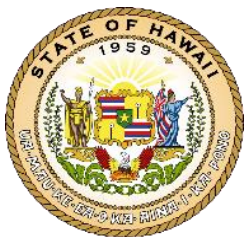


 **2016 Hawaii  
HIV/AIDS Integrated  
Epidemiologic Profile**

**July, 2019**



**Harm Reduction Services Branch  
Communicable Disease and  
Public Health Nursing Division  
Hawaii State Department of Health**



**Prepared for:**

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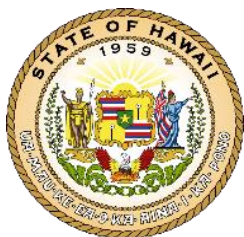
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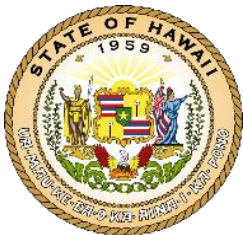


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**July, 2019**



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## **List of abbreviations**

- AIDS: Acquired Immunodeficiency Syndrome
- AIAN: American Indian/Alaskan Native
- CD4: CD4+ T-lymphocyte
- DOB: date of birth
- DBEDT: Department of Business, Economic Development & Tourism
- DS: data suppressed
- eHARS: enhanced HIV/AIDS Reporting System
- HDOH: Hawaii Department of Health
- HIV: Human Immunodeficiency Virus
- IDU: injection drug use
- MSM: men who have sex with men
- NHPI: Native Hawaiian/Other Pacific Islander
- PLWDH: persons living with diagnosed HIV infection
- PLWDA: persons living with diagnosed HIV Infection that was ever classified as stage 3 (AIDS)
- CDC: Centers for Disease Control and Prevention
- VL: viral load
- VS: virally suppressed

## EXECUTIVE SUMMARY

The Hawaii 2016 HIV/AIDS epidemiologic profile describes the epidemiology of human immunodeficiency virus (HIV) infections in Hawaii in 2016. The 2016 profile aims to:

- 1) describe incidence and prevalence of HIV infection (all stages) in Hawaii in 2016;
- 2) describe 2016 HIV care continuum indicators;
- 3) describe disparities by demographic and risk factors along the HIV care continuum;
- 4) describe characteristics of the not-in-care population in 2016, Hawaii;
- 5) describe the epidemiology and HIV care continuum among persons younger than 25 years old, namely, children, adolescents and young adults with HIV infections in Hawaii;
- 6) describe the epidemiology of HIV infections among transgender persons.

**The following significant findings were noted:**

### **Incidence of diagnosed HIV infection**

- Only infections among persons residing in Hawaii at the time of HIV diagnosis were included. From the beginning of the HIV/AIDS epidemic (around 1983) to December 31, 2016, there were a total of 4,734 diagnosed HIV infections. HIV infections were more common in males (89.5%), in persons aged 25-34 years (34.1%) and 34-45 years (33.1%), in whites (54.5%), and in persons whose infections were attributed to male-to-male sexual contact (71.6%).
- A total of 667 HIV infection were diagnosed between 2010 and 2016. From 2010 to 2016, there was no statistically significant trend of linear increase or decrease in the rates of diagnosed HIV infections (7.7 in 2010 and 5.5 per 100,000 in 2016).

### **Prevalence and prevalent cases**

- At year-end 2016, there were 2,473 persons living with diagnosed HIV infection (PLWDH) in Hawaii, resulting in a prevalence rate of PLWDH at 173.1 per 100,000 populations. There were 1,438 persons living with diagnosed HIV infection that were ever classified as stage 3 (AIDS) (PLWDA), resulting in a prevalence rate of PLWDA at 100.3 per 100,000 populations. Prevalence rates in males (PLWDH: 305.6 and PLWDA: 177.3, respectively) were almost eight times as high as that of females (39.4 and 23.4, respectively).

- Prevalence rates increased as age increased, with the highest rate among persons aged 45-54 years (433.1 and 288.4, respectively). Blacks/African Americans had the highest rates (588.2 and 308.4, respectively), followed by whites (379.4 and 215.2, respectively). At the county level, Hawaii County had the highest prevalence rates (209.6 and 127.5, respectively).
- Among both PLWDH and PLWDA, males (88.7% and 88.5%, respectively), persons  $\geq 45$  years old (70.8% and 82.3%, respectively), blacks/African Americans (6.6% and 6.0%, respectively) and whites (48.6% and 47.3%, respectively) were over-represented compared to their respective proportions among Hawaii's general population. Infections attributed to male-to-male sexual contact accounted for over 70% of all diagnosed HIV infection among both populations (72.7% and 71.2%, respectively).
- Honolulu County constituted approximately two thirds of all diagnosed HIV infections (66.5% and 65.5%, respectively), followed by Hawaii County (16.8% and 17.6%, respectively). Proportions of PLWDH (16.8%) and PLWDA (17.6%) were over represented in Hawaii County, compared to their respective proportion in the general population (13.9%).

#### **Linkage to HIV medical care after diagnosis of HIV infection**

- In 2016, of the 79 persons newly diagnosed with HIV infection, 62 (78.5%) were linked to HIV medical care  $\leq 1$  month and 70 (88.6%) were linked to HIV medical care  $\leq 3$  months after HIV diagnosis. Linkage to care  $\leq 1$  month was lower in young persons (e.g. lowest among persons aged 13-24 years, 42.9%) and in black/African Americans (70.0%) by race/ethnicity. Nevertheless, interpretation of linkage to care should be cautioned due to small counts in most groups.

#### **Receipt of any HIV medical care and retention in HIV medical care**

- A total of 2,393 persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed by year-end 2015 and who were alive and resided in Hawaii at year-end 2016 were included in the analysis of receipt of any HIV medical care and retention in HIV medical care. During 2016, 1,934 (80.8%) received any HIV medical care and 1,410 (58.9%) were retained in HIV medical care. Percentages of receipt of HIV medical care (any or retention in care) differed significantly by age, transmission category, and case management status but not by sex or county of residence. Significant difference was found in retention in HIV medical care by race but not in receiving any HIV medical care.



- Both percentages increased as age increased, with the highest percentages among persons aged  $\geq 55$  years (84.4% and 64.1%, respectively). Persons aged 25-34 years had the lowest percentage of receipt of any HIV medical care (72.3%) while persons aged 13-24 had the lowest percentage of retention in HIV medical care (40.4%).
- Asians had the highest percentages for both indicators (85.8% and 66.7%, respectively), followed by NHPIs (81.6% and 62.7%, respectively) and persons of multiple races (83.0% and 59.6%, respectively). Hispanics (77.8% and 53.5%, respectively) and blacks/African Americans (78.3% and 52.6%, respectively) had the lowest percentages. Due to small counts, the data for AIAN should be interpreted with caution.
- Persons whose infections were attributed to heterosexual contact had the highest percentages for both indicators (male, 90.0% and 73.3%, respectively; female, 84.8% and 61.4%, respectively). Persons whose infections were attributed to the other category, including hemophilia, blood transfusions, and risk factors not reported or not identified, had the lowest percentage (54.8% and 33.3%, respectively).
- Percentages of both receiving any HIV medical care and retention in HIV medical care were significantly higher among persons in case management (90.8% and 68.3%, respectively) than those not in case management in 2016 (70.6% and 49.2%, respectively).

### **Viral suppression**

- Among the total of 2,393 persons included in the analysis, 1,756 (73.4%) were virally suppressed in 2016. Percentages of viral suppression increased to 90.8% among persons who received any HIV medical care in 2016 (n=1,934) and to 92.6% among those retained in HIV medical care in 2016 (n=1,410). Significant disparities were observed in viral suppression among all selected characteristics except for county of residence.
- Percentage of viral suppression was significantly higher among persons in case management (82.3%) than those not (64.2%), in males (74.0%) than females (68.3%), in older persons (e.g., persons  $\geq 55$  years old, 78.2%) than younger persons (e.g., those 25-34 years old, 63.7%), in Asians (80.3%) than blacks/African Americans (64.5%) and Hispanics (72.4%). Due to small counts, the data for AIAN should be interpreted with caution.

