

## Monitoring the HIV Continuum of Care in key populations across Europe and Central Asia

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Abstract:

**Objectives:** We measure and compare national continuum of HIV care estimates in Europe and Central Asia by three key sub-populations: men who have sex with men (MSM), people who inject drugs (PWID) and migrants.

**Methods:** Responses to a 2016 ECDC survey of 55 European and Central Asian countries were used to describe continuums of HIV care for the sub-populations. Data were analysed using three frameworks: UNAIDS 90-90-90 targets; breakpoint analysis identifying reductions between adjacent continuum stages; quadrant analysis categorising countries using 90% cut-offs for continuum stages.

**Results:** Overall, 29/48 countries reported national data for all HIV continuum stages (number: living with HIV; diagnosed; receiving treatment; virally suppressed). Six countries reported all stages for MSM, seven for PWID and two for migrants. Thirty-one countries did not report data for MSM (34 for PWID and 41 for migrants). In countries that provided key-population data, overall, 63%, 40% and 41% of MSM, PWID and migrants living with HIV were virally suppressed respectively (compared to 68%, 65% and 68% nationally, for countries reporting key-population data). Variation was observed between countries, with higher outcomes in sub-populations in Western Europe compared to Eastern Europe and Central Asia.

**Conclusions:** Few reporting countries can produce the continuum of HIV care for the three key populations. Despite limitations, differences exist in outcomes between the general and key populations. While MSM broadly mirror national outcomes (in the West), PWID and migrants experience poorer treatment and viral suppression. Countries must develop continuum measures for key populations to identify and address inequalities.

## Introduction

The continuum of HIV care has become one of the central metric through which the public health response to the HIV epidemic can be evaluated at the national level<sup>1</sup>. Its importance has been recognised by UNAIDS that established in 2014 the 90-90-90 targets with the aim that 90% of all those living with HIV are diagnosed, 90% of those diagnosed receive antiretroviral therapy and 90% of those receiving treatment achieve viral suppression by 2020<sup>2</sup>. This is equivalent to an overall 73% viral suppression proportion among all people living with HIV. The concept has been integrated into WHO treatment guidelines<sup>3</sup> and not only allows an assessment of the extent that all people living with HIV have reduced risk of mortality<sup>4,5,6</sup> and untransmissible levels of virus<sup>7</sup>, but also identifies the stages along the continuum of care where further interventions are needed<sup>8</sup>.

In 2014, an ECDC survey used to collect data as part of monitoring the implementation of the 2004 Dublin Declaration<sup>9</sup> produced valuable information on how, and the extent to which, European and Central Asian countries were monitoring the continuum of care for people living with HIV. At this time, only 16 European and Central Asian countries were able to report data on the complete continuum at the national level<sup>10</sup>. By 2017, national continuums of HIV care estimates had been published by 82 countries globally<sup>1</sup>.

Standard presentations of the HIV continuum of care at the national level are likely to mask variations that exists in and between key sub-populations. National descriptions of the continuum of care stratified by key populations have been undertaken in the United States<sup>11,12,13,14,15,16</sup>, the United Kingdom (UK)<sup>17</sup>, Belgium<sup>18</sup>, Canada<sup>19,20</sup> Denmark<sup>21</sup>, France<sup>22</sup>, Georgia<sup>23</sup>, Greece<sup>24</sup>, and Russia<sup>25</sup> and through international comparison<sup>26</sup>. However, no baseline continuum of HIV care data is available for key populations for the whole European and Central Asian region. This information is needed to identify and reduce potential inequalities that exist between key populations both within and between countries.

In view of this, the 2016 ECDC Dublin Declaration questionnaire asked countries to report data for their continuum of care<sup>10</sup> estimates at national level and for key populations. We used data reported for a four stage continuum of care<sup>10</sup> for three key populations: men who have sex with men (MSM), people who inject drugs (PWID) and migrants (i.e. people born outside of their country of diagnosis). We adopt a multi-framework approach<sup>10</sup> to analyse continuums for each populations.

