



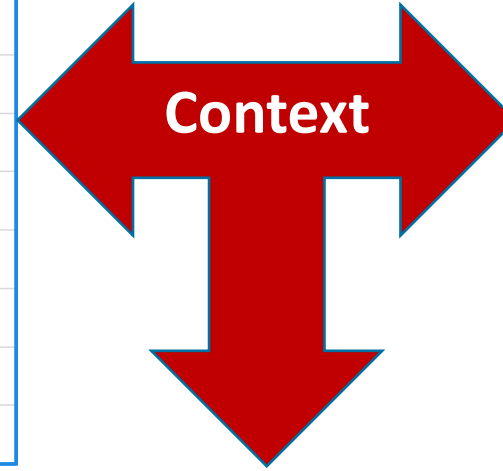
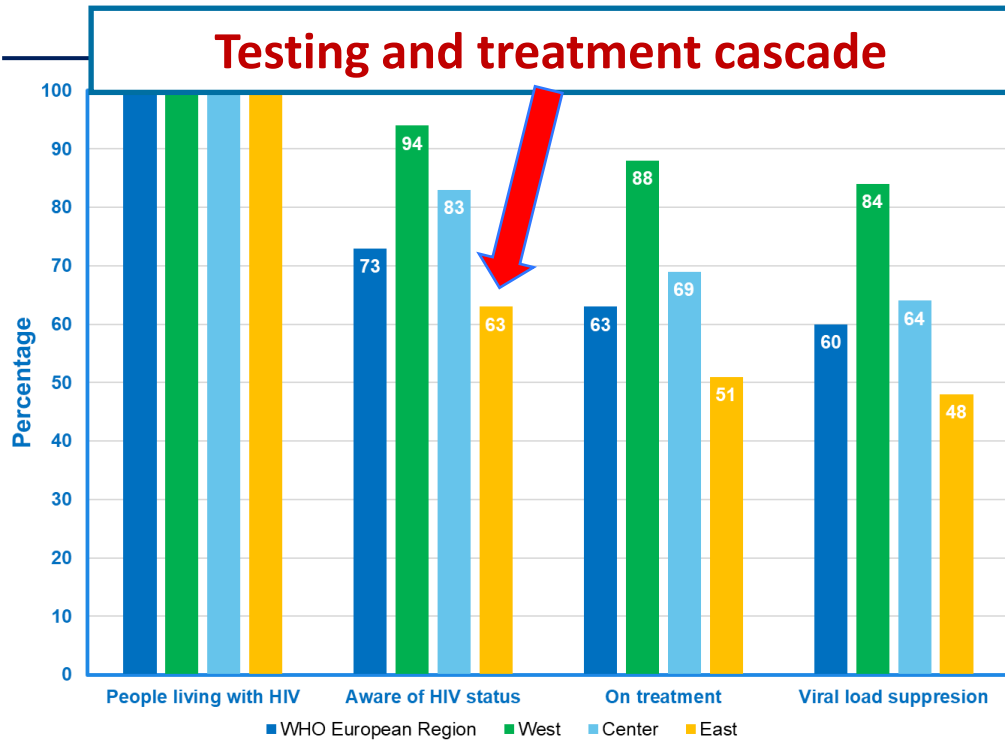
# Updating & Simplifying Testing Algorithms: how to reach the first 95 and close the gaps in HIV diagnosis

**Dr Viatcheslav Grankov,**  
Medical Officer on HIV,  
Joint Infectious Diseases Unit,  
WHO Regional office for Europe



European Region

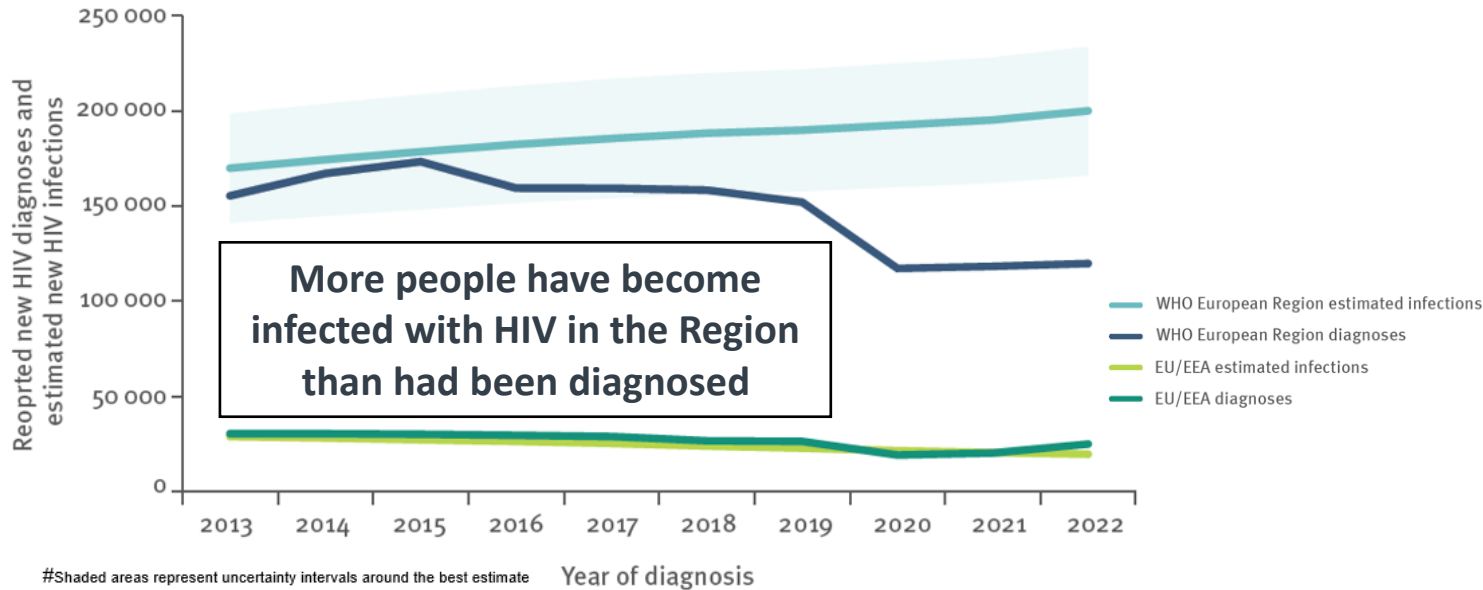
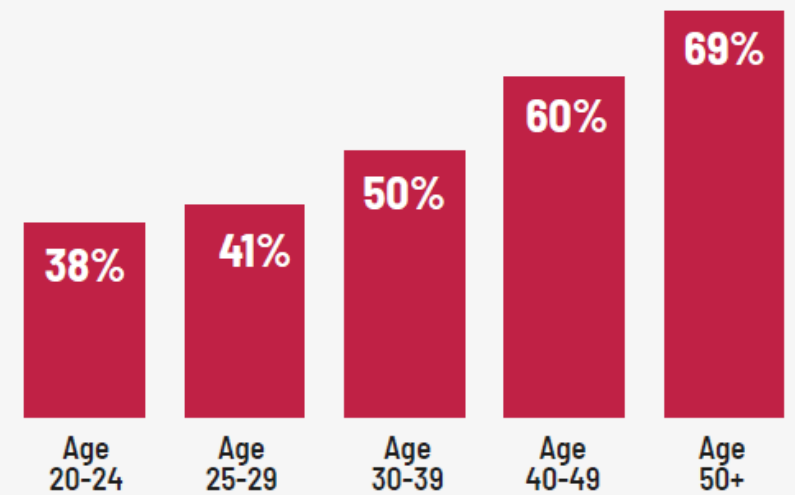
## Testing and treatment cascade



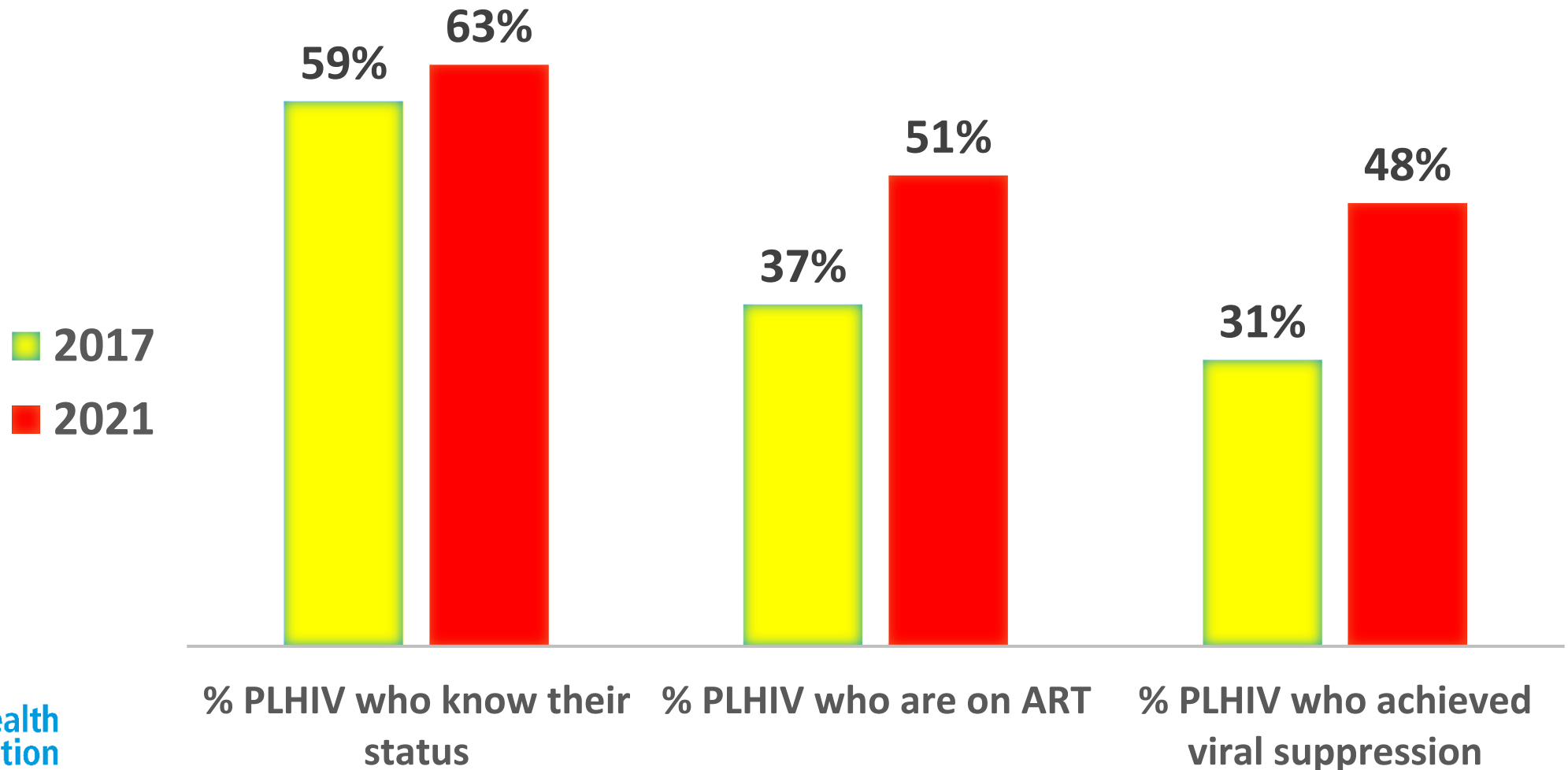
**LATE DIAGNOSIS**  
delays treatment and increases  
the risk of AIDS and death