- By transmission category, the highest percentage of viral suppression was among persons whose infections were attributed to heterosexual contact (male 81.1%; female 75.4%), followed by MSM (75.3%) and the lowest were found among infections attributed to the other category, including hemophilia, blood transfusions, and risk factors not reported or not identified (48.8%).
- Among persons who received any HIV medical care in 2016, although statistically significant differences were observed by sex, race, and transmission category, the magnitude of such differences was small. AIAN was the only group which had a percentage lower than the 2020 national goal of 80% (1). Nevertheless, the data on AIAN should be interpreted with caution due to small counts.
- Among persons who were retained in HIV medical care in 2016, the only significant difference observed was by sex (female, 86.3% and male, 93.4%). Nevertheless, the percentage of viral suppression among females exceeded the 2020 national target of 80% (1).

#### **HIV infections among children (0-12 years), adolescents (13-19 years), and young adults (20-25 years)**

- From the beginning of the epidemic (around 1983) to 2016, a total of 441 Hawaii residents  $\leq 25$  years old were diagnosed with HIV infections, of which 26 (5.9%) were children, 76 (17.2%) were adolescents and 339 (76.9%) were young adults. Over half (57.7%) of the HIV infections among the 26 children were attributed to perinatal transmission. Among both adolescents and young adults, MSM was the main category of transmission (54.0% and 65.5%, respectively).
- A total of 14 persons  $\leq 25$  years old were diagnosed with HIV infection in 2016, of which 6 (42.9%) were linked to care  $\leq 1$  month and 11 (78.6%) were linked to care  $\leq 3$  months after HIV diagnosis. At year-end 2016, a total of 56 persons in Hawaii  $\leq 25$  years old were living with diagnosed HIV, of which 4 (7.1%) were children, 6 (10.7%) were adolescents, and 46 (82.1%) were young adults.
- Among the 51 persons  $\leq 25$  years old with HIV infection diagnosed by year-end 2015 and resided in Hawaii at year-end 2016, 43 (84.3%) were in care, 22 (43.1%) were retained in care, and 38 (74.5%) were virally suppressed in 2016.

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## **Technical notes**

### **A. Source of data**

To be included in the analysis, data must meet the CDC case definition for HIV infection and eligibility criteria for HIV disease (2, 3). Data used in the development of this profile are from the State of Hawaii enhanced HIV/AIDS Reporting System (eHARS). eHARS is the nationwide, population-based data system developed by CDC for collecting, storing, and retrieving mandatory reporting of cases of HIV and/or AIDS. In the State of Hawaii, mandatory name-based reporting of AIDS started at the beginning of the epidemic (around 1983). Mandatory name-based reporting of HIV infections was not completed until March 2008. Hawaii is now one of the 39 states which required reporting of all levels of CD4 and viral load test results to the state or local health department (4).

The eHARS dataset exported on September 4<sup>th</sup>, 2018 was used in the analysis. The dataset included information on persons' date of birth, birth sex, race, transmission category, stage of disease at diagnosis, current address, and laboratory data such as CD4 tests and results, and viral load tests and results. Current address captured in this dataset reflects a person's most recent known residential address as of September 4<sup>th</sup>, 2018. To obtain the most recent known address at year-end 2016, current address captured in the dataset exported at the end of 2016 was used as the starting point of the investigation. Several internal and external datasets were used in the investigation for confirmation of a person's most recent known residential address at year-end 2016. Whether a person was in case management or not in 2016 was obtained from the state's case management data system, known as e2 Hawaii.

### **B. Measures and definitions**

#### **New Diagnosis**

New diagnosis of HIV infection was defined as a diagnosis of HIV infection regardless of the stage of disease (stage 0, 1, 2, 3[AIDS], or unknown) and refers to all persons with a diagnosis of HIV infection from January 1<sup>st</sup> to December 31<sup>st</sup> of the selected measurement year. Only persons whose residence at the time of diagnosis was in Hawaii were included in the count. The month and the year of the earliest HIV positive test result reported to the surveillance system was used to determine the diagnosis date of HIV infection. Persons who died during the same measurement year were included in the analysis. Cumulative incidence rates of diagnosed HIV infections were calculated per 100,000 populations.

### **Linkage to HIV medical care**

Linkage to HIV medical care  $\leq 1$  month after HIV diagnosis was measured by documentation of  $\geq 1$  CD4 (count or percentage) or viral load test performed  $\leq 1$  month after HIV diagnosis, including tests performed on the same date as the date of HIV diagnosis. Linkage to HIV medical care  $\leq 3$  months after HIV diagnosis was measured by documentation of  $\geq 1$  CD4 (count or percentage) or viral load test performed  $\leq 3$  months after HIV diagnosis, including tests performed on the same date as the date of diagnosis (4). Only data from persons residing in Hawaii at the time of HIV diagnosis were included in the denominator for any chosen measurement year.

### **Persons living with diagnosed HIV infection (PLWDH) at year-end 2016**

Prevalent cases of PLWDH in 2016 were defined as persons whose HIV/AIDS diagnosis date was on or before December 31, 2016 and who were alive and resided in the State of Hawaii at year-end 2016. Prevalent cases of persons living with diagnosed HIV infection that was ever classified as stage 3 (AIDS) (PLWDA) were defined as persons whose AIDS diagnosis date was on or before December 31, 2016 and who were alive and resided in the State of Hawaii at year-end 2016. Prevalent rates of PLWDH and of PLWDA were calculated per 100,000 population.

### **Receipt of HIV medical care in 2016**

Receipt of HIV medical care was based on data for persons whose HIV infection was diagnosed by year-end 2015 and who were alive and resided in the State of Hawaii at year-end 2016. Only persons aged  $\geq 13$  years at year-end 2015 were included in the analysis. Receipt of any HIV medical care was measured by documentation of  $\geq 1$  CD4 (count or percentage) or viral load test performed in 2016 (4). Retention in HIV medical care was measured by documentation of  $\geq 2$  or more CD4 (count or percentage) or viral load tests performed  $\geq 3$  months apart during 2016 (4).

### **In care in 2016**

The definition of in care in this document was the same as receipt of any HIV medical care. Whether an individual was in care in 2016 was based on data for persons whose HIV infection was diagnosed by year-end of 2015 and who were alive and resided in the State of Hawaii at year-end 2016. It was measured by documentation of  $\geq 1$  CD4 (count or percentage) or viral load test performed in 2016. The terms, “In care” and “receipt of any HIV medical care” are interchangeable in this document.

### **Not in care in 2016**

Not in care in 2016 was defined as no documentation of any CD4 (count or percentage) or viral load tests performed in 2016. It was based on data for persons whose HIV infection was diagnosed by year-end of 2015 and who were alive and resided in the State of Hawaii at year-end 2016.

### **Viral suppression in 2016**

Viral suppression in 2016 was defined as having a viral load (VL) test result  $< 200$  copies/mL at the last viral load test in 2016 (4). Viral suppression was calculated among the following three populations:

- (1) all persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed by year-end 2015, who were alive and resided in Hawaii at year-end 2016; hereafter referred to as 'All persons'.
- (2) all persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed by year-end 2015, who were alive and resided in Hawaii at year-end 2016, and who had documentation of  $\geq 1$  CD4 or VL test in 2016; hereafter referred to as 'Persons in care in 2016' or 'Persons with  $\geq 1$  CD4/VL test in 2016'.
- (3) all persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed by year-end 2015, who were alive and resided in Hawaii at year-end 2016, and who had documentation of  $\geq 2$  CD4 or VL tests performed  $\geq 3$  month apart during 2016; hereafter referred to as 'Persons retained in care in 2016' or 'Persons with  $\geq 2$  CD4 or VL tests in 2016'.

