ICAP Grand Rounds

Assessing the Impact of National HIV Programs in Africa through Population Surveys

PHIA Project Updates and Data Tools

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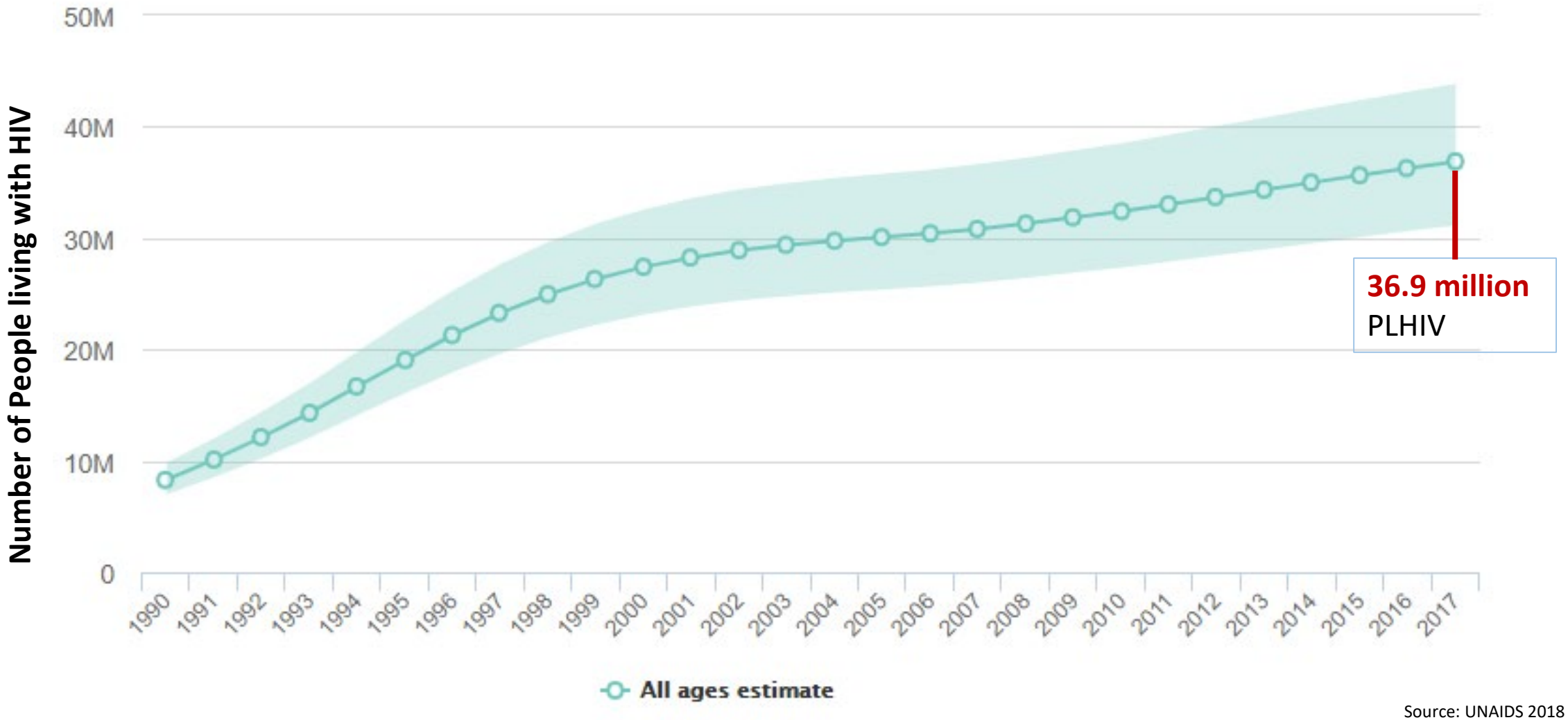
ICAP
Empowering Health
Columbia University
Mailman School
of Public Health

Presentation Outline

- **Background**
  - Global HIV epidemiology
- **PHIA Project**
  - Methods: survey design and lab
  - Results
  - Reports
  - Data visualization (video)
  - Public release dataset (video)
- **Conclusions**

In 2017, 36.9 million people were living with HIV globally



Source: UNAIDS 2018 estimates

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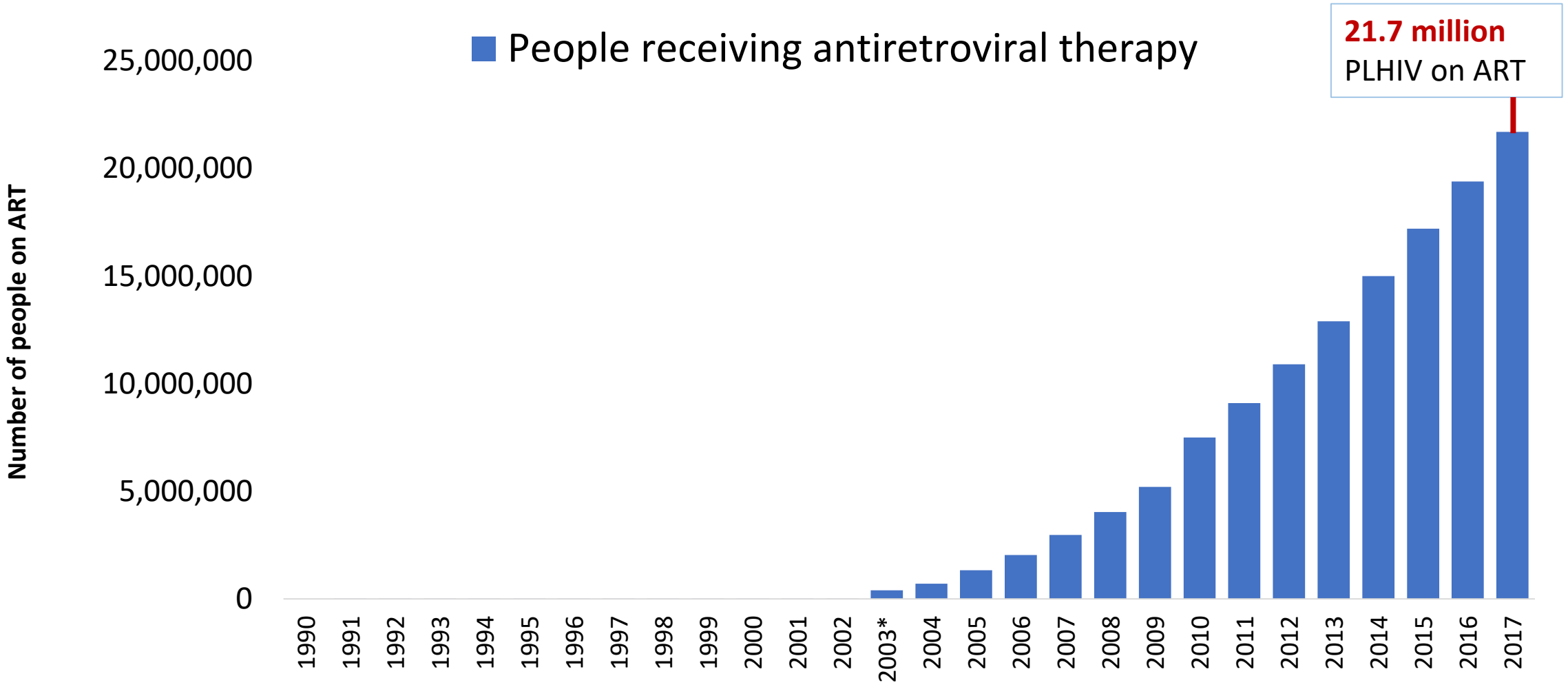
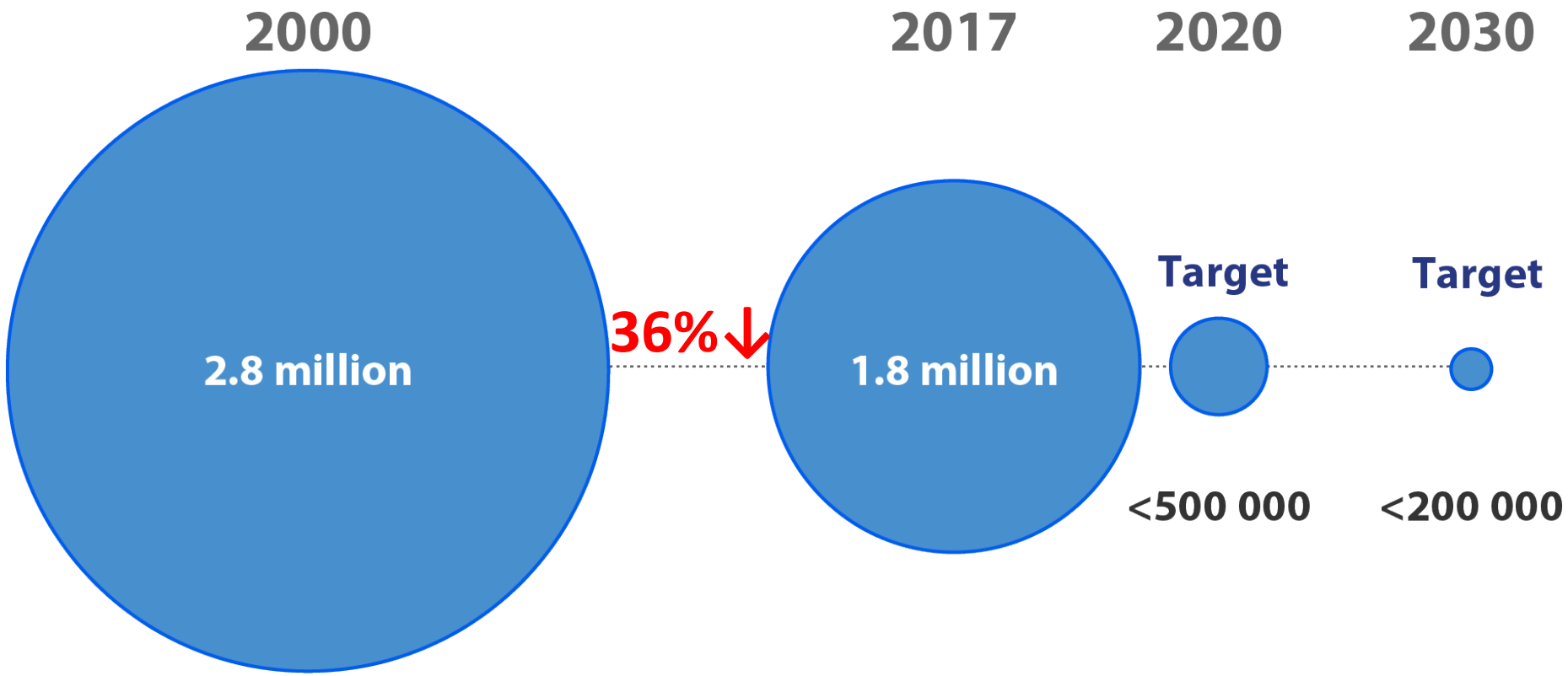
Global scale-up of antiretroviral therapy



