BMJ Open

Country uptake of WHO recommendations on differentiated HIV testing services approaches: a global policy review

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To cite: Kadye T, Jamil MS, Johnson C, *et al*. Country uptake of WHO recommendations on differentiated HIV testing services approaches: a global policy review. *BMJ Open* 2024;**14**:e058098. doi:10.1136/bmjopen-2021-058098

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (https://doi.org/10.1136/bmjopen-2021-058098).

Received 19 October 2021
Accepted 03 March 2023

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ABSTRACT

Objectives In 2015 and 2016, WHO issued guidelines on HIV testing services (HTS) highlighting recommendations for a strategic mix of differentiated HTS approaches. The policy review examines the uptake of differentiated HTS approaches recommendations in national policies.

Methods Data were extracted from national policies published between January 2015 and June 2019. The WHO-recommended HTS approaches included facility-based testing, community-based testing, HIV self-testing and provider-assisted referral (or assisted partner notification). Other supportive recommendations include pre-test information, post-test counselling, lay provider testing and rapid testing. Descriptive analyses were conducted to examine inclusion of recommendations in national policies.

Results Of 194 countries worldwide, 65 published policies were identified; 24 WHO Africa region (AFR) countries (51%, 24/47), 21 WHO European region (EUR) (40%, 21/53), 6 WHO Eastern Mediterranean region (EMR) (29%, 6/21), 5 Pan-American region (AMR) (14%, 5/35), 5 Western Pacific Region (WPR) (19%, 5/27) and 4 WHO South East Asia Region (SEAR) (36%, 4/11). Only five countries included all recommendations. 63 included a minimum of one. 85% (n=55) included facility-based testing for pregnant women, 75% (n=49) facility-based testing for key populations, 74% (n=48) community-based testing for key populations, 69% (n=45) rapid testing, 57% (n=37) post-test counselling, 45% (n=29) lay provider testing, 38% (n=25) HIV self-testing, 29% (n=19) pre-test information and 25% (n=16) provider-assisted referral. The proportion in each region that included at least one recommendation were: 100% AFR (24/47), 100% EMR (6/6), 100% AMR (5/5), 100% WPR (5/5), 100% SEAR (4/4) and 95% EUR (20/21). AFR followed by EMR included the highest number of reccomendations.

Conclusion There was substantial variability in the uptake of the WHO-differentiated HTS recommendations. Those in EMR included the most WHO-differentiated HTS recommendation followed by AFR. Countries within AMR included the least number of recommendations. Ongoing advocacy and efforts are needed to support the uptake of the WHO-differentiated HTS recommendations in country policies as well as their implementation.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ A comprehensive review of available HIV national policies, regardless of language, was conducted.
⇒ The WHO repository does not contain HIV policies for all countries worldwide, and some regions were more comprehensively represented than others.
⇒ The review was limited to the 2015 WHO-differentiated HIV testing services (HTS) recommendations due to the timeline in which it was written.
⇒ The 2019 WHO-introduced recommendations for social network-based approaches were published following the review period and were therefore not included due to timelines.
⇒ HTS policy uptake is often not reflective of implementation.

INTRODUCTION

HIV testing services (HTS) are essential in identifying individuals who are unaware of their HIV status, linking HIV-positive individuals to treatment and HIV-negative individuals to prevention services. In 2021, 85% of people living with HIV were aware of their HIV status.[1] At least eight countries globally reported having reached the 90-90-90 targets in 2020, and in 2021 the Joint United Nations Programme on HIV and AIDS announced new targets of 95-95-95 by 2025.[2–4]

Testing uptake remains particularly low among key populations. Key populations are defined as men who have sex with men (MSM), sex workers, people who inject drugs (PWID), people in prisons and closed settings and transgender people. They make up nearly two-thirds (65%) of all new infections.[3 5 6] Men and young people also have low uptake and access to services.[7–12] In all populations with low uptake, particularly key populations, identified barriers to testing include stigma and discrimination. Structural barriers including accessibility of services, inconvenient clinic hours and opportunity

costs for clients have also been identified among all populations.[7–12]

In 2015, WHO published the first consolidated guidelines on HTS, followed by supplementary guidance recommending HIV self-testing (HIVST) and provider-assisted referral (also referred to as 'assisted partner notification') in 2016.[6] In 2019, WHO published updated consolidated guidelines for HTS which include a new recommendation on social network-based approaches for HIV testing and updated guidance on HIVST and counselling message.[13 14] WHO guidelines encourage a strategic mix of differentiated HTS approaches with a focus on priority populations and people with HIV who do not know their status and areas with greatest gaps.[6 13] Differentiated HTS approaches refer to tailored and 'client-centred' approaches and they address barriers individuals have in accessing HTS.[15] The guidelines include recommendations for HTS approaches and HTS components taking into account the population, epidemic and context. See online supplemental file 1 for a summary of the 2015 and 2016 WHO guidelines on HTS.

It is important to monitor the uptake of these recommendations into country policies in order to promote the inclusion of WHO recommendations into those countries and prioritise support, thereby improving the uptake of HTS and achieving the global 95-95-95 goals. Global monitoring of WHO guidelines uptake in national policies is routinely undertaken as part of Global AIDS Monitoring system.[16] However, an in-depth understanding of adoption of WHO HTS guidelines at national level and in varying epidemic contexts is lacking. Understanding this will enable a better knowledge of where gaps in service may exist, and where further support may be provided to countries. To this end, we reviewed national HTS policies to examine the uptake of 2015 WHO-differentiated HTS recommendations on differentiated testing services.

