STATISTICS PROJECT DECEMBER 2006

LOOKING AT BIRTH WEIGHTS: COMPARING 2 MEANS

DATA

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Births to moms ages 13-30 years old in the 38114 zip code for year 2004

Comparing 2 means:

- **Baby's birth weight for moms 13-19 years old ($\overline{X_1}$)**
- **Baby's birth weight for moms 25-30 years old ($\overline{X_2}$)**

Data: Reasons for Selecting Birth Data from 38114

- Population influx of low-income women of reproductive age from HOPE VI Housing Project formerly Hurt Village Housing Development

- Increased rate of violent crime; it has been proposed that chronic stress such as that experienced by living in a high crime area may contribute to preterm births and low birth weight in infants putting those infants at increased risk of infant mortality

- Social and economic decline, which with intervention could be turned around

Reason for Selecting Mean Birth Weights

- Mean birth weights because low birth weight babies (< 5.5 lbs. or 5 lbs.8oz.) die in the first year of life (infant mortality) at higher rates than normal birth weight babies (>5.5 lbs.).

- Infant mortality is a social issue with medical implications.

- Infant mortality is indicative of a community's overall health and quality of life.

Reason for Selecting Age Groups, 13-19 years old and 25-30 years old

- Babies born to teen mothers are at increased risk of infant mortality.
- Teenage years are not an ideal time to give birth.
- In U. S., women 25-29 years old most productive group in terms of childbirth than other age groups.
- Will 25-29 or 30 years old be proven to be the healthiest time window within which a woman should give birth?
- Social marketers should conduct a public awareness campaign promoting this.

Samples from Populations

- Total births to moms 13-19 years old in zip code 38114 in 2004 = 134
- Data we received was in order of the mom's birth date
- Random sample of the 134 births by taking every 4th name to select a sample = 33
- Total births to moms 25-30 years old was 162
- Random sample of 33 births, every 5th name was selected

HYPOTHESIS

- H_o: $\mu_1 = \mu_2$
- H_a: $\mu_1 < \mu_2$

Test Statistic

- To compare the sample means ($\overline{X_1}$ and $\overline{X_2}$), we used the Z test
- Following is additional information about the data for the 2 samples:
- $n_1 = 33$ $n_2 = 33$
- $\overline{X_1} = 6.44$ (6 lbs.7oz.) $\overline{X_2} = 7.02$ (7 lbs.0oz.)
-
- $S_1 = 1.12$ $S_2 = 1.28$
- One-tailed test because $H_a = \mu_1 < \mu_2$
- The table Z = 1.28

Test Statistic (cont.)

- Following is the calculated Z (Z*):

$$\frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)\left(\frac{N-n}{N-1}\right)}}$$

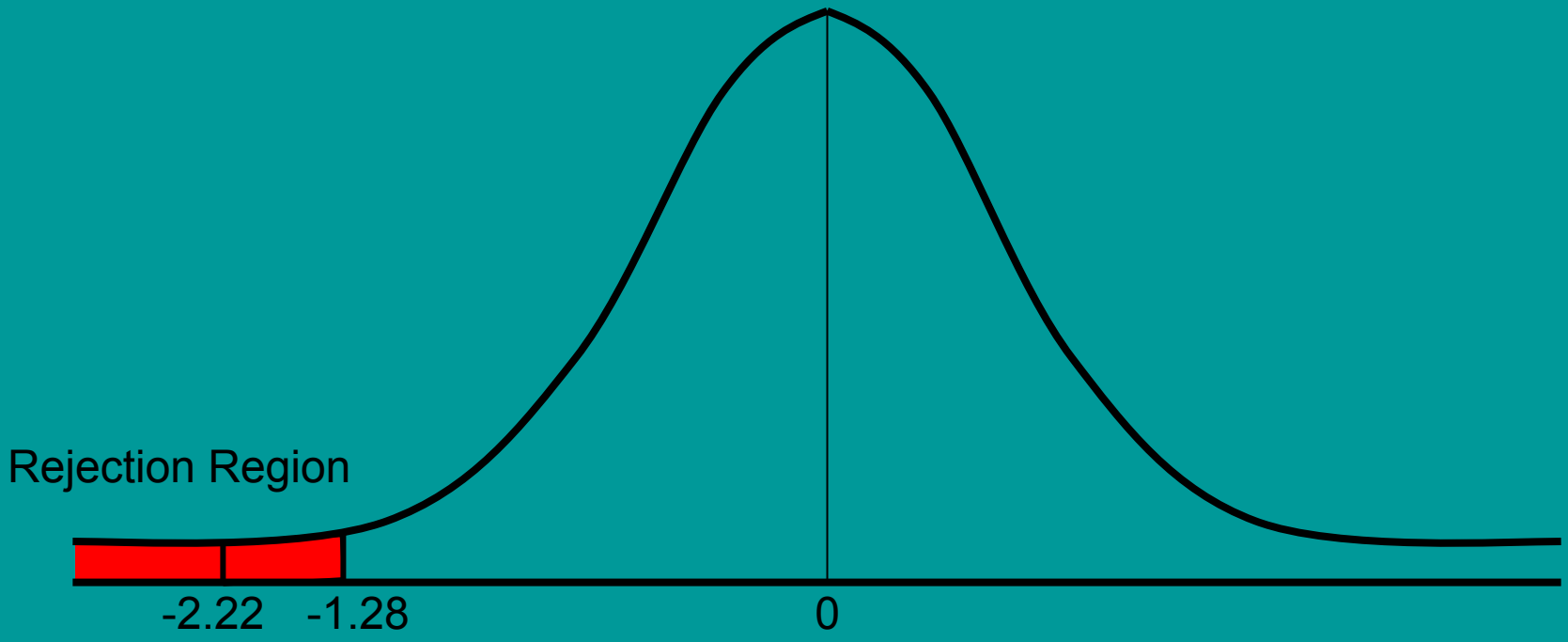
- Finite Population Correction (fpc) Factor = $\sqrt{\left(\frac{N-n}{N-1}\right)}$