* Launch of the "3 by 5" initiative

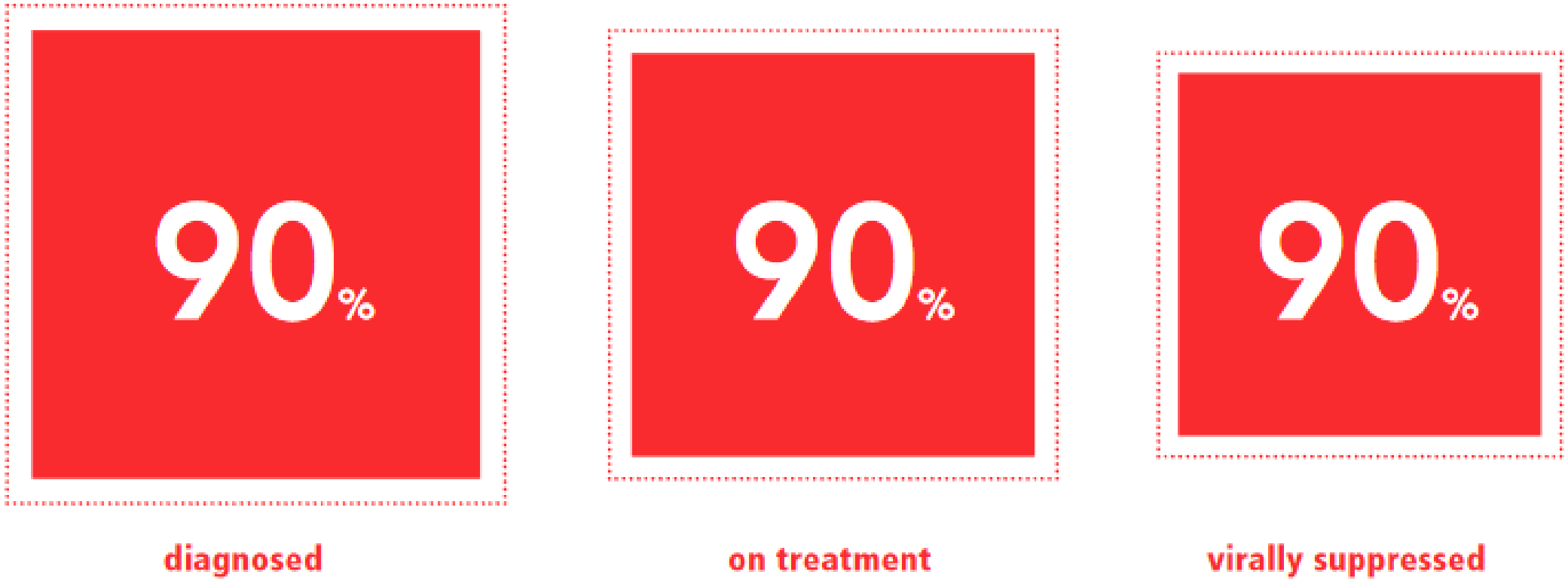
Source: UNAIDS /WHO estimates

Global number of annual new HIV infections and targets for 2020 & 2030

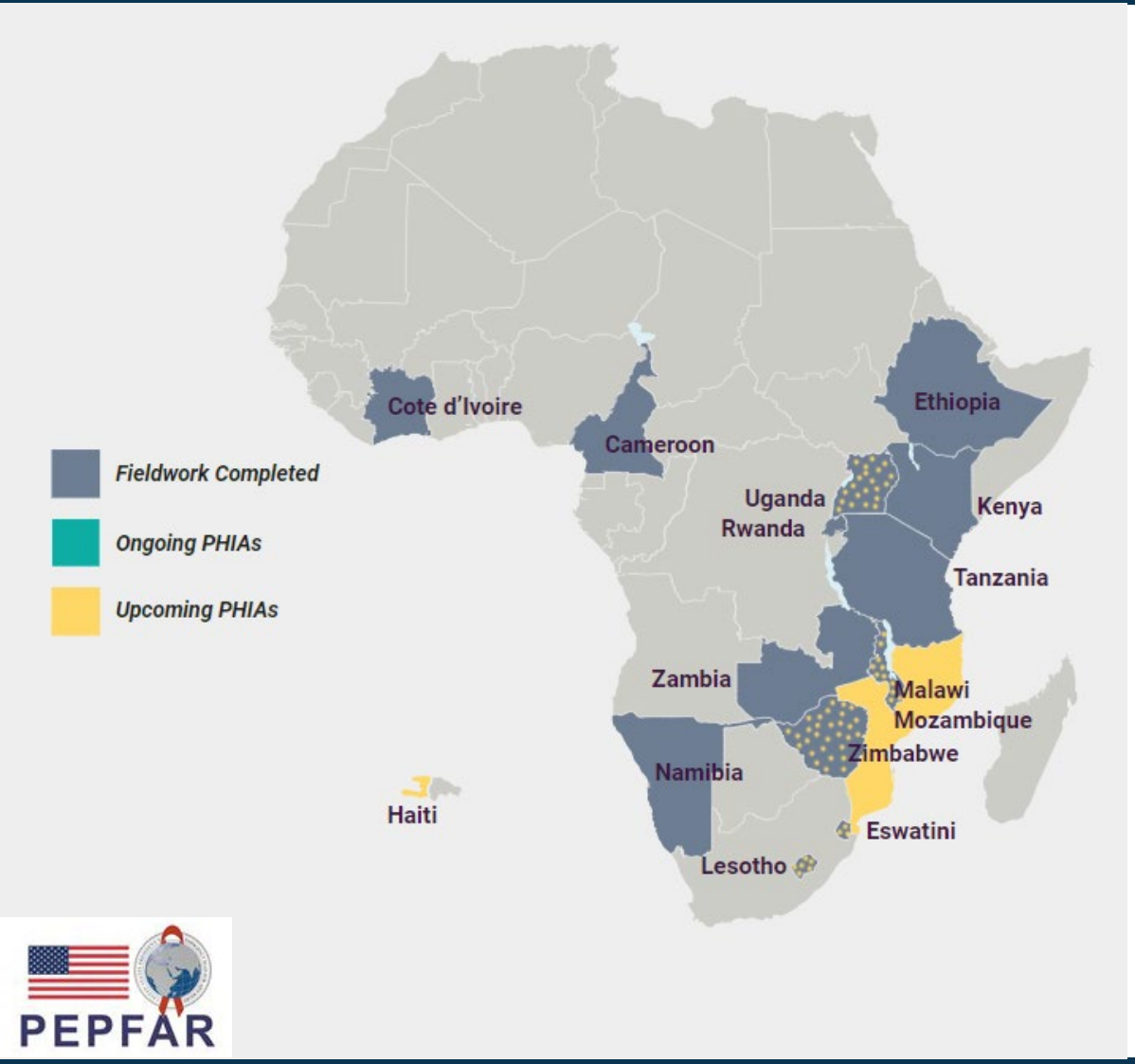


Source: UNAIDS /WHO estimates

UNAIDS Global Targets



Population-based HIV Impact Assessment (PHIA) Project



Goal: To conduct nationally representative, HIV-focused household surveys to assess the HIV epidemic and the impact of response programs in countries that have been heavily affected by the HIV epidemic

- 1º objectives: national HIV incidence and subnational prevalence of viral load suppression among adults
- 2º objectives: HIV prevalence, 90-90-90 cascades, detectable antiretrovirals, among others

PEPFAR

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PHIA Project Methods: Survey Design, Sample Size, Eligibility & Data Collection

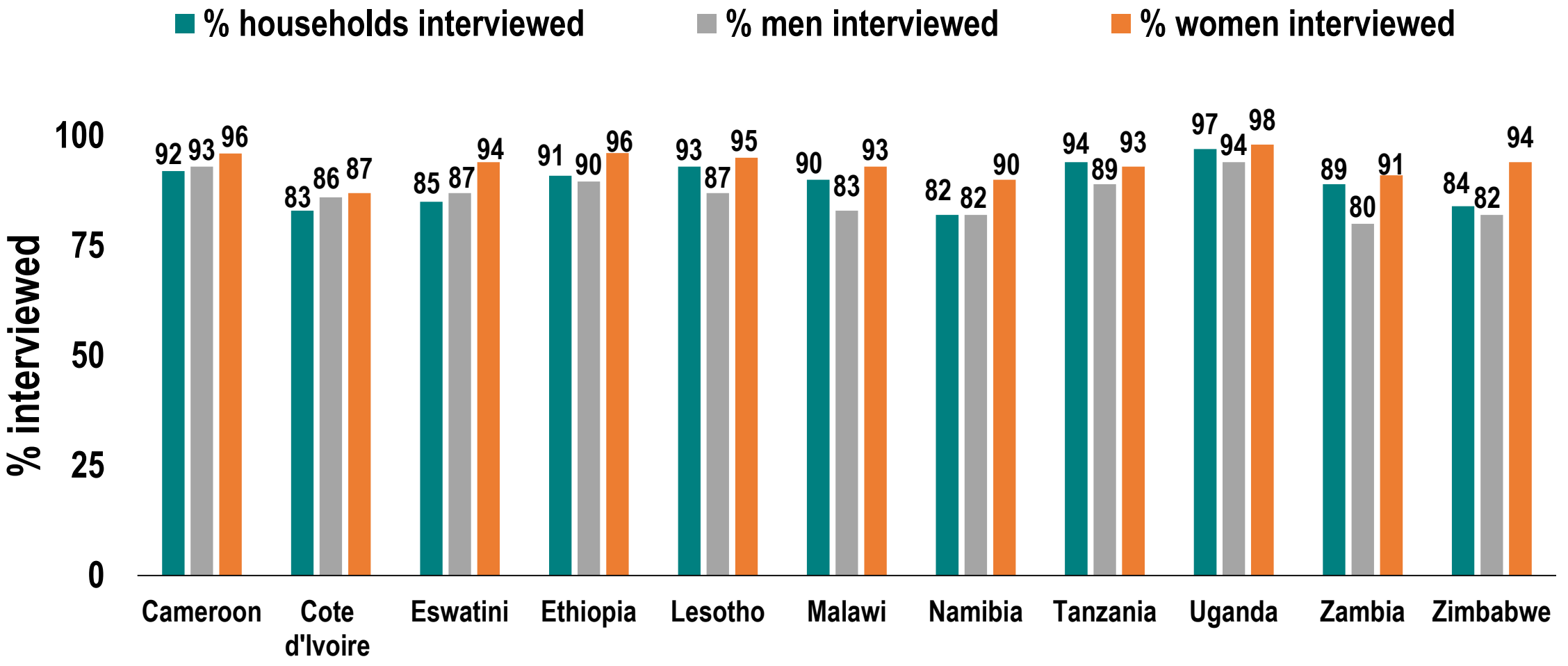
Survey Design	Cross-sectional, two-stage cluster sample to achieve nationally representative cohorts
Sample size	Powered for national HIV incidence and subnational VLS Approximately 30,000 participants, including 5,000 -10,000 children
Eligibility	Household members who slept over the night before
Questionnaires	Household, adult and adolescent demographic, behavioral and clinical information
Data collection	Electronic data capture Approximately six months of field work
Weighting	Sample weighted to adjust for selection probability, differences in non-response and to achieve population representativeness

PHIA Project: Lab Methods

Household	• Venous blood draw; finger/heel stick for <2 years • HIV rapid testing per each national algorithm; CD4+ for HIV+ • Return of results and counseling
Satellite Lab	• HIV confirmatory testing • Quality assurance testing
Central Lab (in-country)	• HIV RNA • HIV DNA (early infant diagnosis) for 0-18 month olds • HIV-1 limiting antigen (LAg)-avidity EIA • Incidence: LAg < 1.5 ODn, VL > 1000 c/mL and absence of detectable ARVs
Other Testing	• Qualitative ARV detection (HPLC tandem MS) • Genotyping and drug resistance

Results

Most eligible households and individuals participated



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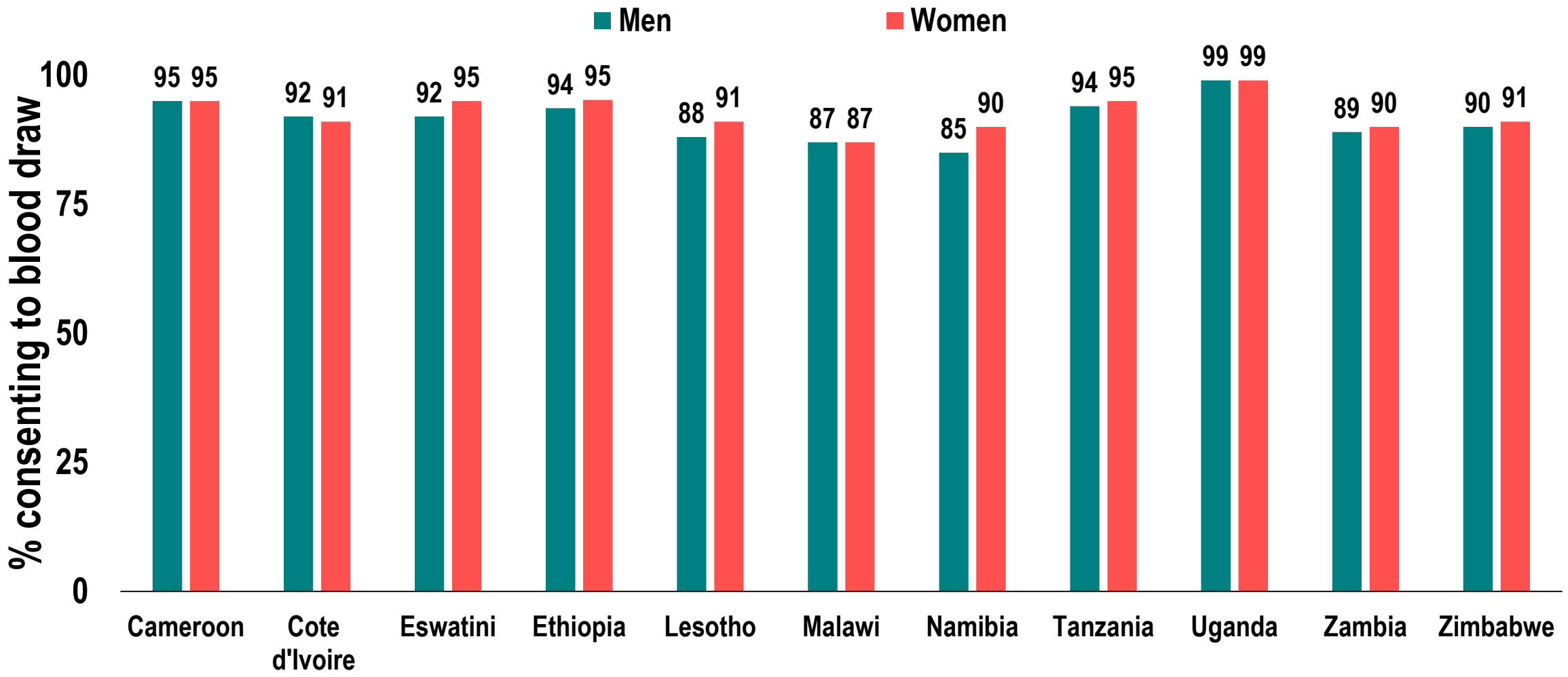
Most self-reported HIV-positive participants consented to provide blood



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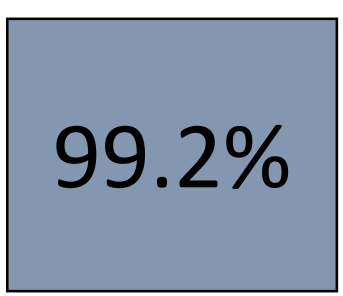
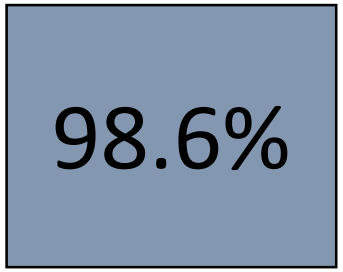
High quality of biomarkers

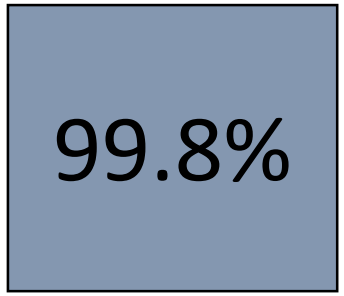
As of March 2019, a total of 375,000 blood samples were collected



