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The HIV treatment cascade in men who have sex with men, people who inject drugs and sex workers

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Abstract

Purpose of review—People who inject drugs (PWID), sex workers and men who have sex with men (MSM) simultaneously bear a high burden of HIV and stigma and discrimination. The purpose of this review was to summarize recent information about the understanding of the HIV care cascade among PWID, sex workers, and MSM populations around the globe.

Recent findings—A review of the published literature relating to the care cascade in these three key populations was conducted. Data on the care cascade among key populations is sparse, particularly for PWID and sex workers. In the twelve countries in which a study or report of the care cascade was available stratified by these populations, all three populations have care cascade outcomes that are far below the 90-90-90 target set by UNAIDS for 2020. Culturally-tailored interventions including co-location of services and peer navigators can improve care cascade outcomes among key populations.

Summary—Key populations' care cascade outcomes must be included in international reporting metrics to expand cascade data for these groups. Improving care cascade outcomes in these key populations through culturally-tailored interventions should be a priority in the coming years.

Keywords

HIV care cascade; sex workers; men who have sex with men; people who inject drugs

Introduction

Men who have sex with men (MSM), people who inject drugs (PWID) and sex workers are at heightened risk for HIV infection because of biological, behavioral and structural

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vulnerabilities (see Table 1)[2,20–28]. Sex workers are estimated to have 13.5 times[20] and MSM 19.3 times[23] increased odds of infection compared to the general population, while an estimated 13.1% of PWID are living with HIV[24]. Potentiating these key populations' great HIV burden are substantial barriers and challenges to HIV care access[3**,9,29]. MSM, PWID, and sex workers experience high levels of stigma, discrimination, and violence, including criminalization, in many countries[8,13,17]. These structural vulnerabilities are associated with fear of seeking healthcare resulting in decreased utilization of health services[30–33]. PWID and sex workers experience incarceration that often disrupts treatment[14,18,34]. Simultaneously, laws often prohibit interventions such as opioid substitution therapy (OST) and other harm reduction for PWID that improve treatment outcomes[19]. Policies and HIV strategic plans have frequently excluded key populations altogether[10–12], such as PEPFAR's early "anti-prostitution pledge"[15,16]. Often key populations simultaneously belong to more than one risk group (such as sex workers who inject drugs) and frequently experience syndemics, synergistically interacting co-prevalent diseases and psychosocial conditions (e.g. early childhood trauma, depression and substance use), associated with worse HIV care outcomes[35,36*,37]. Despite these challenges, evidence shows that treatment can be equally effective among MSM, sex workers, and PWID as other populations when these challenges are appropriately addressed with culturally-competent care[38,39**], such as when PWID are simultaneously provided with OST.

The HIV care cascade, also called the care continuum, has been increasingly used to document engagement in care among people living with HIV (PLWH)[40]. The care cascade documents losses from each "step" between HIV status awareness, linkage to care, engagement and retention in care, initiation of antiretroviral therapy (ART), and viral suppression. While the care cascade has become of increasing importance in understanding the HIV response, this tool has been less rigorously applied to document the health disparities of key populations. Here, we review studies and reports that have utilized the care cascade framework among key populations since its development in 2011, and review interventions published in the past year aimed at components of the care cascade, as of mid-2015.

Methods

We conducted a literature review to identify recent studies describing the HIV care cascade in sex workers, MSM, and PWID. We searched PubMed with key terms for these three populations and the care cascade published from January 1, 2011 to May 24, 2015. This search identified 70 unique articles, of which 51 were excluded because they did not include empirical evidence on the HIV care cascade, leaving 19 included in this article. This search was extended to abstracts from CROI and the International AIDS Conference for 2014–2015, which identified 8 abstracts for inclusion. We also searched online for surveillance data from UNAIDS, WHO, and country-specific sources to identify reports of care cascade data stratified by risk group. Finally, we searched PubMed for key interventions (case management, peer health system navigation, culturally-tailored interventions to improve health literacy, contingency management, co-location and integration of services, and cultural-competence training of clinicians and public health officials) published from

January 1, 2014 to May 24, 2015 that were designed to impact care cascade outcomes in key populations.