### **C. Area of residence**

Residence at HIV disease diagnosis was used for new diagnosis and linkage to HIV medical care in each selected measurement year. A person's most recent known address at year-end 2016 was used for prevalence data, receipt of HIV medical care, in care or not in care, retention of HIV medical care, and viral suppression in 2016. To determine whether a person resided in the State of Hawaii at year-end 2016, vigorous investigation was conducted using several available datasets.

When a person was determined to reside in Hawaii at year-end 2016 but lacked information on county, missing data on county were then distributed back among counties based on the proportion, in each county, of prevalent cases of PLWDH and PLWDA for which county data was available. For example, among prevalent cases of PLWDH who had data on county (n=2,378), the proportion of each county was: Hawaii County, 16.8%, Honolulu County, 66.5%, Kauai County, 4.1%, and Maui County, 12.6%. Among the total 95 persons missing county data, 16 ( $=95 \times 16.5\%$ ) were redistributed back to Hawaii County, 63 ( $=95 \times 66.5\%$ ) to Honolulu County, 4 ( $=95 \times 4.1\%$ ) to Kauai County, and 12 ( $=95 \times 12.6\%$ ) to Maui County.

#### **D. Sociodemographic characteristics of the State of Hawaii**

Please refer to the 2015 Hawaii HIV/AIDS Integrated Epidemiologic Profile (5) (pages 18-22) for information on the geography, counties, and associated islands of the state of Hawaii. The profile is available at <https://health.hawaii.gov/harmreduction/files/2013/05/2015-Epi-Profile.pdf>. Sociodemographic characteristics of the state of Hawaii remained similar in 2016 compared to 2015. Age, sex, and racial distribution of 2016 population of Hawaii was based on U.S. census bureau data estimates of the resident population (6).

#### **E. Policy on reporting of small numbers**

Harm Reduction Services Branch, Division of Communicable Disease and Public Health Nursing, Hawaii Department of Health recently updated its policy on data release of small numbers. This policy outlines the following:

- 1) Data may be reported at the state and county level only.
- 2) At the state level, data will be suppressed if the size of the population of interest (the denominator or stratum) is  $<100$ , unless they are in a category labeled “other” or “unknown”. No suppression rules are required for the numerator, or cell counts, if the size of the population of interest (the denominator or stratum) is  $\geq 100$ .
- 3) At the county level, data will be suppressed if the size of the population of interest (the denominator or stratum) is  $<100$  or the numerator (cell count) is  $<5$ , unless they are in a category labeled “other” or “unknown”.
- 4) At both the state and county levels, data will be suppressed or aggregated to preclude arithmetic calculation of a suppressed cell.
- 5) At both the state and county levels, a count of zero is allowed unless it is a threat to confidentiality.

However, the total counts of HIV diagnosis and the total counts of persons living with diagnosed HIV infection/ever classified as stage 3 (AIDS), for single-year, multiple years, or cumulative, and rates/proportions based on those counts for a single county or of multiple counties with no further stratification, are exempted from data suppression, even for total counts <5.

Nevertheless, data will be suppressed at both the state and county level if the total counts are <5 and are used as a denominator for additional HIV related outcomes (e.g., linkage to HIV medical care, receipt of and retention in HIV medical care, viral suppression, etc.). In addition, data will be suppressed at the county level if the total counts are <5 and are further stratified (e.g., by sex, age, race/ethnicity, etc.).

Population of interest, sometimes referred to as the denominator, subgroup, or stratum, should be based on federal/state official publications, such as the U.S. census, vintage postcensal estimates from the U.S. Census Bureau, or from a state government official agency. For subgroups, or strata, where population data are not available, suppression rules will be based on the size of the underlying population that is most similar to the group. For example, for black men who have sex with men, suppression rules would be applied based on the size of population of black men for the selected geographic areas.



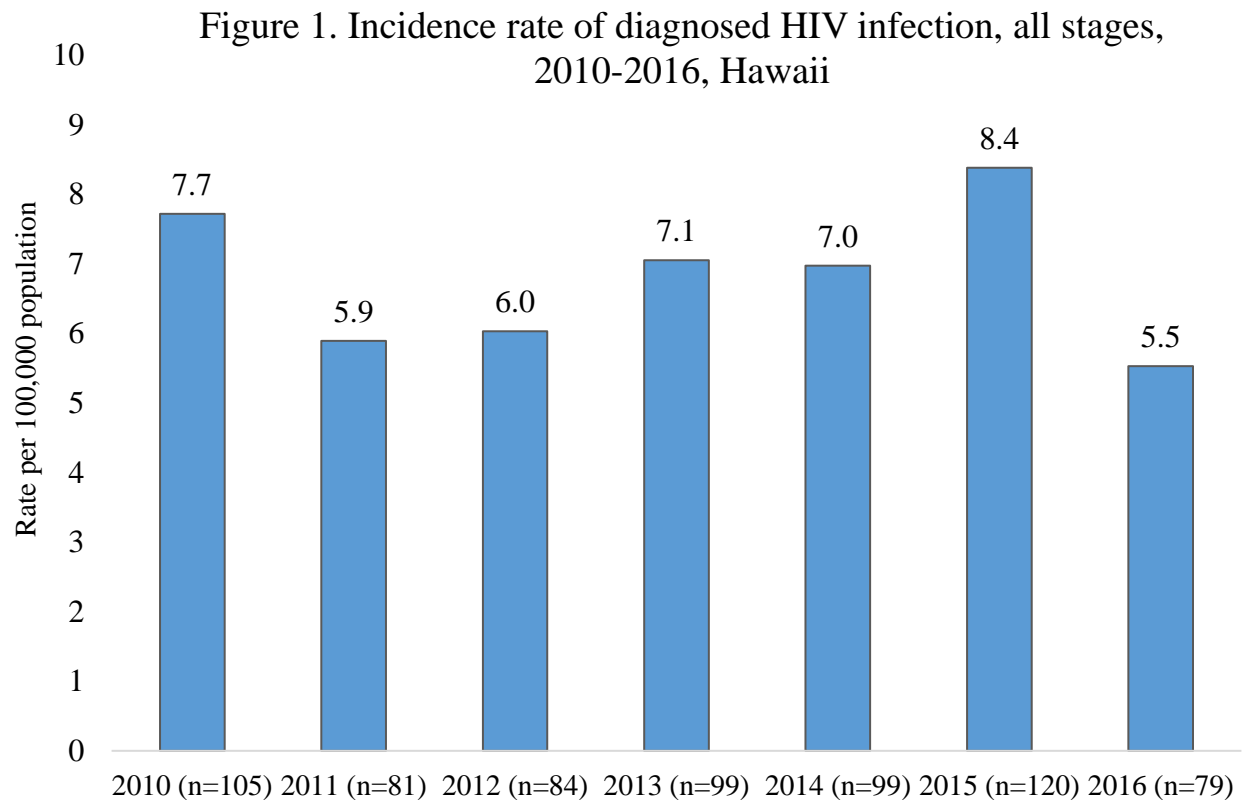
## Results

### A. Epidemiology of HIV/AIDS, 2016, Hawaii

#### I. New diagnosis and incidence rate

##### 1) Incidence rate of diagnosed HIV infection, all stages, 2010-2016

Incidence rates of diagnosed HIV infection were calculated at the state level only. Only infections from persons who resided in Hawaii at the time of HIV diagnosis were counted. Incidence rates by selected characteristics were not calculated because of small counts of infections in most categories. Incidence rates of diagnosed HIV infection decreased from 7.7 in 2010 to 5.9 per 100,000 population in 2011. It then increased from 5.9 in 2011 to 8.4 per 100,000 population in 2015 (**Figure 1**). In 2016, it decreased to 5.5 per 100,000 population. As a result, there was no trend of linear increase or decrease in the rates of diagnosed HIV infection in Hawaii from 2010 to 2016.