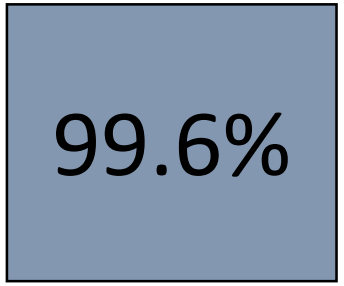
questionnaires completed without errors



adult participants provided sample with expected blood volume

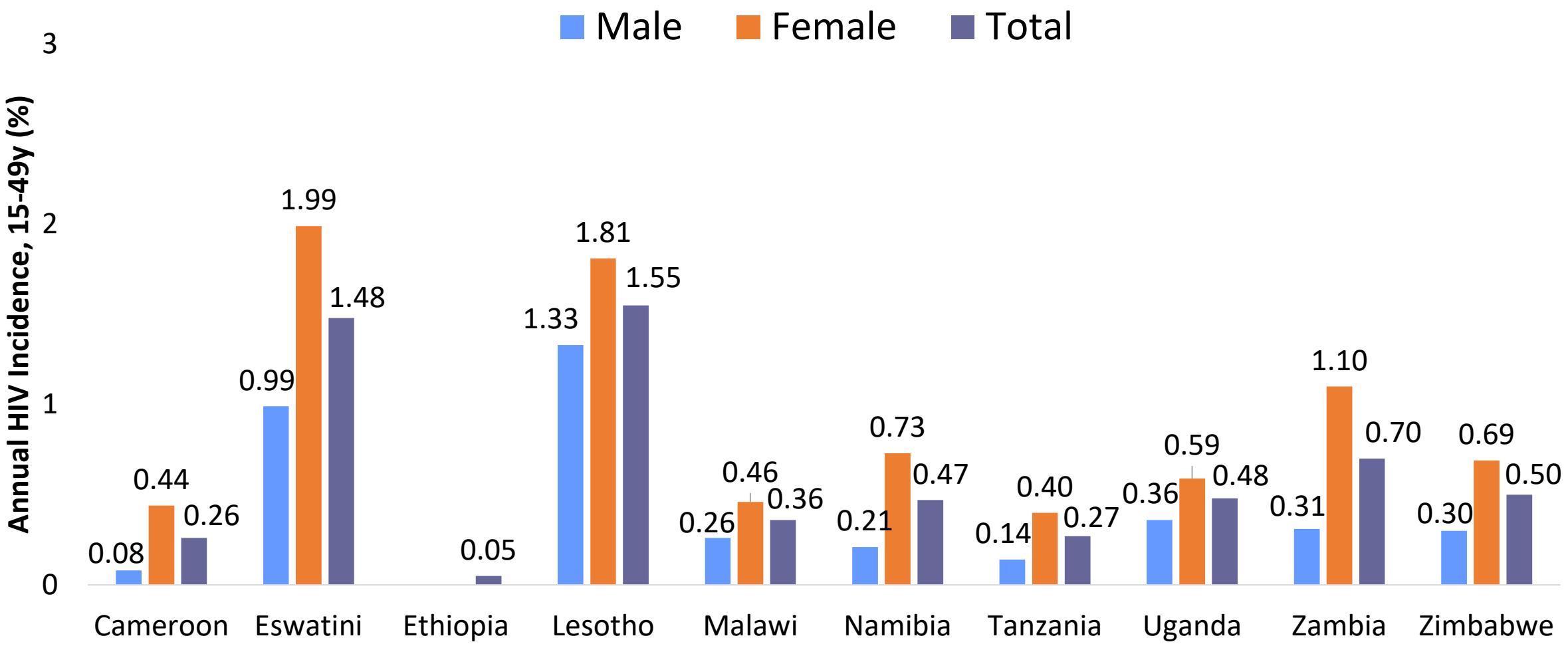


specimens with <24h arm-to-freezer time



specimens with no hemolysis or clotting

Annual HIV incidence among adults (15-49 years) without ARV adjustment



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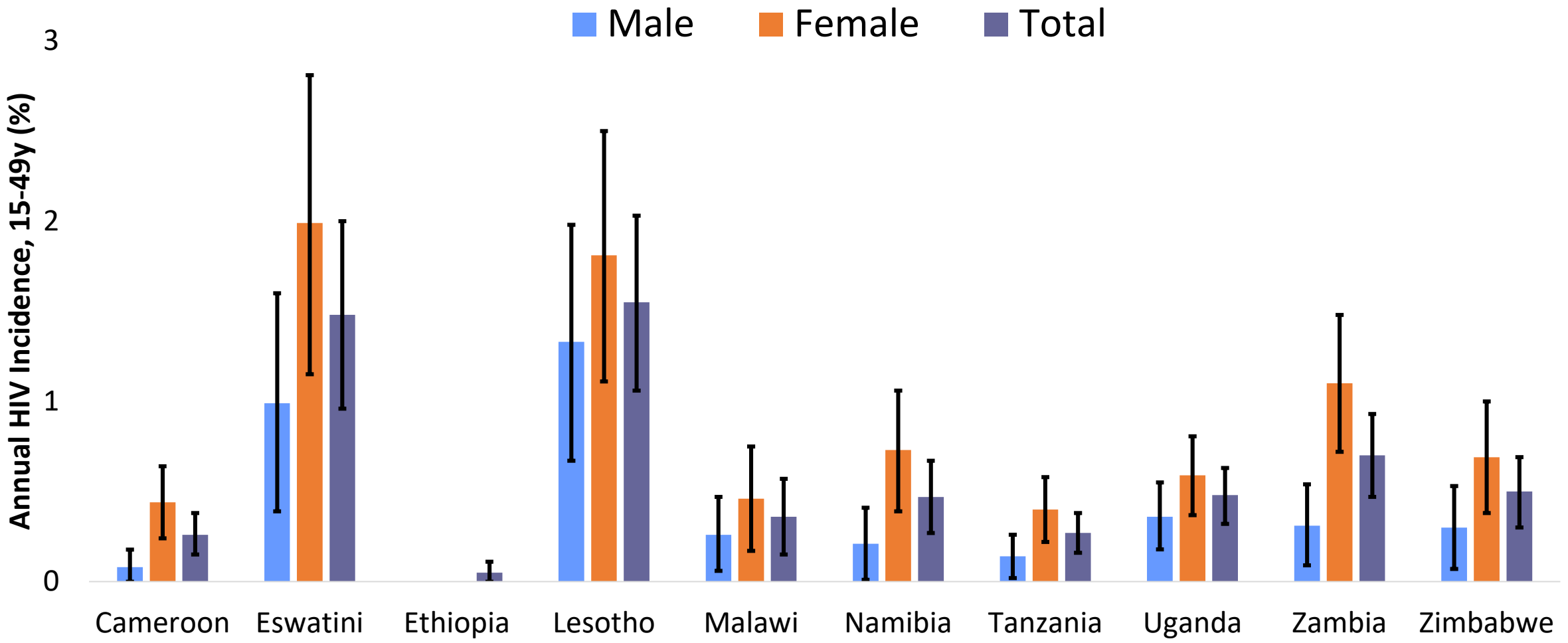
Annual HIV incidence among adults (15-49 years) without ARV adjustment



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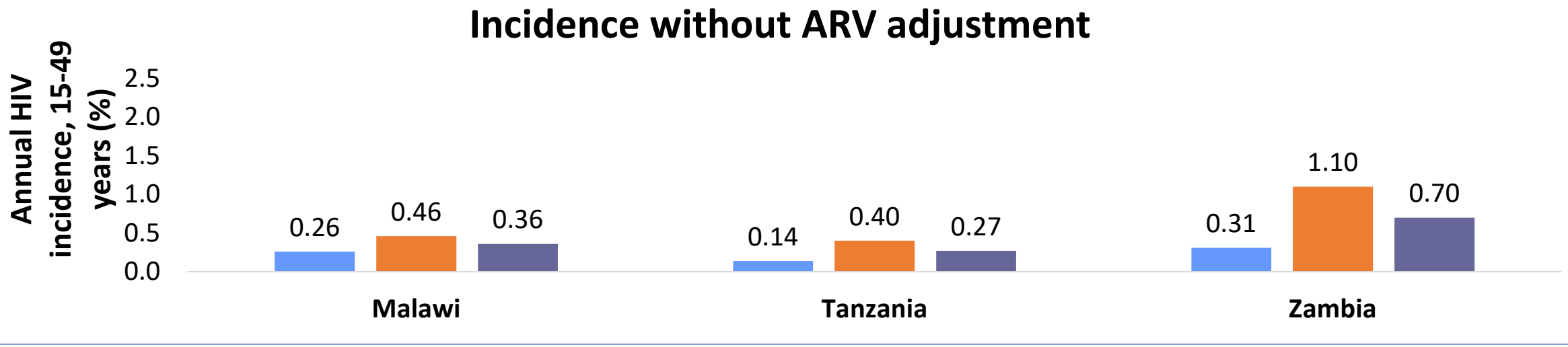
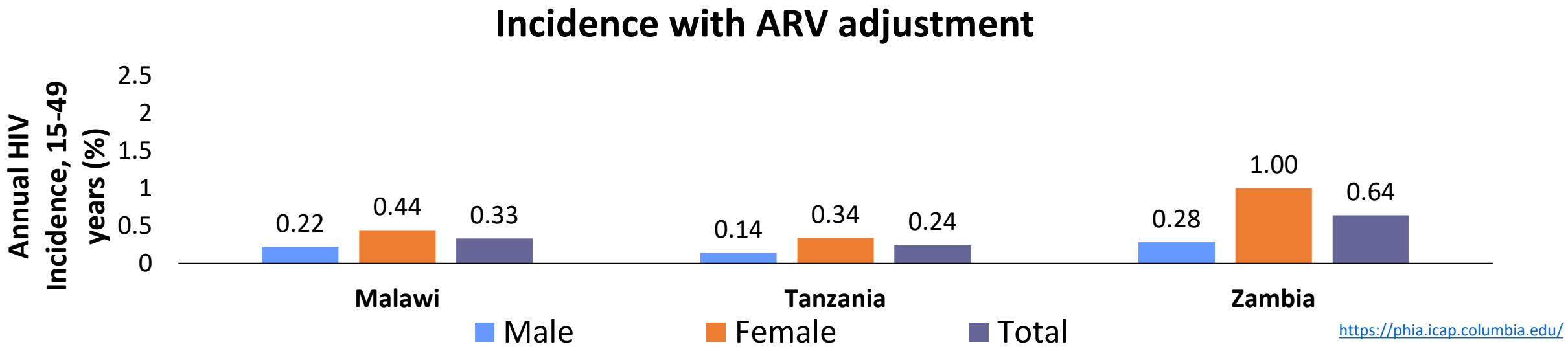
Annual HIV incidence incorporating ARV detection into the recent infection algorithm





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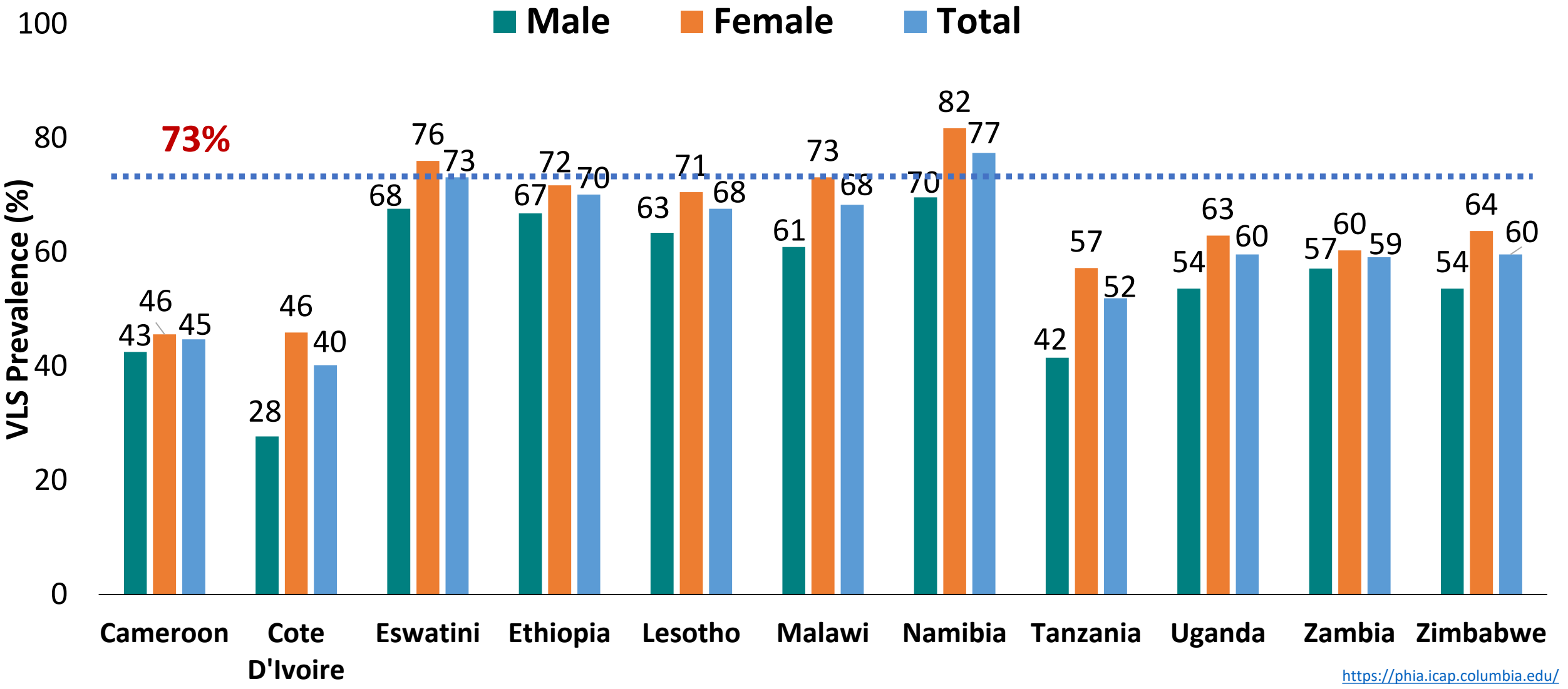
Viral load suppression (HIV RNA <1000 c/mL) among HIV-positive persons



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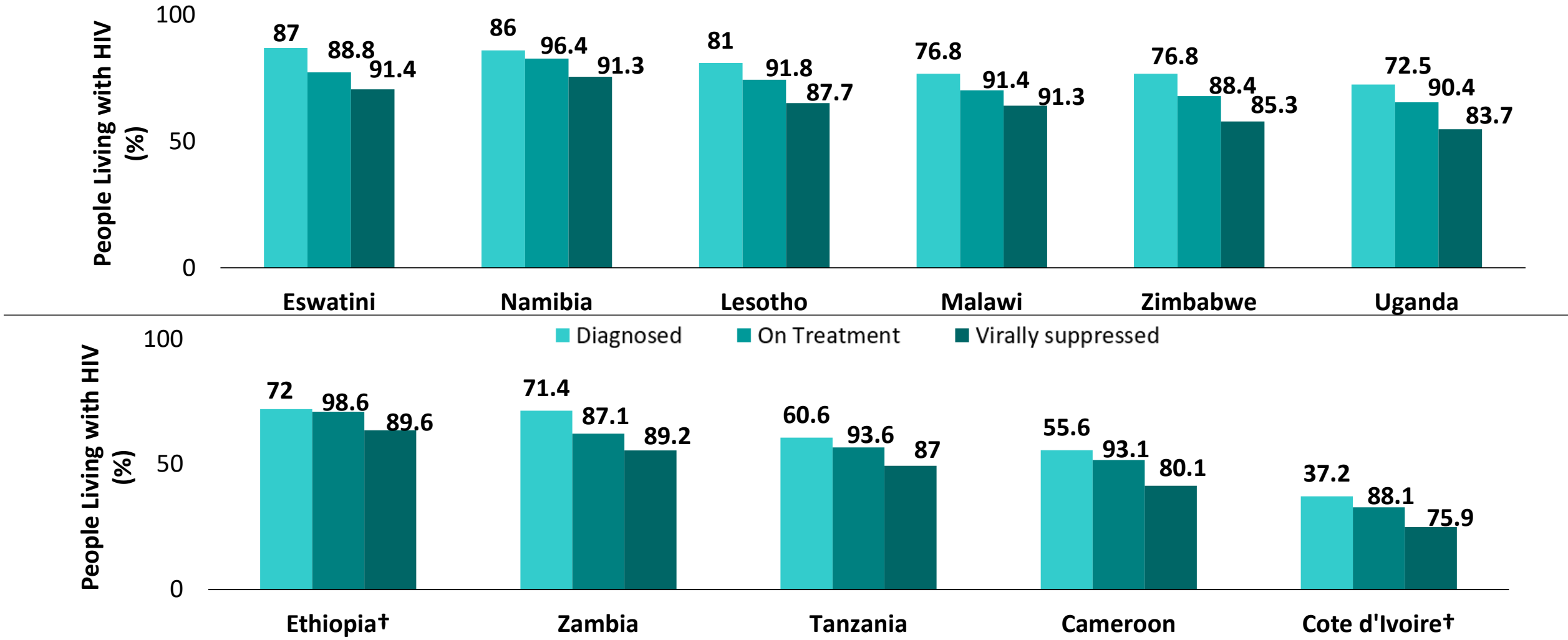
Results: 90-90-90 among adults



*Adjusted for ARVs unless otherwise specified; †Not adjusted for ARVs;
Column labels indicate conditional proportions; Column heights indicate unconditional proportions

