Location, location

Connecting people faster to HIV services

Location, location

Connecting people faster to HIV services

Acknowledgements

This report has been developed following a consultation on geographic epidemiology held in Geneva, Switzerland 25–26 July, 2013. Many of the examples used in this report were presented at that meeting. UNAIDS would like to thank the meeting participants and the reviewers of this document for their contributions.

UNAIDS / JC2559/1/E
ISBN 978-92-9253-039-6

Copyright © 2013
Joint United Nations Programme on HIV/AIDS (UNAIDS)
All rights reserved.

Reproduction of graphs, charts, maps and partial text is granted for educational, not-for-profit and commercial purposes as long as proper credit is granted to UNAIDS: UNAIDS + year. Reproduction permission or translation-related requests—whether for sale or for non-commercial distribution—should be addressed to the Information Production Unit by e-mail at: publicationpermissions@unaids.org.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of UNAIDS concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. UNAIDS does not warrant that the information published in this publication is complete and correct and shall not be liable for any damages incurred as a result of its use.

Contents

1. Location, location, location 2
2. Benefits of a location-based approach 5
3. Using location-specific analysis 14
4. Implications and next steps 40

1. Location, location, location

National and community efforts to halt the HIV epidemic are paying off, worldwide. Fewer people are acquiring HIV, fewer people are dying from AIDS-related illnesses and more people than ever before are accessing life-saving HIV treatment. However, progress is still uneven and, in some places, too slow. International, regional and even national trends can mask negative developments and significant unmet needs.

The mantra of real estate agents - location, location, location - might hold the key to a greatly improved HIV response. Focusing on the areas where the HIV epidemic is highly concentrated, identifying the places where services are lacking and reaching the people in need of prevention services, testing, treatment and support are the first steps towards achieving more efficient and effective programmes.

This report discusses important new opportunities to reverse the HIV epidemic in specific locations and among key populations at higher risk of HIV exposure. More and more countries are collecting and analysing data that enable these locations to be identified. Data collection is expanding, and new methods are being used to identify where localized epidemics may be emerging, where specific populations are carrying the highest burden of disease and where vital HIV services are deficient or absent. These data are being combined in innovative ways, including with geographical information, to produce more detailed and vivid understandings of the HIV epidemic, all the way to the district and subdistrict levels. This makes it possible to focus HIV programmes more precisely and effectively and to offer or adapt services to reach greater numbers of people in need (Fig. 1).

PROTECTING PEOPLE'S RIGHTS

Identifying HIV epidemic areas is vital for more effective HIV programming, but it can also be very risky for some populations – for example, if the information is used to harass or persecute people. This is especially a risk if they practise behaviour that is stigmatized or criminalized. Data must be collected in ways that respect the confidentiality of individuals, and their use and dissemination should be restricted to service providers and health care planners. Particular measures should to be taken to safeguard the security and confidentiality of these data, to control the access to and use of the information and to prevent and address misuse of the data. The data should be used exclusively to benefit the population.

Fig. 1.

SUBNATIONAL DATA CAN INFORM MORE EFFECTIVE PROGRAMME RESPONSES:

A CONCEPTUAL MAP OF HIV-RELATED ISSUES

Data show: Low incidence and prevalence. Most infections are among sex workers and fishermen; low rates of using condoms; low antiretroviral therapy uptake among sex workers.

Response: Increase outreach services and condoms supplies for sex workers and fishermen; increase treatment uptake by people living with HIV in the community and among sex workers.

Data show: Low HIV incidence and prevalence. However, antiretroviral therapy coverage is also less than 50% versus 80% nationally.

Response: Evaluate reasons for low HIV treatment uptake; integrate with other health services and start all pregnant women living with HIV on lifelong HIV treatment.

Data show: Adult HIV incidence increasing; male circumcision is less than 20%.

Response: Increase voluntary medical male circumcision services and messaging as well as condom distribution.

Capital city

Data show: High prevalence; antiretroviral therapy ART coverage is high; good coverage of programmes.

Response: Develop prevention services and ensure that antiretroviral therapy is provided to serodiscordant couples.

Data show: High HIV prevalence; incidence stable; condom use declining among men; increasing epidemic among people who inject drugs.

Response: Strengthen harm-reduction services for people who inject drugs; consider new condom promotion campaign.

HIV prevalence

- 0–0.04%
- 0.05–0.19%
- 0.20–0.49%
- 0.5–1.0%
- River

Taking full advantage of these new opportunities requires enhancing HIV-related data collection and analysis systems, working with affected communities and key populations to achieve high-quality data and analysis and ensuring that the information is gathered and used in ways that do not expose people to victimization and harassment.

The potential benefits are substantial. The stepped-up efforts of the past decade and more have built a powerful momentum that can carry the world closer to the goal of zero new HIV infections, zero discrimination and zero AIDS-related deaths. Countries now have the opportunity to boost that impetus even further. More sharply focused HIV efforts can achieve greater impact with minimal additional investment. By identifying disparities and closing service gaps, countries can also achieve greater equity in their HIV responses.

This report provides examples of the location-based approach from a number of regions and countries, such as Viet Nam, Brazil and South Africa. These are merely examples and not an exhaustive collection. This report illustrates a range of issues that can be better understood and addressed through geographical analyses in all countries, including where HIV services are mismatched or insufficient, and how best to package and focus those services more accurately and effectively.

Many countries are improving the use of data at the subnational level to better understand the epidemic and the response. That data will help all stakeholders to better understand the geographic distribution of HIV epidemics and the responses in each community.

2. Benefits of a location-based approach

Identifying areas where people need HIV services

Responding to the high rates of HIV mortality, morbidity and transmission that often cluster in specific places or among specific populations requires dynamic data collection and analysis that uses this strategic information to guide intensive and focused efforts that have maximum impact. This was difficult when the epidemic started. The strategic information needed to identify localized HIV epidemics was limited, and methods for sensibly combining sets of data were still being refined.

Enough data were available by the mid-1990s, however, to know that HIV had reached almost every corner of the world and that the HIV prevalence was soaring to unexpected levels in some countries, especially in sub-Saharan Africa. These data continue to provide an important bird's-eye view of the global epidemic (Fig. 2) and show that HIV is distributed very unevenly across countries.

Sub-Saharan Africa accounted for 70% of all people newly infected with HIV in 2012, 71% of all people living with HIV and 72% of all AIDS-related deaths. Nevertheless, HIV prevalence among adults varies considerably across the region. In 2012, it ranged from as low as 0.2% [0.2–0.4%] (in Cape Verde in western Africa) to as high as 26.5% [24.6–28.3%] (in Swaziland in southern Africa). Indeed, the global HIV epidemic is disproportionately concentrated in eastern and southern Africa. Together, these two subregions were home to 6% of the global population but accounted for 52% of all people living with HIV (18.5 [17.5–19.5] million of the estimated global total of 35.3 [32.2–38.8] million) and close to half the estimated 2.3 million [1 900 000–2 700 000] people who became infected with HIV in 2012.

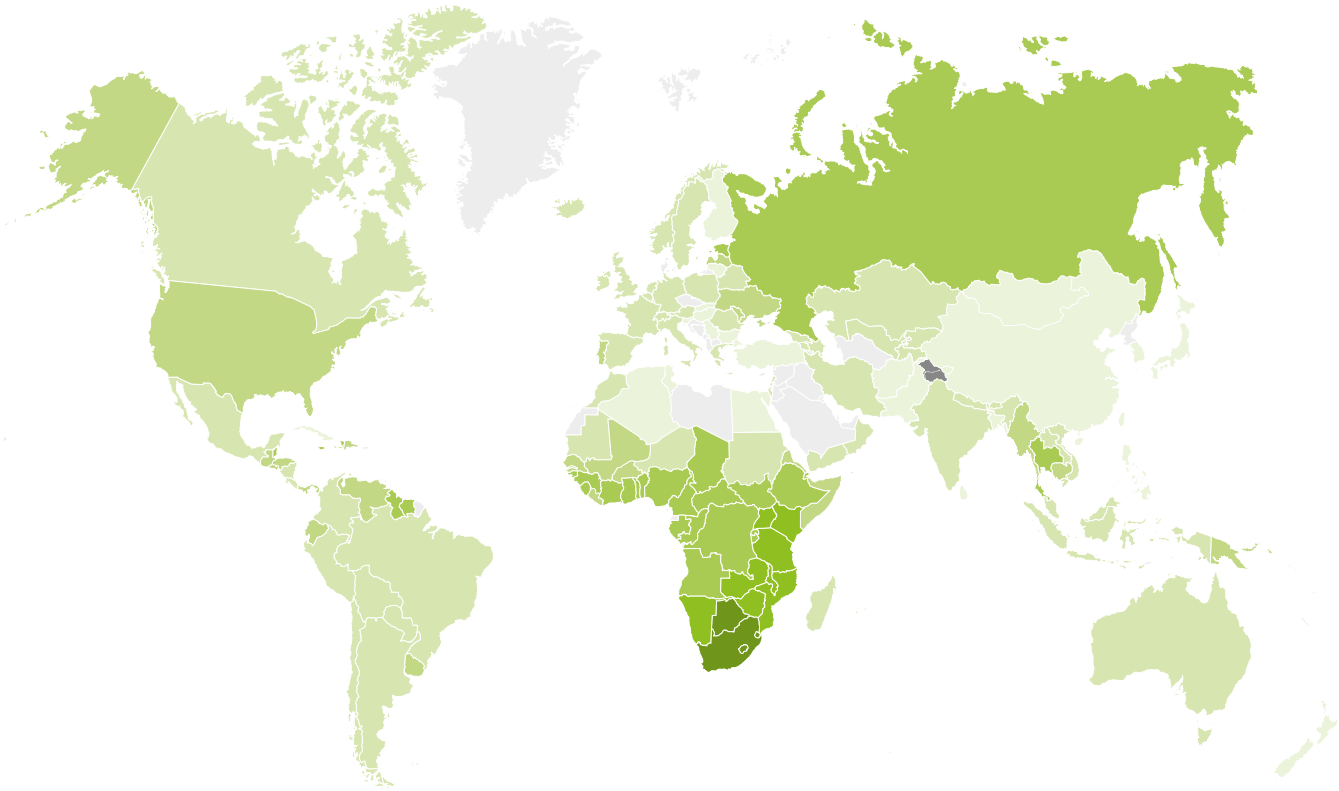
In most other regions as well, a few countries account for the majority of people who acquire HIV. More than 90% of new HIV infections in Asia are occurring in five countries. In eastern Europe and central Asia, about 90% of the people acquiring HIV infection live in the Russian Federation and Ukraine, while Haiti and Jamaica together account for about 85% of the new HIV infections in the Caribbean.

Similar patterns are evident within countries. A growing number of countries are collecting data at the state or provincial, district and even subdistrict levels, and they are finding that the risk of acquiring HIV infection and the number of people acquiring HIV can vary dramatically from one area to the next. In 13 of 33 countries in sub-Saharan Africa, for example, the provincial HIV prevalence among adults varies at least five-fold[1] (Fig. 3).

Fig. 2.

HIV PREVALENCE VARIES BETWEEN COUNTRIES

HIV PREVALENCE AMONG ADULTS (15–49 YEARS), 2012



Adult HIV prevalence (%)

- <0.1%
- 0.1–0.4%
- 0.5–0.9%
- 1.0–4.9%
- 5.0–14.9%
- 15.0–26.5%
- Not applicable
- Data not available

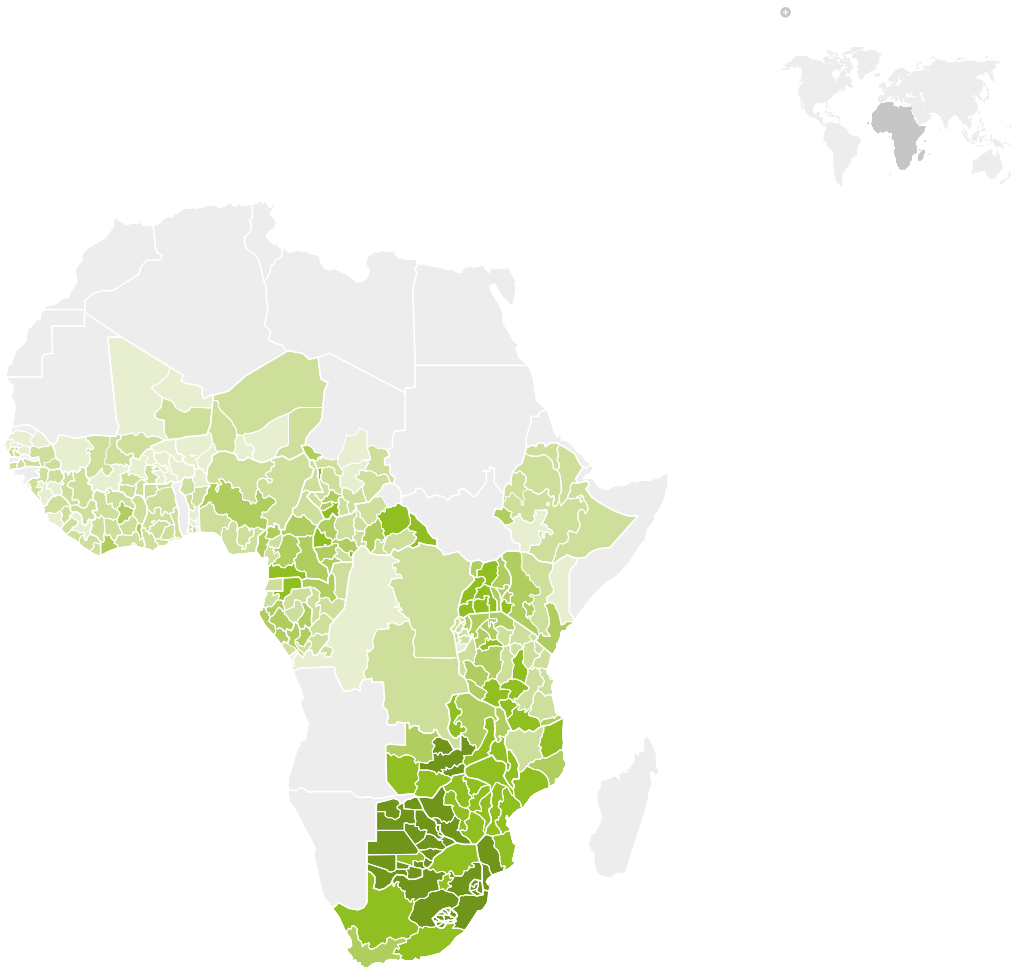
Source: UNAIDS estimates, 2012.

[1] Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Ethiopia, Kenya, Mozambique, Niger, Senegal, South Africa and United Republic of Tanzania.