Cascade Data Gaps and Measurement Challenges

There are major gaps in reporting specific metrics of the care cascade among key populations. International reporting agencies have generally not reported on HIV care cascade outcomes as programmatic indicators for key populations. PEPFAR's outcome indicators for key populations only include some domains of HIV prevention (such as condom use and distribution) and HIV testing[41]. UNAIDS' Global AIDS Response Progress Reporting for key populations similarly only includes HIV testing, of all the HIV care cascade steps, aside from retention outcomes reported only among European PWID[42]. This results in a lack of sufficient data in most countries to construct HIV care cascades among key populations.

Aside from challenges to documenting the HIV care cascade in any population[43*], there are several challenges specific to key populations. Many MSM, PWID and sex workers do not disclose same-sex practices, injection drug use, or sex work in the context of HIV care services, often due to fear of discrimination and stigmatization, and healthcare workers commonly fail to ask about these behaviors[13,27,44]. Thus, even within clinical cohort data, it is often impossible to disaggregate care cascade data by key population. Utilizing population-based surveys that focus on key populations to estimate care cascade outcomes has been suggested as a means to overcome this obstacle[45].

In a number of settings, key population size estimates are lacking, thus making estimating care cascade outcomes in these populations challenging[46]. Population size estimates give a denominator for service need in key populations, and allow estimation of the HIV burden in key populations. Additionally, while epidemic and HIV care reporting is disaggregated by mode of transmission in many concentrated epidemic settings, sex work is generally not disaggregated from other sexual risks (heterosexual or MSM), making care cascade estimates among sex workers a particular gap[47].

Cascade outcomes in key populations

We now describe recent HIV care cascade outcomes in three key populations (PWID, sex workers, and MSM).

People who Inject Drugs

While some countries and studies report full care cascade data for PWID, data is sparse. A recent case study in five countries (Vietnam, Argentina, Australia, Ukraine and the United States) found that care continuum data for PWID was only available for the US[48]. Full cascade data among PWID is available from the United States[49,50*] Canada[51*], and India[52], shown in Table 2. Overall, care cascade outcomes for PWID are much lower than the 90-90-90 target set by UNAIDS for 2020 – i.e., 90% of all PLWH should be aware of their status, 90% of those aware of their status should be on ART, and 90% of those on ART should be virally suppressed[63**]. When compared to the US, PWID in India have

extremely low levels of awareness of positive status (36% in India compared to 93% for males and 94% for females in US). However, once diagnosed, PWID in India remain in care at levels comparable to their US counterparts. US PWID are lost at very high levels between awareness and retention in care compared to Canadian PWID, resulting in much lower levels of viral suppression among US PWID.

In the 2014 Global AIDS Response Progress Reporting (GARPR) to UNAIDS, the proportion of PWID who reported having been tested for HIV and received their results in the past 12 months varied substantially, with an average of 44.1% among the 83 countries reporting estimates, though country estimates ranged from 0–100%[42]. UNAIDS GARPR in the European region includes an indicator for the percentage of PWID alive and on treatment 12, 24 and 60 months following ART initiation. Table 3 shows the 2014 reports from countries including this indicator in UNAIDS progress reports. The reported proportion retained at each time point varied substantially, though Azerbaijan and Georgia consistently had much lower estimates than Armenia and Ukraine, and confirmation of Bulgaria's high reported retention at 60 months is necessary in order for comparison.

Additional reports found worse HIV care cascade outcomes for PWID compared to individuals infected via sexual transmission[69]. In a cohort of Swedish and Danish PLWH[70], PWID were less likely to be “successfully managed” (viral suppression among those eligible for ART or at least annual CD4 testing among those ineligible) than MSM or heterosexuals (78% among PWID vs 92%). PWID initiate care later than those who do not inject drugs, as found by a study in Vietnam where PWID started ART at 69 CD4+ cells/mm³ compared to 96 CD4+ cells/mm³ among non-injectors[71]. Another study found PWID in Belgium diagnosed in 2007–2010 were less likely to be retained in HIV care compared to heterosexuals[72]. In a study of PWID in US cities[36*], syndemics (having multiple concomitant behavioral health problems) resulted in greater odds of poor care continuum outcomes.