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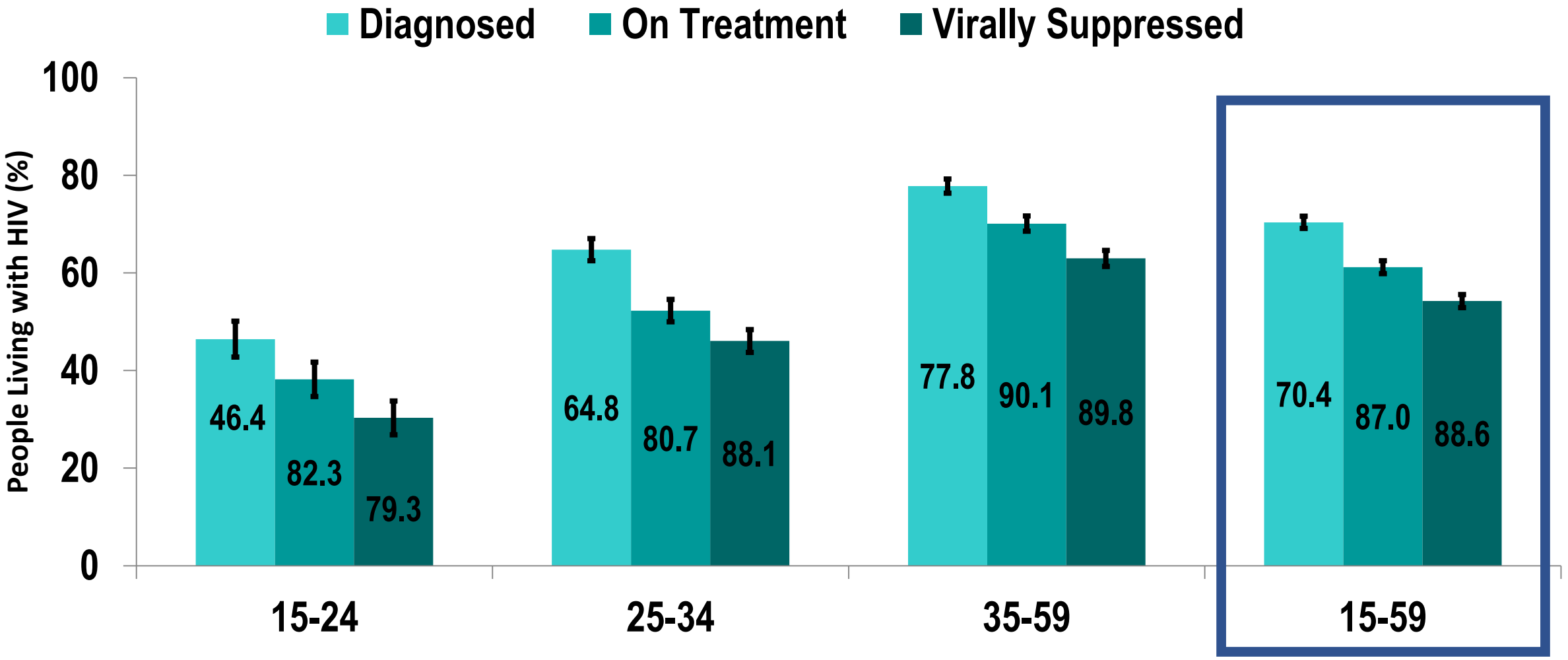
90-90-90 among adults by age (3-Country Combined)



Column labels indicate conditional proportions; Column heights indicate unconditional proportions

CROI #114 LB, 2016

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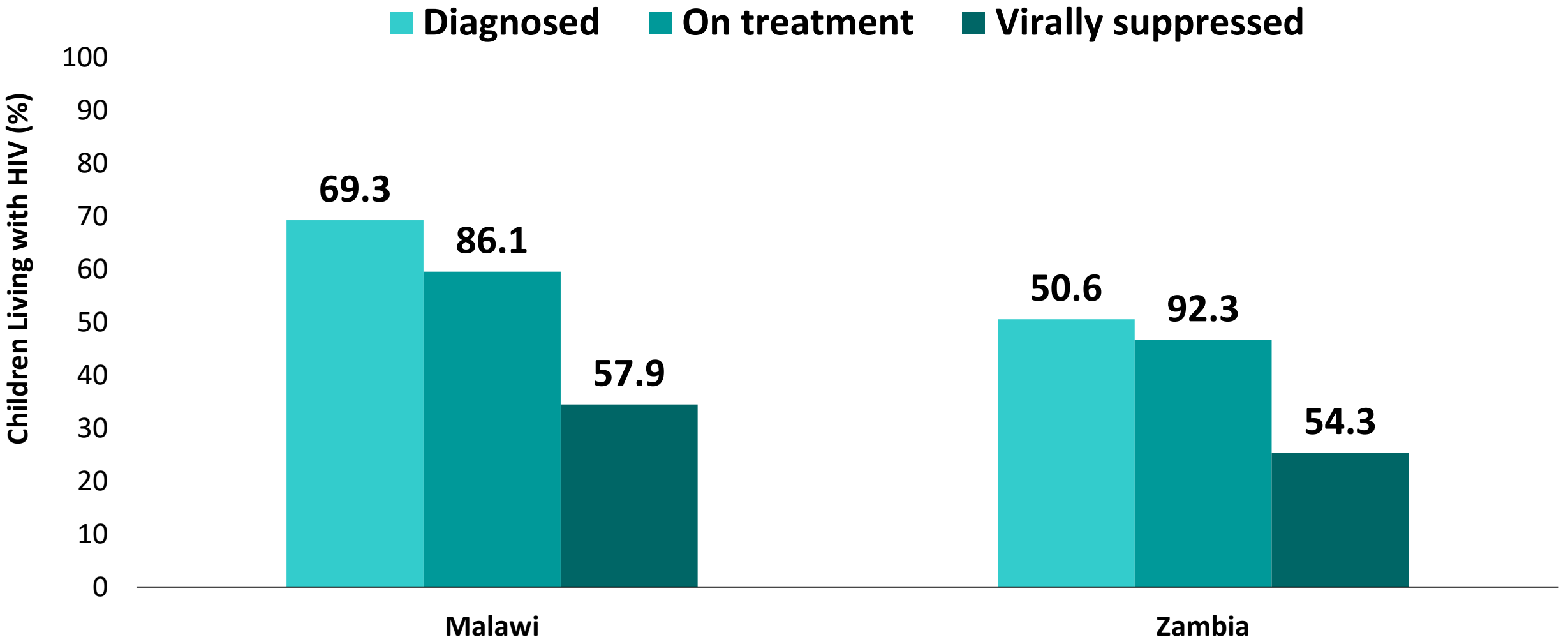
Pediatric 90-90-90
Malawi and Zambia, 0-14 years



Adjusted for ARVs

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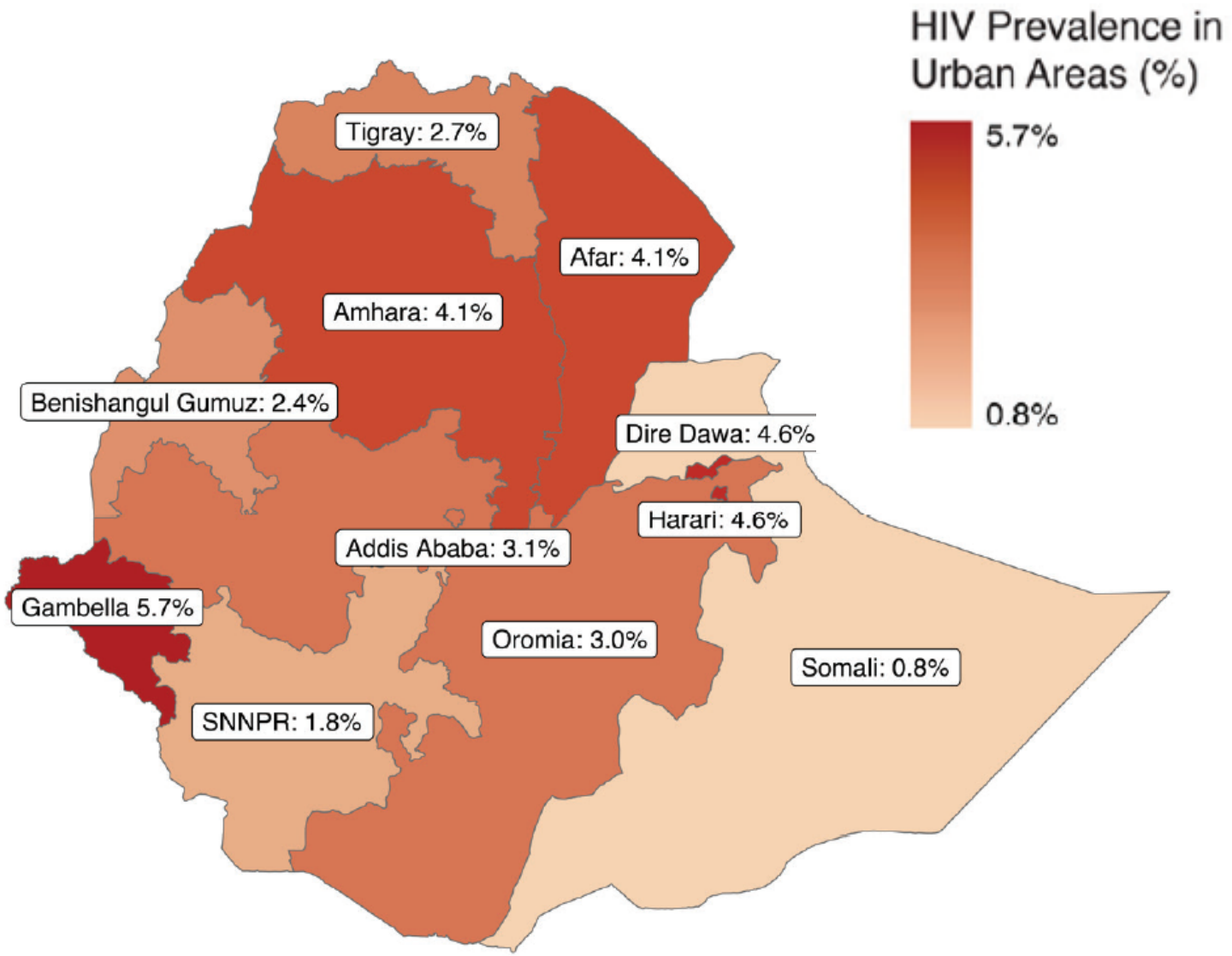
HIV prevalence among adults in urban Ethiopia



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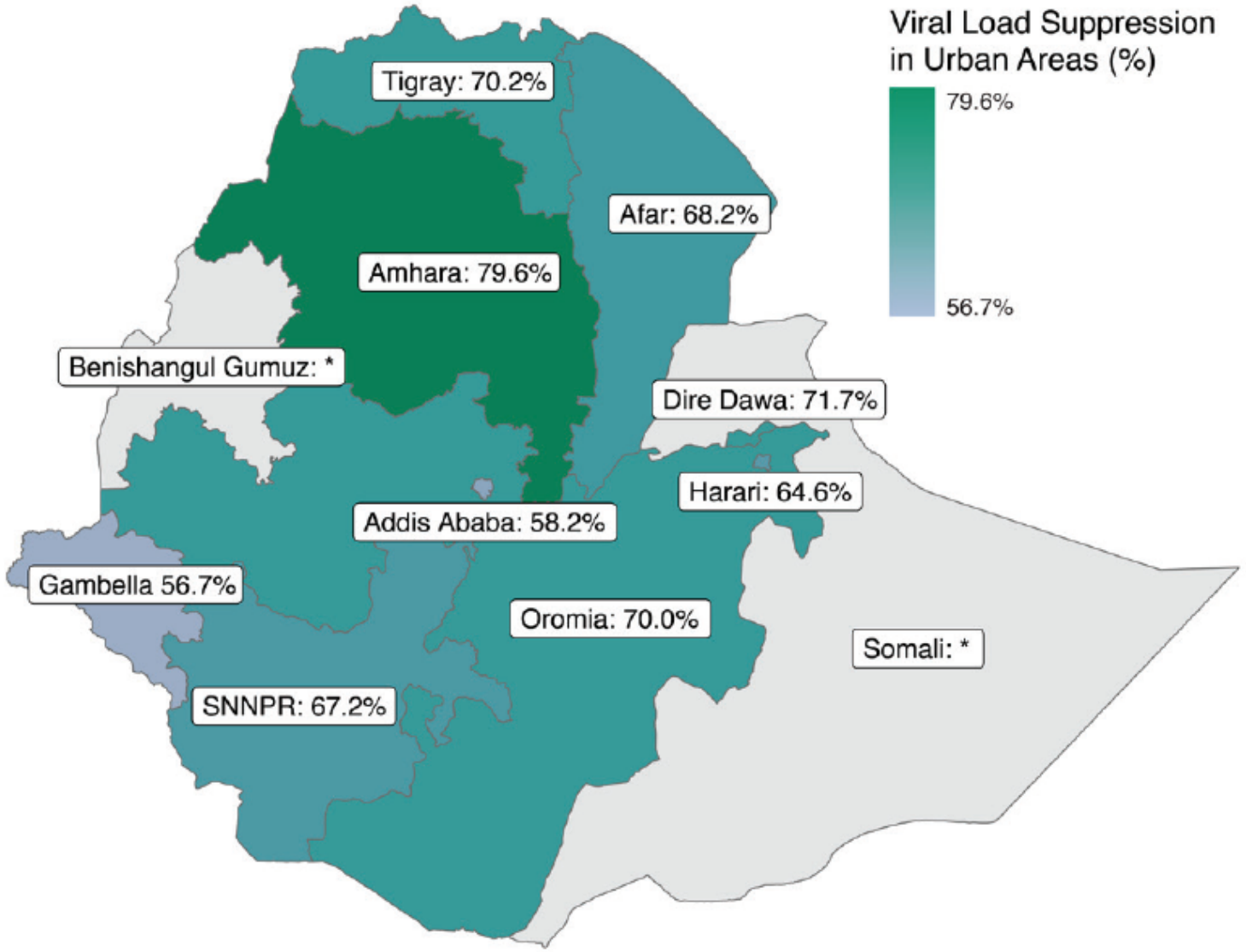
Viral load suppression (HIV RNA <1000 c/mL) among HIV-positive adults in urban Ethiopia



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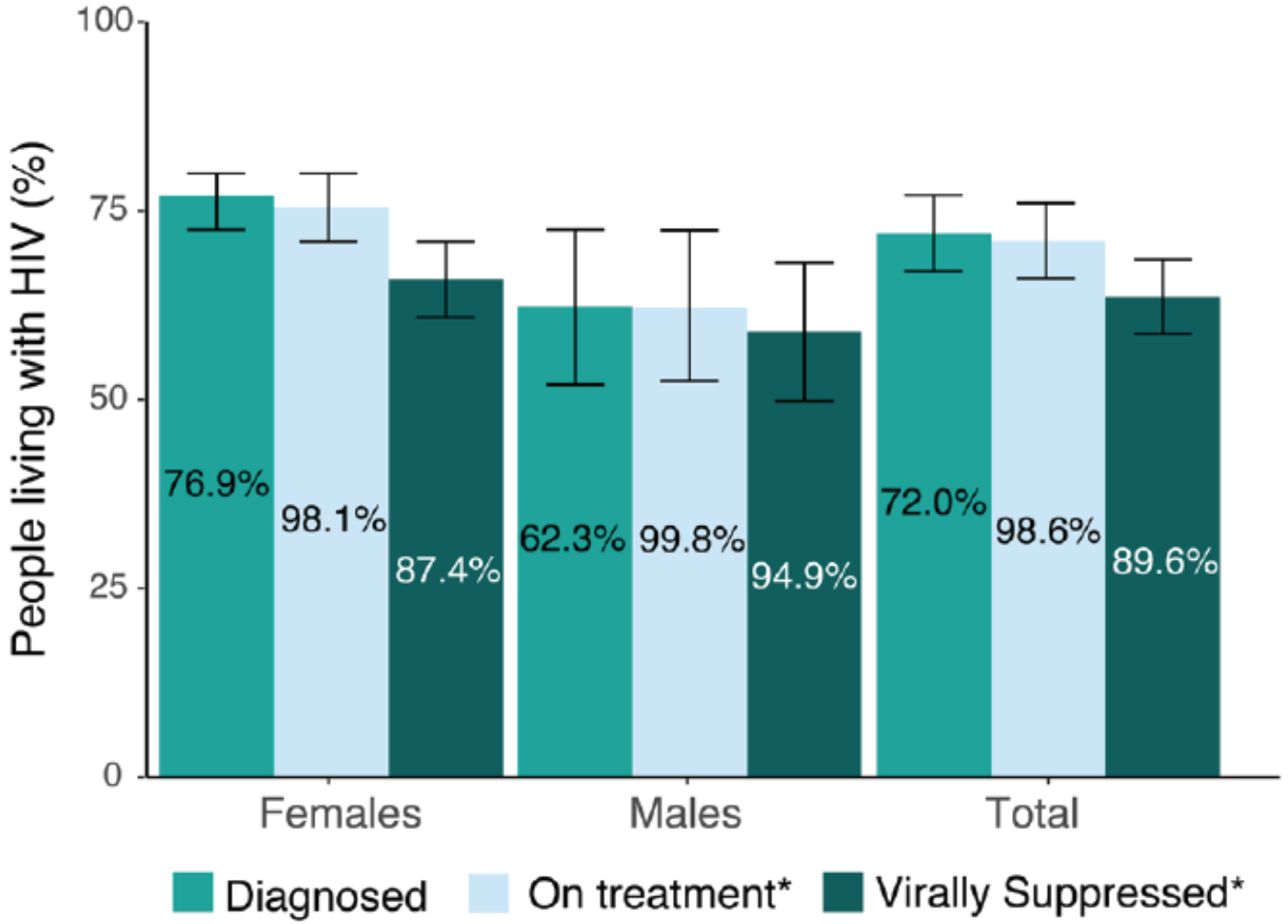
90-90-90 among adults living with HIV in urban Ethiopia, by sex



Percentages shown in the graph refer to the conditional 90-90-90 targets
Error bars represent 95% confidence intervals.