Fig. 3.

HIV PREVALENCE VARIES WIDELY AT THE SUBNATIONAL LEVEL

HIV PREVALENCE AMONG ADULTS (15-49 YEARS) BY SUB-NATIONAL AREAS, VARIOUS YEARS, 2003-2012



Adult HIV prevalence (%)

- 0.0–0.9%
- 1.0–3.9%
- 4.0–6.9%
- 7.0–15.9%
- 16.0–34.9%
- Data not available

Source: All data are from Demographic and Health Surveys or AIDS Indicator Surveys conducted between 2003 and 2012, and implemented by the USAID-funded Measure DHS project (HYPERLINK "http://www.measuredhs.com" www.measuredhs.com), with the exceptions of Botswana (Botswana AIDS Impact Survey III, 2008), Chad (Rapport de l'Enquete Nationale de Séroprévelence du VIH/SIDA au Tchad 2005), Equatorial Guinea (Informe de la Encuesta de Seroprevelencia del VIH en Guinea Ecualtoria, 2004), Nigeria (National HIV/AIDS and Reproductive Health Surveys, Nigeria 2007), and South Africa (National HIV Prevalence, Incidence and Behaviour and Communication Survey 2008).

Mapping is a very useful tool for illuminating HIV issues, especially if it also conveys the key variables that shape localized epidemics, create vulnerability to HIV and affect the provision and use of services. These textured data are helping planners to select the most effective mix of services for specific localized epidemics, aligning strategies with varying patterns of HIV distribution (Fig. 4–6).

Figures 4–6.

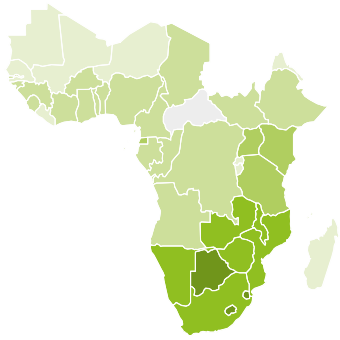
ZOOMING IN ON HIV EPIDEMICS

Fig. 4a.
HIV prevalence among people 15–49 years old in countries in sub-Saharan Africa, 2012
Source: UNAIDS estimates, 2012.

Fig. 4b.
Estimated HIV prevalence among people 15–49 years old by county in Kenya, 2011
Source: UNAIDS and Kenya Ministry of Health.

Fig. 4c.
Estimated risk of HIV infection for women in the general population across counties in Kenya, 2011
Source: Hallet T. Using information on epidemic heterogeneities in resource allocation. Meeting Identifying Populations at Greatest Risk of Infection – Geographic Hotspots and Key Populations, Geneva, Switzerland, 25–26 July 2013.

4a.



Adult HIV prevalence (%)

- 0.0–0.9%
- 1.0–3.9%
- 4.0–6.9%
- 7.0–15.9%
- 16.0–34.9%

Fig. 5a.
Estimated number of people living with HIV in South and South-East Asia, 2012
Source: UNAIDS estimates, 2012.

Fig. 5b.
Estimated number of people living with HIV by province in Viet Nam, 2012
Source: Hu'o'ng PTT. Coverage and gaps of HIV/AIDS services in Viet Nam. Workshop on Strategic Planning and Launching of VAAC-CDC Project 2013–2018, Hanoi, Viet Nam, September 2013.

5a.

Number of people living with HIV

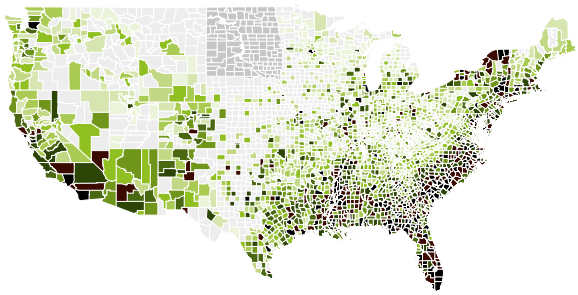
- <5 000
- 5 000–99 999
- 100 000–499 9999
- 500 000–999 999
- 1 000 000–2 000 000
- No data available

Fig. 6a.
People newly diagnosed with an HIV infection in the United States of America, 2008–2011
Source: AIDSVu [website]. Atlanta, Emory University, Rollins School of Public Health, 2013 (www.aidsvu.org, accessed 6 November 2013).

Fig. 6b.
Rate of adults or adolescents living with an HIV diagnosis per 100 000 population in Atlanta, 2010
Source: AIDSVu [website]. Atlanta, Emory University, Rollins School of Public Health, 2013 (www.aidsvu.org, accessed 6 November 2013).

Fig. 6c.
Percentage of the Atlanta population living in poverty, 2010
Source: AIDSVu [website]. Atlanta, Emory University, Rollins School of Public Health, 2013 (www.aidsvu.org, accessed 6 November 2013).

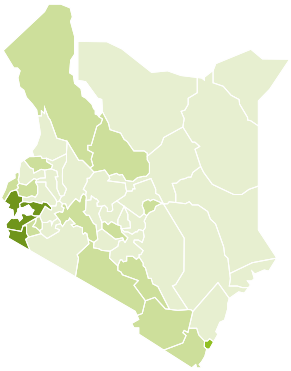
6a.



Adults and adolescents living with HIV per 100 000 population, 2010

- 0–40
- 41–54
- 55–67
- 68–82
- 83–103
- 104–134
- 135–174
- 175–244
- 245–383
- 384 and above
- Data not shown
- Data not released to AIDSVu

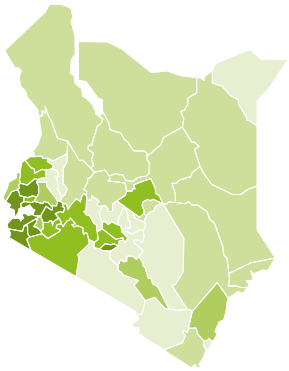
4b.



HIV prevalence by county, 2011 (national prevalence 6.2%)

- <5%
- 5.0–9.9%
- 10–14.9%
- > 15% Hyper endemic

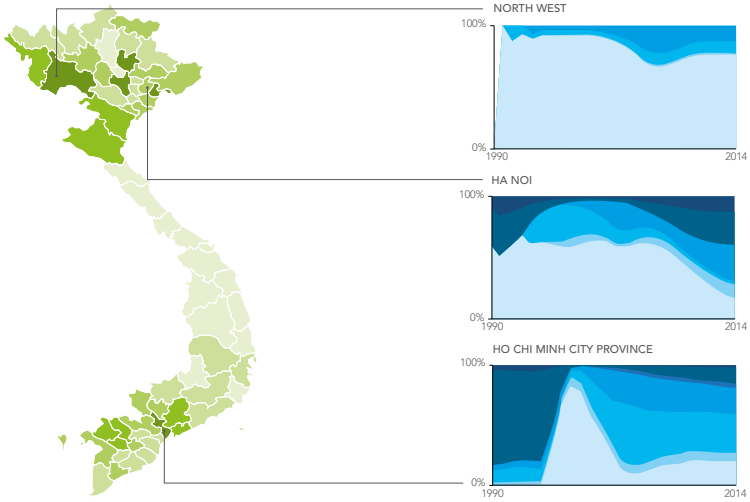
4c.



Modelled number of new HIV infections among women (15-49), 2013

- >4–259
- 260–622
- 623–1 205
- 1 206–2 397
- >2 398–5 360

5b.



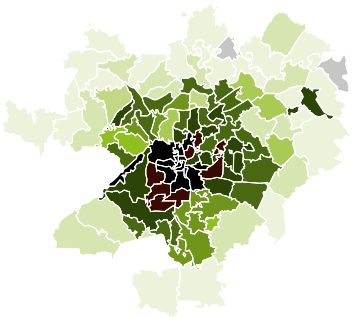
Number of people living with HIV

- <1 000
- 1 000–1 999
- 2 000–3 999
- 4 000–5 999
- 6 000 and above

Trends in the distribution of new HIV infections among specific population groups, various provinces in Viet Nam, 1990–2014

- Low-risk men who have sex with men
- High-risk men who have sex with men
- Low-risk males
- Low-risk females
- Clients of sex workers
- Female sex workers
- People who inject drugs

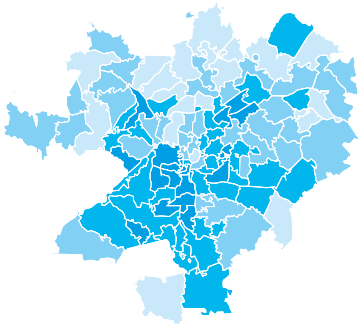
6b.



People with an HIV or AIDS diagnosis per 100 000 population in Atlanta, USA, 2010

- 0–108
- 109–167
- 168–233
- 234 –314
- 315–415
- 416–573
- 574–820
- 821–1 234
- 1 235–2 111
- 2 112 and above
- Data not shown

6c.



Percentage of the population living in poverty, Atlanta, USA, 2010

- 0–8.0%
- 8.1–13.4%
- 13.5–22.5%
- 22.6 and above
- Data not available

Kenya's epidemic map, for example, shows that HIV is disproportionately concentrated in the western part of the country and that similar clustering occurs within certain counties (Fig. 4b). HIV data at the county level leads to other important epidemic patterns. For example, it is estimated that the likelihood of a woman acquiring HIV varies by up to 10-fold by county (Fig. 4c).

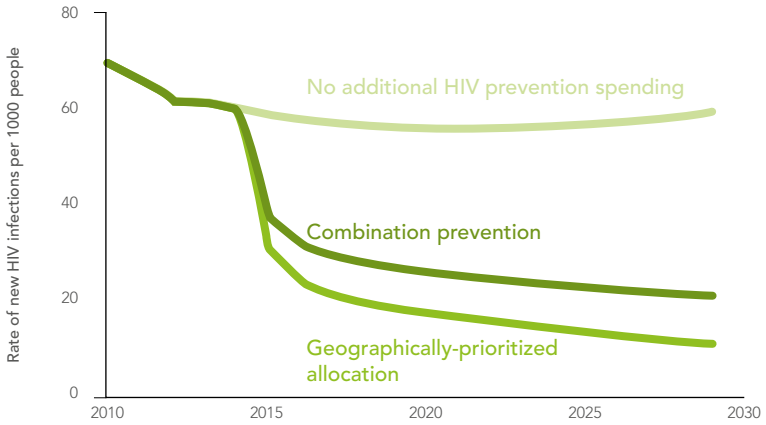
These highly detailed data can also reveal whether certain areas or key populations are being missed, neglected or inadequately serviced. Data collected in Viet Nam make it possible to estimate and track the shifting proportions of new HIV infections in various population groups, as shown for Ho Chi Minh City Province, Ha Noi Province and the north-western part of the country in Fig. 5b. Comparing these highly detailed epidemiological data with maps showing where service facilities are present and which populations are using them enables HIV planners to bring the mix of HIV services in accordance with these localized realities.

Fig. 6a shows the uneven distribution of people diagnosed with HIV in the United States of America in 2010. Indeed, 92% of new HIV diagnoses in the United States since 2008 have occurred in one quarter of the country's counties.Focus in on the city of Atlanta and compare with maps of other variables and the local epidemics are revealed with greater clarity. When local HIV epidemic maps are compared with other data, such as the distribution of poverty (Fig. 6c) or other variables that might provide insight into structural factors that impact HIV vulnerability, local strategies can be tailored to specific needs and conditions. Various measures of vulnerability can be compared and contrasted to refine the analysis and response in each location. Similar comparisons have been made elsewhere.

Fig. 7.

SETTING PRIORITIES FOR RESOURCES CAN RADICALLY IMPROVE EFFICIENCY AND IMPROVE HEALTH OUTCOMES FOR THE SAME BUDGET

POTENTIAL REDUCTION IN THE NUMBER OF NEW HIV INFECTIONS BASED ON DIFFERENT PROGRAMMING APPROACHES, KENYA



Source: Hallett T. Using information on epidemic heterogeneities in resource allocation. Meeting Identifying Populations at Greatest Risk of Infection – Geographic Hotspots and Key Populations, Geneva, Switzerland, 25–26 July 2013.

Note: Projected number of new infections over time nationally for a scenario with no additional HIV spending, combination prevention scenario and combination prevention with geographically prioritized allocation. Budget=$300M/year, assuming unit costs as follows: Circumcision $100, ART $400 ppy, PrEP $250 ppy, sustained behaviour change interventions $30 ppy.

Tackling these vulnerabilities requires sharpened understanding of the underlying behaviour and structural vulnerabilities that place people at greater risk of HIV exposure. Specific programmes can then be tailored for various patterns of HIV risk and disease management to achieve the greatest impact – instead of applying a standard template everywhere and for everyone. Initial modelling based on Kenya's HIV epidemic indicates that tailoring specific packages of interventions including early HIV treatment, behaviour change and condom promotion, medical male circumcision, programmes for key populations and pre-exposure prophylaxis to the various patterns of HIV risk across the country could avert up to 600 000 additional HIV infections by 2030 – with the same overall budget (Fig. 7).

In a context of limited resources, the ability to identify and fill service gaps and fine-tune these services so that they match local needs is especially key in countries with large populations – such as Brazil, with a population of 190 million people spread across 27 states covering 8.5 million km^2.

BRAZIL EXPANDS HIV TREATMENT, USES LOCAL DATA TO UNDERSTAND AND FOCUS RESPONSE

In October 2013, Brazil announced a new strategy to provide early antiretroviral treatment to a much larger number of HIV-positive adults. An estimated 430 000 to 520 000 people are living with HIV in Brazil — just over 300 000 of whom are currently accessing treatment. The new strategy will make an estimated 100 000 more people eligible for HIV treatment.

Brazil has linked its health and HIV information systems at the national level to include all people living with HIV who have presented at least once in the public health system to monitor their progression and ensure appropriate treatment services.

Based on the collected data, Brazil can map the geographical distribution of people diagnosed with HIV, the main modes of transmission, use of HIV services (such as antiretroviral therapy; see Fig. 8) and more. For example, the majority of AIDS cases reported in the country are in fewer than 10% of the country's 5 570 municipalities.

