

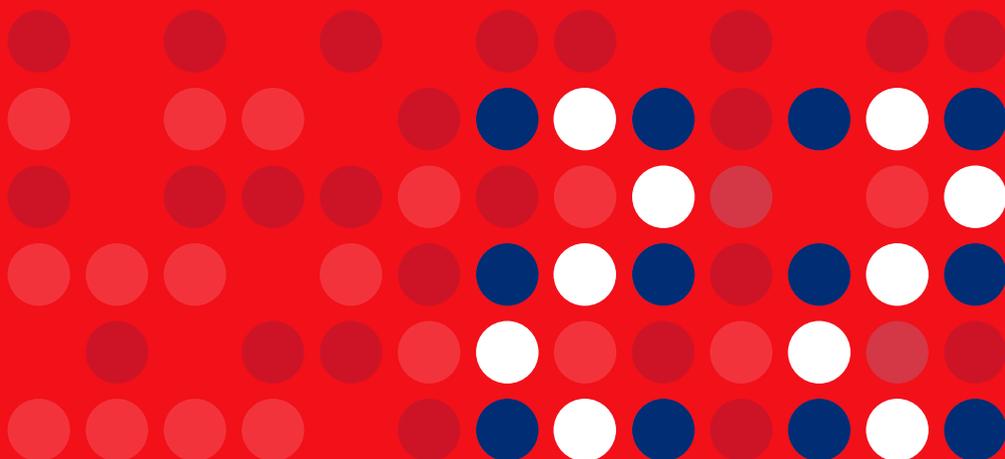
Human Immunodeficiency Virus (HIV)  
Infection in the Netherlands



# HIV Monitoring Report

# 2022

## Chapter 5: Distinct populations: Children with HIV in the Netherlands



## 5. Distinct populations: Children with HIV in the Netherlands

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### Definitions

*Box 5.1: Chapter definitions.*

<b>Child living with HIV</b>	A child diagnosed with HIV before the age of 15 <sup>1,2</sup> , whose first visit to a Dutch HIV treatment centre was before the age of 18 years.
<b>Infection</b>	The moment a child acquires an HIV infection
<b>Diagnosis</b>	The moment an HIV infection is identified in a child.
<b>Registration</b>	The moment an HIV physician or nurse notifies SHM of a child with HIV (in care) and the child's details are recorded in the SHM database. Registration usually takes place within a few months of entering care, but can take longer. Demographic and clinical data from the time of HIV diagnosis can only be collected after registration.
<b>In care in 2021</b>	Individuals with an HIV infection who had a documented clinical visit or lab measurement in 2021.
<b>Vertically-acquired HIV</b>	Transmission of HIV from a woman with the virus to a child during pregnancy, delivery, or breastfeeding.
<b>Non-vertically-acquired HIV</b>	Transmission of HIV through sexual contact or contact with contaminated blood or blood products.
<b>ART</b>	Antiretroviral therapy: a combination of at least three antiretroviral drugs from two different antiretroviral drug classes, or at least three nucleoside reverse transcriptase inhibitors.
<b>Viral suppression</b>	Any viral load measurements below 200 copies/ml, except for time points in the past where tests had quantification limits higher than 200 copies/ml.



**Box 5.2: Outline of the population: all children with HIV registered in the ATHENA cohort before 31 December 2021. (Children = individuals under the age of 15 at the time of diagnosis, who made a first visit to a Dutch HIV treatment centre before the age of 18 years.)**

1. Children who were diagnosed under the age of 15 and who entered care in the Netherlands before the age of 18 (n=397).
2. Population of those diagnosed as a child and in care in 2021:
  - under the age of 15 in 2021 (n=138); includes 119 adopted children.
  - aged 15-18 years in 2021 (n=36); includes 20 adopted children.
  - aged 18 years and over in 2021 (n=156); includes 10 adopted children.

## Background

Combination antiretroviral therapy (ART) has dramatically decreased morbidity and mortality in children with HIV worldwide<sup>3-7</sup>. Immediate initiation of ART, regardless of CD4 cell count or percentage, is associated with a higher survival rate when compared with delayed ART initiation guided by CD4 cell count<sup>8-11</sup>. Studies showing a clinical benefit of early ART initiation led to a 2015 revision of the World Health Organization (WHO) guidelines on when to start ART; they now recommend initiation in everyone with HIV (including children), irrespective of CD4 cell count<sup>12</sup>.

In the Netherlands, children with HIV generally receive health care at one of four paediatric HIV treatment centres. These children transition to adult HIV care when they reach the age of 18. However, children who acquire HIV at an older age through non-vertical transmission are more likely to enter care at an adult HIV treatment centre. Accordingly, those who are aged 15 years and over at the time of diagnosis are described in *Chapter 1* as part of the adult population.

Here we report on the following for children diagnosed with HIV before the age of 15, who have ever received care at one of the paediatric and/or adult HIV treatment centres in the Netherlands while under the age of 18 (*Box 5.2*)<sup>a</sup>:

- demographics
- clinical characteristics
- therapy regimens
- long-term virological and immunological responses to therapy

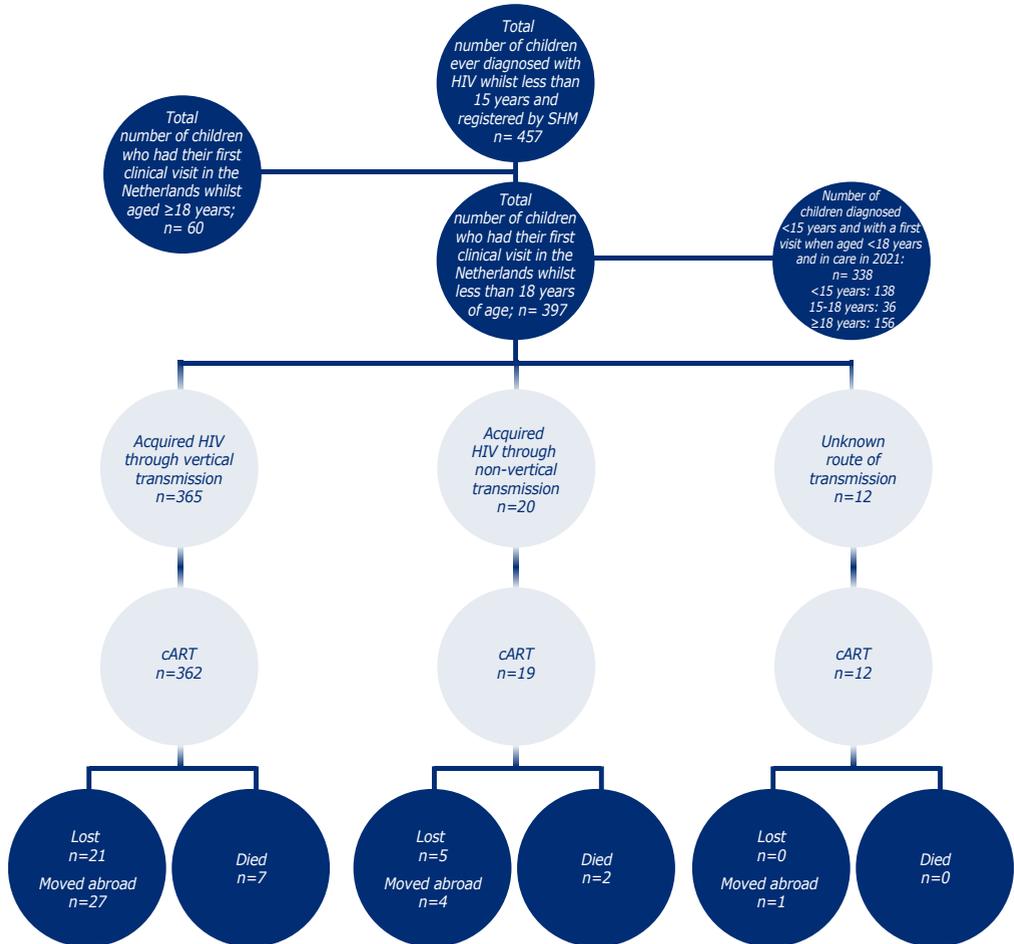
The limit of 15 years is aligned with the definition of children used by the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO)<sup>1,2</sup>.

