



HIV INFECTED YOUTH (13-24 YEAR OLDS) ARE MORE LIKELY TO BE IN CARE BUT LESS LIKELY TO ACHIEVE VIRAL SUPPRESSION

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Overview

What is viral suppression?

A common method of measuring HIV infection severity in an individual is to count the number of HIV virus copies that are present in one milliliter (mL) of blood (1mL is approximately 20 drops). The number of HIV virus copies in one mL of blood is called the **viral load**. The more copies of virus, the more severe the infection. A person is considered **virally suppressed** if s/he has less than or equal to 200 copies of virus in a mL of blood (≤ 200 copies/mL blood).

Why is viral suppression important?

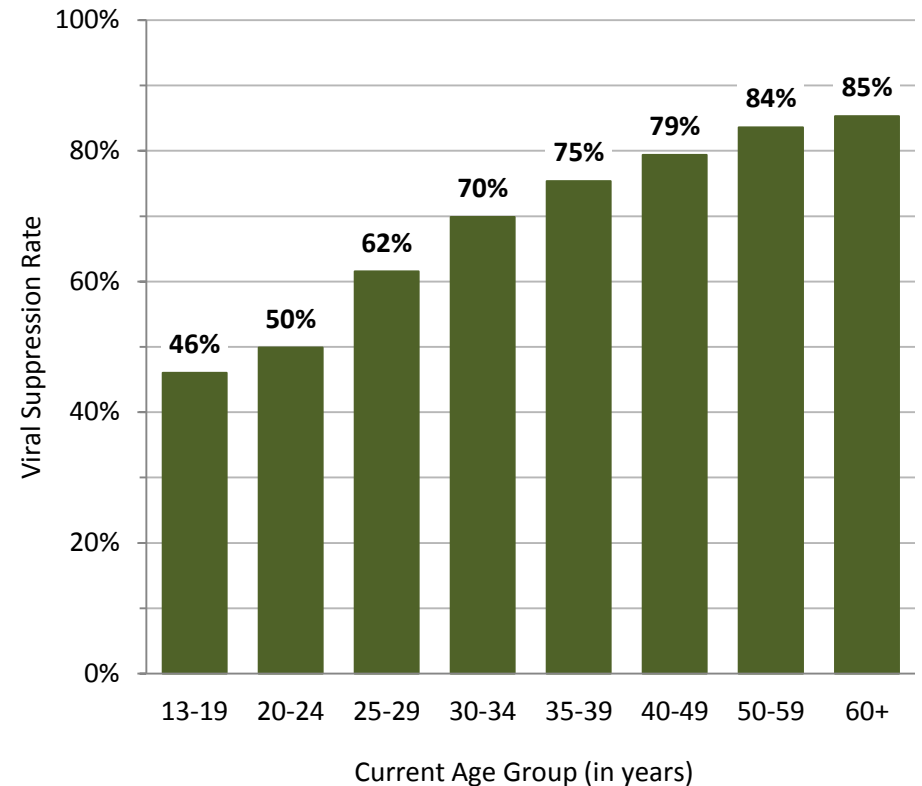
Typically, when an HIV infected individual is virally suppressed it means he/she has access to medical care and is taking ARV medications regularly. Virally suppressed individuals also have better prognoses and are less likely to infect others compared to individuals with higher viral loads.

What is the relationship between viral load levels and age?

According to the most recent National HIV treatment cascade produced by the CDC, the proportion of **persons living with HIV (PLWH)** in care and achieving viral suppression improves with age, leveling off around age 65¹. This special report was created to determine if PLWH in Michigan follow the same trend.

Figure 1 shows **viral suppression rates** among PLWH in Michigan by age group. The higher the rate (the taller the bars) the better. A very clear trend is present. Of PLWH in Michigan, the proportion achieving viral suppression increases with age. Interestingly, younger persons are more likely to be in care (Figure 2)--contrasting with the national data. These trends are further explored in this report.

