

Project 2: Confidence Intervals and Two sample Hypothesis test

Forced Expiratory Disease (FEV) is an index of pulmonary functions that measures the volume of air expelled after 1 sec of constant effort. Data set FEV.DAT contains determination of FEV in 1980 on 654 children ages 3 to 19 who were seen in the Childhood Respiratory Disease (CRD) study in East Boston. These data are part of a longitudinal study to follow the change in pulmonary function over the time in children.

i. For each of the variable (other than ID), obtain appropriate descriptive statistics (mean and standard deviation, quartiles).

ii. Use 95% confidence intervals for the mean of FEV to age and smoking status. (Do this separately for both boys and girls).

Hint: Compute the 95% CI for mean FEV by age group (5 – 9/10-14/15-19) separately for boys and girls and identify the similarity or differences.

iii. Compare the level of mean FEV between males and females separately in three distinct age groups (5-9, 10-14, and 15-19 years) using appropriate hypothesis. Explain your findings using part ii and iii.

iv. Compare the level of mean FEV between smokers and nonsmokers separately for 10- to 14-year-old boys, 10- to 14-year-old girls, and 15- to 19-year-old boys, 15- to 19-year-old girls using 95% CI for the mean FEV. Also, use appropriate hypothesis tests to compare the means of FEV of these groups.

v. Compare the patterns of growth of FEV by age for boys and girls. Are there any similarities? Any differences? **Use all the results above to explain in details.**

2. An experiment was conducted to examine the influence of avian pancreatic polypeptide (aPP), cholecystokinin (CCK), vasoactive intestinal peptide (VIP), and secretin on pancreatic and biliary secretions in laying hens. Researchers were concerned with the extent to which these hormones increase or decrease biliary and pancreatic flows and their pH values.

White leghorn hens, 14-29 weeks of age, were surgically fitted with cannulas for collecting pancreatic and biliary secretions and a jugular cannula for continuous infusion of aPP, CCK, VIP, or secretin. One trial per day was conducted on a hen, if her implanted cannulas remained functional. Thus, there were varying numbers of trials per hen.

Each trial began with infusion of physiologic saline for 20 minutes. At the end of this period, pancreatic and biliary secretions were collected, and the cannulas were attached to new vials. The biliary and pancreatic flow rates (in microliters per minute) and pH values (if possible) were measured. Infusion of a hormone was then begun and continued for 40 minutes. Measurements were then repeated.

Data Set HORMONE.DAT contains data for the four hormones and saline, where saline indicates trials in which physiologic saline was infused in place of an active hormone during the second period. Each trial is one record in the file.

Variable	Column	Description/Code
ID	A	ID
Bilsecpr	B	Biliary secretion-pre
Bilphpr	C	Biliary pH-pre
Pansecpr	D	Pancreatic secretion-pre
Panphpr	E	Pancreatic pH-pre
Dose	F	Dose
Bilsecpt	G	Biliary secretion-post
Bilphpt	H	Biliary pH-post
Pansecpt	I	Pancreatic secretion-post
Panphpt	J	Pancreatic pH-post
Hormone	K	Hormone 1=SAL/2=APP/3=CCK/ 4=SEC/5=VIP

a. Assess whether there are significant changes in secretion rates or pH levels with any of the hormones or with saline using appropriate hypothesis. Explain your results.

b. Compare the changes in secretion rate or pH levels for each active hormone vs. the placebo (saline) group. Use methods of hypothesis testing to express these comparisons statistically. Explain your results.

c. Write a report on all your findings.

For each of the hypothesis tests above, in your report, be sure to

- 1. Clearly state a null and alternative hypothesis**
- 2. Give the value of the test statistic**
- 3. Report the P-value**
- 4. Clearly state your conclusion (i.e. 'Reject the Null' is not sufficient)**

For each of the CI's above, in your report, be sure to

- 5. Interpret the results in a proper way.**

Lastly, summarize the results in your own word.