Sex workers

Care cascade reports among sex workers were similarly limited. We identified care cascade outcomes for female sex workers (FSWs) (Table 2) in: the Dominican Republic[59*]; Zimbabwe[60]; Burkina Faso and Togo[61]; and Malawi[62]. Awareness of being HIV-infected was particularly low for FSWs in Burkina Faso and Togo at just 38%. However, in these West African countries, the proportion of FSWs aware of their status who were on treatment was comparable to or higher than other locations (84%). HIV-infected FSWs in Malawi who were aware of their status were more likely to be virally suppressed (61%) than comparable FSWs in Zimbabwe (51%) or the Dominican Republic (48%). No care cascade outcomes were found for male or transgender sex workers.

The proportion of sex workers who reported having received an HIV test and their test result in the past 12 months, as reported to UNAIDS, varied substantially by country, ranging from 1.1–5.9% in Egypt, Vanuatu and Afghanistan, to 100% in Djibouti, Ireland, Sao Tome and Principe, and Singapore[42]. The average annual testing rate among the 121 countries reporting was 53.4%[42].

A recent review[73] addressing each step of the HIV care cascade among FSWs found that while a number of studies assessed HIV testing among FSWs, almost none evaluated linkage to care and very few addressed retention or adherence. A systematic review and meta-analysis[74**] by the same team assessed ART uptake, attrition and adherence among FSWs and found the following pooled estimates: 37.9% (95% CI: 28.5–48.4%) of HIV+ FSWs were currently on ART, adherence was 76.2% (95% CI: 67.8–83.0%), viral suppression was 57.4% (95% CI: 45.7–68.2%), and 22.2% (95% CI: 5.0–66.4%) of FSWs started ART below 200 CD4+ cells/mm³. However, as the authors mentioned, pooling estimates of FSW care cascade data is challenging, since outcomes are differently defined across studies.

Other recent studies have addressed availability of ART for FSWs, and factors associated with being on ART. One study found that 84–100% of HIV+ FSWs in parts of Cameroon were not on ART[75]. Another study found that in the Dominican Republic FSW-related discrimination, drug use, working in an FSW-establishment, or sex work-related internalized stigma were associated with increased odds of ART interruption, while those reporting positive perceptions of HIV providers were less likely to experience ART interruption[59*].

Men who have sex with men

While there were more reports on the care cascade among MSM than the other two populations assessed, these were predominantly from high-income settings (Table 2). Care cascade reports were available from the United States[49,50*,53,54,76,77]; Canada[51*]; the United Kingdom[55]; Nigeria[58]; Burkina Faso and Togo[56]; Russia[57]; and India[52]. MSM living with HIV in Burkina Faso and Togo, Russia, and India had alarmingly low levels of status awareness (18, 20 and 44%, respectively). MSM in Canada had notably little drop-off between cascade stages, with 81% of MSM diagnosed being virally suppressed. Within the US, major care cascade differences were seen by race among MSM, with black MSM having much lower retention in care (24% vs 43% among white) resulting in only 16% of black MSM being virally suppressed compared to 34% of white MSM. Poor cascade outcomes among black MSM in the US have been documented elsewhere[78,79]. A prospective study to initiate treatment as prevention (TasP) among MSM in Nigeria[58] found that 31.2% of participants were on ART when first interviewed, and of the remaining 68.8% of participants who were offered TasP, 55% initiated ART and 44% of those on ART were virally suppressed by 6 months after initiation. In China during 2011 (not in Table 2), 22% of MSM who screened positive did not return for confirmatory test results, and only 66.1% of those who received confirmatory test results received CD4 count testing by the end of 2011[80].

Table 2 also shows care cascade outcomes for MSM-PWID, males who reported both practices. In Canada and among Latino males in the US, MSM-PWID had slightly better outcomes than PWID, but worse outcomes than non-injecting MSM for most cascade steps, though Bradley et al. estimated higher rates of viral suppression among MSM-PWID than among MSM or PWID in the US and Puerto Rico[50*].

Countries' estimates of the proportion of MSM who had received a test result in the past 12 months reported to UNAIDS varied dramatically, ranging from 0–4.6% reported in Poland,

Tonga and Sudan, to 100% reported in Hungary, the Marshall Islands, and Saint Lucia, with an average of 44.8% for the 140 countries that provided estimates[42].