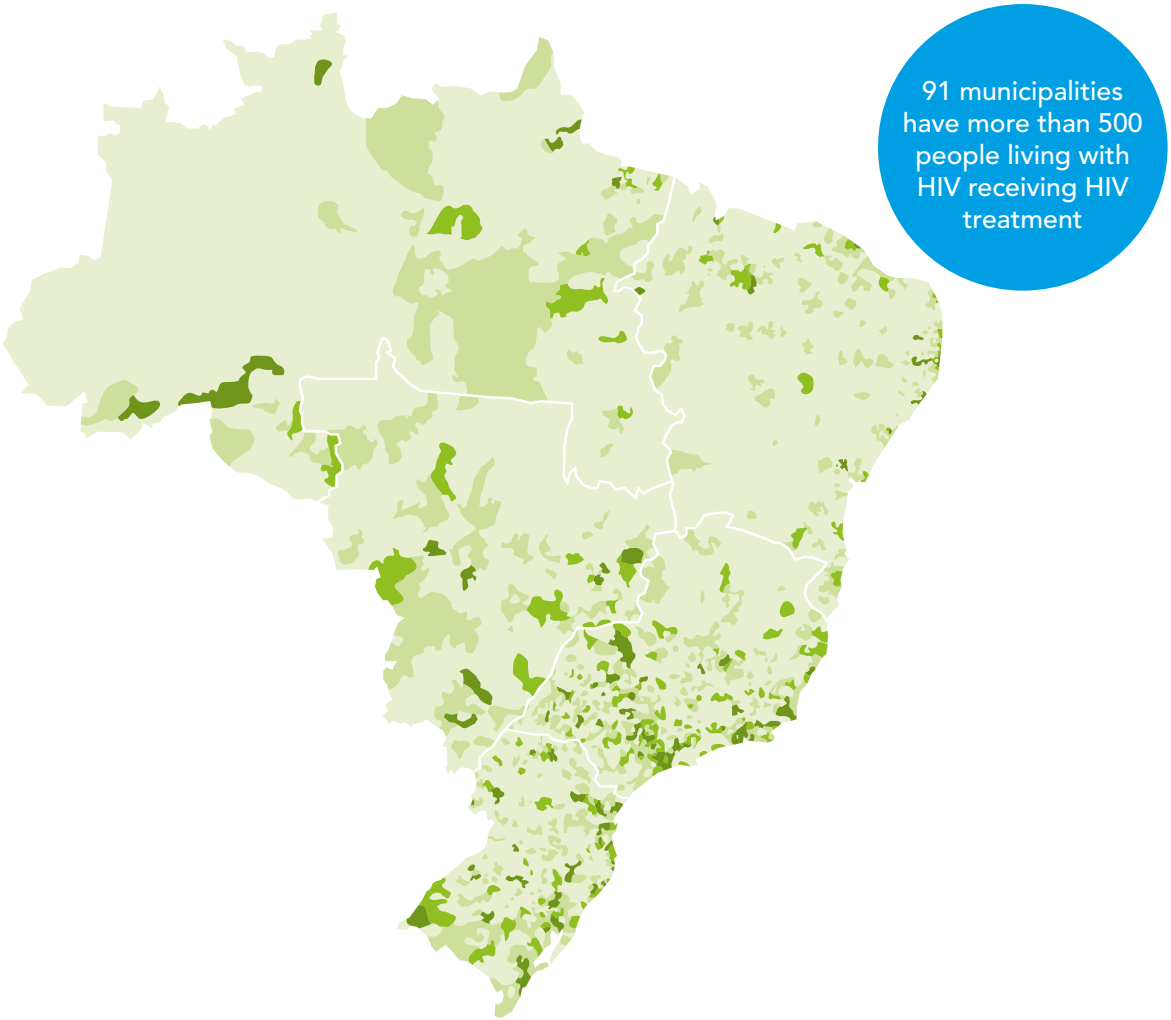
It also uses this data for state and municipal incentives which encourage the development of HIV-related activities and services at all geographical levels. States and municipalities have to report the required data to receive funding for certain HIV services. This resource allocation index is based on AIDS case reports, increase in AIDS cases, provision of services and existing health system capacity. Community involvement has been vital for data collection efforts, especially among key populations.

Brazil has used this information to inform and prioritize services. In the state of Rio Grande do Sul, HIV prevalence among pregnant women is 2% compared to 0.4% nationally. In response to consistently high prevalence and high AIDS detection rates in this state, the Brazilian Health Ministry's Department of STD, AIDS and Viral Hepatitis has set up an inter-federative cooperation mechanism between state, municipal and federal level governments in association with local civil society representatives, to establish an emergency plan and confront the state's epidemiological situation. Among the points agreed on for emergency action is the scaling up of testing and the availability of diagnosis in order to begin treating people immediately. In addition, tackling prejudice and discrimination has been defined as a priority action, together with the incorporation of new technologies.

Fig. 8.

MAPS CAN SHOW THE DISTRIBUTION OF SERVICE DELIVERY

LOCATIONS OF PEOPLE RECEIVING ANTIRETROVIRAL THERAPY IN BRAZIL, 2012



People receiving antiretroviral therapy

- <20
- 20–99
- 100–499
- 500 or more

Source: Brazil Ministry of Health, Health Surveillance Secretary and STD, AIDS and Viral Hepatitis Department.

MAKING SENSE OF HIV IN SPECIFIC LOCATIONS

The enriched understanding of HIV prevalence discussed in the previous section becomes even more useful when we also know the underlying population sizes. Everyone has a right to HIV services, including prevention, treatment and care. However, the overall impact will be greater if HIV services are intensified in areas with relatively high rates of HIV transmission.

High HIV prevalence does not always equate to large numbers of people living with HIV. For example, in Ethiopia, the prevalence of HIV infection is highest in far-west Gambela province, which has a comparatively small population and therefore a comparatively low number of people living with HIV. A dedicated voluntary medical male circumcision programme has been initiated in Gambela province, as the high level of HIV prevalence was found to be associated with low rates of male circumcision. The largest numbers of people living with HIV reside in the Addis Ababa, Amhara and Ormia regions, and the Addis Ababa, Tigray and Amhara regions have the densest concentrations of people living with HIV (Fig. 9) *(1)*. In fact, Ethiopia's HIV epidemic is especially concentrated in urban areas, with about 60% of the people living with HIV residing in eight cities *(2)*, even though only about 17% of the country's population lives in cities and towns, according to World Bank data *(2)*. This does not mean that HIV services should be limited to those urban areas or that the epidemic in Gambela province can be neglected. But it is critically important for the appropriate services to reach the proportionate number of people who need them – and combining different sets of data can guide planners towards those areas and people.

Fig. 9.

COMBINING DIFFERENT TYPES OF DATA YIELDS A CLEARER PICTURE

HIV PREVALENCE, NUMBERS OF PEOPLE LIVING WITH HIV, AND THEIR DENSITY, BY PROVINCE IN ETHIOPIA, 2011

Distribution of HIV by HIV prevalence, Ethiopia, 2011

- 0.9–1.4%
- 1.5–1.9%
- 2.0–4.9%
- 5.0–6.5%

Source: Humanitarian Information Unit, United States Department of State [website]. Washington, DC, United States Department of State, 2013 (https://hiu.state.gov/Pages/PEPFAR.aspx).

Numbers of people living with HIV, Ethiopia, 2011

- 3,900–20,999
- 21,000–61,9999
- 62,000–108,999
- 109,000–224,000

Source: Ethiopia Demographic and Health Survey 2011. Addis Ababa and Calverton, MD: Central Statistical Agency (Ethiopia) and ICF International, 2011.

Density of people living with HIV per km^2, Ethiopia, 2011

- 0.15–0.49
- 0.50–0.99
- 1.00–10.99
- 11.00–166.97

Source: HIV related estimates and projections for Ethiopia – 2012. Addis Ababa: Ethiopian Health and Nutrition Research Institute and Federal Ministry of Health; 2012.

3. Using location-specific analysis

Building and fine-tuning more effective HIV programmes

India was one of the first countries to systematically use a risk and prevalence mapping approach to develop and sharpen its HIV response at all administrative levels (Fig. 10) *(3)*. It built that system steadily and deliberately, increasing the number of sentinel surveillance sites from about 200 in 2000 to more than 1300 a decade later. Data collection and analysis focused in from the national to the state, district and eventually subdistrict levels. The improved data enabled India to focus its HIV response on the most affected areas and populations, with the states of Maharashtra, Tamil Nadu, Andhra Pradesh and Karnataka in the south and Manipur and Nagaland in the north-east identified as "priority states".

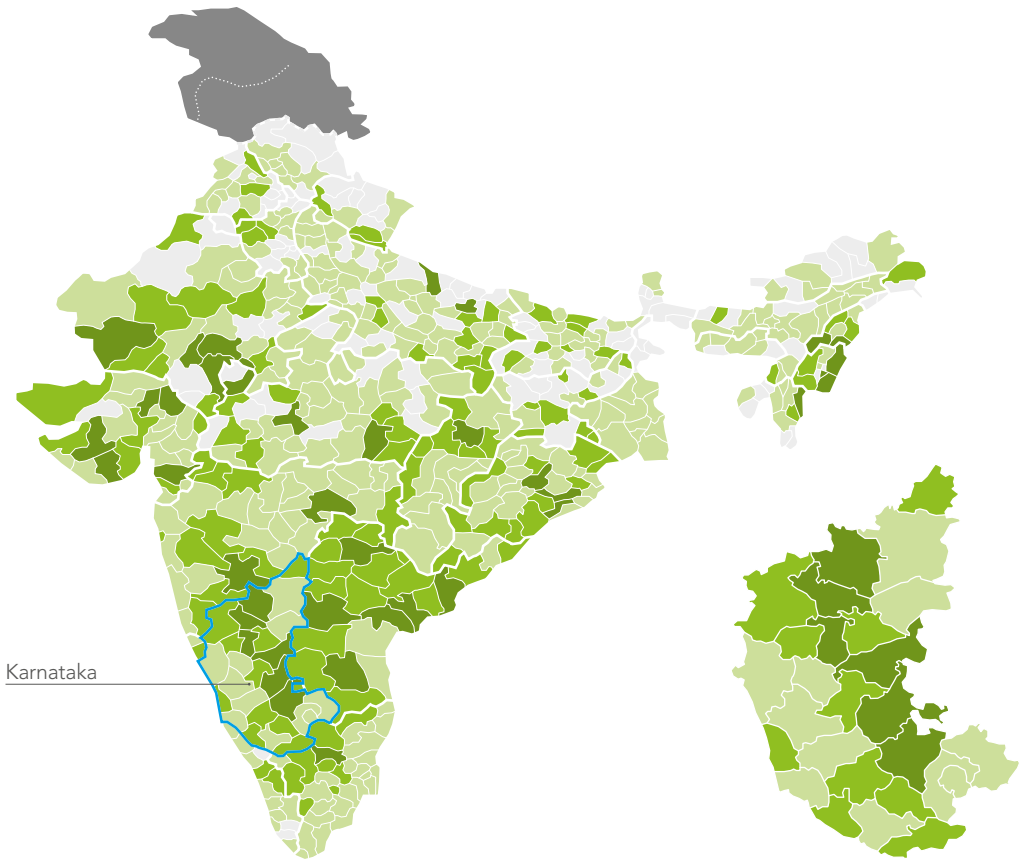
The data showed areas of high HIV prevalence among female sex workers and men who have sex with men (in the south) and among people who inject drugs (in the north-east). In the six states with the highest HIV prevalence, the National AIDS Control Organisation supported data collection at the district level, intensifying prevention programmes among these key populations in the most heavily affected districts *(3)*. Focused prevention efforts (with strong condom promotion and community mobilization components) proved especially effective in reducing HIV transmission during paid sex in the high-prevalence southern states (which were estimated to account for more than two thirds of the people acquiring HIV infection nationally) *(4)*. Quick adaptation could occur. For example, when surveys showed high rates of HIV infection among new entrants into sex work, strategies were adapted to give priority to relevant outreach services.

An unfocused HIV response probably would have had negligible impact in India, with its 1.2 billion people spread across 35 states and union territories, 640 districts and 5924 subdistricts. Instead, during the past 15 years, India has expanded and improved its HIV data collection systems and used the data to inform and refine its HIV strategies. This approach helped India to reduce the number of adults newly infected by 50% between 2001 and 2012 (from 230 000 [190 000–280 000] to 110 000 [70 000–210 000]).

Fig. 10.

HIGHLY DETAILED DATA CAN HELP MAKE HIV SERVICES MORE EFFICIENT

GIVING PRIORITY TO HIV SERVICES IN INDIA: HIV PREVALENCE AMONG WOMEN ATTENDING ANTENATAL CLINICS



India

Karnataka

HIV prevalence among women attending antenatal clinics (%)

- <0.5%
- 0.5%–0.99%
- ≥1%
- No data
- Not applicable

Source: HIV Sentinel Surveillance 2010-11: A Technical Brief. India: National AIDS Control Organization; 2012. (http://naco.gov.in/upload/Surveillance/Reports%20&%20Publication/HSS%202010-11_Technical%20Brief_30%20Nov%2012.pdf, accessed on 13 November 2013).

The potential for similar expansion and fine-tuning exists elsewhere, including in such countries as Kenya, where expanded data collection is enabling planners to pinpoint HIV issues in specific locations. As Fig. 4b shows, the adult HIV prevalence in 2012 was highest in Nairobi and in counties in the western part of the country (particularly in the Homa Bay, Kisumu and Siaya counties in Nyanza province, flanking Lake Victoria). These are also among the most populous counties in Kenya, and their HIV service needs are therefore disproportionately large. At the same time, other data show that the rates of male circumcision, one of the most effective interventions for preventing men and boys from acquiring HIV during unprotected sex in high prevalence settings, are lower in Nyanza than in any other province in Kenya. An intensified and more effective mix of HIV services (including greater coverage of HIV testing, antiretroviral therapy, medical male circumcision and condom provision and promotion) could have a major impact on the epidemics in those counties.

Other countries are moving in a similar direction. In Namibia, most people living with HIV are in the northern part of the country, but an estimated 15–20% of the people living with HIV are in the capital, Windhoek (which is home to about 14% of the country's population). When new HIV infections were mapped against the availability of key HIV-related services in Windhoek, stark patterns appeared. Most new infections were clustered in the northern part of the city, an area that contains most of the city's residents and that includes several informal settlements where biomedical services were largely lacking (Fig. 11). The City of Windhoek has used the findings and recommendations from that mapping exercise to inform the City of Windhoek HIV/AIDS Strategic Plan 2013–2016, which includes a stronger focus on expanding services to informal settlements and increased support for community mobilization and action *(5)*.

