



HIV Treatment Audit 2023 and progress towards UNAIDS 95-95-95 targets, Ireland

November 2024

Key Points - HIV Treatment Audit

- A HIV treatment audit was carried out in 2023 to measure progress against the national antiretroviral therapy recommendation and to measure progress towards targets set by the Joint United Nations Programme on HIV/AIDS (UNAIDS)
- The audit was undertaken to understand how individuals attending HIV treatment services in Ireland are doing with respect to being on antiretroviral treatment and reaching viral suppression. Collection of disaggregate data from clinics for the first time allowed analysis of different age groups and sub-populations
- Just over 7,000 people attended for HIV care in 2022; 67% male
- Those attending are getting older (median age 44 years; 31% were aged 50 years and older) and from over 130 different countries, pointing to a need for services to be appropriate for older age and varying ethnicities and cultures
- The audit showed very high levels of antiretroviral treatment coverage (98% of those in care are on treatment) and viral suppression (98% of those on treatment have reached viral suppression)
- While the overall results of the treatment audit are very good, some people living with HIV are yet to achieve the full benefits of antiretroviral treatment and viral suppression and work is needed to meet the needs of those people

Key Points - Progress towards UNAIDS targets

- Data from the HIV treatment audit contributed to estimates to measure progress towards UNAIDS 95-95-95 targets
 - An estimated 8,000 people (95% Confidence Interval (CI): 6,800 to 9,000) were living with HIV in Ireland in 2022
 - Ireland has achieved 90-99-99 but it should be noted that since “number in care” has been used instead of “number who know their status”, the first “95” is an under-estimate and the second “95” is an over-estimate.
 - 88% of people (95% CI: 75% to >98%) living with HIV in Ireland in 2022 had reached viral suppression. This surpasses the target set by UNAIDS (86%) and shows a considerable improvement when compared to the previous treatment audit carried out in 2018 (76%)
 - The challenges of uncertainty in the modelling are reflected in the wide confidence intervals around the estimates and it is important to note that the true value lies within the confidence intervals
- Despite progress since 2018, there remain individuals who are unaware of their HIV status, individuals who are aware of their status but are not on treatment and individuals on treatment who have not reached viral suppression
- Data from the treatment audit allows us to focus our efforts on these groups to afford them the benefits of antiretroviral therapy from an individual and population health perspective and to measure Ireland’s progress against UNAIDS targets.

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Abbreviations

ART	Antiretroviral therapy
CSAVR	Case surveillance and vital registration
ECDC	European Centre for Disease Prevention and Control
gbMSM	Gay, bisexual and other men who have sex with men
HIV	Human Immunodeficiency Virus
HPSC	Health Protection Surveillance Centre
HSE	Health Service Executive
IHME	Institute of Health Metrics and Evaluation (IHME)
NHPO	National Health Protection Office
PLHIV	People living with HIV
PrEP	Pre-exposure Prophylaxis
PWID	People who inject drugs
SDG	Sustainable Development Goal
SHP	Sexual Health Programme
UNAIDS	Joint United Nations Programme on HIV/AIDS
VL	Viral Load
WHO	World Health Organization

1.0 Introduction

1.1 Overview

A HIV treatment audit was carried out in 2023 and related to attendance at HIV treatment centres in Ireland in 2022. This was undertaken to understand how individuals attending HIV treatment services in Ireland are doing overall and in different age groups and sub-populations, against the national antiretroviral therapy (ART) recommendation and to measure progress towards targets set by the Joint United Nations Programme on HIV/AIDS (UNAIDS) (1, 2).

Given the changes that have happened globally since the outbreak of the war in Ukraine, there was also a strong desire to determine if Ireland was meeting the needs of those who had been displaced.

1.2 Background

Since ART first became available in the mid 1990's, enormous progress has been made in the treatment of people living with HIV such that, for many, life expectancy is similar to that of the general population. Provision of ART in Ireland is free of charge and is recommended for everyone living with HIV. Effective treatment prevents sexual transmission of HIV such that people with a suppressed HIV viral load do not transmit HIV to their sexual partners. This is often referred to as Undetectable = Untransmittable, or U=U. The successful treatment of HIV is a critical element of overall combination HIV prevention (3).

The global 90-90-90 targets, first established in 2014 by UNAIDS were updated in 2021. The updated targets are by 2025, for 95% of all people living with HIV to know their status, 95% of those diagnosed with HIV to be on treatment and 95% of those on treatment to be virally suppressed. These targets were updated to keep countries on track to meet the Sustainable Development Goal to end the HIV epidemic by 2030 (SDG3). These '95-95-95 targets', are equivalent to 86% of all people living with HIV being virally suppressed.

In Ireland, the first national audit of HIV care was conducted in 2018 and related to attendances in 2017. At that time, a Steering Group with relevant stakeholders came together to determine the most feasible and accurate means to understanding how people living with HIV in Ireland were faring in respect to being on treatment and achieving viral suppression. The data from this audit was then used to inform Ireland's HIV care continuum (4). Whilst the audit gave a good understanding in general terms, it did not provide information in a disaggregated way to determine if there are individuals in need of greater supports to getting on treatment and/or achieving viral suppression.

Between 2017 and 2022, there have been significant changes both globally and nationally in respect of HIV and other aspects of health care, including the global COVID pandemic, the introduction of a HIV Pre-Exposure Prophylaxis (PrEP) programme in Ireland in 2019 and ongoing inward migration of people including some already living with HIV to Ireland. This inward migration was particularly noted in 2022 with the outbreak of the war in Ukraine and Ireland's subsequent humanitarian response which resulted in Ireland providing refuge to [67,448 people displaced from Ukraine between February 2022 and 11 December 2022](#)). The increased inward migration influenced the rise in HIV notifications in Ireland in 2022, where

there were 884 notifications recorded, representing a 68% increase compared to pre-pandemic year 2019 (5). Of the 884 notifications in 2022, 62% (548 notifications) were in people previously diagnosed with HIV outside Ireland. Compared to 2019, there was a 138% increase in HIV diagnoses among people who were previously diagnosed outside Ireland.

1.3 Report Structure

This remainder of the report presents data in three sections:

- **Section 2:** Methods and results from a HIV treatment audit which was carried out in 2023 (relating to attendances in 2022)
- **Section 3:** Ireland's progress towards the 95-95-95 targets set by UNAIDS
- **Section 4:** Discussion

2.0 HIV Treatment Audit

This part of the report presents data on the HIV treatment audit which was carried out in 2023 and reported on attendances for HIV care in 2022.

The HIV treatment audit was undertaken by the Sexual Health Programme (SHP), in collaboration with the eight adult treatment centres (Beaumont Hospital; Cork University Hospital; Galway University Hospital; Limerick University Hospital; Mater Misericordiae University Hospital; St. James's Hospital; St. Vincent's University Hospital; Waterford University Hospital), joint paediatric HIV treatment centres (Children's Health Ireland - Temple St. University Hospital and Children's Health Ireland - Our Lady's Children's Hospital), Health Protection Surveillance Centre (HPSC) and National Health Protection Office (NHPO).

2.1 Establishment of Steering Group

The SHP convened a Steering Group in 2022 to plan and oversee the HIV treatment audit and update Ireland's HIV care continuum. It comprised representation from SHP, HPSC, NHPO and a clinical point of contact from each of the public HIV clinics.

In the absence of a HIV registry and with differing infrastructure within clinics, the Steering Group determined which data points were the most feasible to collect, with the intention of expanding on what was collected during the first audit. It was agreed that disaggregate data would be collected which would provide increased scope for analysis.

For the 2022 audit, the Steering Group sought to achieve a more granular understanding of HIV treatment outcomes in Ireland compared to the earlier audit in 2018. At present, Ireland does not have a systematic way of collating information on outcomes for people living with HIV. Therefore, this and the previous audit were undertaken by determining the most feasible, informative data achievable across HIV treatment sites in Ireland.

2.2 Data Collection

All public HIV services participated in the audit and all data collected related to attendance at a HIV clinic during 2022. As this was an audit of treatment services, ethical approval was not required (6). Where available, the work was registered and approved by the clinic institutional audit office. HIV services provided anonymous datasets to SHP and HPSC between November 2023 and February 2024. Aggregate data on private patients was subsequently provided by some but not all centres.

The European Centre for Disease Prevention and Control (ECDC) standardised definitions for monitoring the four-stage continuum were adapted for Ireland and agreed by the Steering Group (Appendix A) (7).

HIV treatment centres were provided with an Excel spreadsheet with pre-populated drop-down menus (see table 1 below). Recognising the increase in individuals seeking care arising from the war in Ukraine, efforts were made to determine if these individuals were also receiving treatment and achieving viral suppression.¹ It was decided that the most feasible data point to collect was "first attendance in 2022". It was not considered possible to gather

¹ Note: Throughout this report, data are analysed by region of birth

information on gender identity and year of first attendance for HIV care in Ireland due to differences in how these data are recorded by clinics.

Once completed with attendances during 2022, the file was anonymised, password protected and emailed securely to HPSC and SHP. Individual files were combined at HPSC to make a national anonymous dataset.

Table 1: Data items collected from HIV clinics

Data item	Options	Notes
Age (in years)	Free text field	
Sex	Male Female Unknown	It was not considered possible to gather information on gender identity for this audit
Country of Birth ²	Country dropdown	
Mode of transmission	Heterosexual Gay, bisexual and other men who have sex with men (gbMSM) People who inject drugs (PWID) Vertical transmission Other Unknown	
Attended HIV care for the first-time in Ireland in 2022	Yes No Unknown	Collected to reflect the needs of those arriving to Ireland
On ART	Yes No	ART dispensed at least once in 2022
Last viral load	Free-text field	Last viral load documented in 2022

² Note: Reported as region of birth throughout the report

2.3 People attending for HIV care in Ireland in 2022

The total number of people who attended for HIV care in Ireland in 2022 is estimated to be 7,100. This consists of 6,652 people for whom disaggregate data were provided in the treatment audit and an estimate of approximately 500 people who attended in 2022 for private care and who were not included in this treatment audit (personal communication from relevant clinics to SHP).

