Epidemiology of HIV

This is a PDF version of the following document:
Module 1: Screening and Diagnosis
Lesson 1: Epidemiology of HIV

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Definitions for HIV Epidemiology Data

The Centers for Disease Control and Prevention (CDC) generates extensive HIV surveillance data. The following explains the information routinely provided in the CDC's United States HIV surveillance reports and how the CDC utilizes these data.

- **HIV Prevalence**: The HIV prevalence is the estimated number of persons living with HIV. This estimate includes persons diagnosed with HIV plus the estimated number with undiagnosed HIV. Prevalence data help to better understand the overall current status of the HIV epidemic in the United States and to estimate the total number of people who need access to HIV treatment.
- **HIV Prevalence Rate**: The HIV prevalence rate is the number of persons living with HIV per 100,000 population. The HIV prevalence rate puts into perspective the proportion of the population that has HIV.
- **Persons Living with Diagnosed HIV**: The number of persons diagnosed with HIV includes all persons who have been diagnosed with HIV and are still living, regardless of when the HIV diagnosis was made. These numbers will be smaller than the estimated HIV prevalence since they do not include persons with HIV who remain undiagnosed. These data help to identify areas and populations that have the greatest need for HIV care and treatment services.
- **New HIV Diagnoses**: The term new HIV diagnoses refers to persons diagnosed with HIV during a fixed time period, typically 1 year. These individuals are newly diagnosed, but they may have acquired HIV years before the diagnosis of HIV is made. Thus, the number of persons diagnosed with HIV is not the same as the number of persons with new HIV infections (HIV incidence). Determining the number of HIV diagnoses in a 1-year period helps to roughly estimate the burden of new HIV infections.
- **HIV Incidence**: The HIV incidence represents the CDC's estimate of the number of persons who newly acquired HIV during a fixed time period, typically a 1-year period. Because many persons with HIV are diagnosed years after their initial infection, the HIV incidence data is based on calculations performed by the CDC, with HIV diagnosis data playing an important role. The incidence estimates are used to monitor trends in HIV transmission, including overall trends in key populations.
- **HIV Incidence Rate**: The HIV incidence rate represents the number of persons who newly acquired HIV during a fixed time period (typically 1 year) per 100,000 population.

HIV Prevalence in the United States

Estimated HIV Prevalence

The estimated prevalence for the total number of persons with HIV in the United States takes into account the number diagnosed with HIV and the estimated number of persons living with undiagnosed HIV.[1] For year-end 2022, the CDC estimated that approximately 1.2 million people 13 years of age and older were living with HIV in the United States; the exact estimate is 1,238,000, which includes 1,079,700 persons diagnosed with HIV and 158,300 with undiagnosed HIV (Figure 1).[1] The HIV prevalence in the United States has increased yearly from 2018 to 2022 by approximately 15,000 to 20,000 people per year; this increase has resulted from the number of persons newly acquiring HIV outnumbered those with HIV who died.[1] In 2022, the HIV prevalence rate for persons 13 years of age and older in the United States was 438.2 per 100,000 population, meaning an estimated 0.4% of the United States population aged 13 years and older are persons with HIV.[1]

HIV Prevalence by Selected Characteristics

The following content and figure summarize the CDC's 2022 estimated HIV prevalence data in the United States related to selected characteristics (Figure 2).[1]

- **Sex**: Among persons living with HIV in the United States, 78% were male and 22% were female.
- **Age Group**: The age group with the highest HIV prevalence was persons 55–64 years of age; the next highest was in persons 45–54 years of age. Adults 45 years of age and older accounted for 60% of people living with HIV.
- **Transmission Category**: An estimated 60% identified male-to-male sexual contact as their transmission category, 25% identified heterosexual contact, 10% identified injection drug use, and 5% identified both male-to-male sexual contact and injection drug use.
- **Race/Ethnicity**: Approximately 40% of those living with HIV identified as Black/African American, 28% White, and 26% Hispanic/Latino. The HIV prevalence rate among Black/African American people was 1.4%—a rate approximately 7 times higher than the 0.2% HIV prevalence rate in White people.
- **Region of Residence**: Approximately 47% resided in the South, 20% in the West, 20% in the Northeast, and 12% in the Midwest.

Knowledge of HIV Status in the United States

Knowledge of HIV Status

Using back-calculation methods for the year-end 2022, the CDC estimated 87% of all people with HIV in the United States were aware of their HIV status.[1] From 2003 to 2015, the percentage of persons who knew their status increased from approximately 75% to 85%. Since 2015, the percentage of people with HIV who are aware of their HIV status has continued to increase, although at a slower rate (Figure 3).[1,2,3,4] The awareness of HIV status remains below the 2025 national goal of 95% among persons with HIV.[1,5] Persons aware of their HIV status can benefit from HIV antiretroviral treatment, including preventing HIV transmission to others.[6]

Knowledge of HIV Status by Selected Characteristics

The following summarizes data on HIV status awareness, based on selected characteristics (Figure 4).[1]

- **Sex**: Knowledge of HIV status is higher among females (90%) than among males (86%).
- **Age Group**: Increasing age was associated with an increased knowledge of HIV status, ranging from only 56% in the youngest age group (13–24) to 98%in the age group 65 years of age and older.
- **Transmission Category**: Knowledge of HIV status was lowest in persons who reported male-to-male sexual contact (85.7%) and highest in persons who reported male-to-male sexual contact and injection drug use (91.7%).
- **Racial/Ethnic Group:** Knowledge of HIV status was lowest among American Indian/Alaska Native people (77%) and highest among Asian people (93%).
- **Region of Residence**: Persons living in the Northeast had the highest awareness of HIV status (93%). The South (86%), West (86%), and Midwest (85%) had similar lower rates.

Undiagnosed HIV and Risk of Transmission

Knowledge of HIV status has very important implications for people with HIV. Studies have shown that a large proportion of HIV transmissions occur from persons with HIV who are not yet aware of their HIV status.[6,7,8,9] Data from 2016 showed an estimated 37% of new HIV infections were attributed to the 14% of individuals who were unaware of their infection at that time.[6] In addition, persons who become aware they have HIV can engage in medical care and receive antiretroviral therapy, which provides tremendous health benefits and improved clinical outcomes. Further, people with HIV who take antiretroviral therapy and consistently maintain an HIV RNA level less than 200 copies/mL do not transmit HIV sexually to others.[10,11]

Awareness of HIV Status and HIV Care Cascade

Increasing awareness and knowledge of HIV status represents the first step in improving the HIV care cascade (also called the HIV care continuum), which is a model for identifying issues and opportunities related to the delivery of HIV services to people with HIV in the United States.[12,13] Early HIV diagnosis and prompt linkage to care, retention in care, and receipt of effective antiretroviral therapy are all essential in reducing HIV-related morbidity and mortality, as well as lowering the risk of HIV transmission to others.[6,9,13,14]