## Methods

The 2016 Dublin Declaration monitoring questionnaire was distributed in electronic PDF format to nominated national representatives in 55 countries. Countries were asked to report available data for the countries' entire population as a whole, including all persons living with HIV from key populations and other groups (hereafter referred to as "national data") as well as data for three key populations (MSM, PWID, migrants) on the following

continuum of care stages: 1) living with HIV infection; 2) diagnosed with HIV infection; 3) receiving anti-retroviral treatment; 4) virally suppressed<sup>1</sup>. Countries were also asked to provide their methods

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<https://ecdc.europa.eu/sites/portal/files/media/en/healthtopics/aids/Documents/Dublin%20Declaration%20Questionnaire%202016.pdf>

for ascertaining the continuums for the key populations and to specify whether this varied from the national approach. Data validation consisted of raising data queries with country representatives directly and sharing draft analytical outputs for comment.

We analysed the number of countries that reported: a) all four stages; b) no stages; c) and at least two consecutive stages of the continuum of care nationally and by key population. The methods that specific countries used to define and measure national continuum stages have been described previously<sup>10</sup>. In analyses where data from multiple countries were combined, each element of the continuum was summed across countries and analyses undertaken using the summed totals.

Three main analyses were conducted: analysis against the 90-90-90 targets, breakpoint analysis and quadrant analysis. In each instance, comparisons were made between key populations and the national data restricted only to those countries where relevant data were available.

The 90-90-90 analysis monitors progress towards the targets described above. The breakpoint analysis<sup>27</sup> identifies countries that had substantial reductions between any two successive stages along the continuum. Regardless of where it occurred in the continuum, a first breakpoint was set as a reduction of >10% between adjacent stages, in line with the 90- 90-90 targets, and a second breakpoint was set as a reduction of >25%. For the quadrant analysis<sup>10</sup> cut-off points of 90% were used to divide countries into quadrants based on the observed data. Two quadrant analyses were undertaken. In the first, quadrants were defined by the percentage of people estimated to be living with HIV who had been diagnosed against the percentage of those diagnosed who were on treatment<sup>28</sup>. The second analysis plotted those diagnosed and treated against those treated and virally suppressed.

## Results

Overall, 48 countries responded to the survey. Of these, 29 reported national data for all four stages of the continuum (Figure 1: Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Croatia, Denmark, France, Georgia, Germany, Greece, Hungary, Italy, Kazakhstan, Kyrgyzstan, Luxembourg, Malta, Moldova, Montenegro, the Netherlands, Portugal, Romania, Serbia, Spain, Sweden, Switzerland, Tajikistan and the United Kingdom). All four stages were reported by six countries for MSM (Austria, Azerbaijan, France, Germany, Kyrgyzstan and the UK) and by seven countries for PWID (Austria, Azerbaijan, France, Germany, Kazakhstan, Kyrgyzstan and the UK). Only Austria and France were able to report all four stages of the continuum among their migrant populations.

Only three countries were unable to report national data on any stage of the continuum, compared to 31 countries for MSM, 34 for PWID and 41 for migrants. Thirteen countries provided at least two consecutive stages for MSM populations, 14 for PWID and four for migrants. Among countries reporting national and key population continuums, all countries reported using the same approach to their measurement and construction of national and key population continuums of care, with the exception of the Ukraine, Germany and Kosovo.

## *Frameworks for analysing and interpreting continuum of care data*

### *90-90-90*

For the 29 countries reporting overall national data on all four stages, 81% of all people living with HIV were diagnosed, 68% were treated and 60% were virally suppressed. Among the six countries reporting MSM data, the equivalent figures were 83%, 70% and 63% (Figure 2). These figures were broadly in line with the national data when restricted to the same six countries that submitted MSM data (84%, 74% and 68%). Among the seven countries reporting PWID data, the proportion of PWID living with HIV who were diagnosed (82%) was similar to the national estimates (83%). However, the proportion of all PWID living with HIV who were treated and were virally suppressed was substantially lower compared to the national outcomes (57% and 40%, respectively for PWID compared to 71% and 65%, nationally). Among the two countries reporting migrant data, migrants had lower outcomes across all stages of the continuum compared to the national picture (73%, 51% and 41% respectively for migrants, compared to 84%, 75% and 68% nationally).