Figure 1. Viral suppression rates among PLWH in Michigan in 2012, by age group



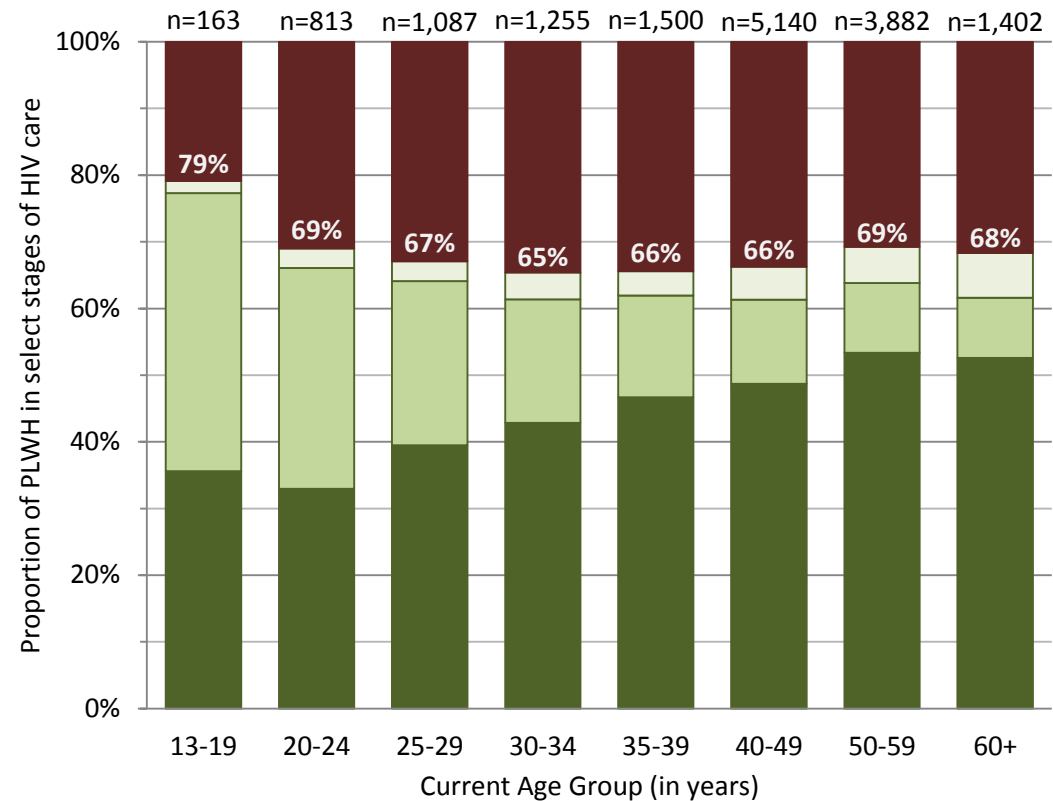
¹HIV in the United States: The Stages of Care, 2012.
<http://www.cdc.gov/nchhstp/newsroom/docs/2012/Stages-of-CareFactSheet-508.pdf>

Reviewing the Basics - Stages of HIV Care

Figure 2 presents four stages of HIV care by age group:

- 1) **The number of reported PLWH** in Michigan ≥ 13 years of age is indicated by "n=".
- 2) **The proportion in care** during 2012 includes persons who received at least one CD4 or viral load test, indicated by percents shown. Young persons (ages 13-24 years) were slightly more likely to be in care during 2012 compared to those 25 and older (71% verse 67%, $p < 0.001$, Odds Ratio: 1.17). This contrasts the national trends as well as the general positive correlation between care and viral suppression (those in care are more likely to achieve viral suppression).
- 3) Distinguishing between those in care who did and did not **receive a viral load** is not usually presented, but because of its importance in calculating viral suppression rates, it is displayed here.
- 4) **The proportion of virally suppressed** PLWH (those with ≤ 200 copies of HIV virus per mL of blood) is indicated by the height of the dark green bar. Depicting all stages of HIV care in figure 2 provides critical context when interpreting viral suppression rates. For example, while a higher proportion of persons 30-34 years old demonstrated viral suppression compared to teenagers (43% verse 36%), more teens had a known viral load (77% verse 61%). The viral loads of the remaining PLWH are unknown. Due to the number of PLWH with unknown viral load levels,