Note: Only data from persons residing in Hawaii at the time of HIV diagnosis were included. N refers to the total number of diagnoses in each year. Number of new diagnoses each year, in particular, most recent years, are incomplete and subject to change due to delays in reporting, the ongoing national de-duplication project, and ongoing data cleaning.

## 2) Diagnoses of HIV infection by selected characteristics

**Table 1** demonstrates characteristics of persons whose HIV infections were diagnosed from the beginning of the epidemic (around 1983) through 2016 (cumulative) as well as those whose HIV infections were diagnosed in more recent years, between 2010 and 2016. Only data from persons residing in Hawaii at the time of HIV diagnosis were included.

Among the total of 4,734 persons diagnosed with HIV infection, 89.5% were males, about a third each were among persons aged 25-34 years (34.1%) and 35-44 years (33.1%), and another sixth (16.7%) were among persons aged 45-54 years. Persons aged 13-24 years accounted for 8.8%. Whites constituted the highest proportion (54.5%), followed by Asians (15.5%), NHPs (11.2%), and Hispanics/Latinos (7.7%). MSM was the leading transmission category (71.6%), followed by heterosexual contact with a person known to have, or to be at high risk for, HIV infection (8.5%), injection drug use (IDU, 7.7%), and MSM & IDU (6.5%). Honolulu County accounted for almost three quarters (73.1%) of all diagnoses, followed by Hawaii County (12.3%), Maui County (9.8%), and Kauai County (4.8%).

In the more recent seven years between 2010 and 2016, there were a total of 667 persons diagnosed with HIV infection. Males constituted 89.1% of all diagnoses. By age at diagnosis, the highest proportion was among persons aged 25-34 years (33.7%), followed by those aged 35-44 years (22.2%) and those aged 45-54 years (22.1%). Persons in age group 13-24 constituted 11.8% and persons aged 55 or older constituted another 11.0%. Proportions from persons aged 13-24 years and older patients (age 45 and older) increased in more recent years.

By race/ethnicity, the highest proportion was among whites (33.8%). Nevertheless, in more recent years, proportions decreased among whites, but increased among Asians, blacks/African Americans, and persons of multiple races. MSM remained as the dominant transmission category (66.9%), followed by heterosexual contact with a person known to have, or to be at high risk for, HIV infection (15.0%), infections attributed to other risk factors, including hemophilia, blood transfusion, and risk factors not reported or not identified (7.1%), and injection drug use (IDU, 7.0%). Of particular note was the increase in the proportion from male heterosexual contacts in more recent years (8.8%). County distribution of HIV diagnoses was relatively unchanged in more recent years.

**Table 1. Diagnoses of HIV infection by selected characteristics, among those diagnosed between 2010 and 2016 and among those diagnosed from the beginning of the epidemic (around 1983) through 2016 (cumulative), Hawaii**

Characteristics	Between 2010 and 2016 (N=667)		Cumulative (N=4,734)	
	No.	Percent	No.	Percent
Birth sex				
Female	73	10.9	496	10.5
Male	594	89.1	4,238	89.5
Age at diagnosis in years				
<13	1	0.2	26	0.5
13-24	79	11.8	416	8.8
25-34	225	33.7	1,614	34.1
35-44	148	22.2	1,565	33.1
45-54	140	21.0	792	16.7
>=55	74	11.0	321	6.8
Race/ethnicity				
Hispanic, all races	60	9.0	364	7.7
American Indian/Alaska Native	3	0.4	17	0.4
Asian	144	21.6	734	15.5
Black/African American	52	7.8	236	5.0
Native Hawaiian/Other Pacific Islander	96	14.4	532	11.2
White	225	33.8	2,578	54.5
Multiple races	86	12.9	261	5.5
Other/Unknown <sup>a</sup>	1	0.1	12	0.3
Transmission category				
Male-to-male sexual contact (MSM)	446	66.9	3,387	71.6
Injection drug use (IDU), female	15	2.2	134	2.8
IDU, male	32	4.8	234	4.9
MSM & IDU	27	4.0	308	6.5
Heterosexual contact <sup>b</sup> , female	41	6.2	257	5.4
Heterosexual contact, male	59	8.8	146	3.1
Perinatal	0	0	15	0.3
Other <sup>c</sup>	47	7.1	253	5.3
County of residence at HIV diagnosis				
Hawaii County	74	11.1	583	12.3
Honolulu County	497	74.5	3,458	73.1
Kauai County	29	4.4	228	4.8
Maui County	67	10.0	465	9.8

*Note.* Only data from persons residing in Hawaii at the time of HIV diagnosis were included. Due to rounding, percentages by selected characteristic may not add up to 100%.

<sup>a</sup> Included cases not able to be differentiated between Asian and Native Hawaiian/Other Pacific Islander and those with unknown race/ethnicity.

<sup>b</sup> Included heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

<sup>c</sup> Included hemophilia, blood transfusion, and risk factors not reported or not identified.

## II. Prevalent cases and prevalence rate

### 1) Prevalence of persons living with diagnosed HIV infection (PLWDH) at year-end 2016, Hawaii

Despite extensive data cleaning, there remained 515 (18.9%) individuals whose location was not known at year-end 2016. Among those 515 persons, there was a total of 257 (49.9%) persons whose HIV infection was diagnosed by the end of 2006 and who had not been in care since 2007. Among those 257 persons, 147 (57.2%) were living with stage 3 (AIDS). Based on the natural progression of HIV infection, if a person was not in care for  $\geq 10$  years since diagnosis, the odds of survival were likely low. It is therefore reasonable to assume that those persons had moved away from Hawaii. Those 257 persons were excluded from further analysis. As a result, a total of 2,473 persons were identified as persons living with diagnosed HIV infections (PLWDH) and a total of 1,438 were identified as persons living with diagnosed HIV infection that was ever classified as stage 3 (AIDS) (PLWDA) at year-end 2016 in Hawaii.

County data was missing for 95 (3.8%) persons among the 2,473 cases of PLWDH and 59 (4.1%) persons among the 1,438 cases of PLWDA. Cases with missing data on county of residence were distributed back among counties based on the proportion, in each county, of prevalent cases of PLWDH and PLWDA for which county data was available.

Prevalence of PLWDH and of PLWDA at the state level, county level, and by selected characteristics are shown in **Table 2**. The prevalence rate (calculated per 100,000 population) of PLWDH in Hawaii (173.1) was much lower than that of the 2016 national average (306.6) (7). The rate for males was 305.6, almost eight times as large as that of females (39.4). Among persons of different age groups, the highest rate (433.1) was among persons aged 45-54 years old and the lowest rate (1.8) was among those younger than 13 years. Among different race/ethnicity groups, the highest rate (588.2) was among blacks, followed by whites (379.4). The lowest rates were found among Asians (72.6) and those of multiple races (82.5). Similar patterns were observed in the prevalence rate of PLWDA.