METHODS

Search strategy

A comprehensive search of national HTS policy documents was undertaken using the existing WHO national policy repository.[17] The repository was first produced in 2015 and is routinely updated by WHO staff using a AIDSFree HTS policy database, country by country search of International Association of Physicians in AIDS Care (IAPAC)/HIV Policy Watch website and a broad Google search. The google search using the following keywords:

- country name AND "HIV testing" AND policy;
- country name AND "HIV testing" AND guideline;
- country name AND PrEP AND policy;
- country name AND PrEP AND guideline;
- country name AND "pre-exposure prophylaxis" AND policy;
- country name AND "pre-exposure prophylaxis" AND guideline The policy repository is maintained by WHO.

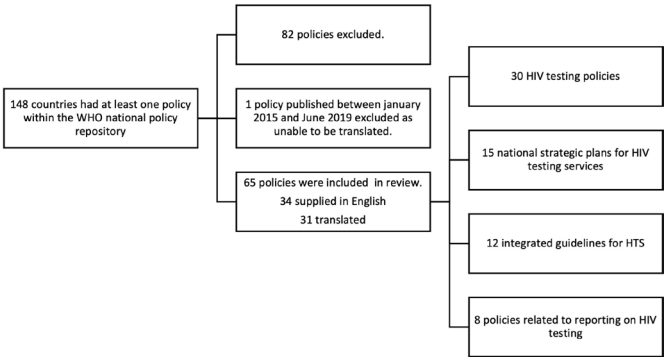

Figure 1 Process to identify country policies including recommendations on HIV testing services. 82 country policies were excluded as they were published before January 2015.

The repository includes national policies relating to HTS, HIV counselling services, prevention services, antiretroviral therapy (ART) as well as policies relating to prevention of mother-to-child transmission, HIV partner services, national HTS action/strategic plans and differentiated service delivery. In addition, national policies relating to sexual health and sexually transmitted infections were also included. All available national policies were used for data extraction.

For inclusion, national policies needed to include HTS and be published between January 2015, after the release of the 2015 WHO consolidated guidelines, and June 2019. The most recent available policy document containing information on HTS was used for extraction.

The national policies included were reviewed against WHO recommendations published in 2015/2016. Given the review end date of June 2019, the WHO 2019 guidelines were not included as they were published in December 2019. Policies in languages other than English were translated using Google translate. One country gave policy documents in formats that did not permit translation and was therefore excluded. Further details on the process to identify country policies including HTS recommendations is shown in figure 1.

Data extraction

Data were extracted by one author (TK) into an Excel spreadsheet. The HTS approaches considered are: (1) facility-based testing for pregnant women (1a), adolescents (1b), infants and children (1c) and key populations (1c); (2) community-based testing, including community-based testing for specific populations; (3) HIV self-testing and (4) provider-assisted referral. Additional supportive HTS recommendatiosn considered were: (5) pre-test information, (6) post-test counselling, (7) lay provider testing and (8) rapid testing. In the 2015 guidelines, pre-test information was recommended instead of pre-test counselling, however data for pre-test counselling were extracted to better understand if countries were still recommending this component. The 2015 WHO consolidated guidelines and 2016 guidelines on HIV self-testing and partner notification were used.

Data analysis and reporting

We estimated the number and proportion of countries in each WHO region that had a relevant policy in the period of review (76%: 148/194). This was done overall (worldwide) and stratified by WHO region and epidemic type defined by generalised (≥5% HIV prevalence) and concentrated (<5%) HIV prevalence) epidemics (now often referred to as high or low burden settings). This last stratification was included because some recommendations were epidemic type specific: in particular, routine facility-based testing for those with signs and symptoms, adults, adolescents and children apply only to concentrated epidemics and community-based testing for adolescents apply to both generalised epidemics. The 2015 WHO consolidated guidelines define a concentrated epidemic as 'HIV has spread rapidly in a defined subpopulation (such as MSM, sex workers, transgender people, people who use drugs or people in prison or other closed settings) but is not well established in the general population'.[6] A generalised is defined as 'HIV is firmly established in the general population. Although subpopulations at high risk may contribute disproportionately to the spread of HIV, sexual networking in the general population is sufficient to sustain the epidemic'.[18]

Policies were categorised in three groups:

- Included: policies that clearly and explicitly stated and included a specific recommendation.
- Not included: policies that did not include a specific recommendation.
- Unclear: policies in which it was unclear whether a WHO recommendation was included due to insufficient information.

Analyses were conducted in Microsoft Excel.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

RESULTS

Characteristics of included policies

Of the 194 WHO member states, 148 countries had at least one policy within the WHO national policy repository. Of these, 65 country policies were eligible to be included; 30 were HIV testing policies, 15 national strategic plans, 12 integrated guidelines for HTS, 8 were related polices reporting on HIV testing (1 HIV counselling policies, 1 ART policy, 1 integrated guidelines for sexually transmitted infections, 1 sexual health national strategic plan, 1 policy on HIV contact management, 1 global AIDS progress report, 1 differentiated testing guideline and 1 policy on community-based testing). Overall, 34 (52%) country policies were in English. 82 country policies were excluded because they were published before January 2015. Morocco's latest policy documents (written in French) were in formats that did not permit translation. No other policies were available for Morocco in the timeframe of interest; therefore, we could not include Morocco.

