Note Title 11/6/2009

Exercise 5.9.2
Senturia et al describe a survey taken to study how many children have access to guns in their household. questionnaires were distributed to all parents who attended selected clinics in the Chicago area during a 1-week period for well-child or sick-child visits.

a) Suppose the quantity of interest is the percentage of households with guns. Describe why this is a cluster sample. What is the psu? The ssu? Is it a one-stage or two-stage cluster sample? How would you estimate the percentage of households with guns and the standard error of your estimate?

$$\hat{V}(\bar{\hat{y}}_r) = \left(1 - \frac{n}{N}\right)\frac{s_r^2}{n} + \text{1-stage within}$$

clinic 1	M_1	# parents	# w/ access to guns g_1	$\bar{y}_{i\cdot}$ g_1/M_1
⋮	⋮	⋮	⋮	⋮
n	M_n	r_n	g_n	g_n/M_n

$$s_r^2 \quad \frac{\sum\{M_i(\bar{y}_i - \bar{\hat{y}})\}^2}{n-1}$$

$$\bar{\hat{y}}_r = \hat{p} = \sum_{i\in S} M_i\bar{y}_i \Big/ \sum_{i\in S} M_i = \sum g_i / \sum M_i$$

Exercise 5.9.4
Jacoby and Handlin selected 26 scholarly journals from a list of 1285 scholarly journals in social and behavioural sciences.
They examined all articles published during 1988 and recorded the number o farticles that described empirical research from a survey and the total number of articles that used probability sampling, nonprobability sampling, or for which the sampling method could not be determined.
The data are in journal.dat.

a Explain why this is a cluster sample.
b Estimate the proportion of articles in the 1285 journals that use nonprobability sampling, and give the standard error of your estimate.

a) $\hat{p} = \sum M_i\bar{y}_{i\cdot} / \sum M_i$ where M_i = NUMEMP $\bar{y}_{i\cdot}$ = NUMPROB/NUMEMP
$= 0.926$

Exercise 5.9.5

Use the data in the file coots.dat to estimate the average egg length, along with its standard error.

$$\hat{V}(\hat{p}) = \frac{1}{\bar{M}^2}\left(1 - \frac{n}{N}\right)\frac{s_r^2}{n}$$

$\bar{M}$: ↑ means

$$s_r^2 = \sum \{M_i(\bar{y}_i - \bar{\bar{y}})\}^2/(n-1)$$

replace by: each now $\hat{p}_i(1-\hat{p}_i)/M_i$?

??

$$\sum_{i=1}^{n} \hat{p}_i(1-\hat{p}_i)/M_i$$

Example 5.6, average egg volume.

$$\bar{\hat{y}}_r = \sum M_i \bar{y}_i / \sum M_i = 48.6$$

$m_i = 2$

$$\hat{V}(\bar{\hat{y}}_r) = \left(\frac{1}{\bar{M}^2}\right)\left[\left(1 - \frac{n}{N}\right)\frac{s_r^2}{n} + \frac{1}{nN}\sum_{i \in S}\left(1 - \frac{m_i}{M_i}\right)\frac{s_i^2}{m_i} M_i^2\right]$$