**Table 2. Prevalence of persons living with diagnosed HIV infection (all stages) (PLWDH)/infection ever classified as stage 3 (AIDS) (PLWDA) at year-end 2016, by selected characteristics, Hawaii**

Characteristics	2016 general population	PLWDH		PLWDA	
		No.	Rate	No.	Rate
<b>National 2016</b>	<b>323,127,513</b>	<b>991,447</b>	<b>306.6</b>	<b>525,374</b>	<b>162.5</b>
<b>State total</b>	<b>1,428,469</b>	<b>2,473</b>	<b>173.1</b>	<b>1,438</b>	<b>100.3</b>
County of residence at year-end 2016 <sup>a</sup>					
Hawaii County	198,449	416	209.6	253	127.5
Honolulu County	992,605	1,645	165.7	943	95.0
Kauai County	72,029	101	140.2	61	84.7
Maui County	165,386	311	188.0	181	109.4
Birth sex					
Female	710,895	280	39.4	166	23.4
Male	717,574	2,193	305.6	1,272	177.3
Age at year-end 2016					
<13	228,461	4	1.8	0	0.0
13-24	208,326	52	25.0	11	5.3
25-34	207,896	283	136.1	78	37.5
35-44	177,219	384	216.7	165	93.1
45-54	178,253	772	433.1	514	288.4
≥55	428,314	978	228.3	670	156.4
Race/ethnicity <sup>b</sup>					
Hispanic, all races	148,147	252	170.1	150	101.3
American Indian/Alaska Native	3,106	10	322.0	2	64.4
Asian	522,043	379	72.6	232	44.4
Black/African American	27,884	164	588.2	86	308.4
Native Hawaiian/Other Pacific Islander	134,980	237	175.6	157	116.3
White	316,055	1,199	379.4	680	215.2
Multiple races	276,254	228	82.5	130	47.1

*Note.* Only data from persons residing in Hawaii at year-end 2016 were included. Rates were per 100,000 population. Populations from Kalawao county were excluded because there were no PLWDH or PLWDA in Kalawao County (6). National 2016 prevalence data was based on HIV surveillance report from the Centers for Disease Control and Prevention (7).

<sup>a</sup> County data was missing among 95 (3.8%) of all PLWDH and 59 (4.1%) among all PLWDA. Missing data was redistributed back to each county based on their proportions among those who had data on county.

<sup>b</sup> Excluded one person unable to be differentiated between Asian and Native Hawaiian/Other Pacific Islander and three persons of unknown race/ethnicity.

## 2) Characteristics of PLWDH and of PLWDA

**Table 3** compares the distribution of age, sex, race/ethnicity, and county of residence for PLWDH and PLWDA at year-end 2016 with the 2016 general population in the state of Hawaii. Males were dominant and overrepresented in both populations (88.7% of PLWDH and 88.5% of PLWDA vs 50.2% of the general population). In general, older persons made up a larger proportion of both PLWDH and of PLWDA and were overrepresented in both populations compared to younger ones (e.g. persons aged  $\geq 45$  years constituted 42.5% of the general population but 70.8% of PLWDH and 82.3% of PLWDA). Among persons of different racial/ethnic groups, whites (48.6% of PLWDH, 47.3% of PLWDA and 22.1% of the general population) and blacks/African Americans (6.6% and 6.0%, respectively vs 2.0% of the general population) were overrepresented while Asians (15.4% and 16.1%, respectively vs 36.5% of the general population) and persons of multiple races (9.2% and 9.0%, respectively vs 19.3% of the general population) were underrepresented.

Differences by county were subtle. The proportions of PLDWH and PLWDA in both Honolulu County (66.5% and 65.5%, respectively) and Kauai County (4.1% and 4.3%, respectively) were slightly smaller than that of the general population (69.5% in Honolulu County and 5.0% in Kauai County). In Hawaii County, however, proportions of PLDWH (16.8%) and PLWDA (17.6%) were higher than that of the general population (13.9%).

MSM was the leading risk factor for both populations (72.7% of PLWDH and 71.2% of PLWDA), followed by female heterosexual contact with a person known to have, or to be at high risk for, HIV infection (7.1% for both), then by MSM & IDU (6.4% and 6.7%, respectively). Less than one percent of all infections was attributed to perinatal transmission (0.5% for both populations).

**Table 3. Characteristics of persons living with diagnosed HIV infection (all stages) (PLWDH)/infection ever classified as stage 3 (AIDS) (PLWDA) at year-end 2016, Hawaii**

Characteristics	Percent of 2016 population	PLWDH		PLWDA	
		No.	Percent	No.	Percent
<b>State total</b>	<b>100</b>	<b>2,473</b>	<b>100</b>	<b>1,438</b>	<b>100</b>
Birth sex					
Female	49.8	280	11.3	166	11.5
Male	50.2	2,193	88.7	1,272	88.5
Age at year-end 2016 in years					
<13	16.0	4	0.2	0	0
13-24	14.6	52	2.1	11	0.8
25-34	14.6	283	11.4	78	5.4
35-44	12.4	384	15.5	165	11.5
45-54	12.5	772	31.2	514	35.7
>=55	30.0	978	39.6	670	46.6
Race/ethnicity <sup>a</sup>					
Hispanic, all races	10.4	252	10.2	150	10.4
American Indian/Alaska Native	0.2	10	0.4	2	0.1
Asian	36.5	379	15.4	232	16.1
Black/African American	2.0	164	6.6	86	6.0
Native Hawaiian/Other Pacific Islander	9.4	237	9.6	157	10.9
White	22.1	1,199	48.6	680	47.3
Multiple races	19.3	228	9.2	130	9.0
Transmission category					
Male-to-male sexual contact (MSM)	N/A	1,798	72.7	1,024	71.2
Injection drug use (IDU), female	N/A	55	2.2	40	2.8
IDU, male	N/A	89	3.6	66	4.6
MSM & IDU	N/A	159	6.4	97	6.7
Heterosexual contact <sup>b</sup> , female	N/A	176	7.1	102	7.1
Heterosexual contact <sup>b</sup> , male	N/A	97	3.9	56	3.9
Perinatal	N/A	13	0.5	7	0.5
Risk factor not reported/identified	N/A	86	3.5	46	3.2
County of residence at year-end 2016 <sup>a</sup>					
Hawaii County	13.9	416	16.8	253	17.6
Honolulu County	69.5	1,645	66.5	943	65.5
Kauai County	5.0	101	4.1	61	4.3
Maui County	11.6	311	12.6	181	12.6

*Note.* Only data from persons residing in Hawaii at year-end 2016 were included. Percentages may not add up to 100% due to rounding. N/A: Not applicable.

<sup>a</sup> Excluded one person unable to be differentiated between Asian and Native Hawaiian/Other Pacific Islander and three persons of unknown race/ethnicity.

<sup>b</sup> Included heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

<sup>c</sup> County data was missing among 95 (3.8%) of all PLWDH and 59 (4.1%) among all PLWDA.

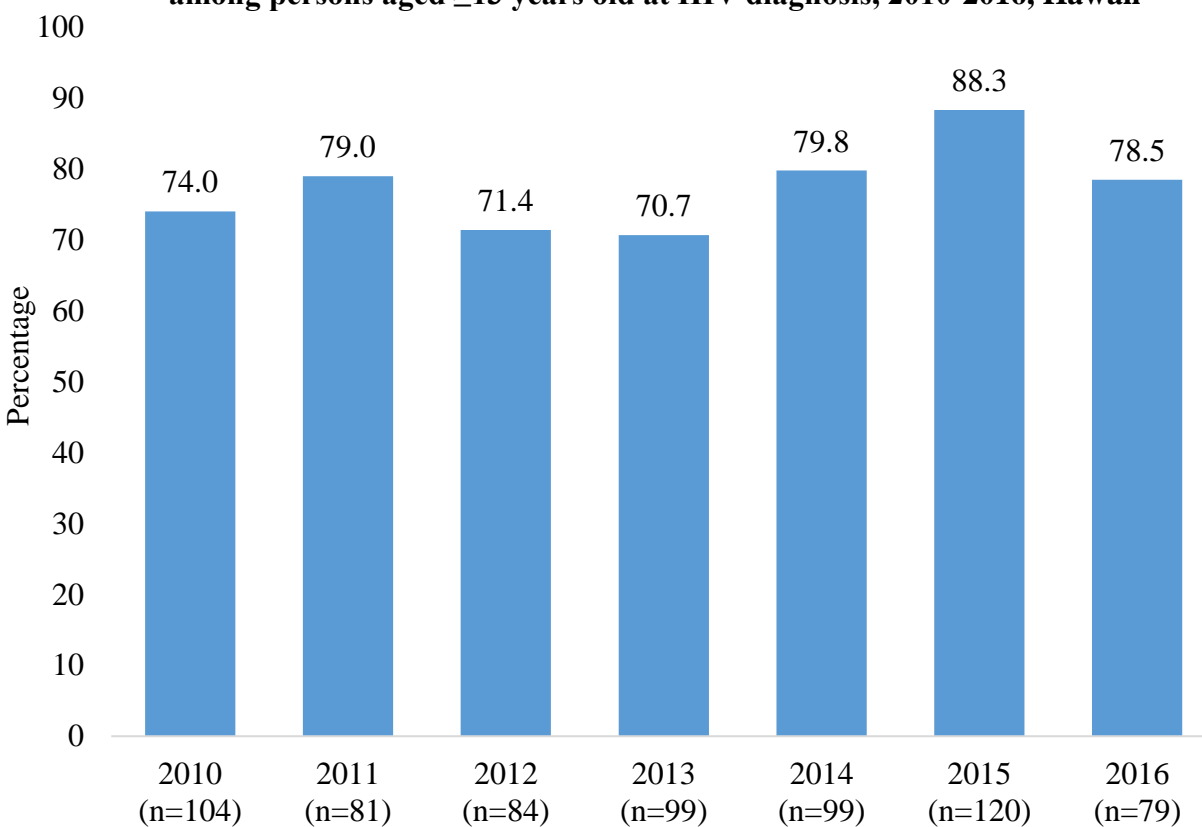
Missing data was redistributed back to each county based on their proportions among those who had data on county.