This section describes the 6,652 people for whom disaggregate data are available.

2.3.1 Age and Sex

Of the 6,652 people who attended for HIV care in Ireland in 2022

- 67% (n=4,481) were male, 33% (n=2,163) were female (sex was not reported for eight people)
- 31% were aged 50 years and older with 34% of males aged 50 years and older versus 28% of females.
- Median age was 44 years (range: 1-87 years) with no difference in median age between males and females.

Figure 1 describes the people attending for care by age group and sex.

Table 2 describes the people who attended for care stratified by sex.

Table 3 describes the people who attended for care stratified by age group (those aged 0-14 years are not included due to low numbers).

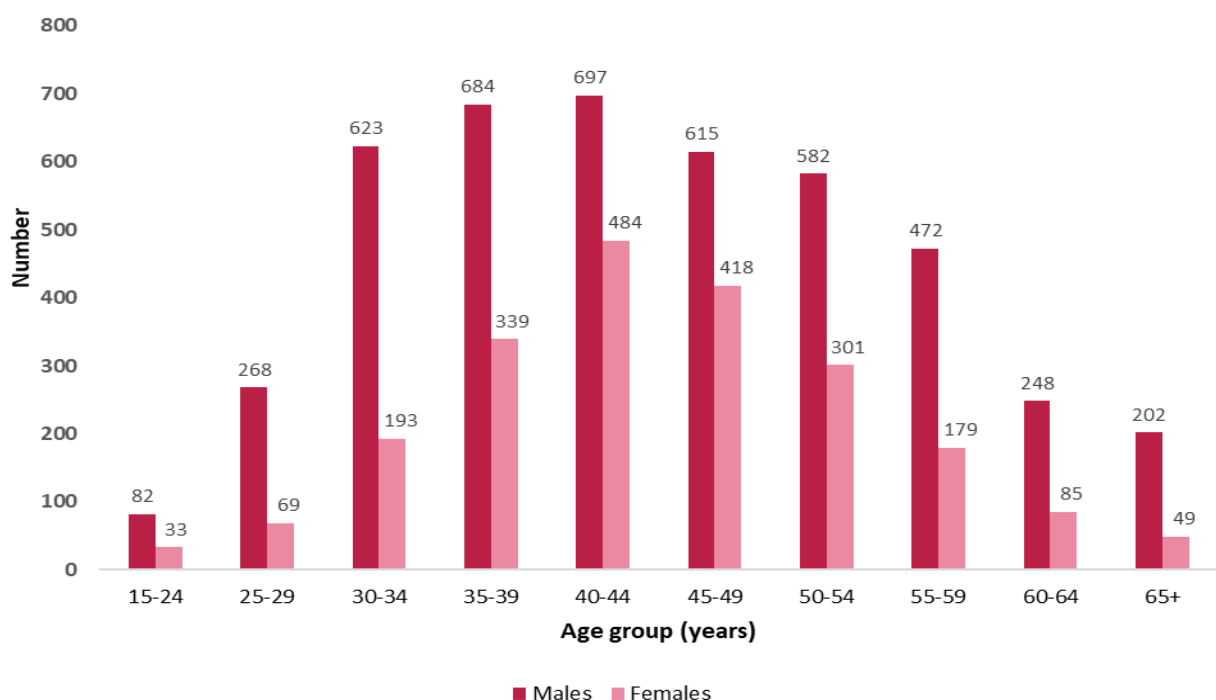


Figure 1: People who attended for HIV care in Ireland in 2022, by age group and sex

Table 2: Demographics of people who attended for HIV care in Ireland in 2022, stratified by sex

		Male	Female	Total ³
Total		4,481	2,163	6652
Age group	0-14 years	7 (0.2%)	13 (0.6%)	20 (0.3%)
	15-24 years	82 (1.8%)	33 (1.5%)	115 (1.7%)
	25-49 years	2,887 (64.4%)	1,503 (69.5%)	4,394 (66.1%)
	50+ years	1,504 (33.6%)	614 (28.4%)	2,122 (31.9%)
	Unknown	1 (0.02%)	0 (0.0%)	1 (0.01%)
Mode of transmission	Hetero	1,026 (22.9%)	1,767 (81.7%)	2,799 (42.1%)
	gbMSM ⁴	2,693 (60.1%)	21 (1.0%)	2,715 (40.8%)
	PWID	414 (9.2%)	155 (7.2%)	569 (8.6%)
	Vertical transmission	57 (1.3%)	60 (2.8%)	117 (1.8%)
	Other	30 (0.7%)	33 (1.5%)	63 (0.9%)
	Unknown	261 (5.8%)	127 (5.9%)	389 (5.8%)
Region of birth	Ireland	1,978 (44.1%)	435 (20.1%)	2,416 (36.3%)
	Sub-Saharan Africa	617 (13.8%)	1,208 (55.8%)	1,827 (27.5%)
	Latin America & Caribbean	827 (18.5%)	43 (2.0%)	870 (13.1%)
	Eastern Europe	189 (4.2%)	157 (7.3%)	347 (5.2%)
	Western Europe	263 (5.9%)	45 (2.1%)	308 (4.6%)
	Central Europe	230 (5.1%)	50 (2.3%)	280 (4.2%)
	South and Southeast Asia	145 (3.2%)	39 (1.8%)	185 (2.8%) ⁵
	Other	89 (2.0%)	10 (0.5%)	99 (1.5%)
	Unknown	143 (3.2%)	176 (8.1%)	320 (4.8%)
First time attendance in Ireland in 2022	Yes	678 (15.1%)	336 (15.5%)	1,017 (15.3%)
	No	3,803 (84.9%)	1,827 (84.5%)	5,635 (84.7%)

³ Sex was not reported for eight people

⁴ Data collected in this audit was by sex at birth and not gender identity.

Table 3: Demographics of people who attended for HIV care in Ireland in 2022, stratified by age group⁶

		Age group			Total ⁷
		15-24 yrs	25-49 yrs	50+ yrs	
Total		115	4394	2122	6,652
Mode of transmission	Hetero	12 (10.4%)	1,826 (41.6%)	961 (45.3%)	2,799 (42.1%)
	gbMSM	50 (43.5%)	1,951 (44.4%)	713 (33.6%)	2,715 (40.8%)
	PWID	0 (0.0%)	315 (7.2%)	254 (12.0%)	569 (8.6%)
	Vertical transmission	50 (43.5%)	49 (1.1%)	0 (0.0%)	117 (1.8%)
	Other	0 (0.0%)	39 (0.9%)	24 (1.1%)	63 (0.9%)
	Unknown	3 (2.6%)	214 (4.9%)	170 (8.0%)	389 (5.8%)
Region of birth	Ireland	23 (20.0%)	1,223 (27.8%)	1,162 (54.8%)	2,416 (36.3%)
	Sub-Saharan Africa	39 (33.9%)	1,252 (28.5%)	529 (24.9%)	1827 (27.5%)
	Latin America & Caribbean	22 (19.1%)	818 (18.6%)	30 (1.4%)	870 (13.1%)
	Eastern Europe	11 (9.6%)	270 (6.1%)	61 (2.9%)	347 (5.2%)
	Western Europe	1 (0.9%)	185 (4.2%)	122 (5.7%)	308 (4.6%)
	Central Europe	6 (5.2%)	229 (5.2%)	45 (2.1%)	280 (4.2%)
	South & Southeast Asia	5 (4.3%)	141 (3.2%)	38 (1.8%)	185 (2.8%)
	Other	0 (0.0%)	62 (1.4%)	37 (1.7%)	99 (1.5%)
	Unknown	8 (7.0%)	214 (4.9%)	98 (4.6%)	320 (4.8%)
First time attendance in Ireland in 2022	Yes	47 (40.9%)	821 (18.7%)	141 (6.6%)	1,017 (15.3%)
	No	68 (59.1%)	3,573 (81.3%)	1,981 (93.4%)	5,635 (84.7%)

⁶ Breakdown of 0-14 year age group not included due to small numbers

⁷ Age was not reported for one person

2.3.2 Mode of transmission

Of the 6,652 people who attended for HIV care in Ireland in 2022, mode of transmission was reported as follows:

- 41% gbMSM (n=2,715)
- 42% heterosexual (n=2,799)⁸
 - 27% female (n=1,767)
 - 15% male (n=1,026)
- 9% people who inject drugs (PWID) (n=569)
 - 2% female (n=155)
 - 7% male (n=414)
- 2% vertical transmission (n=117)
- 0.9% Other (n=63)

Figure 2 shows mode of transmission by age group. In general, people who inject drugs and heterosexual males were older with a median age of 48 years, compared to a median age of 44 years among heterosexual females and 40 years among gbMSM. The median age among cases acquired through vertical transmission was 23 years.

