

Hypothesis formulation and testing

Eisa Mohamed Yousif MD

Assistant Professor, Faculty of Applied Medical Sciences, University of Gezira, P.O.Box 20 Wad Medani, Sudan

What is a hypothesis?

A hypothesis is a prediction of expected outcomes; it states the relationships between variables that the researcher expects to find as a result of the study. If that is so, then the hypothesis represents a formalized focus for the collection of data.

Further highlights:

- 1- A hypothesis is needed only when there is an interaction between variables. Now suppose that you want to detect the ratio females: males of the associates of this journal, then there is no need to formulate a hypotheses as far as there are no interactions of variables.
- 2- A hypothesis is derived from an observation or a reflection.
- 3- A hypothesis should specify the following: population, cause, outcome, dose response and time response.

For example:

"Eating more (*cause*) makes people fat". This is less well-defined than the following: "Eating more than 3 meals (*dose*) for 3 month (*time*), will increase the

weight of individual adult (*population*) by 8 kilogram (*outcome*).

To formulate the null hypothesis (Ho), just add the word (*not*) to the wording of the alternative hypothesis. The last is the one you should strive to disprove.

- 4- One study might need more than one hypothesis. This would depend on the number of indicators involved.

Testing the hypothesis:

To do this, let us try this hypothesis dealing with first body

Mothers: "There will be positive and established effects of each quality type of antenatal care intervention on neonatal survival at birth"

Steps:

- 1- Identify the health status of each respondent (by interviews, clinical exam, etc....)
- 2- Decide on the quality of antenatal care received by each respondent (antenatal care card, interviews etc...).
- 3- Label them as shown in the table below:

| Indicators categories | Indicators | | |
|-----------------------|---------------|-------------|-----------|
| | Antenatal (A) | Mothers (M) | Child (C) |
| Good | + | + | + |
| Moderate | : | : | + |
| Bad | - | - | + |

The words good, bad, and moderate are used as allegoric.

Results of test would be based on the analysis of possible outcome.

This is better indicated by the combinations of indicators.

Here they are:

| | | | | | | | |
|---|----|----|----|----|----|----|----|
| 1 | A+ | M+ | C+ | 10 | A+ | M+ | C- |
| 2 | A: | M+ | C+ | 11 | A: | M+ | C- |
| 3 | A- | M+ | C+ | 12 | A- | M+ | C- |
| 4 | A+ | M: | C+ | 13 | A+ | M: | C- |
| 5 | A: | M: | C+ | 14 | A: | M: | C- |
| 6 | A- | M: | C+ | 15 | A- | M: | C- |
| 7 | A+ | M- | C+ | 16 | A+ | M: | C- |
| 8 | A: | M- | C+ | 17 | A: | M: | C- |
| 9 | A- | M- | C+ | 18 | A- | M: | C- |

Accordingly four possible hypotheses can be derived

H₁: A+ M- C-
A:
A-

This means a 'bad' health mother if given whatever quality antenatal care outcome is a dead baby.

H₂: A+ M+ C+
A:
A-

Which means a 'good' health mother, given whatever quality antenatal care, the outcome is a live-baby.

H₃: A+ M+ C+
M:
M-

Which means a 'good' antenatal care service given to any mother irrespective to her health status the outcome is a live-baby.

H₄: A- M+ C-
M:
M-

This means that if there is no antenatal care given to a mother, the outcome would be a dead baby.

4- Identify each combination outcome . This will appear as shown in the table below:

| Antenatal Care (ANC) | Live birth-total 210 | | | Stillbirth-total 26 | | | Total |
|----------------------|----------------------|----|----|---------------------|----|----|-------|
| | M+ | M: | M- | M+ | M: | M- | |
| Good | 68 | 16 | 20 | 0 | 1 | 1 | 106 |
| Moderate | 16 | 18 | 15 | 3 | 3 | 2 | 57 |
| No Care | 09 | 17 | 31 | 2 | 0 | 14 | 73 |
| Total | 93 | 51 | 66 | 5 | 4 | 17 | 236 |

Different combinations of indicators with the end outcome.(Figures were taken from a real situation.)

To support your results use the statistics:

1. χ^2 – test.
2. The log linear model

3. Logistic regression (to determine the odds ratio).

It will appear that, Antenatal care is the unique decisive variable in pregnancy desirable outcome (Live-birth). This stands as the hypothesis approval.