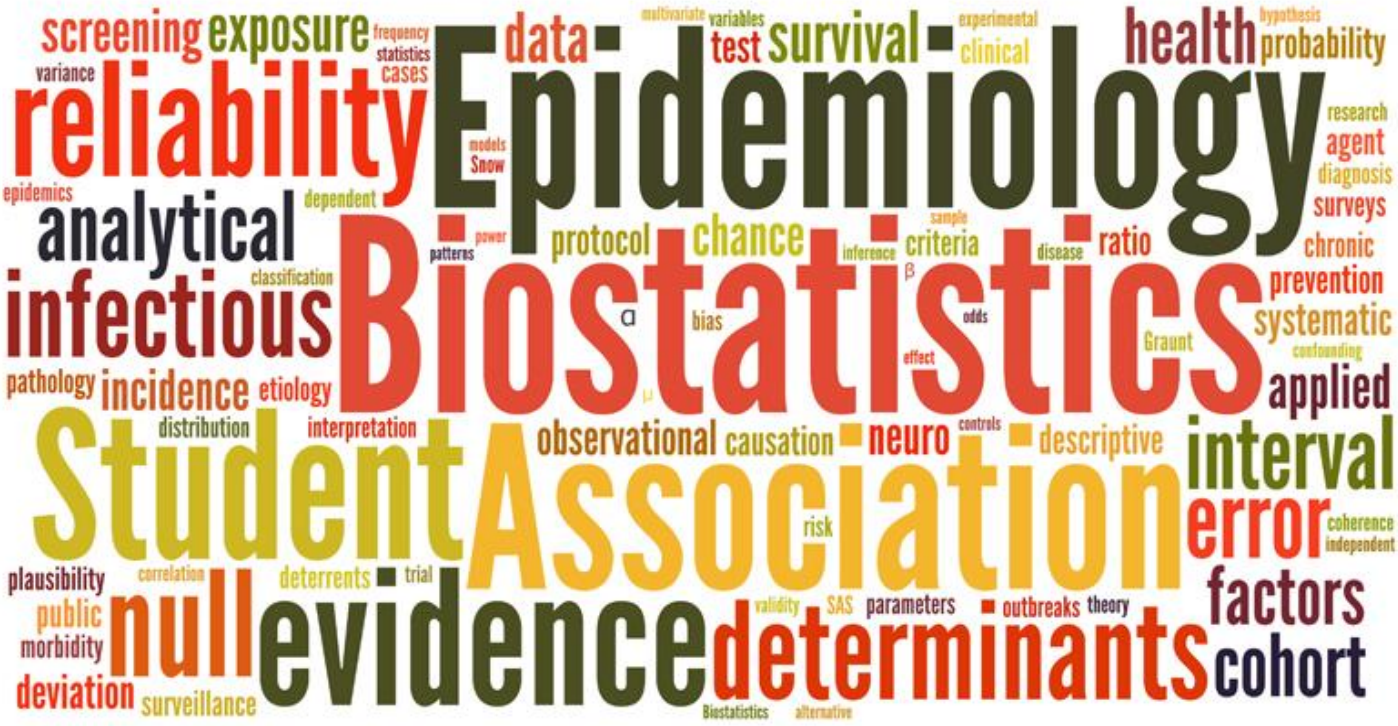
University of Jordan
Faculty of Medicine



☑ Sheet (Notes) ☐ Slide ☐ Handout

Number: 3

Done By: Dana Rida

Subject: Bias and Confounding

Doctor: Sireen Al-Khalidy

Price:

Date:

Bias and confounding

Section A is not included

Section B

Now to understand the whole subject you need to know what we mean by bias in epidemiology, we can say it is a mistake or an error.

Now why do I have to ask myself "is the association reala? Simply because it can be a Spurious association *explained in the previous notes*, that's why I need to see if there is a bias.

Examples on bias: I found there was an association but in reality there isn't.

Or I found there was no association but in reality there was.

Types of bias (slide 18)

The first two types "selection and information”: once they have been made they can't be corrected, because they are systemic errors effecting a step of the study, so it's impossible to take their effect away.

The third type "confounding”: can be reversed, if we discover the confounding factor at the analysis stage{conclusion} ,we can go back to the analysis again and do something about the confounding factor then find the real association.

Selection bias (slide 19)

In this bias we have selected the cases or the (exposed, non-exposed) in a way that it no longer represents their distribution in the population, so it's an error.