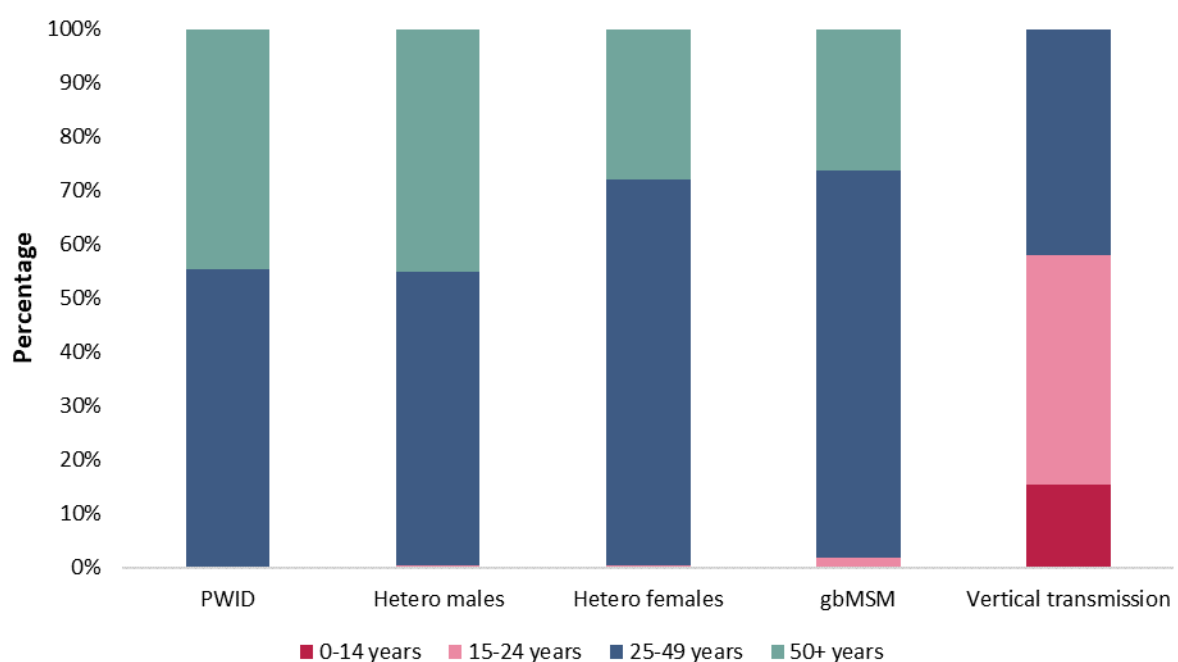


Figure 2: People who attended for HIV care in Ireland in 2022, by age group and mode of transmission

⁸ Sex was not reported for 6 heterosexual people

2.3.3 Region of Birth

Individuals who attended for HIV care in Ireland in 2022 were born in over 130 different countries.

Just over a third (36%) of those attending for HIV care in Ireland were born in Ireland. The remaining people were born in sub-Saharan Africa (28%), Latin America and Caribbean (13%), Eastern Europe (5.2%), Western Europe (4.6%), Central Europe (4.2%) and South and South East Asia (2.8%).

Figure 3 shows the region of birth by sex. Most individuals born in Latin America and Caribbean (95%), Western Europe (85%), Central Europe (82%), South and Southeast Asia (79%) and Ireland (82%) were male. The majority (66%) of individuals born in sub-Saharan Africa were female. The sex breakdown for those born in Eastern Europe was 55% male and 45% female.

Figure 4 describes the data by region of birth and age group. There are differences in age group by region of birth with 48% of individuals born in Ireland aged 50 years and older compared to 3% of those who were born in Latin America and Caribbean.

Figure 5 shows region of birth by mode of transmission. The majority of gbMSM (74%) were born in either Ireland (44%) or Latin America and Caribbean (30%). Those born in sub-Saharan Africa accounted for the majority of heterosexual females (63%), almost half (47%) of heterosexual males and those infected through vertical transmission (49%). Eighty percent of people who inject drugs were born in Ireland.

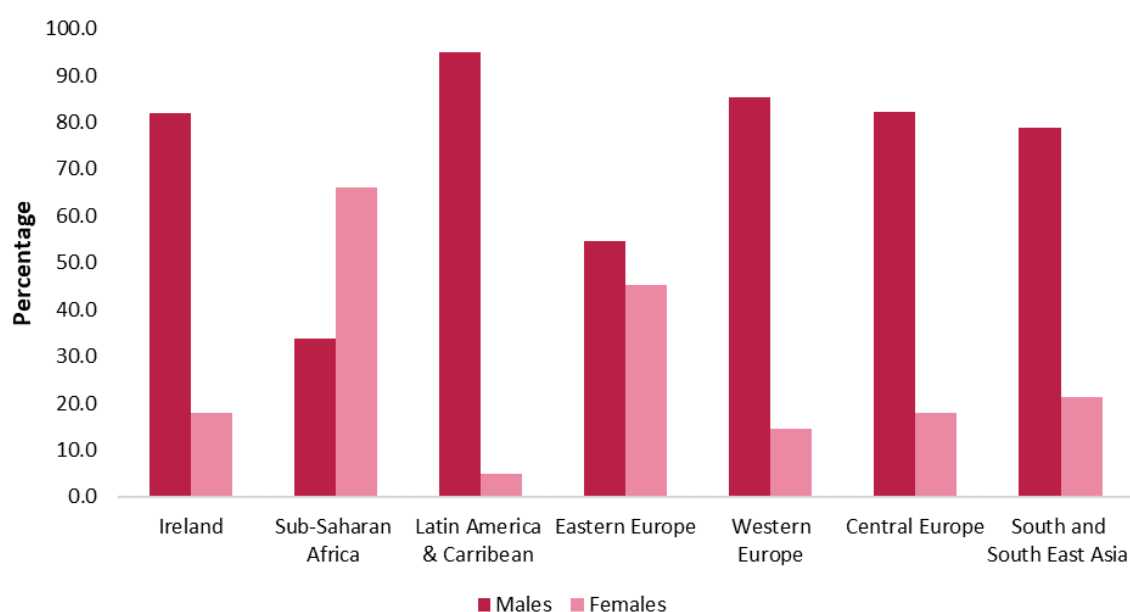


Figure 3: People attending for HIV care in Ireland in 2022, by sex and region of birth

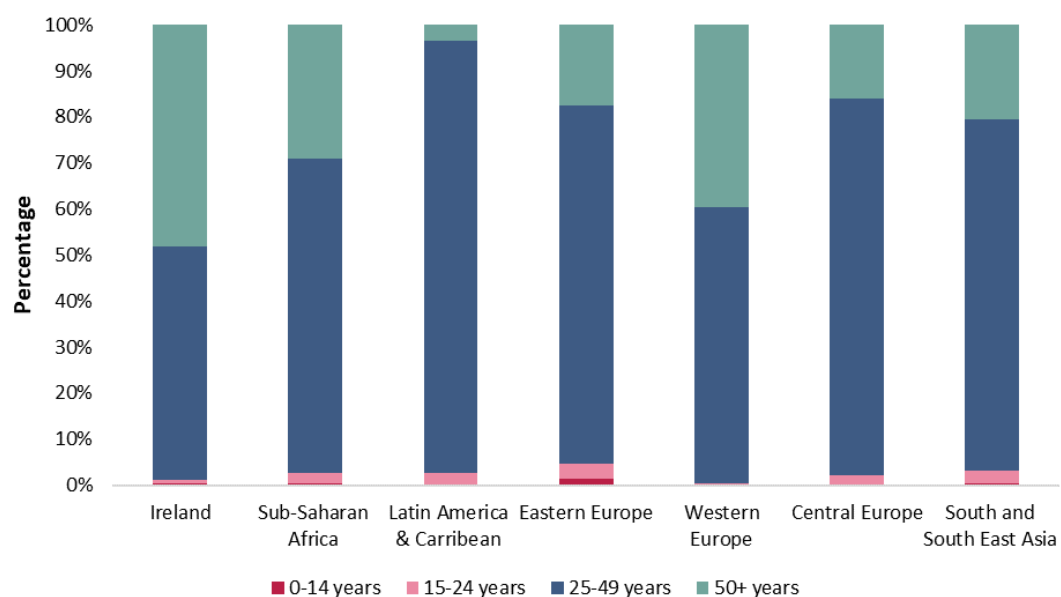


Figure 4: People attending for HIV care in Ireland in 2022, by age group and region of birth

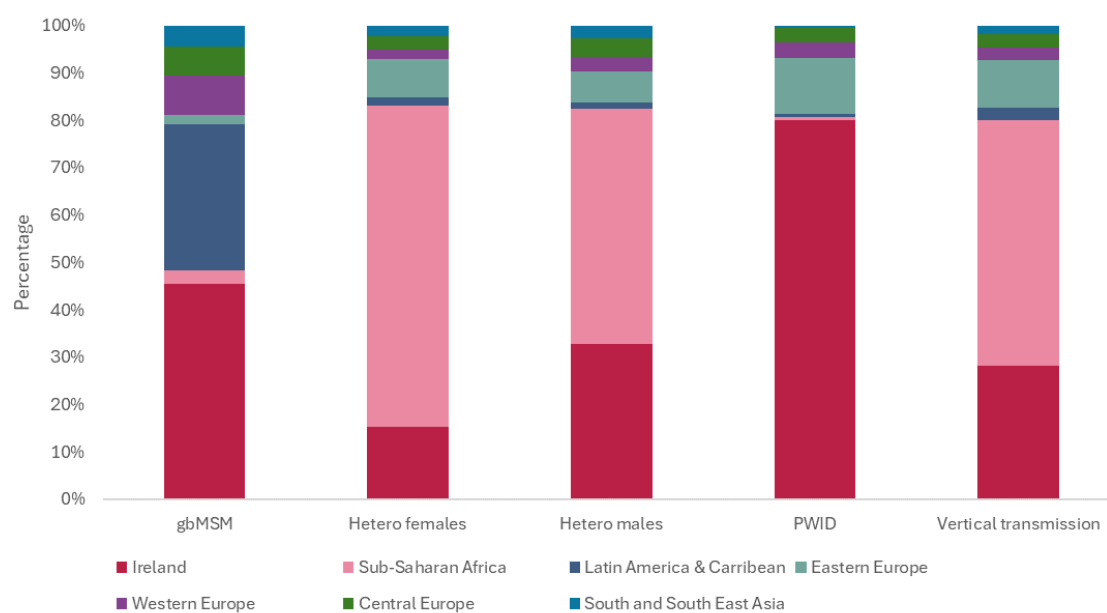


Figure 5: People attending for HIV care in Ireland in 2022, by mode of transmission and region of birth

2.3.4 First time attendees

Of the 6,652 people who attended for HIV care in Ireland in 2022, 15% (n=1,017) were attending for the first time.

Figure 6 describes the proportion attending for the first time by sex, age group, mode of transmission and region of birth. A higher proportion of first-time attendees was seen among younger people aged 0-14 years (40%) and 15-24 years (41%), those from Latin America and Caribbean (33%) and those from Eastern Europe (54%).