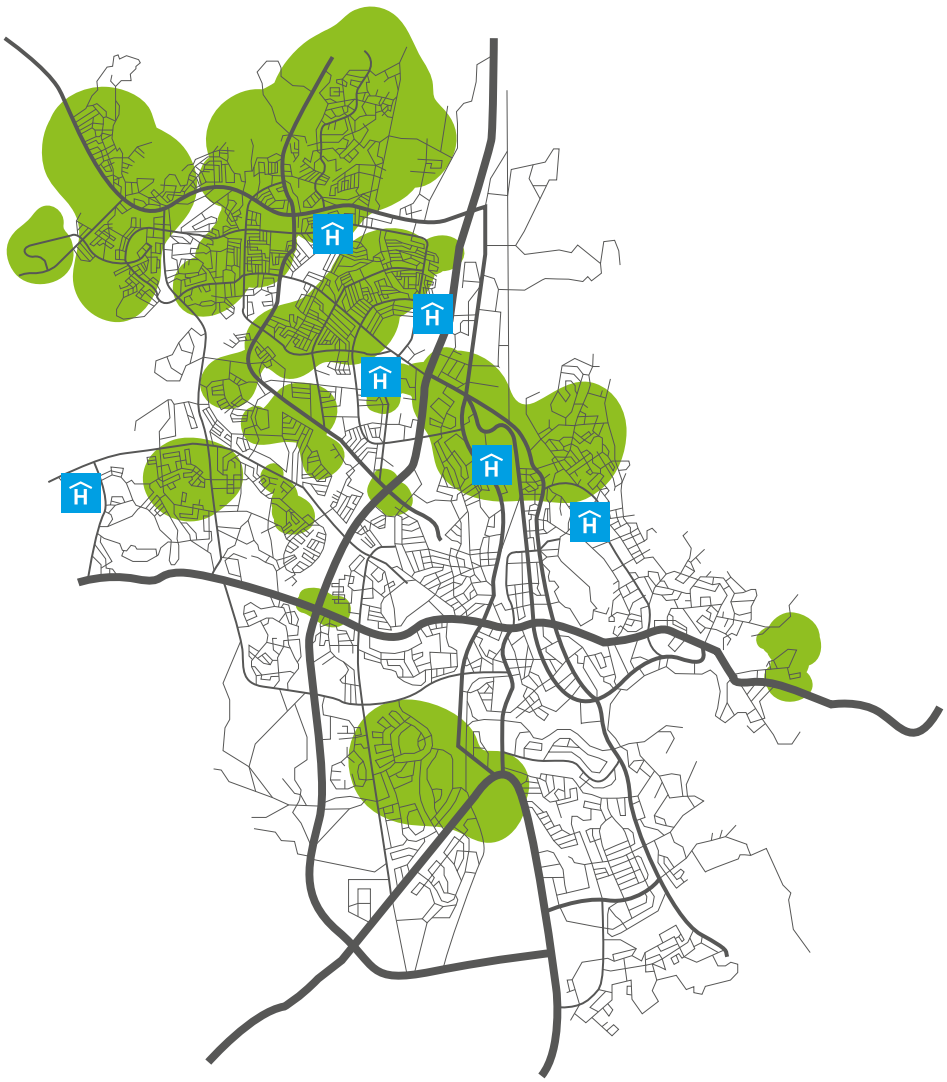
Ecuador, meanwhile, is using information on population size estimates, AIDS-related deaths, population data at the lowest geographical level (*parroquias*) and the numbers of people exiting hospitals to develop a point system, which enables the country to distinguish between geographical areas in terms of their social vulnerability and risk.

There are many similar opportunities for focusing and intensifying HIV services more effectively, even at the subdistrict level. Consider South Africa, for example. As Fig. 12 shows, the estimated HIV prevalence among adults differs by as much as three-fold, depending on the province, and is exceptionally high in KwaZulu-Natal. Among pregnant women in 2011, it exceeded 30% in all but one of that province's districts (Fig. 13).

Fig. 11.

SERVICES ARE LACKING IN AN AREA WITH THE HIGHEST CONCENTRATION OF PEOPLE LIVING WITH HIV

CLUSTERING OF PEOPLE LIVING WITH HIV AND LOCATIONS OF HEALTH CARE FACILITIES IN WINDHOEK, NAMIBIA, 2010



Areas with higher HIV prevalence, per sampling area

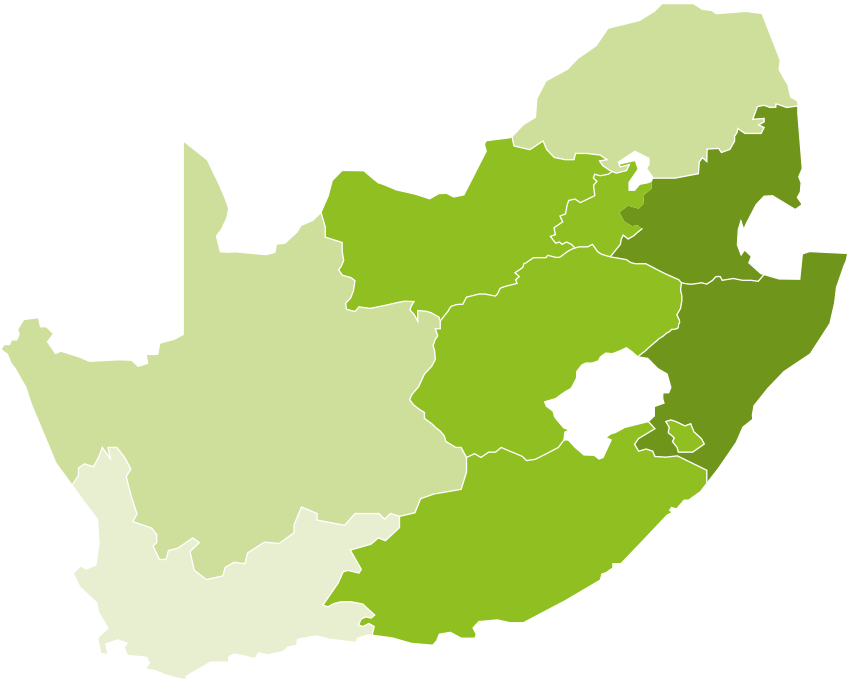
Health facilities providing HIV treatment

Source: City of Windhoek, Namibia: Know your HIV Epidemic/ Know your Response (KYE/KYR) Policy Synthesis. Windhoek: City of Windhoek, 2012.

Fig. 12.

SUBNATIONAL ANALYSIS REVEALS VARIATION BETWEEN PROVINCES

HIV PREVALENCE AMONG PREGNANT WOMEN (15–49 YEARS), BY PROVINCE IN SOUTH AFRICA, 2012



HIV prevalence

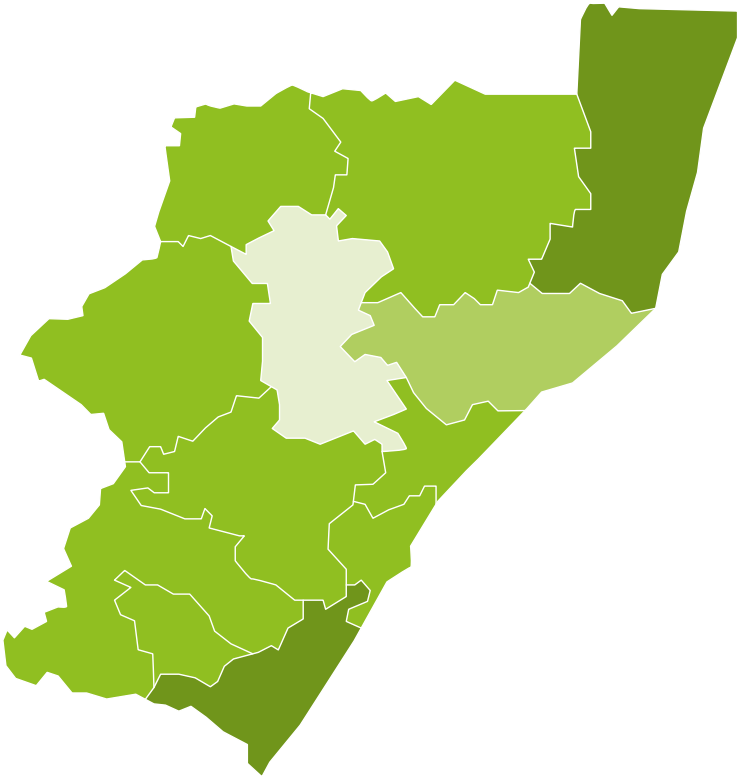
- 5–9%
- 10–14%
- 15–19%
- 20–29%

Source: South African National HIV Prevalence, Incidence and Behaviour Survey, 2012.

Fig. 13.

HIV PREVALENCE ALSO VARIES WITHIN PROVINCES

HIV PREVALENCE AMONG PREGNANT WOMEN (15-49 YEARS) ATTENDING ANTENATAL CLINICS, KWAZULU-NATAL, SOUTH AFRICA, 2011



HIV prevalence (%)

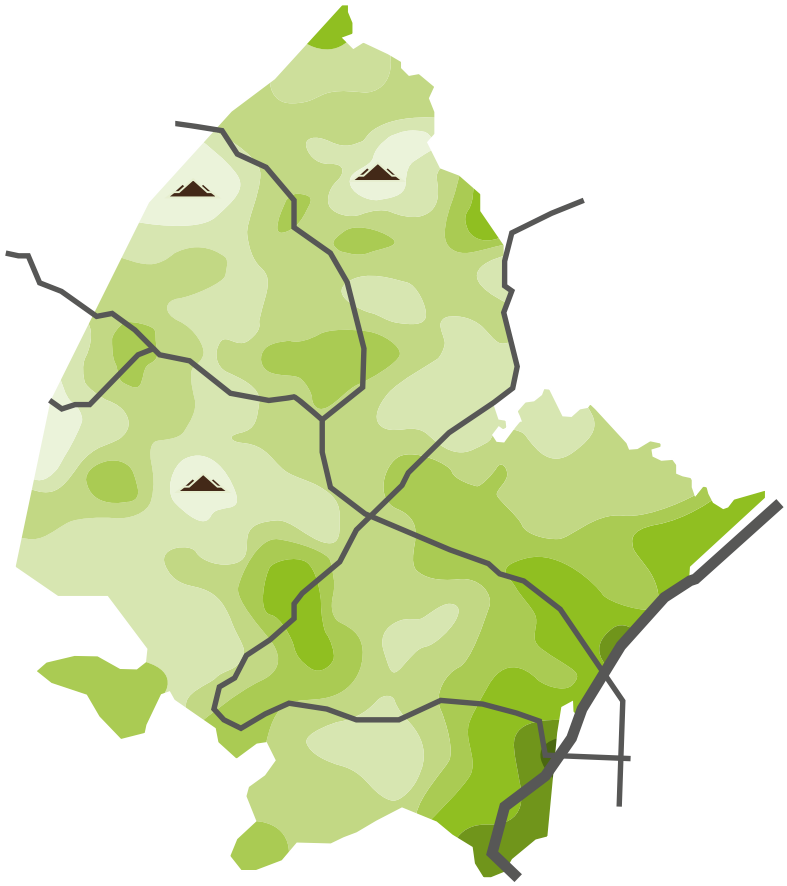
- 20–24.9%
- 25–29.9%
- 30–34.9%
- 35–39.9%
- 40% and above

Source: 2011 National Antenatal Sentinel HIV & Syphilis Prevalence Survey in South Africa. Pretoria: Department of Health; 2012.

Fig. 14.

EPIDEMIC DIFFERENCES APPEAR EVEN IN AREAS WITHIN PROVINCES:

CLUSTERS OF LOW AND HIGH HIV PREVALENCE IN A NORTHERN PART OF KWAZULU-NATAL PROVINCE, SOUTH AFRICA



HIV prevalence (%)

- <10%
- 10–14%
- 15–19%
- 20–24%
- 25–29%
- 30–34%
- 35% and above

- Main road
- Highway
- Mountains

Source: Tanser F, Barnighausen T, Cooke G, Newell M. Localized spatial clustering of HIV infections in a widely disseminated rural South African epidemic. Int J Epidemiol. 2009;38:1008–16.

HIV prevalence varies widely even in a district with extremely high overall HIV prevalence. Fig. 14 depicts a small, 438-km^2 part of Umkhanyakude district in northern KwaZulu-Natal province that is home to about 87 000 residents. The HIV prevalence among adults in the area averaged 22% but varied drastically depending on the specific area – exceeding 35% in the high-density settlements toward the east, along a major road, but 10% or less in the more remote western parts *(6)*.

These high-resolution pictures of the epidemic are especially valuable in the context of decentralized budgeting and governance systems. They enable state, provincial, district and municipal governments to set priorities, devote resources and design programmes that closely fit localized epidemic realities. This can help countries to achieve the scale of impact they need to make greater progress in response to their epidemics.

Mapping HIV to reach key populations with prevention and treatment

In most countries around the world, a few types of high-risk behaviour are driving the HIV epidemics: unprotected paid sex, unprotected sex between men and the sharing of contaminated injecting equipment. Key populations are often disproportionately affected by HIV, even in countries with high levels of HIV prevalence. Globally, sex workers and men who have sex with men are more than 13 times more likely to be living with HIV than other people while people who inject drugs are 22 times more likely to be living with HIV. Reaching these populations with HIV and other health services is vitally important.

This task is facilitated by the fact that many key populations are found in urban areas, where geographical proximity tends to make it less expensive to provide necessary services. Nevertheless, these populations are stigmatized and discriminated against and, in many countries, they are also criminalized. This can trap people "underground" beyond the reach of HIV and harm reduction services. As a result, service providers often also lack the up-to-date information they need to customize services for key populations. Indeed, the HIV treatment gains of recent years are not reaching enough sex workers, people who inject drugs, men who have sex with men and transgender people *(7)*.

Data from key populations continue to highlight the need to prioritize investments in adequate services for the populations most affected by HIV. The data show, for example, that although the incidence of HIV infection is declining in most regions of the world, the incidence among men who have sex with men appears to be rising in several places – including in Asia, where this mode of transmission is a major contributor to the HIV epidemics of several countries.

HIV prevention and treatment programmes will have a much greater impact if rights-based and non-coercive services and support are provided to help key populations avoid acquiring or transmitting HIV and to mitigate how HIV affects their lives. This requires more refined understanding of the sizes of key populations, their location, their high-risk behaviour, the factors that increase their vulnerability, and which services are available to them and at what scale and coverage.

Survey and mapping methods are being used to estimate the sizes of key populations, measure HIV prevalence among them and map local areas with high HIV prevalence. Countries using these methods are finding that HIV features among key populations tend to cluster tightly together, although sometimes in surprising patterns. In Morocco, for example, HIV is affecting different key populations in different parts of the country. Female sex workers and men who have sex with men appear to have the highest risk of acquiring HIV infection in the Sous Massa Draa region including Agadir and surrounding areas, while, HIV prevalence among people who inject drugs is the highest in the north (especially in Nador, with 25% HIV prevalence among people who inject drugs). This kind of information makes it easier to set priorities, allocate resources and provide services where they can have the greatest possible results *(8)*.

