Using GIS for mapping the sampling frame for a trial

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ON BEHALF OF THE HPTN 071 (POPART) STUDY TEAM
Presentation outline

- HPTN 071(PopART) Trial Design
- Challenges at start of Trial – SA
- Aim
- Method
- Results
- Conclusion
HPTN 071 (PopART) Trial Design

• Purpose
  – to determine the impact of two community-level combination prevention packages, both of which include universal HIV testing and intensified provision of HIV antiretroviral therapy (ART) and care, on population/community-level HIV incidence.

• Study conducted in 2 countries:
  – South Africa (9) & Zambia (12)
HPTN 071 (PopART) Communities

Location of the 21 HPTN 071 (PopART) Communities in Zambia & South Africa

Legend
- Community
- Roads

Created: Sept 2016
HPTN 071 (PopART) Trial Design - Population Cohort

• Random selection of 2,500 households per community
  – Based on the spatial location within the community
  – To ensure an even distribution throughout a community
Challenges at start of Trial - SA

• National Census
  – Outdated
  – Study communities didn’t align to census Enumeration Areas (EA’s)
  – Study communities represented the catchment area for a health clinic

• National Census - No information on Household level
  – Key information for a sampling frame for a trial
    • Demographics
    • Spatial location of Households
Aim

• Illustrate how one can use GIS & Electronic Data Capturing (EDC) systems:
  (1) To do a Trial-specific census and map a sampling frame by
    • Rapid collection of information
    • Creating maps to randomly select a population-representative cohort
  (2) To monitor progress on various levels namely:
    • Community
    • Device
    • Operational work area (Zone)
Methods

- **Setting:**
  - South Africa
    - Western Cape Province
    - 9 Communities
- **Census was conducted between May 2013 & August 2013 (16 weeks)**
Methods
Methods - Zones

- Operational working areas (Zones)
  - Approx. 150 HH per zone
  - Each numbered in an anti-clockwise spiral, starting at clinic
  - Zones base layer on SA 2011 National Census EA’s
    - Adjusted to “natural boundaries”
Methods - Zones
Methods - Census

- 15 EDC’s used
- GPS point of Household (HDOP < 2)
- Street Address of Household
- Consent asked from Head of Household for the following information:
  - Name and Surname of Head of Household
  - Number of men above age 16
  - Number of women above age 16
  - Number of children below age 16
  - Do they use the study Clinic
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Methods - Progress

• To monitor progress:
  – Data downloaded from EDC’s on a daily basis
  – Central database was developed at Desmond Tutu TB Centre (DTTC)
  – Used ArcGIS to:
    • Visualize progress within each community
    • Ensure that all HH’s were visited
    • Monitor progress on the following:
      – Community
      – Device
      – Zone
Results – Trial Specific Census

• 16 Weeks
  – 9 communities
    • 74 457 households
    • Adult at Home – 40 055
    • Gave Consent – 39 006
  ± 50% of household gave consent
    – To estimate Total Population: Know population (consented HH) + estimated population based on average HH size per community
• Estimated Total population – 312 473
Results - Census

Communities - Total Nr of Households

Legend
Communities Nr of HH
- 2 906
- 2 906 - 5 629
- 5 830 - 7 710
- 7 711 - 11 214
- 11 215 - 17 385

Major Highways
Results - Census
Results – Progress

Community Progress
Device Use by Zone
Results - Progress
Results - Progress
Conclusion

Using GIS and EDC systems:

• Within 16 weeks
  – \textit{Produced population representative sampling frame for a trial which can be mapped}
  – \textit{Demographic database – estimated Population of 312 473}

• Valuable management tool
  – Visual feedback to field teams
  – Give feedback in real time regarding progress

• Caution: Balance needed
  – Operational efficiency vs accurate data
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Afrikaans - Dankie
IsiNdebele - Ngiyathokoza
Sesotho - Ke a leboha
Northern Sotho - Ke a leboga
Setswana - Ke a leboga
SiSwati - Siyabonga
Xitsonga - Inkomu
Tshivenda - Ndo livhuwa / Ro livhuwa
IsiZulu - Ngiyabonga