<sup>a</sup> The total number of children described in this analysis is lower compared to the 2019 SHM Monitoring Report. This is due to a change in definition: we now only include children who were diagnosed before the age of 15, whereas previously we also included adolescents who were diagnosed between the ages of 15 and 18.

### Children with HIV ever registered by SHM

As of 31 December 2021, SHM had registered 457 individuals who had ever been diagnosed with HIV while under 15 years of age (*Figure 5.1*). Of these, 137 were diagnosed with HIV before arriving in the Netherlands and 320 were newly diagnosed in the Netherlands. In total, 397 of the 457 children entered care in the Netherlands before the age of 18. Among the 60 children who entered care *after* the age of 18, 75% were born outside the Netherlands. Although the date of migration to the Netherlands is not available for all children, the median age at time of migration to the Netherlands was 28 years (IQR: 21-31) for those with an known date. Of those who were born in the Netherlands, all were diagnosed before 1995 and entered care after the age of 18 years.

Figure 5.1: Overview of children with HIV registered by stichting HIV monitoring as of 31 December 2021.



Legend: ART = combination antiretroviral therapy.

The majority (97%) of the children entered care at a paediatric HIV treatment centre. Ten entered care at an adult HIV treatment centre at a median age of 16.9 years (IQR 16.2-17.6) (Table 5.1).

**Table 5.1: Demographic and HIV-related characteristics of 397 children with HIV ever registered by SHM who were diagnosed before 15 years of age and entered care in the Netherlands below the age of 18.**

Characteristics	Vertical transmission*	Non-vertical transmission*	Route of transmission unknown*
<b>Total</b>	365 (92)	20 (5)	12 (3)
<b>HIV treatment centre</b>			
Paediatric care	362 (99)	15 (75)	10 (83)
Adult care	3 (1)	5 (25)	2 (17)
<b>Gender</b>			
Male	175 (48)	8 (40)	9 (75)
Female	190 (52)	12 (60)	3 (25)
<b>Child's country of origin</b>			
The Netherlands	113 (31)	2 (10)	0
Sub-Saharan Africa	208 (57)	16 (80)	11 (92)
Other	44 (12)	3 (10)	1 (8)
<b>Mother's country of origin</b>			
The Netherlands	32 (9)	1 (5)	1 (8)
Sub-Saharan Africa	188 (51)	8 (40)	7 (58)
Other/unknown	145 (40)	11 (55)	4 (34)
<b>Adopted</b>	149 (41)	0	3 (25)
<b>Age at HIV diagnosis</b>	1.1 (0.25–3.6)	11.5 (7.14–14.4)	10.5 (5.0–12.0)
<b>ART-treated</b>	362 (99)	19 (95)	12 (100)
<b>Therapy-naïve at ART initiation</b>	316(87)	16 (80)	12 (100)
<b>CD<sub>4</sub> at ART initiation</b>	560 (286–1230)	324 (171–508)	330 (310–475)
<b>CD<sub>4</sub> Z-score at ART initiation</b>	-0.6 (-1.0– -0.10)	-0.6 (-1.13– -0.01)	-0.50 (-0.8– -0.24)
<b>VL (log copies/ml) at ART initiation</b>	5.2 (4.5–5.8)	4.3 (4.0–5.5)	4.9 (4.6–5.0)

*Legend: \*Data are number (%) of children or median (interquartile range).*

*ART = combination antiretroviral therapy; VL = viral load.*

### Mode of transmission

The majority (92%) of the children registered acquired HIV through vertical transmission. (Figure 5.1).

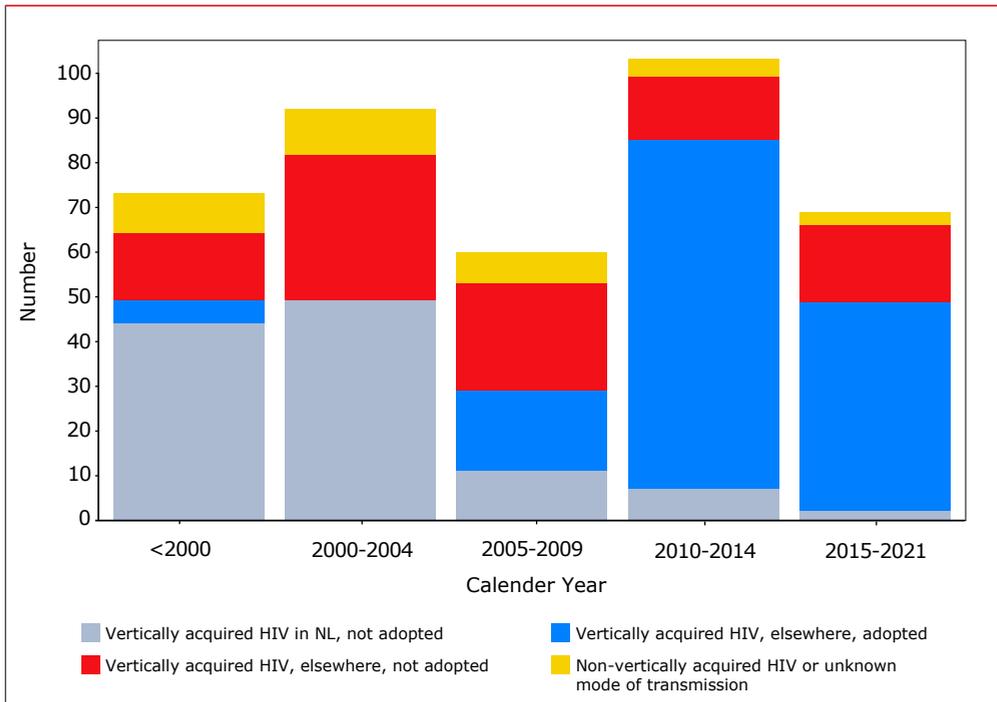
### Vertical transmission

Between 1998 and 2021, 365 children entered care after acquiring HIV through vertical transmission (Table 5.1). The median age at which they received their first reported HIV-positive test result (including self-reported tests performed in their country of origin), was 1.1 years (interquartile range [IQR] 0.3–3.6 years). Of this total:



- 99% received care in a paediatric HIV treatment centre in the Netherlands;
- ART initiation was documented for 99% of the children;
- 57% (n = 208) of the children were born in sub-Saharan Africa;
- 31% (n = 113) of the children were born in the Netherlands; and
- 9% of the children born in the Netherlands (10 out of 113) had two Dutch parents.

Figure 5.2: Number of children with HIV by year of entering care in the Netherlands, stratified by mode of HIV transmission and adoption status.



Note: The numbers of children with non-vertically-acquired HIV or unknown mode of HIV transmission entering care were too small for stratification by mode of acquisition.

