Network Scale-up and indirect methods for group size estimation

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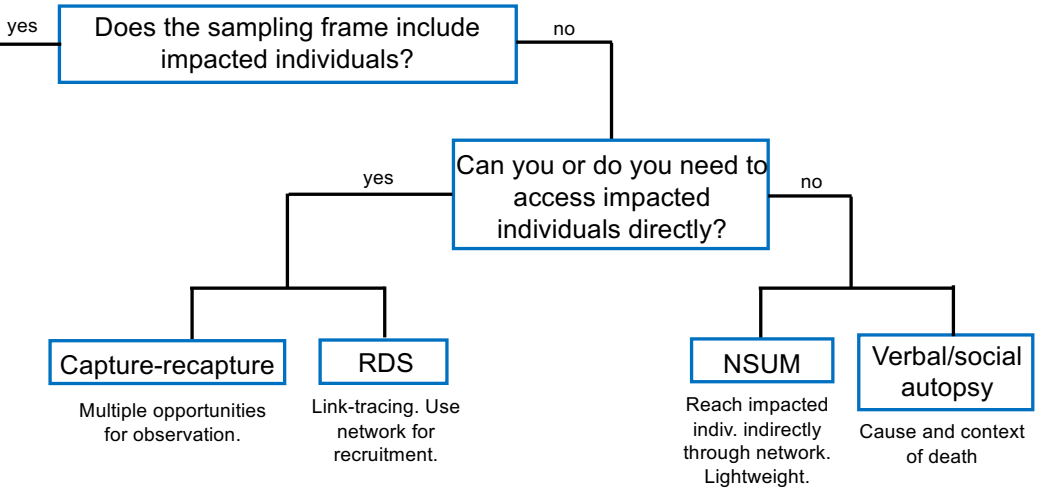
Best Practices in Assessing Mortality and
Significant Morbidity Following Large-Scale Disasters

February 11, 2020

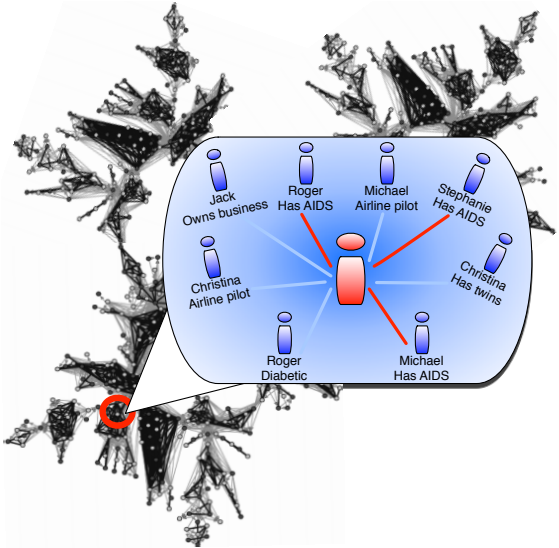
Overview/summary



Network scale-up method

- Uses respondents' network to access hard-to-reach groups
- Key distinctions:
  - Respondents come from a probability sample (*not* the hard-to-reach group)
  - Reach members of hard-to-reach (HTR) groups *indirectly* through respondents
- Assumption that peoples' social networks are, on average, representative of the general population in which you live and move

How many people do you know who —— ?



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3. Averaging proportion in group of interest known by a respondent over many respondents.

Network scale-up method

- 2 types of questions:
  1. “Reference” questions to estimate degree
  2. Hard-to-reach (HTR) populations
- Improve accuracy by combining responses across respondents

$$\widehat{HTR} = \frac{\sum_i \#known\_in\_HTR_i}{\sum_i estimated\_degree_i} \times N$$

Network scale-up features

- Does not access HTR group directly
- Sampling only first-order network dependent
- Estimate size of multiple groups with the same sample
- Large “indirect” sample size
  - Sample 1000 respondents who know on average 750 alters

Three issues

1. Recall problems
2. Respondent systematically knows more (or fewer) members of a specific group than expected under random mixing (barrier effects, nonrandom mixing)
3. Respondent knows someone in a specific group but is not aware that the person is actually in that group (transmission errors)

Lessons from my experiences

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  - OpenVA

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  - NSUM uses data on demographics of reference groups
  - Symptoms of Ebola in children?
- It's a data science problem
  - Prioritize **both** innovations in analytical methods **and** data collection
  - OpenVA
- Measured use of link-tracing designs

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More sophisticated methods exacerbate this challenge.

