Disc. rec. 8 #2 (R-89)

AMS 7
16 Nov 09

~~2pm~~

treatment: low (C) vs. moderate (T) exercise ①

outcome: CHD or not

basic design: obs. study

enemy: bias from PCFs

PCF: age, diet, ...

CHD rate (low) $\frac{101}{10239} = 0.0099 \doteq 0.99\% \doteq 1\%$

CHD rate (mod) $\frac{56}{9877} = 0.0057 \doteq 0.57\% \doteq 0.6\%$

$$\frac{0.99\% - 0.57\%}{0.57\%} = 0.74, \text{ so}$$

CHD rate in (low) group was 74% higher than in (mod) group; this is huge in practical terms

2.0% new
1.5% old mortality rate

2.0% is $\frac{2.0\% - 1.5\%}{1.5\%} = 0.33 = 33\%$ higher mortality now than before (huge)

2 indep samples with 1/0 outcomes (like sudden oak death case study from class) (formulas (13) – (14), p. R-25)

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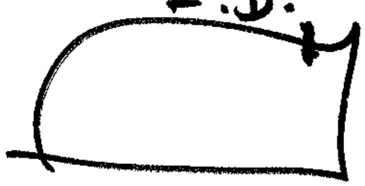
pop. (low)

all U.S. women health professionals over 1987–2000

1 = Y
0 = N

sample: the observed women

I.D.



(low)

CHD?

$N_1 = ?$ (big)

$\begin{pmatrix} 1_s \\ k_{0s} \end{pmatrix}$

(like SRS) → IID

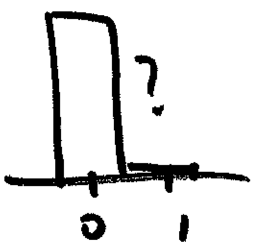
CHD?

$\begin{pmatrix} 1_s \\ 2_{0s} \end{pmatrix}$ $n_1 = 10239$

mean $\hat{p}_1 = 0.99\%$

mean $p_1 = ?$

SD $\sigma_1 = \sqrt{p_1 (1 - p_1)} = ?$



pop. hist.

measurement issue: exercise is self-reported & women may exaggerate

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inf. summ. (1 = low, 2 = mod)

unknown pop. quantity of interest	$p_1 - p_2$ = pop. diff in CHD rates (low − mod)
estimate	$\hat{p}_1 - \hat{p}_2 = 0.99\% - 0.57\% = 0.42\%$
give or take	$\hat{SE}(\hat{p}_1 - \hat{p}_2) = 0.12\%$ formula (13) p. (R-25)
95% int. for $(p_1 - p_2)$	formula (14) (p. R-25) $(\hat{p}_1 - \hat{p}_2) \pm 1.96\,\hat{SE}(\hat{p}_1 - \hat{p}_2)$

$0.42\% \pm 1.96(0.12\%)$

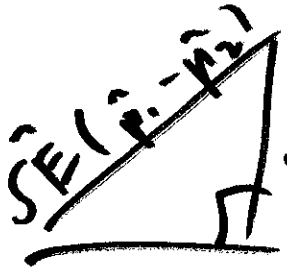
0.24%

0 (low/mod) in 95% int so this diff is stat sig

0 (0.18% | 0.42% | 0.66%)

2nd diagram (mod) is similar ⑤
except for: $n_2 = 9877$, $\hat{p}_2 = 0.57\%$,
$p_2 = ?$, $p \circ p_2$ = ditto (mod)

$$SE(\hat{p}_1 - \hat{p}_2) = \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$



$$= \sqrt{\frac{(.0099)(1-.0099)}{1029} + \frac{(.0057)(1-.0057)}{9877}}$$

stay with decimals, convert to % at end

$$= \sqrt{9.54 \cdot 10^{-7} + 5.74 \cdot 10^{-7}}$$

$$= \sqrt{1.52 \cdot 10^{-6}} = 1.23 \cdot 10^{-3}$$

this diff is probably real ⑥
is definitely large in practical
terms but may not have
been caused by (low) vs. (mod.)
exercise because of PLFs