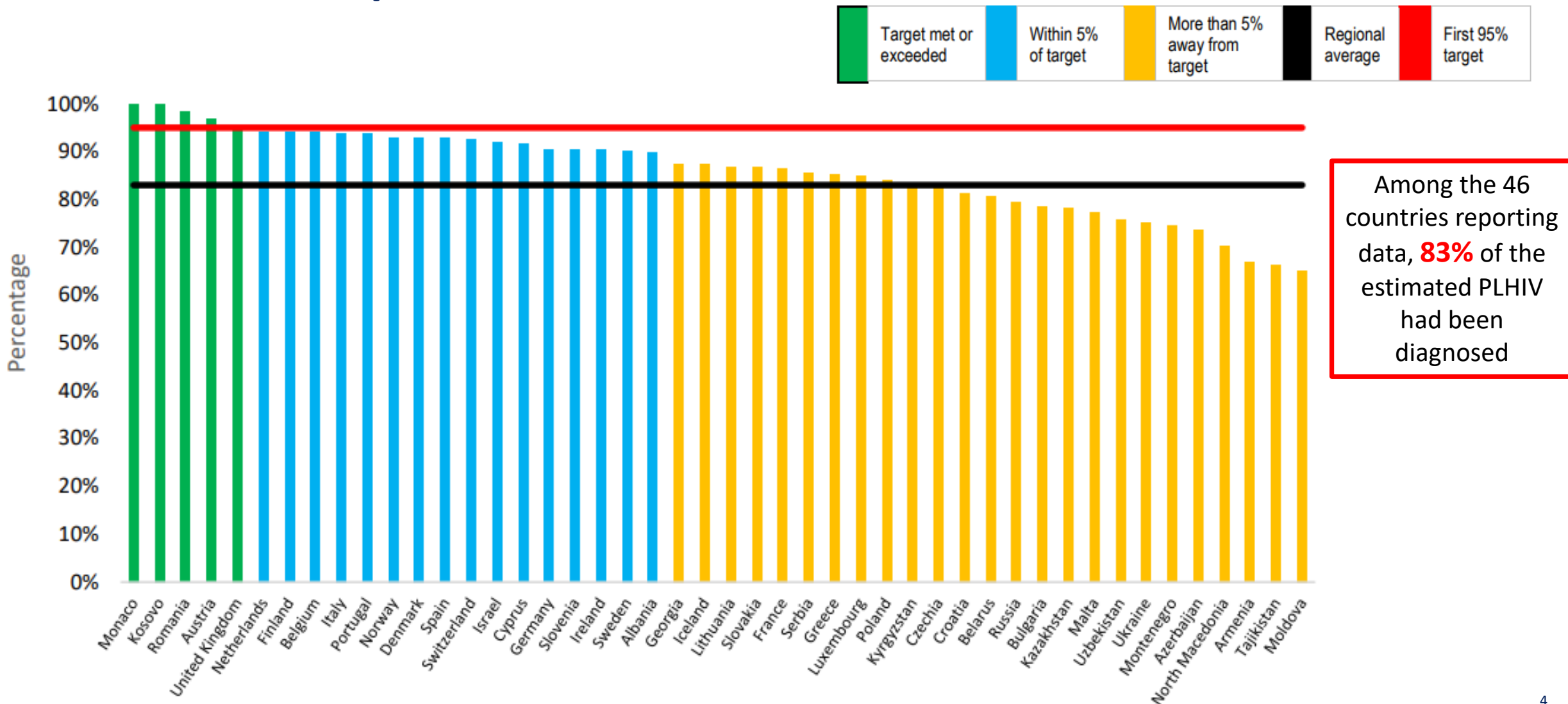
Percentage of people **diagnosed late**  
with HIV increases with age  
and is highest in people over age 50.



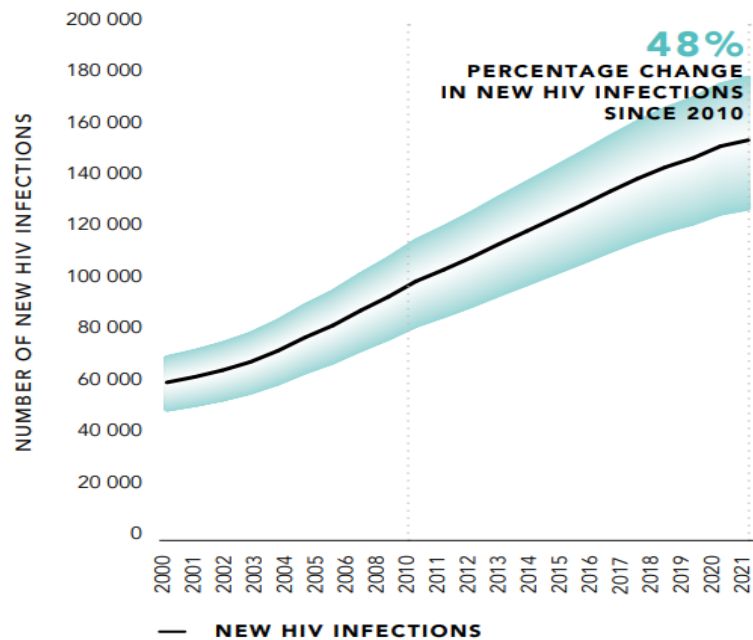
# EECA HIV cascade of care in 2017 and 2021



# Proportion of PLHIV who had ever been diagnosed in 46 countries of Europe and Central Asia, based on data as of 2023



Countries of EECA have had the **fastest growing HIV epidemic in the world** over the last decade and contributed to 78% of new HIV diagnoses reported in WHO European region in 2021



Source: UNAIDS epidemiological estimates, 2022 (<https://aidsinfo.unaids.org/>)

## NEWLY DIAGNOSED HIV INFECTIONS IN THE WHO EUROPEAN REGION, 2021

A total of 106 508 people were diagnosed in 2021.  
Overall rate for the WHO European Region: 12% per 100 000 population



