

Methodologies for Estimating the Number of People Living with HIV (PLHIV) in 22 Fast-Track Cities

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LONDON

FAST-TRACK CITIES 2019

SEPTEMBER 8-11, 2019 | BARBICAN CENTRE

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Background

- Fast-Track Cities around the world are reporting progress on global 90-90-90 targets
- Reliable and accurate methodologies for estimating the number of PLHIV are crucial for measuring progress against the first 90 target

Methodology

A survey examining methodologies for estimating the number of PLHIV was sent to all cities reporting estimated PLHIV in the public domain and was completed by 22 Fast-Track Cities.

Survey Components :

1. Qualitative*

- a) Description of methodology
- b) Limitations to methodology
- c) Course corrections necessary
- d) Changes to methodologies since baseline reporting

2. Quantitative

- a) Ranking accuracy of methodology from 1-10

**Qualitative data were coded to analyze overarching themes*

Participating Cities



Africa

- Dar es Salaam, Tanzania
- eThekweni, South Africa
- Kampala, Uganda
- Kinshasa, Democratic Republic of Congo
- Lagos State, Nigeria
- Nairobi County, Kenya

Asia-Pacific

- Almaty, Kazakhstan
- Bangkok, Thailand
- Melbourne, Victoria State, Australia

Latin America and the Caribbean

- Salvador, Brazil
- Kingston, Jamaica

Europe

- Athens, Greece
- Berlin, Germany
- Brighton & Hove, UK
- Kyiv, Ukraine
- London, UK

North America

- Metro Denver, USA
- New York City, USA
- Phoenix, USA
- Providence, USA
- San Antonio, USA
- San Francisco, USA

Methodologies for Estimating Number of PLHIV



Estimation Tool	City
ECDC CD4 Depletion Model	<ul style="list-style-type: none"> Athens, Greece Berlin, Germany Melbourne/Victoria State, AUS
CDC CD4 Depletion Model	<ul style="list-style-type: none"> Metro Denver, USA New York City, USA Providence, USA San Antonio, USA San Francisco, USA
CD4 Depletion Model	<ul style="list-style-type: none"> Salvador, Brazil Brighton & Hove, UK
Spectrum Software	<ul style="list-style-type: none"> Almaty, Kazakhstan Dar es Salaam, Tanzania Kinshasa, DRC Kyiv, Ukraine Lagos, Nigeria Nairobi, Kenya
Bayesian Modelling	<ul style="list-style-type: none"> London, UK
Modelling (unique)	<ul style="list-style-type: none"> Kingston, Jamaica
Triangulation	<ul style="list-style-type: none"> eThekwini, South Africa
CDC Prevalence Model	<ul style="list-style-type: none"> Phoenix, USA
AIDS Epidemic Model	<ul style="list-style-type: none"> Bangkok, Thailand
Survey	<ul style="list-style-type: none"> Kampala, Uganda

Limitations

Theme	Number of Cities	Associated Method(s)
City Estimates Unavailable/Unreliable	8	Spectrum; CDC CD4 depletion Model; PHIA Survey
In/Out Migration	8	CD4 depletion model; CDC Prevalence model; CDC CD4 depletion model; Bayesian Modelling
Lack of Unique Identifier	2	Triangulation; Modelling
Modelling Parameters misaligned with city epidemiology	7	PHIA survey; Spectrum; CDC CD4 Depletion model
Data Quality Issues:		
Unreliable	5	Spectrum; Triangulation; Modelling; CDC CD4 Depletion Model
Incomplete	7	Triangulation; Spectrum; CD4 Depletion Model
Outdated	7	PHIA survey; Spectrum; CDC CD4 Depletion model; CDC Prevalence Model; ECDC tool CD4 depletion model; CD4 Depletion Model

City Estimates Unavailable/Unreliable

<p>Providence, Denver, San Francisco, San Antonio</p>	<p>CD4 Depletion algorithm is calculated statewide and applied to city</p>
<p>Dar es Salaam, Kingston</p>	<p>Due to small size of city, model utilizes regional (Dar es Salaam) or national (Kingston) prevalence estimates</p>
<p>Lagos</p>	<p>Some inputs into Spectrum software are not available for Lagos State and assumptions are made</p>
<p>Kampala</p>	<p>Unsure if KP estimates on national survey were adjusted for city, considering city has higher KP prevalence</p>

In/Out Migration	
Berlin, Brighton and Hove	Lack of clarity around those living in vs accessing services in city
London	Bayesian model assumes HIV acquisition was in country
Melbourne	Applies migration rate of general population, which is not reflective of PLHIV population
Kingston	High mobility in small country context
San Francisco, Providence	State migration applied to city, though migration in city is higher
Phoenix	Immigration/Emigration analysis lacking

Lack of Unique Identifier

eThekwini

Lack of UI can result in double counting diagnosis

Kingston

Lack of national ID creates inability to confirm diagnosis location

Model Parameters Inconsistent with City Epidemiology

**Providence, Denver,
San Antonio, San Francisco**

Calculated using statewide algorithm

Kampala

City Key Population estimates in UPHIA likely based on national estimates

Kyiv

Increase of life expectancy in Spectrum model misaligned with city epidemic resulting in inflation of estimated PLHIV