### *Quadrant analysis*

Figures 3A, 3C and 3E present countries assigned to quadrants depending on the percentage of people estimated to be living with HIV who had been diagnosed plotted against the proportion diagnosed who had been treated. In these analyses, no countries reported any of the key populations to be in the highest quadrant (>90% for both measures). Figure 3A shows that while outcomes for MSM were relatively high for Austria, France, Germany, Italy and the UK (range 82%-88% for those living with HIV who were diagnosed vs. range 76%-90% for those diagnosed and treated), outcomes for Kyrgyzstan and the Ukraine were much lower (4% vs. 23% and 23% vs. 25% respectively). Among PWID, outcomes were better for countries in Western Europe (range 77%-97% for those living with HIV who were diagnosed vs. range 81%-88% for those diagnosed and treated for Austria, Germany, Italy and the UK) compared to countries in Eastern Europe and Central Asia (range 22%-85% vs. 21%-64% respectively for Azerbaijan, Kazakhstan, Kyrgyzstan, Ukraine and Tajikistan) (Figure 3c).

Figures 3B, 3D and 3E present information on the proportion diagnosed and treated against the proportion treated who are virally suppressed. MSM were in the highest quadrant in the UK (90% vs. 96%) with Germany almost meeting this benchmark (89% vs. 90%). Overall, Figure 3B shows some variation between countries (range 43%-90% vs. 51%-96%), with values lowest for Azerbaijan and Kyrgyzstan (54% vs. 51% and 43% vs. 70% respectively). Figure 3D shows more variation overall among PWID (range 21%-88% vs. 16%-93%) with Kazakhstan, Kyrgyzstan and Tajikistan below 50% on both metrics. In the UK, migrants were in the highest quadrant (91% vs. 95%) compared to Austria and France (Figure 3E, 83% vs. 65% and 70% vs. 81% respectively).

### *Breakpoint analysis*

At the national level, 38 out of 40 countries had least one breakpoint (>10%) (Table 1): 86% (31/36) between the estimated number living with HIV and number diagnosed; 82% (32/39) between the number diagnosed and number treated; 72% (26/36) between those treated and those virally suppressed. Among countries reporting MSM continuum data, the equivalent percentage and number of countries reporting at least one breakpoint (>10%) was 100% (8/8), 92% (11/12) and 80%

(8/10). For PWID, 70% (7/10), 100% (13/13) and 89% (8/9) of countries reported at least one breakpoint (>10%), respectively. The equivalent figures for countries reporting continuum data for migrants were 100% (3/3), 75% (3/4) and 67% (2/3).

Overall, 25% (2/8) countries reporting MSM data had a breakpoint greater than 25% between those living with HIV and those diagnosed. Equivalent figures were 50% both for those diagnosed and treated and those treated and virally suppressed (6/12 and 5/10 respectively). Among countries reporting PWID data, 40% (4/10) reported breakpoints of at least 25% between those living with HIV and diagnosed. Equivalent figures were 69% (9/13) and 56% (5/9) among those diagnosed and treated and those treated and virally suppressed respectively.

## Discussion

To our knowledge this is the first time estimates of the continuum of HIV care for key populations in Europe and Central Asia were calculated. These results can be used as a baseline against which to monitor progress towards implementation of continuums of care for key populations, and to inform public health measures to improve HIV outcomes for these populations. At present, only six, seven and two of the 48 reporting countries are able to provide complete continuum data for MSM, PWID and migrant populations, respectively. The paucity of data is concerning and needs to improve. The little information is available from these countries indicates substantial inequalities in estimates for key populations compared to overall national data for the entire population of people living with HIV. While outcomes for MSM populations broadly reflect the national picture (63% viral suppression in MSM vs. 68% nationally), PWID and migrants show poorer outcomes in all stages of the continuum with a viral suppression rate of around 40% compared to around 65% nationally.