### Decline in vertical transmission of HIV in the Netherlands since 2005

Figure 5.2 shows the number of registered children by year of entering care, mode of transmission, and region of origin. The number newly entering care in the Netherlands has fallen over time from 103 in 2010-14 to 69 in 2015-22. This drop is likely linked to the declining number of adopted children newly entering care over time. Standard HIV screening for pregnant women, introduced nationally in 2004<sup>13,14</sup>, is responsible for the strong decline in vertical transmission in the Netherlands from 2005 onwards.

### Non-vertical transmission

Between 1998 and 2021, 20 children were registered as having acquired HIV through non-vertical transmission (*Table 5.1*); the reported modes were heterosexual transmission (n=8) and contact with contaminated blood and blood products or medical procedures (n=12). Reporting on the latter category stopped in 1997 for children born in the Netherlands, and in 2009 for all children, regardless of country of birth. No further details are available regarding this category. It is also worth noting that some children only enter care a few years after their HIV diagnosis.

The median age at which they received their first reported HIV-positive test result was 11.5 years (IQR 7.14-14.4). However, the median age of HIV diagnosis for those who acquired HIV by sexual transmission was higher, at 14.7 years (IQR 13.8-14.9). In total:

- 95% of these children had started ART;
- 40% of children acquired HIV through heterosexual contact;
- 80% were born in sub-Saharan Africa; and
- 25% received care in an adult HIV treatment centre.

### Unknown route of HIV transmission

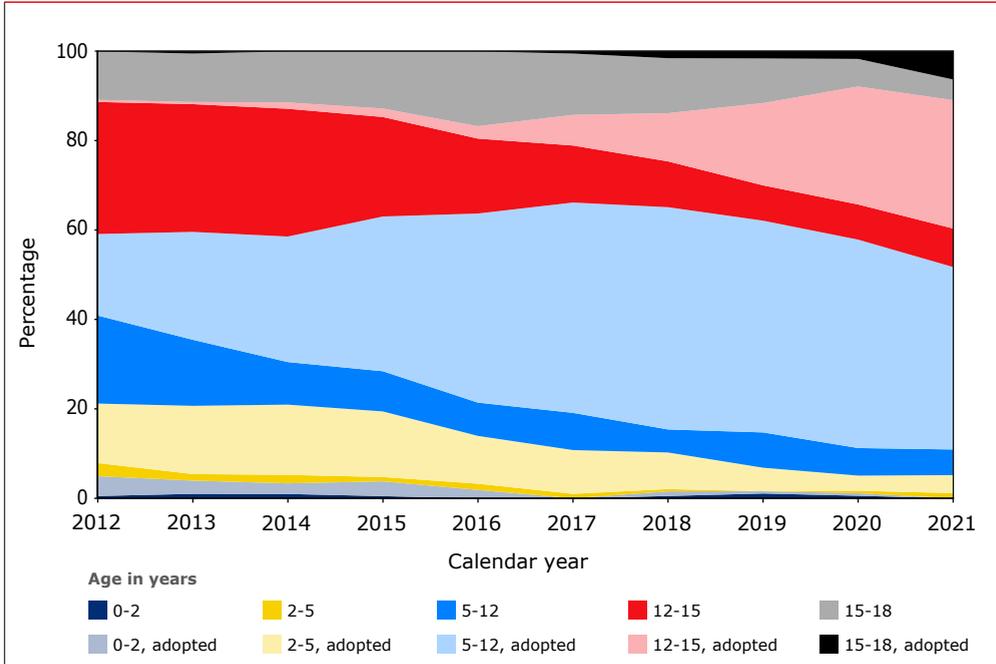
For 12 children with HIV, the route of transmission remains unknown (*Table 5.1*). Their median age at diagnosis was 10.5 years (IQR 5-12), and all children had started ART.

### Age distribution

Figure 5.3 shows the age distribution of children receiving HIV care in the last 10 years (2012-2021). Over time, the proportion of children aged 5-12 and 12-15 increased. This was mainly due to a relative increase in the rates of adopted children with HIV in those age groups. In 2021, approximately 83% of children with HIV aged between 5 and 15 years were adopted.



Figure 5.3: Time-dependent age distribution of children with HIV in care over time.



### Low mortality rates

No children registered with SHM and in care were reported to have died before the age of 18 between 2012 and 2021. The mortality rate therefore remains very low, with a total of two deaths recorded since the start of registration. Both children died from AIDS before 2010. However, between 2012 and 2022 seven young adults who had been diagnosed with HIV as children, died in adulthood; their median age at death was 26.8 years (IQR 24-30). Four of these young adults died from AIDS, two of a non-AIDS related cause and for one young adult the cause of death is unknown.

### Antiretroviral therapy

Of the 397 children who entered care in the Netherlands before 18 years of age, 393 (99%) started ART; 344 (88%) of them were treatment-naïve at the start of ART and 49 (12%) had previously been exposed to monotherapy or dual therapy (i.e. were pre-treated). In total, four children never received ART; all are no longer in care, and the last date of contact for them was between 1998 and 2010.

For the purposes of this analysis, both pre-treated and treatment-naïve children who initiated ART from 2012 onwards have been included. Children were grouped by calendar year of ART initiation: 76 children started an ART regimen in 2012-2016 and 23 in 2017-21. For 13 children, the year of ART initiation is not known. All these children were born outside the Netherlands.

### Initial ART regimen

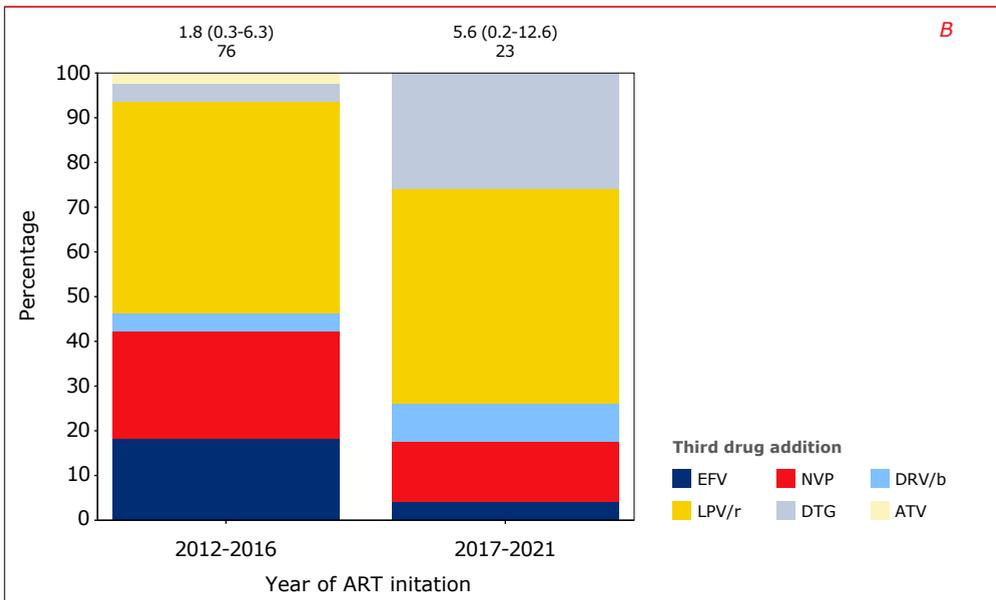
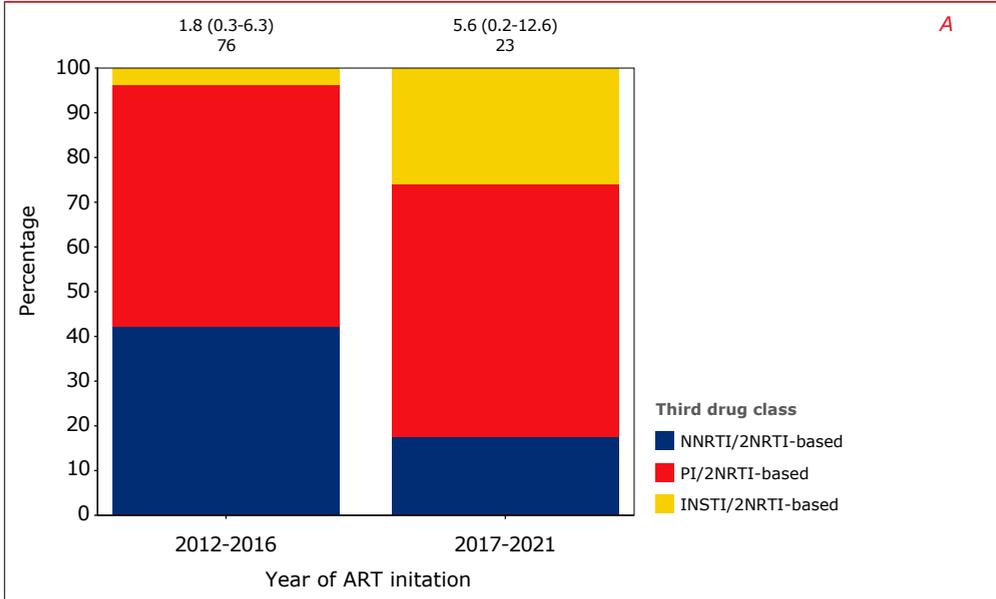
Of the 99 registered children known to have initiated ART between 2012 and 2021:

- 55% were treated with a first-line regimen that included a protease inhibitor (PI) and two or more nucleoside reverse transcriptase inhibitors (NRTIs);
- 36% were treated with a non-nucleoside reverse transcriptase inhibitor (NNRTI) with two or more NRTIs; and
- 9% were treated with an integrase inhibitor-based first-line regimen.

*Figure 5.4* shows the trends over time for the third-drug additions to the NRTI backbone as part of the initial ART regimens, stratified by calendar period of starting ART. Among children, lopinavir was the most commonly-used PI (47%). Following its introduction in 2014, the integrase inhibitor dolutegravir was included in the initial ART regimen given to 26% of the children who initiated a first-line regimen between 2017-2021.



Figure 5.4: Third-drug additions to the nucleoside reverse transcriptase backbone used as part of the initial ART regimen, stratified by calendar year period, according to (A) antiretroviral class, and (B) specific third drugs. Numbers above the bars represent the total number of individuals initiating ART in that calendar year period. Median ages and interquartile ranges above the bars represent the ages of individuals at the time of ART initiation.



Legend: ART = combination antiretroviral therapy; ENTRY = entry inhibitor; INSTI = integrase inhibitor; NRTI = nucleoside reverse transcriptase inhibitor; NNRTI = non-NRTI; PI = protease inhibitor; EFV = efavirenz; NVP = nevirapine; LPV/r = ritonavir-boosted lopinavir; IDV = indinavir; SQV = saquinavir; NFV = nelfinavir; RAL = raltegravir; DRV/b = cobicistat- or ritonavir-boosted darunavir; ATV/r = ritonavir-boosted atazanavir; DTG = dolutegravir; EVG/c = cobicistat-boosted elvitegravir.

### Discontinuation of the initial ART regimen

The median time the 99 children who had started ART between 2012 and 2021 spent on an initial regimen was 22.0 months (IQR 7-39). Discounting weight-related dose changes, 65 children (66%) discontinued their first-line therapy regimen. The most important reasons for changing included simplification (42%) and toxicity (12%). Virological failure was the reason given in 11% of cases. Other reasons included parent or child decision, blood level-related issues, or unknown.

### Virological response

Virological response to ART was assessed based on viral suppression (i.e. viral load below 200 copies/ml, [Box 5.1]). Initial virological response is reported for the first two years after starting ART between 2012-2021. Long-term virological response is reported by time-updated age for those who used ART for at least 24 months.

#### Initial response to ART

This analysis used data from the 90 children who were registered with SHM and had started ART between 2012-2021, and who had viral load data available in the first 24 months after ART initiation. Children were stratified by age at ART initiation, resulting in the following categories:

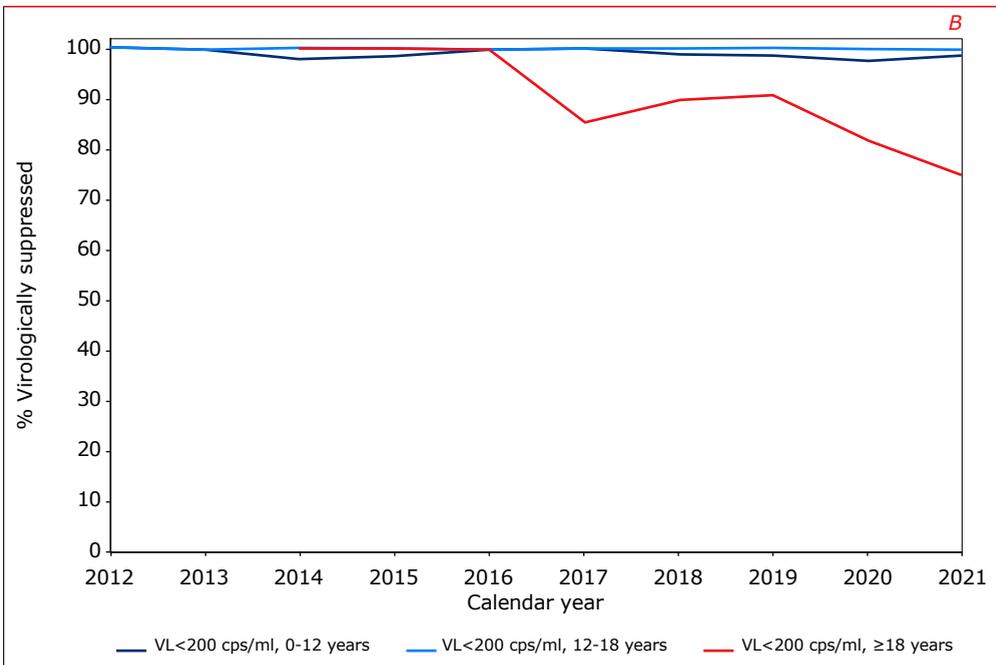
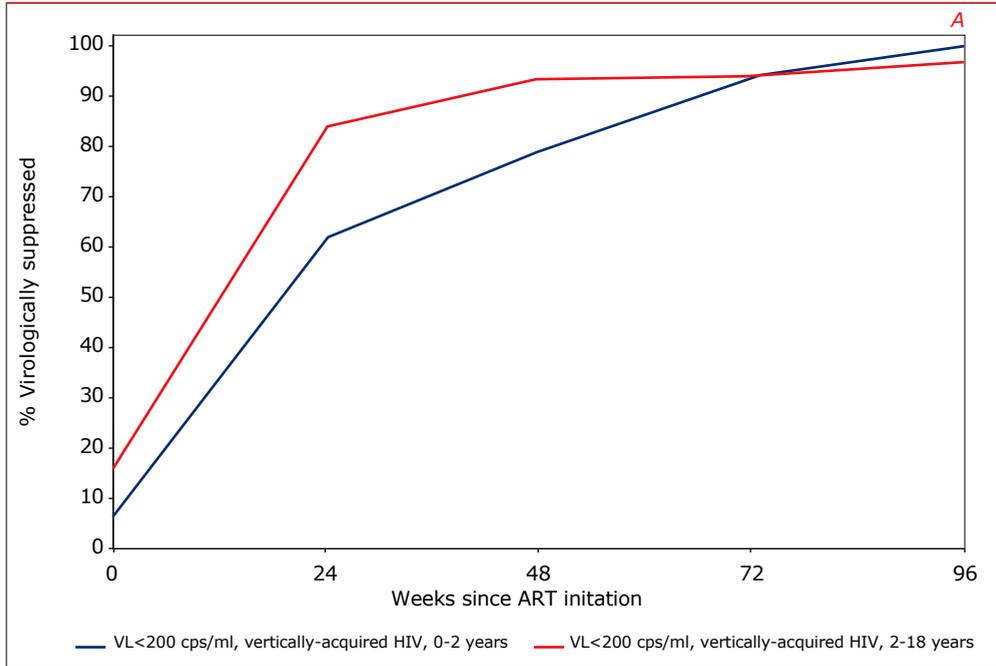
- (1) 0-2 years, n=47
- (2) 2-18 years, n=43

