

Quantitative Methods for Evaluating Behavioural HIV Prevention Interventions



Skills Building Workshop
ICASA, Addis Ababa, Dec 4-8, 2011

Personal Background

- Born and raised near Toronto, Canada
- B.Sc. in Mathematics from Brock University, Canada
- M.Math in Statistics from University of Waterloo, Canada
- Based in Durban, South Africa since 2008
- Working as Monitoring & Evaluation Officer for Africaid's WhizzKids United
- An NGO which delivers HIV & AIDS prevention, care, treatment and support to adolescents through the medium of football (soccer)



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Workshop Outline

- Evaluation Question
- Evaluation Methodology
- Questionnaire Design
- Sampling
- Data Capturing in Microsoft Excel
- Data Analysis in Microsoft Excel
- Q & Eh



Please go to this link:

- <http://www.whizzkidsunited.org/downloads.php>
- Download the files:
 - ICASA 2011 Skills Building Workshop Notes
 - ICASA 2011 Skills Building Workshop Examples
 - ICASA 2011 Skills Building Workshop R code
 - ICASA 2011 Skills Building Workshop R data



Evaluation Question

- What are the key behavioural outcomes of your intervention?
 - E.g. reduction in AIDS stigma
- Formulate the outcome(s) into a specific question (multi-part if necessary)
 - E.g. “Has our intervention reduced stigmatized attitudes to AIDS among participants?”

Evaluation Design

- How can you quantitatively measure the variable(s) of interest in order to answer your research question?
 - E.g. How can you measure whether stigma has been reduced?
- Need a Measurement Tool
- Need a Methodology to implement it

Measurement Tool

- Could be a questionnaire, an observational study, or biological samples
 - E.g. a questionnaire to measure AIDS stigma
- Things to consider:
 - Timeframe (baseline and one or more follow-ups to show a change)
 - Ethics
 - Cost / Complexity



Questionnaire Design

- Questionnaires are an effective way of getting information about human behaviour and attitudes
 - Compared to biological samples or observation
 - How else would you measure AIDS stigma?
- However, there is an art to getting accurate, objective data from a questionnaire

Question Types

- Open Form, e.g. “How do you feel about people living with HIV and AIDS?” _____
- Closed Form, e.g. “People living with HIV and AIDS are like everybody else.”
 - AGREE DISAGREE
- Likert Scales (e.g. Agree strongly...Disagree Strongly; or Always/Usually/Sometimes/Rarely/Never)
- Responses must be ordinal (able to be ranked from least to greatest) to be analyzed quantitatively

Question Design

- Keep the wording **simple** and **unmistakable**
- Good: “It is likely that I will get AIDS in my lifetime.”
- Bad: “There is a substantial probability that in the course of my bodily existence I will acquire the illness referred to clinically as AIDS.”
- Bad: “I am concerned about getting AIDS in my lifetime.” (mistakable)

Question Design

- Avoid double-barreled questions
- Bad: Male medical circumcision and using a condom reduce the risk of HIV infection.
- Good:
 - Male medical circumcision reduces the risk of HIV infection.
 - Using a condom reduces the risk of HIV infection.

Question Design

- Avoid double negatives if possible
- Bad: Do you agree or disagree with the following statement: “It is never acceptable for a man not to use a condom with a casual sex partner.”
- Good: “It is acceptable for a man to have unprotected sex with a casual partner.”