Lagos

Some spectrum input parameters unavailable for state, and assumptions are made

Data Quality – Reliability

San Antonio	Not based on direct epi data
London	Outputs vulnerable to large variety of sources
Dar es Salaam, Lagos, eThekweni	Quality issues with timeliness and reliability of routine program data

Data Quality – Outdated Model Inputs

Kampala	Outdated prevalence estimates
Phoenix	Outdated DHS so prevalence at health level is a proxy
Kyiv, Lagos	Outdated census
Providence	Outdated data on residence
Brazil	Outdated mortality estimates

Data Quality – Completeness of Data

Bangkok	AEM does not include pediatric estimates
Kingston	Incomplete PLHIV count due to lack of national ID
Dar es Salaam	Depends on completeness of program data
Kinshasa	Data missing/incomplete from few health zones due to differing donors
Lagos	Lagos data not available for all inputs into Spectrum
Brazil	Exposure category not available to input into model

Suggestions for Optimizing Methodology Accuracy Included

- Improved accuracy of city-level data
- Support for surveillance teams, and additional staff and funding
- Triangulation of multiple sources
- Stakeholder engagement
- Improved data reliability encompassing multiple sources
- Frequent updates
- On-going validation
- Improved data collection systems

Updates to Methodologies



Theme	Number of Cities	Cities	Description
Switch from CDC prevalence to CD4 depletion method	3	Metro Denver; San Francisco; San Antonio	The CDC switched to the CD4 Depletion Model in 2016, where many states followed suit, to ensure accurate State-level Estimates
Improved emigration parameters	1	Melbourne/Victoria	Melbourne/Victoria has improved emigration estimates through improving their demographic data and increasing studies on PLHIV migration. These improvements have led to more accurate and validated estimates of PLHIV.
Replacing national estimates with municipal (State/District) estimates in models	3	San Antonio; Melbourne/Victoria; Kinshasa	Replacing national estimates with municipal estimates has allowed for a more accurate estimate of PLHIV.
Change of data source inputs into model	1	London	In London, data sources are updated annually to make sure the data adapts to the changing context of the epidemic and testing programs. These updates require dedicated statistical staff, quality case reporting, and adjustments for migration and sero-conversion.

Thank you to my co-authors



- José M. Zuniga, International Association of Providers of AIDS Care
- Chris Duncombe, International Association of Providers of AIDS Care
- Molly Pezzulo Collier, International Association of Providers of AIDS Care
- Emma Stacey, International Association of Providers of AIDS Care
- Herbert Backes, Senatsverwaltung für Gesundheit, Pflege und Gleichstellung
- Pannee Chaiphosri, AIDS TB and STIs Control Division Health Department Bangkok Metropolitan Administration
- Harriet Cheron Kongin, UNAIDS
- Trouble Chikoko, UNAIDS
- Duncan Churchill, Brighton & Sussex University Hospitals NHS Trust
- Anna Civitarese, Rhode Island Department of Health
- Adamou Dambagi, UNAIDS DRC
- Gillian Dean, Brighton & Sussex University Hospitals NHS Trust
- Valerie Delpech, Public Health England
- Oladipupo Fisher, Lagos State AIDS Control Agency
- Richard Gray, The Kirby Institute, Faculty of Medicine, UNSW Sydney, Kensington, NSW, Australia
- Tanesha Hickman, HIV/STI/Tb Unit, Ministry of Health
- Ling Hsu, San Francisco Department of Public Health
- Paul Kiggundu, Kampala Capital City
- Peter Kirwan, Public Health England
- Olena Lukashevich, Kyiv City Public Health Centre
- Theodore Marak, Rhode Island Department of Health
- Ulrich Marcus, Robert Koch-Institut
- Heiden Matthias, Robert Koch-Institut
- Thandi Penelope, Msimango KZN Department of Health
- Hope Ngobese, SANC
- Carol Ngunu, UNAIDS
- Kantakarn Nilsum, AIDS TB and STIs Control Division Health Department Bangkok Metropolitan Administration
- Modupe Oduwole, UNAIDS Country Office, Nigeria
- Ana Roberta Pati Pascom, Ministry of Health Brazil
- Sarah Rowan, Denver Public Health
- Marc Saba, UNAIDS DRC
- Nataliia Salabai, UNAIDS
- Susan Scheer, San Francisco Department of Public Health
- Nicola Skyers, HIV/STI/Tb Unit, Ministry of Health
- Mark Stoové, Burnet Institute, Disease Elimination Program
- Maria Stratigaki, Municipality of Athens
- Celia Landmann Szwarcwald, Oswaldo Cruz Foundation
- Barbara Taylor, UT Health San Antonio
- Kanat Tossekbayev, Almaty Mayor's Office
- Marat Tukeev, Center for the Prevention and Control of AIDS in Almaty
- Mohamed Turay, UNAIDS
- Georgia Vourli, National & Kapodistrian University of Athens, Medical School