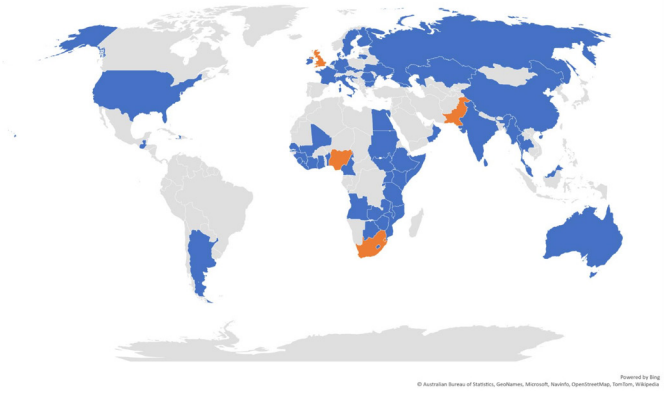

Figure 2 Countries with a national policy identified between January 2015 and June 2019. A map of all 65 countries within this review (n=65). Countries highlighted in orange are those that included all recommendations relevant to their country setting (n=5).

Of the 65 country policies reviewed, 24 were from AFR (51% of 47 counteries), 21 from the WHO European region (EUR; 40% of 53 countries), 6 from the WHO Eastern Mediterranean region (EMR; 29% of 21 countries), 5 from the Pan-American region (AMR; 14% of 35 countries), 5 from the Western Pacific Region (WPR; 19% of 27 countries) and 4 from the WHO South East Asia Region (SEAR; 36% of 11 countries). Just over two-thirds (37%, 24/65) policies were from countries classified as having a concentrated epidemic, 34% (22/65) from a generalised epidemic.

Overall uptake of the WHO-differentiated HTS recommendations in national policies

Only five country policies included all the relevant recommendations (figure 2). Among the recommendations on approaches, and components, applicable to all settings and populations (figure 3); 69% (45/65) included rapid testing, 45% (29/65) permitted lay provider testing, 38% (25/65) of countries supported HIVST, 35% (23/65) included pre-test counselling and did not specify the use

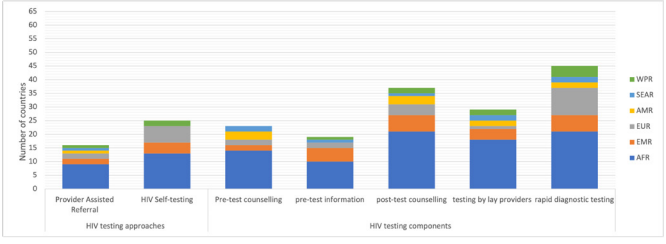

Figure 3 Number of countries that included recommendations valid in all settings and populations from the 2015 WHO consolidated guidelines for HTS, by type of recommendation and WHO region. AFR, WHO Africa region; AMR, Pan-American region; EMR, WHO Eastern Mediterranean region; EUR, WHO European region; SEAR, WHO South East Asia Region; WPR: Western Pacific Region.

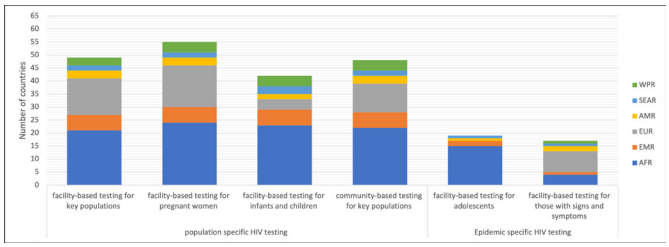

Figure 4 Number of countries included in the review that included population-specific or epidemic-specific recommendations from the 2015 WHO consolidated guidelines for HTS, by type of recommendation and WHO region. Facility-based testing for key popualtions here refers to provider-initiated testing and counselling; this is recommended in malnutrition clinics or sexually transmitted infections or hepatitis and tuberculosis services or health services for key populations in all settings. Facility-based testing for pregnant women, infants and children applies to all countries (n=65). Community-based testing for key populations applies to all countries (n=65). Facility-based testing for all those presenting with signs and symptoms is recommended only in countries with a concentrated epidemic (n=24); facility-based testing for adolescents only in countries with a generalised epidemics (n=22). AFR, WHO Africa region; AMR, Pan-American region; EMR, WHO Eastern Mediterranean region; EUR, WHO European region; SEAR, WHO South East Asia Region; WPR: Western Pacific Region.

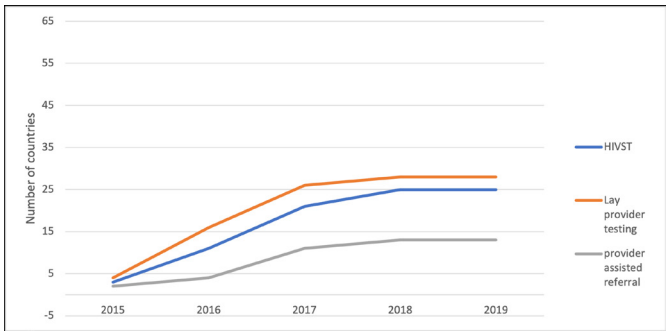

Figure 5 Number of countries including the new recommendations, by year. HIVST, HIV self-testing.

of pre-test information, 35% included (37/65) post-test counselling, 29% (19/65) included pre-test information and 25% (16/65) supported provider-assisted referral.

