try a general search engine, such as `http://www.altavista.com/`.

  - Give the search engine a list of keywords which you think will get you to an article. The librarian can give you some guidance here.
  - Look at some of the documents found by the search engine. Some skill is involved in choosing those that are likely to yield the information you are looking for.
  - Based on what you have found, revise your list of keywords (if need be) and try again.

- Make sure that your reference(s) are complete before proceeding.
- Go to the library computer (using the URL "`http://iris.unl.edu/`)" and find the journal or journals which you need. Find out which library houses them.
- Go get the journal or:
  - If the journal is housed in C. Y. Thompson Library, you may wish to submit a request for the library to fetch the article and deliver it.
  - Use Interlibrary Loan if need be.

  One advantage of going to get the article yourself is that the volume it is in may contain other relevant articles, e.g. commentaries on the article you have selected.
- Make sure you have a copy of your main article. This will need to be turned in with your report.

Make sure that you really have a primary source. Otherwise, you could end up wasting a huge amount of time. If you are unsure whether you have a primary source or not, come and ask me.

Carefully read the article. You are obligated to understand the article in its entirety, with the exception of technical statistical remarks which are beyond the scope of Math 203. Look up words you do not know, but your understanding should be deeper than simply being able to repeat the meanings of the words.

Analyze the article. Ask lots of questions. Look carefully at the data itself. Some things to consider are:

- What was the population and what was the sample? How was the sample chosen and how big was it?
- It is very, very important to understand as much as possible about how the data was gathered. Have the authors told you enough about this?
- Look at the data yourself. Can you discern a pattern?
- How might bias have occurred in the sampling? The more bias you can identify, the better. Were there confounding variables? Do not confuse bias with sample size or sampling variability.
- In the case of an experiment, was there a control group? Were the subjects randomly assigned? Was the study double-blind?
- Discuss confidence intervals. Make your own independent calculation of them.
- What are the conclusions of the study? Do they seem justified? How might the study have been improved? Can you suggest a completely different approach to the same problem?

Prepare your report. Your critique should take the form of a well written, coherent, grammatically correct essay. **Above all, your job is to pose intelligent questions about the methodology of the paper.** Your paper should flow smoothly, and in particular should not simply repeat questions given above. The essay should be single-spaced, typewritten, and *roughly* three pages in length. Include careful citations for those articles you have read. Be sure to include your article(s) with your report when you turn it in.

Your completed report will be due in class on Thursday, April 11.