Among the children who started ART, we assessed their viral suppression rates at 24-week intervals while they were on ART. Viral load measurements closest to each 24-week time point (plus or minus 8 weeks) were included in the analysis. Viral suppression rates are shown for the calendar period 2012-2021 of ART initiation. *Figures 5.5A* shows viral suppression rates among children who initiated ART between 2012 and 2021:

- Among children who were aged 0-1 years at the time of ART initiation, viral suppression rates increased from 79% after one year of ART, to 100% after two years.
- Among children who were aged 2-18 years at ART initiation, viral suppression rates increased from 94% after one year of ART, to 97% after two years.



Figure 5.5: Viral suppression following combination antiretroviral therapy (ART) initiation: (A) during the first two years of ART 2012–2021, (B) time-dependent and age-dependent viral suppression rates for children in care between 2012 and 2021 after two years of ART with ART initiation from 2010 onwards. Viral suppression is defined as any viral load measurements below 200 copies/ml, except for time points in the past where tests were used with quantification limits above 200 copies/ml.



Legend: ART = combination antiretroviral therapy; cps = copies; VL = viral load.

### Long-term virological response

Among the children who were using ART for more than 24 months, we assessed viral suppression rates by calendar year of follow up. The latest viral load measurement in each calendar year was included in the analysis. Viral suppression rates were stratified by calendar period of ART initiation, to account for changes in the use of ART regimens.

Time-updated age of HIV RNA measurements was calculated, and children were stratified by the following time-updated age ranges:

- (1) 0-12 years
- (2) 12-18 years
- (3) 18 years and over

Age and time-updated HIV RNA viral suppression rates were consistently high among children aged below 18 years. However, viral suppression rates decreased once the age of 18 years was reached (*Figure 5.5B*).

### Immunological response

Earlier reports have shown that the clinical benefit of ART is strongly related to the degree to which the CD4 cell count recovers<sup>15</sup>. Given that normal CD4 cell counts in younger children are highly age-dependent<sup>16</sup>, it is more appropriate to analyse time-dependent CD4 count trajectories, expressing CD4 counts as Z-scores in which counts are standardised in relation to age.

CD4 Z-scores represent the standard deviation from the reference values for HIV-negative children. They were calculated for CD4 cell counts to correct for age-related differences. All absolute CD4 T-cell counts were transformed into Z-scores by subtracting the age-related reference value for the age at the time of the CD4 measurement<sup>17</sup>, and dividing the outcome by the age-related standard deviation.

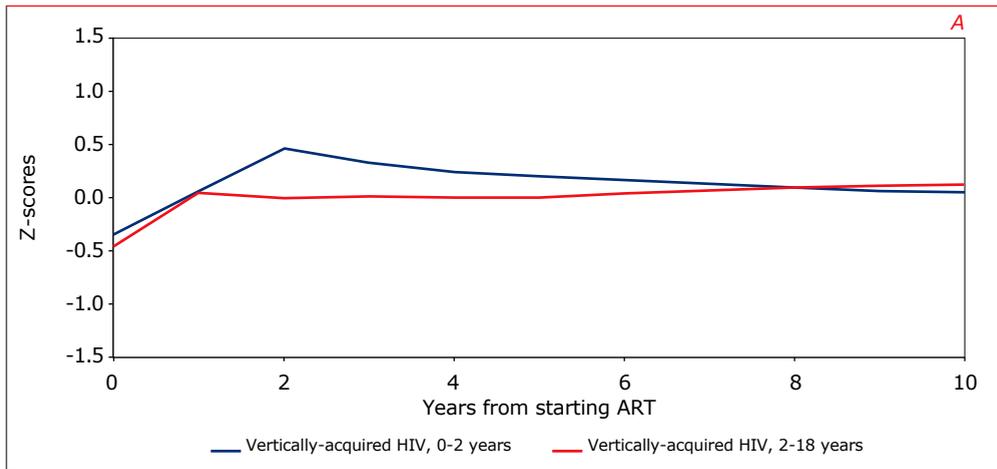
A Z-score of zero represents the age-appropriate median. A CD4 Z-score of minus 1 indicates that a child's CD4 cell count is 1 standard deviation below the age-specific median of the HIV-negative population.

*Figure 5.6* shows the changes in CD4 T-cell Z-scores among children with HIV, stratifying those with vertically-acquired HIV by age at initiation of ART.



For those who initiated ART between 2012 and 2021, CD<sub>4</sub> Z-scores increased significantly for both age groups in the year following ART initiation. However, in the second year the increase in CD<sub>4</sub> Z-scores was less pronounced for children aged between 2-18 years at time of ART initiation, resulting in higher CD<sub>4</sub> Z-scores among the youngest children (Figure 5.6).

Figure 5.6: Changes in Z-scores for CD<sub>4</sub> T-cell counts among children with HIV, stratified by age at initiation of antiretroviral therapy (ART), who initiated ART between 2012 and 2021.



Legend: ART = antiretroviral therapy.

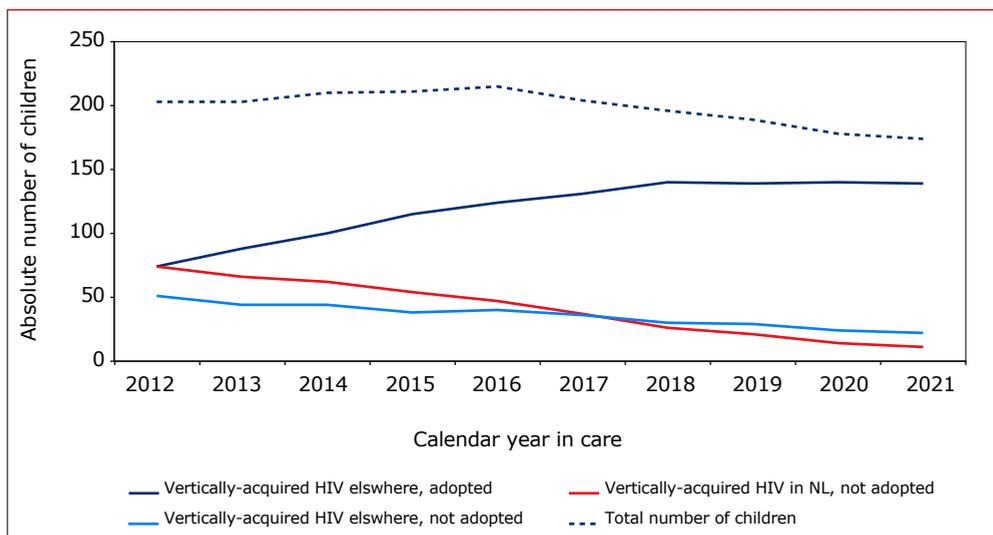
### Currently in clinical care

Of the 397 children with HIV ever registered by SHM, and who entered care in the Netherlands before the age of 18, 330 (or 83%) were still in care in 2021. Of these, 174 were under the age of 18 (Figure 5.1). Of the 67 children no longer in care:

- Nine had died;
- 32 had moved abroad;
- 26 – a substantial number – were lost to care.