Regarding recommendation for specific subpopulations (figure 4 on the left), 85% (55/65) included recommendations for testing for pregnant women, 75% (49/65) recommended testing for key populations, 71% (17/24) recommended facility-based testing for all those presenting with signs and symptoms, 74% (48/65) recommended community-based testing for key populations and 65% (42/65) recommended facility-based testing for infants and children. Of countries with a concentrated epidemic (n=24), 71% (17/24) recommended facility-based testing for all those presenting with signs and symptoms. Of those with a generalised epidemic (n=22), 86% (19/22) recommended facility-based testing for adolescents.

Uptake of the WHO-recommended HTS approaches by WHO region

The uptake of recommendations varied across countries (see uptake of single recommendations for each country in online supplemental file 2) and regions. HIVST was recommended by 38% (25/65) of countries. The inclusion of HIVST ranged from EMR (67%; 4/6), AFR (54%; 13/24), WPR (40%; 2/5) and EUR (29%; 6/21). No included countries from SEAR and AMR supported HIVST at the time of review.

Only 25% (13/65) of countries included recommendations for provider-assisted referral: 38% of AFR (9/24) countries, 33% of EMR (2/6), 20% (1/5) of AMR, 10% (2/21) of EUR, 5% (1/4) of SEAR and in 5% (1/5) of WPR.

Pre-test information was included in 29% (19/65) of country policies. The inclusion of pre-test information ranged from EMR (83%; 5/6), followed by the AFR (42%; 10/24), WPR (20%; 1/5), SEAR (25%; 1/4) and EUR (10%; 2/21). No countries from AMR included this recommendation at the time of the review.

Overall, 57% (37/65) of country policies recommended post-test counselling, with variation across regions (100% EMR, 88% AFR, 40% WPR, 25% AMR, 25% SEAR and 19% EUR). While pre-test counselling is no longer recommended by WHO, it was still included by 35% (23/65) of countries: (60% AMR, 58% AFR, 50% SEAR, 33% EMR and 10% EUR) while no countries in the WPR included this recommendation.

Rapid testing was included in 69% (45/65) of country policies, with regional variation (100% EMR, 88% AFR, 80% WPR, 50% SEAR, 48% EUR and 40% AMR). Lay provider testing was permitted in 45% (29/65) of countries (75% AFR, 67% EMR, 50% SEAR, 40% WPR, 20% AMR and 5% EUR).

Lay provider testing was recommended for the first time by WHO in 2015 and provider-assisted referral and HIVST in 2016. Figure 5 shows the number of countries including the new recommendations in their policies in the years following their introduction. A steep increase in uptake can be observed with 16, 25 and 29 countries including recommendation on respectively provider-assisted referral, HIVST and lay provider testing by June 2019.

Uptake of population-specific HTS approaches by WHO region

Facility-based testing for pregnant women was recommended by 85% (55/65) of countries, including all countries in EMR (100%; 6/6) and AFR (100%; 24/24) followed by WPR (80%; 4/5), EUR (76%; 16/21), AMR (60%; 3/5) and SEAR (50%; 2/4). Nearly two-thirds of countries (65%, 42/65) recommended facility-based testing for infants and children (100% EMR, 76% AFR, 80% WPR, 75% SEAR, 40% AMR and 19% EUR).

Facility-based testing for key populations is recommended in 49 countries (100% EMR, 88% AFR, 67% EUR, 60% AMR, 60% WPR and 50% SEAR). Of the

countries that recommended facility-based testing for key populations, 69% (34/49) recommended targeted testing for MSM, 59% (29/49) for sex workers or those who engage in transactional sex, 57% (28/49) for PWID, 45% (22/49) for prisoners and 18% (9/49) for transgender people. Inclusion ranged with countries from the EMR starting from 100% (6/6) uptake, as well as AFR (88%; 21/24), the EUR (66%; 14/21) and WPR (60%; 3/5), while it was lower in the AMR (60%; 3/5) and the SEAR (50%; 2/4).

Nearly three-quarters (74%, 48/65) of countries recommended community-based testing for key populations. Uptake of community-based testing varied by region (100% EMR, 88% AFR, 80% WPR, 52% EUR, 50% SEAR and 20% AMR). Of the countries that included community-based testing for key populations; 44% (21/48) home-based/door-door testing, 38% (18/48) included outreach services, 35% (17/48) workplace testing, 35% (17/48) mobile testing, 23% (11/48) testing within educational establishments, 15% (7/48) testing in places of worship and 13% (6/48) recommended testing in community health centres.

Of the countries classified as having a concentrated epidemic, 37% (n=24) and 20% (5/24) were in the AFR, 46% (11/24) in EURO, 12% (3/24) in AMR, 8% (2/24) in SEAR, 8% (2/24) in WPR and 4% (1/24) in EMR. 72% (18/24) of these countries recommended facility-based testing for all those presenting with signs and symptoms of HIV. 34% (n=22) of countries were classified as having a generalised epidemic. Among the countries with a generalised epidemic, 100% (22/22) recommended routine facility-based testing for adolescents.

DISCUSSION

As of 2019, 81% of all people with HIV are estimated to have been diagnosed globally.[2] Differentiated testing approaches are critical for reaching the remaining people with HIV as standard testing services have not been successful in serving them. WHO recommends a strategic mix of HTS depending on the epidemiology, context and focus populations. The variations in uptake suggest that further research is required to understand why some countries did not include the WHO-differentiated HTS recommendations, and what support countries require to include recommendations. National policies often did not elaborate how various approaches will be used within a differentiated HTS plan to reach national goals and specific service delivery models and support tools. Moreover, inclusion of recommendations in policies does not always directly lead to implementation or scale up of effective practices. Further monitoring is needed to understand the implementation status of services as well as their scale and coverage.

