Population Surveys to Assess Impact of HIV Programming

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Plenary
HPTN/IMPAACT
Overview

• Background and rationale
  – global scale-up of ART
• Assessing impact in population-based studies
  – SHIMS
• Population-based HIV Impact Assessments
  – The PHIA Project
12.9 million adults and children living with HIV and receiving ART in 2013

Source: Global AIDS Response Progress Reporting (WHO/UNICEF/UNAIDS)
Adult Care & Treatment

- Test
- HIV Positive
- Link
- Engage, Counsel, Monitor, and Support
- HIV Care (PRE-ART)
- ART Eligible
- Retain, Counsel, Monitor, and Support
- ART
- Adherence and Viral Suppression

McNairy, El-Sadr AIDS 2012
The Treatment Target

- 90% diagnosed
- 90% on treatment
- 90% virally suppressed
SHIMS: Swaziland HIV Incidence Measurement Survey

"A DROP THAT COUNTS ...
..the number of new HIV infections"
The Kingdom of Swaziland

- Population: 1.2 million
- Highest HIV prevalence in the world: 26% among 15-49 y*
- HIV prevention campaign launched 2011—expanded male circumcision and ART—to curb epidemic
- HIV incidence measurements needed to assess impact

* 2007 DHS
SHIMS: Study Design

Baseline Incidence

HIV Prevention and Treatment Campaign

Follow-up Incidence

LEGEND

Cohorts of 18-49 year old men and women

HIV testing
SHIMS: Two-stage Cluster Sampling Design

Select 575 of 2054 Enumeration Areas (EAs)

Randomly select 26 households from each EA

Invite all adults aged 18-49 in households to participate in cross-sectional survey

Invite HIV-uninfected adults to join incidence cohort
SHIMS Individual Participation

Total potential participants 24,462

- No contact 3,660 (15%)
- Refused 2,493 (10%)
- Participated 18,154 (74%)
- Not eligible 5,760 (32%)
- Cohort Eligible/HIV-Neg 12,357 (68%)
  - Refused 477 (4%)
  - Enrolled in Cohort 11,880 (96%)
  - Not Retained 725 (6%)
  - Follow-Up Completed 11,155 (94%)
Total HIV + participants 5,841†

- No VL sample
  - 13 (<1%)

- Viral load done
  - 5828 (99%)

Unaware of HIV+ diagnosis
- 2,156 (37%)

Aware of HIV+ diagnosis
- 3,672 (63%)

Reports No ART
- 1909 (52%)

Reports ART
- 1763 (48%)

† weighted
2011 HIV Prevalence and Incidence
SHIMS Survey, Adults 18-49 Years

Overall HIV prevalence: 32%

Overall HIV Incidence: 2.38%

Women: Prevalence by Age
SHIMS: Distribution of VL

**VL categories**
- VL > 50,000 c/ml
- VL 1,000-49,999 c/ml
- VL < 1,000 c/ml
- VL < 20 c/ml

Diagram showing the distribution of VL categories for different groups:
- Total
- Unaware
- Aware
- ART
- No ART
SHIMS: Prevalence of Viral Load Suppression

**VL categories**

- VL >50,000 c/ml
- VL 1,000-49,999 c/ml
- VL <1,000 c/ml
- VL <20 c/ml
SHIMS: Key Results

- Overall prevalence of 32%
  - More severe among young women and men
  - Half of men not aware of dx
- Incidence of 2.38%, and 4% in young women
- Incidence based on LAg+VL similar (not shown)
- Prevalence of viral load suppression (<1000 c/ml): 35% of all PLWH
PHIA Project
PHIA Project

• CDC award to plan and implement household-based HIV-focused national surveys in the general population of 15-20 African countries over a five-year period, 2014-2019

• Project Goals:
  
  – **Describe the epidemic** in specific PEPFAR-supported countries at a given point in time

  – **Build capacity** by strengthening the workforce and infrastructure needed in targeted countries to design, conduct, analyze and disseminate results of PHIAs

• Survey names: AIS, DHS+, HIA and **PHIA**
PEPFAR’s Five Key Agendas
Translating the 3 Guiding Pillars to Results

**Efficiency Agenda**
Saving lives through smart investments

**Sustainability Agenda**
Sharing responsibility, advancing progress

**Partnership Agenda**
Working together towards an AIDS-Free Generation

**Impact Agenda**
Controlling the epidemic

**Human Rights Agenda**
Securing, protecting, & promoting human rights

Blueprint for an AIDS-free Generation
PHIA Project: Methodologic Considerations

– Study design
  • Longitudinal versus cross-sectional design
  • limitations of each

Window period (e.g., 6 mo.)