HIV Incidence in the United States

Estimates of HIV Incidence in the United States

The HIV incidence in the United States represents new HIV infections during a specific time period and data for incidence are typically reported as the number of new HIV infections in a 1-year time frame.[1] The CDC estimates HIV incidence in the United States primarily based on the approach of the Serological Testing Algorithm for Recent HIV Seroconversion (STARHS), a two-step serologic laboratory process that can identify persons with recent HIV infection.[15] The CDC estimates 31,800 new HIV infections occurred in the United States in the year 2022.[1] The estimated number of new HIV infections in the United States decreased by approximately 12% during 2018 to 2022 (Figure 5).[1] The annual number of new HIV infections in the United States remains well above the Ending the HIV Epidemic goals of reducing new infections to 9,300 by 2025 and 3,000 by 2030.[1,5] Overall, five major trends in HIV incidence have occurred in the United States since the onset of the HIV epidemic: (1) a dramatic rise in the early 1980s, (2) a peak in the mid-1980s, (3) a marked decline in the late 1980s, (4) stabilization and leveling off in the 1990s, and (5) a gradual decline in new infections from 2007 to 2022.[1,16,17,18,19]

Estimates of HIV Incidence by Selected Characteristics

The following content and figure summarize the CDC's 2022 estimated HIV incidence data in the United States related to selected characteristics among the estimated 31,800 new HIV infections (Figure 6).[1]

- **Sex**: Among the estimated new HIV infections in persons 13 years of age and older in the United States, an estimated 81% occurred in males and 19% in females.
- **Age Groups**: The number of new HIV infections was highest in the age group 25–34 years, followed by those 35–44 years of age.
- **Transmission Category**: For the reported transmission categories for new HIV infections, an estimated 67% were attributed to male-to-male sexual contact, 22% to heterosexual contact, 7% to injection drug use, and 3% to both male-to-male sexual contact and injection drug use.
- **Race/Ethnicity**: Among all new HIV infections, an estimated 37% were in Black/African American persons and 33% in Hispanic/Latino persons. The HIV incidence rate (new HIV infections per 100,000 population) was by far highest in Black/African American persons 34.1 per 100,000 population and this rate was nearly 8 times higher than for White persons (4.4 per 100,000 population).
- **Region of Residence**: The number of new HIV infections in the United States was the highest in the South, which accounted for an estimated 49% of new HIV infections.

Factors Related to Health and HIV

Multiple overlapping factors, including social, cultural, environmental, and economic factors impact community and regional HIV rates. The CDC has released a report based on data collected from 2016 to 2020 that summarizes HIV diagnoses among adults by federal poverty level, education level, median household income, employment status, and health insurance coverage.[20] Although the intersection of these factors and HIV acquisition is complex, the CDC report suggests that HIV diagnosis rates are higher with poverty, low levels of education, unemployment, and lack of health insurance.[20] Such indicators underscore that HIV risk is informed by a confluence of factors that go beyond individual-level attributes and have population-level consequences.

Deaths in Persons with HIV in the United States

Deaths of Persons Diagnosed with HIV or AIDS

With the availability of potent combination antiretroviral therapy in the mid-1990s, the annual number of deaths in persons with HIV in the United States dramatically decreased during that time period.[19,21,22] More recently, during the period 2018 to 2022, the annual number of deaths (from any cause) among persons diagnosed with HIV has remained relatively stable, fluctuating between approximately 16,000 and 20,000 deaths per year; however, during that time period, HIV-related deaths decreased 19% (5,116 deaths in 2018 compared with 4,145 deaths in 2022) (Figure 7).[23] The continued high number of deaths from any cause in persons with HIV in recent years likely reflects the overall aging population of persons with HIV in the United States. Among 18,939 deaths from any cause in persons with HIV in 2022, approximately 73% occurred in persons 50 years of age and older, and most of these deaths were not directly caused by HIV.[23]

Identified Causes of Death

As noted above, among persons diagnosed with HIV who take effective antiretroviral therapy, significantly more than 50% of deaths are now due to causes not related to HIV-related complications.[24,25,26] In the modern era in North America and Europe, the most common causes of death among adults with HIV who are on antiretroviral therapy are cardiovascular disease, non-AIDS malignancies, and liver-related complications.[26,27]

Global HIV Epidemiology

HIV-1 Groups and Subtypes (Clades)

Strains of HIV-1 can be classified into four groups: the “major” group M, the “outlier” group O, and two additional groups, N and P (Figure 8).[28] Group M, which is responsible for most of the global HIV pandemic, has at least nine distinct subtypes (clades) of genetically related HIV. Groups N, O, and P are uncommon and have been found in Africa. Among the nine HIV-1 group M subtypes, three are responsible for most HIV infections globally: subtype A (common in Western Africa, Central Africa, and Russia), subtype B (common in Europe, the Americas, Australia, and Japan), and subtype C (common in Southern Africa, Eastern Africa, India, and Nepal). Viral subtypes can mix genetic material and create a hybrid virus, and if the recombinant virus is capable of transmission, it is designated as a circulating recombinant form. For example, the circulating recombinant form created from subtypes B and F has been designated circulating recombinant form B/F.

HIV Global Prevalence

In the year 2024, an estimated 40.8 million people were living with HIV globally, including 39.4 million adults (persons 15 years of age and older) and 1.4 million children (younger than 15 years of age) (Figure 9).[29] For the year 2024, more than 26 million people living with HIV resided in sub-Saharan Africa, including 21.1 million in Eastern and Southern Africa and 5.2 million in Western and Central Africa.[29] Outside of Africa, the Asia/Pacific region had the next highest number of persons living with HIV (6.9 million).[29] An estimated 87% of people living with HIV knew their HIV status in 2024.

HIV Global Incidence

Based on the UNAIDS data, an estimated 1.3 million new HIV infections occurred globally in 2024 (Figure 10), which represented a 61% decline from the peak in 1996 and a 40% decline since 2010.[29,30] There were 120,000 new HIV infections in children in 2024, which was a 62% decline since 2010.[29,30]

Global Antiretroviral Therapy Coverage

In 2024, an estimated 31.6 million persons with HIV globally were taking antiretroviral therapy, which is approximately 77% of all people living with HIV globally; this represents a substantial ramp-up from the 7.7 million persons receiving antiretroviral therapy in 2010 and a dramatic increase from the 1.9 million receiving antiretroviral therapy in 2005 (Figure 11).[29]

Global AIDS-Related Deaths

For the year 2024, there were an estimated 630,000 AIDS-related deaths globally, including 260,000 in the UNAIDS Eastern and Southern Africa region and 120,000 in the Asia and the Pacific region (Figure 12).[29,31] Overall, AIDS-related deaths have fallen by approximately 69% since 2004 (2.0 million) and by 52% since 2010 (1.3 million).[29] The global decline in AIDS-related deaths has been attributed to the expanded availability and use of antiretroviral therapy in many regions of the world.[29,32]