The example in the slides (20-22)

It's a case control study, I want to know what the association between alcoholism and pneumonia is. Usually when we want to know the association between two things I should do a case control study in the "community" which is the right way (slide 21), and as we can see after calculating OR (I will explain its calculations later , though we took it last semester) the result was 1 , which means there is no association (OR >1 there is an association , OR< 1 the association is inverse , means that this factor prevents a disease, OR=1 no association) OR = odds ration

Calculations in slide 21

	Disease	
	Yes	No
Exposure		
Yes	a	b
No	c	d

OR = AxD/CxB

So pneumonia is the disease, and alcoholism is the exposure

After calculating OR we discovered that there was no association since it was 1

The next slide is an example on selection bias

Instead of doing the study on people in the community, we did it on people in hospitals which is totally wrong, so this matches the meaning of selection bias; which is selecting the wrong cases or samples which should have been people from the community.

When calculating OR it equals 2.25 which means there is an association but in realty there isn't.

Slide 24

The last point is deleted (use prevalent…)

Working individuals are healthy because they can go and work, not like the ones sitting at home whether it's because they are old or need care.

Slide 25

Randomized clinical trials are the best in causality, but need more time and money (refer to last semester's slides if you want to know more about it, I know no one will)

Slide 26

From (when information is…) to the end of the slide; not included.

Slide 27

Surrogates, example: a person with cancer, after a while he died, but you need some info about his disease, so you ask a relative about that person. But this will cause an information bias because the relative might not know everything or remember much about that person's life.

Recall bias is more in the control (people who don’t have the disease) they sometimes can't remember being exposed to something because they don’t have the disease, so they don’t really care to remember it or harder to remember.

Slide 28

The people who collect data must have a standard way to ask questions, using verbs, accent… etc. they must be trained so that all of them have the same way in talking to people to avoid bias. Because some interviewers might explain more about the question than other interviewers so they might collect different data, the best way is having only one interviewer, but is some cases when there is a large number of people to be interviewed we need more than one, that's why we have them trained. The best way to avoid bias, is not letting the interviewer know that this is a case or control, not giving him the status of the person being interviewed, So that he would ask the question in the same way. This is called blinding.

Slide 29

Confounding could be one of the types of bias and could be considered by itself, because as we said before bias can't be corrected (systematic error) but confounding can.

What happens in confounding; you think that there is an association but actually if you remove the third factor there would be no association.

In the example the two cities looked as if they differed in crude mortality rates, but when we adjusted them for age, they turned out having same rates, because one of those cities had the younger ages in higher proportion, the other had a higher number of older people, this makes us think that age can be a confounder so we adjusted the age; we made the older group alone and the younger group alone. In every study we have to think what could be a possible confounder.

Slide 32

The sketch on the left as we can see it is a direct relationship there is no outside factor to play an effect.

The sketch on the right there is an outside factor affecting the exposer, the disease and the relation between them, so part of the association that we see could be due to this confounder.

Slide 33

The doctor skipped the last point.

Slide 37

Usually in our studies cases and controls must be matched, it means each case will be matched with another control very similar to it, in the same age, same characteristics, especially characteristics that might affect the disease (same education levels, same backgrounds ...) In this case we can move the effect of the things we have matched for.

In this example the problem happened because they were unmatched.

1-In slide 38 we didn't match the cases. In order to know if age is a confounder we did another table (slide 40), I need to do some matching, the older people in a category and the younger in another category. So if I wanted to see the effect of age as a confounding factor, I do something called stratification according to age (old age group, young age group) in this way I can see the difference, I noticed from the chart that 20% of the elderly cases were controlled (don't have the disease) which means that older people have the disease in a higher rate, in conclusion the disease is associated with older ages.

2-In the next slide (41) it's an exposure status(to see if the confounder associated with the exposure) we did a stratification according to age, we can conclude that 50% of exposure is in elderly and 10% among younger people, that means exposure among older people is more , so age is related to disease exposure . (By these two examples the two conditions where met to say age was a confounder, by it being a risk factor and associated with exposer)

Now go back to **slide 38** (the doctor kept on jumping back and forth between slides) in this example OR>1 so there was an association between the exposure and the disease, so we thought maybe age was a confounder. First we have to see if age met the two conditions which is what we did there in point 1 and 2 back then. Then we do a table (slide 43) which has each age category alone (by moving the effect of age using stratification), then by calculating the OR in each age, we found out that it equals 1(the real OR), which means that there is no association between exposure and the disease, and that age is really a confounder.

Slide 44

The OR was 2.9 without adjusting age, in the next slide when I adjusted the age, it turned out to be 2, so there is an association, but the extra 0.9 was due to the

effect of age. There might be also other confounders in the study so I have to stratify them and see if there is a difference.

Slide 47

The doctor did not explain the example.

You need to get the hang of everything in the material in order to be able to do the research with your group. Anything not clear please let me know.

Sorry for any mistake

By: Dana Rida