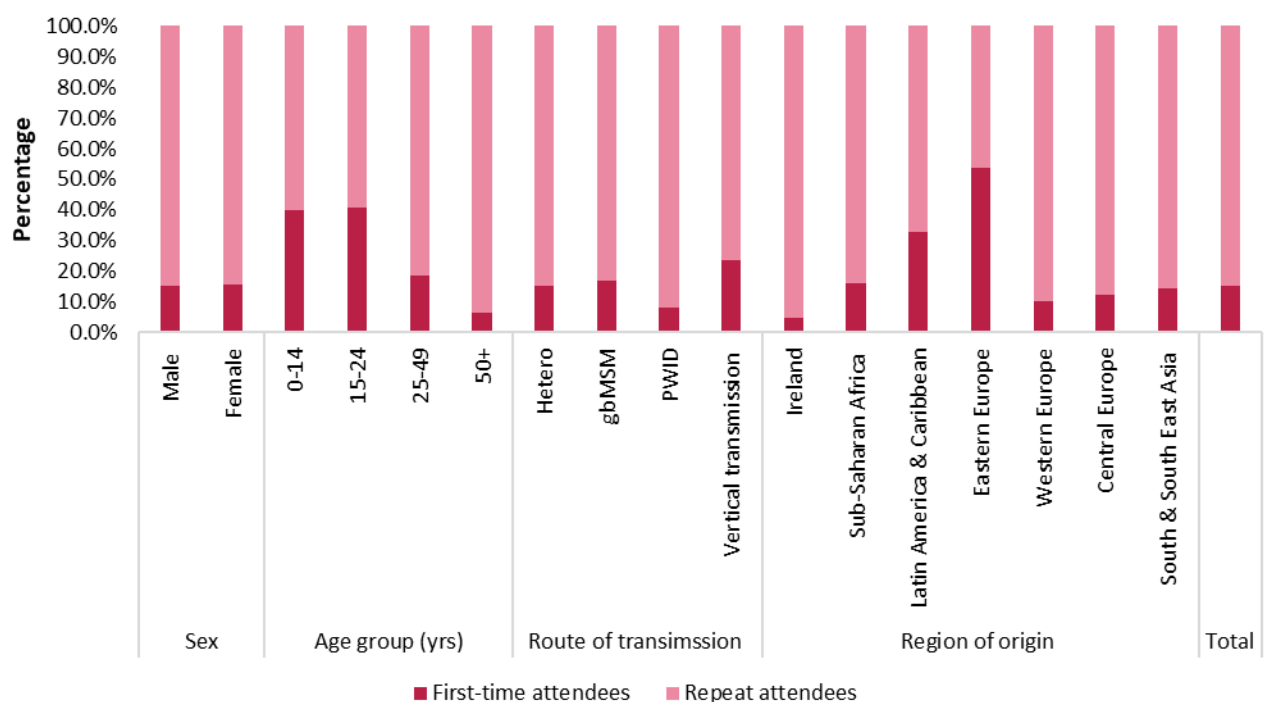


Figure 6. Proportion of people attending for HIV care in Ireland who attended for the first-time or were repeat attendees in 2022

2.4 ART and Viral Suppression

For people diagnosed with HIV, rapid linkage to care and treatment, and subsequent retention in care on treatment with viral suppression are critical for improving health and reducing onward transmission.

In Ireland, ART for HIV treatment is dispensed to individuals during their HIV clinic appointments by on-site pharmacists.

2.4.1 ART

Of the 6,652 people who attended for HIV care in Ireland in 2022, ART was dispensed for 6,621 people (99.5%), not dispensed for 28 people (0.4%), and unknown for 3 people.

- Of the 28 people where it was reported that ART was not dispensed in 2022, 23 were reported to be virally suppressed (<200 copies per ml), suggesting that they may be people with spontaneous HIV viral control (sometimes known as elite controllers).

Table 4 describes the proportion of people in each demographic group where ART was dispensed in 2022. In general, the proportion where ART was dispensed was very high in all groups (>98%), including those who first attended for care in 2022 and the only statistically significant differences were noted by sex and route of transmission.

2.4.2 Viral suppression

Of the 6,652 people who attended for HIV care in 2022, 6,485 (97.5%) were virally suppressed (cut off <200 cpm), 147 were reported not to be virally suppressed, nine did not have a viral load test in 2022 and 11 were unknown. Of those on treatment, 97.9% were virally suppressed.

Table 5 describes the proportion of people on treatment who were virally suppressed in each demographic group.

There were statistically significant differences between the proportion of people who were virally suppressed by

- Sex: a higher proportion of males (98.1%) were virally suppressed compared to females (97.7%).
- Route of transmission: the group with the lowest proportion virally suppressed was amongst people who inject drugs (92.6%) compared to other groups where the proportion ranged from 97.9% to 98.8%.
- Region of origin: those with the lowest proportion virally suppressed were from Eastern Europe (94.8%) compared to other regions which ranged from 97.2% to 99.0%.
- First attendance in Ireland in 2022: a lower proportion (95.1%) virally suppressed among those attending for the first time in 2022 compared to people who were not attending for the first time (98.5%).

There was no significant difference observed by age group.

Table 4: Number of people attending for HIV care in Ireland in 2022 and proportion receiving ART

		Total attending	On ART		P value ⁹
			No.	% of total	
Total		6,652	6,621	99.5	
Sex	Male	4,481	4,469	99.7	p < 0.01
	Female	2,163	2,144	99.1	
	Unknown	8	8	100.0	
Age group	0-14	20	20	100.0	ns
	15-24	115	114	99.1	
	25-49	4,394	4,374	99.5	
	50+	2,122	2,112	99.5	
	Unknown	1	1	100.0	
Mode of transmission	Hetero	2,799	2,778	99.2	p < 0.01
	Hetero male	1,026	1,022	99.6	
	Hetero female	1,767	1,750	99.0	
	gbMSM	2,715	2,712	99.9	
	PWID	569	564	99.1	
	Vertical transmission	117	117	100.0	
	Other	63	62	98.4	
	Unknown	389	388	99.7	
Region of origin	Ireland	2,416	2,405	99.5	ns
	Sub-Saharan Africa	1,827	1,817	99.5	
	Latin America and Caribbean	870	869	99.9	
	Eastern Europe	347	344	99.1	
	Western Europe	308	306	99.4	
	Central Europe	280	280	100.0	
	Other	284	282	99.3	
First time attendance in Ireland in 2022	Yes	1,017	1,008	99.1	ns
	No	5,635	5,613	99.6	

⁹ p value relates to results of chi-square tests; a p-value that is less than or equal to the 0.05 significance level indicates that the observed values are different to the expected values.

Table 5: Number of people on treatment for HIV in 2022 and proportion virally suppressed

		Number on ART	Virally Suppressed (<200)		P value ¹⁰
			Number	% of those on ART	
Total		6621	6462	97.6	
Sex	Male	4469	4374	97.9	p < 0.05
	Female	2144	2081	97.1	
	Unknown	8	7	87.5	
Age group	0-14	20	20	100.0	ns
	15-24	114	111	97.4	
	25-49	4374	4260	97.4	
	50+	2112	2070	98.0	
	Unknown	1	1	100.0	
Mode of transmission	Hetero	2778	2708	97.5	p < 0.05
	Hetero male	1022	997	97.6	
	Hetero female	1750	1706	97.5	
	gbMSM	2712	2677	98.7	
	PWID	564	519	92.0	
	Vertical transmission	117	115	98.3	
	Other	62	61	98.4	
	Unknown	388	382	98.5	
Region of origin	Ireland	2405	2330	96.9	p < 0.05
	Sub-Saharan Africa	1817	1783	98.1	
	Latin America and Caribbean	869	861	99.1	
	Eastern Europe	344	324	94.2	
	Western Europe	306	301	98.4	
	Central Europe	280	278	99.3	
	Other	282	274	97.2	
First time attendance in 2022	Yes	1008	953	94.5	p < 0.05
	No	5613	5509	98.1	

¹⁰ p value relates to results of chi-square tests; a p-value that is less than or equal to the 0.05 significance level indicates that the observed values are different to the expected values.

3.0 Ireland's progress towards 95-95-95 targets

This section of the report presents data on Ireland's progress towards the 95-95-95 testing, treatment and viral suppression targets set by UNAIDS (8).

3.1 Background

Estimates of HIV incidence, the number of people living with HIV, and the proportion undiagnosed, are important for understanding and responding to the HIV epidemic. Modelled estimates and the confidence intervals around these provide a scientifically appropriate way of describing the HIV epidemic and monitoring trends. Modelled estimates are required because it is not possible to count the exact number of new infections and number of people living with HIV.

In 2021, UNAIDS released a new set of ambitious targets calling for 95% of all people living with HIV to know their HIV status, 95% of all people diagnosed with HIV to be on treatment, and 95% of all people on treatment to have reached viral suppression by 2025 (see table below).

	2025 target	Numerator	Denominator
The first 95 (indicator 1)	At least 95% of people living with HIV know their HIV status	Number of people living with HIV who know their HIV status	Number of people living with HIV
The second 95 (indicator 2)	At least 95% of people who know their HIV status are on treatment	Number of people living with HIV who are on treatment	Number of people living with HIV who know their HIV status
The third 95 (indicator 3)	At least 95% of people on treatment have a suppressed viral load	Number of people living with HIV who have a suppressed viral load	Number of people living with HIV who are on treatment

Note: the denominator of the second 95 is the numerator of the first 95 (green boxes), and the denominator of the third 95 is the numerator of the second 95 (blue boxes).

The same targets are often presented in a second, different way, referred to as 'cascade', where the denominator (number of people living with HIV) remains the same for each indicator (see table below).