**17 130**

3.9 per 100 000



**5940**

3.1 per 100 000



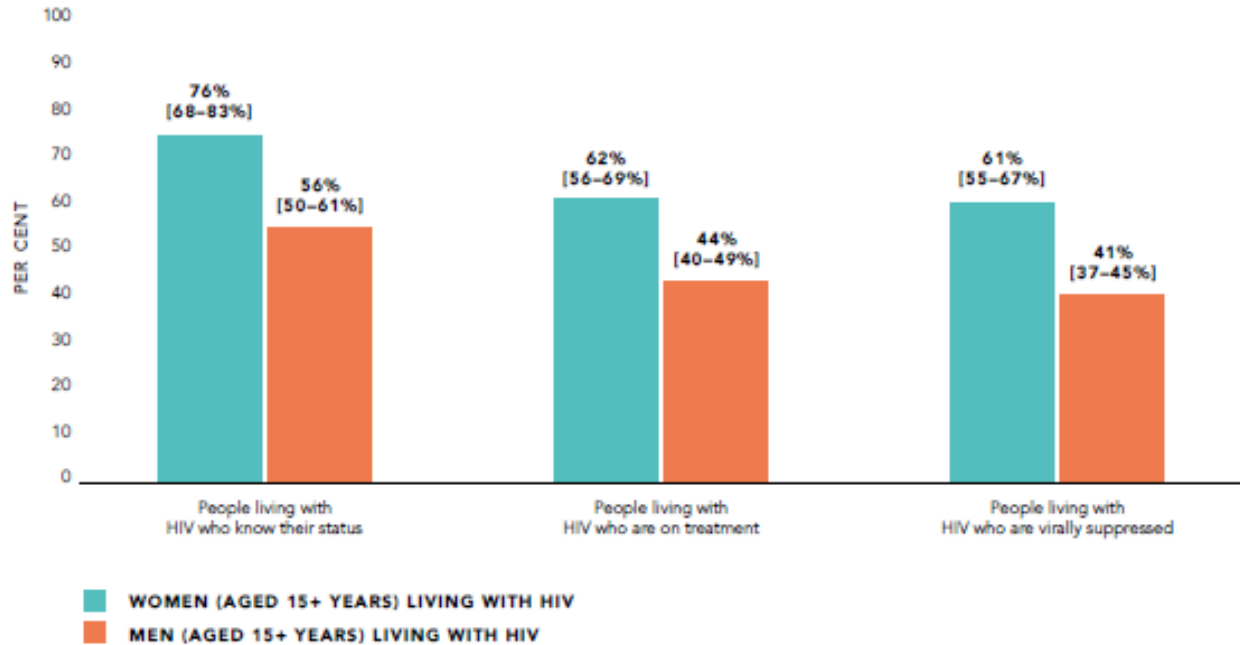
**83 438**

32.4 per 100 000

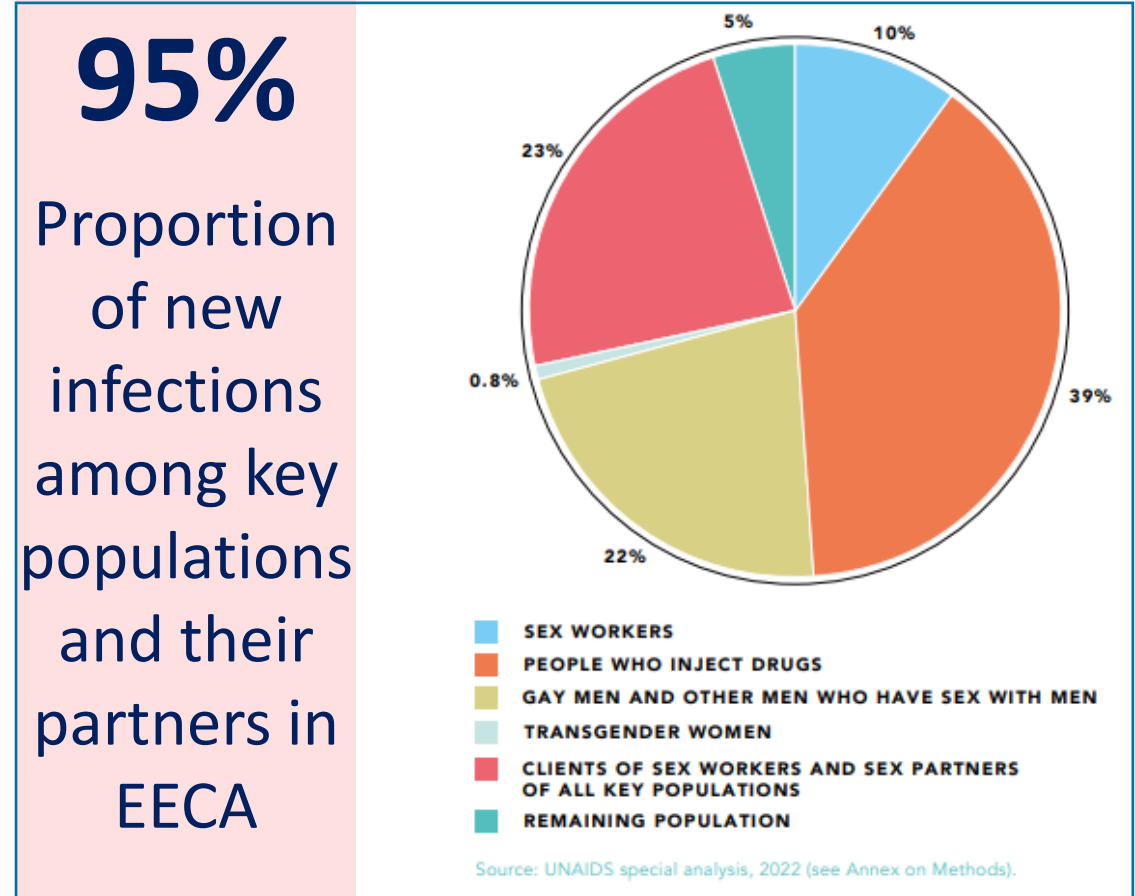


# What populations tend to be missed in HIV diagnosis?

FIGURE 12.5 HIV testing and treatment cascade, women (aged 15+ years) compared to men (aged 15+ years), eastern Europe and central Asia, 2021