In comparative studies of high-income concentrated epidemics, MSM have similar or better care cascade outcomes as others living with HIV[50*,51*,69]. In a cohort of Swedish and Danish PLWH[70], in 2010, 92.6% of Swedish/Danish MSM (vs. 91.0% among Swedish/Danish heterosexual males) and 74.2% of immigrant MSM (vs. 70.9% of immigrant heterosexual males) were virally suppressed or receiving annual CD4 counts if not yet on ART. In Belgium, MSM were less likely to have undiagnosed HIV infection and more likely to be retained in care than heterosexual populations[72].

Additional studies have assessed ART access and factors associated with care engagement among MSM. One study found that late diagnosis was common among MSM, with 19% of MSM at one US center diagnosed with AIDS at the time of their HIV diagnosis[79]. A study of young black MSM in the US found that negative self-image was inversely associated with both care seeking and adherence to medical appointments[81]. A study in Cameroon found that 75–100% of MSM in studied areas were not on ART[75].

Recent work in interventions to improve outcomes for key populations

While key populations have frequently been the focus of HIV prevention interventions, fewer culturally-tailored HIV care programs for key populations have been developed and evaluated. Nevertheless, several highly effective interventions have shown impact on care cascade outcomes among key populations, and a recent article identified several interventions that improve HIV management among PWID[82**].

Co-location and integration of services, such as STI screening, TB screening or opioid substitution therapy (OST) as part of HIV care, have been shown to improve HIV care cascade outcomes. Recent studies have found that OST among PWID is associated with higher CD4+ cell count at ART initiation[71], ART initiation and access[83,84], ART medication adherence[85,86], decreases in ART discontinuation[87], and decreases in delayed care visits[88].

Studies have found that peers and sexual partners can improve HIV care cascade outcomes among key populations. A Nigerian study found that peer outreach workers/case managers are able to identify MSM living with HIV and engage them in care[89]. A Chinese study found that peer-led HIV testing with case management among MSM led to a higher proportion of MSM screened receiving their test result and a higher proportion of those positive being linked to care[90]. Peer networks have been used to identify PWID living with HIV who are out of care in Russia[91]. Additional studies have suggested that involving partners in dyadic care, either among serodiscordant or seroconcordant couples, may improve care continuum outcomes among same-sex couples[92].

There is insufficient data on interventions to improve linkage to care and ART initiation among key populations in low- and middle-income settings. A recent review[93] found only one intervention published for PWID and none for MSM or sex workers among low- and middle-income settings.

Cultural competence training for healthcare providers and public health officials has been identified as a key intervention for improving care cascade outcomes among key populations[3**,94], though we identified no recent studies that have assessed this intervention on care cascade outcomes.

Conclusion

Very few recent reports describe the HIV care cascade among MSM, PWID, and sex workers. Across the three key populations considered, with the exception of MSM in Canada, no population is close to achieving the UNAIDS 90-90-90 by 2020 target[63**]. Improving care cascade outcomes among key populations must be a principal component of the international HIV agenda for the next five years to achieve this goal, including the provision of culturally-competent and -tailored care that includes co-located and integrated services.

PWID had greater HIV care cascade attrition than MSM, though this varied substantially by location. MSM living in high-income countries where there are relatively lower levels of same-sex stigma and discrimination had some of the best care cascade outcomes, though MSM living in environments with very high stigma and discrimination such as Russia, Burkina Faso and Togo had some of the worst.

Box 1 lists a suggested research agenda to improve our understanding of and outcomes along the HIV care cascade among key populations. Indicators for the care cascade must be added to HIV reporting among key populations. Additionally, sex work must be disaggregated from other sexual risk in order to better understand care cascade outcomes in high-income settings.

With the increasing recognition of the role of HIV care engagement and treatment on decreasing HIV morbidity, mortality and transmission, the HIV care cascade necessarily plays an increasingly important role in understanding our response to the HIV epidemic. It is necessary that we include key populations in our understanding of the HIV care cascade as these populations bear an undue burden of HIV and have unique care and engagement needs.