These methods have only recently been adapted for settings in which the significance of key populations in the HIV epidemics tends to be underestimated, such as in sub-Saharan Africa. HIV transmission in this region occurs mainly during unprotected heterosexual intercourse between people who are married, in a stable partnership

UKRAINE INCLUDES PEOPLE WHO USE DRUGS IN NEW HIV STRATEGY

The Government of Ukraine has strongly committed to scaling-up HIV treatment and life-saving prevention services including comprehensive harm reduction and opioid substitution therapy for people who use drugs. Ukraine's draft National AIDS programme for 2014–2018 contains a series of ambitious goals, including the significant scaling up of antiretroviral treatment for people living with HIV and a major increase in government funding.

Ukraine has one of the most severe HIV epidemics in Europe (an estimated 200 000 people are living with HIV). It is estimated that less than 2 in 3 people living with HIV have been tested and know their HIV status. The epidemic is concentrated among people who inject drugs, sex workers and men who have sex with men. The highest HIV prevalence is in people who inject drugs at 21.5%. There are an estimated 330 000 people who inject drugs in Ukraine.

In 2012 the number of newly identified HIV cases in Ukraine was lower than in previous years, which supported results from surveys showing that HIV prevalence among young people who inject drugs had reduced in seven of eight cities. HIV prevalence among young people who use drugs can be considered a proxy measure of incidence, as these individuals were recently exposed to HIV.

Working together, the Ukrainian government and civil society organizations are striving to provide services for HIV prevention, treatment, care and support to key populations and people living with HIV, using evidence to guide investments and target programmes. Safe behaviours are on the increase with virtually all people who inject drugs reporting safe injection practices and around half reporting consistent condom use. Additional efforts are needed to ensure that methadone substitution therapy and antiretroviral therapy are available to key populations.

In 2011 Ukraine amended its AIDS law, promoting a human rights-based response. The law guarantees harm reduction services for people who inject drugs, confidentiality of HIV status for people living with HIV and removal of HIV-related travel restrictions. These structural actions are cornerstones for an effective AIDS response.

Source: Website: HYPERLINK "http://www.unaids.org.ua" www.unaids.org.ua (accessed on 11 November 2013).

or in a casual relationship *(9)*. However, evidence indicates that sex workers and their clients, men who have sex with men and people who inject drugs are also disproportionately affected in the region's epidemics.

A lack of adequate treatment and prevention services means that key populations comprise disproportionately large shares of the people acquiring HIV infection. For instance, key populations in Kenya and South Africa account for an estimated 33% and 26%, respectively, of new HIV infections, although those estimates are associated with wide levels of uncertainty *(9)*. Sex between men has been documented throughout sub-Saharan Africa, and surveys show that men who have sex with men often have higher HIV prevalence than other men *(10)*. For example, mode-of-transmission studies indicate that HIV transmission among men who have sex with men could comprise between 1% and 8% of all adults newly infected with HIV in eastern and southern Africa *(9,11,12)*.

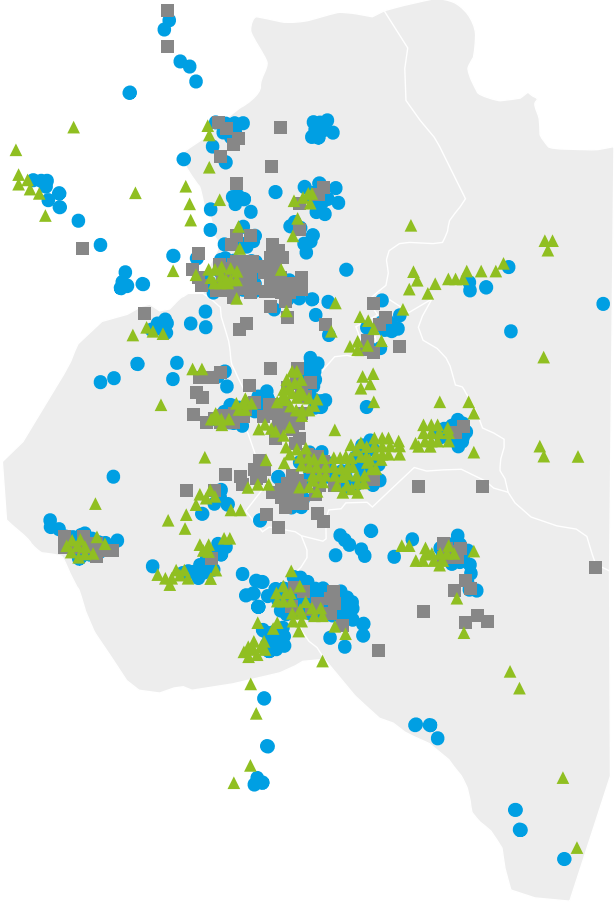
Many countries in sub-Saharan Africa are estimating the size of key populations *(13)*. A detailed mapping exercise in Nigeria has begun to map urban locations of activities that carry high risks of HIV infection across eight states (Anambra, Benue, Cross River, FCT Abuja, Gombe, Lagos, Nassarawa and Ondo). Important patterns emerged: for example, more than 60% of the sites where people who inject drugs congregate were in one state (Gombe), signalling a need to intensify harm reduction efforts there. There was also considerable overlap between venues where paid sex was solicited and where men and women generally congregate to find casual sex partners. Nevertheless, fewer than one fifth of these venues had condoms available on site *(14)*. Focusing on these venues would enable such HIV prevention programmes as condom promotion and HIV testing with links to services in urban areas to be implemented more effectively. Guided by the mapping data, state-level AIDS agencies have identified local areas for intensified, focused prevention programmes for female sex workers and their clients. They are also using the estimates of the size of key populations provided by the urban mapping to estimate the resources needed to expand these programmes.

Mapping of key populations in Kampala, Uganda has also revealed a striking overlap of areas and venues in particular parts of the city where people with various types of high-risk behaviour associated with HIV tend to socialize (Fig. 15). A similar exercise in the central business district of Nairobi, Kenya found that nearly two thirds of the sex workers in the area congregated in a few venues in a very small part of the city *(15)*. In Rocha Pinto, a large informal settlement in Angola's capital, Luanda, clusters of venues where people meet future sexual partners were identified and matched against local HIV prevention services in the surrounding areas. Carried out by the project Priorities for Local AIDS Control Efforts (PLACE) together with local stakeholders, the study found entire high-risk areas that lacked HIV prevention programmes (Fig. 16). It is important to understand the reasons for these kinds of service gaps, which tend to reflect wider patterns of systematic discrimination. Filling the gaps therefore often also requires changes and inroads that extend beyond technically designing and providing services.

Fig. 15.

HIV CLUSTERS OVERLAP IN UGANDA

LOCATIONS OF PEOPLE ENGAGING IN HIGH-RISK BEHAVIOURS IN KAMPALA, UGANDA



0 2.5 km 5 km

- Female sex workers
- People who use drugs
- Men who have sex with men

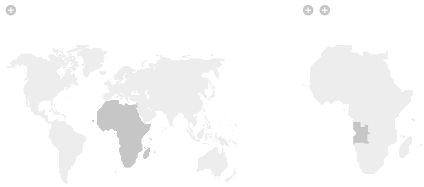
Source: Modification of map presented in: Hladik W. Mapping efforts for key populations in Kampala, Uganda, 2012–2013. Meeting Identifying Populations at Greatest Risk of Infection – Geographic Hotspots and Key Populations, Geneva, Switzerland, 25–26 July 2013.

Note: Locations are where the individuals were interviewed.

Fig. 16.

MAPS ILLUSTRATE GAPS IN SERVICES FOR HIV PREVENTION

LOCATIONS WHERE PEOPLE MEET NEW SEXUAL PARTNERS BUT WHERE HIV SERVICES ARE ABSENT, IN ROCHA PINTO, ANGOLA, 2012



Health facilities

- Condom distribution
- Pamphlets or posters
- Visits from activists
- Other

Roads

Source: Hileman S, Pelenda V, Rivas J, Serrano D, Weir SS. Priorities for Local AIDS Control Efforts (PLACE) report for Luanda, Angola 2010–11. Chapel Hill, NC: MEASURE Evaluation, University of North Carolina at Chapel Hill, 2011.

Detecting – and filling – gaps in HIV services

Countries have committed to achieve 10 core HIV targets and elimination commitments; most of them by 2015 *(16)*, and a wide-ranging data collection and reporting process is in place to track their progress. United Nations Member States have committed to achieve universal access to prevention, treatment, care and support.

Gaps in HIV treatment services

Nevertheless, even countries with relatively high HIV treatment coverage have many people who are eligible for treatment but do not receive it. If treatment access is assessed in terms of the absolute numbers of people eligible for antiretroviral therapy according to the 2013 WHO guidelines but who are not receiving it, the greatest HIV treatment gaps tend to be in countries with large populations and large numbers of people living with HIV (Fig. 17).

This is crucial information that reveals the scale of unmet HIV treatment need and that can help inform funding, procurement and other vital decisions at the international and national levels. Fig. 17 implies that reaching everyone eligible for antiretroviral therapy largely depends on the numbers of people receiving treatment in a few countries with very large populations of people living with HIV. Nevertheless, equitable HIV treatment provision is equally important, so that everyone eligible for treatment (including people belonging to key populations) receives it, irrespective of the size of the country's epidemic. However, as Fig. 18 illustrates, measuring the HIV treatment gap in terms of the percentages of people who are eligible for antiretroviral therapy (in accordance with the 2013 WHO antiretroviral therapy guidelines) but did not receive it in 2012 presents a rather different picture.

IDENTIFYING A SMARTER MIX OF SERVICES IN KENYA

Modelling suggests that if packages of HIV prevention services were tailored to the epidemic realities at the county level in Kenya, annual new HIV infections could be reduced by an additional 5-35% with the same overall budget, compared with applying a combination prevention approach uniformly across the entire country. Recognizing this potential efficiency, the Kenyan Ministry of Health has created estimates of HIV impact for each county. Using these data, county profiles were developed to summarize the key estimated variables in each county. County profiles were linked to district health information system that provides key programme data to include information on HIV response in the county profiles. These profiles were useful, so county leadership could utilize the values for advocacy purposes and county programme managers could use the data for planning.

Based on data for each county, a mix of interventions is being identified to reflect a geographically focused analysis of its epidemic. Early projections point to some of the ways in which prevention benefits can be maximized with minimal additional resources. Further useful information could be obtained from separate maps about children, adults and other age groups. An intensified and more effective mix of HIV services (including greater coverage of HIV testing, HIV treatment, voluntary medical male circumcision and condom provision and promotion) could have a major impact on the HIV epidemic in Kenya.

Source: Hallett T. Using information on epidemic heterogeneities in resource allocation. Meeting Identifying Populations at Greatest Risk of Infection – Geographic Hotspots and Key Populations, Geneva, Switzerland, 25–26 July 2013.

In Viet Nam, the need for and uptake of antiretroviral therapy can now be estimated all the way to districts within provinces (Fig. 19). This is valuable knowledge in an epidemic which severely affects hard-to-reach key populations. Once countries map HIV treatment coverage at the subnational levels, resources for HIV treatment can be allocated in accordance with the distribution of people who are eligible for antiretroviral therapy. In Viet Nam, the data indicate that HIV treatment services are being provided broadly in accordance with the geographical distribution of people living with HIV across the country in the provinces with the largest numbers of people with HIV. However, focusing more closely on the availability of services within provinces changes this picture: HIV treatment and other services are often concentrated in provincial centres and are not entirely aligned with the epidemic in the rest of a province, as Fig. 19 shows for Ha Noi Province.

IMPROVING SERVICES FOR SEX WORKERS IN VIET NAM

In 2012, Viet Nam effectively ended punitive laws towards key populations, including the compulsory detention of sex workers. The practice of detaining sex workers in administrative detention centres and limiting access to judicial procedures had created serious barriers for persons needing access to HIV prevention and treatment services. Ending these laws is one of numerous steps taken by Viet Nam to provide and improve services for key populations.

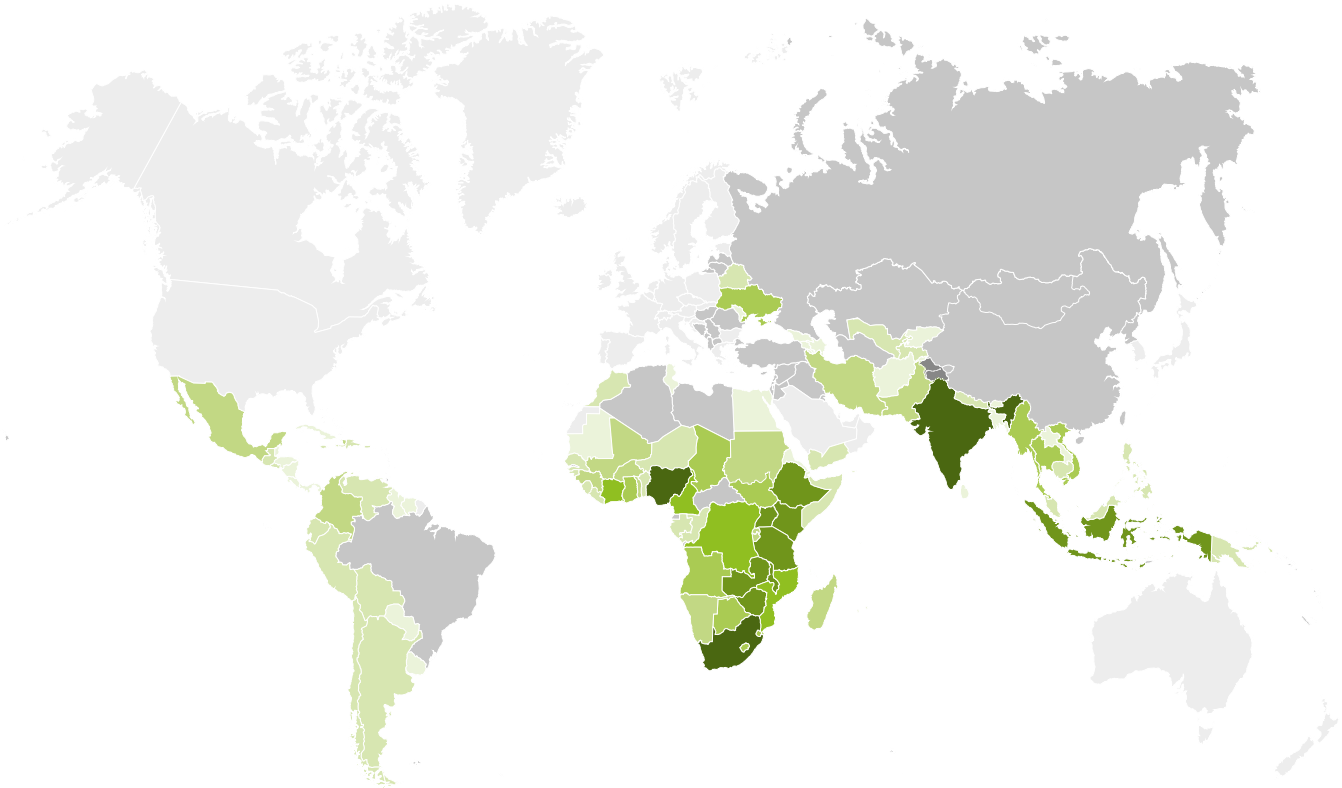
Other steps include training a cadre of peer educators to provide information and services to sex workers, people who inject drugs and men who have sex with men. A recent survey suggested that 61% of sex workers had received free condoms in the last month through these services. More than 80% of sex workers report using a condom with their most recent partner. In 2011 49 of 63 provinces carried out community outreach activities for people who inject drugs and female sex workers and 57 provinces distributed condoms free of charge.