HIV-2

HIV-2 on a Global Scale

Of the estimated 40.8 million individuals with HIV worldwide in 2024, approximately 1 to 2 million people have HIV-2.[33] Most persons with HIV-2 reside in West Africa, or in countries, particularly France, Spain, and Portugal, after migrating from West Africa.[33] In addition, HIV-2 has been reported in several former Portuguese colonies, including Angola, Mozambique, and the Indian states of Goa and Maharashtra. Since 1996, HIV-2 prevalence has declined in several West African countries.[33]

HIV-2 in the United States

Fewer than 1% of persons diagnosed with HIV in the United States are diagnosed with HIV-2.[34,35] The number of persons with HIV-2 reported to the CDC between 1988 and June 2010 was 242, though only 166 met the CDC's strict working case definition.[35] A follow-up study reported that from 2010 through 2017, there were 198 reported diagnoses of HIV-2 in the United States, of which 102 were HIV-2 monoinfection, 11 were dual HIV-1 and HIV-2 infections, and 85 were probable (unconfirmed) HIV-2 monoinfection.[34] The 198 diagnoses of HIV -2 corresponded to only 0.6% of all new diagnoses of HIV in the United States during this time period.[34] Among those diagnosed with HIV, 45% had a birth country listed that is known to be endemic for HIV-2.[34] Among persons with a new diagnosis of HIV-2 reported to the CDC from 2010 through 2017, approximately 55% resided in the Northeast and 31% in the South.[34]

Summary Points

- In the United States, at year-end 2022, approximately 1.2 million people were living with HIV. The number of people with HIV has increased in recent years since new infections have outpaced the number of deaths in people with HIV.
- Key 2022 HIV prevalence data in the United States included the following: 78% were males, 60% were 45 years of age or older, 60% reported male-to-male sexual contact as their transmission category, approximately 40% identified as Black persons, and 47% resided in the South.
- In 2022, an estimated 87% of people with HIV in the United States knew their HIV status. Knowledge of HIV status is critical to receive the benefits of HIV treatment, including improved health outcomes and HIV transmission prevention.
- There were an estimated 31,800 new HIV infections in the United States in 2022, which was a decrease of approximately 12% since 2018.
- Key 2022 HIV incidence data in the United States included the following: 81% were male, the age group with the highest number was persons 25–34 years of age, 67% reported male-to-male sexual contact as their transmission category, and Black and Hispanic people together accounted for 70% of new HIV infections.
- In the United States, HIV-related deaths declined 18% during 2018-2022. Deaths from any cause in persons with HIV have not declined since most of the deaths in people with HIV are age-related and not due to HIV-related complications.
- Globally, an estimated 41 million people were living with HIV in 2022, with an estimated 1.3 million new HIV infections in 2022. In 2022, an estimated 30 million persons with HIV globally were receiving antiretroviral therapy.
- An estimated 1 to 2 million persons are living with HIV-2 globally, with the highest prevalence rates in West Africa. In the United States, HIV-2 accounts for fewer than 1% of all people with HIV.

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Figures

Figure 1 Estimated HIV Prevalence in the United States

Source: Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report. 2024;29(No. 1):1-131. Published May 2024 (revised February 7, 2025).

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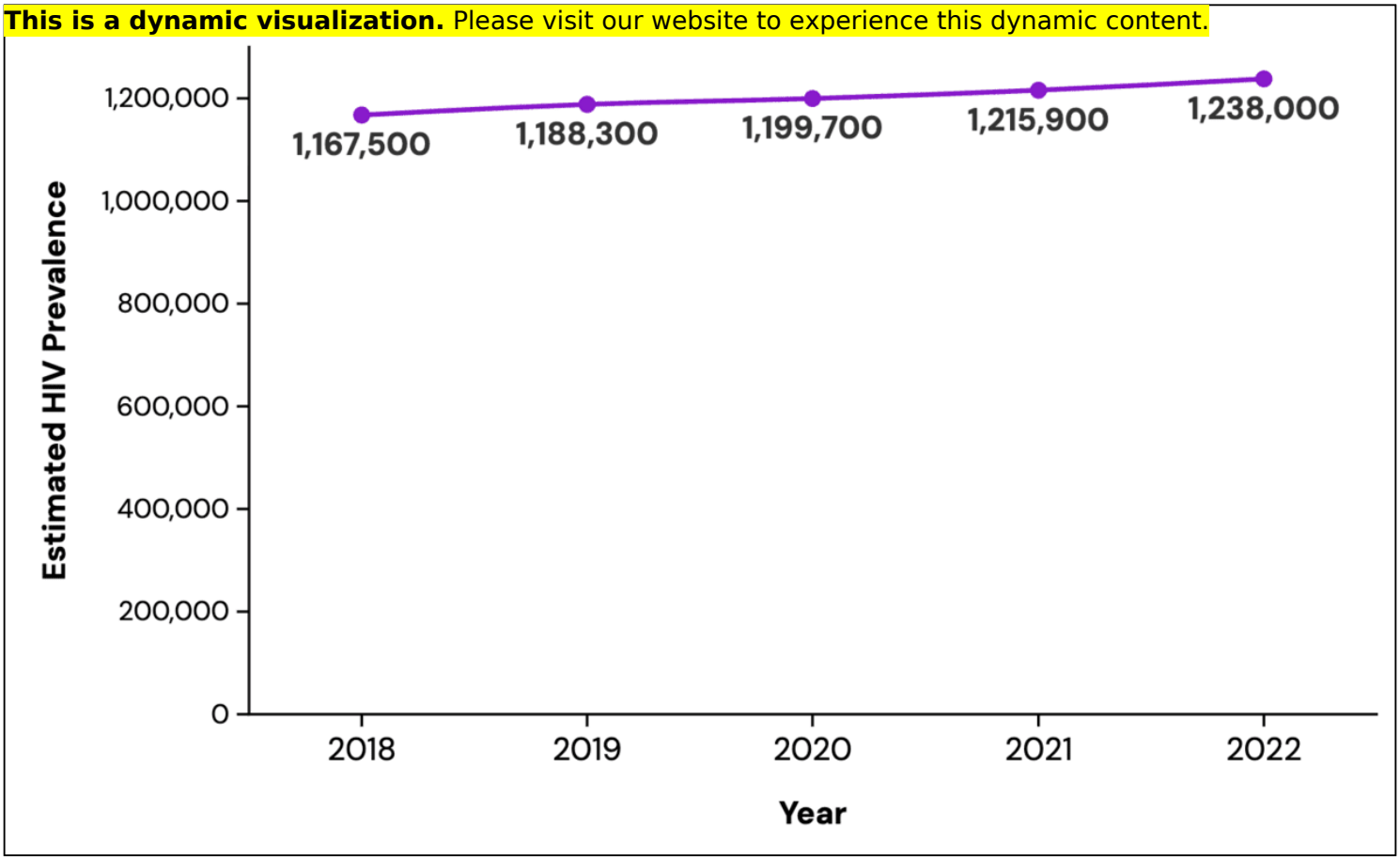

Figure 2 Estimated HIV Prevalence in the United States, by Selected Characteristics

Source: Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report. 2024;29(No. 1):1-131. Published May 2024 (revised February 7, 2025).