Figure 2. Proportion of PLWH in Michigan in select stages of care during 2012, by age group



$$\text{Viral suppression rate} = \frac{\text{Number of persons virally suppressed}}{\text{Number of person who received a viral load test}}$$

Because viral suppression rates (displayed in figures 1 & 3) and community viral loads are a proportion of those who received a viral load test (and not all PLWH) they must be interpreted with care.

HIV Viral Suppression Rates in Michigan

Figure 3. Viral suppression rates among PLWH in Michigan in 2012, by age group

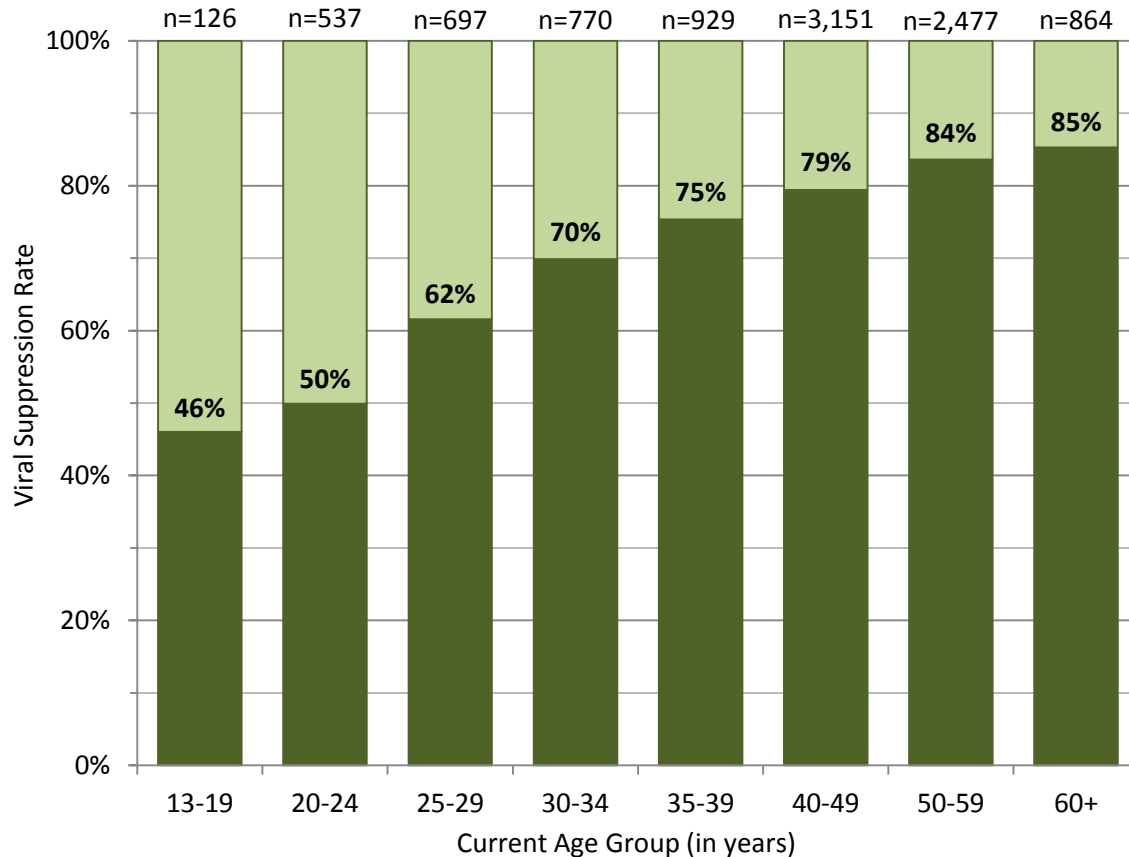


Figure 3 displays the viral suppression rates among age groups during 2012. Care category colors are maintained from figure 2. The height of the dark green bar represents those virally suppressed and the remainder (in light green) received a viral load but did not achieve viral suppression. The relative height of the dark green bar looks slightly different compared to figure 2 because in figure 3, the denominator is the number of PLWH *who received a viral load test* ("n=")--not all PLWH. It is this viral suppression rate that is used to compare groups and conduct other analyses on suppression.