Source: Viet Nam National Committee for AIDS, Drugs and Prostitution Prevention and Control. Viet Nam AIDS response progress report 2012.

Fig. 17.

GAPS IN HIV TREATMENT VARY BY COUNTRY

NUMBERS OF PEOPLE IN LOW- AND MIDDLE-INCOME COUNTRIES ELIGIBLE FOR HIV TREATMENT UNDER THE 2013 WHO GUIDELINES BUT WHO DID NOT RECEIVE TREATMENT IN 2012



Number of people

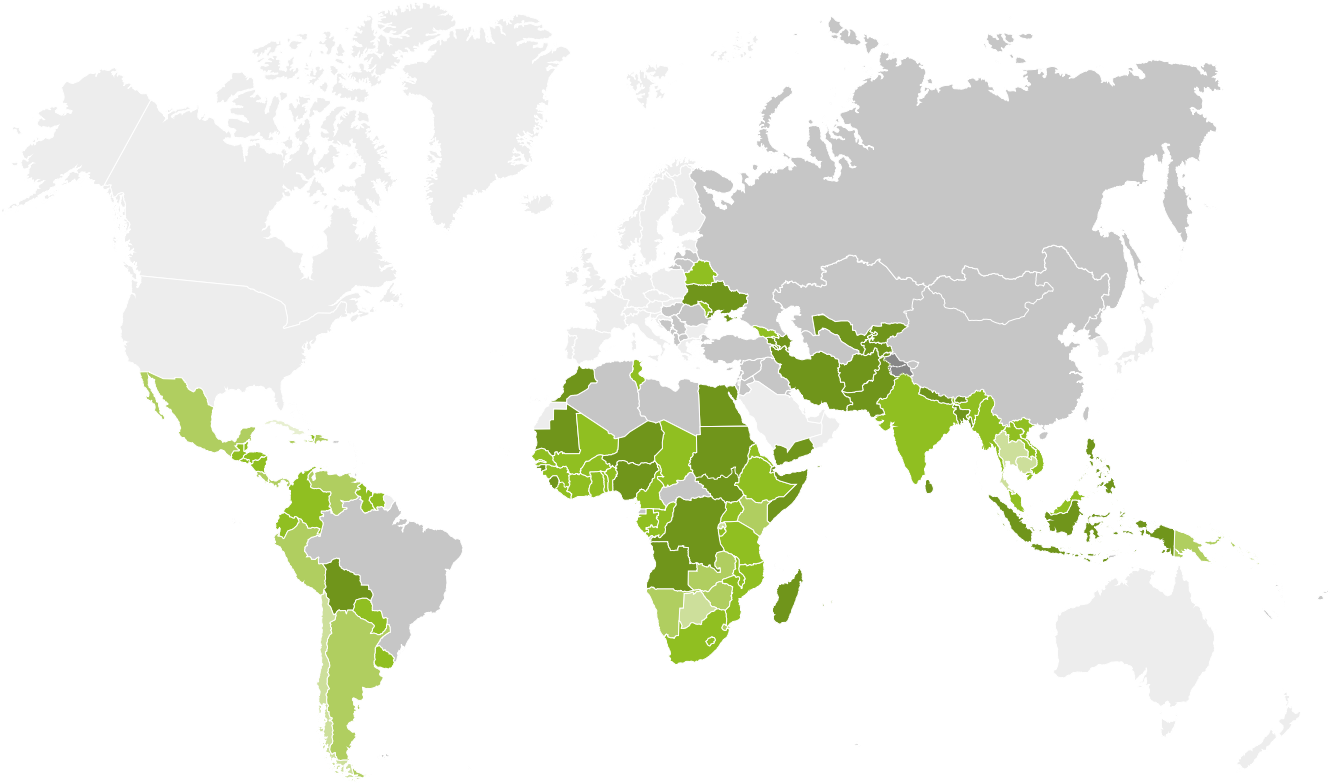
- <10 000
- 10 000–49 000
- 50 000–99,000
- 100 000–199 000
- 200 000–499 000
- 500 000–999 000
- 1 000 000–3 000 000
- Not applicable
- No data available
- High-income country

Source: UNAIDS estimates, 2012.

Fig. 18.

MANY COUNTRIES HAVE SIGNIFICANT UN-MET NEEDS FOR HIV TREATMENT

PERCENTAGES OF PEOPLE IN LOW- AND MIDDLE-INCOME COUNTRIES ELIGIBLE FOR HIV TREATMENT UNDER THE 2013 WHO GUIDELINES BUT WHO DID NOT RECEIVE TREATMENT IN 2012



Percentages of eligible people who did not receive treatment

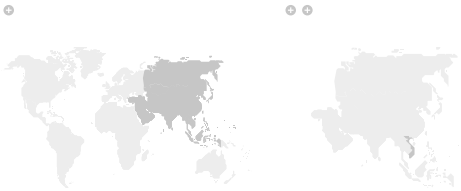
- <20%
- 20–39%
- 40–59%
- 60–79%
- 80% and above
- Not applicable
- No data available
- High-income country

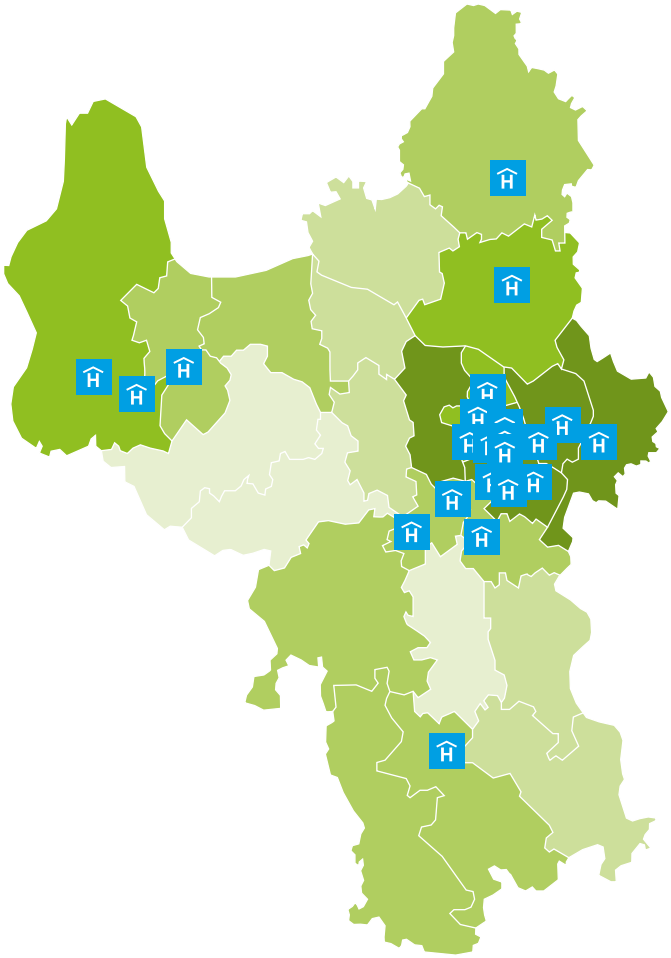
Source: UNAIDS estimates, 2012

Fig. 19.

ALIGNING HIV TREATMENT WITH NEEDS AT THE SUBNATIONAL LEVEL:

ESTIMATED NUMBERS OF PEOPLE LIVING WITH HIV, AND ANTIRETROVIRAL THERAPY COVERAGE, HA NOI PROVINCE, VIET NAM, 2012





People living with HIV, 2012

- ≤100
- 101–200
- 201–400
- 401–800
- >800

Location of clinics providing HIV treatment

Source: Hu'o'ng PTT. Coverage and gaps of HIV/AIDS services in Viet Nam. Workshop on Strategic Planning and Launching of VAAC-CDC Project 2013–2018, Hanoi, Viet Nam, September 2013.
Note:Based on antiretroviral therapy criteria of CD4 <350 cells per ml.

Spatial data and mapping techniques also enable deficiencies in service provision and infrastructure to be highlighted graphically and help to inform where to place additional services.

Many factors potentially prevent people from starting and staying on antiretroviral therapy. Studies in sub-Saharan Africa, for example, show that transport and opportunity costs are major factors affecting whether people eligible for HIV treatment actually start antiretroviral therapy *(17–20)*. Mapping analysis carried out in the rural northern part of KwaZulu-Natal province, South Africa, has confirmed that the greatest factor affecting the use of health services is travel time to clinics.

Use of a specific clinic dropped off considerably once it took a person more than one hour of travel time to reach that clinic. This kind of analysis of the various factors affecting treatment access and uptake is vital for the ongoing scaling up of antiretroviral therapy and for ensuring that people are able to continue receiving the treatment.

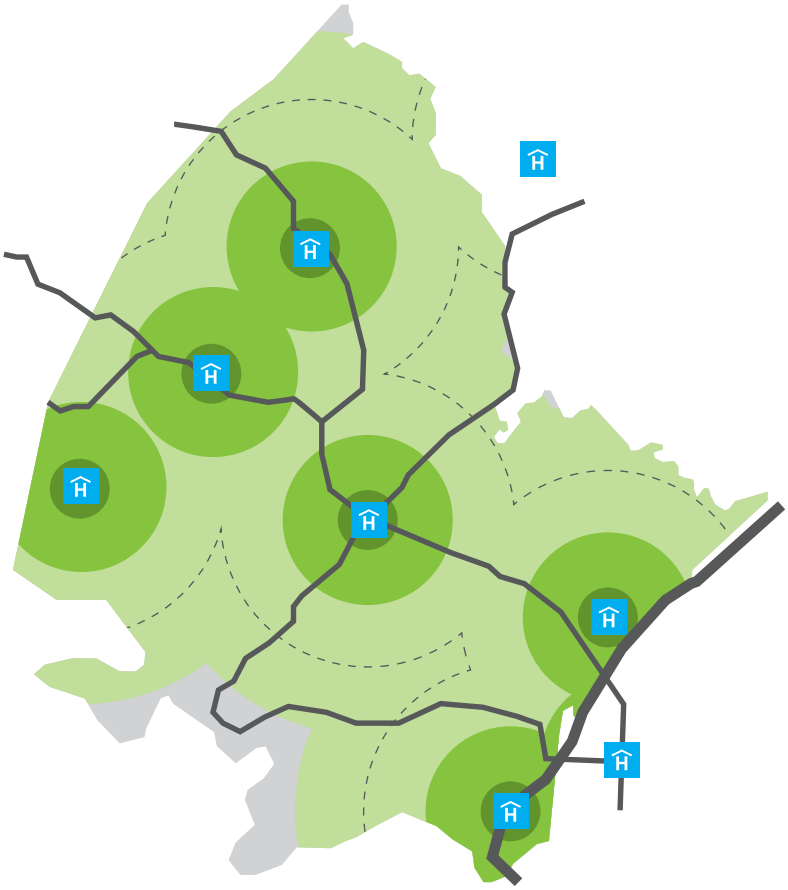
The map in Fig. 20 depicts HIV treatment access in a specific section of KwaZulu Natal (the same area shown in Fig. 14). The chances that people eligible for HIV treatment were receiving treatment depended largely on how close they lived to a health care facility: the probability of starting antiretroviral therapy on time decreased by 3% for every kilometre a person lived further away from the closest local health clinic.[ii] Providing antiretroviral therapy through primary health care facilities in the area has already reduced the median distance people have to travel to access it from 34.2 km to 3.1 km. However, as Fig. 20 illustrates, additional steps may be needed to benefit people who still struggle to access treatment services. A person living with HIV who is 5 km from the nearest clinic is half as likely to be accessing antiretroviral therapy as a peer living next door to that clinic. Improving these odds may require greater integration of antiretroviral therapy with other health services, along with other support, such as transport coupons or community-based services.

[ii] Achieving high treatment coverage in such an area also has major implications for preventing HIV infection. In the area shown in Fig. 20, about 17 000 people were observed to have seroconverted between 2004 and 2011. Individuals without HIV were almost 40% less likely to become infected in communities with high antiretroviral therapy coverage (30–40% of all people living with HIV receiving antiretroviral therapy) than in communities with low coverage (<10% of all people living with HIV receiving antiretroviral therapy) *(21)*.

Fig. 20.

ACCESS TO ANTIRETROVIRAL THERAPY DECREASES WITH THE DISTANCE TO PRIMARY HEALTH CARE FACILITIES

RELATIVE LIKELIHOOD OF HIV-POSITIVE ADULTS (15-49 YEARS) ACCESSING ANTIRETROVIRAL THERAPY DUE TO THE DISTANCE FROM THEIR NEAREST PRIMARY HEALTH CARE FACILITY, RURAL KWAZULU-NATAL PROVINCE, SOUTH AFRICA



0 4 km 8 km

5km from facility

Likelihood of accessing antiretroviral compared to someone who lives next to the facility (adjusted, %)

- >60 less likely
- 40–60% less likely
- 20–40% less likely
- Up to 20% less likely

- Main road
- Highway
- Nearest primary health care facility

Source: Cooke GS, Tanser FC, Bärnighausen TW, Newell ML. Population uptake of antiretroviral treatment through primary care in rural South Africa. BMC Public Health. 2010;10:585.

