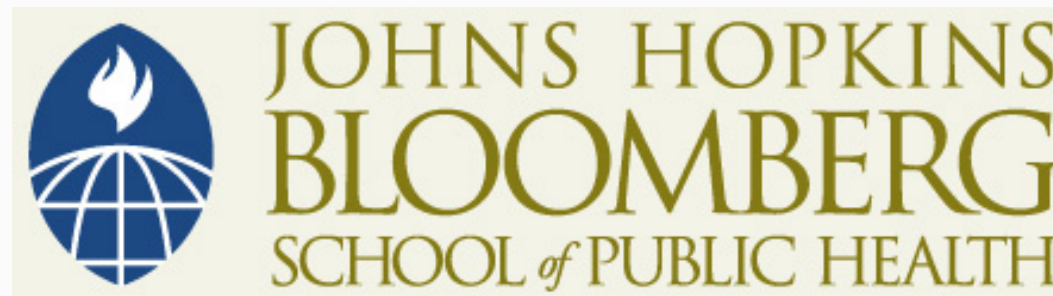


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## Lecture 7a: Practice Problem Solutions

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# Practice Problems

- A study was performed on a representative sample of 258 intravenous drug users (IVDUs)
- Of particular interest to the researchers were factors which may influence the risk of contracting tuberculosis amongst IVDUs\*
- Ninety-seven of the study subjects admitted to sharing needles to shoot drugs
- Of these ninety-seven, twenty-four had a positive tuberculin test result
- The other 161 subjects denied having shared needles—of these 161 subjects, 28 had a positive tuberculin test result

Notes: \* Based on data reported in Graham, N., et al. Prevalence of tuberculin positivity and skin test anergy in HIV-1-seropositive and seronegative intravenous drug users, *Journal of the American Medical Association* 267: 3.

## Practice Problems

- Using these study results, construct a 95% confidence interval for the difference in the proportion of tuberculosis infected IVDUs who shared needles as compared to IVDUs who did not share needles
- First, compute the sample proportions:

$$\hat{p}_{shared} = \frac{24}{97} \approx 0.247$$

$$\hat{p}_{not\ shared} = \frac{28}{161} \approx .174$$

- So:  $\hat{p}_{shared} - \hat{p}_{not\ shared} \approx .247 - .174 = .073$

## Practice Problems

- Now for the estimated standard error:

$$\begin{aligned} S\hat{E}(\hat{p}_{shared} - \hat{p}_{not\ shared}) &= \sqrt{\frac{\hat{p}_{shared} \times (1 - \hat{p}_{shared})}{n_{shared}} + \frac{\hat{p}_{not\ shared} \times (1 - \hat{p}_{not\ shared})}{n_{not\ shared}}} \\ &= \sqrt{\frac{.247 \times .753}{97} + \frac{.174 \times .826}{161}} \\ &\approx 0.053 \end{aligned}$$

- Now for the 95% CI:

$$\begin{aligned} \hat{p}_{shared} - \hat{p}_{not\ shared} \pm 2 \times S\hat{E}(\hat{p}_{shared} - \hat{p}_{not\ shared}) \\ &= .073 \pm .106 \\ &= (-0.033, 0.179) \end{aligned}$$