	2025 target	Numerator	Denominator
HIV cascade indicator 1 (same as first 95)	At least 95% of people living with HIV know their HIV status	Number of people living with HIV who know their HIV status	Number of people living with HIV
HIV cascade indicator 2	At least 90% of people living with HIV are on treatment	Number of people living with HIV who are on treatment	Number of people living with HIV
HIV cascade indicator 3	At least 86% of people living with HIV have a suppressed viral load	Number of people living with HIV who have a suppressed viral load	Number of people living with HIV

Note: in a cascade, the denominator (number of people living with HIV) remains the same for each indicator

3.2 Data inputs

A UNAIDS led process for developing estimates was chosen for Ireland, whereby HPSC provided input into the development of estimates, reviewed outputs and approved the results. UNAIDS carried out the modelling using Spectrum modelling software.

HPSC provided demographic, epidemiological and programme data to UNAIDS (see Appendix C). These data were provided from the national HIV surveillance system, the HIV treatment audit and from Children's Health Ireland. Some of these data were used directly in the modelling estimates and some were to provide context to the Irish data. Demographic data on population size, age and sex distribution, life expectancy, fertility, and other parameters are provided within the modelling software by UNAIDS.

3.3 Model fitting

Within Spectrum, there are various methods of modelling the epidemic, depending on the nature of the epidemic. For countries such as Ireland, where HIV transmission occurs largely among key populations at higher risk of HIV (concentrated epidemic), and where there are robust HIV case-based reporting and strong vital registration systems, the CSAVR (case surveillance and vital registration) module is used (9). The modelling process is iterative, in which models are reviewed and amended based on the findings and understanding of the HIV epidemic, with some modification of inputs to obtain a best fit.

Once the Irish data were inputted to Spectrum, the tool searched for a HIV incidence curve which matched as closely as possible the estimates of new HIV diagnoses and AIDS deaths. Once this incidence curve was reviewed, modified accordingly and agreed by HPSC and UNAIDS, it was used to derive estimated national adult HIV prevalence, number of people living with HIV and number of new HIV infections, among other estimates by age and sex.

3.4 Uncertainty in modelling process

The estimation software calculates uncertainty bounds (confidence intervals) around each estimate. These define the range within which the true value lies. UNAIDS is confident that the actual numbers of people living with HIV and number of new infections lie within the reported ranges.

The number of assumptions required to arrive at the estimate also contributes to the extent of the ranges around the estimates: in brief, the more assumptions, the wider the uncertainty range, since each assumption introduces additional uncertainties. Over time, more and better data from countries steadily reduces uncertainty.

In particular, the issue of inward and outward migration and determining whether HIV was acquired inside or outside the country is challenging for generating estimates for Ireland. While Spectrum does not explicitly account for out-migration of those living with HIV, there are in- and out-migration components to population estimates obtained from WPP 2017 (<https://worldpopulationprospects.info/country/ireland/>), Institute of Health Metrics and Evaluation (IHME) and the World Health Organization (WHO). This assumes that the in- and out-migration of HIV positive people follows the same pattern as the general population, which may or may not be a correct assumption.

In addition, a large proportion of HIV diagnoses in Ireland are among people who have been previously diagnosed outside Ireland (62% in 2022). To estimate incidence in Ireland, the final model was run with HIV diagnoses excluding people who were previously diagnosed HIV positive abroad.

3.5 Estimates for Ireland

UNAIDS generated estimates for Ireland and shared these with HPSC for discussion on plausibility and best fit. The national estimates are produced with oversight from the UNAIDS Reference Group on Estimates, Modelling and Projections (www.epidem.org).

After several iterations, the final set of estimates was formally approved by UNAIDS and HPSC in May 2024 and are shown in Table 6. The estimates are also publicly available on the UNAIDS website at <https://www.unaids.org/en/regionscountries/countries/ireland>

The total number of people living with HIV is estimated based on empirical modelling by UNAIDS. It includes people living with diagnosed and undiagnosed HIV. This was estimated to be 8,000 at the end of 2022. This is likely to be an over-estimate as it is difficult to fully account for out-migration of people living with HIV in the model. The true value lies between the 95% confidence intervals of 6,800-9,000 people (see figure 7).

Figure 8 describes the estimated number of new infections from 2010 to 2023. The number of new infections in 2022 was estimated to be <200 (95% CI: <200-<500).

Table 6: HIV estimates for Ireland, 2022

Indicator	Rounded estimates (with 95% CI) ¹¹
Number of people living with HIV	8,000 [6,800– 9,000]
HIV prevalence rate (%)	0.2 [0.2 - 0.3]
Number of new infections	<200 [<200 - <500]
HIV incidence (per 1,000 population)	<0.1 [<0.1 - <0.1]
Number of PLHIV who know their status	7,228
Number of PLHIV who are on ART	7,120
Number of PLHIV who have suppressed viral loads ³	7,033

¹¹ The uncertainty interval has been calculated based on the uncertainty that arises from the modelling to obtain the estimated number of PLHIV. This does not capture the additional uncertainty arising from the data.

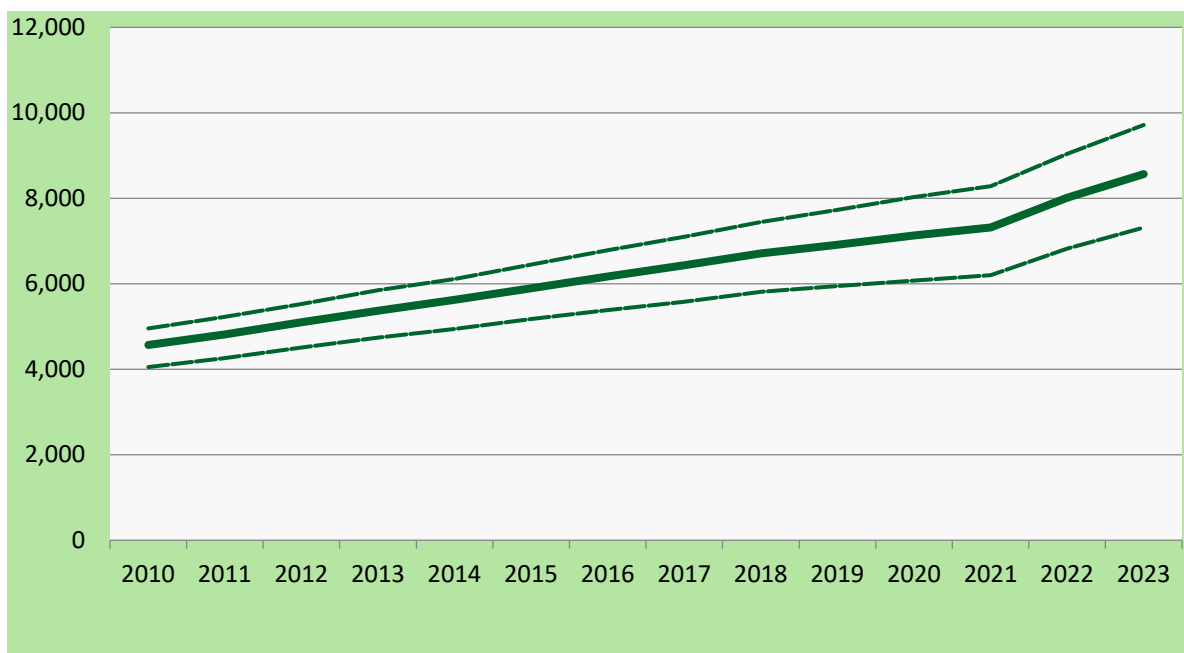


Figure 7: Estimated numbers of people living with HIV in Ireland, 2010 to 2023

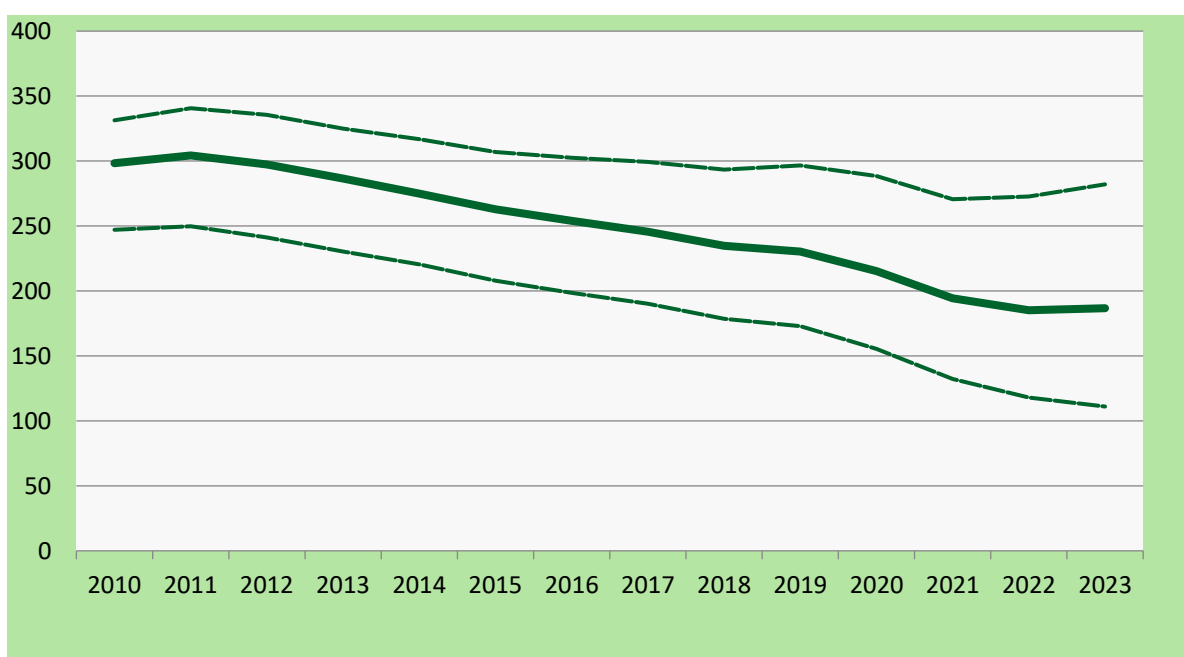


Figure 8: Estimated numbers of new HIV infections 2010 to 2023¹²

¹² Solid line represents the point estimate for each year and the dotted lines represent the lower and upper 95% confidence intervals