Gaps in services to prevent new HIV infections among children

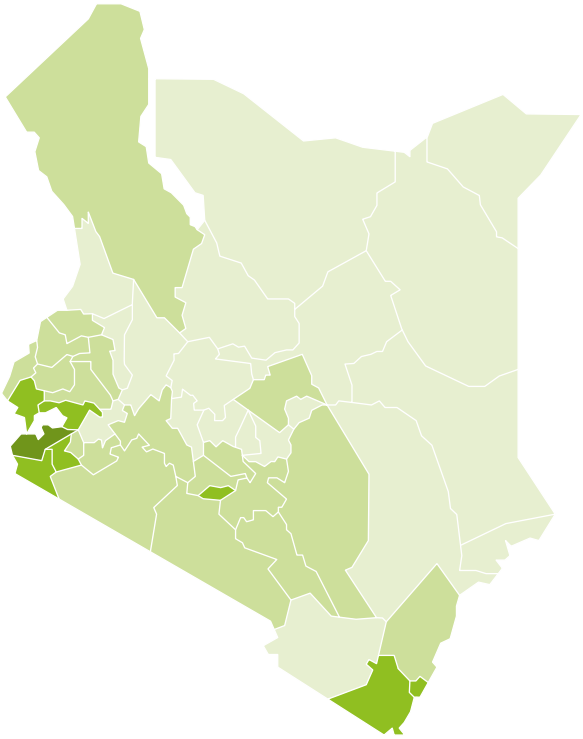
Eliminating new HIV infections among children requires adequate coverage of a range of services – including preventing people from acquiring HIV, providing family planning services to women and men living with HIV who want to avoid pregnancy, HIV testing and counselling and antiretroviral medicines to avoid transmission or lifelong antiretroviral therapy. Nigeria accounted for by far the largest number of women and children who lacked these services in 2012: an estimated 160 000. The Democratic Republic of the Congo, Ethiopia, Kenya, South Africa, Uganda and the United Republic of Tanzania also had significant shortfalls in services, with at least 20 000 women and children who needed medicines for preventing mother-to-child transmission not receiving them. Major progress in providing services in the areas with the largest numbers of people needing these services would radically narrow the overall global gap.

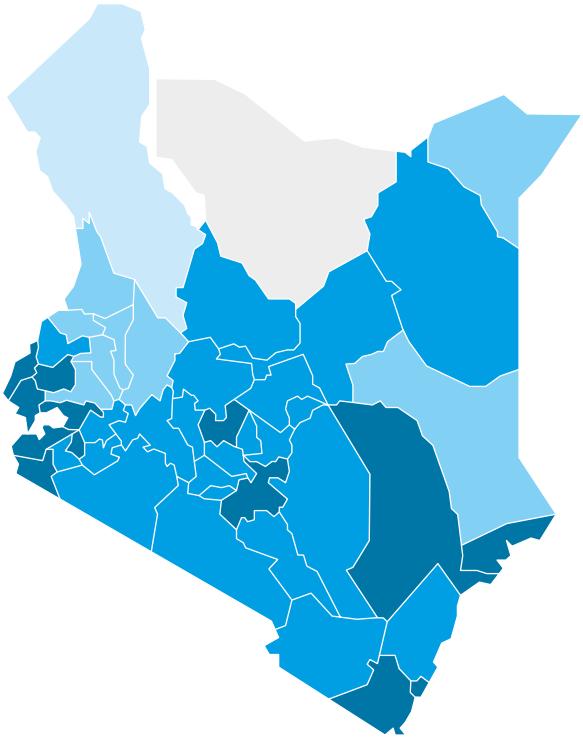
However, measuring this gap solely in absolute numbers can obscure the dimension of equity. Measuring coverage in terms of the percentage of women who need antiretroviral medicines to prevent new HIV infections among children produces a different picture. In Kenya, for example, these data have been combined and mapped for each county to yield a clearer picture of service achievements and gaps (Fig. 21). For example, the maps indicate that up to 4 000 pregnant women are living with HIV in each of the north-west counties, yet fewer than 50% receive antiretroviral medicine to prevent their children acquiring HIV infections. This can help planners in deciding where to intensify efforts.

Fig. 21.

LAYERING MAPS PROVIDES ADDITIONAL INFORMATION

ESTIMATED NUMBERS OF PREGNANT WOMEN LIVING WITH HIV, VERSUS COVERAGE OF ANTIRETROVIRAL MEDICINE TO PREVENT MOTHER-TO-CHILD HIV TRANSMISSION, BY COUNTY IN KENYA, 2011





Estimated numbers of pregnant women living with HIV by county

- <1 000
- 1 000–3 999
- 4 000–6 999
- >7 000

Coverage of antiretroviral medicine to prevent mother-to-child HIV transmission

- <30%
- 30–49%
- 50– 79%
- >80%

Source: Ministry of Health (Kenya) and UNAIDS.

Gaps in condom promotion and use

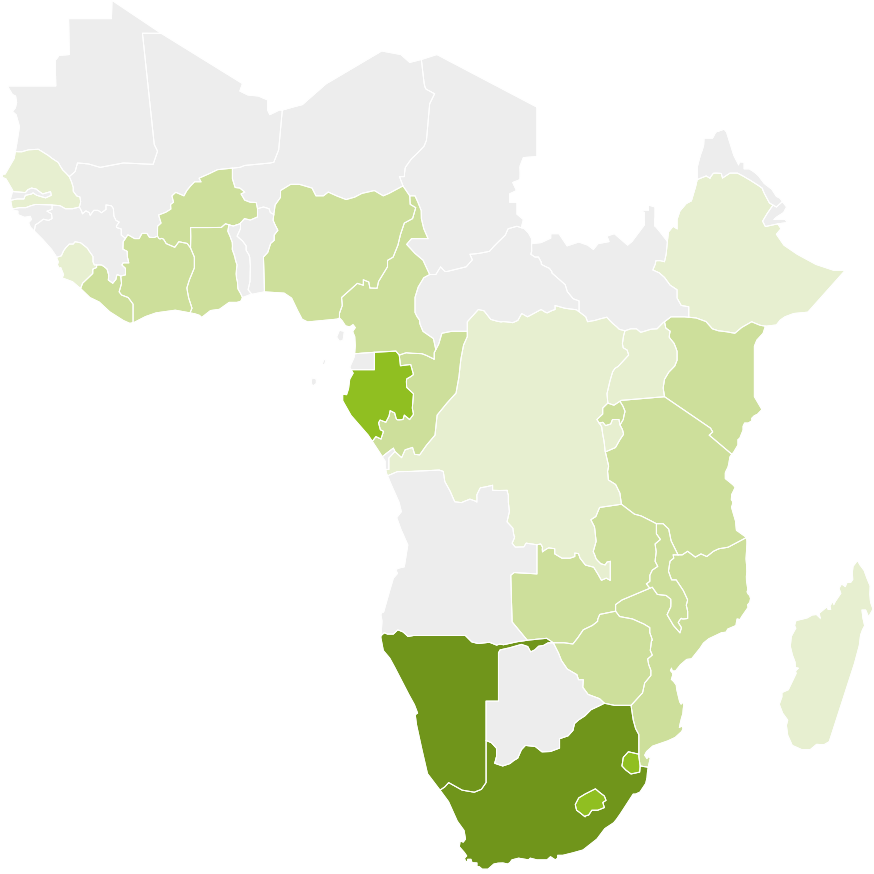
Promoting the consistent use of condoms during sex that carries a high risk of HIV transmission remains one of the cornerstones of effectively preventing HIV infection. As Fig. 22 shows for sub-Saharan Africa, the rates of condom use not only vary between countries but also remain low in some countries. More detailed data enable the identification of locations where condom promotion efforts are paying off and where they need to be intensified to be identified. In South Africa, for example, the number of male condoms distributed per man is significantly lower in provinces in which the HIV prevalence, and thereby potentially the risk of HIV transmission, is highest (Fig. 23). Combining these data with other pertinent information, such as the demand for condoms, frequency of sexual intercourse and prevalence of multiple partnerships, could guide more effective efforts to promote condom use.

The powerful preventive effect of voluntary medical male circumcision has led to 14 countries (Botswana, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia and Zimbabwe) being given priority for scaling up services to achieve 80% coverage of male circumcision. A modelling exercise has indicated that circumcising 80% of the men in these 14 priority countries in eastern and southern Africa by 2015 could prevent almost 3.4 million from becoming newly infected with HIV by 2025 *(22)*. However, progress has been slow, and a large gap remains in most of the priority countries between the percentage of boys and men who are circumcised and the 80% coverage target (Fig. 24). At the subnational level, the unevenness of voluntary medical male circumcision is even more evident. Fig. 25 depicts data from the United Republic of Tanzania. Male circumcision is almost universal in four zones, but in the rest of the country fewer than half of the males reported being circumcised. The 2011-2012 HIV/AIDS and Malaria Indicator Survey found that the Southwest Highlands region, which has the lowest levels of circumcision, has a HIV prevalence of 8% compared to the national average of 5%.

Fig. 22.

FEW SUB-SAHARAN AFRICA COUNTRIES ARE REPORTING SAFE SEXUAL PRACTICES

PERCENTAGES OF ADULT MEN WITH MORE THAN ONE SEXUAL PARTNER IN THE PREVIOUS 12 MONTHS WHO REPORTED USING A CONDOM AT LAST SEXUAL INTERCOURSE IN SUB-SAHARAN AFRICA, 2007–2012



Condom use among men 15–49 years old at last high-risk sex, 2007–2012

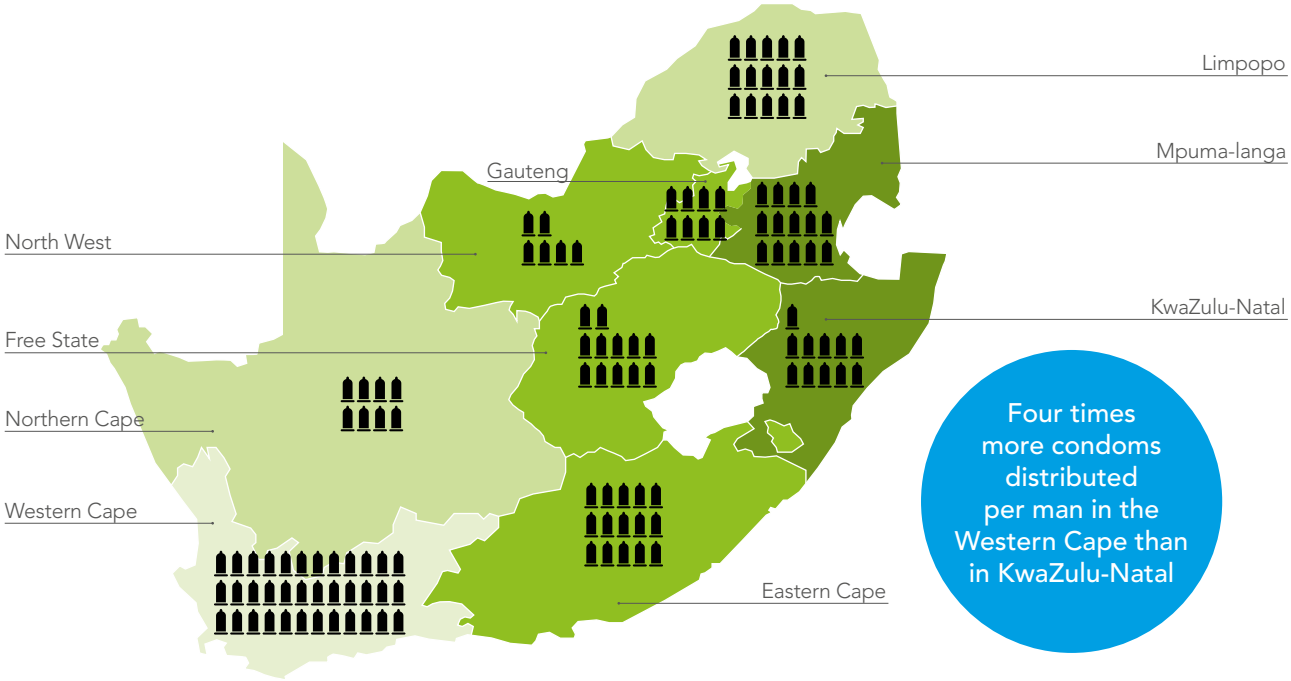
- 0–19%
- 20–39%
- 40–59%
- 60–70 %
- No data available

Source: Demographic and Health Surveys 2007-2012, and Human Sciences Research Council, 2008.

Fig. 23.

CONDOM DISTRIBUTION COMPARED WITH HIV PREVALENCE

NUMBERS OF CONDOMS DISTRIBUTED PER MAN IN 2011 AND HIV PREVALENCE AMONG ADULTS (15–49 YEARS) IN 2012, BY PROVINCE IN SOUTH AFRICA



HIV prevalence among adults (15–49), 2012

- 5–9%
- 10–14%
- 15–19%
- 20–29%

Condoms distributed per man, 2011

one condom per man per year

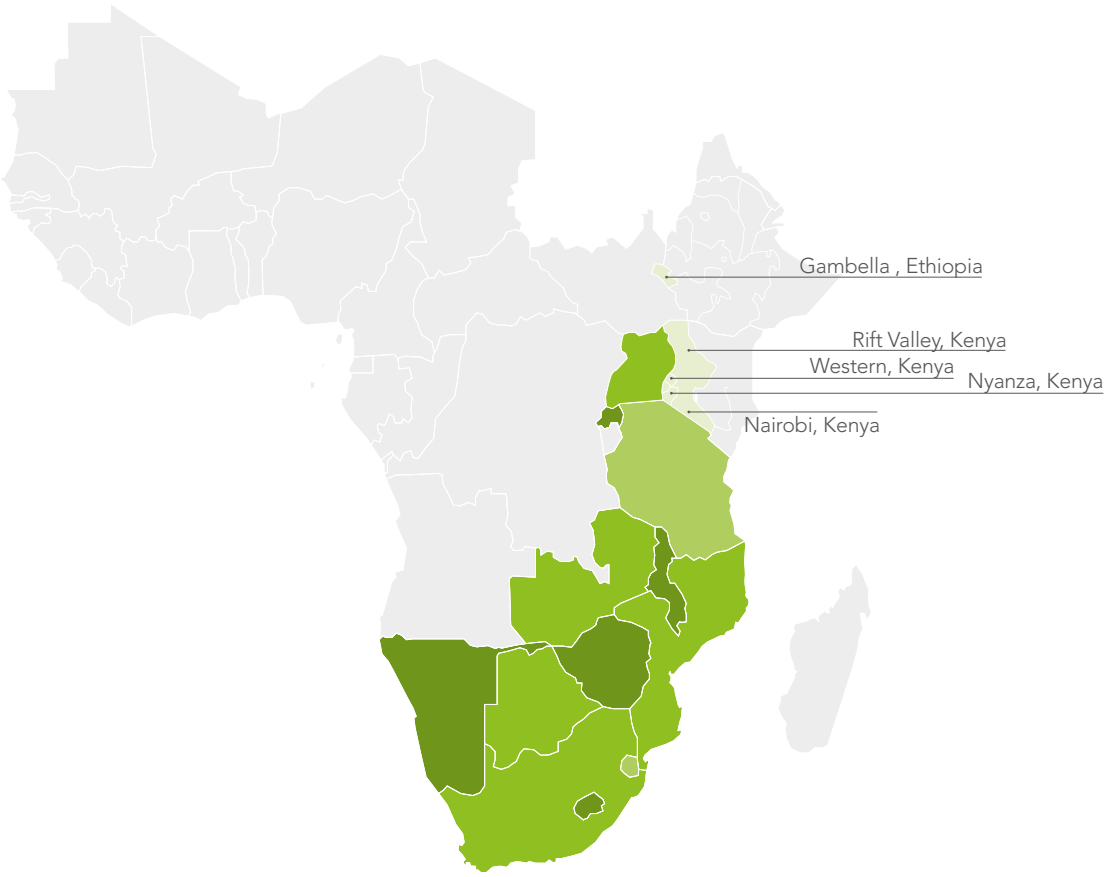
Source: Condoms distributed per man aged 15 years and older: South Africa District Health Information System Database [online database]. Pretoria: National Department of Health, 2011 (http://indicators.hst.org.za/healthstats/183/data).

