BIOL 121 Lab 1 Notebook Guide

Research Proposal

# Research Question 1: Difference Between Two Groups

## **1. What is your research question?**

*...this is your “BIG question” about a potential difference in diabetes rate due to a particular variable of your choosing.*

## **2. Conduct background research.** Some background research has already done for you and the data made available.

## **3. Construct a hypothesis.**

## What is your hypothesis? What is your H0?

*...this is more specific. What difference do you expect to see? In which group*? Remember, your Ho will be “no difference.”

## Why do think this may be the case? What is the rationale for this hypothesis?

*Why do you expect to find the difference you just predicted in your hypothesis? You can have more than one potential mechanism.*

## **4. Test the Prediction/Design your experiment.** This is observational, based on existing data, in Unit 1.

## What variables do you have? You need an IV (group membership) and a DV (diabetes incidence rate). Should they be continuous or categorical/grouping? Label them as needed.

*Identify each variable and explain if it is continuous or categorical (a grouping variable). If you are going to change a variable from continuous (like divorce rate) to categorical, you need to decide on a cut off for your two groups. For example, you may put states with a divorce rate > 55% in Group 1 and states with a divorce rate < or = 55% in Group 2. If you make this change, explain it here.*

## What statistical test will you use to test your hypothesis? Will you need a one-tailed or two-tailed test? Will you need a paired or unpaired test?

*A two tailed test tests for a difference in any direction. For example, the diabetes rate may be higher in group 1 or higher in group 2. A one-tailed test (which most of you will use) makes a more specific prediction and only tests for a difference in one direct. For example, the diabetes rate may be higher in group 1 vs. group 2.*

*You need to use a paired t-test if your data in each “group” are from the same states. You need to use an un-paired t-test if your data in each “group” are from different states. ©*

How might you graph your data? What might they look like if you reject your H0?

# Research Question 2: Relationship Between Two Variables

## **1. What is your research question?**

*...this is your “BIG question” about a potential relationship between the diabetes rate and another particular variable of your choosing.*

## **2. Conduct background research.** Some background research has already done for you and the data made available.

## **3. Construct a hypothesis.**

## What is your hypothesis? What is your H0?

*...this is more specific. What relationship do you expect to see? Positive or negative?*

## Why do think this may be the case? What is the rationale for this hypothesis?

*Why do you expect to find the relationship you just predicted in your hypothesis? You can have more than one potential mechanism.*

## **4. Test the Prediction/Design your experiment.** This is observational, based on existing data, in Unit 1.

## What variables do you have? Do you need an IV and a DV? Should they be continuous or categorical/grouping? Label them as needed.

*You do not identify an IV and a DV for correlation tests, they simply test the relationship between variables. By convention the variable most like an IV goes on the y-axis and the variable most like a DV goes on the x-axis. You can only do a correlation with two continuous variables.*

## What statistical test will you use to test your hypothesis? Will you need a one-tailed or two-tailed test?

*A two tailed test tests for any type of relationship between variables, positive AND negative. For example, the diabetes rate and divorce are positively correlated or negatively correlated. A one-tailed test (which most of you will use) makes a more specific prediction and only tests for a relationship in the positive OR negative direction.*

How might you graph your data? What might they look like if you reject your H0?