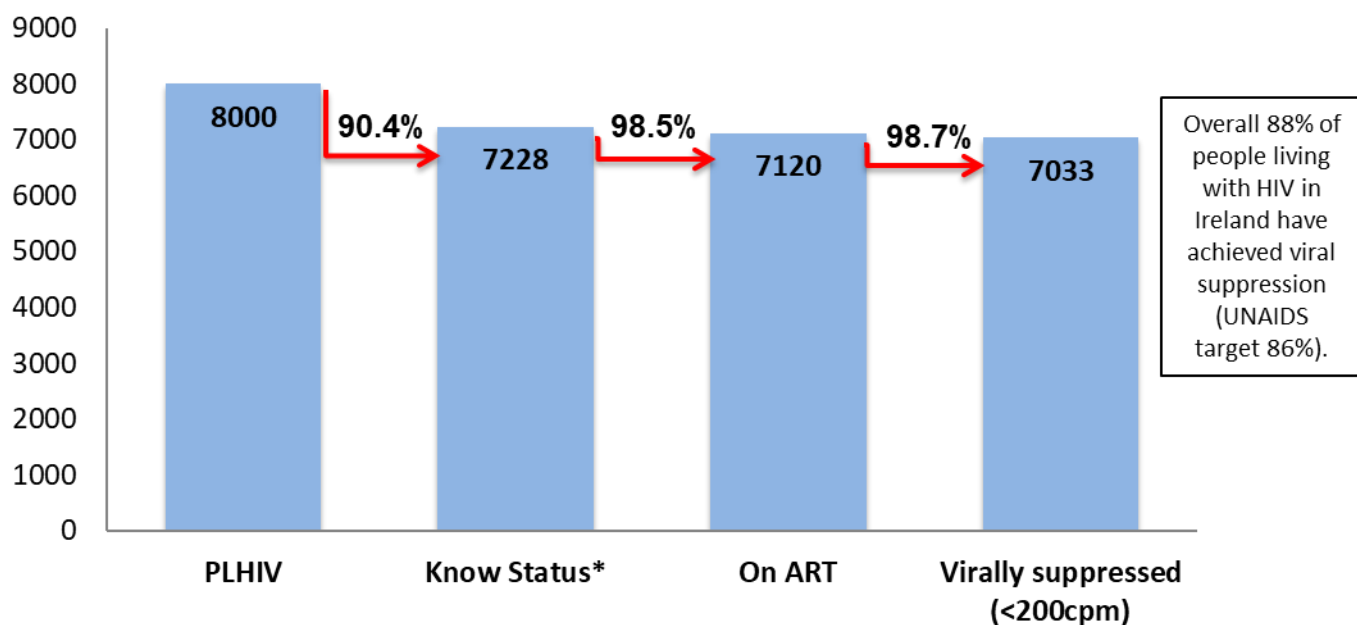
3.6 Ireland's progress towards UNAIDS 95-95-95 targets

Ireland's progress towards UNAIDS 95-95-95 targets is described below and in Figure 9. In summary, Ireland has achieved 90-99-99 but it should be noted that since "number in care" has been used instead of "number who know their status", the first "95" is an under-estimate and the second "95" is an over-estimate.

Achieving the UNAIDS 95-95-95 targets translates to 86% of people living with HIV achieving viral suppression. Ireland has achieved this target with 88% (95% CI: 75% to >98%) of those living with HIV having reached viral suppression.

1st UNAIDS 95 Proportion of people living with HIV who know their status* 90.4% for Ireland True value lies within the 95% confidence intervals (77% to >98%).
2nd UNAIDS 95 Proportion of people who know their status that are on treatment 98.5% for Ireland True value lies within the 95% confidence intervals (84% to >98%).
3rd UNAIDS 95 Proportion of people on treatment who are virally suppressed 98.7% for Ireland True value lies within the 95% confidence intervals (84% to >98%)

**Note: For Ireland, the "number in care" is used instead of the "number who know their status" and therefore is an under-estimate. This affects our estimate for the first "95", making it lower than it really is and affects our second "95" making it higher than it really is.*



Proportion living with HIV who know their status (90.4%): 95% CI: 77% to >98%
 Proportion of those who know their status who are on treatment (98.5%): 95% CI: 84% to >98%
 Proportion of those on treatment who have a suppressed viral load (98.7%): 95% CI: 84% to >98%

Figure 9: Progress towards the 95-95-95 UNAIDS targets, Ireland, 2022

**Note: For Ireland, the “number in care” is used instead of the “number who know their status” and therefore is an under-estimate. This affects our estimate for the first “95”, making it lower than it should be and affects our second “95” making it higher than it should be.*

3.7 UNAIDS 2nd and 3rd targets among key populations and groups

UNAIDS targets also apply to all sub-populations and age groups of people living with HIV. While the first 95 is not currently available for sub-populations and age groups in Ireland, the 2nd and 3rd targets are available and are shown in Figure 10 (by sex, age group, mode of transmission, region of birth and whether first attended in 2022).

In summary:

- All groups have reached the 2nd UNAIDS target (>95% of people who know their status¹³ are on treatment).
- Whilst overall viral suppression rates are very high, the following groups have not reached the 3rd UNAIDS target (>95% of people on treatment reaching viral suppression)
 - People who inject drugs (92.6%)
 - People from Eastern Europe (94.2%)
 - First time attended (94.5%)
- Taking a closer look at individual risk groups, the following people have not reached the 3rd UNAIDS target (data not shown)
 - Heterosexuals: those aged 15-24 years¹⁴; those born in Eastern Europe
 - People who inject drugs: males and females; all age groups (25-49 years and 50+years); those born in Ireland

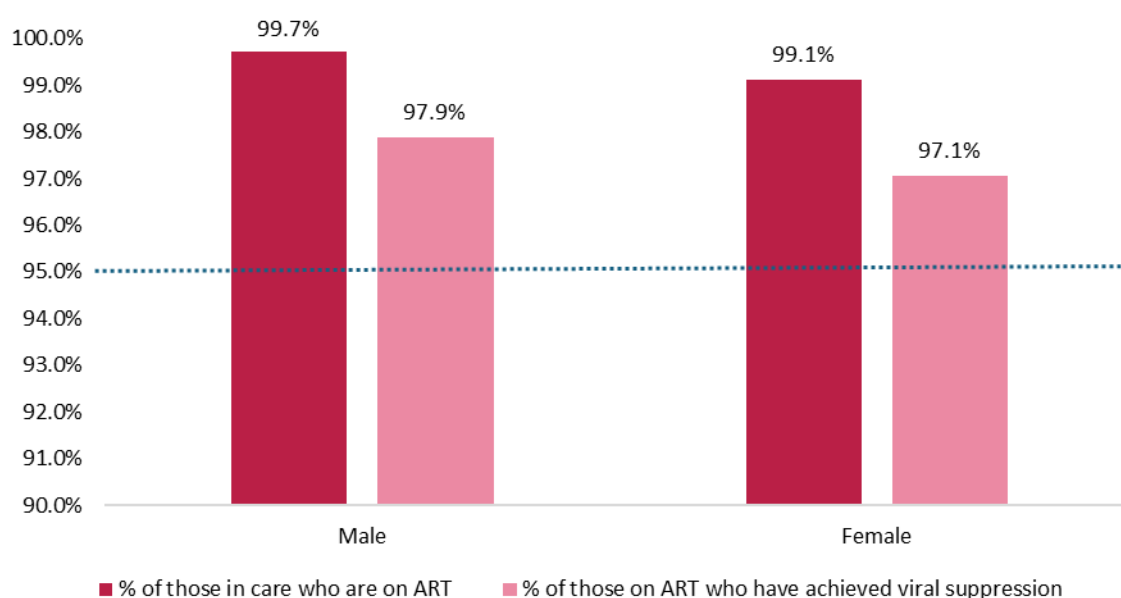


Figure 10a: Second and Third UNAIDS targets for those who attended for HIV care in 2022 by sex

¹³ Attending for HIV care being used as a proxy for “know status”

¹⁴ Note small numbers in this group (11/12 had reached viral suppression)

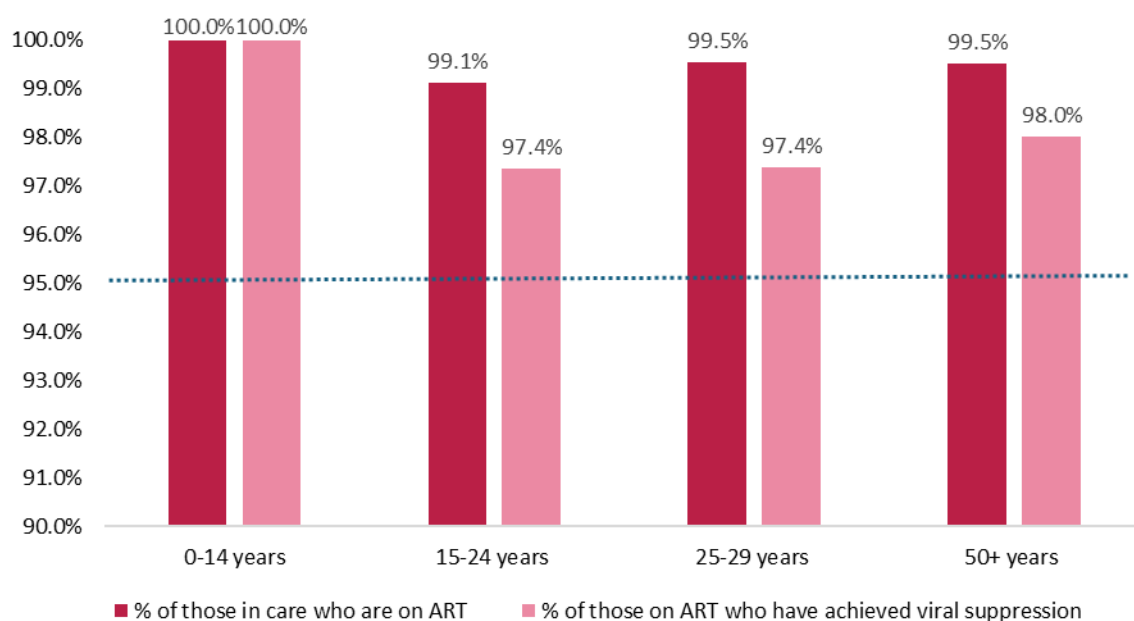


Figure 10b: Second and Third UNAIDS targets for those who attended for HIV care in 2022 by age group

