

Solution to Exercise 2: Variability in serial smear results

Key Learning Points

When you have a hypothesis to test, remember that it may be logical to:

- Create and use a subset of the working dataset
- Create new variable(s)

Tasks:

Exercise hypothesis:

H₀: In each study country, at least 60% of cases found among suspects with a complete diagnostic series show a variation in the serial pattern

- Determine with a program C_EX02.PGM the proportions of smears with and without variation in serial smears by country*
- Interpret the findings*

Solution

Determine with a program C_EX02.PGM the proportions of smears with and without variation in serial smears by country

The following summary output was created:

Crude: Proportion of Grading variation = With variation among all.						
variable	stratum	Total N	n _{Grading variation=With variation}	%	(95% CI)	
Grading variation	Total	7900	3466	43.9	(42.8-45.0)	
Study country	Moldova	870	552	63.4	(60.2-66.6)	
	Mongolia	1499	542	36.2	(33.8-38.6)	
	Uganda	3465	1608	46.4	(44.8-48.1)	
	Zimbabwe	2066	764	37.0	(34.9-39.1)	

Crude: Proportion of Grading variation = With variation among all.

Interpret the findings

Conclusion: Except for Moldova, the hypothesis has to be refuted for each country. Of course, there is no accepted standard what constitutes an “acceptable” minimum level of variation that should be found. Nevertheless, it would appear that the level of variation particularly in Mongolia and Zimbabwe is unexpectedly low, that is the serial results raise some questions on the diligence of reading and reporting sputum smear examination results.

The program C_EX02.PGM that produced the above output is the following:

* Part C, Exercise 2

* Identifying patterns of serial smear results with identical individual results

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* Objective of the exercise
* Identify series of identical result patterns in the four countries
* The reason for this exercise is that we hypothesize
*   that too regular patterns indicate that the laboratory
*   simply copies a positive result once found to (a) subsequent
*   result(s) rather than properly examining the individual smear
* Thus, this analysis may be an indirect quality assurance program

* First decision: denominator:
* Define the denominator with the choice of the appropriate dataset
*   Data set must be suspects
*   Assessing variability among persons with only negative results
*   is biased as the proportion of these varies widely, thus excluding
*   such examinees
*   Assessing variability among patients with only two results provides
*   too little insight in variability, selecting thus those with three
*   results of which at least one is positive
*   Furthermore, those with unquantified positive results will also
*   bias the result

* Data courtesy:
* Moldova: Dumitru Laticevschi, OR Paris 2003
* Mongolia: Nymadawa Naranbat, OR Paris 2004
* Uganda: Achilles Katamba, OR Paris 2003
* Zimbabwe: Biggie Mabaera, OR Paris 2004

* Written by: Hans L Rieder
* First version: 17 Jan 2010
* Last revision: 28 Apr 2013

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cls
close
logclose

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* Selection process

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cls
close

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read "c_ex01.rec"

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* All records in dataset:
* 128,808 records

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* Include only suspects for analysis
select reason=0
* 89,362 records retained

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* Select only examinees with three quantified smear results
select result1<4
select result2<4
select result3<4
* 61,064 records retained

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define include #
           include=0
if result1>0 then include=1
if result2>0 then include=1
if result3>0 then include=1
select include=1
* 7,900 records retained

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savedata "temp_01.rec" /replace

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*****

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* Variable definition for analysis

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cls
close

read "temp_01.rec"

define variation #
variation=1
if (result1=result2) and (result1=result3) then variation=0
label variation "Grading variation"
labelvalue variation /0="No variation"
labelvalue variation /1="With variation"

*****
* Analysis: Hypothesis testing that
*   at least 60% have variation

cls
ciplot variation country /ng

*****
* Clean up

define yesno # global
yesno=?Delete all temporary files: 1=yes 0=no?
imif yesno=1 then
  cls
  close
  erasepng /all /noconfirm
  erase "temp_01.chk"
  erase "temp_01.rec"
  cls
  type "All temporary files erased" /h2
else
  type "All temporary files retained" /h2
endif
set echo=on

```