Triangulation

Data synthesis and use for programme planning and decision-making
Triangulation in Public Health

Synthesis of data from *multiple sources* for programme decision making
Triangulation: Synthesis of Different Measures

Measure: Behavioral

Measure: STI

Measure: HIV prevalence, incidence

Conclusions
Triangulation: Synthesis of Different Types of Data

Type: Quantitative

Type: Qualitative

Type: Expert opinion

Conclusions
Triangulation: Synthesis of Different Sources of Data

Conclusions

Source: Surveillance
Source: Programmatic
Source: Research
Should sound familiar…

• **Intuitive, common sense** – Components are widely present in Tanzania and reports already using triangulation principles

• **Corroboration** - No single study gives the full picture; decrease uncertainty of one study by drawing on others

• **Second Generation HIV Surveillance** – Focus on trends in risk behavior, STI, and HIV prevalence

• **Inductive reasoning** - Making observations, developing hypotheses to explain them, and searching for more data to confirm, refute, or modify them
# How is Triangulation different from conventional data analysis?

<table>
<thead>
<tr>
<th>Conventional analysis</th>
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<td>1. Deductive reasoning</td>
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<td>2. Emphasis on data of highest scientific rigor</td>
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<td>3. Focus on statistics as basis for conclusions</td>
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<td>4. Focus on internal validity “Did A cause B in our study?”</td>
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<td>5. Meta-analysis: combines similar data, measures, and methodologies for analysis</td>
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<td>6. Based on independent samples</td>
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When to Use Triangulation

• When data are plentiful
• When data are scant
• When the "best" data aren’t available
  - The “best” data are expensive (e.g., randomized controlled trials, cohort studies)
  - All data are potentially biased…
• When a rapid response is needed
  - With the AIDS epidemic, it always is…
  - We cannot wait for more data: Need to use existing data
The AIDS response is generating tons of data (“Strategic Information”)

- Data go up and seldom come down
- Data from different sources are seldom seen side-by-side
- Data are not used to full advantage
Uses of Data in HIV Prevention and Care

- Advocacy
- Strategic planning
- Allocating resources
- Targeting programmes
- Developing new programmes
- Monitoring and evaluation
- Informing the public
- Guiding research (generating and testing hypotheses)
- Tracking the leading edge of the epidemic
Triangulation in Uganda

First country to see a decline in HIV prevalence

Hypotheses to explain observed decline in HIV prevalence among ANC attendees:

• Bias in surveillance data
• HIV effects on fertility
• Increased mortality at late epidemic stage
• Real behavior change
  – Increased condom use
  – Partner reduction
HIV prevalence at Kampala’s ANC site, Uganda, 1985-2001

Is this decline real?

Dramatic drop in HIV Prevalence among ANC attendees in Kampala, Uganda, from 1993 - 1994
Continuing and parallel declines in HIV prevalence across many ANC sites make bias of data in one site less likely.
Parallel declines in male recruits suggest surveillance biases or HIV effects on fertility do not explain the decrease.
HIV prevalence at ANC sites, Uganda and Zambia

Decline in HIV prevalence does not appear due to increased mortality or epidemic stage – no similar decline in Zambia
Comparison of risk behaviour: Uganda vs. Malawi, Zambia, Kenya

Condom use levels in Uganda were similar to other countries
Comparison of risk behaviours
Uganda vs. Zambia, Kenya, Malawi

Evidence suggests HIV declines in Uganda are real, and likely related to partner reduction.
Planning Triangulation

Gather data from *multiple* sources

Refine hypothesis (corroborate, refute or modify)

Examine data

Conducting Triangulation

Communicating Results
# A 12 step process for triangulation

<table>
<thead>
<tr>
<th>Which part of the process?</th>
<th>What steps are involved?</th>
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<tbody>
<tr>
<td><strong>Planning</strong></td>
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<td><strong>Step 1</strong>: Identify key questions</td>
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<td><strong>Step 2</strong>: Ensure question is answerable &amp; actionable</td>
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<td><strong>Step 3</strong>: Identify data sources &amp; gather background information</td>
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<td><strong>Step 4</strong>: Refine research question</td>
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<td><strong>Conducting</strong></td>
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<td><strong>Step 5</strong>: Gather data and assess quality</td>
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<td><strong>Step 6</strong>: Make observations from each data set</td>
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<td><strong>Step 7</strong>: Note trends across data sets &amp; hypothesize</td>
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<td><strong>Step 8</strong>: Refine hypotheses</td>
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<td><strong>Step 9</strong>: <em>If necessary</em>, identify additional data &amp; go back to step 5</td>
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<td><strong>Step 10</strong>: Summarise findings &amp; draw conclusions</td>
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<td><strong>Communicating</strong></td>
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<td><strong>Step 11</strong>: Communicate results &amp; recommendations with limitations and gaps in information</td>
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<td><strong>Step 12</strong>: Outline next steps</td>
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Drawing Conclusions in Triangulation

• At some point, a decision must be reached
• Select the hypothesis supported by the most sources of data, types of data, and measures
• Select the hypothesis supported by the best data
• Select the hypothesis closest to consensus
  — Agreement of experts, policy makers, owners of data
• Select the hypothesis most actionable
• Put your best case forward
  — Note dissenting opinions and alternative hypotheses
  — Note limitations of the data and triangulation
Limitations of Triangulation

- **Data quality:** Should be assessed throughout
- **Representation:** Most data tend to include those easily accessed
- **Causality:** Difficult to establish in triangulation
- **Data fishing**