Intro

• Binary endpoint:
  • It is one type of categorical end point where there are only two possible outcomes.
    • Response vs No-Response
    • Yes vs No
    • 1 vs 0
  • Clopper-Pearson (exact) 95% CI
    • PROC FREQ

Challenges of a programmers

1. Calculating 95% CI for a level which is not expected.
2. When the proportion is zero of Yes (responders), it calculates for No (non-responders)

Solution

EXACT macro - This macro can calculate 95% CI for all types of data correctly.

*NOTE: Macro is provided in paper
**Usage of Exact Macro**

1. Things to know before using exact macro.
2. Binomial Response Variable: *Please make sure SUCCESS/RESPONSE is 1.* (level for which you want 95% CI).
3. Required Macro Parameters: `ds=`, `var=`.
4. Final output dataset would be named - `CI_n` like `CI_1`, `CI_2` etc.

**How to use the Exact Macro**

### Parameter | Is it req? | Default Value | Note
--- | --- | --- | ---
**DS** | Req | Last Created Dataset `(_last_)` | Name of Dataset (Req.), if Missing, it would take last created dataset.
**VAR** | Req | | Binomial Variable (Req.) i.e. response outcome variable. NOTE: Success/Response should be 1. All other values are considered as No-Success/No-Response.
**BYGRP** | Optional | Name of BY Group -- > Columns in table like treatment group. e.g. `BYGRP = TRT01P`. If more than one group, then you can pass more than one variable name. E.g. `BYGRP = TRT01P STAGE`
**OUT** | Optional | 1 | Any number to make output dataset unique. E.g. `out=1` would give dataset `CI_1`.
**KEEP** | Optional | N | Keep=N (Default) --> Just keep final results variable and remove intermediate variables like `p`, `n`, `x`, `CI_low`, `CI_high`. Keep=Y --> Keep all intermediate variables like `p`, `n`, `x`, `CI_low`, `CI_high` AND result variable. You can Keep=Y for debugging.
**PDEC** | Optional | 1 | Decimals of Proportion. Default is 1 decimal
**DEC** | Optional | 1 | Decimals of CI values. Default is 1 decimal.
**CI** | Optional | 95 | Confidence interval. Default is 95, but if you want to calculate CI for any other % like 99, 90 then you can pass parameter here.

*Dealing with Exact Confidence Interval of Binary Endpoint Data*

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Usage 1: Simplest with only required parameters - DS and VAR*/
%exact (ds=ADEFF, var=ResponseN);
*Note:
1. It will consider all records of DS in one group and will calculate 95% CI.
2. Will use default values as provided.
3. Output dataset = CI_1 (as out=1 in default);

Usage 2: Get 95% CI BY Treatment */
%exact (ds=ADEFF, bygrp=treatment, var=ResponseN, out=2); /*To create output dataset CI_2 */
*Note:
1. It will get it BY TREATMENT and will calculate 95% CI for each treatment group.
2. Will use default values as provided.
3. Output dataset = CI_2 (as out=2);

Usage 3: Get 99% CI BY Treatment and by Stages - Two BY GROUP */
%exact (ds=ADEFF, bygrp=treatment stage, var=ResponseN, out=3); /* To create output dataset CI_3 */
*Note:
1. It will get it 95% BY TREATMENT, BY STAGE and will calculate 99% CI for each treatment group within each STAGE.
2. Will use default values as provided.
3. Output dataset = CI_3 (as out=3)
4. CI = 99 will calculate CI for 99%

Usage 4: Get 95% CI BY Treatment and by Stages and want to look at other variables for Debugging */
%exact (ds=ADEFF, bygrp=treatment stage, var=ResponseN, out=4, CI=95, /* To get 95% CI */ Keep=Y); /*Keep other intermediate variable*/
*Note:
1. It will get it 95% BY TREATMENT, BY STAGE and will calculate 95% CI for each treatment group within each STAGE.
2. Will use default values as provided.
3. Output dataset = CI_4 (as out=4)
4. CI = 95 will calculate CI for 95%

Usage 5: Get 95% CI BY Treatment and by Stages + 2 Decimal of proportion and CI in output + No other variable in final DS */
%exact (ds=ADEFF, bygrp=treatment stage, var=ResponseN, out=5, CI=95, Pdec=2, /* To get 2 decimals in proportion */ Dec=3, /* To get 3 decimals in CI */ Keep=N);
*Note:
1. It will get it 95% BY TREATMENT, BY STAGE and will calculate 95% CI for each treatment group within each STAGE.
2. Will use default values as provided.
3. Output dataset = CI_5 (as out=5)
4. CI = 95 will calculate CI for 95%
5. Decimal in final output would be 2 for Proportion (PDEC) and 3 Decimal for CI;