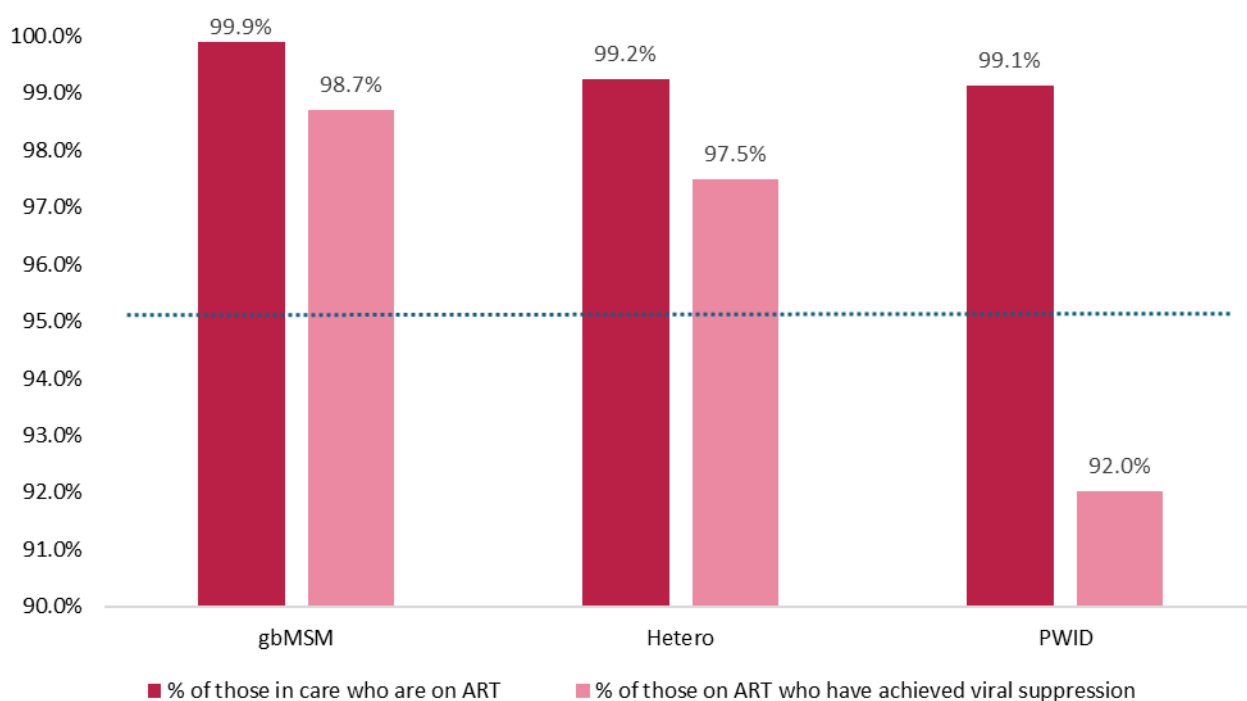


Figure 10c: Second and Third UNAIDS targets for those who attended for HIV care in 2022 by mode of transmission

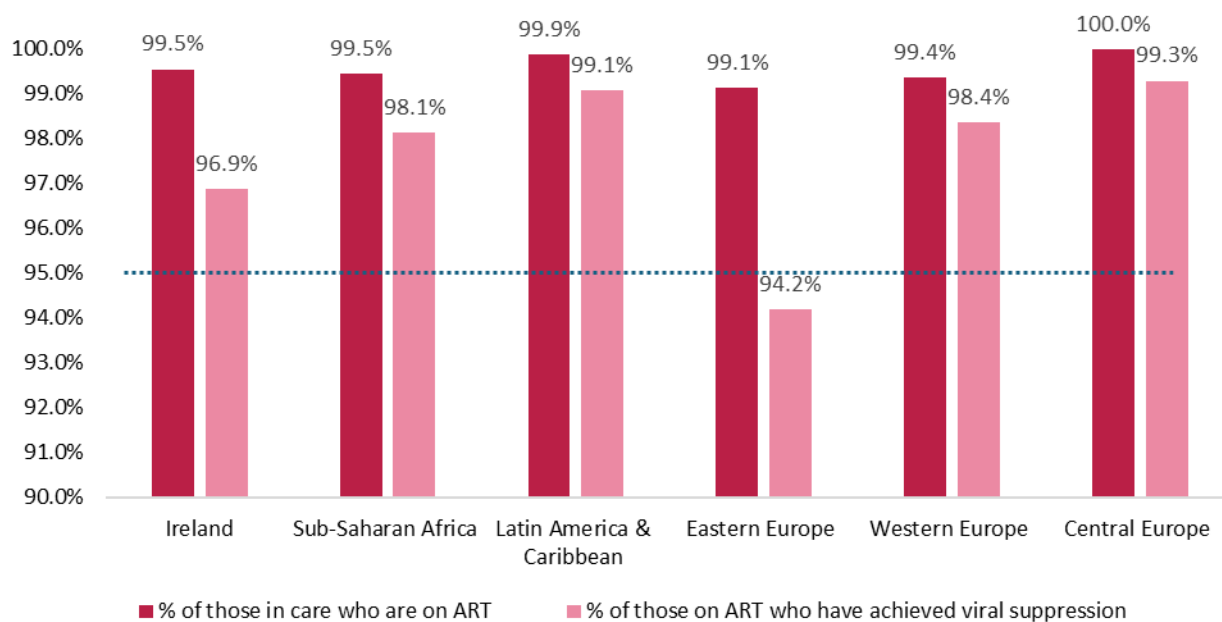


Figure 10d: Second and Third UNAIDS targets for those who attended for HIV care in 2022 by region of birth

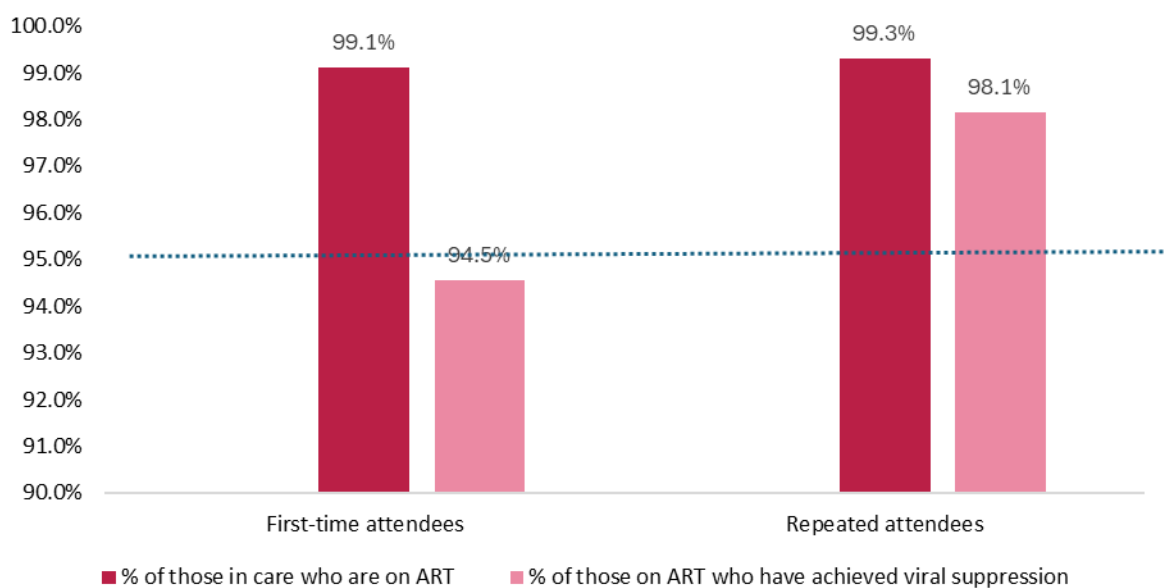


Figure 10e: Second and Third UNAIDS targets for those who attended for HIV care in 2022 by first time attendance

4.0 Discussion

4.1 HIV treatment audit

The national HIV treatment audit carried out in 2023 provides a more detailed description of those in HIV care in Ireland than previously available, due to disaggregate data collection from each site. The audit shows that those attending for HIV care in Ireland are an ageing cohort with almost a third aged over 50 years. It also provides useful information on the size of key populations who are attending for HIV care in Ireland. It highlights that people attending for HIV care in Ireland are from over 130 countries, highlighting the need for services to have the capability to respond to the language and cultural needs of those attending.

The audit demonstrates that almost all those attending for HIV care are receiving treatment, which is very welcome. There are small but important differences among groups in relation to being on treatment.

Similarly, the audit has demonstrated that most people in HIV care in Ireland have reached viral suppression. However, a lower proportion of some groups, notably people who inject drugs, those born in Eastern Europe and those who first attended in 2022, have reached viral suppression. Whilst the duration of treatment may be a factor in the lower viral suppression rate in people who first attended in 2022, 60% of those who were newly diagnosed in 2022 already knew their HIV diagnosis and many are likely to have arrived in Ireland on treatment. Further statistical analysis is planned to determine which factors are independently associated with lower rates of viral suppression.

Given the advances that have been made in HIV care, it is important to identify individuals who have not reaped the benefits of these advances and examine how best to meet their needs. The recent availability of long-acting injectable agents may form part of the solution for individuals in our HIV cohort for whom daily oral therapy is not suitable. This audit data presents evidence that whilst overall the picture is good, there is inequity of viral suppression. This evidence can be used to support efforts to develop models of care delivery that meet the needs of all people living with HIV.