Across all country policies reviewed, only five countries (in three AFR, one EMR and one EUR) included all the WHO-differentiated HTS recommendations (relevant to their country setting) with gaps in uptake remaining. 63 counteries included at least one recommendation. The uptake of recommendation in some country policies, although varied, does however suggests that it is feasible to adapt latest policies within a short timeframe. We found high uptake of recommendations for community-based testing, first recommended in 2013.[19] Mobile testing, outreach testing, self-testing and provider-assisted referral were the approaches with the lowest uptake. As mentioned, the first two were more recently recommended so they might partly explain the lower uptake. For the latter two (mobile testing and outreach testing), the lower uptake might reflect the fact that they require more resources to introduce them and that they are more difficult to integrate. Population-specific facility-based testing recommendations were generally taken up for pregnant women and, infants and children and key populations. Among countries with generalised and concentrated epidemics, there was high uptake of community-based testing for key populations; while, only half of countries recommended mobile testing explicitly, and just over two-fifths recommended outreach testing.

These methods are likely to increase the uptake of HIV testing for key populations, by reducing barriers to access to HTS. For example, the 2016 WHO guidelines on HIVST and partner notification pointed out that these two approaches were perceived to reduce stigma among MSM and female sex workers.[20] Stigma and discrimination have been found to be associated with never testing.[21 22] In particular, studies have shown people might fear to be perceived as promiscuous, to be sexually rejected, socially distanced or even rejected by friends and family members if found to be living with HIV.[23 24] Stigma has also been associated with feelings of worthlessness and shame.[24] Women with greater perceived stigma have been shown to be less likely to test with gender inequality being associated with stigmatising attitudes, and in some studies healthcare workers identify stigma as a barrier to testing.[25 26]

Both HIVST and provider-assisted referral have been found to be acceptable and feasible to implement, and in reaching people who would not otherwise have tested for HIV.[27 28] A steady increase in the number of countries adopting these recommendations within national policies has been observed. According to latest Global AIDS Monitoring, as of 2021 94 countries globally report inclusion of HIVST in national policies and 48 of them are routinely implementing HIVST.[2]

Since 2015, WHO has recommended a brief pre-test information when offering HTS instead of detailed pre-test counselling. Evidence and programmatic experiences suggest lengthy pre-test counselling is no longer needed and may in fact deter some testers from seeking HTS, such as repeat testers. Our review shows many countries may still be continuing to include traditional pre-test counselling within their national policies. Traditional pre-test counselling reduces the efficiency of HTS and does not represent the best use of scarce human and financial resources.[6] Anecdotal evidence suggests many countries

provide post-test counselling that includes outdated information. For example, many programmes had not adapted counselling messages to include information of prevention benefits of treatment and achieving viral suppression for partners (undetectable=untransmissible), availability of effective prevention options such as pre-exposure prophylaxis and messages on optimal testing frequency based on risk and epidemiology. Countries need to review and revise their policies to adopt latest WHO recommendation on pre-test information and post-test counselling.

Over two-thirds of countries included in this review support the use of rapid HIV testing, which can provide same day diagnosis, facilitating rapid initiation of ART. WHO recommends the use of trained lay providers and peers for delivering HTS using Rapid diagnostic tests (RDTs). However, of the countries that included RDT in their policies, few included the use of lay providers. Lay providers can affect expansion of services by enabling testing at places accessible and convenient to populations or groups most affected with HIV. This includes the introduction and scale up of community-based testing. Countries need to review their policies to address legal barriers to use of trained lay providers and develop standard operating procedures and training material and supervision activities for this cadre of providers.

Our review found variations in policy uptake by region. Overall, countries in EMR showed the highest uptake followed by AFR countries, while uptake in other regions remained comparatively low. For AFR, these findings are expected as well as encouraging as this region represents the highest burden of HIV infection.[2] We also had a greater coverage of policies included (51% of all countries in the region) better representation of countries compared with other regions. WHO and other international agencies and donors make concerted efforts to support the HIV response in AFR which may be reflected in greater uptake of WHO recommendations. Typically, countries in this region also rely on WHO guidelines to inform national policies in contrast to some other regions such as AMR, EUR and WPR, which are more likely policy-based decisions on national guidance. These findings need to be interpreted with caution for regions other than AFR, partly due to low coverage of policies included (ranging 14%–40%), thus may not be representative of the country approaches. The epidemic context also varies in other regions, epidemics focused among key populations may face the presence of stigma and discrimination and varied implementation should also be considered. Further efforts focused on these regions and engagement with countries may be needed to improve uptake.

Overall, our review findings suggest that regular monitoring and better understanding of country uptake of WHO recommendations is needed to address country support needs to address such gaps. It is important to consider that inclusion of recommendations in national policies does not necessarily reflect that they are implemented and often there is a gap between policy uptake and implementation. Efforts are needed to enhance country policy uptake and minimise the lag in implementation. It is also important to note that while this review focuses on the inclusion of recommendation from the 2015 WHO consolidated guidelines, national HTS policies were already in existence before this date. All stakeholders including international organisations, implementing partners and donors need to support the governments and national programmes in updating national policies and translating these into implementation. Community groups and civil society need to advocate for availability of latest and evidence-based recommendations and interventions in their countries. Further support may be needed in operationalisation and scale up of such policies, and strategies focusing on key populations are required in some settings. Regular monitoring of country policy uptake and implementation status is needed to identify country support gaps for appropriate action.