Knowledge of HIV status in men < women

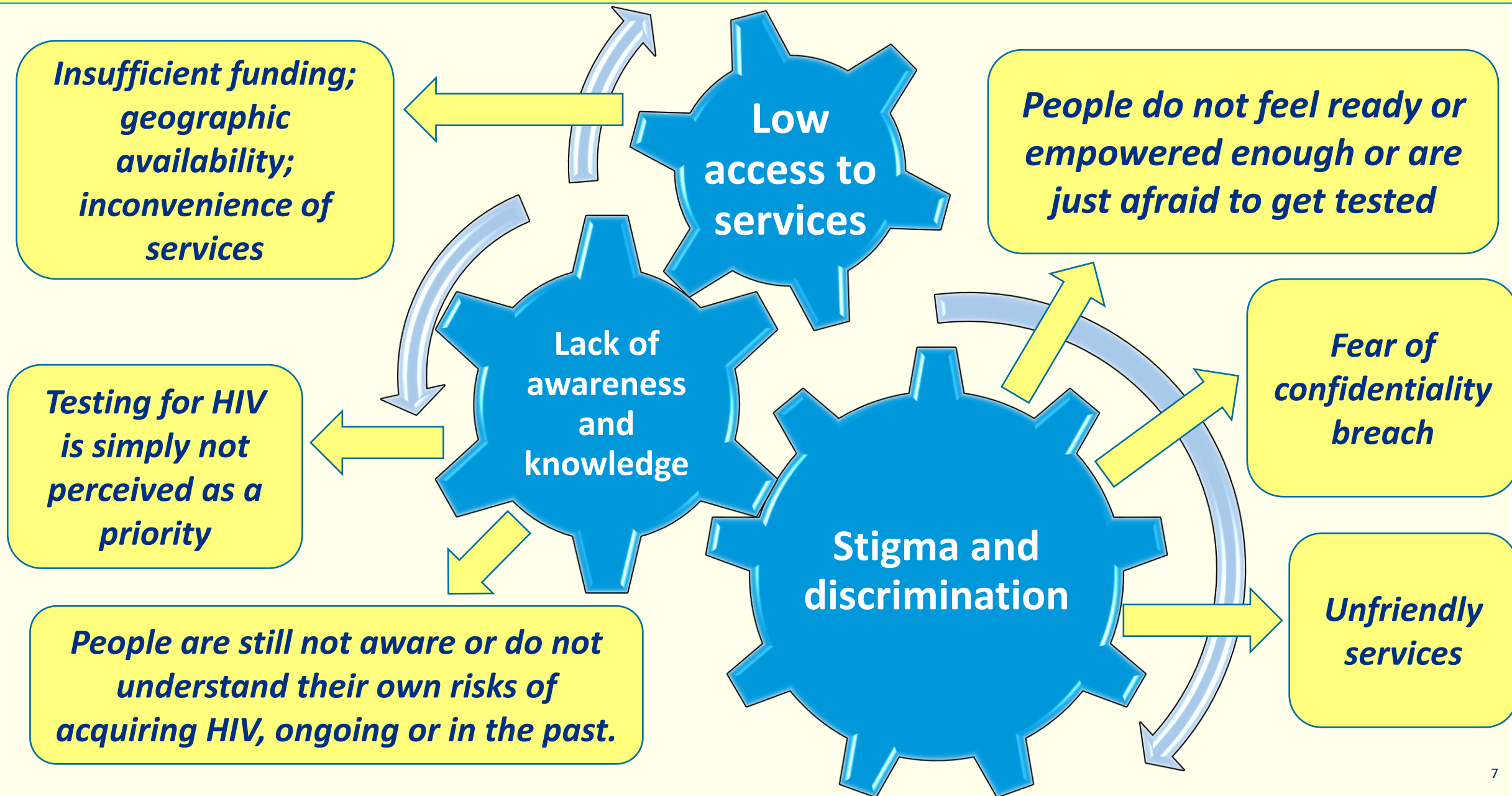


Men and Key population are the most affected in EECA



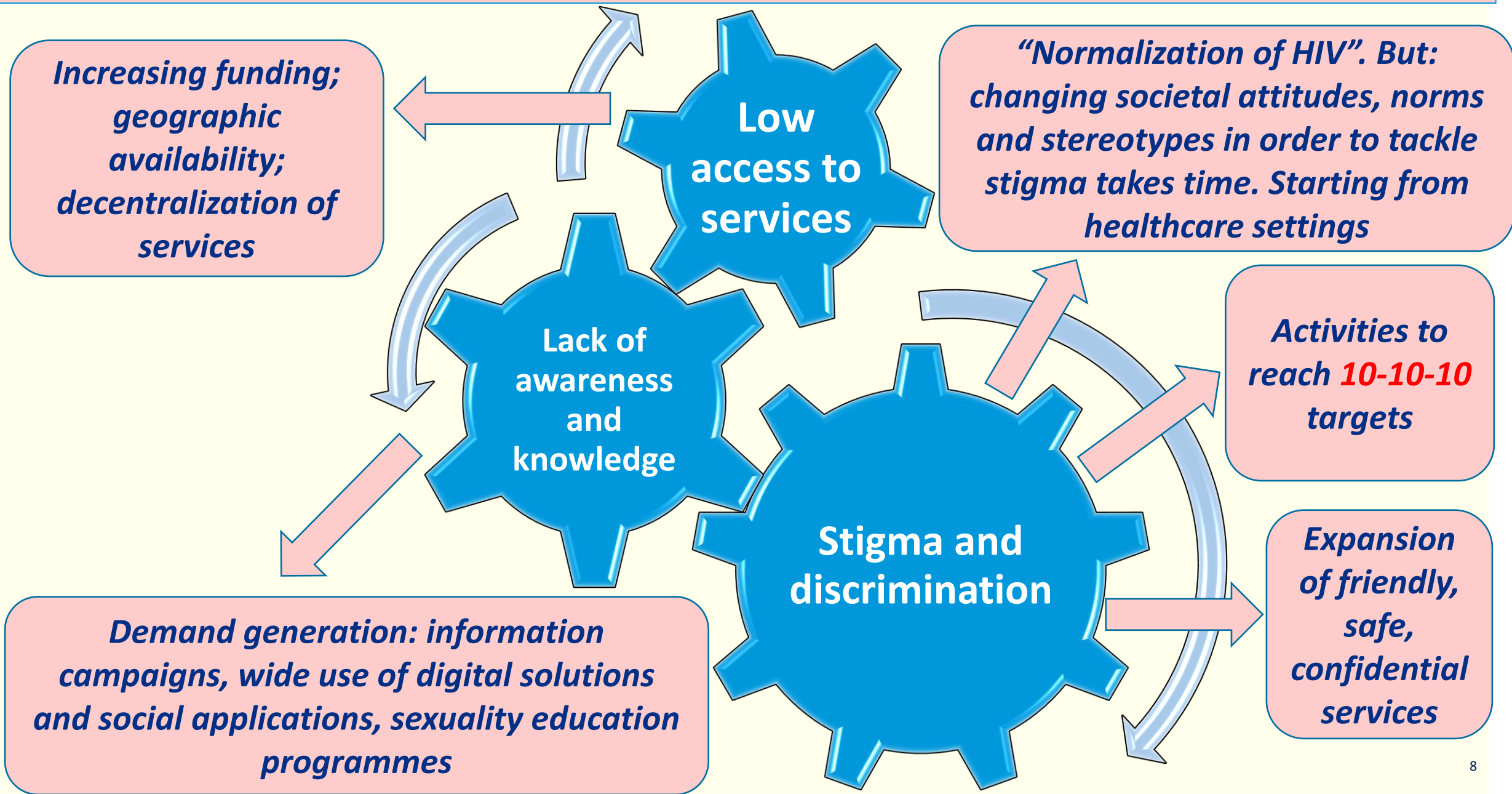
European Region

## Main reasons behind the remaining gaps in HIV case detection



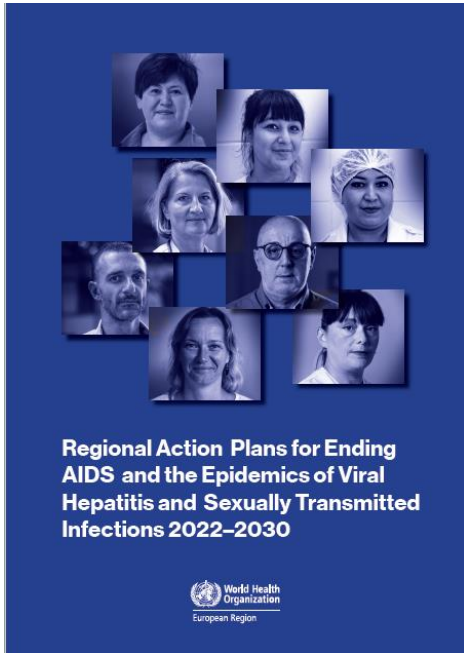


# Solutions





## Priority actions for countries for Strategic Direction 1 (a shared response to HIV, VH and STIs)

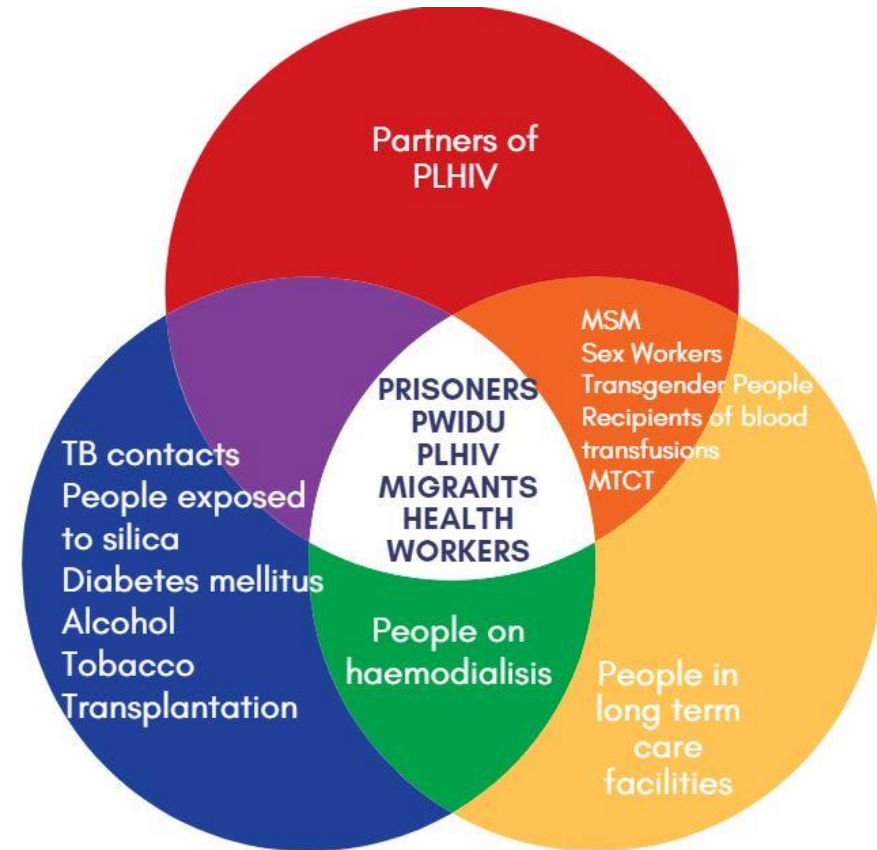


### 1.5. Ensure accessible, decentralized diagnostic and laboratory services

- Develop strategic laboratory plans across disease programmes to clarify the role of reference laboratories, while decentralizing and integrating testing and optimizing the use of the available molecular diagnostic platforms including point-of-care testing (POCT) and rapid testing for HIV, TB, VH, STIs and other communicable diseases.
- Ensure quality standards for decentralized testing strategies and appropriate professional competencies.
- Implement laboratory information management systems that are linked to patient data systems to deliver timely results.

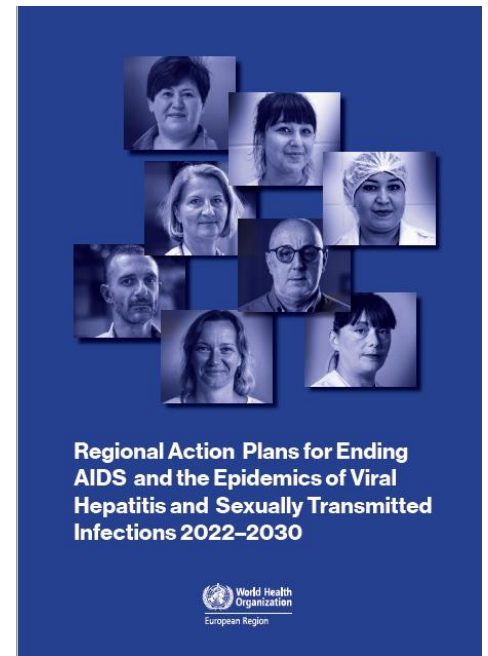
# Why integrated testing for HIV, viral hepatitis and STIs?

- HIV, VH and STIs share **common modes of transmission** and determinants, and many of the populations affected by these diseases overlap.
- Integrated HIV, VH and STIs testing allows synergies to be created in times of **constrained resources**.

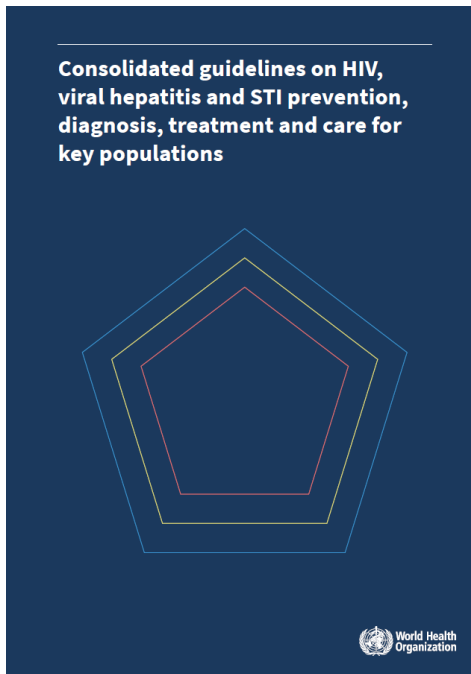


# RAP: Priority populations for HIV, VH and STIs

- people exposed through **sexual transmission**, including
  - **young people** and adolescents;
  - men who have sex with men (**MSM**);
  - **sex workers** and their clients; **transgender** people;
  - people in **prisons** and other closed settings;
  - and people whose sexual behaviour is mediated by drug or alcohol use;
- people exposed through **unsafe blood** supplies and/or **unsafe medical** injections and procedures;
- people who inject and use **drugs**;
- children exposed through **vertical (mother-to-child) transmission** or early childhood infection;
- **pregnant and breastfeeding** women;
- women and girls, including adolescent girls and young women, who face risks associated with gender inequalities and exposure to **violence**, in conjunction with increased biological risks on the basis of sex;
- people of all ages, including men, who are less likely to use health services; **migrants**, mobile populations, and people **affected by conflict** and civil unrest; indigenous peoples;
- people with **disabilities**.



# Essential health and enabling recommendations for key populations,



## Essential for impact: enabling interventions

- Removing punitive laws, policies and practices
- Reducing stigma and discrimination
- Community empowerment
- Addressing violence

## Essential for impact: health interventions

### Prevention of HIV, viral hepatitis and STIs

- Harm reduction (needle and syringe programmes (NSPs), opioid agonist maintenance therapy (OAMT) and naloxone for overdose management)
- Condoms and lubricant
- Pre-exposure prophylaxis (PrEP) for HIV
- Post-exposure prophylaxis (PEP) for HIV and STIs
- Prevention of vertical transmission of HIV, syphilis and HBV
- Hepatitis B vaccination
- Addressing chemsex

### Diagnosis

- HIV testing services
- STI testing
- Hepatitis B and C testing

# Recommended packages of interventions for each key population

	MSM	PWID	TGD	SW	PRIS
<b>Diagnosis</b>					
HIV testing services	X	X	X	X	X
STI testing	X	X	X	X	X
Hepatitis B and C testing	X	X	X	X	X
Screening, diagnosis, treatment and prevention of HIV associated tuberculosis (TB)	X	X	X	X	X

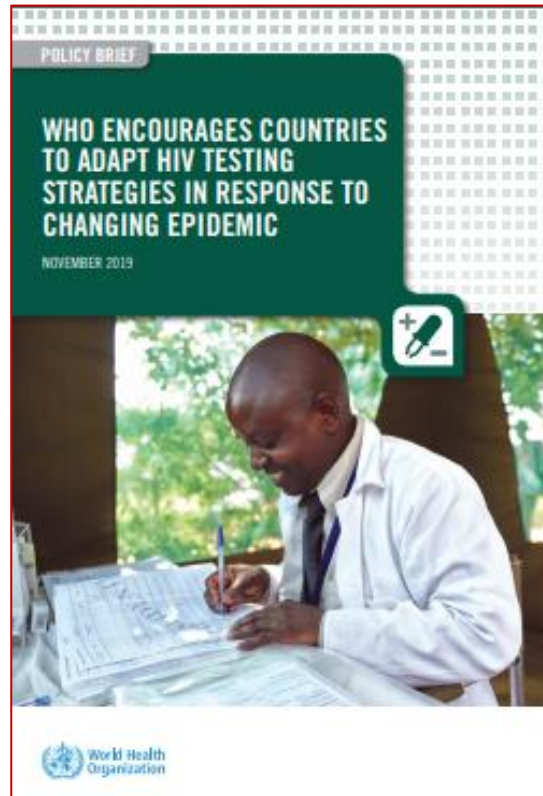
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In each context, we need to decide which testing approaches can be attractive and perceived as safe by potential clients, even in settings with current high levels of HIV-related stigma and discrimination.