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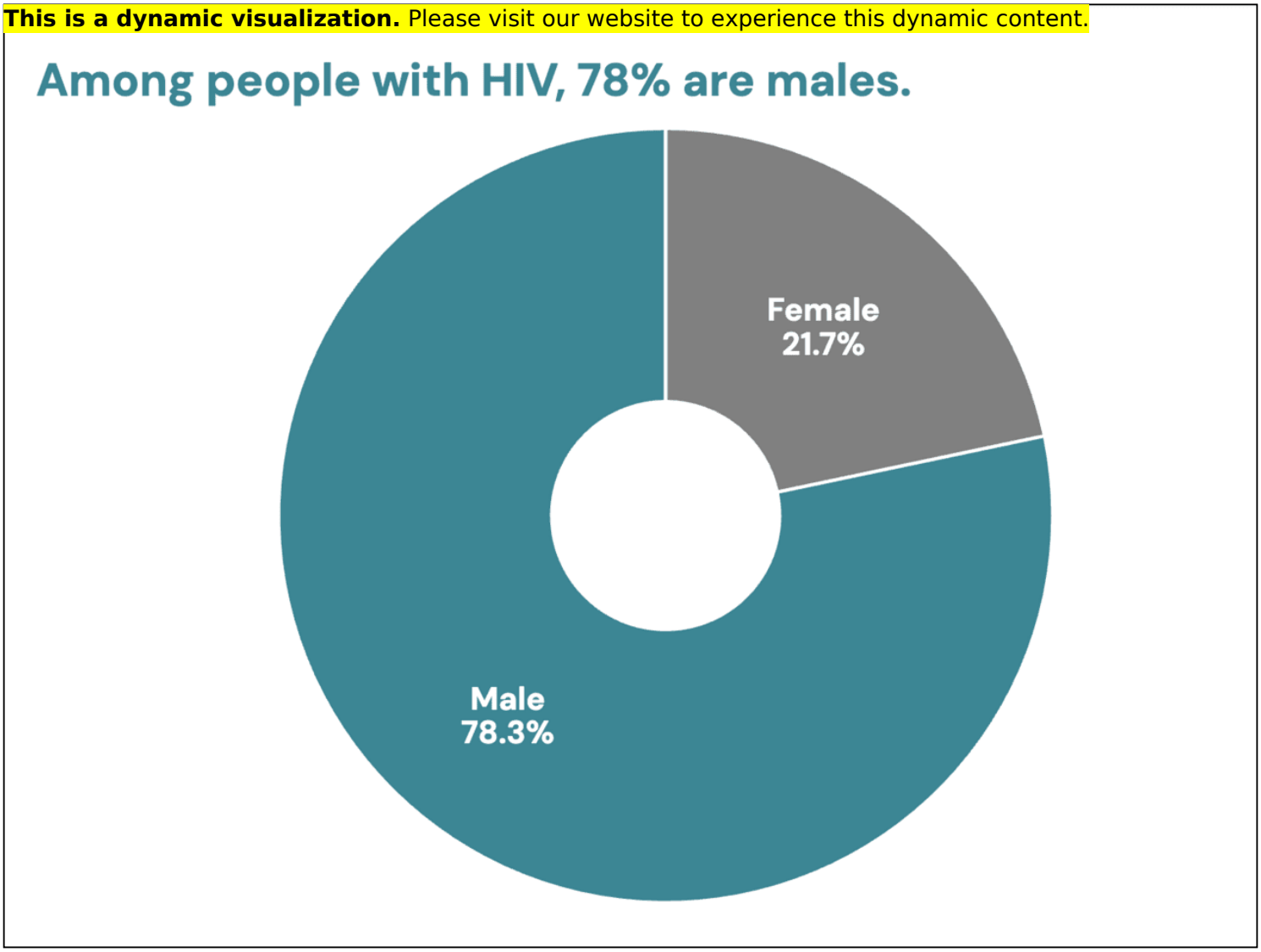

Figure 3 Knowledge of HIV Status in the United States

Source: Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report. 2024;29(No. 1):1-131. Published May 2024 (revised February 7, 2025).

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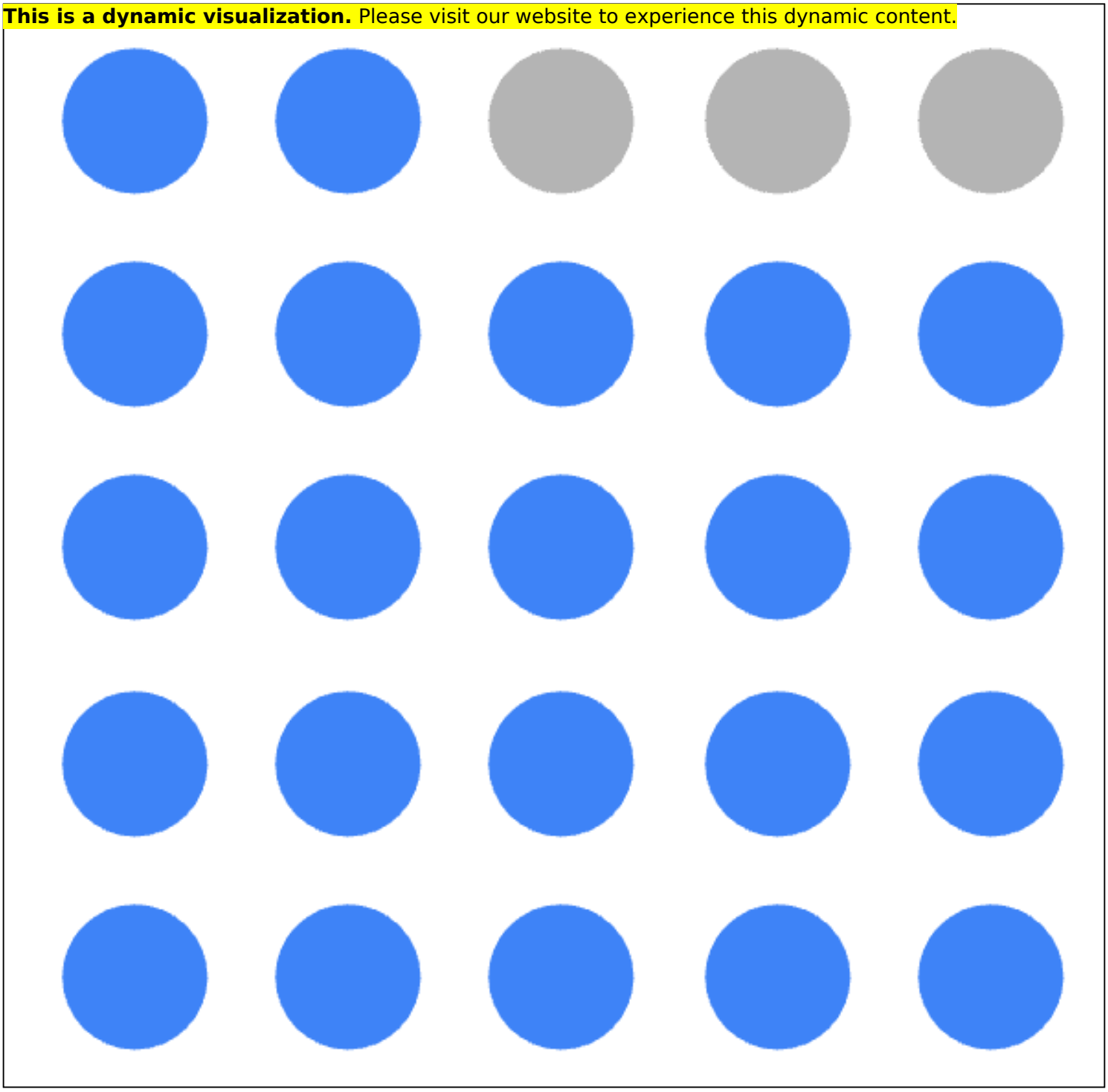