The variation in continuum outcomes between key populations broadly reflects the geographic diversity of the populations affected by HIV in the region and the history of the epidemics in each country, with older epidemics in the West, and newer in the East.; due to effective treatment, countries with older epidemics will consistently have relatively high numbers of people living with diagnosed HIV infection. Compared to the other countries in the region, a higher proportion of people newly diagnosed in countries in Western Europe probably acquired their HIV infection through sex between men<sup>29</sup>. In this setting, HIV continuum outcomes are generally higher and better outcomes among MSM largely reflect this<sup>30,31,32</sup>. However, the quadrant and breakpoint analysis suggests that outcomes among MSM are poorer in Eastern European and Central Asian countries compare to the national picture in this setting, particularly in relation to the proportion diagnosed and proportion receiving treatment, which could be explained by the challenging legal and cultural context for gay, bisexual and transgender communities in some of these countries<sup>33</sup>.

While the estimates are only slightly below the national picture in Western European countries, PWID in countries in Eastern Europe and Central Asia have consistently worse estimates compared to the national picture in all analytical frameworks. In these countries, HIV epidemics are more likely to be concentrated among PWID<sup>29</sup>, a population that is consistently shown to experience poorer outcomes in relation to treatment and viral suppression<sup>39,40</sup>. In general, PWID are less likely to be retained in care<sup>34,35</sup> less likely to start antiretroviral treatment<sup>36,37</sup> more likely to interrupt treatment<sup>38</sup> and less likely to achieve suppressed viral load<sup>39,40</sup> compared to the national picture. Within PWID populations, better outcomes have been identified where PWID report lower levels of

drug and alcohol use<sup>41</sup> and availability of and engagement with effective drug treatment programmes<sup>42,43</sup>.

In our analysis, continuum data are only available for migrants from Austria, France, Italy and the UK. These are all settings where outcomes along the continuum are higher than average in Europe, so outcomes for migrants in these countries may not reflect the overall situation in Europe and Central Asia. However, in all four countries, this population achieves sub-optimal outcomes compared to the national picture. Monitoring the HIV continuum of care in relation to migrant populations is particularly challenging due to lack of information<sup>44</sup> (especially for undocumented migrants, who are the most vulnerable group and least likely to be in HIV care, receive treatment and attain viral suppression<sup>45,46</sup>) and to high levels of mobility. The absence of data is of concern because migrants account for a significant proportion of new HIV diagnoses in Europe, are most likely to be diagnosed late<sup>47,29</sup> and to die sooner<sup>48</sup>, and may be less likely to seek health care due to concerns about migration status<sup>49</sup>.

We aimed to assess the data availability and quality for different metrics to monitor the continuum of care between different populations; an evaluation of the public health utility of each of the metrics is not the focus of this work. However, we reiterate the need to develop further epidemiological rigour and a consensus in approach to monitor the continuum of care. Much of this work should focus on estimating the size of the undiagnosed population and ensuring this information is presented alongside the 90:90:90 targets to aid interpretation (for instance, a country with a 90% of the population diagnosed may have a large undiagnosed population that drives transmission)<sup>50</sup>. This work aimed to assess the data availability and quality. Since we identified limited data availability and quality, this together with the differences between countries in the methods used to estimate and collect national data<sup>10</sup>, means that the baseline measurements should be interpreted with caution. With few exceptions, countries reportedly used the same approach to data collection in the construction of national and key population continuums and, as such, the same limitations are relevant and significant in the interpretation of our results<sup>10</sup> and we reiterate the need to work towards a consensus in approach to monitor the continuum of care. Furthermore, since the relative size and characteristics of each key sub-population within each country's epidemic varies considerably, overall national data for all PLHIV are not likely to represent the nuanced and diverse situation for the whole of Europe and Central Asia. It is also important to note that the countries that were able to monitor the continuum of care in key populations were also likely to be the countries with better HIV outcomes overall. Consequently, the data presented probably overestimates the outcomes experienced by key populations in the region as a whole

To maximise the use of available data on the HIV care continuum we adopted a multi-framework approach. These analyses help to identify the specific stages of the continuum of care where further investment is required. Losses along any stage of the continuum of care are not only of clinical concern for individual patients but also have public health implications in relation to onward transmission of HIV.