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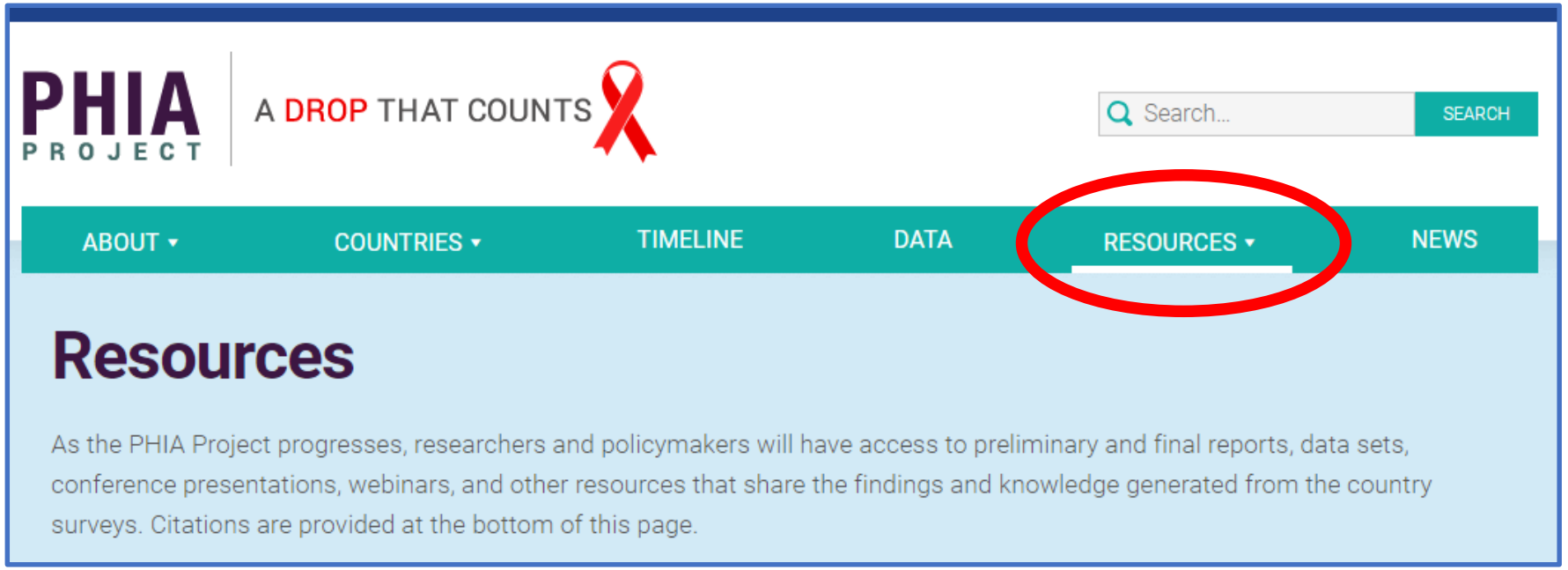
Presentation Outline

- **Background**
  - Global HIV epidemiology
- **PHIA Project**
  - Survey design and weighting
  - Lab methods
  - Results
  - Reports
  - Data visualization (video)
  - Public release dataset (video)
- **Conclusions**

Reports

- **Available in "Resources" section**
- **Report types:**
  - Summary sheets
  - First reports
  - Final reports



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11 PHIA Summary Sheets Available

Cameroon Summary Sheet

Cote D'Ivoire Summary Sheet (English, French)

Slides with Figures and Maps

Ethiopia Summary Sheet

Eswatini (SHIMS2) Summary Sheet

Lesotho Summary Sheet

Slides with Figures and Maps

Malawi Summary Sheet

Slides with Figures and Maps

Namibia Summary Sheet

Slides with Figures and Maps

Tanzania Summary Sheet

Slides with Figures and Maps

Uganda Summary Sheet

Slides with Figures and Maps

Zambia Summary Sheet

Slides with Figures and Maps

Zimbabwe Summary Sheet

Slides of Figures and Maps

Summary Sheets

- PDFs
- 4 to 6 pages
- Tables, charts, maps by sex, age, and region

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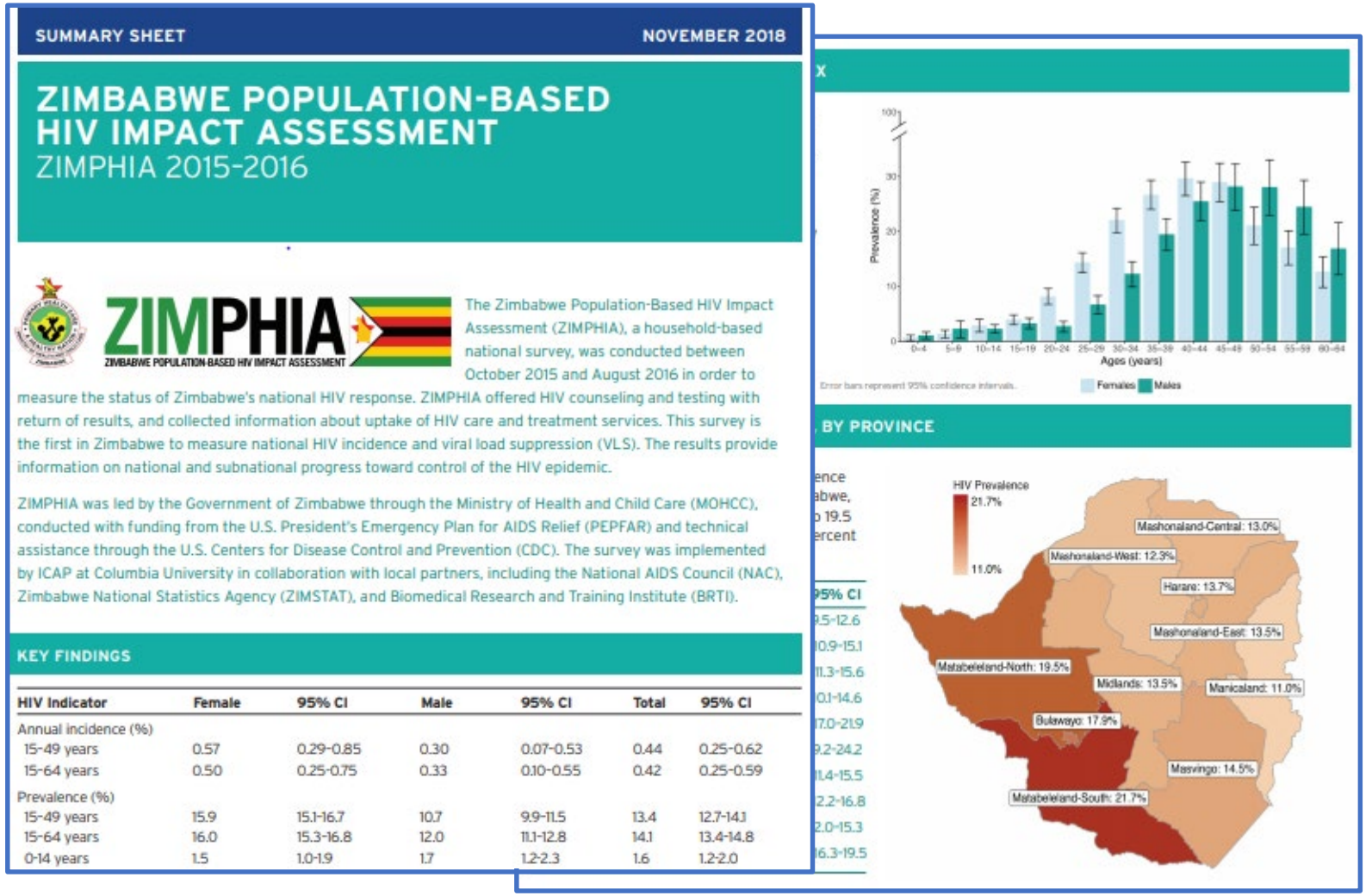
Example: ZIMPHIA Summary Sheet

Summary Sheets include:

- HIV incidence
- HIV prevalence
- Viral load suppression
- UNAIDS 90-90-90 targets



SUMMARY SHEET NOVEMBER 2018

ZIMBABWE POPULATION-BASED HIV IMPACT ASSESSMENT
ZIMPHIA 2015-2016

ZIMPHIA
ZIMBABWE POPULATION-BASED HIV IMPACT ASSESSMENT

The Zimbabwe Population-Based HIV Impact Assessment (ZIMPHIA), a household-based national survey, was conducted between October 2015 and August 2016 in order to measure the status of Zimbabwe's national HIV response. ZIMPHIA offered HIV counseling and testing with return of results, and collected information about uptake of HIV care and treatment services. This survey is the first in Zimbabwe to measure national HIV incidence and viral load suppression (VLS). The results provide information on national and subnational progress toward control of the HIV epidemic.

ZIMPHIA was led by the Government of Zimbabwe through the Ministry of Health and Child Care (MOHCC), conducted with funding from the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and technical assistance through the U.S. Centers for Disease Control and Prevention (CDC). The survey was implemented by ICAP at Columbia University in collaboration with local partners, including the National AIDS Council (NAC), Zimbabwe National Statistics Agency (ZIMSTAT), and Biomedical Research and Training Institute (BRTI).

KEY FINDINGS

HIV Indicator	Female	95% CI	Male	95% CI	Total	95% CI
Annual incidence (%)						
15-49 years	0.57	0.29-0.85	0.30	0.07-0.53	0.44	0.25-0.62
15-64 years	0.50	0.25-0.75	0.33	0.10-0.55	0.42	0.25-0.59
Prevalence (%)						
15-49 years	15.9	15.1-16.7	10.7	9.9-11.5	13.4	12.7-14.1
15-64 years	16.0	15.3-16.8	12.0	11.1-12.8	14.1	13.4-14.8
0-14 years	1.5	1.0-1.9	1.7	1.2-2.3	1.6	1.2-2.0

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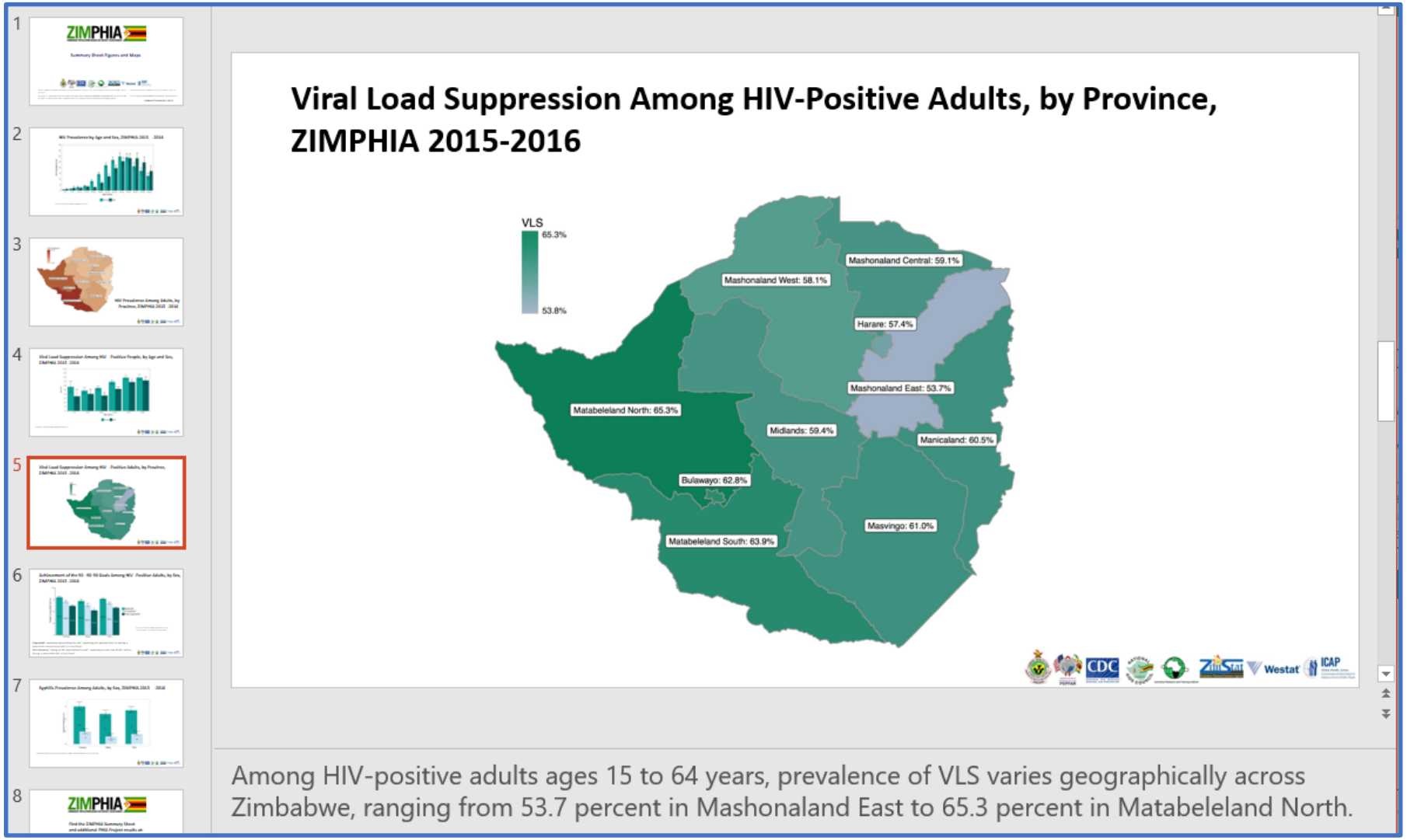
Example: ZIMPHIA Slides



PowerPoint slide sets include:

- Charts
- Maps
- Descriptive comments

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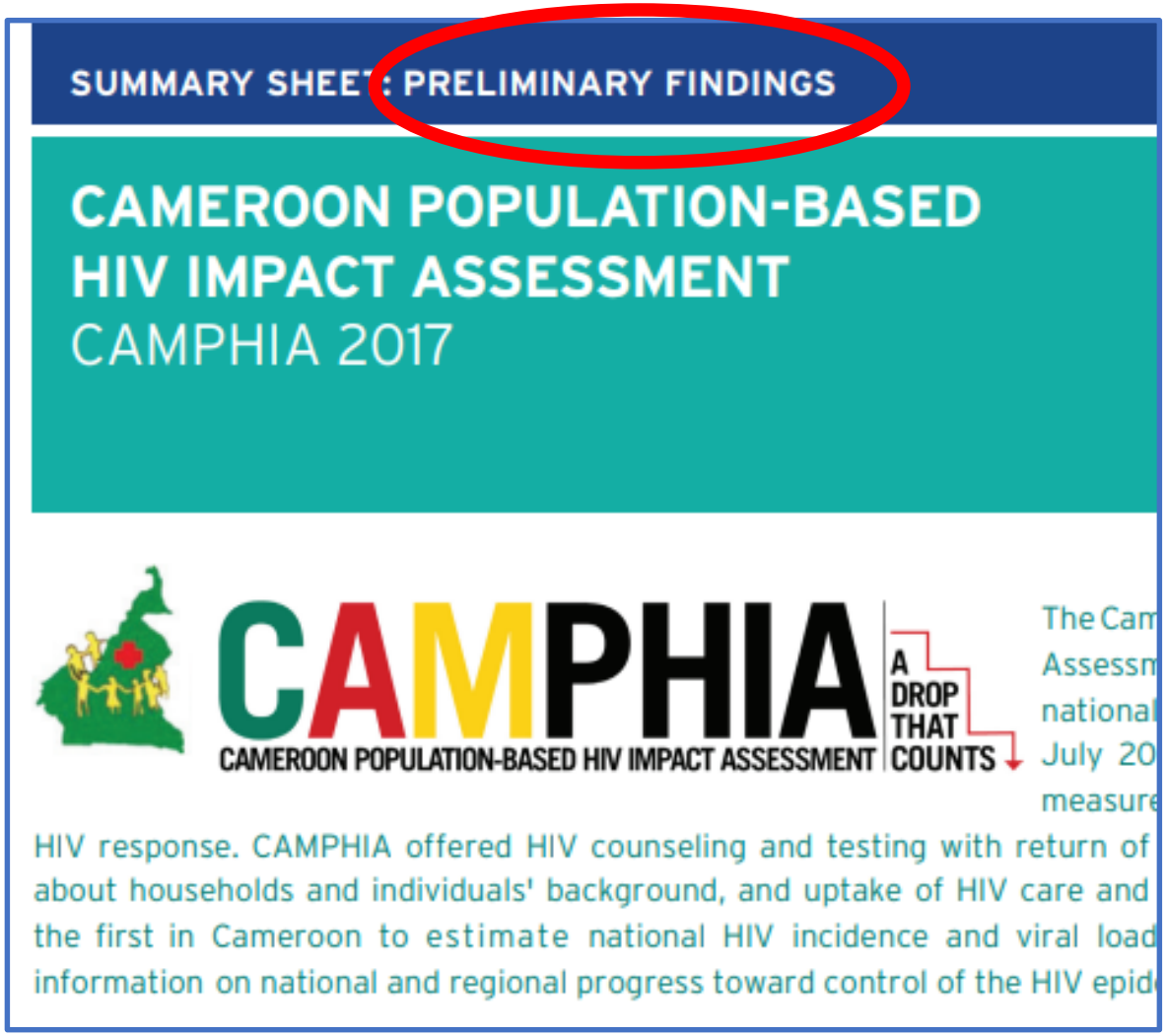
Example: Preliminary Summary Sheets

- Summary Sheets provide results quickly
- Some include preliminary findings that have not yet been adjusted for the presence of antiretrovirals
- Preliminary findings are indicated in the title
- Summary sheets with preliminary findings are replaced with final sheets when they become available


SUMMARY SHEET: PRELIMINARY FINDINGS

CAMEROON POPULATION-BASED HIV IMPACT ASSESSMENT

CAMPHIA 2017

CAMPHIA

CAMEROON POPULATION-BASED HIV IMPACT ASSESSMENT

A DROP THAT COUNTS

The Cam
Assessm
national
July 20
measure

HIV response. CAMPHIA offered HIV counseling and testing with return of
about households and individuals' background, and uptake of HIV care and
the first in Cameroon to estimate national HIV incidence and viral load
information on national and regional progress toward control of the HIV epid

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PHIA First Reports

3 First Reports Available

- Executive summary
- More detailed presentation of prevalence, incidence, 90-90-90, and other results than in the Summary Sheets
- Discussion of design and methods
- Produced for earlier PHIA surveys only
- All surveys have final reports

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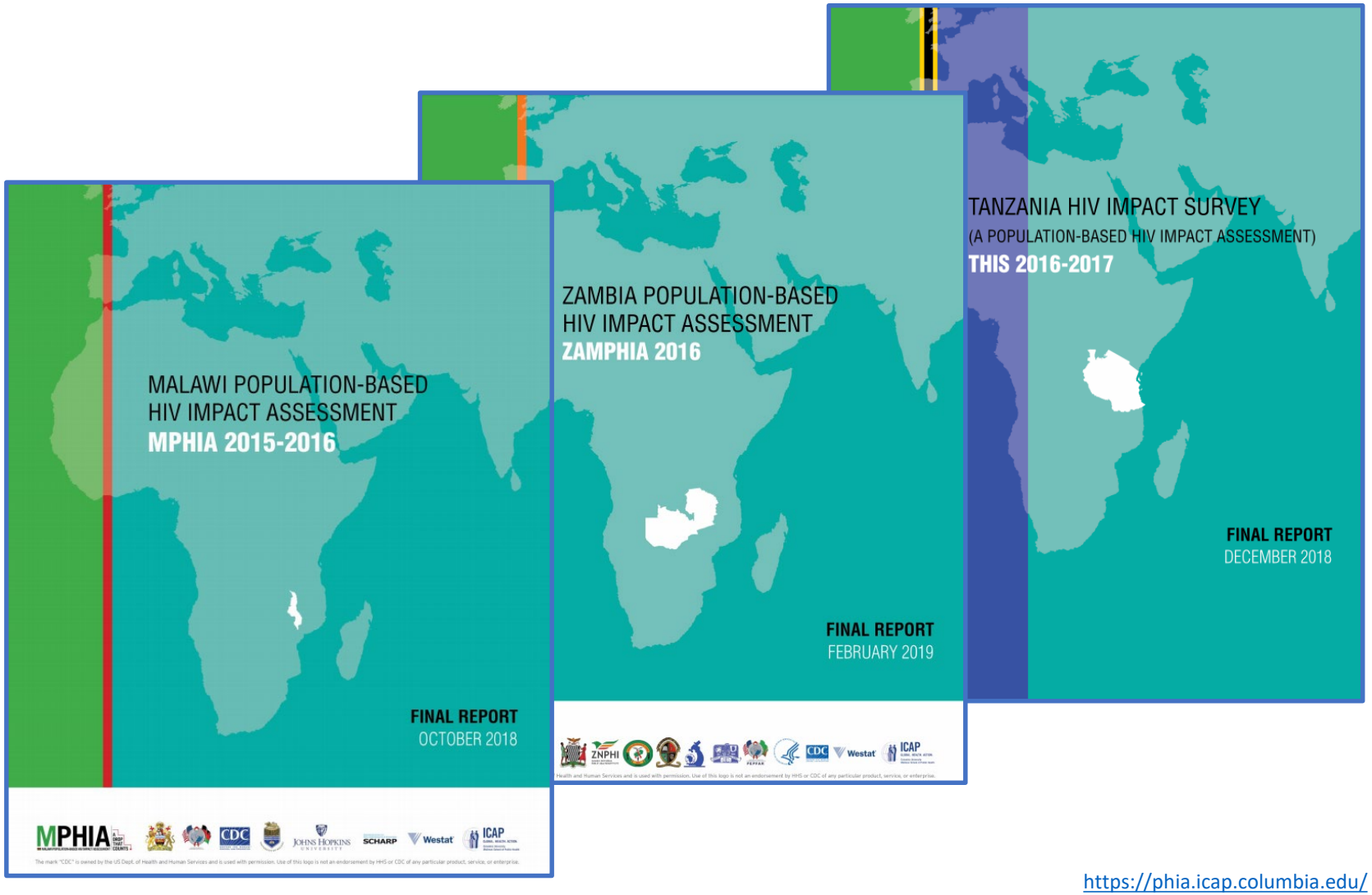
PHIA Final Reports

Final Reports include:

- ARV-adjusted 90-90-90 estimates
- Late HIV diagnosis (CD4+ cell count)
- Transmitted resistance to ARVs
- Retention on ART
- TB (linkage, diagnosis and treatment)
- HIV knowledge and attitudes



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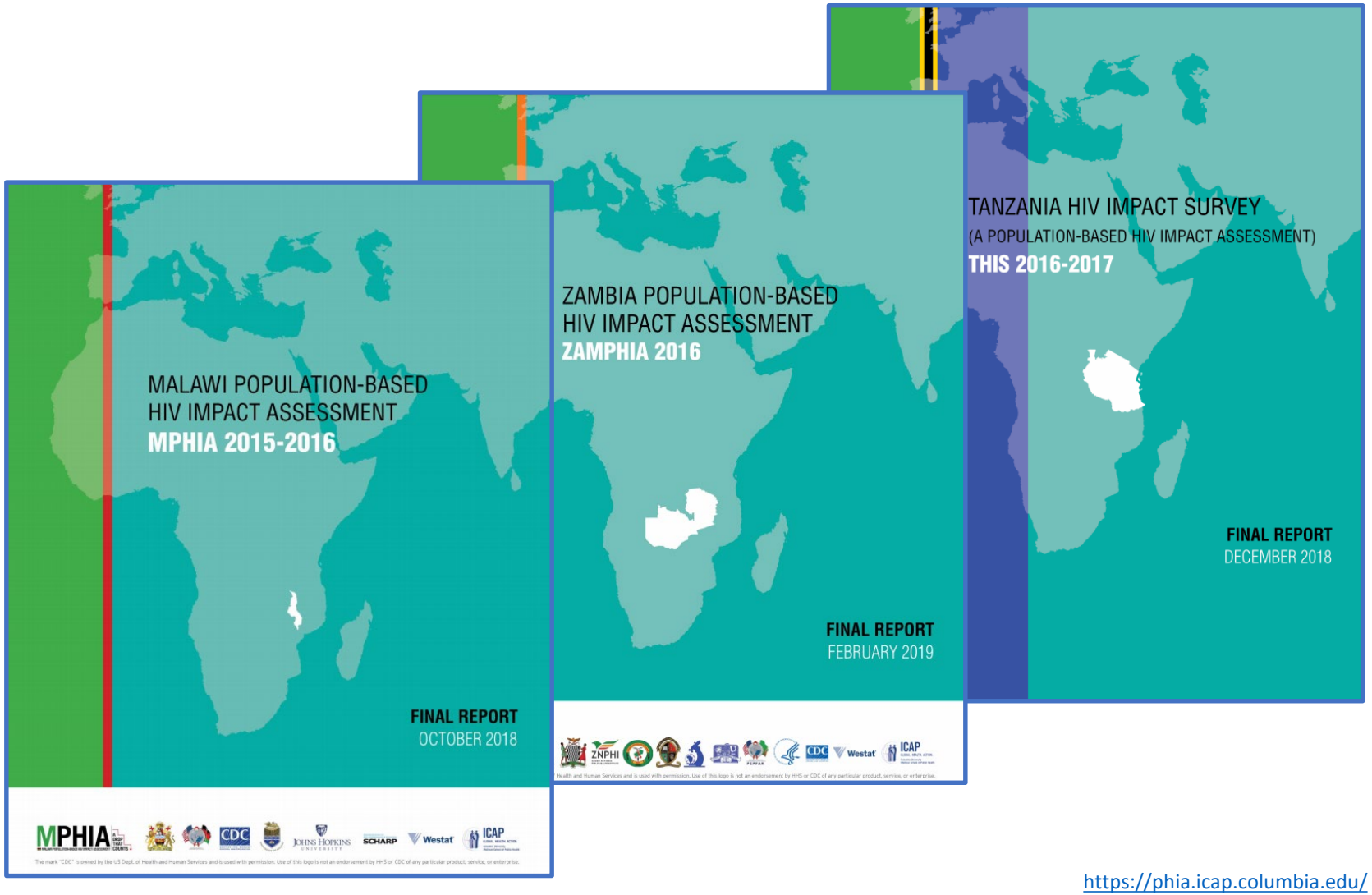
PHIA Final Reports (continued)

Final reports include detailed discussion of:

- Sample frame and design
- Implementation
- Biomarker testing
- Data processing
- Response rates
- HIV testing methodology
- Estimates of sampling errors
- Questionnaires
- Consent forms



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Deliverables Forecast

	Final Report	Public Dataset
ZAMBIA	Feb 2019	Mar 2019
MALAWI	Oct 2018	Apr 2019
TANZANIA	Apr 2019	May 2019
ZIMBABWE	Jun 2019	Jul 2019
ESWATINI	May 2019	Jun 2019
UGANDA	Jun 2019	Jul 2019
LESOTHO	Jun 2019	Jul 2019
NAMIBIA	Jul 2019	Aug 2019
CAMEROON	Jul 2019	Sept 2019
COTE D'IVOIRE	Aug 2019	Oct 2019
ETHIOPIA	Sept 2019	Oct 2019
KENYA	April 2020	May 2020
RWANDA	Jan 2020	Feb 2020
HAITI	Aug 2020	Sep 2020

