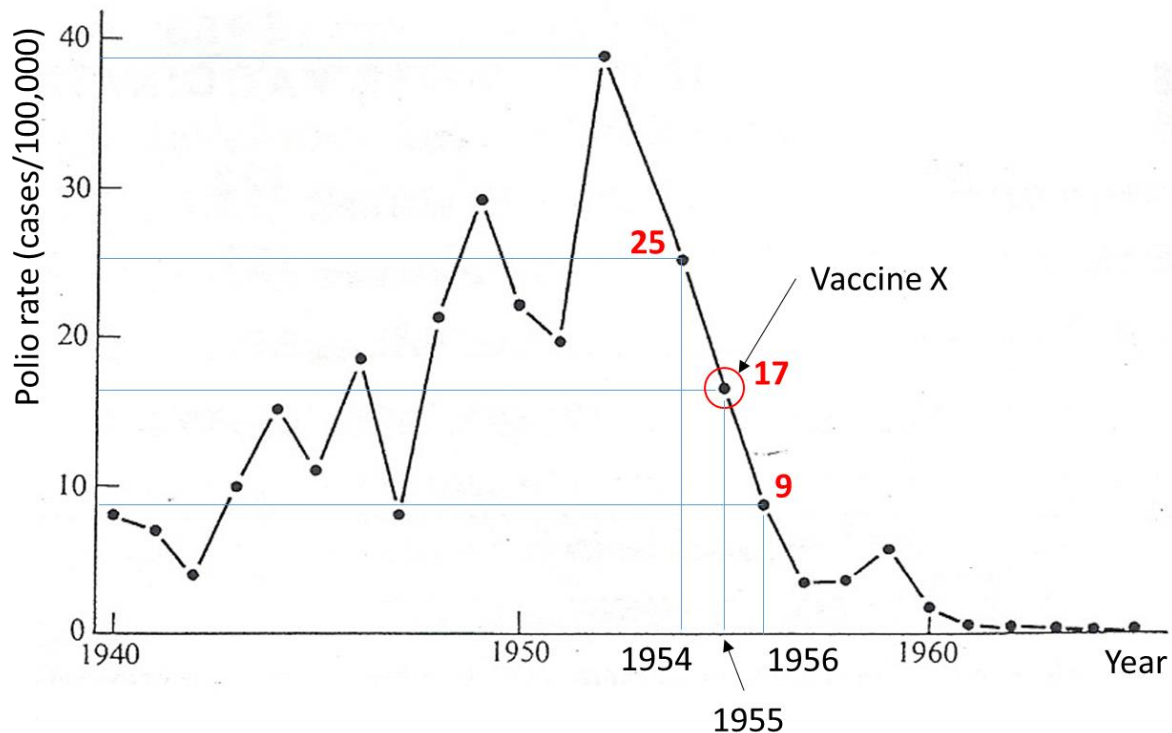


Quiz 1

1. The following figure shows the polio rate in the United States over the years. The vertical axis indicates the number of cases per 100,000 people and the horizontal axis indicates time. Let's assume a certain vaccine is given to all children in 1955. What can be concluded from the information given?



- A) The vaccine is effective as there is a reduction in incidence of 8 per 100,000.
- B) The vaccine is not effective as the reduction from the year 1955 to 1956 is equal the reduction from 1954 to 1955, and there was no vaccination in 1954.
- C) The vaccine is effective but its effectiveness is more than reduction of 8 per 100,000.
- D) We are not able to definitively comment on the effectiveness of the vaccine.

Explanation:

D is the correct answer. In the case an experiment does not have a control group, there is no way to tell if the change observed is due to treatment.

2. The direction of hair whorl on the crown of the head can be clockwise or anti-clockwise. Among all left-handers in the world, 50% have an anti-clockwise whorl. Among all right-handers, 10% have an anti-clockwise whorl. Given this information and assuming that people are either left handed or right handed, which of the following is true of all the left- and right-handers in the world?

- A) The percentage with an anti-clockwise whorl is 30%.
- B) The percentage with an anti-clockwise whorl can be calculated, but is not 30%.
- C) The percentage with an anti-clockwise whorl cannot be calculated, but it is between 10% and 50%.
- D) The percentage with an anti-clockwise whorl cannot be calculated, but it is either less than 10% or more than 50%.

Explanation:

C is the answer. Information provided indicate that people are either left handed or right handed. Now, among left handers we have 50% anti-clockwise and among right handers we have 10%. If we put these two groups together, the anti-clockwise whorl people percentage should be something between 10% and 50%. Notice that since no information is provided regarding the percentage of left-handers and right-handers in the population, we cannot precisely compute the percentage of people with anti-clockwise whorl.

3. A village has 150 inhabitants. 50 are less than 30 years old ("young"), of whom 20 like durian. The rest are at least 30 years old ("old"), of whom 20 like durian.

