Respondent-Driven Sampling: An Epidemiological Tool with Interventional Potential

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BACKGROUND

- UNAIDS has set an ambitious target of 90-90-90 by 2020
- Achieving these targets in hard-to-reach populations such as MSM and PWID in RDS will likely be challenging
- The largest drop-off in the care continuum particularly among MSM and PWID is in the first step – awareness of HIV status
- RDS is an epidemiological tool that is commonly used for surveillance but appears to have potential to help achieve the first “90” of the UNAIDS 90-90-90 targets

METHODS

- Used respondent-driven sampling (RDS) to recruit MSM and PWID from 27 sites (26 Indian cities) in India as part of the baseline assessment of a 12-month study
- Targets sample size per site was 1000
- Recruitment procedures
  1. Include MSM or PWID
  2. Self-identify as male
  3. Provide verbal consent
  4. History of Injecting drugs for non-medicinal purposes in the prior 24 months
  5. Present a valid RDS coupon
- Target sample size was 1000 per site
- Survey and specimen collection
  1. Participants underwent a survey and provided a blood specimen
  2. Informed consent
- Statistical analyses were conducted using Stata

RESULTS

- Median site-level HIV prevalence (%) (range)
  1. <26 – 26,447 (56)
  2. 26 – 36.4 (0 – 92.4)
  3. 36.4 – 43.3 (2.8 – 92.2)
  4. >43.3 (2.8 – 92.2)
- Total number recruited per site
  1. Overall (15 sites): 36,447 (56)
  2. MSM sites only (15 sites): 99 (70 – 157)
  3. IDU sites only (15 sites): 26,447 (56)
- Median recruitment rate in days (range)
  1. Overall (15 sites): 112 (52 – 200)
  2. MSM sites only (15 sites): 99 (70 – 157)
  3. IDU sites only (15 sites): 135 (52 – 200)
- Median number of waves (range)
  1. Overall (15 sites): 31 (11 – 58)
  2. MSM sites only (15 sites): 31 (11 – 28)
  3. IDU sites only (15 sites): 22 (13 – 50)
- Median site-level proportion of HIV positive unaware of status (%) (range)
  1. Overall (15 sites): 38.9 (0 – 92.4)
  2. MSM sites only (15 sites): 36.4 (0 – 92.4)
  3. IDU sites only (15 sites): 43.3 (2.8 – 92.2)

ELIGIBILITY CRITERIA

1. 18 years of age or older
2. Present a valid RDS coupon
3. Present a valid RDS coupon
4. History of injecting drugs for non-medicinal purposes in the prior 24 months
5. Present a valid RDS coupon

study procedures

- Participants underwent a survey and provided a blood specimen
- HIV testing was performed on-site (three rapid tests) and results were notified to participants with pre- and post-test counseling
- Awareness of HIV-positive status and linkage to HIV medical care were self-reported

- This study was approved by the JHMI, JHSPH and the YRGCARE Institutional Review Board

STATISTICAL METHODS

- All samples satisfied RDS process measures with respect to equilibrium and homophily
- RDS recruitment tree was drawn using RDS-Analyzer version 0.32 (http://rds-analyzer.org)
- Probability of residence by wave was mapped using ArcGIS version 10.2

CONCLUSIONS

- Despite starting with only 2-3 “seeds” per site, we recruited ~1000 MSM/PWID in 27 sites across India in ~4–5 months
- Where remains unknown is how many more could have been recruited had RDS not been stopped when the target sample size was reached
- Though “seeds” were from one or two episodes, RDS reached participants across dense, populated cities (~20km and potentially up to 4 hours driving distance) highlighting the potential reach of RDS
- The deeper RDS ran within cities, the probability of identifying unaware and out-of-care HIV infected persons (potential transmitters) increased
- Combined with further interventions to improve HIV linkage to care and viral suppression, RDS could be a critical component to achieving the 90-90-90 target among vulnerable populations particularly in LMICs

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Figure 1. Study sites
Figure 2. RDS recruitment dynamics by wave
Figure 3. RDS Recruitment among people who inject drugs in Mumbai, Maharashtra.
Panel A: 2 seeds; Panel B: Recruitment waves 1 thru 5 including seeds; Panel C: Complete sample (n=1002)
Figure 4. RDS Recruitment among men who have sex with men in Chennai, Tamil Nadu.
Panel A: 2 seeds; Panel B: Recruitment waves 1 thru 5 including seeds; Panel C: Complete sample (n=1002)
Figure 5. Recruitment of MSM in Coimbatore, Tamil Nadu by HIV awareness.
Light blue = HIV negative; Green = HIV positive; and aware of status; Red = HIV positive but unaware of HIV status

Panel B

Panel C

Panel A

Table 2. Characteristics of HIV-infected MSM and PWID aware of their status across 26 sites in India (n=1726)