Figure 5.7 shows the number of children under 18 years of age in care, for each calendar year. This figure reached its peak in 2016, with 215 children. However by 2021, this figure had declined to 174, mainly due to the fact that more children with vertically-acquired HIV who are not adopted are reaching the age of 18 years and, at the same time, fewer children are newly entering care.

**Figure 5.7: Number of children aged <18 years known to be in care at the end of each calendar year shown by mode of HIV transmission and adoption status. Note: Children with non-vertically-acquired HIV are not reported as a separate category due to their small numbers, but they are included in the total number of children in care.**



#### Currently in clinical care: under 18 years of age

- 174 were younger than 18 years at the end of 2021
- 138 were younger than 15 years
- The median age was 12 years (IQR 10-15) as of 31 December 2021.

#### Currently in clinical care: aged 18 years and over

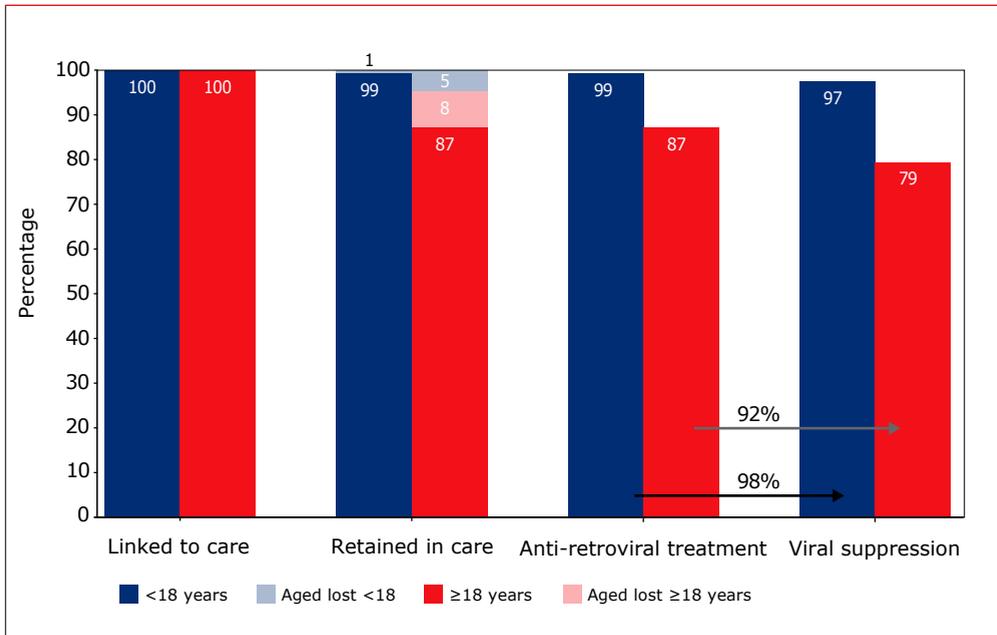
- 156 were older than 18 years of age at the end of 2021
- The median age was 25 years (IQR 22-29) as of 31 December 2021

#### Continuum of care

A 'continuum of care' was constructed based on the total number of children with HIV ever registered by SHM, who were still alive on 31 December 2021 and were not reported to have moved abroad. This continuum of care depicts engagement in HIV care across a number of key indicators. The final one of these is the number of children whose most recent HIV RNA measurement was below 200 copies/ml (Figure 5.8).



Figure 5.8: Continuum of care by age, as of 31 December 2021. The numbers in and above the bars indicate the proportion of individuals.



Individuals were stratified by age on 31 December 2021 and categorised as:

- (1) current age, under the age of 18 years
- (2) current age, 18 years and over

#### Continuum of care: current age under 18 years

In total, 176 children were linked to care, registered by SHM, still alive and not reported to have moved abroad. Of these:

- 99% (n=174) were retained in care;
- two children, both born outside the Netherlands, were lost to care;
- 99% (n=174) had ART during their last clinical visit in 2021; and
- 97% (n=170) had a most recent HIV RNA measurement below 200 copies/ml (98% of those on ART).

**Continuum of care: current age 18 years and over**

In total, 180 individuals were linked to care, registered by SHM, still alive and not reported to have moved abroad. Of these:

- 87% (n=156) were retained in care;
- 24 individuals (13 of whom were born outside the Netherlands) were lost to care, of whom
  - 10 before they turned 18
  - 14 when they were aged 18 and over;
- 87% (n=156) had ART during their last clinical visit in 2021; and
- 79% (n=143) had a most recent HIV RNA measurement below 200 copies/ml (92% of those on ART).

It is worth noting that 11 of the 24 young adults who were lost to care had their last clinical contact at a paediatric HIV treatment centre. They were deregistered and may have been lost during transition to adult care, or may be waiting to be re-registered at an adult treatment centre.

**In care and on ART in 2021**

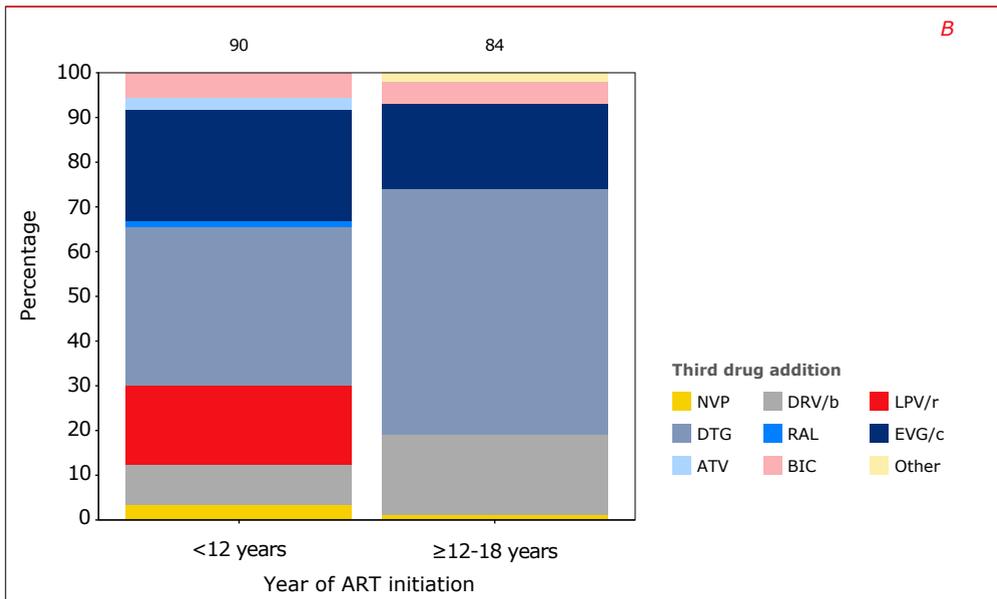
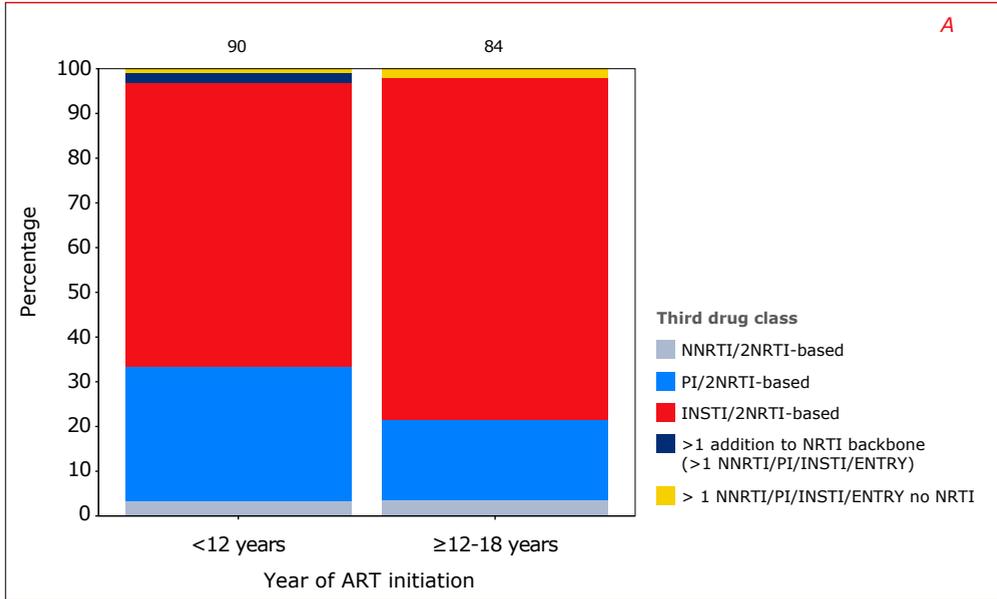
Of the 174 children known to be in care in 2021 and under 18 years of age, all had ART during their last reported clinical visit. The distribution of current ART use is shown in *Figure 5.9*, according to age on 31 December 2021.