In Europe, HIV continues to be an infection that disproportionately affects key populations who face discrimination and stigmatisation in many settings. Our results indicate that there is a need to improve availability and uptake of HIV testing, linkage to effective ART, and adherence support to achieve viral suppression generally in Europe and Central Asia, and for PWID and migrant

populations in particular. It is critical that countries invest in the development and use of more robust methods to monitor the HIV continuum of care for key populations in order to identify and tackle inequalities in HIV care and public health outcomes experienced by these populations.

Figure 1: Number of European and Central Asian countries reporting data for different stages of the HIV continuum of care, reported in 2016 (n = 48).

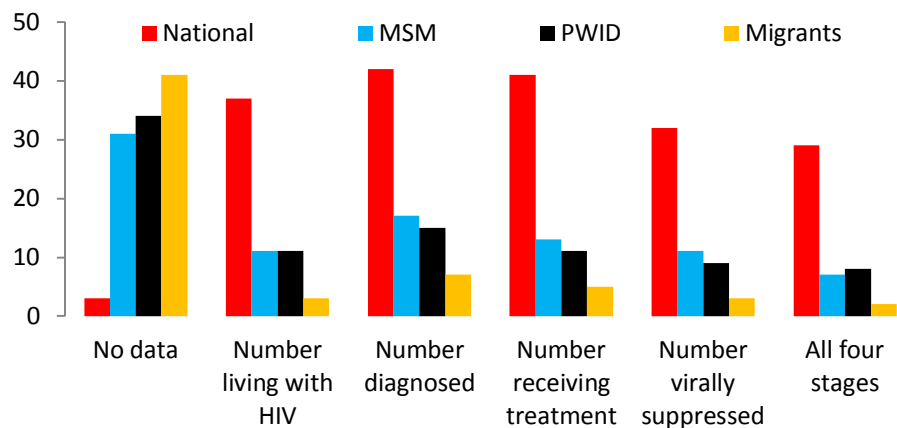
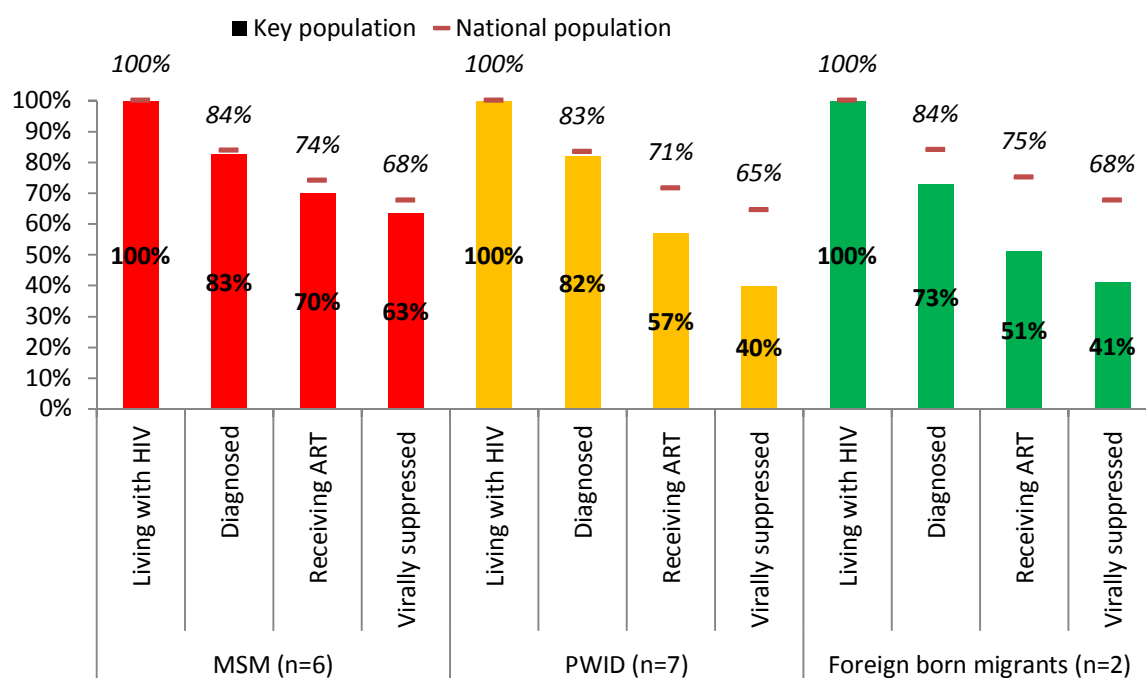