Figure 4 Knowledge of HIV Status in the United States, by Selected Characteristics, 2022

Source: Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report. 2024;29(No. 1):1-131. Published May 2024 (revised February 7, 2025).

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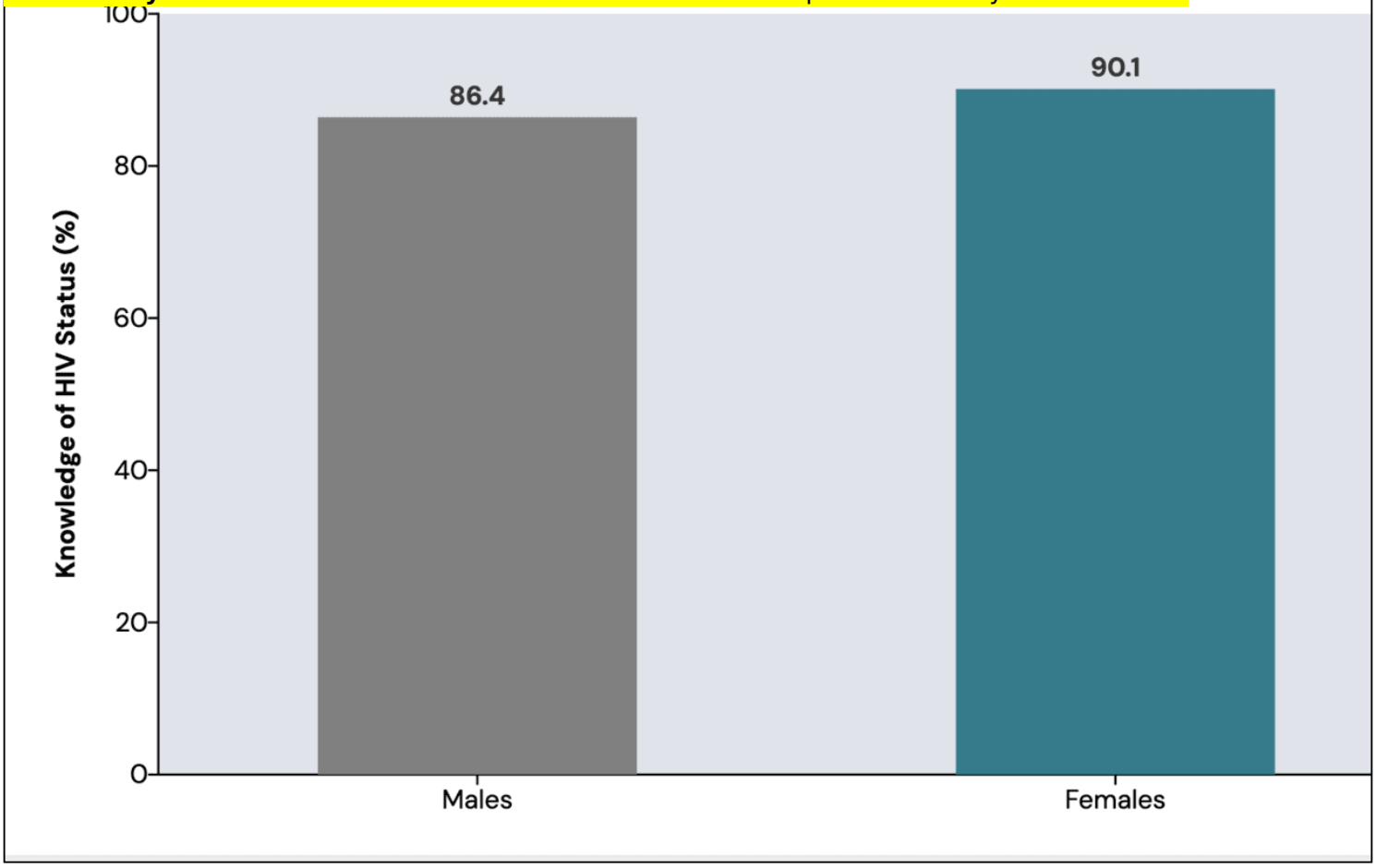

Figure 5 Estimated HIV Incidence in the United States

Source: Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report. 2024;29(No. 1):1-131. Published May 2024 (revised February 7, 2025).