Similar to national findings, the proportion of those achieving viral suppression significantly increased with age ($p < 0.001$). On average, viral suppression increased 6% in each age group, with the largest increase (12%) between those 20-24 years and 25-29 years of age.

The significant lack of viral suppression in youth compared to older PLWH is maintained regardless of demographic or HIV diagnostic and care strata (sex, race, risk, residence, HIV stage 1 & 2 verse HIV stage 3 status, and number of care visits in a given year). Additionally, year of diagnosis has no effect on the significant age/viral suppression relationship. For example, current youth (those 13-24 years old during

2012) who were diagnosed in 2006, were significantly less likely to be virally suppressed in 2012 compared to the older age groups diagnosed in the same year. The purpose of accounting for year of diagnosis was to determine if the higher viral loads among youth were due to early diagnosed new infections. Approximately six months after infection, viral load levels peak and begin to fall in the following months due to the body's immune response. If the majority of youth included in this study were recently infected, the age/viral load relationship may be confounded.

However, the vast majority of youths (>84%) were infected over a year before the assessed viral load measure, negating the possibility that the discrepancy is due to new infections. Because the year of diagnosis does not affect the age/viral suppression relationship, there is strong evidence that this is a true correlation.

Viral Loads among PLWH in Michigan, by Age Group

In addition to viral suppression rates, viral load levels (copies of virus/mL blood) were assessed. Viral load results demonstrate how far youth are from achieving the higher suppression rates observed in older persons.

Viral load levels observed in youth are significantly higher compared to persons 25 years and older ($p < 0.001$, figure 4 & Table 1). Those 13-19 and 20-24 had median viral loads of 306.5 and 222 copies of virus/mL of blood, a significant contrast to the median viral loads of ≤ 48 copies among older age groups. In addition, while the overall range of viral load levels among age groups were essentially the same (undetectable to approximately 10,000 copies/mL blood), the

Figure 4. Median viral loads of PLWH who received a viral load test in 2012, by age group

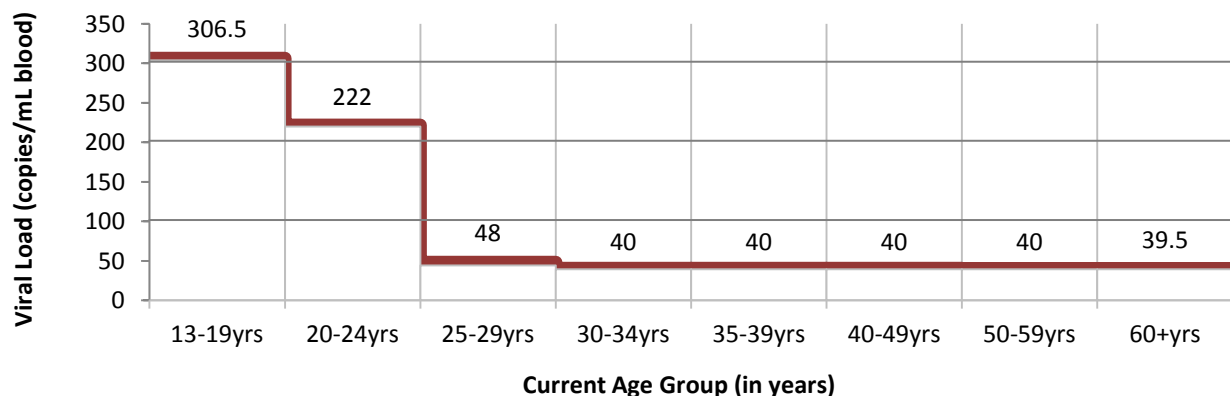


Table 1. Quartile viral loads of PLWH who received a viral load test in 2012, by age group

