

## Homework Set #3 Solutions

①  $p = P(A) = .10$  ,  $\pi_{1|1} = P(+|A) = .850$   
 $\pi_{2|2} = P(-|NA) = .995$

(a)

		+	-
true status	A	$p\pi_{1 1} = .0850$	$p(1-\pi_{1 1}) = .0150$
	NA	$(1-p)(1-\pi_{2 2}) = .0045$	$(1-p)\pi_{2 2} = .8955$

(b)  $PVP = P(+|A) = \frac{p\pi_{1|1}}{p\pi_{1|1} + (1-p)(1-\pi_{2|2})} = \frac{.0850}{.0895} = .9497$

(c) We estimate that there is a 95% chance that a subject testing positive actually has antibodies.

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② cross sectional data

		Injury	
		Fatal	nonFatal
s.e. = none		1601	162,527
s.e. = seat belt		510	412,368

(a)  $\hat{\pi}_1 = \frac{1601}{1601 + 162527} = .0097546$  ,  $\hat{\pi}_2 = \frac{510}{510 + 412368} = .0012352$

$$\hat{RR} = \frac{\hat{\pi}_1}{\hat{\pi}_2} = 7.897$$

(b) We estimate that non seat belt users are 7.9 times more likely to suffer a fatal injury in a traffic accident.

3.

In prospective sampling, the input variable is fixed by the sampling design, so only the response variable is observed from experimentation.

In retrospective sampling, the response variable is fixed by the sampling design, so only the input variable is observed from experimentation.

In a prospective study, we can estimate the difference in proportions, the relative risk, and the odds ratio.

In a retrospective study, we can estimate the odds ratio.