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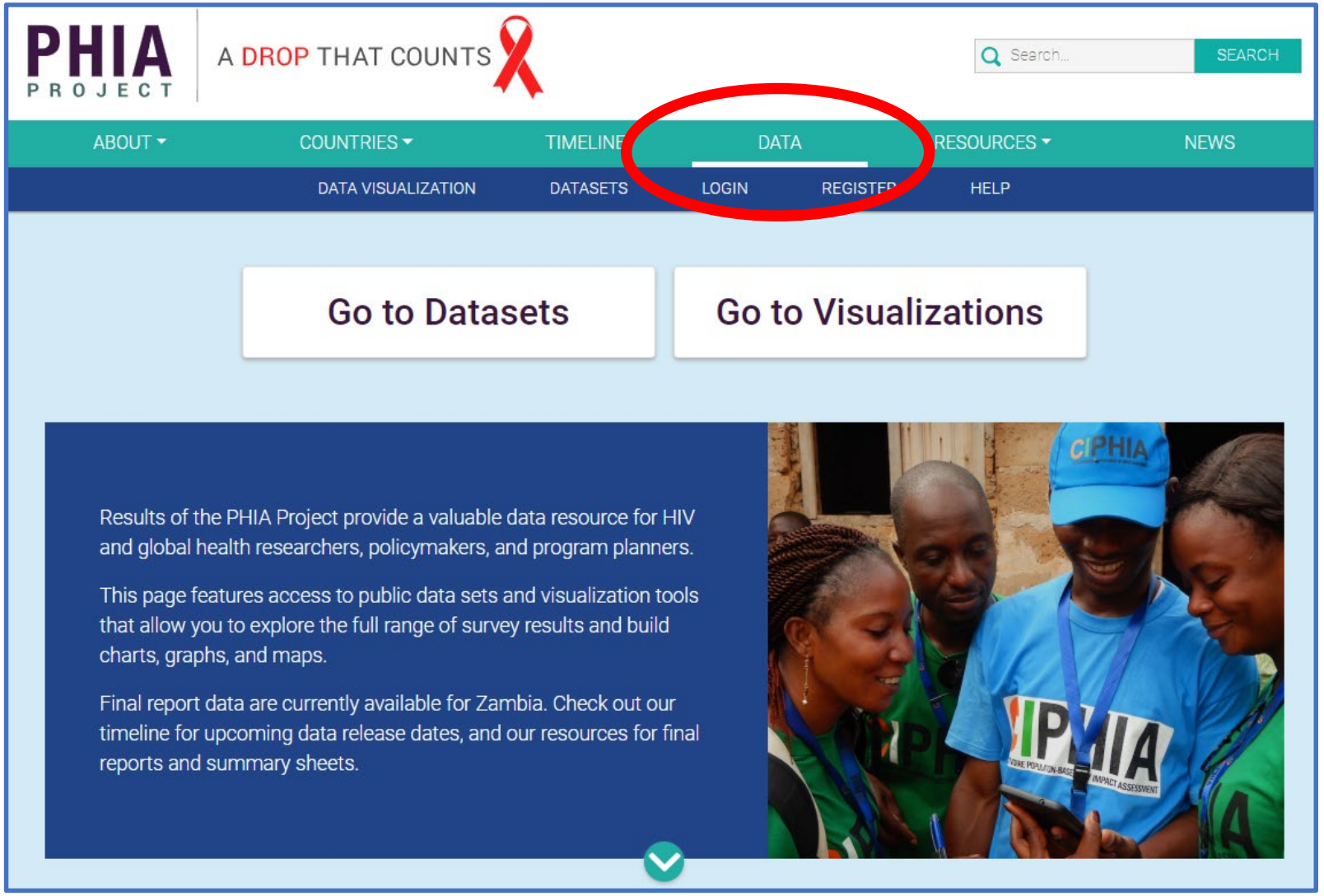
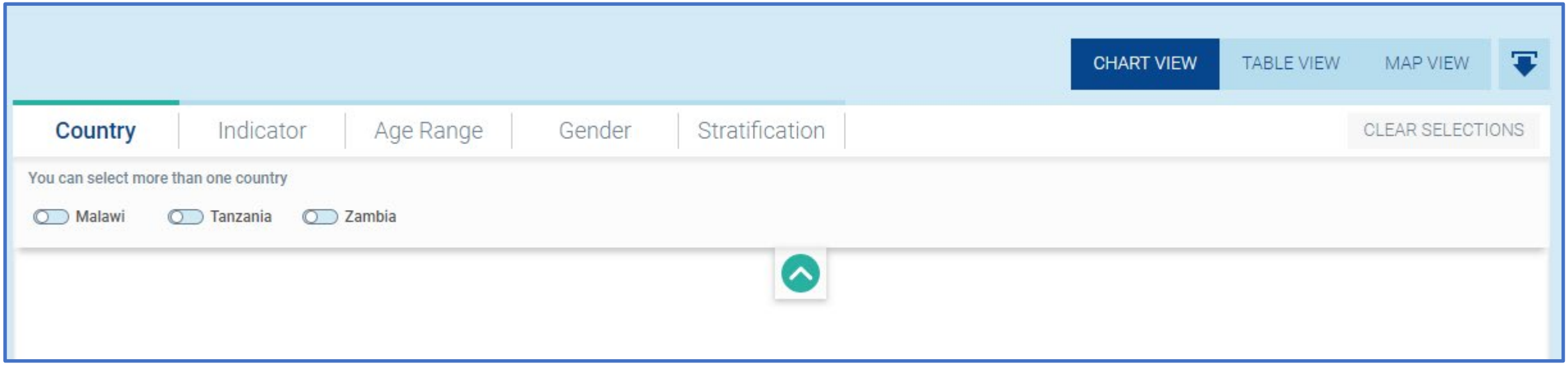
PHIA Data Visualization Tool



- Allows detailed data exploration without use of statistical software
- Available in “Data” section
- Produces charts, tables, and maps

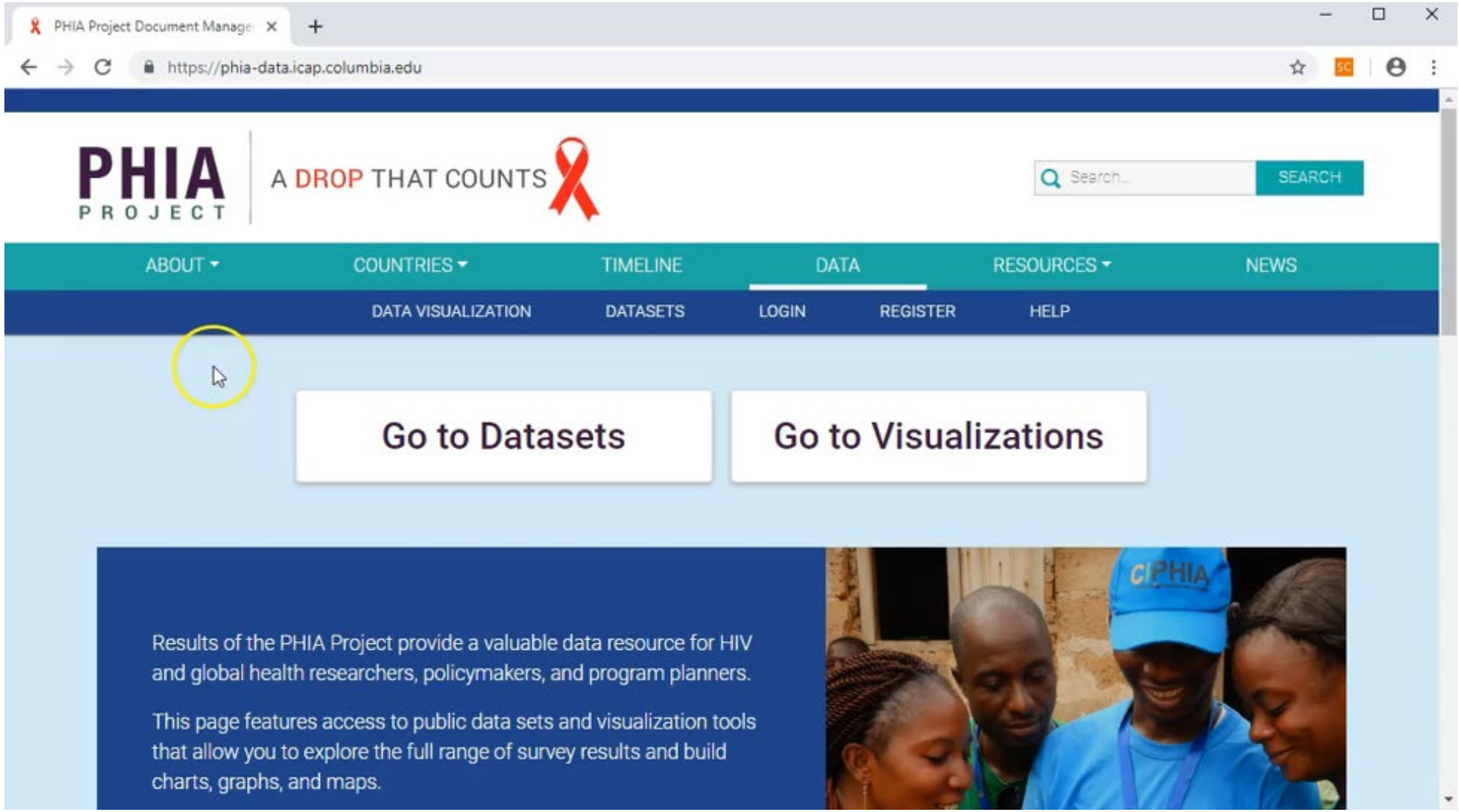
PHIA Data Visualization Tool



- **Users can compare within and across countries to explore spatial trends and variations across contexts**

- **Supports customizing by:**
  - Indicator
  - Country
  - Sub-national area
  - Stratifiers such as age, gender, income

Video: Using the PHIA data visualization tool



Available at: https://youtu.be/mSUGJfdETjw

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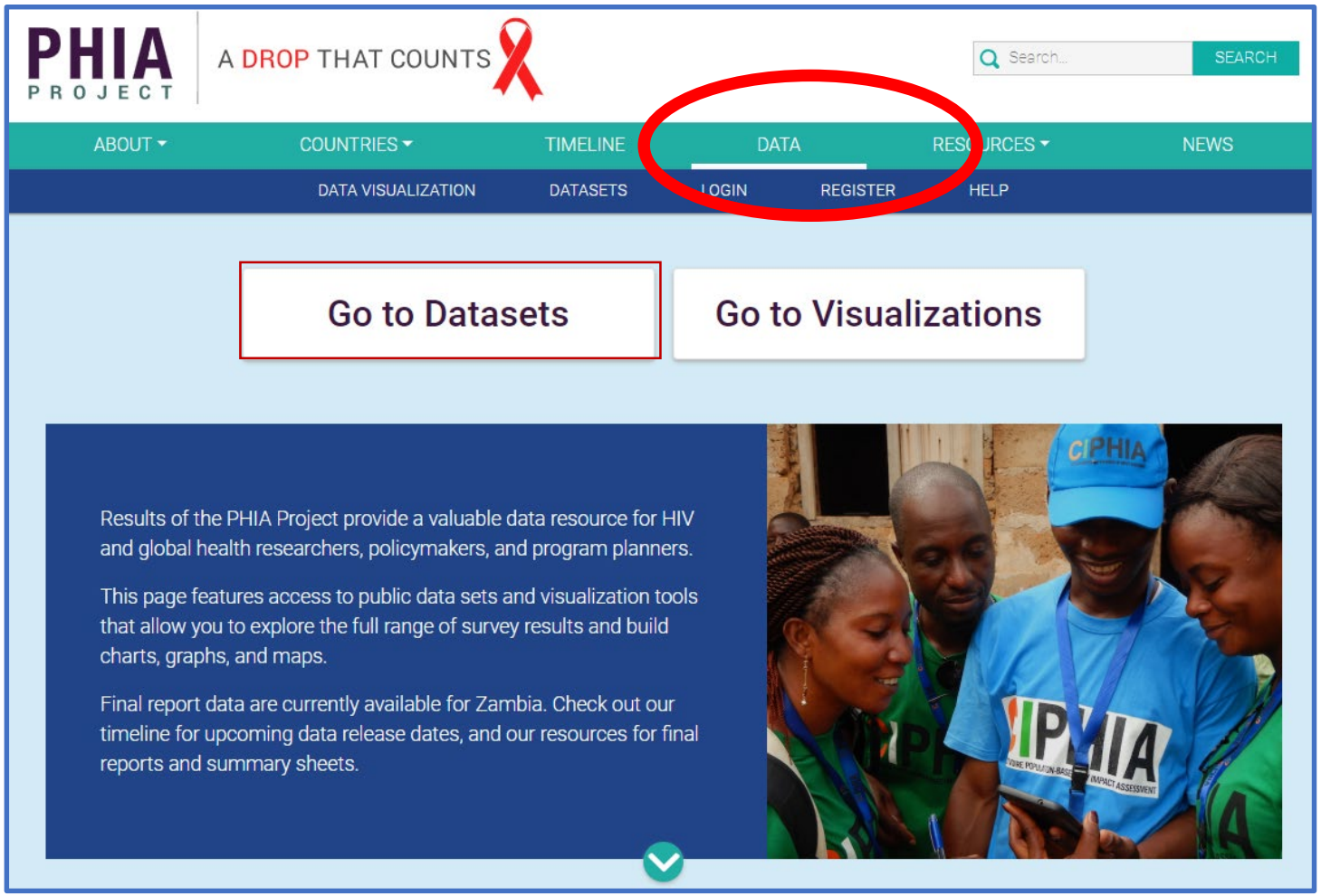
PHIA Public-use Dataset Dissemination



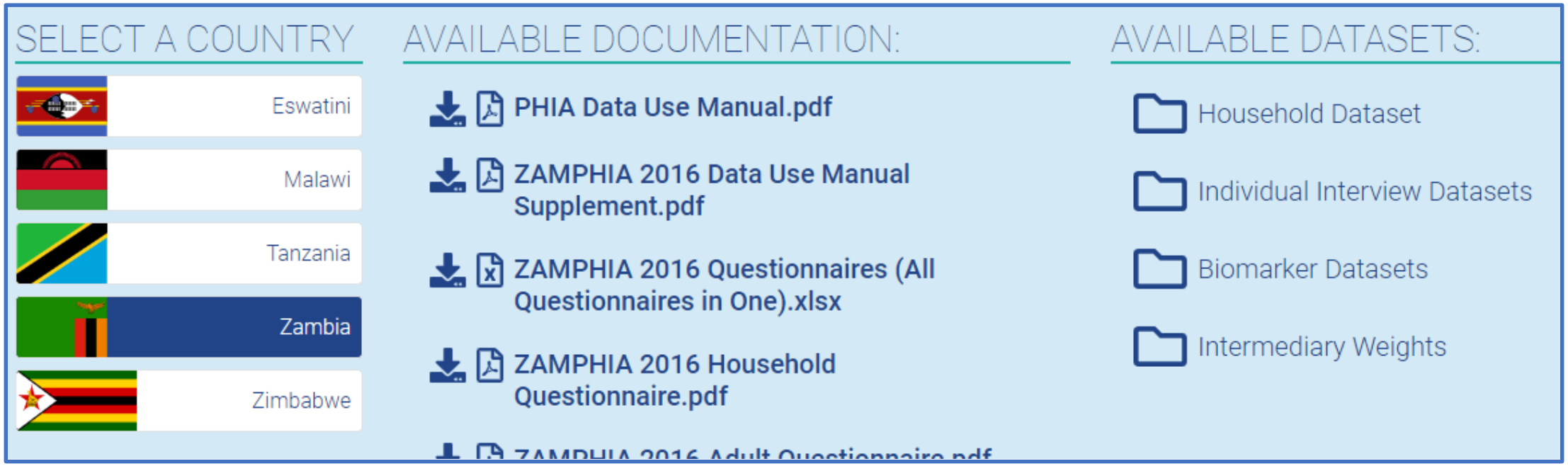
Public-use datasets

- Promote use and dissemination of PHIA results
- Support analysts in conducting their own analyses
- Require statistical software to analyze