Age Group	n	Min	Q1	Median	Q3	Max
13-19yrs	126	Undetectable	40	306.5	7,615	98,381
20-24yrs	537	Undetectable	20	222	9,624	92,800
25-29yrs	697	Undetectable	Undetectable	48	2,428	94,900
30-34yrs	770	Undetectable	Undetectable	40	710	94,969
35-39yrs	929	Undetectable	Undetectable	40	191	99,426
40-49yrs	3,151	Undetectable	Undetectable	40	101	99,600
50-59yrs	2,477	Undetectable	Undetectable	40	73	99,497
60+yrs	864	Undetectable	Undetectable	39.5	51	99,614

Q1 indicates 25% of persons in the given age group had viral loads less than or equal to the given value.

The median indicates 50% of persons in the given age group had viral loads less than or equal to the given value.

Q3 indicates 75% of persons in the given age group had viral loads less than or equal to the given value.

"Undetectable" viral load indicates < 20 copies of virus per mL blood

first quartile, median, and third quartile of persons 25 years and older were tighter and lower than those 13-24 years of age (Table 1). This indicates that while all age groups include persons with extremely low viral loads and persons with extremely high viral loads, the vast majority of those 25 years and over are either virally suppressed or close to achieving viral suppression. Also, nearly half of older persons had such low viral loads, the virus was not detected by the lab test. These individuals have an "undetectable viral load" (Table 1). Young persons, on the other hand, had viral suppression rates of $\leq 50\%$ in 2012, and the majority of those who were not suppressed did not achieve viral load levels remotely close to 200 copies/mL blood.

High viral loads indicate lack of access to care or adherence to treatment. Because youth were slightly more likely to be in care, the discrepancy in viral loads is probably due to lack of ARV treatment adherence. High viral loads also result in poorer prognoses and significantly heightened transmission risk. The heightened viral load levels among youth is likely contributing to the growing rate of new HIV diagnoses among these age groups.

Understanding Viral Load Level Discrepancies



Viral suppression rates among youth have been significantly lower than PLWH 25 years and older for at least eight years (2006 was the first year it was possible to measure such a correlation due to changes in lab reporting). Possible explanations for the discrepant viral load suppression rates and viral load levels among age groups may include, but are not limited to the following reasons.

1) *Offering incentives for care enrollment and not ARV adherence*. Youth oriented care enrollment programs lacking ARV therapy adherence components may explain why youth were significantly more likely to be in care in 2012 compared to those 25 and older, but significantly less likely to achieve viral suppression. Youth oriented, care enrollment programs (especially those providing incentives) may want to assess program success among youth based on viral suppression; not only number of care visits. Also, it may be beneficial to examine the possibility of ARV adherence programs for youth.

2) *ARV cost*. Young persons may not be able to afford ARV medication. Youth entering the work force may earn enough money to be ineligible for Ryan White support but lack health insurance. The high viral loads may indicate youth are not able to afford ARV therapy.

3) *The common feeling of invincibility among youth*. In general, young persons are less likely to seek care or adhere to treatment regimens (pertaining to HIV or other health issues). In addition, due to the effective treatment available, HIV is no longer viewed as a serious health issue among many youth. Once diagnosed, young PLWH may wait several years before seeking treatment because the benefits of early treatment are not fully understood.

4) *CD4 and viral load lab tests may not be accurate proxies for care visits among youth*. CD4 and viral load lab tests are used as proxies for HIV care visits. It is possible these tests are not good care visit proxies for all age groups.



The high viral loads among youth are likely a factor behind the increasing diagnosis rates observed in these age groups. The CDC's recommendation of "treatment as prevention" is especially important among PLWH under the age of 30. While there are special, youth-oriented linkage and retention in care programs, it may be time to consider modifying or enhancing these to include treatment adherence.

Please direct any questions or comments to:

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