Among those under 12 years of age, PI-containing and INSTI-based regimens were the most commonly-used (30% and 63%), with dolutegravir (36%) and elvitegravir (24%) the most common individual third agents.

In children aged between 12 and 18 years, 76% were using an INSTI-based regimen and 18% a PI-containing regimen. Among those using an INSTI-based regimen, dolutegravir was most common (55%), followed by elvitegravir (19%). Overall, nine children used bictegravir.



Figure 5.9: Third-drug additions to the nucleoside reverse transcriptase backbone used as part of the current regimen, stratified by current age: (A) antiretroviral class, and (B) specific drug. Numbers above the bars represent the total number of individuals initiating ART in that particular calendar year period.



**Legend:** ENTRY = entry inhibitor; INSTI = integrase inhibitor; NRTI = nucleoside reverse transcriptase inhibitor; NNRTI = non-NRTI; PI = protease inhibitor; EFV = efavirenz; NVP = nevirapine; DRV/b = cobicistat/ritonavir-boosted darunavir; LPV/r = ritonavir-boosted lopinavir; DTG = dolutegravir; RAL = raltegravir; EVG/c = cobicistat-boosted elvitegravir; ATV = ritonavir-boosted atazanavir; BIC = bictegravir.

## Special Populations

### Adopted children

Of the 397 children ever registered by SHM who were under 18 years of age when they entered care in the Netherlands, 152 (38%) had been adopted by Dutch parents. The percentage of adopted children newly entering care increased from 1% in 2002 and 2001 to 86% in 2015 (*Figure 5.2*), with a median age at the time of entering care of 2.7 years (IQR 1.6-5.0). Overall:

- 108 (71%) children were already receiving ART before they were adopted;
- 18 (12%) children were treated with monotherapy or dual therapy before the start of ART;
- All children had ART during follow up in clinical care at one of the Dutch HIV treatment centres;
- Three adopted children are no longer in care;
- All children known to be in care were still receiving therapy in 2021;
- 99% of those still in care had an undetectable viral load (equal to or below 200 copies/ml) in their most recent HIV RNA measurement.

Initially, at the time of entering care in the Netherlands, only 66 (43%) of the 152 children had a viral load below 200 copies/ml.

*Figure 5.7* shows the number of adopted children still in care and under 18 years of age. As of 31 December 2021, 149 children were alive and in care and 139 of them were aged below 18 years. Their median age was 11.3 years (IQR 9.4-14.0).

### Transfer to adult care

Of the 397 children ever registered by SHM who were under the age of 18 when they entered care in the Netherlands, 164 children had reached the age of 18 and above, and had transferred from paediatric care to adult care by 31 December 2021.



Figure 5.10: Follow up status, as of 31 December 2021, of children who transferred to adult care.