HIV prevalence among people 15–49 years old: Shisana O. Plenary Session 3, 20 June 2013 – "HIV/AIDS in South Africa: at last the glass is half full". Pretoria: Human Sciences Research Council, 2012 (http://www.hsrc.ac.za/en/media-briefs/hiv-aids-stis-and-tb/plenary-session-3-20-june-2013-hiv-aids-in-south-africa-at-last-the-glass-is-half-full).

Fig. 24.

CIRCUMCISION TARGETS ARE NOT BEING UNIFORMLY MET

GAP IN REACHING MALE CIRCUMCISION COVERAGE TARGETS IN 14 PRIORITY COUNTRIES IN SUB-SAHARAN AFRICA, 2008–2012



Gap in reaching male circumcision coverage targets

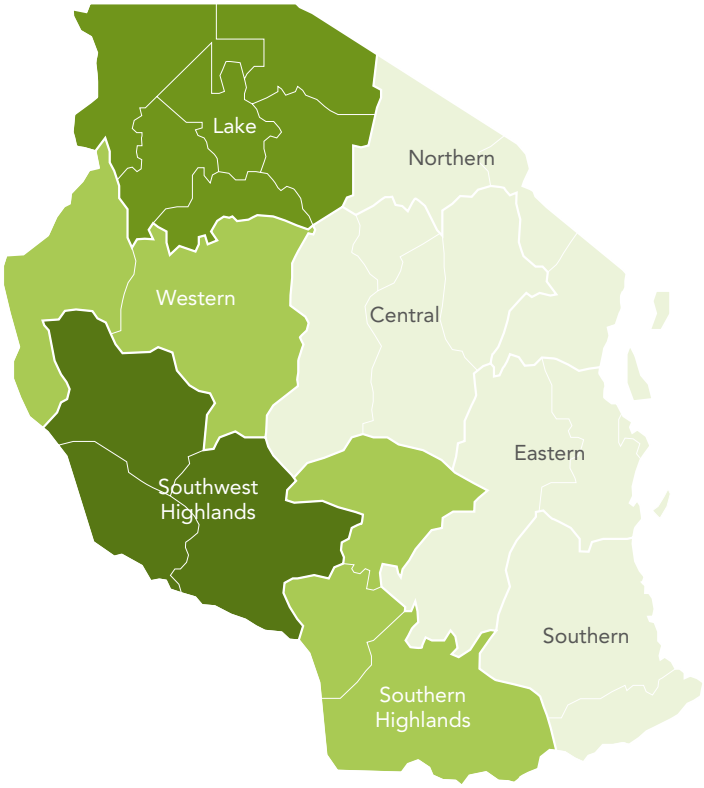
- 30–49%
- 50–69%
- 70–79%
- 80–89%
- 90 and above
- No target available

Source: UNAIDS Report on the global AIDS epidemic 2013. Geneva: UNAIDS; 2013.

Fig. 25.

SHORTFALLS IN ADULT MALE CIRCUMCISION CAN VARY STRONGLY BY PROVINCE

PERCENTAGE OF MEN 15–49 YEARS OLD IN THE UNITED REPUBLIC OF TANZANIA WHO REPORTED HAVING NOT BEEN CIRCUMCISED, 2012



Percentage of men (15–49) who reported having not been circumcised

- <10%
- 10–19%
- 20–29%
- 30–39%
- 40–49%
- 50–59%
- ≥60%

Source: Tanzania HIV/AIDS and Malaria Indicator Survey 2011–12 .

4. Implications and next steps

The collection and analysis of HIV-related data have improved considerably during the past decade, shedding light on important localized features of the epidemic. Researchers are combining sets of data to map and examine the distribution of HIV in relation to epidemiological, behavioural, occupational (for example, truck drivers and law enforcement personnel), sociodemographic (for example, people's economic or educational status), infrastructure (such as transport links or health care facilities) or geographical factors (such as proximity to drug-trafficking routes) *(23)*. Data collection methods that map behavioural risks, such as high rates of injecting and syringe-sharing, can help to localize responses in relatively small, discrete areas that could be serviced with HIV treatment and prevention packages (such as hepatitis C diagnosis and treatment and needle and syringe programmes).

Taking full advantage of these opportunities involves important shifts in which data are collected, how they are collected and how the data are analysed and used. This implies, for example, moving from:

- "know your country's epidemic" to "know your local epidemics";
- a few surveillance sites and sources to multiple sources of data;
- focusing on the national effects of interventions to focusing on their local effects;
- gathering monitoring data at the country or province level to collecting the data at the clinic and community levels;
- using information systems based on paper to ones using the internet and mobile phones; and
- separate surveillance and monitoring and evaluation systems to strategically linked systems that inform and enhance local programmes.

Spatial analysis requires that the data be geocoded: referenced to specific geographical areas. This enables the distribution of HIV infections to be matched with the services provided or used and then examining the likely factors that affect these patterns in a given area. Situations vary, but many countries (especially in Asia and the Americas) already have the data infrastructure and capacity to enhance and further sharpen their HIV responses along these lines. Nevertheless, further specific improvements are needed to realize the full potential of this approach, including:

- expanding the use of various data sources, including comparing data from HIV surveillance systems with other data that illuminate the underlying factors that affect people's vulnerability to HIV;
- moving towards using electronic data systems while ensuring that reliable information technology systems are in place;
- increasing survey sample sizes to enable subnational analysis;
- identifying the geographical location of health facility and community services and analysing the data at the lowest relevant geographical level; and
- involving affected communities and key populations in these processes to achieve high-quality data and analysis and to ensure that the information is gathered and used in ways that do not expose people to victimization and harassment.

Using HIV data for prevention and treatment programmes in practice is much easier if they can be generated by representatives from networks of key populations and are based on reasonably accurate estimates of the sizes and locations of relevant populations. This can ensure that the data are gathered and used in ways that do not expose key populations to discrimination, harassment or persecution. Understanding where clusters of people living with HIV or key affected populations are living should not lead to further isolating communities but to improving access to services, especially HIV prevention and treatment, to meet the needs of these communities.

Methods exist for maintaining the anonymity of people participating in surveys. Organizations that work closely with key populations, and which include representatives from them, often carry out surveys that generate useful but sensitive information. All organizations collecting data have a duty of care to protect the confidentiality of the people concerned. All epidemiological surveillance activities must also follow the ethical review board requirements of the respective countries to ensure that they adhere to the principle of "do no harm".

The methods used to collect these data require careful thought and planning and need to match the specific context. At the facility level, data can be collected systematically on condom distribution and demand, provision and uptake of medical male circumcision, testing and HIV diagnoses, CD4 cell count distribution, viral load, women receiving antiretroviral drugs for preventing the vertical transmission of HIV, people receiving antiretroviral therapy, etc. These data must be disaggregated by sex and age. Facilities and services should be geocoded, or associated with geographical coordinates, so that they can be mapped against other data showing where these services are needed the most.

Some countries are collecting considerable biological and behavioural data using household surveys, but the sample sizes are not always large enough to provide reliable subnational data at the administrative levels at which local planning and decision-making takes place. Larger samples can be expensive but would yield representative data that enable more precise planning and resource allocation. Oversampling specific regions in surveys can offer further insight into specific local settings. The costs and benefits of oversampling should be carefully estimated, however.

Sometimes the required improvements are largely procedural – creating or properly managing channels for sharing data and analysis, for example. This is because information systems are often developed and maintained independently, which can complicate sharing data between sectors. Geographical information systems can help to bridge these communication gaps by linking data using common geographical identifiers *(24)*. Health and other relevant ministries, along with national AIDS coordinating agencies, also need to build stronger collaboration and links related to collecting and analysing data *(25)*.

Finally, guidance is needed on how best to combine and interpret geographical data, to establish uncertainty bounds for the findings and to ensure that the data and analysis are confidential and securely held so that they cannot be used against individuals and communities.

There are significant potential rewards. A location-specific approach will enable countries to pinpoint – more precisely than ever before – where and how to intensify or adapt their HIV responses to achieve greater impact with minimal additional investment. Initial estimates from Kenya suggest that, in sub-Saharan Africa alone, refined programming based on the clustering of HIV could avert a significant additional proportion of new HIV infections in the years ahead.

References

1. Heard N. Mapping service provision to enhance programme planning. Meeting Identifying Populations at Greatest Risk of Infection – Geographic Hotspots and Key Populations, Geneva, 25–26 July 2013 and Meeting of the UNAIDS Reference Group on Estimates, Modelling and Projections, Geneva, 25–26 July 2013.

2. Van Renterghem H, Colvin M, de Beer I, Gunthorp J, Odiit M, Thomas L et al. (2012) The urban HIV epidemic in eastern and southern Africa: need for better KYE/KYR to inform adequate city responses. International AIDS Conference, Washington (DC), J Int AIDS Soc, 15 (Suppl 3).
   Urban population (% of total) [online database]. Washington, DC, World Bank, 2013 (http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS, accessed 4 November 2013).

3. Sgaier SK, Claeson M, Gilks C, Ramesh BM, Ghys PD, Wadhwani A et al. Knowing your HIV/AIDS epidemic and tailoring an effective response: how did India do it? Sex Transm Infect. 2012;88:240–49.

4. HIV in Asia and the Pacific: getting to zero. Bangkok: UNAIDS; 2011.

5. Towards strategic investments in HIV and AIDS at city level: lessons learnt from the know your epidemic, know your response exercise in Windhoek, Namibia. Windhoek: UNAIDS and City of Windhoek; 2013.

6. Cooke GS, Tanser FC, Bärnighausen TW, Newell ML. Population uptake of antiretroviral treatment through primary care in rural South Africa. BMC Public Health. 2010;10:585.

7. Global update on HIV treatment 2013: results, impact and opportunities. Geneva: World Health Organization, 2013.

8. Abu-Raddad L. Emerging HIV epidemics and key populations in the Middle East and North Africa. Identifying Populations at Greatest Risk of Infection – Geographic Hotspots and Key Populations, Geneva, Switzerland, 25–26 July 2013.

9. Gouws E, Cuchi P. Focusing the HIV response through estimating the major modes of HIV transmission: a multi-country analysis. Sex Transm Infect. 2012;88:i76–i85.

10. Muraguri N, Temmerman M, Geibel S. A decade of research involving men who have sex with men in sub-Saharan Africa: current knowledge and future directions. SAHARA J. 2012;9:137–47.

11. Baral S, Sifakis F, Cleghorn F, Beyrer C. Elevated risk for HIV infection among men who have sex with men in low- and middle-income countries 2000–2006: a systematic review. PLoS Med. 2007;4:e339.

12. Smith AD, Tapsoba P, Peshu N, Sanders EJ, Jaffe HW. Men who have sex with men and HIV/AIDS in sub-Saharan Africa. Lancet. 2009;374:416–22.

13. Size estimation for key populations at risk: lessons from the field – regional consultations to discuss successes, challenges, and solutions. December 5–7, 2012, Johannesburg, South Africa. Meeting report. Johannesburg: UNAIDS Regional Support Team for Eastern and Southern Africa; 2012.

14. HIV epidemic appraisals in Nigeria: evidence for prevention planning and implementation: data from the first 8 states. Abuja: National Agency for the Control of AIDS; 2013.

15. Kimani J, McKinnon LR, Wachihi C, Kusimba J, Gakii G, Birir S et al. Enumeration of sex workers in the central business district of Nairobi, Kenya. PLoS One. 2013;8:e54354.

16. United Nations General Assembly. Political Declaration on HIV and AIDS: Intensifying Our Efforts to Eliminate HIV and AIDS. New York: United Nations; 2011.

17. Aspeling HE, van Wyk NC. Factors associated with adherence to antiretroviral therapy for the treatment of HIV-infected women attending an urban care facility. Int J Nurs Pract. 2008;14:3–10.

18. Ingle SM, May M, Uebel K, Timmerman V, Kotze E, Bachmann M et al. Differences in access and patient outcomes across antiretroviral treatment clinics in the Free State province: a prospective cohort study. S Afr Med J. 2010;100:675–81.

19. Losina E, Bassett IV, Giddy J, Chetty S, Regan S, Walensky RP et al. The "ART" of linkage: pre-treatment loss to care after HIV diagnosis at two PEPFAR sites in Durban, South Africa. PLoS One. 2010;5:e9538.

20. Feldacker C, Ennett ST, Speizer I. It's not just who you are but where you live: an exploration of community influences on individual HIV status in rural Malawi. Soc Sci Med. 2011;72:717–25.

21. Tanser F, Barnighausen T, Grapsa E, Zaidi J, Newell ML. High coverage of ART associated with decline in risk of HIV acquisition in rural KwaZulu-Natal, South Africa. Science. 2013;339:966–71.

22. Hankins C, Forsythe S, Njeuhmeli E. Voluntary medical male circumcision: an introduction to the cost, impact, and challenges of accelerated scaling up. PLoS Med. 2011;8:e1001127.

23. Beyrer C, Razak MH, Lisam K, Chen J, Lui W, Yu X-F. Overland heroin trafficking routes and HIV-1 spread in south and south-east Asia. AIDS. 2000;14:75–83.

24. Stewart J. GIS data linking to enhance multi-sectoral decision making for family planning and reproductive health: a case study in Rwanda. Chapel Hill, NC: MEASURE Evaluation; 2013.

25. Nigeria Health and Mapping Summit 2011. Summary. Enlisting National Mapping Agencies in Improving Health Outcomes. Abuja Nigeria, October 18–19, 2011. Chapel Hill, NC: MEASURE Evaluation; 2011.

UNAIDS

UNAIDS
Joint United Nations
Programme on HIV/AIDS

UNHCR
UNICEF
WFP
UNDP
UNFPA
UNODC
UN WOMEN
ILO
UNESCO
WHO
WORLD BANK

20 Avenue Appia
1211 Geneva 27
Switzerland

+41 22 791 3666
distribution@unaids.org

unaids.org

JC2559/1/E