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Key Points

- International HIV reporting metrics for key populations generally do not include care cascade outcomes, resulting in a lack of data
- The limited reports identified demonstrate that key populations frequently have poor HIV care cascade outcomes, and that we are far from reaching the 90-90-90 by 2020 target for key populations
- Culturally-tailored interventions can greatly improve care cascade outcomes for key populations and must be a priority in the coming years

Box 1**Research Agenda**

- Continue to expand upon care cascade research among key populations around the globe, particularly in South America and Asia, as well as PWID in Eastern Europe and sex workers globally
- Improve HIV care cascade outcomes among key populations, particularly among PWID, sex workers and MSM living in highly discriminatory environments
- Expand PEPFAR and UNAIDS reporting indicators for key populations to include HIV care cascade outcomes
- Include sex work in risk reporting
- Collect data on care cascade among transgender or male sex workers
- Collect data on interventions for linkage to care and ART initiation among key populations, particularly in low- and middle-income countries

Table 1

Biological, behavioral, and social-structural factors that increase risk of HIV transmission and disease progression among PWID, sex workers and MSM

Population	Biological	Behavioral	Social-structural
MSM	<ul style="list-style-type: none"> Anal sex transmission efficiency[1] Sexually transmitted infections (co-factor) [2] 	<ul style="list-style-type: none"> Ability to be receptive or insertive (sexual role versatility)[5] Open relationships[5] Alcohol and illicit drug use[5] 	<ul style="list-style-type: none"> Institutional Homophobia[8,9] Exclusion from policy/programming[10–12]
Sex workers	<ul style="list-style-type: none"> Sexually transmitted infections (co-factor) [3**] 	<ul style="list-style-type: none"> Alcohol and illicit drug use[6] Condom use[6] 	<ul style="list-style-type: none"> Criminalization[13] Incarceration[14] Exclusion from policy/programming[15,16]
PWID	<ul style="list-style-type: none"> Blood-borne infections[4] Needle sharing transmission efficiency[1] 	<ul style="list-style-type: none"> Frequently report sexual and injection risk[7] 	<ul style="list-style-type: none"> Criminalization[17] Incarceration[18] Effective interventions often banned[19]

Table 2

Recent reports on the HIV treatment cascade by key population

Study	Location	Population	Year	N	Diagnosed %	Linked %	Retained in care %	On Treatment %	Suppressed %
Lourenco 2014[51]* ^a	British Columbia, Canada	PWID	2011	2,095	100%	97% ^a	84% ^b	73% ^c	53% ^d
Bradley 2014[50]* [^]	United States & Puerto Rico	PWID - Male	2011	109,500	93%	-	36% ^e	34% ^f	28% ^g
Bradley 2014[50]* [^]	United States & Puerto Rico	PWID - Female	2011	70,100	94%	-	47% ^e	42% ^f	34% ^g
Gant 2014[49]*	United States, 19 jurisdictions	PWID - Male, Hispanic or Latino	2010	172	100%	77% ^h	48% ⁱ	31% ^f	28% ^g
Gant 2014[49]*	United States, 19 jurisdictions	PWID - Female, Hispanic or Latino	2010	64	100%	79% ^h	59% ⁱ	34% ^f	23% ^g
Mehta 2014[52]	India	PWID	2012-2013	2,534	36%	32%	25%	20%	15%
Lourenco 2014[51]* ^a	British Columbia, Canada	MSM-PWID	2011	629	100%	100% ^a	93% ^b	88% ^c	74% ^d
Bradley 2014[50]* [^]	United States & Puerto Rico	MSM-PWID	2011	64,800	93%	-	48% ^e	44% ^f	35% ^g
Gant 2014[49]*	United States, 19 jurisdictions	MSM-PWID - Hispanic or Latino	2010	86	100%	79% ^h	56% ⁱ	34% ^f	28% ^g
Lourenco 2014[51]* ^a	British Columbia, Canada	MSM	2011	2,465	100%	99% ^a	94% ^b	88% ^c	81% ^d
Bradley 2014[50]* [^]	United States & Puerto Rico	MSM	2011	647,700	84%	-	38% ^e	35% ^f	30% ^g
Gant 2014[49]*	United States, 19 jurisdictions	MSM - Hispanic or Latino	2010	2,060	100%	80% ^h	54% ⁱ	49% ^f	42% ^g
Rosenberg 2014 [53] [^]	United States	MSM - Black	2009-2010	180,477	75%	-	24% ^e	20% ^j	16% ^g
Rosenberg 2014 [53] [^]	United States	MSM - White	2009-2010	243,174	84%	-	43% ^e	39% ^j	34% ^g
Schneider 2015[54]	Chicago, United States	MSM - Young, Black	2013-2014	626	72%	60% ^k	49% ^l	36%	31%
Delpech 2012[55]	United Kingdom	MSM	2010	40,100	74%	-	-	59%	53% ^m
Schwartz 2014[56]	Burkina Faso and Togo	MSM	2013	99	18%	16.9% ⁿ	-	9% ^j	-
Wirtz 2014[57]	Moscow, Russia	MSM	2010-2013	189	20%	16.4% ⁿ	-	9%	-
Mehta 2014[52]	India	MSM	2012-2013	1,150	44%	40%	34%	30%	24%