Figure 2: Comparison of the continuum of HIV care for key populations against national continuums, reported in 2016\*



\* National comparisons provided only for countries that provided the key population data.

Countries included: MSM: Austria, Azerbaijan, France, Germany, Kyrgyzstan and the UK; PWID: Austria, Azerbaijan, France, Germany, Kazakhstan, Kyrgyzstan and the UK; migrants: Austria and France



Figure 3: Quadrant analysis: proportion of persons living with diagnosed HIV vs those diagnosed receiving treatment (A,C,E) and the proportion diagnosed treated vs those treated and virally suppressed (B,D,F), by key population and country, reported in 2016

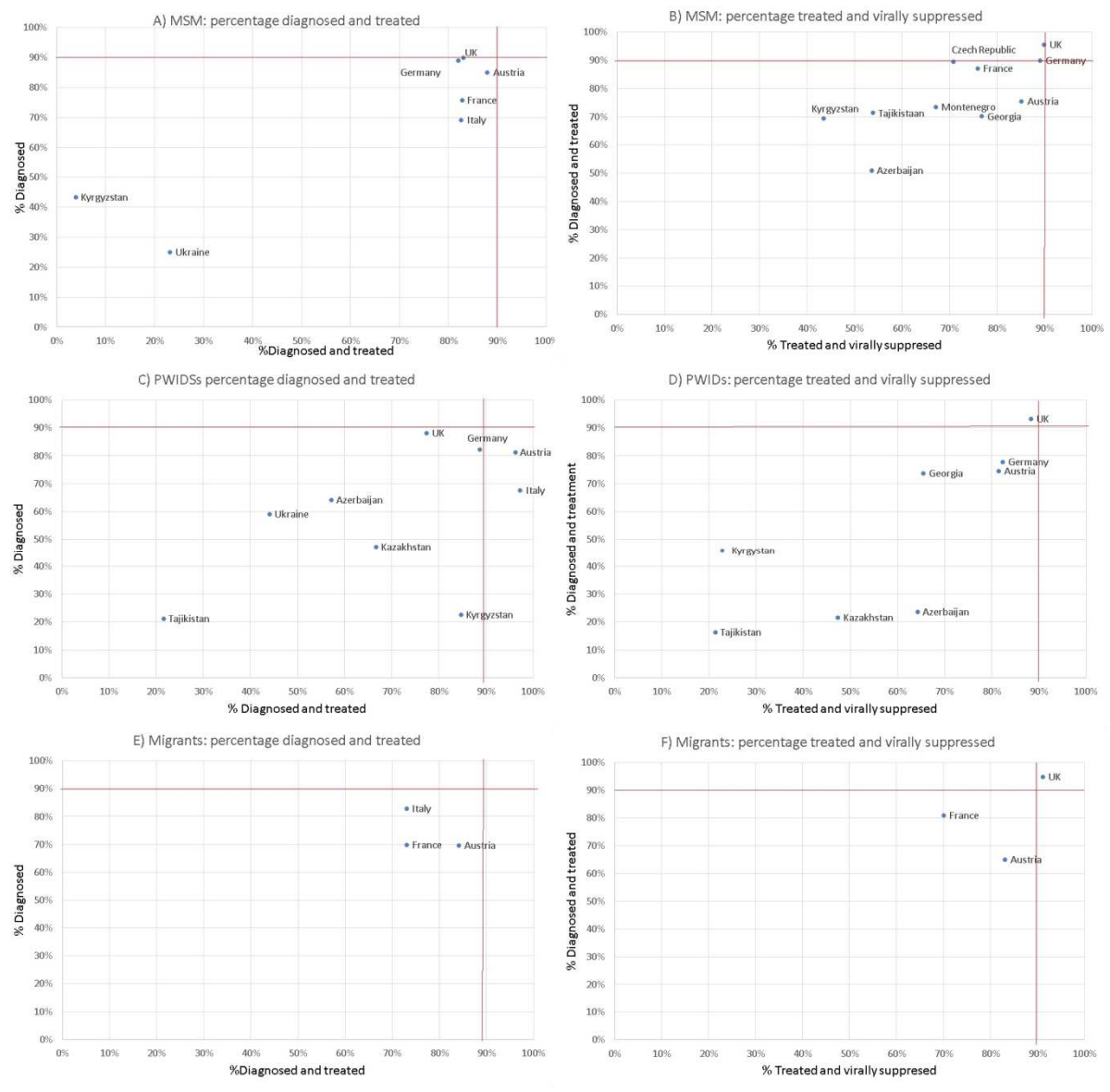


Table 4: Breakpoints in the HIV continuum of care, by key population, reported in 2016

	Total			MSM			PWID			Foreign born migrants		
	Diagnosed	Receiving ART	Viral suppression	Diagnosed	Receiving ART	Viral suppression	Diagnosed	Receiving ART	Viral suppression	Diagnosed	Receiving ART	Viral suppression
Albania	50%	65%	32%									
Armenia	48%	55%	68%									
Austria	88%	85%	76%	88%	85%	76%	96%	81%	75%	73%	83%	65%
Azerbaijan*	53%	63%	52%		54%	51%	57%	64%	24%			
Belgium	84%	84%	95%	86%								
Bulgaria	64%	36%	87%									
Croatia	65%	87%	88%									
Czech Republic		71%	85%		71%	89%		63%				
Denmark	91%	94%	94%									
Estonia	84%	40%	0%									