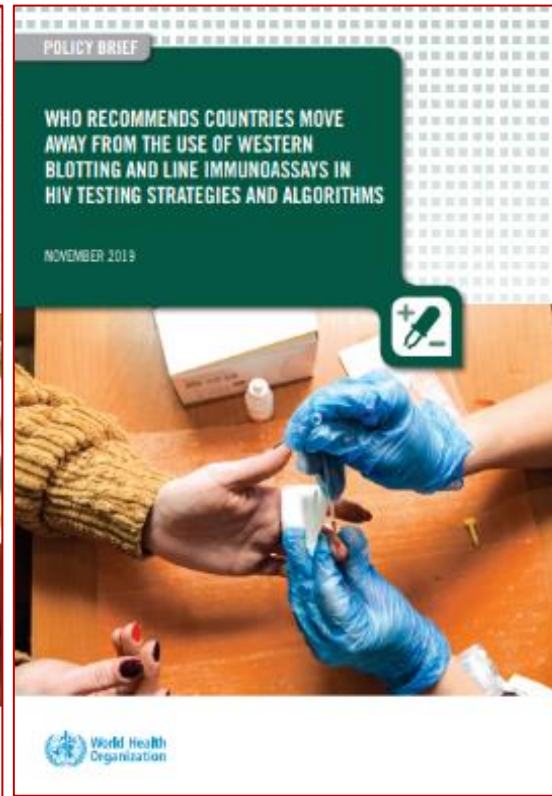




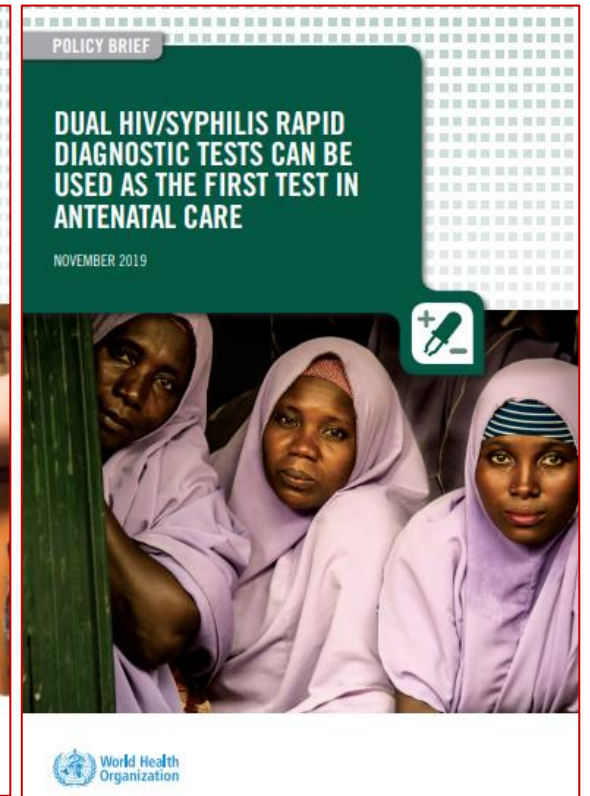
**Consolidated guidelines on HIV testing services**



**Universal 3 tests strategy**



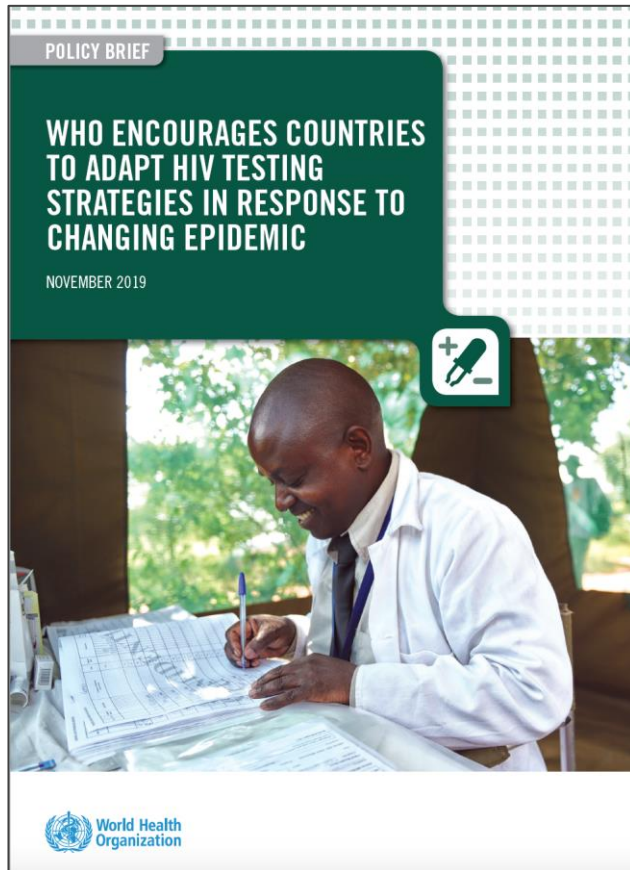
**Moving away from WB/IB**



**Dual HIV RDT in ANC (and now KP) settings**



# Adapting national HIV testing strategies



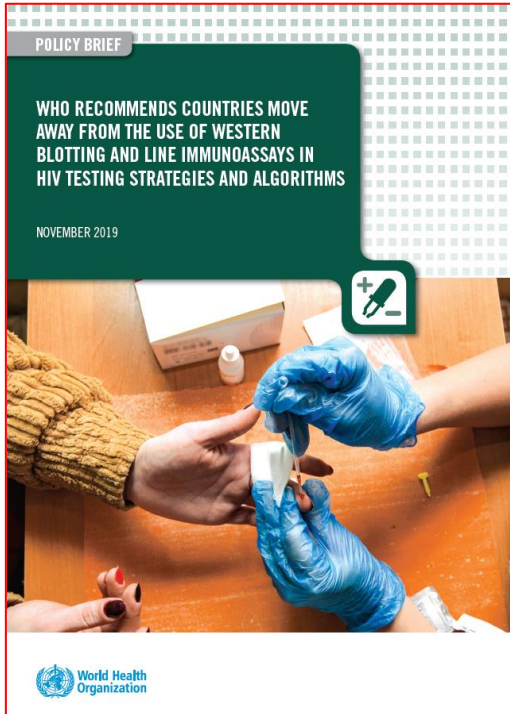
Confirmation of HIV infection = combination of **3** “**reactive**” IA/RDT results  
(not an individual confirmatory test)

- Ensure that the testing strategy has a positive predictive value  $\geq 99\%$  (PPV)
  - Meaning of the persons classified as HIV+,  $\geq 99\%$  will truly be living with HIV
  - PPV depends on positivity rate among testing population

- Quality assured assays, such as WHO prequalified, should be used:
  - **$\geq 99\%$  sensitivity**: fewer than **1** ‘*false negative*’ for 100 truly positive
  - **$\geq 98\%$  specificity**: fewer than **2** ‘*false positive*’ for 100 truly negative
  - Either rapid diagnostic tests (RDTs) or immunoassay (EIA, CLIA, ECL)

# Moving away from WB: Systematic review of published data

Pooled estimates from bivariate mixed-effects meta-analysis



	Comparator (with WB/LIA)				Index (without WB/LIA)			
	Estimate	Std error	95% CI		Estimate	Std error	95% CI	
<b>Sensitivity (%)</b>	98.6	0.8	95.9	99.6	99.2	0.5	97.6	99.7
<b>Specificity (%)</b>	99.9	0.1	99.7	100.0	100.0	<0.01	99.7	100.0
<b>Indeterminate</b>	81				0			

- **Comparator (with WB/LIA) produced 81 indeterminate diagnosis**
- *37 of 81 INDs (46%) were from specimens that were Positive*
- *44 of 81 (54%) were from specimens that were Negative.*

Performance:

- **Sensitivity and specificity is comparable**
- **But high-rate indeterminate results with an algorithm containing WB**

# Western blot limitations

- Higher frequency of **indeterminate** results
- Lower sensitivity in the early stages of infection
- **Longer testing procedure than RDT/ELISA**
- More time-consuming, the need for specially trained staff
- Cost per test is higher than RDT/ELISA
- **Higher loss to follow-up, and lower linkage to care with WB algorithms**

**Estimated mean window period (time from HIV infection to immunological reactivity, in days)**

Test generation	Median
4 generation	17,8
3 generation	23,1
2 generation	31,1
2 generation additional essays	33,4
Western blot	36,5

Delaney K, Время от заражения ВИЧ-1 до появления реактивных тестов на ВИЧ: практические следствия для интерпретации результатов и повторного тестирования после контакта, 2017.

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## Verification studies – good examples

- WHO is currently supporting HIV testing verification studies in [Armenia, Kazakhstan, Georgia](#)

It is suggested to conduct a **verification study of the new testing algorithms** in order to:

1. Identify the **combination of products which have minimum possible common cross-reactivity** to reduce the risk of false HIV-positive diagnosis. (Note: *Products from the same manufacturer should not be used as part of the testing algorithm to minimize common cross-reactivity*)
2. Identify **flexible algorithms**: replacement tests in case of a "problem" with one of the selected tests, e.g. stock out, lot recall, etc. One for A1 and one for A2/A3
3. **Not intended to reevaluate sensitivity and specificity of individual products!**

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# Why lay provider testing and rapid testing?

- **Better uptake & preferred by clients (especially KP) = more people know their status**
  - In all studies individuals preferred RDTs over lab-based methods (EIA & WB)
- **Low cost & affordability**
- **Accurate diagnosis**
  - equivalent accuracy to laboratory methods (EIA/WB)
- **Same day start**
  - RDTs have much faster turnaround time than lab-based testing
  - RDTs enable decentralization of confirmation testing which is key
  - People get to start PrEP & ART same day