References

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Issue 1: Recall issues

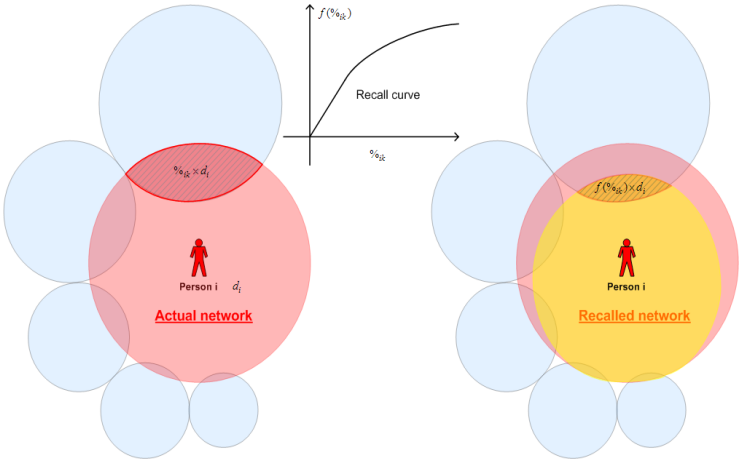


Figure: The Calibration Curve.

Solution(s)

- Use small groups
- Calibrate with known sizes

Issue 2: Barrier effects

How many people named Christina do you know?

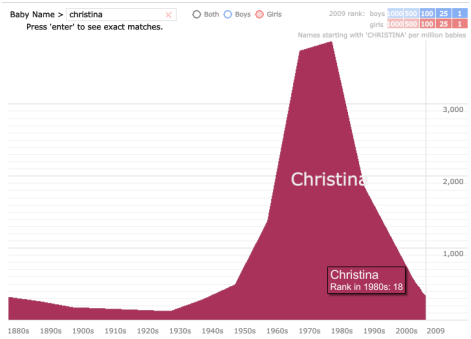
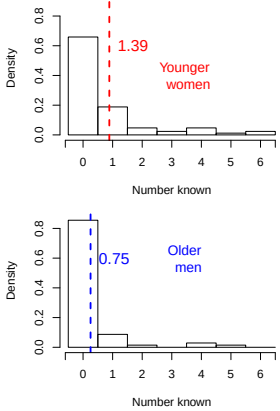


Figure: NameVoyager from babynamewizard.com.



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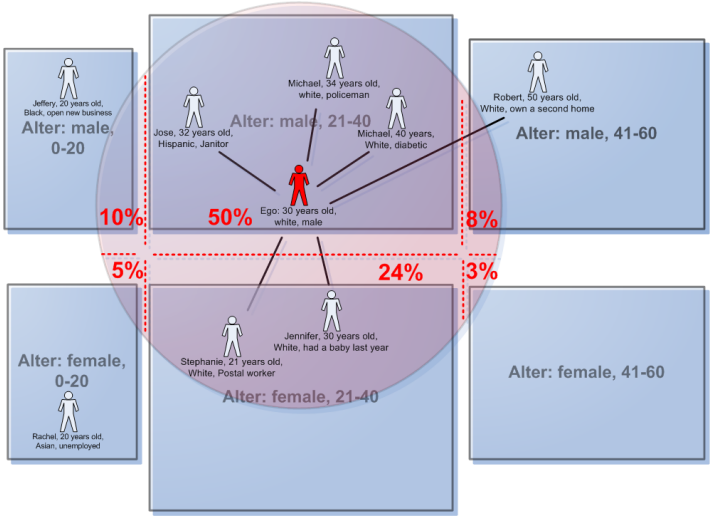

Solution(s)

- Calibrate using group demographics
- Scaled-down condition

Issue 3: Transmission errors

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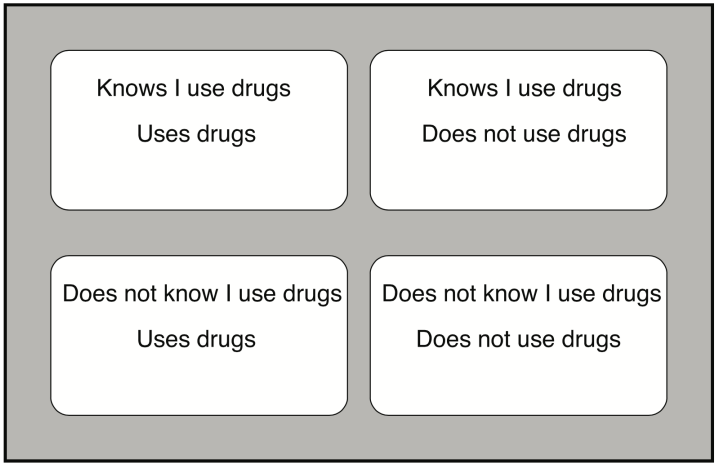

Solution(s)

- External data