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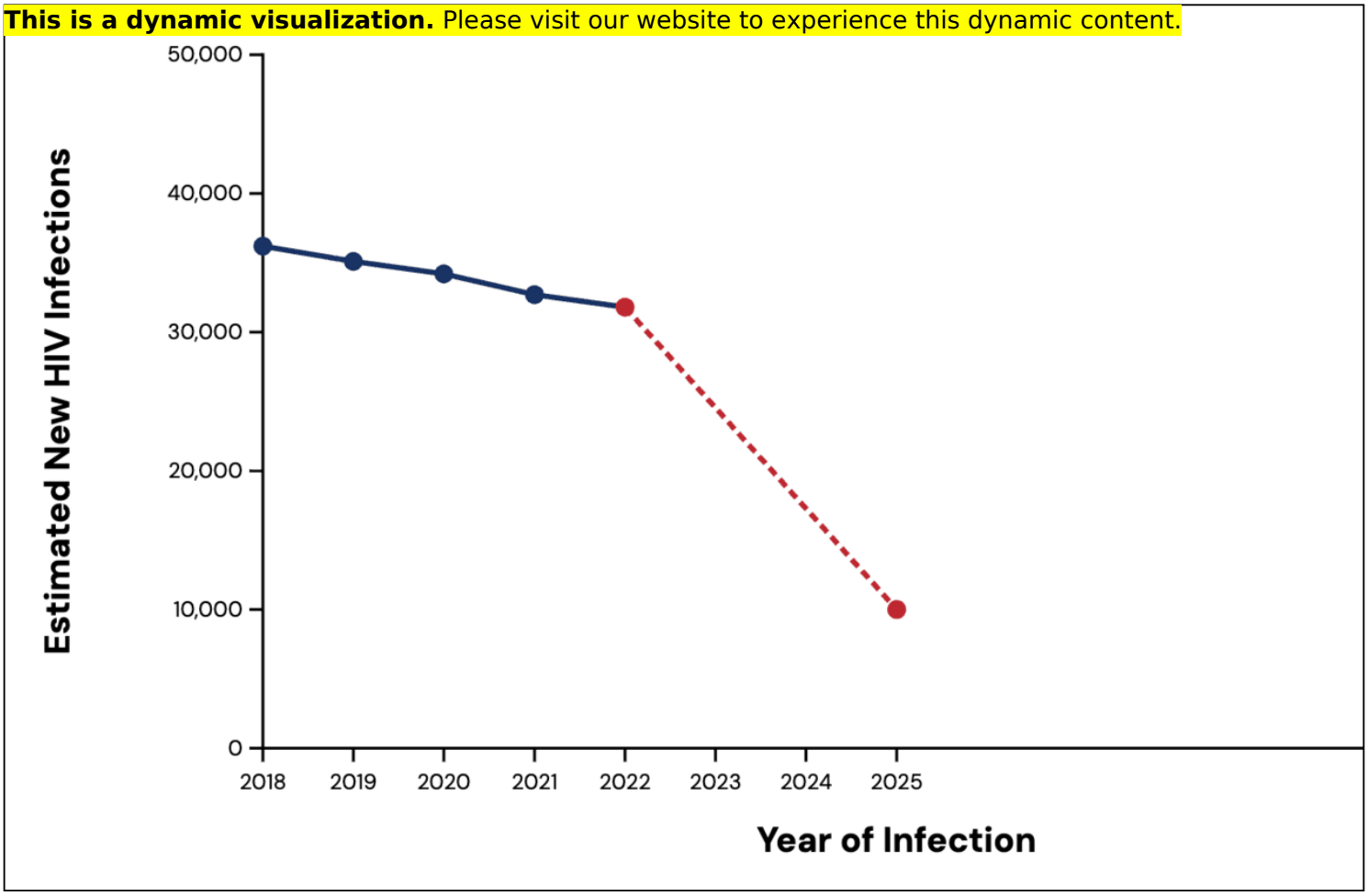

Figure 6 Estimated HIV Incidence in the United States, by Selected Characteristics, 2022

Source: Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report. 2024;29(No. 1):1-131. Published May 2024 (revised February 7, 2025).

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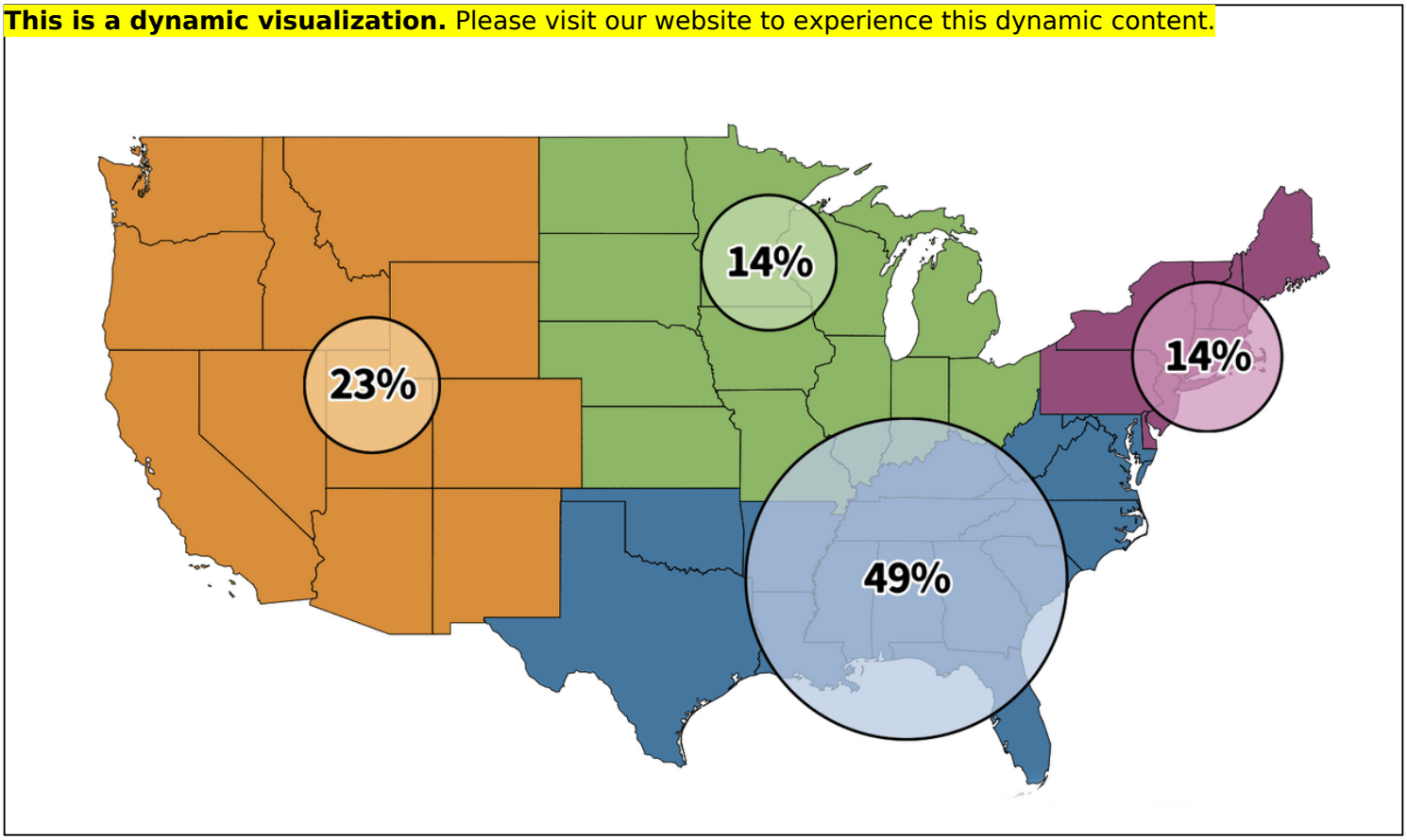

Figure 7 Annual Deaths in Persons with Diagnosed HIV, by Year, United States, 2018-2022

This graphic shows deaths from any cause in persons with HIV (red line) and HIV-related deaths (blue line).