This review has several limitations. National HTS policies were available only for 65 countries published between January 2015 and June 2019. There may be policies published in this period that we have not identified. For eight countries information was extracted from policy documents that were not directly related to HTS and may not have information with the required level of detail. For the EMR, SEAR and WPR, national policies were available from only a small number of countries and thus they may not be representative of the situaiton in the whole regions. In 2019, WHO published updated consolidated guidelines for HTS which include a new recommendation on social network-based approaches for HIV testing and updated guidance on HIVST and counselling messages,[14 20] these were not included within this review due to timelines.

CONCLUSION

This review found that the uptake of all WHO's 2015 and 2016 HTS recommendations varied substantially. Five countries included all the recommendations relevant to their country setting, and 63 included at least one. Uptake was particularly low for HIV self-testing, provider-assisted referral and lay provider testing, key interventions for reaching undiagnosed populations and for expanding access to HTS. Encouragingly, the inclusion of recommendations in the AFR and EMR was high compared with other regions. Differentiated HTS are essential for reaching people with HIV who do not know their status and others at high ongoing risk to facilitate linkage to prevention, treatment and care. Ongoing advocacy and efforts are needed to support the uptake of the WHO-differentiated testing recommendations in country policies as well as their implementation. The variations in the inclusion of the WHO-differentiated reccomendations suggest that further research is required to understand why some countries did not include the WHO-differentiated testing recommendations, and the support countries require to include recommendations.

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Contributors TK took overall responsibility for the review of the policies. MS, CJ and MD were responsible for creating the WHO's global policy repository and keeping it up to date. TK, CJ, VC, RB were involved in the development of the protocol and of the data extraction tool and in designing the analysis. TK screened the policies, extracted the data, conducted the analysis and produced the first draft of the manuscript. All authors reviewed the manuscript, provided inputs and approved the final version of the manuscript. CJ contributed to the writing, coordination and research for the WHO Consolidated Guidelines for HIV Testing Services.

Funding This work was supported by the Bill & Melinda Gates Foundation, grant number INV-024432.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. Extra data can be accessed via the Dryad data repository at http://datadryad.org/ with the doi:10.5061/dryad.fj6q57406.

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Additional File 1: Summary of the 2015 and 2016 WHO guidelines for differentiated HIV testing services.

Box 1 WHO guidelines for differentiated HIV testing services (Source: The WHO 2015 and 2016 Consolidated guidelines on HIV testing services).	
HIV testing services approach	
Facility-based testing (referred to a provider-initiated testing and counselling referral in the 2015 guidelines)	In concentrated epidemics provider-initiated testing and counselling should be offered for clients (adults, adolescents, and children) in clinical settings who present with symptoms or medical conditions indication infection, including Tuberculosis cases. In all settings provider-initiated testing and counselling should be considered for malnutrition clinics, sexually transmitted infections, hepatitis and Tuberculosis services and health services for key populations.
Community-based testing	In generalised epidemics community-based testing should be offered to all individuals, especially key populations. In concentrated epidemics community-based HIV testing services is recommended for key populations.
HIV Self-testing	It is strongly recommended that HIV self-testing should be offered as an additional approach to HIV testing services.
Provider assisted referral (referred to as voluntary partner notification within the 2015 recommendations)	It is strongly recommended that voluntary assisted partner notification services should be offered as part of a comprehensive package of testing and care offered to people with HIV.
HIV testing services components	
Pre-test information	Programmes may provide pre-test information through individual/group sessions, media and age-appropriate material when required.
Post-test counselling	Post-test counselling should be provided for all who attend testing services.
Testing by Lay Providers	It is strongly recommended that lay providers who are trained and supervised to use rapid diagnostic tests are permitted to independently conduct safe and effective HIV testing services.
Population specific HIV testing	

Pregnant women	In high prevalence settings provider-initiated testing and counselling should be considered a routine component of antenatal clinic, childbirth, postpartum and paediatric care settings. Retesting is recommended in the third trimester, or during labour, or shortly after delivery In Low prevalence settings provider-initiated testing and counselling considered for all pregnant women. For pregnant women from key populations, or those with partner from key populations, HIV testing is recommended.
Adolescents	In generalised epidemic HIV testing should be offered to all adolescents.
Infants and Children	In all settings HIV-exposed infants and children younger than 18 months should be tested in cases where status is unknown or uncertain.
Key Populations	It is recommended that HIV testing services are routinely recommended to key populations in community and facility-based settings.

HTS Approaches

Facility based testing is recommended in all settings and should be considered for malnutrition clinics, sexually transmitted infections (STI), hepatitis and TB services and health services for key populations (1). Unlike voluntary testing and counselling, in facility-based testing clients are offered HIV testing with the option of 'opting out' (2). This approach to HIV testing has been shown to increase the number of people who test for HIV, one study in the USA found that 65.9% of people who were offered HIV testing accepted compared to 38% of voluntary testers (2).

In all settings community-based testing is recommended for key populations (1). Community-based testing refers to testing that is not conducted in a healthcare facility and may take different forms such as outreach testing, home-based/door-door testing (testing offered to individuals within their homes) and mobile testing (1). This has been shown to be a feasible and convenient approach to testing in some studies (3-6). Home based testing has been associated with confidentiality, credibility of tests and easily accessible counsellors, and mobile testing has been suggested to increase the number of people accessing testing services and help to overcome barriers such as long distances from clinic (7, 8).