Question Design

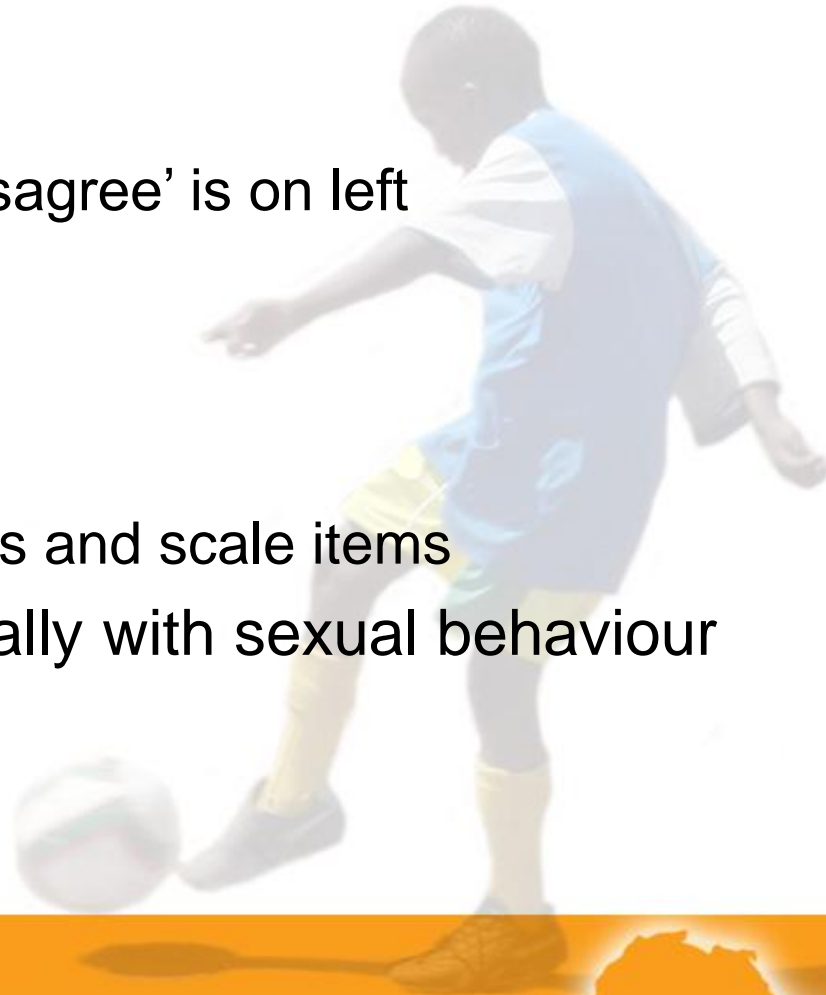
- Ensure questionnaires are translated into the mother tongue of the respondents
- Back-translate the translation as a check
- Have questions read aloud if literacy is an issue

Multi-item Scales

- A series of related questions
- Used to comprehensively measure a particular variable (e.g. AIDS stigma)
- Can be validated using measures of internal consistency (e.g. Cronbach's alpha)
- Validated scales can be found in the literature; this allows comparison across geographic areas and interventions
- But check copyright!

Dealing with Bias

- Acquiescence Bias
 - Reverse response order so ‘disagree’ is on left
- Centrality Bias
 - Eliminate ‘neutral’ category
- Habit Bias
 - Stagger different question types and scale items
- Social Desirability Bias (especially with sexual behaviour questions!)
 - Ensure anonymity and privacy
 - Coin flipping technique



Piloting

- Very important, but often overlooked!
- Choose a small group (~ 50 people) demographically similar to your target group
- Run the questionnaire with them interactively, encouraging them to raise any points of confusion or offence

Piloting

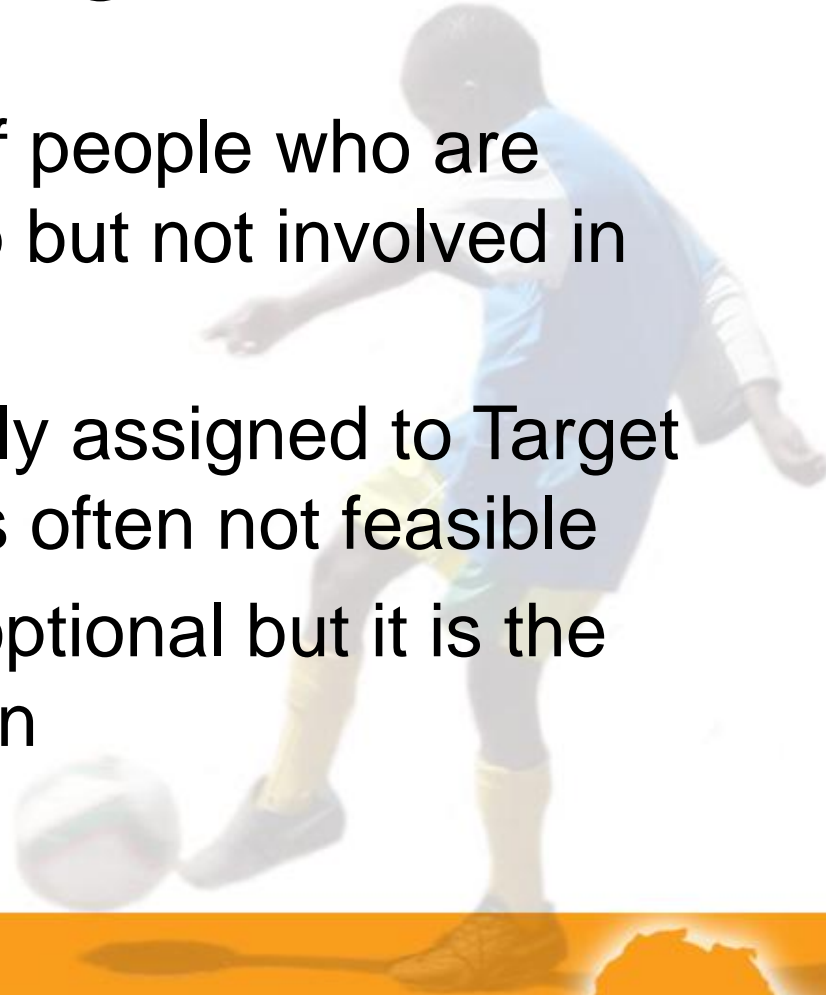
- Advantages of piloting:
 - Catch typo's; correct poorly worded or poorly translated questions
 - Can help you determine sample size
 - Can help you tentatively validate scales
 - Can help you weed out irrelevant questions
 - Find out how respondents feel about questionnaire (too long/short; invasive; offensive)