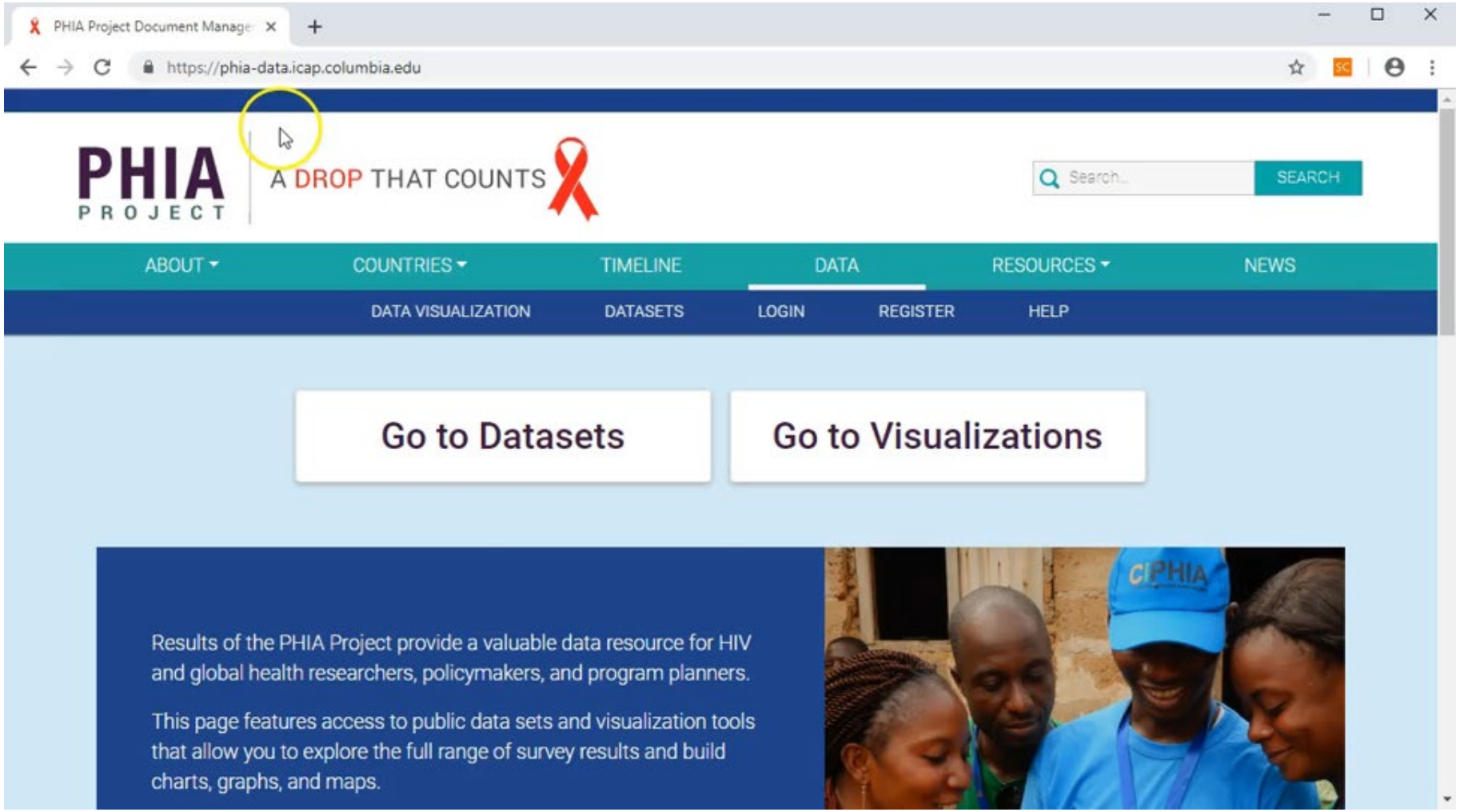
PHIA public-use dataset dissemination

Public-use datasets

- Contain anonymized household, individual, and biomarker data
- Include technical documentation
- Are available in SAS, Stata, and CSV formats
- Available with Final Report for each country



Video: Accessing PHIA documentation and datasets

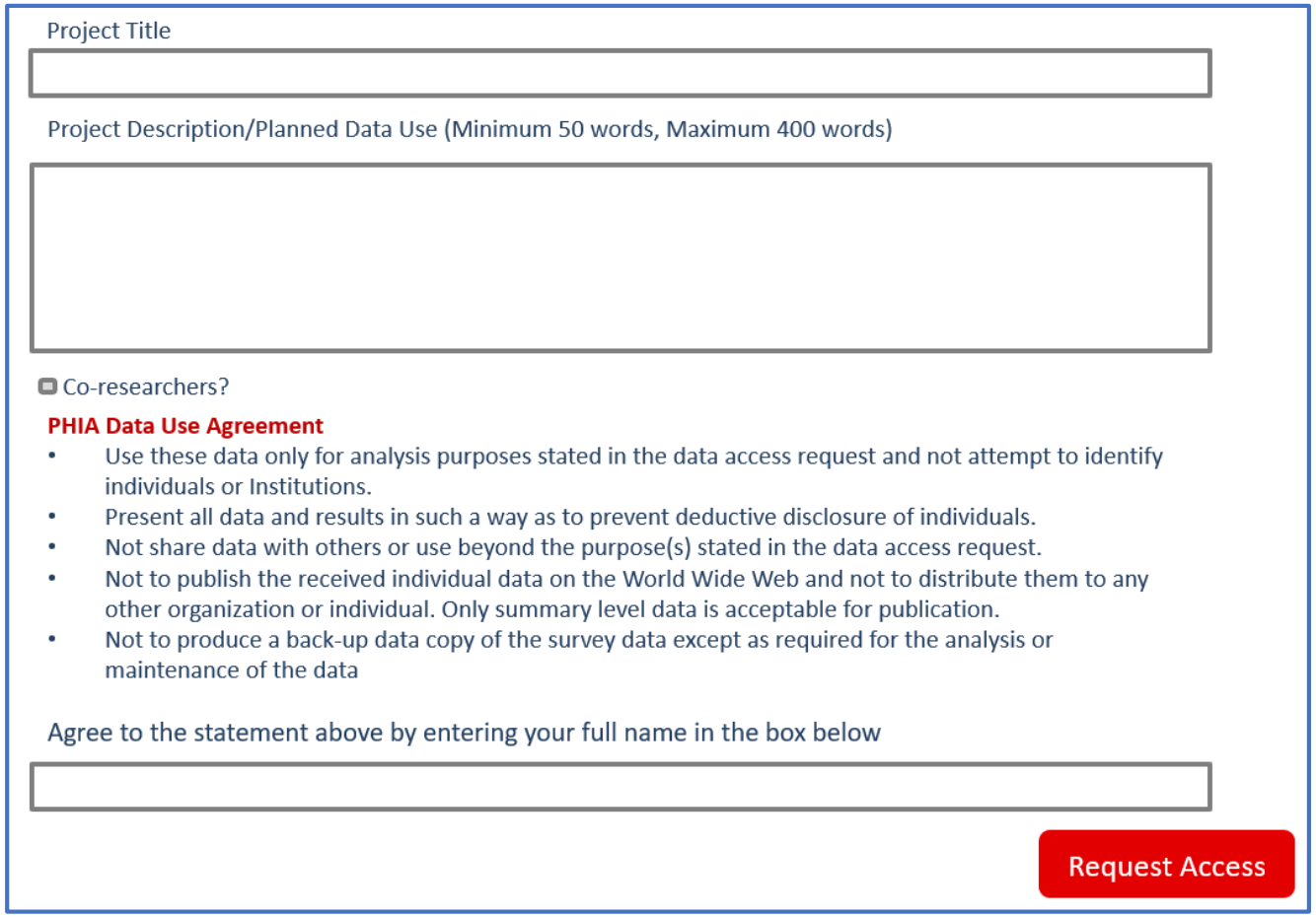


Available at: https://www.youtube.com/watch?v=Wn5ZVnvu82g

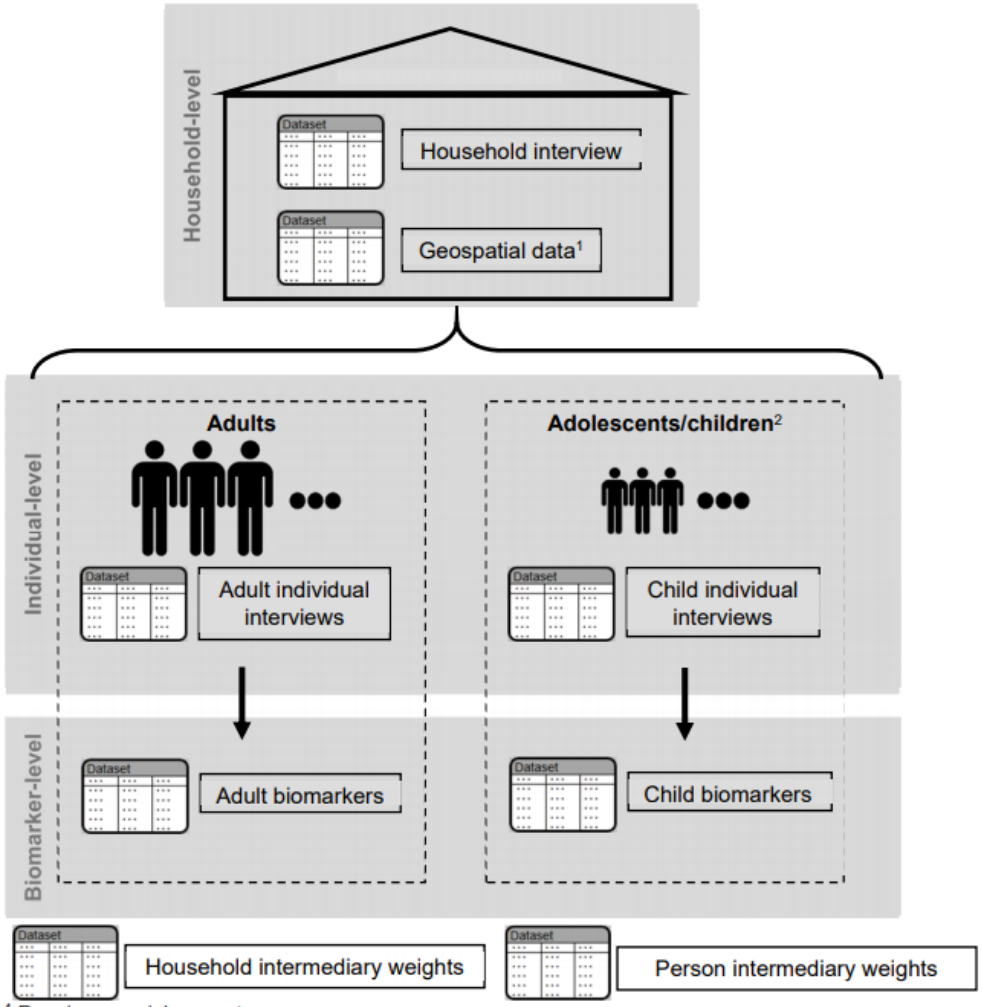
Data Requests

Request requirements

- Title
- Background/Context
- Primary research question
- Exposure/outcome variables and covariates
- Stat Methods
- Collaborators
- Where
- Co-researchers



Structure of PHIA datasets



[1] Requires special request.
[2] See each PHIA survey's **Data Use Manual Supplement** for survey-specific definitions of adolescents and children.

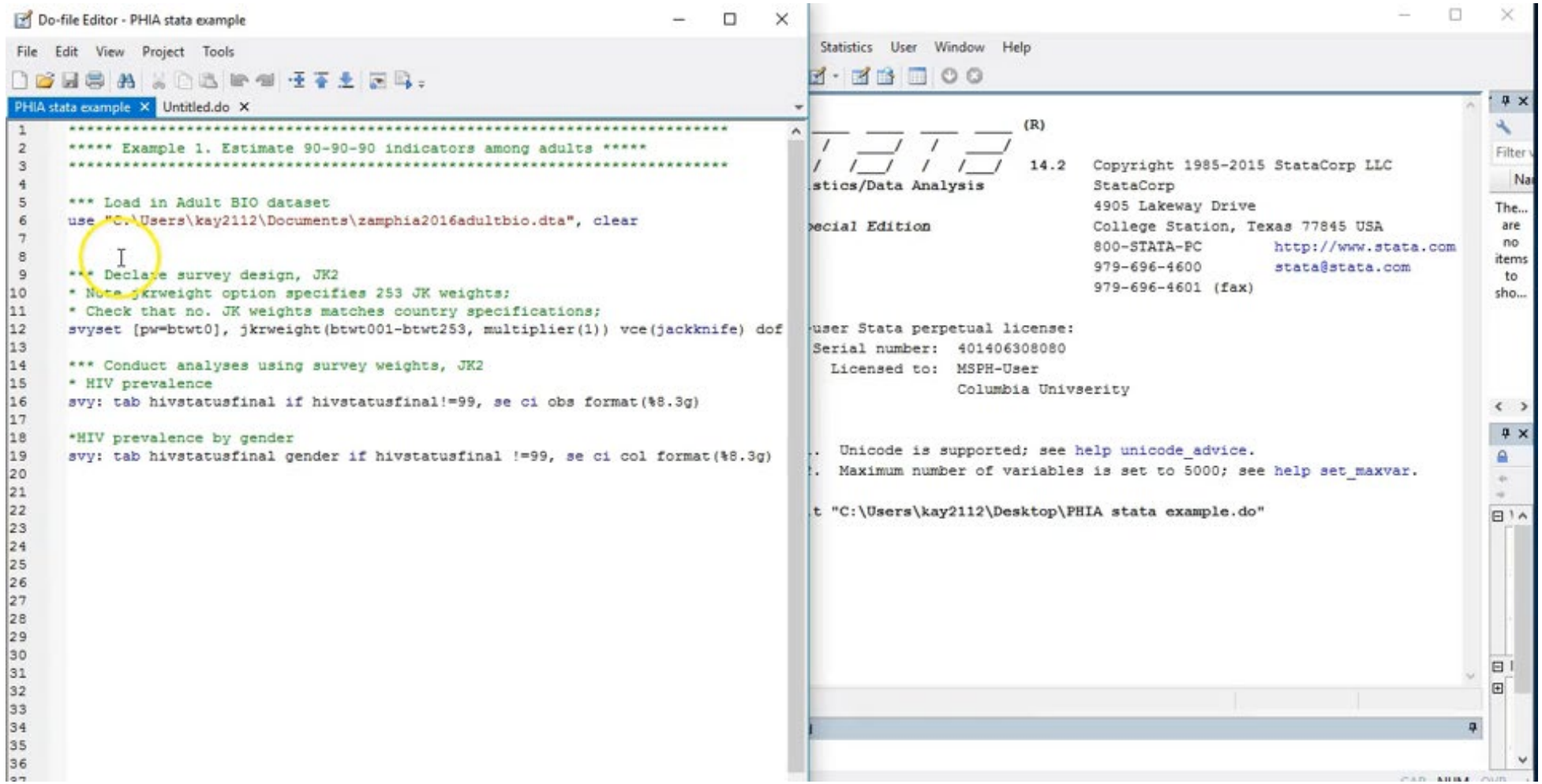
- Each household record is associated with one or more individual records
- Each individual record may have an associated biomarker record
- Separate datasets are provided for records at different levels of analysis
- Individual and biomarker tests are separated for adults and children
- Geospatial data (masked location data) will be available upon request

Getting started

After receiving the requested datasets:

- Review PHIA data use manual
- Review the survey-specific data use manual supplement
- Note top count of replicate weights
- Open datasets in a statistical package and compare record counts to counts included in the survey-specific data use manual
- Run unweighted frequencies and match some variables from the codebooks and/or reports
- Run weighted analyses and match some tables from the final report

Video: Analyzing PHIA data in Stata



Available at: https://youtu.be/bAEhfdCz070

Conclusions

- High participation in the PHIA surveys, with high quality samples and data from over 375,000 adults and children
- Data highlight achievements and gaps of national HIV response programs
  - Remarkable progress toward 90-90-90 targets
  - Challenges among younger adults and children
- Datasets and visualization tools allow users to compare within and across countries and explore spatial trends and variations across contexts
- Many final reports and datasets forthcoming

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  - Kristin Brown
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