Source: Centers for Disease Control and Prevention. Diagnoses, deaths, and prevalence of HIV in the United States and 6 territories and freely associated states, 2022. HIV Surveillance Report, 2022; vol. 35:1-177. Published May 2024.

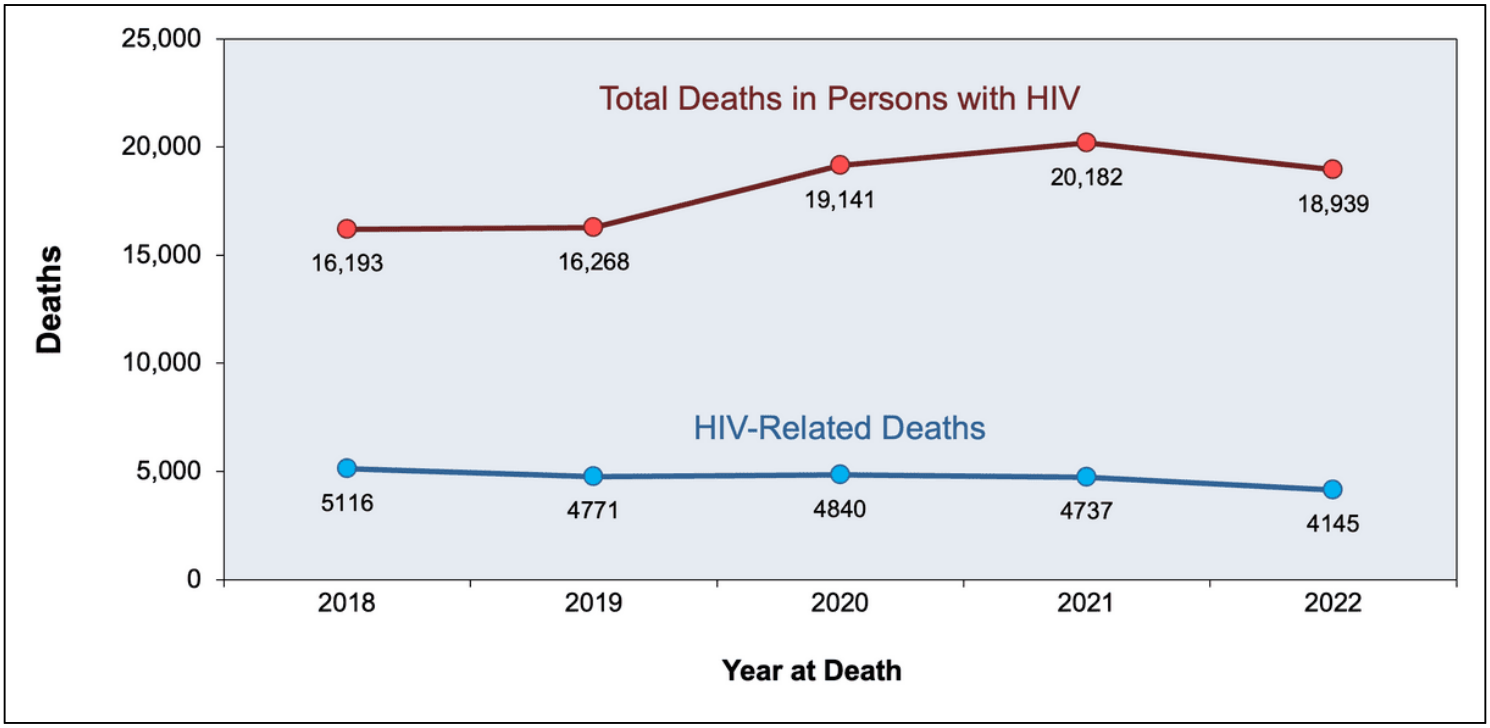

Figure 8 HIV-1-Groups

Strains of HIV-1 can be classified into four groups: the "major" group M, the "outlier" group O, and two additional groups, N and P. The M group comprises at least 9 distinct HIV subtypes.

Source: Taylor BS, Sobieszczyk ME, McCutchan FE, Hammer SM. The challenge of HIV-1 subtype diversity. N Engl J Med. 2008;358:1590-602.