HIVST is strongly recommended as an additional approach to HIV testing services (1). HIVST is defined as ' a process in which a person collects his or her own specimen (oral fluid or blood) and then performs an HIV test and interprets the results' (9). HIVST may increase uptake among those who never tested before by addressing barriers such as long distance transportation, long waiting times and has the potential to reduce stigmatization (10, 11). This is because HIVST can be conducted in private, or in facilities offering other services and

in populations who are at high risk, may also provide an opportunity to test more regularly (9).

Provider assisted referral (voluntary partner notification in the WHO 2015 guidelines) is a partner service which is strongly recommended (1). Partner services are defines as 'a voluntary process whereby a trained provider asks people diagnosed with HIV about their sexual partners and/or drug injecting partners, and then, if the HIV positive clients agrees, offers there partner(s) HIV self-testing' (9). Clients may be assisted by trained providers to disclose their status or anonymously notify sexual partners or drug injecting partners of their potential exposure to HIV, and offer HIV testing (9). This approach has been suggested to improve HIV testing services by identifying those who do not yet know their status, improving testing uptake for those who have never been tested and increase early referral to care (12-14).

HTS Components

The 2015 consolidated guidelines recommended pre-test information instead of the previously recommended pre-test counselling(1). Previously, pre-test counselling provided comprehensive information to clients before testing to prepare clients to cope with a HIV positive diagnosis in the absence of treatment and encourage clients to return for results(1). However, the introduction of RDTs meant that individuals were now able to get results on the same day and the need for counselling before testing was no longer present and may have created barriers (1). Unlike pre-test counselling Pre-test information can be delivered in a number of formats, including to both individuals and groups, through posters, brochures, websites and short clips in waiting rooms (1). Post-test counselling is also recommended across all settings, in all HIV tests depending on the specific test result and HIV status reported (1). In order to ensure individuals are linked to the appropriate treatment and prevention services (1).

Testing by trained lay providers supervised to use rapid diagnostic tests (RDTs) independently, safely and effectively (1). Testing by lay providers refers to individuals who are trained to conduct HIV tests but have no formal professional or paraprofessional certificate or tertiary education degree (1). RDT refers to a form of HIV testing that produce results quickly (usually in less than 30 minutes) enabling patients to know their result on the day in a short period of time (1). Both strategies reduce the time taken to undergo a HIV test. These components may therefore address barriers associated with time, as well as reduce the burden on resources through task shifting (15). As well as this, peer delivered testing (when lay providers are members of the same population as testers) has been shown to increase uptake, including in first time testers, and higher rates of detection of HIV cases amongst MSM and PWID in Vietnam and Thailand (16). In another study peer counsellors was identified as a facilitator for HIV testing amongst participants (3). In some populations where stigma and discrimination are present peer testing has been identified as a preferred and viable method (3, 16, 17).

Population specific facility-based HIV testing

Facility-based testing is recommended for priority populations such as pregnant women, key populations, infants and children, and adolescents (1). Diagnosing HIV as early as possible reduces mortality in infants, and in populations such as key populations and adolescents

where testing uptake remains low differentiated testing approached are essential in reducing barriers to testing (5, 8, 18-21).

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WHO region	Country	Year
AFR	Angola	2015
AMR	Argentina	2015
WPR	Australia	2017
AFR	Benin	2017
AFR	Botswana	2016
EUR	Bulgaria	2017
AFR	Cameroon	2018
EUR	Denmark	2015
WPR	China	2015
EUR	France	2017
AFR	Côte d'Ivoire	2016
EUR	Croatia	2017
AMR	Guatamala	2018
EUR	Czech Republic	2018
SEAR	India	2015
EMR	Egypt	2015
EUR	Italy	2016
EUR	Kazakhstan	2015
AFR	Ethiopia	2017
EUR	Finland	2018
AFR	Ghana	2017
EUR	Georgia	2016
EUR	Lithuania	2017
EUR	Germany	2015
AMR	Haiti	2015
AFR	Guinea	2018
AFR	Kenya	2015
EUR	Ireland	2015
AFR	Lesotho	2016
AFR	Liberia	2015
EUR	Luxembourg	2017
EUR	Netherlands	2017
AFR	Malawi	2016
WPR	Malaysia	2015
AFR	Mali	2017
EUR	Russia	2016
AFR	Mozambique	2015
SEAR	Myanmar	2017
AFR	Nigeria	2016

EMR	Oman	2015
EMR	Pakistan	2017
EUR	Romania	2017
AFR	Rwanda	2016
AFR	Senegal	2017
AFR	Sierra Leone	2017
EUR	Slovenia	2017
EUR	Slovakia	2017
EMR	Somalia	2017
EUR	Sweden	2017
AFR	South Africa	2016
EMR	South Sudan	2017
SEAR	Sri Lanka	2016
AMR	Cayman Islands	2015
SEAR	Thailand	2017
EMR	Sudan	2016
EUR	Ukraine	2016
AFR	Swaziland	2018
AFR	Tanzania	2017
AFR	Uganda	2016
EUR	United Kingdom	2016
AMR	United States of America	2017
WPR	Vietam	2018
WPR	Nauru	2015
AFR	Zambia	2016
AFR	Zimbabwe	2018