## B. HIV care continuum, 2016, Hawaii

### I. Linkage to HIV medical care

From 2010 to 2016, linkage to HIV medical care  $\leq 1$  month increased significantly ( $P=0.04$ ) from 74.0% in 2010 to 78.5% in 2016, despite the decrease from 88.3% in 2015 to 78.5% in 2016 (**Figure 2**). The decrease from 2015 to 2016 should be interpreted with caution. In 2016, there were three individuals who left Hawaii shortly after their HIV diagnoses. If those three individuals were removed from the analysis, percentage of linkage to HIV medical care  $\leq 1$  month in 2016 would be 81.6%.

**Figure 2. Linkage to HIV medical care  $\leq 1$  month after HIV diagnosis among persons aged  $\geq 13$  years old at HIV diagnosis, 2010-2016, Hawaii**



Note: data included persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. Only data from persons residing in Hawaii and  $\geq 13$  years old at the time of HIV diagnosis were included. N refers to the total number of diagnoses in each year.

**Table 4** presents linkage to care by selected characteristics among Hawaii residents with new HIV diagnoses in 2016. Due to small numbers in most of the categories, results should be interpreted with caution. Among the 79 persons with new HIV diagnoses in 2016, 62 (78.5%) were linked to care  $\leq 1$  month and 70 (88.6%) were linked to care  $\leq 3$  months after HIV diagnosis. No statistically significant differences were observed for any of the selected characteristics.



**Table 4. Linkage to HIV medical care during 2016, among persons aged  $\geq 13$  years at the time of HIV diagnosis, by selected characteristics, Hawaii**

Characteristics	No. total	$\leq 1$ month		$\leq 3$ months	
		No.	Percent	No.	Percent
<b>Total</b>	<b>79</b>	<b>62</b>	<b>78.5</b>	<b>70</b>	<b>88.6</b>
In case management in 2016					
Yes	22	17	77.3	21	95.5
No	57	45	78.9	49	86.0
Birth sex					
Female	8	6	75.0	7	87.5
Male	71	56	78.9	63	88.7
Age at HIV diagnosis in years					
13-24	14	6	42.9	11	78.6
25-34	35	29	82.9	31	88.6
35-44	13	13	100.0	13	100.0
45-54	6	6	100.0	6	100.0
$\geq 55$	11	8	72.7	9	81.8
Race/ethnicity					
Hispanic, all races	9	7	77.8	9	100.0
American Indian/Alaska Native	1	DS	DS	DS	DS
Asian	18	14	77.8	16	88.9
Black/African American	10	7	70.0	9	90.0
Native Hawaiian/Other Pacific	9	8	88.9	8	88.9
White	21	16	76.2	18	85.7
Multiple races	11	9	81.8	9	81.8
Transmission category					
Male-to-male sexual contact (MSM)	61	48	78.7	54	88.5
Injection drug use (IDU), female	3	DS	DS	DS	DS
IDU male	0	N/A	N/A	N/A	N/A
MSM & IDU	2	DS	DS	DS	DS
Heterosexual contact <sup>a</sup> , female	4	DS	DS	DS	DS
Heterosexual contact, male	8	7	87.5	8	100.0
Other <sup>b</sup>	1	1	100.0	1	100.0
County of residence at HIV diagnosis					
Hawaii County	7	6	85.7	6	85.7
Honolulu County	61	47	77.0	54	88.5
Kauai County	4	DS	DS	DS	DS
Maui County	7	6	85.7	7	100.0

*Note.* Only data from persons residing in Hawaii at the time of HIV diagnosis were included. Linkage to HIV medical care was measured by documentation of  $\geq 1$  CD4 or viral load test  $\leq 1$  month or  $\leq 3$  months after HIV diagnosis. N/A: not applicable; DS: data suppressed.

<sup>a</sup> Included heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

<sup>b</sup> Included risk factors not reported or not identified.

## II. Receipt of HIV medical care

**Table 5** describes receipt of HIV medical care and retention in HIV medical care in 2016 by selected characteristics. Both were based on data among persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed through 2015 and who were alive and residing in the state of Hawaii at year-end 2016. Among the 2,393 persons included in the analysis, 1,934 (80.8%) received any HIV medical care in 2016 and 1,410 (58.9%) were retained in HIV medical care.

Percentage of receipt of any HIV medical care did not differ significantly by birth sex, race, or county of residence but did differ significantly by person's age ( $P < .0001$ ), transmission category ( $P < .0001$ ) and case management status ( $P < .0001$ ). The percentage increased as age increased, with the highest percentage among persons aged  $\geq 55$  years (84.4%) and the lowest among persons aged 25-34 years (72.3%). Percentage of receipt of any HIV medical care was highest among persons whose infection was attributed to heterosexual contact (male 90.0%, female 84.8%) and lowest among persons whose infection was attributed to the other category, including hemophilia, blood transfusion, and risk factors not reported or not identified (54.8%). Percentage of receipt of any care was much higher among persons in case management (90.8%) than those not in case management (70.6%) in 2016.

Percentage of retention in HIV medical care did not differ significantly by birth sex or county of residence, but did differ significantly by person's age, race/ethnicity, transmission categories, and case management status ( $P_s < .001$ ). The percentage increased as age increased (e.g. 64.1% among persons aged  $\geq 55$  years old vs 40.4% among persons aged 13-24 years). Asians had the highest percentage (66.7%), followed by NHPIs (62.7%), and by persons of multiple races (59.6%). Blacks/African Americans (52.6%) and Hispanics (53.5%) had the lowest percentages. Results of AIAN should be interpreted with caution due to small number of individuals in this category.

Percentage of retention in care was highest among persons whose infection was attributed to heterosexual contact (male, 73.3%; female, 61.4%), followed by male IDUs (60.7%). Percentage of retention in care was higher among persons in case management in 2016 (68.3%) than those not in case management (49.2%).

