

THIS WILL INCLUDE HYPOTHESIS TESTING OF ONE MEAN AND HYPOTHESIS TESTING OF 2 MEANS, AND CALCULATION OF P-VALUES AND MEANING OF P-VALUES. THEY HAVE due on oct 16

1. A sample of 100 young women of Chinese descent in a US college had mean 21.5 kg/m^2 and standard deviation 1.9 kg/m^2 . Formulate, conduct, report, and interpret the results of a hypothesis test to determine whether these data suggest the women have BMI consistent with a Chinese population in which the (known) mean BMI is 21.1.
2. You carry out a test (DO ONE) and obtain $p=0.03$. How do you interpret this p-value?

AMY TRANSLATE ALL INTO SUBJECT MATTER SAY FROM HEALTH POLICY JOURNAL MAYBE ASHU WORK ON CASH PROGRAM IN AFRICA?

OK: If the null hypothesis is true, you would obtain the results of the current experiment, or more extreme results, 3% of the time.

NOT OK: There is only a 3% or less chance that the null hypotheses is true. Yippee!

Not OK: There is a 97% chance that the null hypothesis is wrong.

NOT OK:

3. This question involves data from the 1991 and 2009 waves of the China Health and Nutrition Study, contained in the file `chinalong.dta` (AMY MAKE SMALLER). Generate a new variable X that is the increase in BMI between 1991 and 2009 for each subject and call the corresponding population mean μ . What is the estimated mean increase in BMI over this 18 year time period?
4. Which of the following describes the appropriate hypothesis testing setup if the researcher would like to test whether the 2009 BMI is the same (or less) than in 1991 versus the alternative hypothesis that BMI has increased during that time period?

A: $H_0 : \mu = 0$ versus $H_A : \mu \neq 0$

B: $H_0 : \mu \geq 0$ versus $H_A : \mu < 0$

C: $H_0 : \mu \leq 0$ versus $H_1 : \mu > 0$

D: $H_0 : \mu > 0$ versus $H_A : \mu = 0$

5. The UNC Atherosclerosis Risk in Communities (ARIC) collected longitudinal data on the level of physical activity among people aged 45-64, summarized in an activity score variable which took integer values from 2 (low physical activity) to 10 (high physical activity). These scores were ascertained at baseline (year 0 of the study) and follow-up

(year 6), and a change score for each participant was constructed by subtracting the year 0 score from the year 6 score. Suppose the population distribution of the change scores has mean μ_R and standard deviation σ_R among retirees and mean μ_W and standard deviation σ_W among people who are still working. HINT: Throughout this question, assume that for $d > 200$, a t_d distribution is essentially the same as an $N(0, 1)$ distribution and use critical values from the normal distribution.

- What is the estimated standard deviation of the mean (standard error) for the change score among retired women?
- What is the estimated standard deviation of the change scores of retired women?
- Which test can be used to assess whether the activity levels of retired women are the same at follow-up as they were at baseline?
 - A two sample t-test, because we are comparing two independent groups, the baseline group and the year 6 group.
 - A paired t-test, because the same people provide measures at baseline and follow-up.
 - It is not possible to use a t-test in this situation because the original data are ordinal rather than continuous.
- Suppose you wish to test the hypothesis that there is no change in physical activity level from baseline to follow-up among African-American women who are retired at follow-up against the alternative that there is a change in activity level. Which of the following describes the appropriate hypothesis testing framework?
 - A: $H_0 : \mu = 0$ versus $H_A : \mu \neq 0$
 - B: $H_0 : \mu \geq 0$ versus $H_A : \mu < 0$
 - C: $H_0 : \mu \leq 0$ versus $H_A : \mu > 0$
 - D: $H_0 : \mu > 0$ versus $H_A : \mu = 0$
- Evaluate this hypothesis using a critical value of $\alpha = 0.05$. In reporting the results, be sure to provide either (a) a 95% interval estimate for the population mean of interest, or (b) a test statistic, degrees of freedom, and p-value. For either (a) or (b), report the results of your evaluation in language suitable for publication in a scientific journal.
- Suppose you wish to test the hypothesis that the standard deviations of the change scores among working and retired African-American women were the same, using $H_0 : \sigma_W = \sigma_R$ versus $H_A : \sigma_W \neq \sigma_R$. What is the p-value from this test?

- Suppose you wish to test the hypothesis that the standard deviations of the change scores among working and retired African-American women were the same, using $H_0 : \sigma_W = \sigma_R$ versus $H_A : \sigma_W \neq \sigma_R$. Based on the p-value from the test, should you use the t-test with equal or unequal variances?
- Assume that the t-test for unequal variances is needed. Carry out and report the results (including the test statistic, degrees of freedom, p-value, and decision) of this test, including an interpretation in words suitable for publication in a scientific journal.