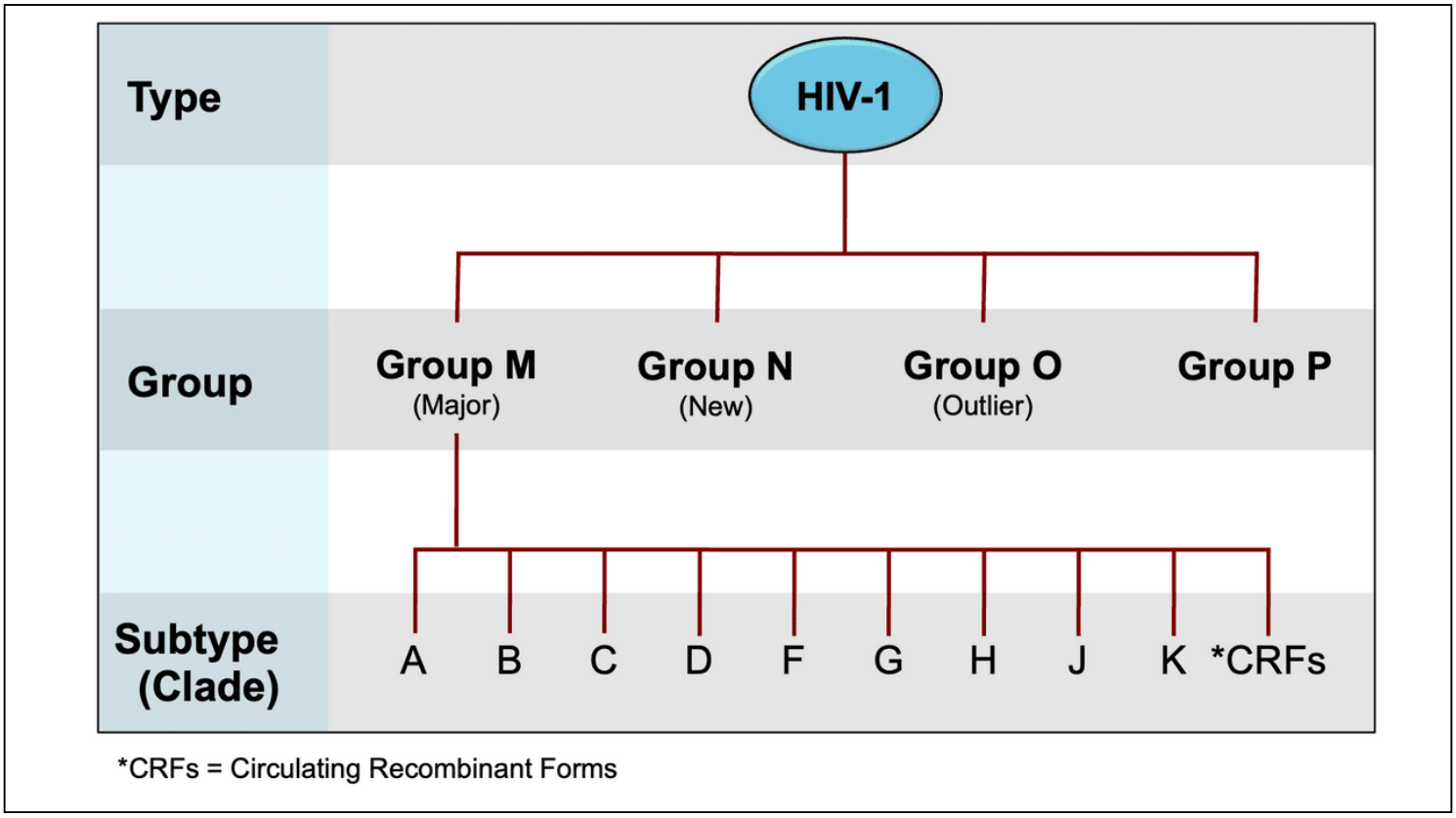

Figure 9 Global HIV Prevalence by Region, 2024

Source: UNAIDS. Fact Sheet 2025.

HIV Prevalence, by Global Region, 2024	
Region	People Living with HIV
Global Total	**40,800,000**
Eastern and Southern Africa	21,100,000
Western and Central Africa	5,200,000
Middle East and North Africa	240,000
Asia and the Pacific	6,900,000
Latin America	2,500,000
Caribbean	340,000
Eastern Europe and Central Asia	2,100,000
Western and Central Europe and North America	2,400,000

Figure 10 Global HIV Incidence by Region, 2024

Source: UNAIDS. Fact Sheet 2025.

HIV Incidence by Region, 2024	
Region	New HIV Infection
Global Total	**1,300,000**
Eastern and Southern Africa	490,000
Western and Central Africa	160,000
Middle East and North Africa	23,000
Asia and the Pacific	300,000
Latin America	120,000
Caribbean	15,000
Eastern Europe and Central Asia	130,000
Western and Central Europe and North America	62,000

Figure 11 Persons with HIV on Antiretroviral Therapy—Global, 1999–2024

Source: UNAIDS. Fact Sheet 2025.

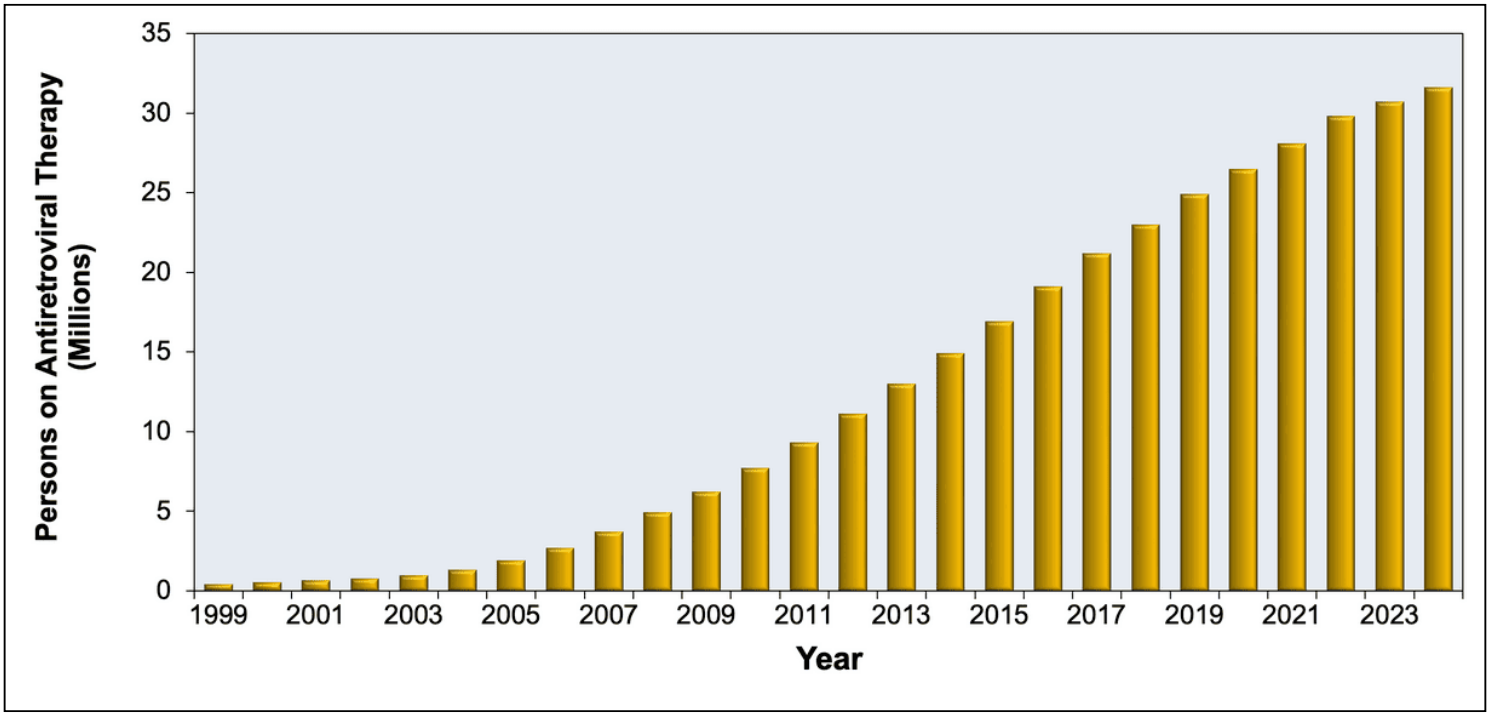

Figure 12 Global Deaths Due to AIDS During 2024

Source: UNAIDS. Fact Sheet 2025.

Death Due to AIDS, by Region, 2024	
Region	AIDS-Related Deaths
Global Total	**630,000**
Eastern and Southern Africa	260,000
Western and Central Africa	120,000
Middle East and North Africa	7,000
Asia and the Pacific	150,000
Latin America	27,000
Caribbean	4,800
Eastern Europe and Central Asia	48,000
Western and Central Europe and North America	9,000