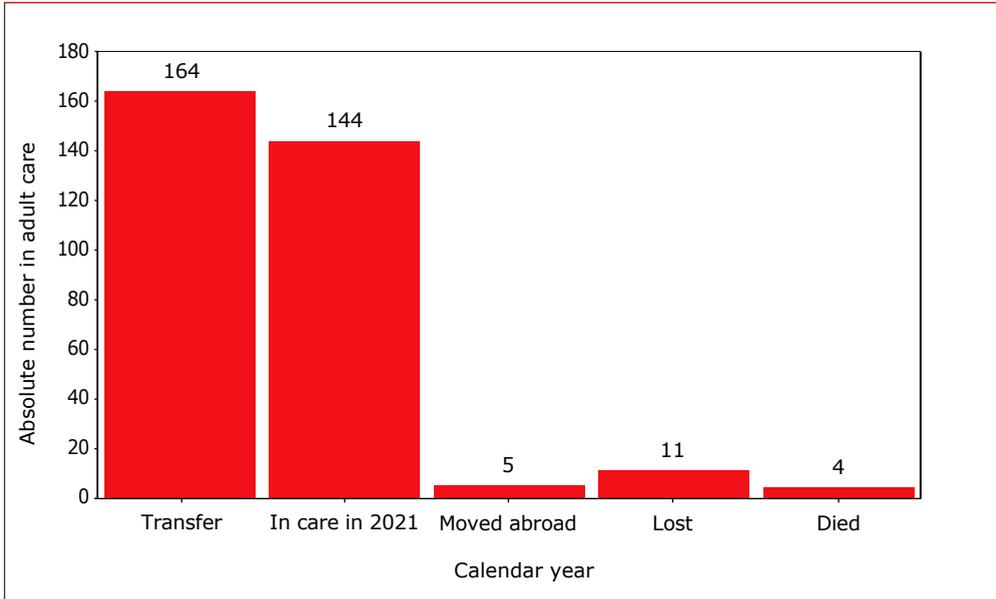
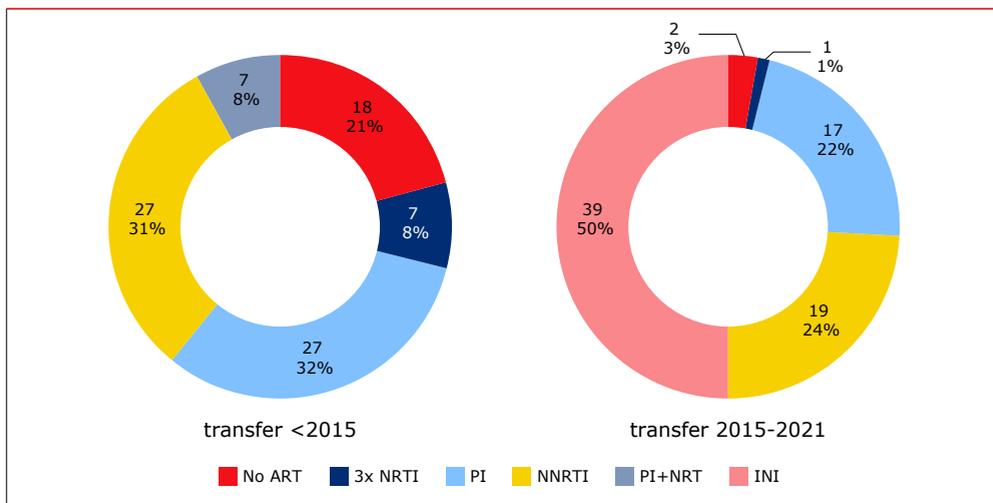
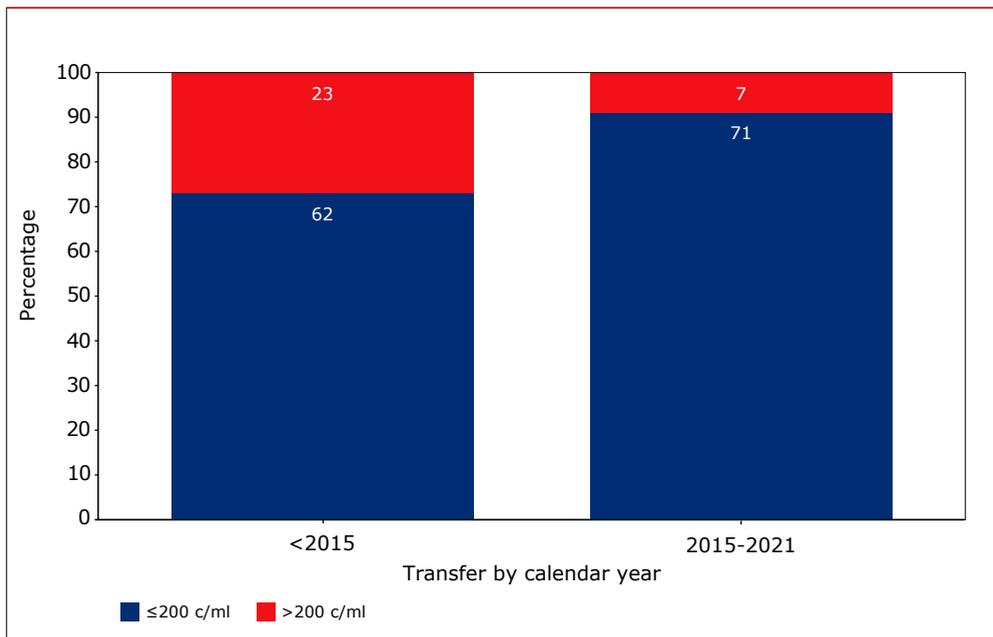


Figure 5.11: HIV RNA (A) and ART regimens (B) at last visit in paediatric care of children who transferred to adult care, stratified by calendar year of transfer (A).





The median age for their last visit to paediatric care was 18.3 years (IQR 18.0-19.0). The median time between their last visit to paediatric care and their first visit to adult care was 3.8 months (IQR 2.6-5.8). Time in care after transfer until their last documented clinical visit was 6.7 years (IQR 3.1-9.9).

*Figure 5.10* shows the follow up status of the 164 adolescents who transferred to adult care:

- 144 (88%) were still in care in 2021;
- 11 (7%) were lost to care, of whom
- four were deregistered at the paediatric centre but have not yet been registered at an adult treatment centre (which could be due to an administrative delay);
- five (3%) had moved abroad; and
- four (2%) had died.

Overall, at the time of their last clinical visit to paediatric care, 30 adolescents (18%) had an HIV RNA level above 200 copies/ml (median 3443; IQR 1220-27065). This figure is more or less comparable to results from the UK, which found that three quarters of adolescents were virologically suppressed at the time of transition<sup>18</sup>. However, we observed a lower proportion of detectable HIV RNA levels among young adolescents who made their transfer to adult care in or after 2015 (9%), compared to those who transferred before 2015 (27%) (*Figure 5.11a*).

During their last visit to paediatric care, 88% of the 164 adolescents received ART, 3 adolescents (2%) had not yet started ART and 10% had discontinued ART. Reported reasons for discontinuation were: decision by adolescent or parents; low adherence; or toxicity. Before 2015 there were more frequent occurrences of individuals not on ART at time of transfer, compared to 2015 or later (21% and 3%, respectively, *Figure 5.11b*).

Among adolescents who transferred to adult care before 2015, 31% were on an NNRTI-based regimen and 32% on a PI-based regimen. These percentages differed for adolescents who transferred in or after 2015: 50% were on an integrase-based regimen, 24% on an NNRTI-based regimen and 22% on a PI-based regimen.

All 144 adolescents who transferred to adult care, and who were still in care in 2021, were receiving ART in 2021. Just over half of these were on an integrase inhibitor-based regimen (55%). In total, 92% of the 144 had HIV RNA levels below 200 copies/ml in 2021.

## Summary

Of the 397 children with HIV ever registered by SHM who were under the age of 18 when they entered care in the Netherlands, 83% remain in care in the Netherlands.

A substantial proportion of the children newly registered since 2010 are children who were adopted by Dutch parents. It is worth noting that the annual number of newly registered children who were adopted by Dutch parents has been decreasing since 2016. In the last three years this has dropped to only a few cases, which has contributed to the decline in the overall number of newly registered children with HIV in the Netherlands since 2016.

The majority of children with vertically-acquired HIV were born outside the Netherlands. Vertical transmission of HIV within the Netherlands has become rare, reflecting the success of standardised HIV screening during the first trimester of pregnancy<sup>13</sup>.

None of the children who entered care over the last 10 years died before the age of 18. However seven young adults over the age of 18, who had been diagnosed with HIV as a child, did die in the past 10 years. These deaths included AIDS-related causes of death.

In total 99% of children with HIV, who had ever received care in the Netherlands, have received ART. Those who did not receive ART are no longer in care, but had been in care at an earlier point in time before guidelines were revised to recommend ART for everyone with HIV, regardless of CD4 counts. All children in care in 2021 were receiving ART. Current regimens in use include an integrase inhibitor for 62% of young children and for 76% for children aged 12 years and over.

Although a less favourable *initial* virological response was seen in the youngest children, very high *long-term* viral suppression rates were observed in children with HIV who initiated ART in or after 2012. However, those response rates fell when children reached the age of 18. For example, overall detectable HIV RNA rates were 18% at the time of transition to adult care, which is typically the case around the age of 18. Nonetheless, transition to adult care with an undetectable viral load increased over time, from 73% to 91%.

The continuum of care showed a high retention-in-care rate among children under 18 years of age. Moreover, a substantially lower proportion of those aged 18 years and over had suppressed HIV RNA levels by the end of 2021, when compared to children under the age of 18 (92% versus 98% among those in care and receiving ART).



## Recommendations

The provision of care for children with HIV in the Netherlands has resulted in generally favourable outcomes, with no reported mortalities in recent years and good long-term virological and immunological responses to therapy for those under the age of 18. Additionally, the number of children with HIV in paediatric care is decreasing as a result of targeted efforts to prevent mother-to-child transmission, as well as a fall in the number of adopted HIV-positive children in recent years. However, an increasing proportion of the children registered with SHM has now reached the age of 18 and transitioned to adult care. This period of transition is associated with lower levels of viral suppression and lower care retention rates, hence this group requires special attention.

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