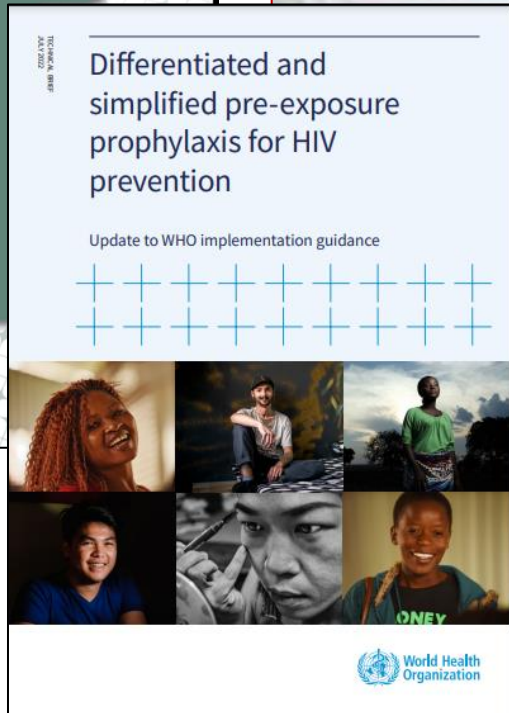
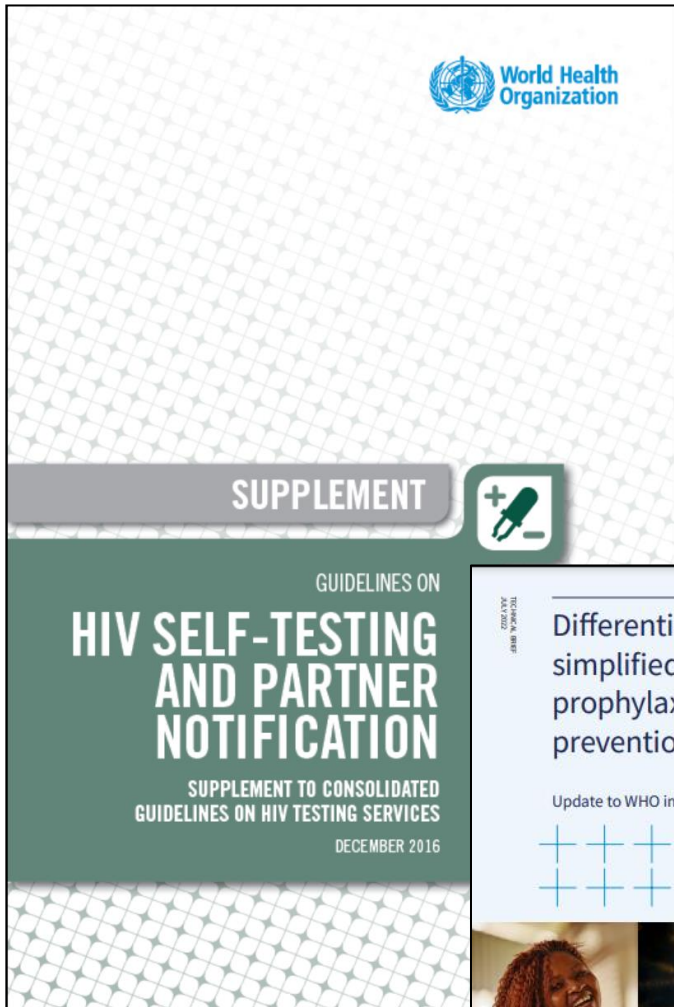
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Using rapid diagnostic tests, the diagnosis can be confirmed within one day

**WHO recommends:**

Treatment should be prescribed on the day of confirmation of the diagnosis of HIV infection (and no later than 7 days from the confirmation of the diagnosis – if additional examinations are necessary).\*





**WHO recommendation:**

**HIV self-testing should be offered as an approach to HIV testing services**

*(strong recommendation, moderate quality evidence)*

**Self-testing is now the new normal!**



## WHO RECOMMENDS SOCIAL NETWORK-BASED HIV TESTING APPROACHES FOR KEY POPULATIONS AS PART OF PARTNER SERVICES PACKAGE

DECEMBER 2019



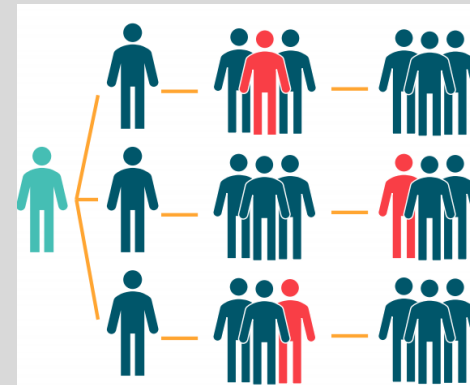
## WHO RECOMMENDATION:

Social network-based approaches can be offered as an approach to HIV testing for key populations as part of a comprehensive package of care and prevention

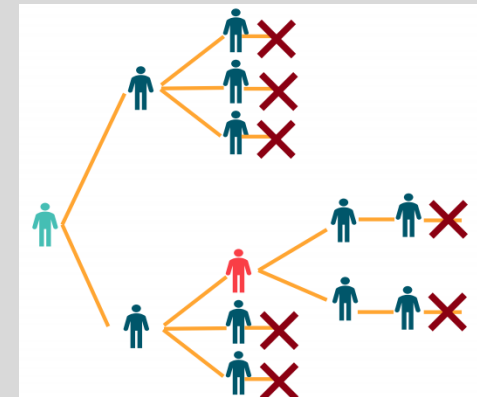
**Social network approach (SNA):** process where individuals (including those newly with diagnosed, with established infection or HIV negative) at high ongoing risk of HIV (such as key populations) are enlisted to encourage and offer HIV testing to social, sexual, drug injecting contacts in their network who may be at risk for HIV



### SNA Types

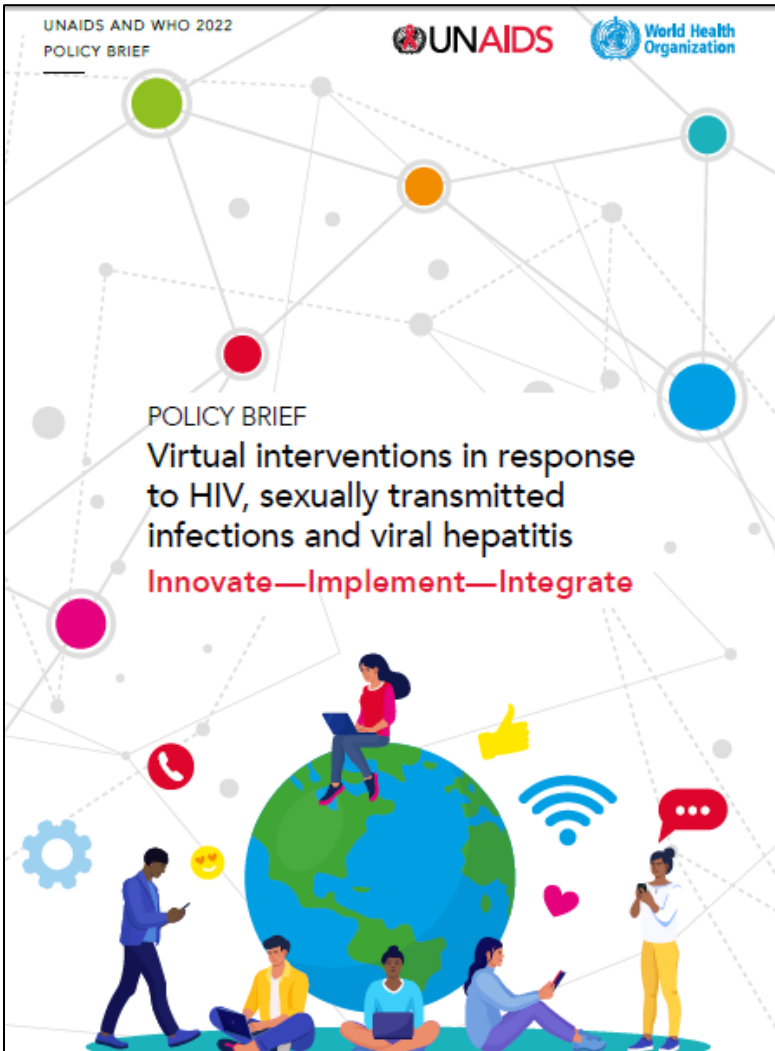
#### Unlimited waves



#### Limited waves



-  Seed
-  HIV+ Recruit
-  HIV- Recruit



# What are virtual interventions?

Internet and phone-based ways of communicating

# Why should we go virtual?

- **4.80 billion internet users** (61% of total population)
- 4.48 active social media users (99% mobile users)
- **2.5 hours on social media**
- Reach broader audience
- Targeted reach
- **Offers choices**
- Improved efficiency
- Less opportunity costs for clients
- Less time consuming

## 1. Conditions which are AIDS defining among PLHIV\*

Strongly recommend testing:

### Neoplasms:

- Cervical cancer
- Non-Hodgkin lymphoma
- Kaposi's sarcoma

### Bacterial infections

- Mycobacterium Tuberculosis, pulmonary or extrapulmonary
- Mycobacterium avium complex (MAC) or Mycobacterium kansasii, disseminated or extrapulmonary
- Mycobacterium, other species or unidentified species, disseminated or extrapulmonary
- Pneumonia, recurrent (2 or more episodes in 12 months)
- Salmonella septicaemia, recurrent

### Viral infections

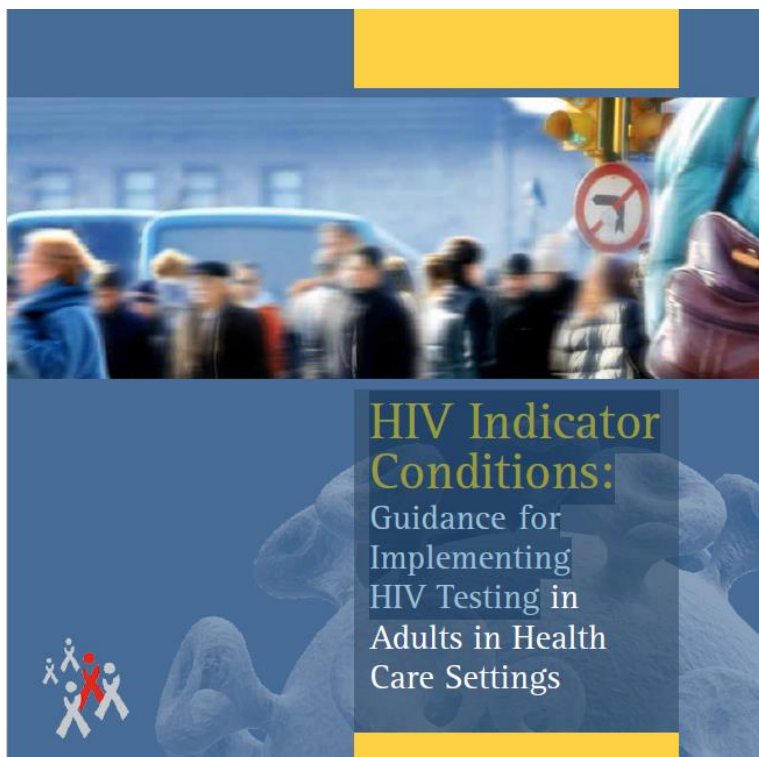
- Cytomegalovirus retinitis
- Cytomegalovirus, other (except liver, spleen, glands)
- Herpes simplex, ulcer(s) >1 month/bronchitis/pneumonitis
- Progressive multifocal leucoencephalopathy

### Parasitic infections

- Cerebral toxoplasmosis
- Cryptosporidiosis diarrhoea, >1 month
- Isosporiasis, >1 month
- Atypical disseminated leishmaniasis
- Reactivation of American trypanosomiasis (meningoencephalitis or myocarditis)