**Table 5. Receipt of HIV medical care during 2016, among persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed by year-end 2015 and alive and residing at Hawaii at year-end 2016, by selected characteristics, Hawaii**

Characteristics	Total No.	$\geq 1$ CD4 /VL tests		$\geq 2$ CD4/VL tests <sup>a</sup>	
		No.	Percent	No.	Percent
<b>Total</b>	<b>2,393</b>	<b>1,934</b>	<b>80.8</b>	<b>1,410</b>	<b>58.9</b>
In case management in 2016					
Yes	1,213	1,101	90.8	829	68.3
No	1,180	833	70.6	581	49.2
Birth sex					
Female	268	211	78.7	146	54.5
Male	2,125	1,723	81.1	1,264	59.5
Age at year-end 2015 in years					
13-24	47	39	83.0	19	40.4
25-34	267	193	72.3	130	48.7
35-44	394	299	75.9	200	50.8
45-54	822	675	82.1	508	61.8
$\geq 55$	863	728	84.4	553	64.1
Race/ethnicity <sup>b</sup>					
Hispanic, all races	243	189	77.8	130	53.5
American Indian/Alaska Native	9	6	66.7	3	33.3
Asian	360	309	85.8	240	66.7
Black/African Americans	152	119	78.3	80	52.6
Native Hawaiian/Other Pacific Islander (NHPI)	228	186	81.6	143	62.7
White	1,179	941	79.8	683	57.9
Multiple races	218	181	83.0	130	59.6
Transmission category					
Male-to-male sexual contact (MSM)	1,740	1,423	81.8	1,032	59.3
Injection drug use (IDU), female	52	42	80.8	27	51.9
IDU male	89	67	75.3	54	60.7
MSM & IDU	157	122	77.7	93	59.2
Heterosexual contact <sup>b</sup> , female	171	145	84.8	105	61.4
Heterosexual contact, male	90	81	90.0	66	73.3
Perinatal	10	8	80.0	5	50.0
Other <sup>c</sup>	84	46	54.8	28	33.3
County of residence at year-end 2016					
Hawaii County	408	325	79.7	219	53.7
Honolulu County	1,586	1,272	80.2	955	60.2
Kauai County	98	80	81.6	62	63.3
Maui County	301	257	85.4	174	57.8

Note. CD4, CD4+ T-lymphocyte count or percentage; VL, viral load (copies/mL). Data are based on most recent known residential address as of December 31, 2016.

<sup>a</sup> The two tests must be performed  $\geq 3$  months apart during 2016.

<sup>b</sup> Excluded one person not differentiated between Asian and NHPI and three persons of unknown race/ethnicity.

<sup>c</sup> Included heterosexual contact with a person known to have, or to be at high risk for HIV infection.

<sup>d</sup> Included hemophilia, blood transfusion and risk factors not reported or not identified.

<sup>e</sup> Missing data on county (n=95,4.0%) was redistributed.

### III. Viral suppression

Viral suppression was based on data among persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed through 2015 and who were alive and residing in the state of Hawaii at year-end 2016. A total of 2,393 persons were included in the analysis, of which 1,756 (73.4%) were virally suppressed in 2016. Among persons who received any HIV medical care in 2016 (n=1,934), percentage of viral suppression increased to 90.8%. Among persons who were retained in care in 2016 (n=1,410), the percentage of viral suppression was 92.6%.

**Table 6** describes viral suppression by selected characteristics. Among the 2,393 persons  $\geq 13$  years at year-end 2015, with HIV infections diagnosed through 2015, and who were alive and residing in Hawaii at year-end 2016 (hereafter referred as “all persons”), percentage of viral suppression was significantly higher among persons in case management (82.3%) than those not (64.2%) ( $P < .0001$ ). Nevertheless, the difference was not statistically significant if looking only among persons who received any HIV medical care (90.6% vs 91.0%) or those retained in care in 2016 (92.3% vs 93.1%). The same pattern was found by age where percentage of viral suppression increased significantly as age increased among all persons ( $P < .0001$ ), with the highest percentage among persons aged  $\geq 55$  years (78.2%) and the lowest among persons in the age group 25-34 years (63.7%). Nevertheless, no significant difference was observed by age among those who received any HIV medical care or were retained in care in 2016.

Percentage of viral suppression was higher (about 6% higher) among males than females among all three populations (all persons, persons received any HIV medical care, and persons who were retained in HIV medical care). Significant differences were observed by a person’s race/ethnicity among all persons and those who received any care in 2016, but not among those retained in care in 2016. The highest percentage was among Asians (80.3%) and whites (73.5%). The lowest was among blacks/African Americans (64.5%) and Hispanics (72.4%). Interpretation on AIAN should be with caution due to small counts.

Significant difference was observed by transmission category in the three groups. The highest percentage of viral suppression was among heterosexual contacts (male 81.1%; female 75.4%), followed by MSM (75.3%) and the lowest was among infections attributed to the other category, including hemophilia, blood transfusion, and risk factors not reported or not identified (48.8%). No significant difference was observed by county of residence.

**Table 6. HIV viral suppression during 2016, among persons aged ≥13 years at year-end 2015 with HIV infection diagnosed through 2015 and alive and residing in Hawaii at year-end 2016, by selected characteristics, Hawaii**

Characteristics	All persons		Persons with ≥ 1 CD4 or VL tests		Persons with ≥ 2 CD4 or VL tests <sup>a</sup>	
	Total	VS <sup>a</sup>	Total	VS	Total	VS
	No.	No. (%)	No.	No. (%)	No.	No. (%)
<b>Total</b>	<b>2,393</b>	<b>1,756 (73.4)</b>	<b>1,934</b>	<b>1,756 (90.8)</b>	<b>1,410</b>	<b>1,306 (92.6)</b>
In case management in 2016						
Yes	1,213	998 (82.3)	1,101	998 (90.6)	829	765 (92.3)
No	1,180	758 (64.2)	833	758 (91.0)	581	541 (93.1)
Birth sex						
Female	268	183 (68.3)	211	183 (86.7)	146	126 (86.3)
Male	2,145	1,573 (74.0)	1,723	1,573 (91.3)	1,264	1,180 (93.4)
Age at year-end 2015 in years						
13-24	47	35 (74.5)	39	35 (89.7)	19	17 (89.5)
25-34	267	170 (63.7)	193	170 (88.1)	130	118 (90.8)
35-44	394	262 (66.5)	299	262 (87.6)	200	181 (90.5)
45-54	822	614 (74.7)	675	614 (91.0)	508	468 (92.1)
≥55	863	675 (78.2)	728	675 (92.7)	553	522 (94.4)
Race/ethnicity (excluding one not differentiated between Asian and NHPI and three of unknown race)						
Hispanic, all races	243	176 (72.4)	189	176 (93.1)	130	124 (95.4)
American Indian/Alaska Native	9	4 (44.4)	6	4 (66.7)	3	DS (DS)
Asian	360	289 (80.3)	309	289 (93.5)	240	227 (94.6)
Black/African American	152	98 (64.5)	119	98 (82.4)	80	73 (91.3)
Native Hawaiian/Other Pacific Islander (NHPI)	228	164 (71.9)	186	164 (88.2)	143	127 (88.8)
White	1,179	866 (73.5)	941	866 (92.0)	683	637 (93.3)
Multiple races	218	156 (71.6)	181	156 (86.2)	130	114 (87.7)
Transmission category						
Male-to-male sexual contact (MSM)	1,740	1,310 (75.3)	1,423	1,310 (92.1)	1,032	972 (94.2)
Injection drug use (IDU), female	52	35 (67.3)	42	35 (83.3)	27	22 (81.5)
IDU male	89	57 (64.0)	67	57 (85.1)	54	45 (83.3)
MSM & IDU	157	104 (66.2)	122	104 (85.3)	93	82 (88.2)
Heterosexual contact <sup>b</sup> , female	171	129 (75.4)	145	129 (89.0)	105	92 (87.6)
Heterosexual contact, male	90	73 (81.1)	81	73 (90.1)	66	63 (95.5)
Perinatal	10	7 (70.0)	8	7 (87.5)	5	4 (80.0)
Other <sup>c</sup>	84	41 (48.8)	46	41 (89.1)	28	26 (92.9)
County of residence at year-end 2016 <sup>d</sup>						
Hawaii County	408	291 (71.3)	325	291 (89.5)	219	205 (93.6)
Honolulu County	1,586	1,157(73.0)	1,272	1,157 (91.0)	955	882 (92.4)
Kauai County	98	73 (74.5)	80	73 (91.3)	62	56 (90.3)
Maui County	301	235 (78.1)	257	235 (91.4)	174	163 (93.7)

<sup>a</sup> CD4, CD4+ T-lymphocyte; VL, viral load; VS: virally suppressed (defined as last VL test in 2016 with a result of VL<200 copies/mL); the two tests (CD4/VL) should be performed ≥3 months apart during 2016. DS: data suppressed.