- We used the fpc factor because the sample sizes were > 5% of the total population

Rejection Region

- $\alpha = .10$
- Reason: social research
- Precision level of 0.01 or 0.05 is not critical

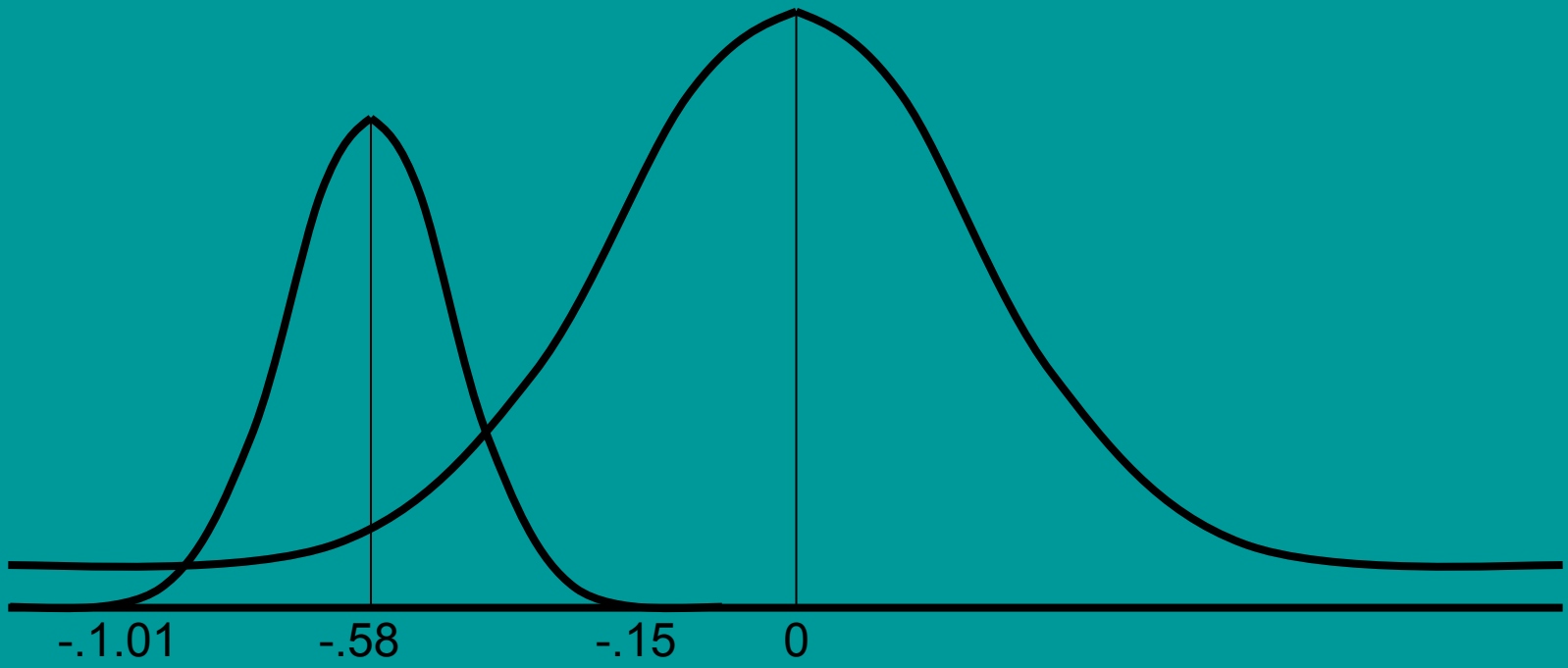
Table Z and Z*



Confidence Interval

- $\overline{X}_1 - \overline{X}_2 \pm Z_{\alpha/2}(.2609) =$
- (6.44 – 7.02) ± 1.645 (.2609) =
- -.58 ± 1.645 (.2609) =
- -.58 ± .43 =
- -1.01 to -.15 =
- -1lb to -2oz.
- "0" not in confidence interval; reject H_o
- 90% confident that the difference in the mean birth weights of the 2 populations is between -1lb. and -2oz.

Confidence Interval



Conclusion

- $Z^* = -2.22$
- Falls in the rejection region (< -1.28)
- Rejected the null hypothesis.
- Z table, the value for -2.22 =.4868.
- P-value for our statistic = .5 -.4868 =.0132 .
- 1.3% chance that we have made a Type I error, meaning that there is a 1.3% chance that we have rejected the null hypothesis when it is, in fact, true.

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