France*	84%	89%	91%	83%	76%	87%	96%	83%	85%	73%	70%	81%
Georgia	45%	70%	78%		77%	70%		65%	74%			
Germany	85%	84%	93%	82%	89%	90%	89%	82%	78%			
Greece	78%	67%	73%									
Hungary	87%	53%	93%									
Israel	74%	69%										
Italy	88%	88%	87%	83%	69%		97%	68%		84%	70%	
Kazakhstan	77%	35%	57%				67%	47%	22%			
Kosovo		30%										
Kyrgyzstan	65%	48%	41%	4%	43%	70%	85%	23%	46%			
Latvia		27%	0%									
Lithuania	70%	30%	0%									
Luxembourg	87%	75%	91%									
Malta	75%	96%	86%									
Moldova	57%	38%	69%									
Montenegro	76%	67%	69%		67%	74%		33%				
Netherlands	88%	87%	92%									
Poland	57%	63%					32%					
Portugal	70%	67%	78%									
Romania	98%	77%	51%									
Serbia	63%	66%	95%									
Slovakia*	79%											
Slovenia		91%	83%									
Spain	82%	92%	88%									
Sweden	90%	95%	95%									
Switzerland	82%	91%	97%									
Tajikistan*	49%	56%	21%		54%	71%		21%	16%			
Ukraine	57%	48%	0%	23%	25%		44%	59%				
United Kingdom	87%	96%	94%	85%	90%	96%	77%	88%	93%		91%	95%
Uzbekistan	90%	40%	0%									
	77%	76%	87%	54%	80%	91%	65%	61%	57%	77%	81%	91%

Key: red indicates a stage that is <75% of its predecessor; amber indicates a stage that is 75-89% of its predecessor; green indicates a stage that is >90% of its predecessor. Red and amber correspond to Raymond's concept of breakpoints<sup>27</sup>. Grey indicates no data reported.

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