Extraction Tool (Coun

HTS APPROCHES			
Community-based testing	provider assisted referral	HIV- self testing	Pre-test information
u	u	u	u
y	n	n	u
y	y	n	n
y	y	u	y
y	n	n	n
y	n	n	n
y	y	exploring	n
n	n	n	n
y	n	y	n
n	n	y	n
y	n	y	n
y	n	n	n
n	n	n	n
y	n	y	n
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y	y	y	n
n	n	n	n
n	n	n	n
y	n	n	y
y	n	n	n
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n	n	n	n
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y	y	y	y
y	n	n	n
y	u	y	y
n	n	n	n
y	n	y	y
y	n	y	y

try uptake of WHO recommendations on differentiate

HTS COMPONENTS			
Pre-test counselling	**post-test counselling**	**Lay provider HIV testing**	**Rapid Diagnostic tests**
y	u	u	y
y	y	y	y
n	n	u	y
n	y	y	y
y	y	y	y
n	n	n	n
y	y	n	u
n	n	n	n
n	y	n	y
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y	y	y	y
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y	n	y	y
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n	n	n	y
n	y	y	y
n	y	u	y

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POPULATION SPECIFIC FACILITY BASED HIV TESTING			
Adolscents	Pregnant women	Key Populations	Infants and Children
y	y	u	y
y	y	y	n
n	y	y	y
n	y	y	y
y	y	n	y
y	y	y	u
y	y	y	y
n	n	y	n
n	y	n	y
n	y	y	n
y	y	y	y
y	y	y	n
n	y	n	y
n	y	n	n
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n	y	y	y
n	y	n	n
y	y	y	y
n	y	y	u
y	y	y	y
n	y	y	u
n	n	n	n
n	n	y	n
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y	y	y	y
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y	y	y	y

		EPIDEMIC SPECIFIC
Epidemic type	**Community-based testing in concentrated and generalised epidemics**	**Facility based testing for all adolescents in all clinical settings in generalised epidemics**
c	u	
c		
c	y	
g	y	n
g	y	u
g	y	y
c	n	
c	n	
g	y	y
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c	y	
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c	n	
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g	y	y
g	y	y
c	n	
c	u	
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c	y	
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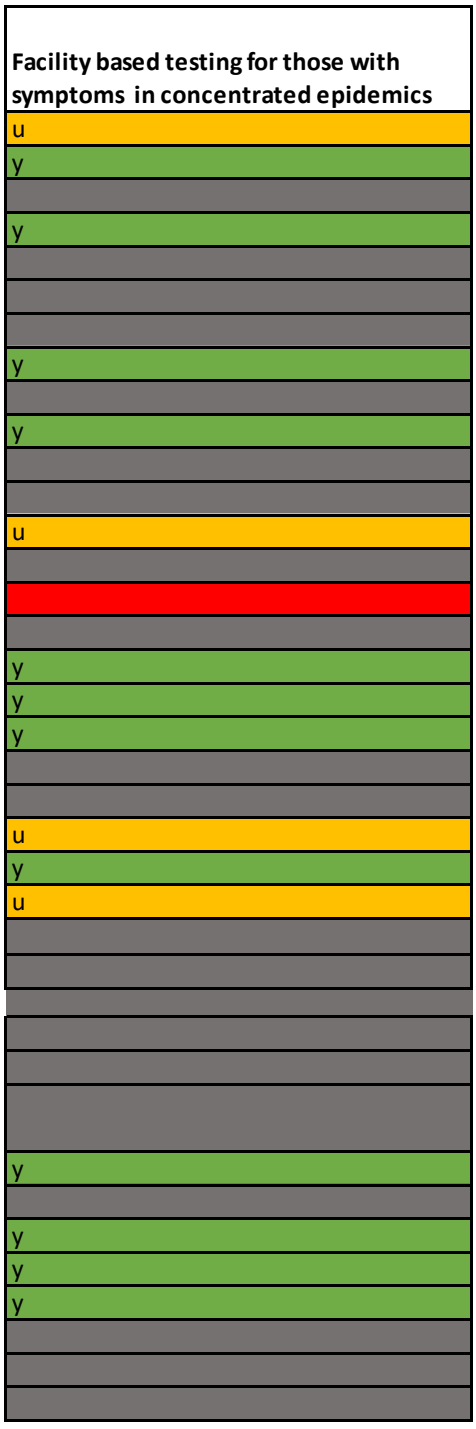
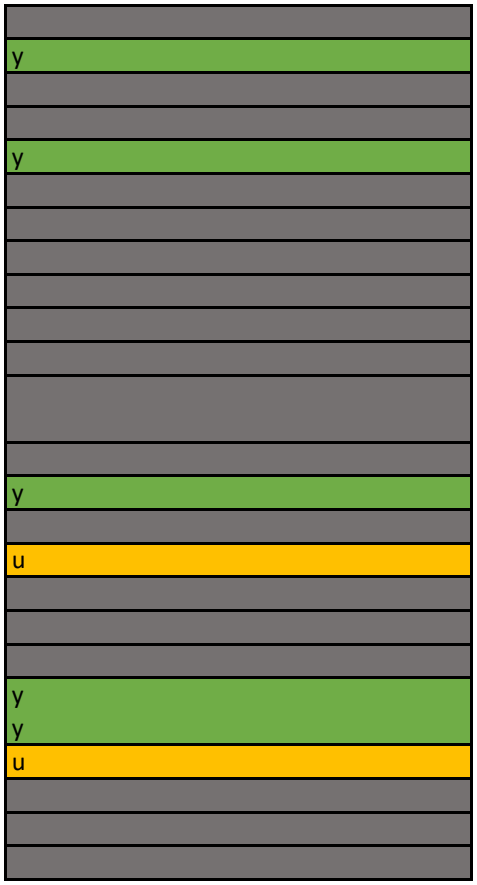
c	y	
g	y	y
g	y	y


Facility based testing for those with symptoms in concentrated epidemics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