Study	Location	Population	Year	N	Diagnosed %	Linked %	Retained in care %	On Treatment %	Suppressed %
Charurat 2015[58] ^{<i>§</i>}	Nigeria	MSM - TasP	2013–2014	128	100%	80% ^{<i>o</i>}	-	55%	44% ^{<i>p</i>}
Zulliger 2015[59] ^{<i>*, §</i>}	Santo Domingo, Dominican Republic	FSW	2012–2013	268	100%	92% ^{<i>q</i>}	85% ^{<i>r</i>}	78% ^{<i>j</i>}	48% ^{<i>s</i>}
Cowan 2015[60]	Zimbabwe	FSW	2013	1,599	61%	-	-	40%	31% ^{<i>t</i>}
Schwartz 2014[61]	Burkina Faso and Togo	FSW	2013	275	38%	33.5% ^{<i>n</i>}	-	32%	-
Lancaster 2015[62]	Lilongwe, Malawi	FSW	2014	138	80%	68% ^{<i>q, j</i>}	-	51% ^{<i>j</i>}	49% ^{<i>u</i>}

- ^{***} = Care cascade outcomes denominator is diagnosed population;
- ^{*^*} = Estimated;
- ^{*§*} = Treatment as Prevention (TasP) cascade;
- ^{*a*} = First instance of an HIV-related service;
- ^{*b*} = At least two HIV-related physician visit, diagnostic tests, or HAART dispensations 3 or more months apart in a one-year period;
- ^{*c*} = At least two drug dispensations 3 or more months apart in one year;
- ^{*d*} = An episode 3 or more months long of viral load <200 copies/mL;
- ^{*e*} = Received medical care during 4 month period;
- ^{*f*} = Documented ART prescription;
- ^{*g*} = Most recent viral load <200 copies/mL;
- ^{*h*} = A CD4 count or viral load test within 3 months after HIV diagnosis;
- ^{*i*} = Two or more CD4 count or viral load results at least 3 months apart in one year;
- ^{*j*} = Self-reported;
- ^{*k*} = Linkage within 6 months;
- ^{*l*} = At least 2 visits 3 months apart in one year;
- ^{*m*} = Viral load <50 copies/mL in the year of ART initiation;
- ^{*n*} = Having received a CD4 count;
- ^{*o*} = Attended first pre-Treatment as Prevention (TasP) preparatory visit

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p = Viral load >200 copies/mL 6 months after ART initiation;
 q = Ever having attended HIV services;
 r = Received HIV-related services in the past 6 months;
 s = Viral load <50 copies/mL;
 t = Viral load <1,000 copies/mL;
 u = Viral load 5,000 copies/mL

PWID = people who inject drugs, MSM = men who have sex with men, MSM-PWID = men who have sex with men who inject drugs, FSW = female sex worker

Table 3

UNAIDS 2014 reports from European countries reporting indicator 4.2.1, “Percentage of injecting drug users with HIV still alive and known to be on treatment 12 months, 24 months and 60 months after initiation of antiretroviral therapy”

Country [Reference]	Year	Percent alive and known to be on treatment after ART initiation:		
		12 months	24 months	60 months
Armenia [64]	2013	89.1	65.9	72.7
Azerbaijan[65]	2012–2013	73.0	59.8	40.7
Bulgaria[66]	2010	90.91	-	100.0
Georgia[67]	2012–2013	80.1	79.1	59.4
Ukraine[68]	2012–2013	-	-	73.64