HIV-uninfected cohort

Initial HIV test  Repeat HIV testing

Recently infected Individuals

A
Methodologic Considerations: Participation Rates

- Problem: If people living with HIV who are aware of their status choose not to participate in the survey, estimates of HIV prevalence are lower.

- Solution: **Heckman selection model** uses a variable associated with survey participation but not with HIV status, such as *interviewer characteristics* to adjust the estimate.
Methodologic Considerations: District Data

• Problem: Sample size needed to estimate HIV prevalence in districts is too large to be feasible

• Solution: **Small Area Estimation** uses regional estimates plus additional district data from census and HIV program to predict district level HIV prevalence
MPHIA and ZIMPHIA

Malawi
Population: 16,777,547
Prevalence rate: 10.3%

Zimbabwe
Population: 14,149,648
Prevalence rate: 15%

Source: UNAIDS
MPHIA and ZIMPHIA: Objectives

Primary:

• To estimate national HIV incidence among adults age 15 years and above
• To estimate subnational prevalence of viral load suppression [HIV RNA <1000 c/ml] among adults age 15 years and above

Secondary (many, including):

• To estimate national prevalence of HIV among children under age 15 years
MPHIA and ZIMPHIA: Methods

• Standardized elements:
  – protocol and questionnaire with local adaptation
  – electronic data collection with open-access software (ODK)
  – Data management system

• Venipuncture for plasma and dried blood spots

• HIV biomarkers:
  – HIV rapid testing with return of results; CD4 POC
  – HIV RNA
  – HIV incidence assays:
    • Limiting antigen (LAg) avidity + HIV RNA for identification of incidence in one visit

• External monitoring
MPHIA and ZIMPHIA: Sample sizes

- **Malawi:**
  15,000 households
  - Adults 15-49: 19,845
  - Adults 50-64: 2,995
  - Children 0-14: 10,988
  - **TOTAL:** 33,828

- **Zimbabwe:**
  15,000 households
  - Adults 15-49: 16,650
  - Adults 50+: 4,509
  - Children 0-14: 7,309
  - **TOTAL:** 28,468
MPHIA and ZIMPHIA: Questionnaire

- Comprehensive HIV-focused questionnaire for all consenting or assenting household members over age 15; adolescent questionnaire in ZIMPHIA for ages 10-14; ~ 45 min
  - Based on Demographic and Health Survey (DHS) and Kenya AIDS Indicator Survey (KAIS), with input from UNAIDS and OGAC
  - Topics: household characteristics, individual demographics, reproductive history, marriage and sexual activity, HIV knowledge and attitudes, HIV testing, HIV status, care, and treatment, tuberculosis and other health issues and male circumcision

- Will serve as the model for other PHIA questionnaires
ZIMPHIA & MPHIA
Implementation Strategies

Governance:
• Technical Working group and Steering Committee chaired by MOH and/or NSO;
• standing sub-committees (e.g., Protocol, Data Management)

Data collection & management and capacity building:
• Tablets (ODK) ➔ Cloud server ➔ in-country server

Laboratory management and capacity building:
• POC testing: HIV rapid testing, CD4 via PIMA
• Central lab: QA and certain tests (VL, EID, LAg)
• Outside lab: specialized tests (drug resistance, ART metabolites)
ZIMPHIA & MPHIA
Innovations

- HIV incidence and prevalence of viral load suppression as primary outcomes
  - Opportunity to estimate rate of new infections and assess continuum of care of population
- Inclusion of children
- Electronic consent forms and tablet-based data collection
- Development of ACASI module using open-access software
- Adolescent module
- Return of results:
  - HIV test and CD4 results
  - Approach to returning viral load and drug resistance results
Conclusions

• Population HIV impact assessments will provide information on status of the HIV epidemic in the most severely affected countries

• Historic effort to measure the impact of a global health initiative

• Repeating surveys will serve to assess progress and evolution of the epidemic

• Supplemental surveys needed to assess adolescents, young women and key populations

• Results will assess national and regional cascades and guide use of resources and future efforts to control the epidemic
Conclusions II

- Findings will inform the scientific agenda for HIV prevention research for both adults, adolescents and children
  - status of the continuum of care
  - national prevalence of HIV among children
  - national HIV incidence
  - Access to different prevention and treatment interventions
- Effort provides opportunities for collaboration: biorepositories with nationally representative samples, e.g., phylogenetic studies; behavioral data
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