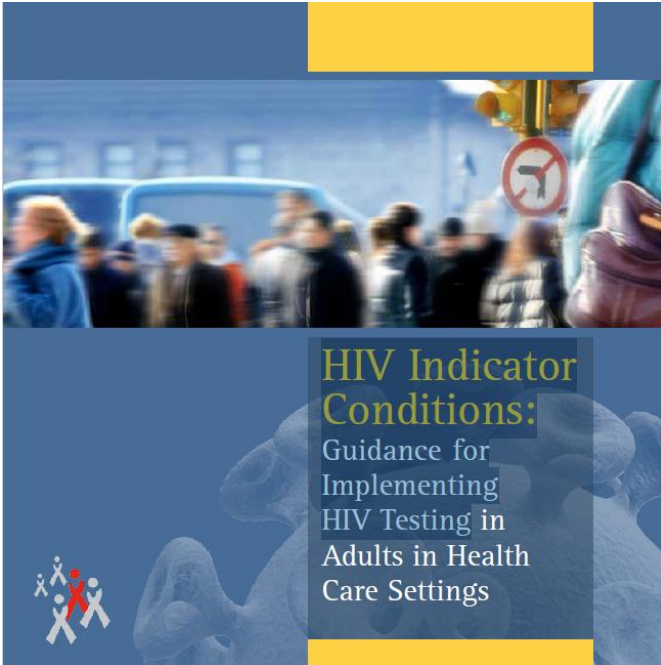
### Fungal infections

- Pneumocystis carinii pneumonia
- Candidiasis, oesophageal
- Candidiasis, bronchial/ tracheal/ lungs
- Cryptococcosis, extra-pulmonary
- Histoplasmosis, disseminated/ extra pulmonary
- Coccidioidomycosis, disseminated/ extra pulmonary
- Penicilliosis, disseminated



**HIV in Europe.**  
*HIV Indicator Conditions: Guidance for Implementing HIV Testing in Adults in Health Care Settings.*  
Copenhagen: HIV in Europe; 2012.





## 2a. Conditions associated with an undiagnosed HIV prevalence of >0.1 %\*\*

### Strongly recommend testing:

- Sexually transmitted infections
- Malignant lymphoma
- Anal cancer/dysplasia
- Cervical dysplasia
- Herpes zoster
- Hepatitis B or C (acute or chronic)
- Mononucleosis-like illness
- Unexplained leukocytopenia/ thrombocytopenia lasting >4 weeks
- Seborrheic dermatitis/exanthema
- Invasive pneumococcal disease
- Unexplained fever
- Candidaemia
- Visceral leishmaniasis
- Pregnancy (implications for the unborn child)

## 3. Conditions where not identifying the presence of HIV infection may have significant adverse implications for the individual's clinical management despite that the estimated prevalence of HIV is most likely lower than 0.1%

### Offer testing:

- Conditions requiring aggressive immuno-suppressive therapy:
  - Cancer
  - Transplantation
  - Auto-immune disease treated with immunosuppressive therapy
- Primary space occupying lesion of the brain.
- Idiopathic/Thrombotic thrombocytopenic purpura

## 2b. Other conditions considered likely to have an undiagnosed HIV prevalence of >0.1%

### Offer testing:

- Primary lung cancer
- Lymphocytic meningitis
- Oral hairy leukoplakia
- Severe or atypical psoriasis
- Guillain–Barré syndrome
- Mononeuritis
- Subcortical dementia
- Multiplesclerosis-like disease
- Peripheral neuropathy
- Unexplained weightloss
- Unexplained lymphadenopathy
- Unexplained oral candidiasis
- Unexplained chronic diarrhoea
- Unexplained chronic renal impairment
- Hepatitis A
- Community-acquired pneumonia
- Candidiasis

## Missed opportunities for diagnosis at different levels

Health Contact and Missing opportunities according to HIV Rapid Test Result in DRIVE 01 study					
Health Contact (N 5329)		Overall	Negative	Positive	P
Any Health Care Contact in last two years	Yes (%)	94.4	94.4	90,9	0.478
In Hospital Emergency Room	Yes (%)	46.5	46,4	55	0.443
Primary Care Center	Yes (%)	91	91	70	0.001
Specialist Physician	Yes (%)	39.9	40	35	0.648
Occupational Health Physician	Yes (%)	11.3	11.4	0	0.109
Number of Health care Contacts	Mean ±SD	8.9±0,15	8.9±0,15	8.1± 1,9	0.71
Prior HIV testing	Yes (%)	29.9	29.7	59.1	0.003
			(OR: 3.4, 95% CI: 1.5-8,02)		

- 18 - 60 years old who received services at a PHC Center or in a Hospital Emergency room in **Madrid**.
- Almost **91%** of patients with new HIV diagnosis had had **at least one health care contact** in the last two years before their HIV diagnosis.
- During this period, the same patients reported that **59%** of them had been **tested for HIV before**.
- At least **32%** of HIV infected patients had **missed opportunities** to be HIV diagnosed

**Missed Opportunities: 90.9% - 59.1% = 31.8%**

## Brighton Study 2000-2005: Missed opportunities for diagnosis

**62%** accessed **secondary care** in  
the preceding year:

- 26% with an HIV-related  
problem;

**80%** had been seen in **primary  
care**

- 60% with an HIV-related problem

Ottewil, BHIVA 2006I



European Region

## BMJ Open Missed opportunities for earlier diagnosis of HIV in patients who presented with advanced HIV disease: a retrospective cohort study

Itzhak Levy,<sup>1,2</sup> Yasmin Maor,<sup>3,2</sup> Naim Mahroum,<sup>1,2</sup> Liraz Olmer,<sup>4</sup> Anat Wieder,<sup>1</sup>  
Vladislav Litchevski,<sup>1</sup> Orna Mor,<sup>5,2</sup> Galia Rahav<sup>1,2</sup>

- Old age and being heterosexual were significant risk factors for being diagnosed late.
- **All patients with advanced disease** had at least one clinical indicator disease (CID) that did not lead to an HIV test in the 5 years prior to AIDS diagnosis.
- The median time between CID and AIDS diagnosis was **24 months** (IQR 10–30).
- **60%** of CIDs were missed by a general practitioner and **40%** by a specialist.

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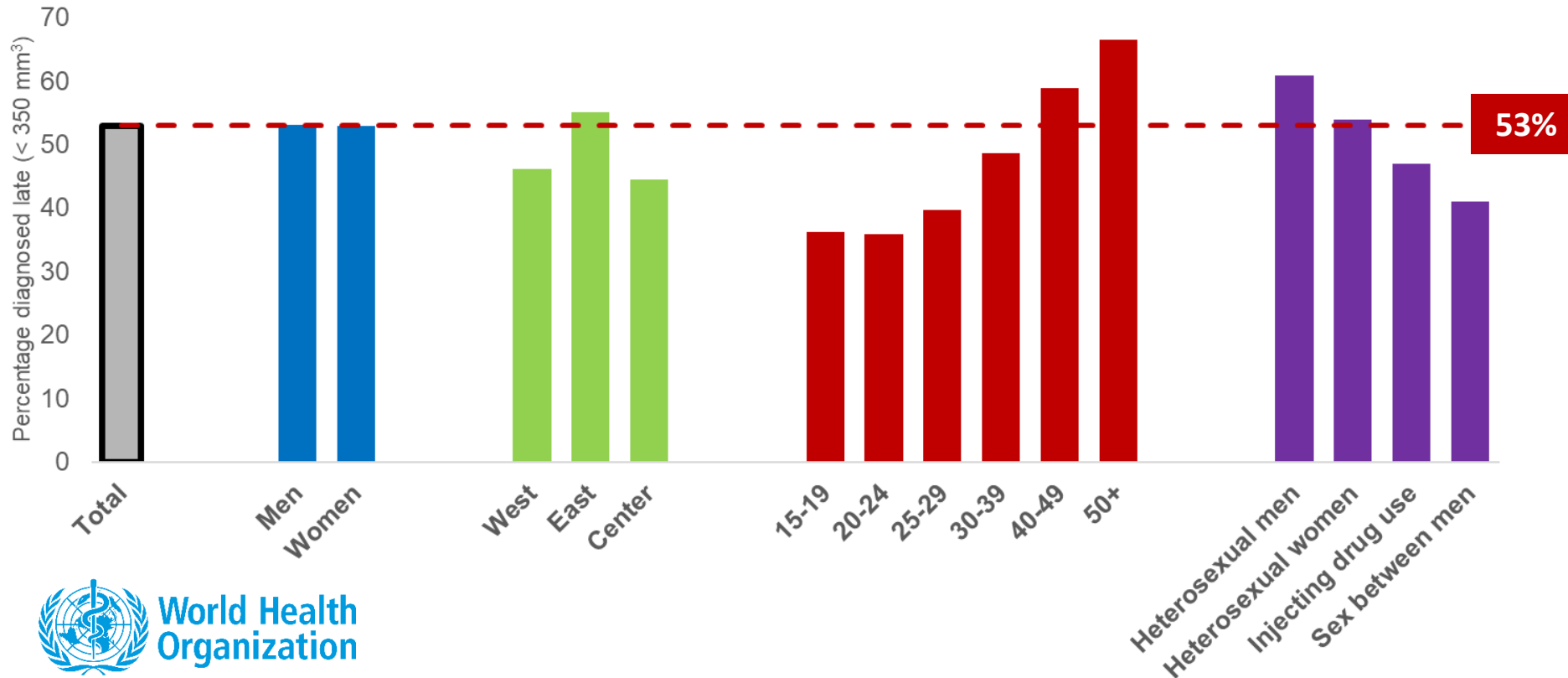
## Missed opportunities for HIV testing in people diagnosed with HIV in Estonia, 2014-2015

- Of 538 newly diagnosed HIV cases, **82%** had visited healthcare services at least once during the 2 years before HIV diagnosis; the mean number of visits was **9.1**.
- Of these, **31%** had at least **HIV indicator condition** on at least one of their treatment invoices.
- In **390 cases of HIV indicator conditions**, **only 5% were tested for HIV**.



