

Questions for Discussion

1.1

What can we learn just by looking at the chart?

From just visual inspection, it's pretty obvious that the vaccine group exhibited far fewer COVID cases than the placebo group. Thus, it's likely that vaccines are helpful in combatting COVID.

1.2

Just by looking at the chart, describe how you think the trials were performed.

A group of experiment participants who initially did not have COVID were probably separated into a placebo and vaccine group where the vaccine group received a COVID vaccine and the placebo group did not. Afterwards, the experimenters followed up with the study participants to track the number of participants that contracted COVID.

1.3

What are some questions to ask about the experimental procedure?

What COVID vaccine did they use? Was the same COVID vaccine given to everyone in the vaccine group? What was the placebo treatment? What were the sizes of the placebo and vaccine group? Were they the same size? Did the two groups live in the same area?

1.4

When designing experiments, it is useful to think about two types of control samples:

1. **Negative controls:** ways to show that you can correctly measure "zero" or a "null result".

2. **Positive controls:** ways to show that you can correctly measure "non-zero" or a "positive result".

Describe how both types of controls are present and used in this study.

Note that it is a bit of a trick question; or at least a deliberately open-ended question. In this case what you call the positive control and what you call the negative control depends a bit about what you are trying to measure.

The point of this exercise is to think through what we learn from this type of study. To help frame the discussion let's say that a "null result" would mean "the vaccine doesn't work" and a "positive result" would mean "the vaccine works perfectly".

The negative control is the placebo group, because it would allow us to determine whether the vaccine didn't work (i.e., whether the vaccine group line overlaps with the placebo group line). The positive control is the vaccine group, because it would allow us to determine whether the vaccine worked perfectly (i.e., whether the vaccine group line is horizontal).

1.5

Describe some things we might learn if we had the numbers that went into making this chart.

One thing we could learn if we had the quantitative results in addition to the qualitative results is the proportion of the vaccine group that ended up contracting COVID. Right now, we have no way of inferring this statistic. Another thing we could learn is the time at which the number of COVID cases between the two groups diverged.