Sampling

- Sampling is the process of determining who will fill out your questionnaire
- **Target Group:** the group your evaluation is targeting
 - E.g. participants in a programme; or an entire community
- In some cases, could survey entire target population
- When not feasible, use simple random sampling to survey a representative 'sample' and extrapolate

Sampling

- **Control Group:** A group of people who are similar to your target group but not involved in your intervention
- Ideally, people are randomly assigned to Target or Control Group but this is often not feasible
- Having a control group is optional but it is the only way to prove causation



Sampling

- **Sampling Frame:** The list of individuals from which you draw your sample
 - E.g. a register of programme participants; or people passing a certain bus stop in the morning
- **Sampling Techniques:**
 - Simple random sampling, clustered random sampling, stratified random sampling
- **Sampling units:** e.g. individuals, school classes, households

Sampling

- **Sample size:** can be calculated using this formula:

$$n = \frac{z_{\alpha}^2 pq + d^2}{z_{\alpha}^2 pq / N + d^2}$$

- Where: p = proportion you want to measure, e.g. “proportion of women who have used female condom” (if unavailable, use 0.5); $q=1-p$; $z_{\alpha}^2 = 1.96$ (if $\alpha=0.05$ by default); N =size of target group; d =tolerance limit (margin of error), e.g. 0.04 ($\pm 4\%$)

Sampling

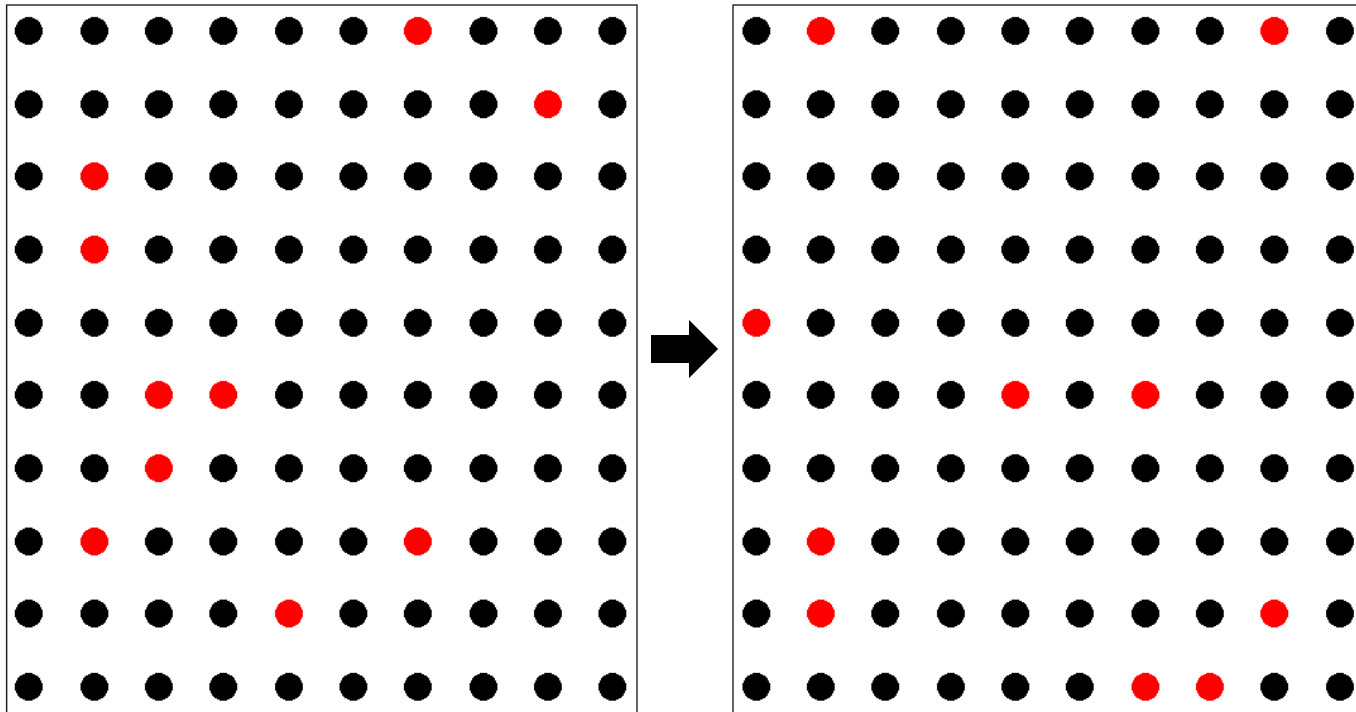
- If N is very large or unknown, use this formula:

$$n = \frac{z_{\alpha}^2 pq + d^2}{d^2}$$

- E.g.: tolerance limit of $\pm 4\%$, $\alpha = 0.05$, $p = 0.5$
 - $n = 602$
- If $N = 500$, everything else same, $n = 274$

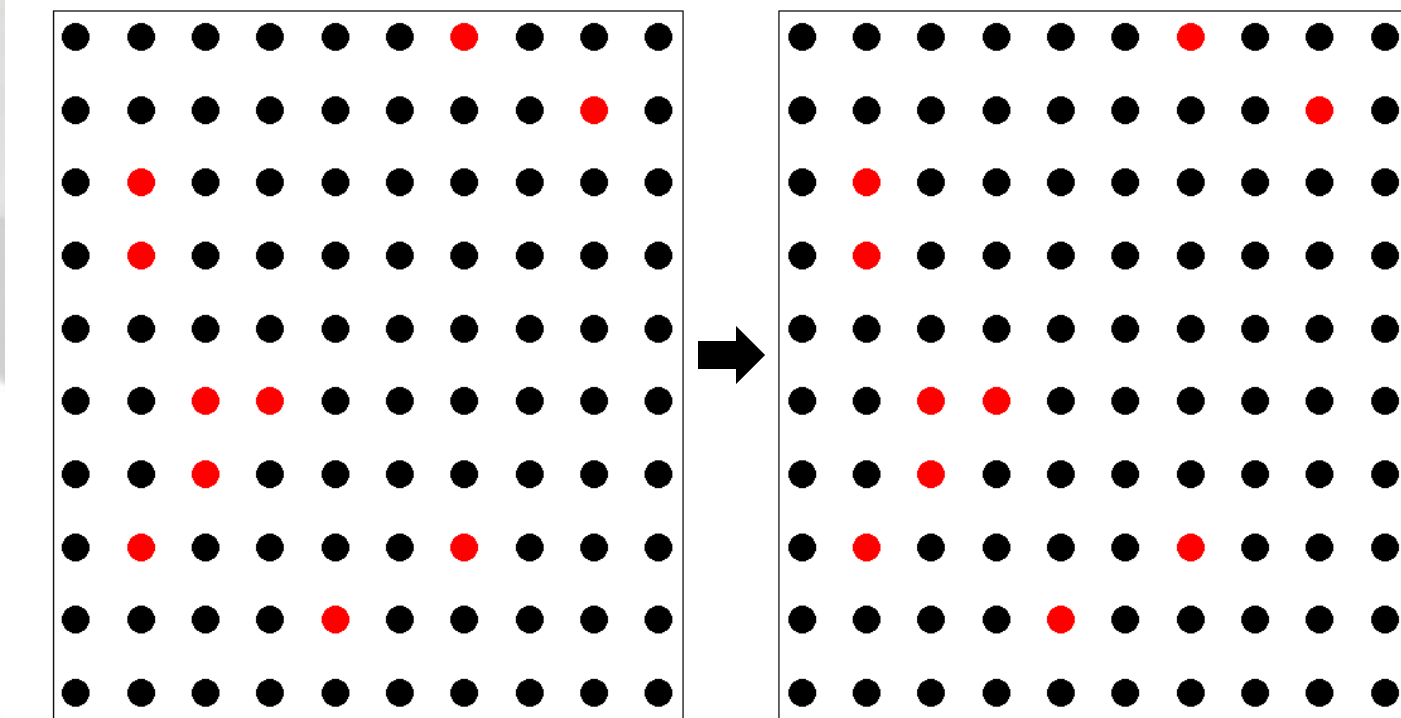
Follow-up Methodologies

- Population-based



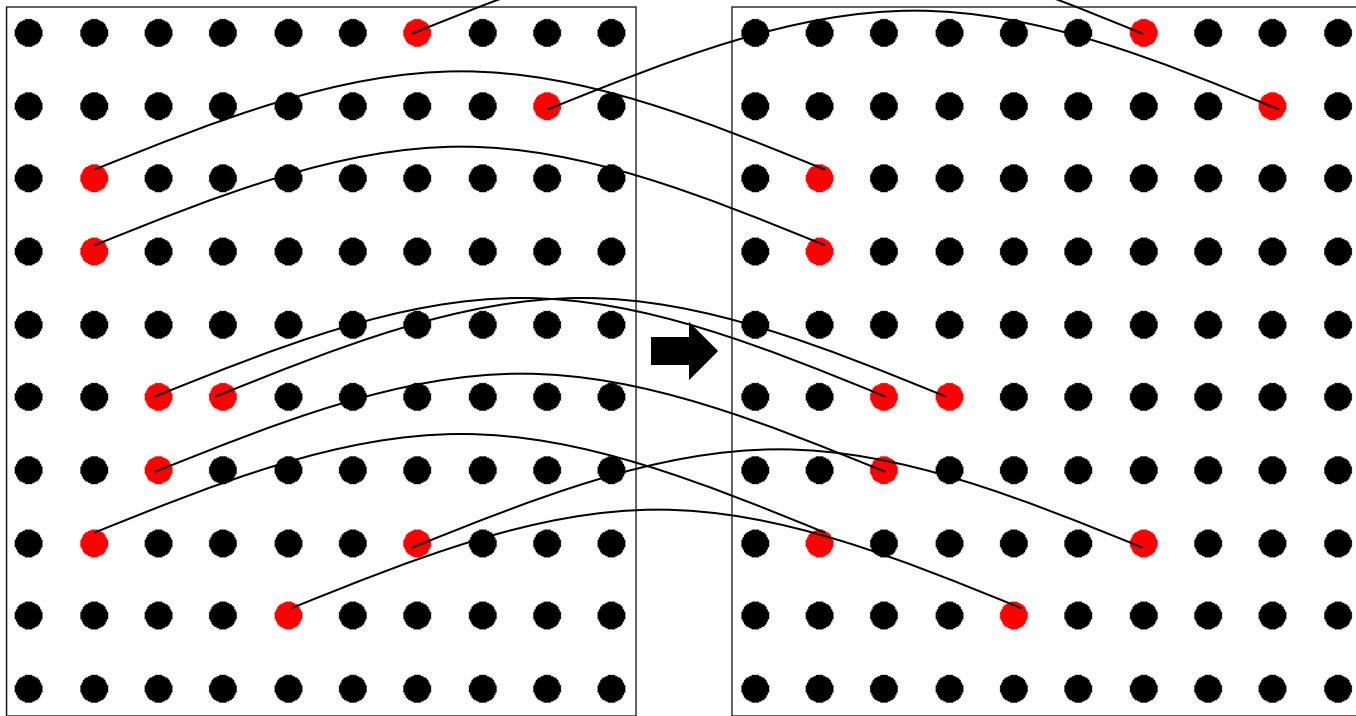
Follow-up Methodologies

- Serial (unpaired)



Follow-up Methodologies

- Serial (paired)



Follow-up Methodologies

- Serial, paired is statistically ideal, but logistically difficult (must track respondents while preserving anonymity)
- For serial, unpaired you can simply keep a register of respondents and their contact details
- Population-based is easiest but least powerful statistically speaking

Data Capturing

- Questions are columns; respondents are rows
- Code data numerically (1=far left answer, 2, 3,...)
- Missing or corrupt data must be dealt with appropriately
 - Method 1: Remove rows with missing values
 - Method 2: Replace missing values with median or mode for that column
- We will go to Microsoft Excel to see some data capturing tips

Data Capturing

- Mobile survey technology makes data capturing easy and error-free

Data Analysis

- Graphical representation
- See instructions in Word document on creating nice quantitative graphs in Microsoft Excel
- Descriptive statistics (mean, median, mode, variance)
- Cronbach's alpha for scale validation

Data Analysis

- Hypothesis Tests:
 - Test for difference in proportions
 - 2x2 Contingency Table: Test for Association
 - 2x2 Contingency Table: Odds Ratio Test
 - Paired t-test
 - Unpaired t-test
 - Kendall's Rank Correlation Test

Q and Eh?

- Questions?



Acknowledgments

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- <http://captnetwork.org>

