# Homework 2

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**1. Choose all appropriate method or methods (i.e., questionnaire, diary, observation by investigator, records, physical or chemical measurement on environment, physical or chemical measurement on subject) for measuring each of the following variables for the prospective cohort study of physical activity and colon cancer: demographic factor, physical activities, family history of colon cancer, diet fiber, pre-existing medical condition (i.e. ulcerative colitis), and obesity (all at baseline)**.

Table 1. Measurement methods for different exposure variables in a prospective cohort study of physical activity and incidence of colon cancer (with a 10-year follow-up period).

| Exposure variable | Examples of methods of measurement |
|---|---|
| demographic factor | Assuming that "demographic factor" pertains to sex, race and age, then options include:<br>● questionnaire to be filled out by participant<br>● observation by the researcher<br>● observation by sample of others<br>● examination of birth certificates for each participant |
| physical activities | Participants' physical activities could be measured through<br>● accelerometers<br>● pedometers<br>● self-reporting<br>● observation ($) |
| family history of colon cancer | Family history of cancer could be measured through:<br>● self-reporting (questionnaire)<br>● Examination of cancer registry<br>● questionnaire for family members ($) |
| diet fiber | Dietary fiber could be measured through<br>● self-reporting (food diary)<br>● observation ($)<br>● examination of stool ($ and gross) |
| pre-existing medical condition (i.e. ulcerative colitis) | Pre-existing medical conditions could be measured through<br>● self-reporting (questionnaire)<br>● examination of medical records<br>● medical examination ($) |
| Obesity | Obesity could be measured through<br>● Weighing and measuring height (BMI)<br>● Skin folds<br>● Water displacement |

**2. Choose a method to measure salting of food at the table for a cross-sectional study of added salt and hypertension. (Assume that those with a prior diagnosis of hypertension are omitted.) Please also explain the reasons for your selection.**

For the measurement of salt consumption, self-reporting would be very inaccurate, since even the most honest participant might not be AWARE of how much salt they are consuming. Rather, I would provide enlisted participants with a salt-shaker, and instruct them to *only* use this salt-shaker at home for a period of 30 days. I would also ask that they record exactly how many times they ate at home (ie, 61 times). At the end of the month, I would measure the amount of salt consumed, and would be able to calculate average salting of food per meal through the following formula:

Average salting of meal:
(original quantity of salt - remaining quantity of salt) / (number of times they ate at home)

**3. What are the advantages and disadvantages of using a biochemical or physical method to measure the primary exposure in a case-control study vs. an interviewer administered questionnaire?**

The primary disadvantage of a biochemical or physical method is cost. Almost invariably, it is cheaper to simply ask someone than to measure directly. A secondary disadvantage hinges on the reliability of the test. Some tests have high specificity and sensitivity, and can be considered more reliable than direct questioning; other tests, however, are so unreliable that the self-reported answers might be more accurate (despite bias).

The primary advantage of a biochemical or physical method is accuracy. In general, despite the above qualification, biochemical/physical measurement is more reliable and consistent (and less subject to forms of bias such as recall, interview, social desirability, etc.) than a questionnaire. A secondary advantage is universality: unlike a questionnaire, which is language-specific, biochemical and physical measurement can be realized in all cultural and linguistic settings.

**4. What are the disadvantages of using a self-administered questionnaire in a case-control study of estrogen replacement therapy and coronary artery disease vs. an interviewer administered questionnaire?**

In a case-control study of estrogen replacement therapy and coronary artery disease, a self-administered questionnaire has several disadvantages (relative to an interviewer-administered questionnaire). Mainly, an interviewer can address questions and misunderstandings, as well as “flag” any questionnaires in which he/she suspects that the participant was being less than truthful. That said, a self-administered questionnaire is likely cheaper, which can be an important aspect to improving a measurement’s accuracy (since cheapness means bigger sample size, meaning less statistical uncertainty).