4.2 Progress towards UNAIDS targets

UNAIDS has set a goal to end the AIDS epidemic by 2030 and has published targets to achieve this goal. Using the data to measure progress against UNAIDS targets, allows countries to monitor the effectiveness of specific areas of their HIV response.

Modelling of the HIV epidemic in Ireland showed that there are approximately eight thousand people living with HIV in Ireland and 88% (95% CI: 76% to >98%) of all those living with HIV had reached viral suppression. This surpasses the target set by UNAIDS (86%) and shows a considerable improvement when compared to an earlier treatment audit carried out in 2018 which found that an estimated 76% (64% - 84%) of people living with HIV in Ireland had reached viral suppression. Despite this progress, there remain individuals who are unaware of their HIV status, individuals who are not on treatment and individuals on treatment who have not reached viral suppression. Data from the treatment audit allows us

to focus our efforts on these groups to afford them the benefits of treatment from an individual and population health perspective.

While the first “95” for Ireland is lower than the target set by UNAIDS, it is important to note that due to limitations around obtaining this estimate for Ireland, it is an under-estimate (see limitations section below). It is vital to consider the confidence intervals which define a range around which the true value lies.

Modelling also shows that the incidence of HIV reduced in Ireland over several years. This is very welcome and is a vital step in the overall aim of ending the HIV epidemic.

Comparing the data from Ireland with global data, approximately 86% [95% CI: 69%–>98%] of people living with HIV worldwide knew their HIV status in 2023 (10). Of those diagnosed, approximately 89% [95% CI: 71%–>98%] were on treatment and 93% [95% CI: 74–>98%] of people on treatment had a suppressed viral load. In 2023, almost three in four adults (73% [95% CI: 66%–81%]) living with HIV globally had a suppressed viral load. Within the WHO European region, 83% of all people living with HIV knew their status, 84% of those diagnosed were on treatment and 93% of those on treatment were virally suppressed. Overall, 65% of those living with HIV were virally suppressed (11).

While this work did not address the issue of quality of life for those living with HIV or HIV-related stigma, it is acknowledged that tackling these issues is a critical part of reaching the UNAIDS targets, which include a goal to ensure that 95% of PWHIV on ART experience a good health-related quality of life and for HIV-related stigma to be experienced by less than 10% of people living with HIV by 2025 (12).

4.3 Future work

Continued work and collaboration are vital to improve the modelling of estimates for Ireland and in particular to determine the number of people living with diagnosed and undiagnosed HIV in Ireland. Spectrum is being modified and improved on an ongoing basis by UNAIDS, based on the latest available scientific and statistical methods. UNAIDS are continuing to address the issues of migration within the UNAIDS Reference Group and with input from ECDC and other countries in the European Union. It is also hoped that the HIV modelling tool developed by ECDC can be explored. This may help to validate results from Spectrum and provide more accurate estimates. It is also hoped that it will be possible to generate estimates by key population in future versions of Spectrum or within the ECDC modelling tool. This work would require additional modelling resources.

The development of a HIV registry in Ireland would provide data which would more accurately estimate the number of people living with HIV, the number of people lost to follow up, number who died and number who emigrated. It would improve the accuracy of the estimates for Ireland and measure our progress towards UNAIDS targets. It could also provide many other benefits including medicine management, case management, location of patients and planning of services and facilitate clinical and epidemiological research.

In the absence of a HIV registry, it will be important to repeat the HIV treatment audit at regular intervals and improve the data collected to ensure that the population of people living with HIV have full benefits of treatment. It will be important to address the issue of those who are lost to follow up in future audits. The information within the audits can be

used to ensure services are meeting the needs of all people living with HIV in Ireland. It is important to note that collection of the data was labour intensive for some of the treatment centres and for some involved review of paper charts.

The accuracy of the estimates depends on the availability and quality of the data used in the model. It is important that the HIV surveillance system in Ireland gathers high quality and complete data in relation to history of previous diagnosis prior to diagnosis in Ireland, CD4 count at diagnosis, country of birth, and probable route of transmission.

4.4 Limitations

The ability to account for out-migration, deaths, and loss to follow-up when calculating each of the stages of the continuum has a significant impact on the final estimates. Modelling the HIV epidemic in Ireland is particularly challenging due to the issue of inward and outward migration.

Our estimate for the first “95” in Ireland uses the number of people who attended HIV care in Ireland as the numerator instead of the number of people who knew their status. There are additional people who know their status and are not attending for care (lost to follow up). This results in a lower estimate for the first 95 and a higher estimate for the second 95. Further work is needed to determine the proportion of people who are lost to follow up and explore reasons for disengagement from HIV care.

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Appendix A: Monitoring a four-stage HIV continuum of care in Ireland in a given year*

Stage	Definition	Numerator	Denominator	Notes
1) Number of people living with HIV (PLHIV)	Total number of PLHIV in the country by the end of the given year YYYY.	Estimated number of PLHIV, diagnosed and undiagnosed, including those who in-migrated and excluding those who out-migrated or died by the end of the given year YYYY.	N/A	Back-calculation modelling approach using routine HIV surveillance data, e.g. ECDC HIV Modelling Tool or Spectrum. Challenges include accounting for in-migration, out-migration, deaths and incomplete surveillance data.
2a) Diagnosed	Number diagnosed with HIV. Expressed as a number and proportion of PLHIV (see denominator definition).	Number ever diagnosed with HIV by the end of the given year YYYY, including those who in-migrated and excluding those who out-migrated or died by the end of the year YYYY.	Total number of PLHIV (as defined for stage 1)	Ideally, the number diagnosed should not be restricted to those in care. Where it is not possible to include all diagnoses since the beginning of the epidemic (e.g. due to limited years of surveillance), the diagnosed population may be estimated, e.g. using modelling, or triangulating with other data sources. Mortality and migration should be estimated where these data are unavailable and linkage to migration/death records is not feasible.
2b) Attending HIV services	Number of PLHIV attending HIV services. Expressed as a number and proportion of PLHIV (see denominator definition).	Number of diagnosed individuals attending HIV services/seen for HIV care in the given year YYYY.	Total number of PLHIV (as defined for stage 1)	This will include those who attended outpatient HIV services who in-migrated during the year YYYY, and will exclude all those who have out-migrated or died during the year YYYY, where this information is known or available. This will exclude those diagnosed with HIV (such as in-patients), who have not yet attended a specialist HIV clinic.***
3) On ART	Number who are taking ART in the given year YYYY. Expressed as a number and proportion of those attending HIV services, and as a proportion of all PLHIV (see denominator definitions).	Number with at least one record of ART (prescribed or, ideally, dispensed) in the year YYYY. ART is defined as any ART regimen since diagnosis, regardless of the number of antiretroviral drugs.	1) Number diagnosed with HIV (as defined for stage 2a) 2) Number attending HIV services (as defined for stage 2b) 3) Total number of PLHIV (as defined for stage 1)	Ideally the same data source is used as for stage 2b. Those with missing ART information are assumed to be untreated.
4) Virally-suppressed	Number virally-suppressed. Expressed as a number, as a proportion of those on ART, and as a proportion of all PLHIV (see denominator definitions).	Number on ART whose most recent HIV RNA measurement in the given year YYYY was <200 copies/mL, and below the limit of quantitation** of the assay. Those who in-migrated by end of YYYY are included and those who out-migrated or died by end of YYYY are excluded.***	1) Number on ART (as defined for stage 3) 2) Total number of PLHIV (as defined for stage 1)	Ideally the same data source is used as for stage 3. Those with missing viral load measurements in the year YYYY are assumed to be unsuppressed. Below the limit of quantitation** of the assay is defined as follows: <ul style="list-style-type: none"> • Abbott RealTime HIV-1 assay, limit of detection 40c/mL • Roche AMPLIPREP-TAQMAN assay, limit of detection 20c/mL.

*Adapted from ECDC Recommendations for monitoring a four-stage HIV continuum of care in Europe (http://journals.lww.com/aidsonline/Fulltext/2017/09240/Towards_standardized_definitions_for_monitoring.2.aspx)

**Some individuals might have detectable RNA below the limit of quantitation; however, these individuals should be considered virally suppressed.

***The degree to which services were able to accurately count inward and outward migration is not known.

Appendix B: Monitoring the Continuum of HIV Care in Ireland Steering Group Membership

	Name	Location
1.	Fiona Lyons	SHP & GUIDE Clinic, SJH
2.	Caroline Hurley Rachael Metrustry	SHP
4.	Derval Igoe	NHPO
5.	Kate O'Donnell	HPSC
6.	Almida Lynam	GUIDE Clinic, SJH
7.	Peter Coakley	Beaumont Hospital
8.	Aoife Cotter	Mater Misericordiae University Hospital
9.	Cathal O'Broin	St. Vincent's University Hospital
10.	Helen Tuite	University Hospital Galway
11.	Sarah O'Connell	Cork University Hospital
12.	Sinead Murphy Josephine Clancy	University Hospital Limerick
13.	Ruth O'Riordan	Waterford University Hospital
14.	Bridget Freyne	OLCHC & Temple Street

Appendix C: Data inputs from Ireland for Spectrum modelling

Section	Data item
Prevention of Mother to Child Transmission	Number or percent of women receiving ART, started before and during pregnancy
ART	Number of adults receiving ART by age group in males and females
	Number of children receiving ART
Viral suppression	Viral suppression threshold
	Number of adults on ART tested for viral suppression
	Number of adults with suppressed viral load by sex
	Number of children on ART tested for viral suppression
	Number of children with suppressed viral load
HIV tests	Number of HIV tests carried out
Case and Mortality Data	Number of HIV diagnoses per year by age group (in males and females)
	Number of HIV diagnoses per year by age group (in males and females - excluding those diagnosed previously)
	AIDS-related mortality estimates, adjusted for missing data and garbage codes