- A) There is no association between being young and liking durian, since the number of young persons who like durian is the same as the number of old persons who like durian.
- B) There is an association between being young and liking durian, since the number of young persons who like durian is the same as the number of old persons who like durian.
- C) There is no association between being young and liking durian, since the rate of liking durian among young persons is different from the rate among old persons.
- D) There is an association between being young and liking durian, since the rate of liking durian among young persons is different from the rate among old persons.

Explanation:

D is the answer. To see if there is an association between being young and liking durian, we should check if the rate of durian likers among young and old people are different.

Rate (durian likers | young) = $20/50 = 40\%$

Rate (durian likers | old) = $20/100 = 20\%$

Since these two rates are different, there is an association between being young and liking durian.

4. In a randomized controlled experiment, a large number of subjects are assigned to treatment and control groups randomly. Random assignment means that ...

- I) The results of the study can be generalized to a larger population.
- II) Control and treatment groups are very likely similar except for the treatment.

- A) Only (I)
- B) Only (II)
- C) (I) and (II)
- D) Neither (I) nor (II)

Explanation:

B is the answer. Random assignment to control and treatment will make the two group very similar. You can refer to unit 4 of chapter 1 for more information. Whether the results can be generalized to some larger population will depend on the sampling method used; watch out for chapter 3!

5. Consider two studies on the effect of a drug on lowering blood pressure.

Study A is a double-blind randomized controlled experiment with treatment group of size 5 and control group of size 5. The average blood pressures in both groups are very similar.

Study B is a double-blind randomized controlled experiment with treatment group of size 500 and control group of size 250. The average blood pressure of the control group is much higher than that of the treatment group.

Choose the best option:

- A) I will trust the results of study A since the treatment and control groups have similar size, while they don't have similar size in study B.
- B) I will trust the results of study B since sizes of treatment and control groups are large and I can be more confident that the difference observed is due to the treatment.
- C) I will trust the results of neither study.

Explanation:

B is the answer. In a controlled experiment where we want to test the effectiveness of a treatment or we want to see the effect of an exposure, it is important that control and treatment groups are as similar as possible so that the only difference between the two groups is the treatment. In unit 4 of chapter 1 we discussed that when dealing with **large** number of individuals, after we assign the individuals randomly to treatment and control, it is very likely that the two groups are similar in all aspects. Please note that it is totally fine if control and treatment groups are not the same size. When dealing with small group sizes, it is possible that the two groups are not similar. Can you imagine why?

6. The following is the method section of a study on “Bedtime in Preschool-Aged Children and Risk for Adolescent Obesity”. What is the design of this study?

“Data from 977 of 1364 participants in the Study of Early Child Care and Youth Development were analyzed. Healthy singleton-births at 10 US sites in 1991 were eligible for enrollment. In 1995-1996, mothers reported their preschool-aged (mean = 4.7 years) child’s typical weekday bedtime, and mother-child interaction was observed to assess maternal sensitivity. At a mean age of 15 years, height and weight were measured.”

A) A controlled experiment with historical control

B) A randomized controlled experiment

C) An observational study

Explanation:

C is the answer. This is an observational study since there is no assignment to treatment and control.

7. In unit 8 slide 4 of chapter 1, the statement “attitude to health seems to be a confounder” is fully justified by

I. Percentage of people with good attitude among adherers is different from the percentage of people with good attitude among non-adherers.

II. Percentage of deaths among adherers is different from the percentage of deaths among non-adherers.

III. Percentage of deaths among people with good attitude is different from the percentage of deaths among people with bad attitude.

A) I only.

B) II only.

C) III only.

D) I and II only.

E) I and III only.

F) II and III only.

Explanation:

E is the answer. Confounder is a third variable which is associated with both exposure and outcome. In this context, adherence is exposure and death is outcome. For attitude to health to be a confounder, it needs to be associated with both, adherence and death. (I) shows an association between exposure and attitude. (II) shows the association between the exposure and outcome. (III) shows the association between attitude to health and outcome. As such, I & III justify attitude towards health to be a confounder.

8. Singapore citizens of age at least 25 in 2012 are categorised as follows:

	University degree (in thousands)	No university degree (in thousands)
Age 25-34 (young)	215	215
Age 35 or above (old)	383	1527

Is there an association between being young and having a university degree?

A) Yes, because $383 > 215$.

B) Yes, because $215/430 > 383/1910$.

C) Yes, because $1527 > 215$.

D) Yes, because $383/598 > 215/598$.

E) No.

Explanation:

B is the answer. In order to prove that there is an association, it is needed to calculate two rates and compare them with each other:

Rate of university degree among young and old

Rate (university degree | young) = 215/430

Rate (university degree | old) = 383/1910