# Late HIV diagnosis remains a challenge with variation across transmission mode & age

In 2022, 53% of reported diagnoses were diagnosed late, with CD4 < 350 cells/mm<sup>3</sup> at diagnosis\*



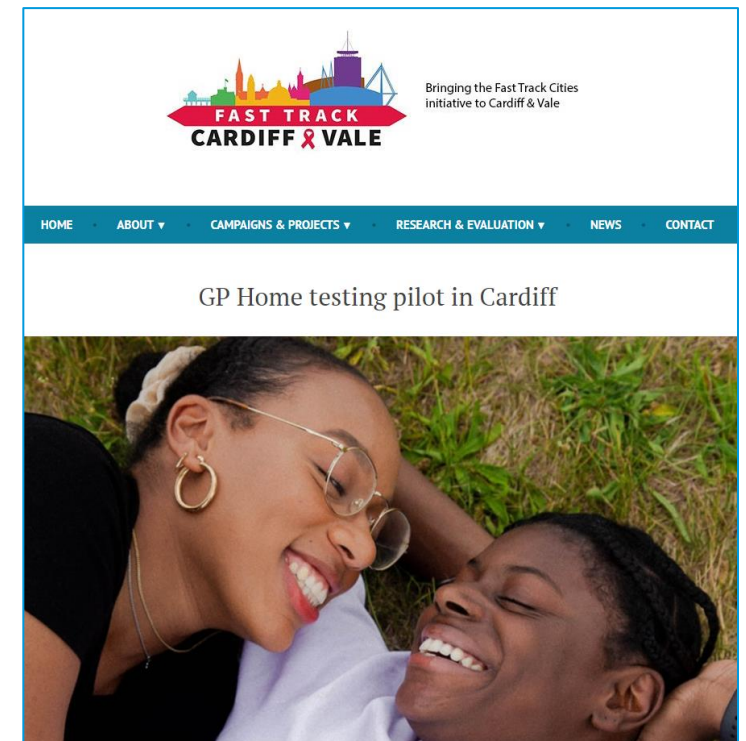
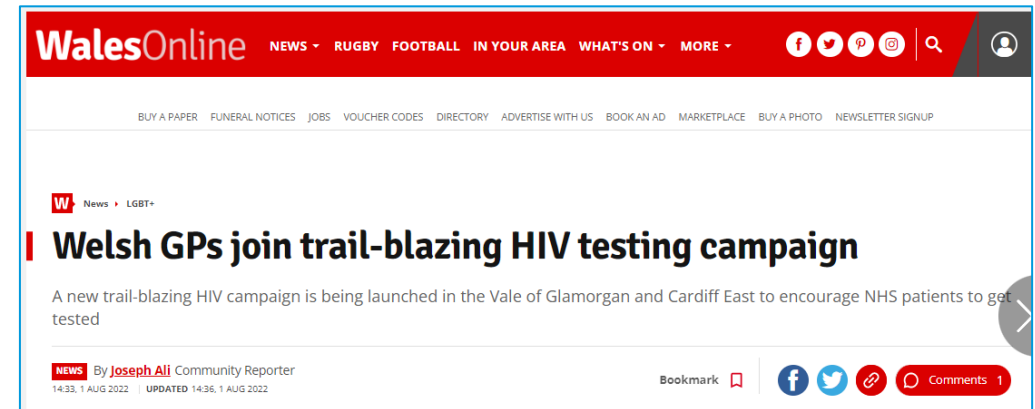
The percentage of people with HIV diagnosed late increases with age and is highest in people over the age 50

The percentage of people with HIV diagnosed late is highest among those infected heterosexually (for both men and women)

# Involving PHC in HIV testing in Wales

## 'Texting 4 Testing' project

- People aged 16+ years, served by GP practices in Cardiff & Vale, receive a text message offering a free HIV postal test kit.
- Those who receive a text message from their GP will be able to order a postal test kit from "Sexual Health Wales" online, through a link to their website.
- The kit will arrive in a discreet box which fits through a letterbox.
- Anyone who does not get a text can also order a free, confidential HIV test through "Sexual Health Wales".



***Testing as the Gateway to Prevention and Treatment***

## HIV TESTING

HIV testing determines the next steps and whether treatment or prevention is needed (including PrEP)

*Key components of HIV control programs*

## HIV TREATMENT

People diagnosed with HIV should receive daily ART to suppress viral load and prevent HIV transmission

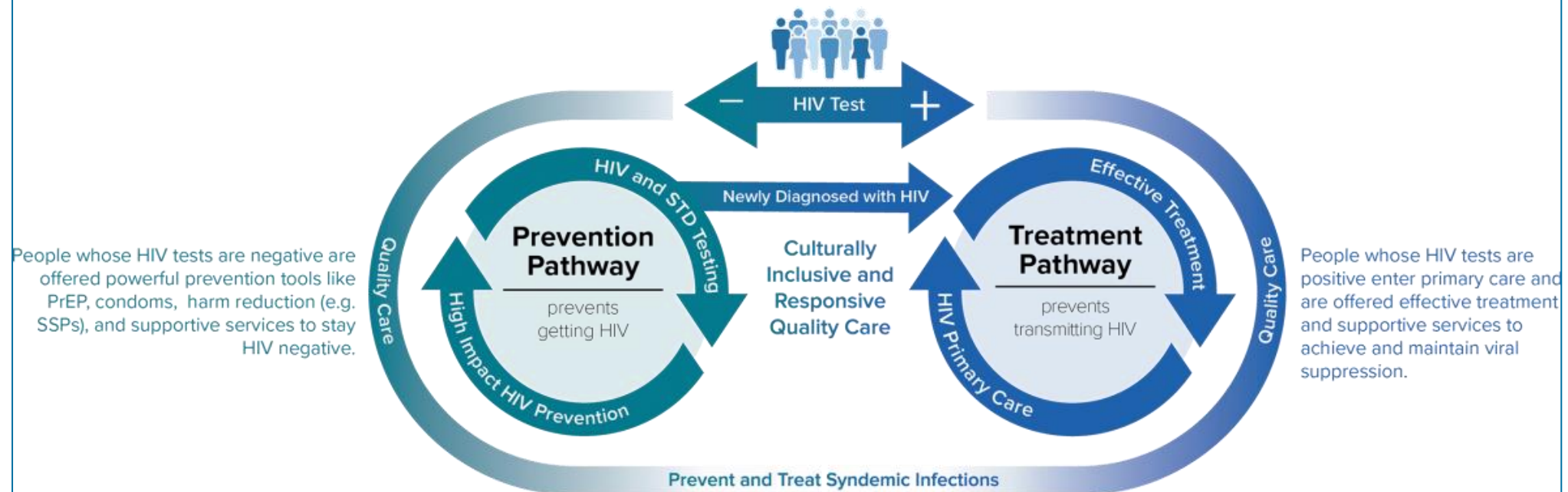


## PREVENTION

People without HIV, but at risk of becoming infected, can take PrEP for prevention. Basic combination prevention measures should be provided by the national HIV prevention program

- The status neutral approach to HIV prevention and care defines the entry point to care as the time of an HIV test.
- At this entry point, clients' needs are assessed, and they are engaged and linked to appropriate services based on these needs, regardless of whether their HIV test is positive or negative.

## Status Neutral HIV Prevention and Care



Follow CDC guidelines to test people for HIV. Regardless of HIV status, quality care is the foundation of HIV prevention and effective treatment. Both pathways provide people with the tools they need to stay healthy and stop HIV.



**Decentralize** and **simplify** HIV testing to reach as earlier as possible those who are undiagnosed; introduce and expand **peer-led partner/contact tracing**

Reduce delays in **diagnosis confirmation** (RDT, POCT, discontinuation of WB) and ensure rapid and effective **linkage to ART and care** (minimize losses to follow-up)

Add and expand evidence-based approaches to **self-testing/self-sampling**

Expand **indicator testing for HIV** in emergency care and other settings

Ensure optimal **accuracy** of test results (WHO pre-qualification, verification studies)

Use HIV testing as the pathway to both **prevention** and treatment (**status neutral** approach)

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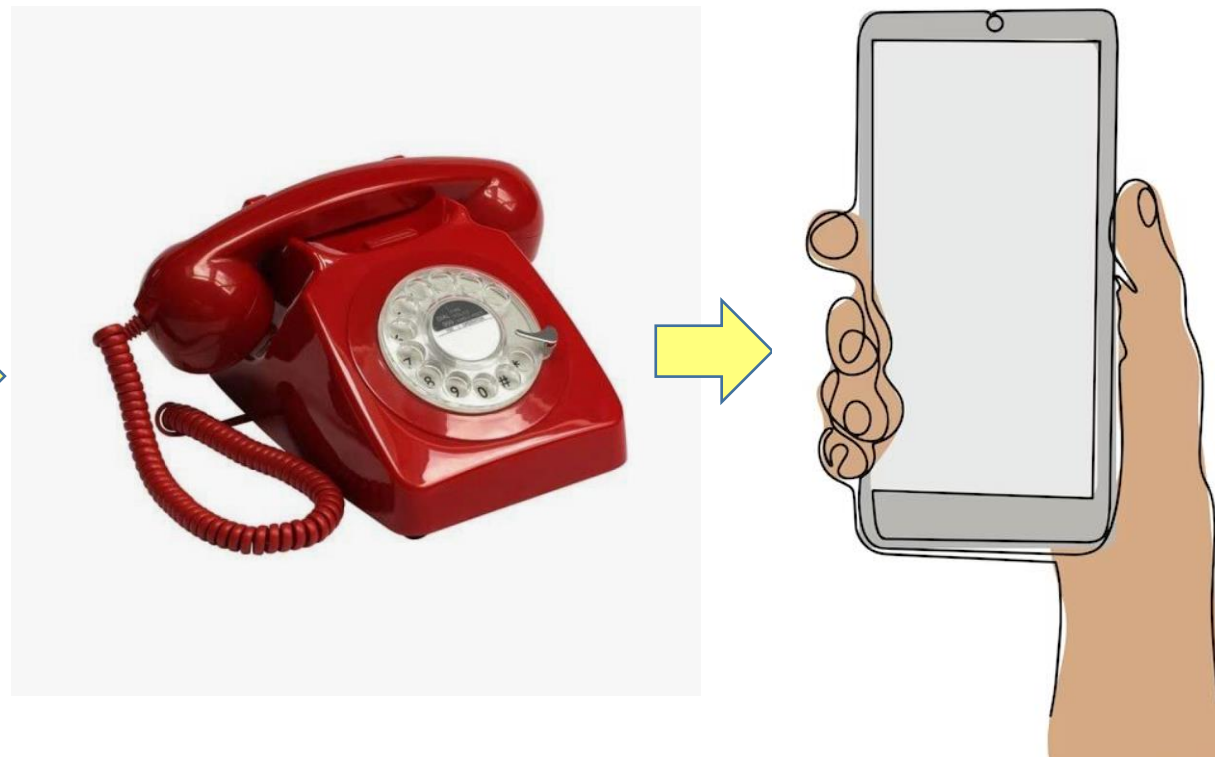
**We shouldn't be afraid to switch from  
instrumental laboratory-based testing  
methods to a decentralized system using  
rapid tests!**

**New methods are replacing old ones -  
this is a natural process!**





**Progress cannot be stopped!**





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# Thank you for your attention!

## Acknowledgements:

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Anita Sands



World Health  
Organization

European Region