<sup>b</sup> Included heterosexual contact with a person known to have, or to be at high risk for HIV infection.

<sup>c</sup> Included hemophilia, blood transfusion and risk factors not reported or not identified.

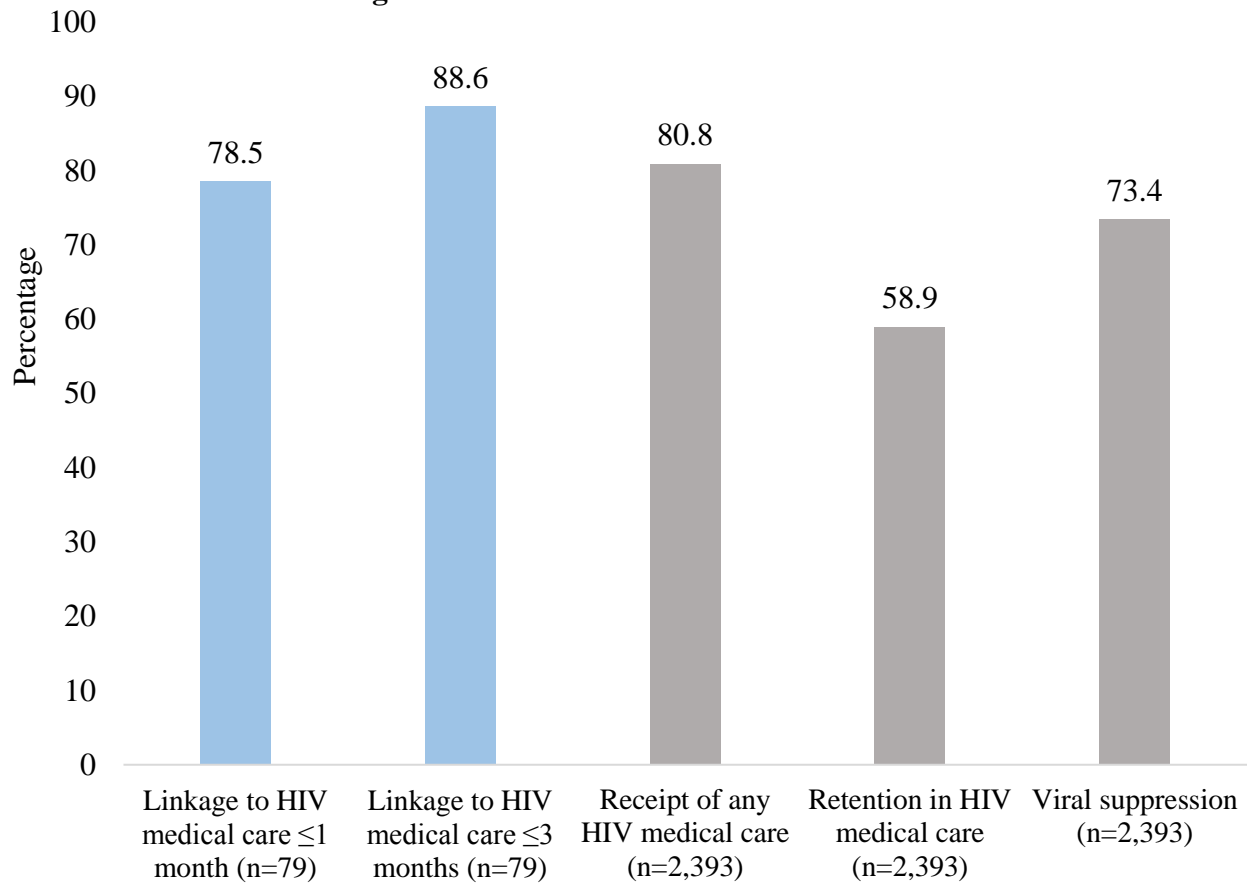
<sup>d</sup> Missing data on county (n=95, 4.0%) was redistributed.

#### IV. Diagnosis-based HIV care continuum

Figures 3 to 29 portray the diagnosis-based 2016 HIV care continuum of Hawaii, overall, and by selected characteristics. The diagnosis-based care continuum shows each step in the continuum as a percentage of persons achieving each indicator of care along the continuum for the total population as well as for persons of selected characteristics (1, 4).

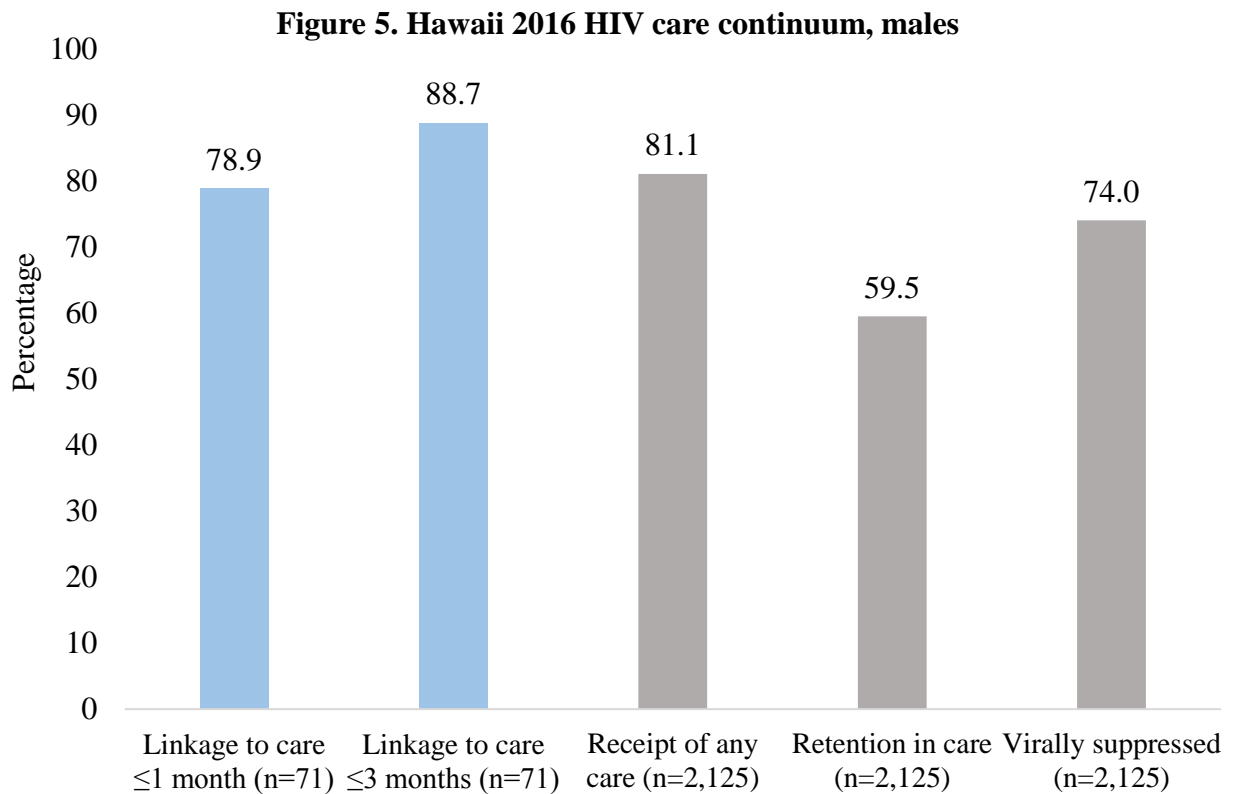
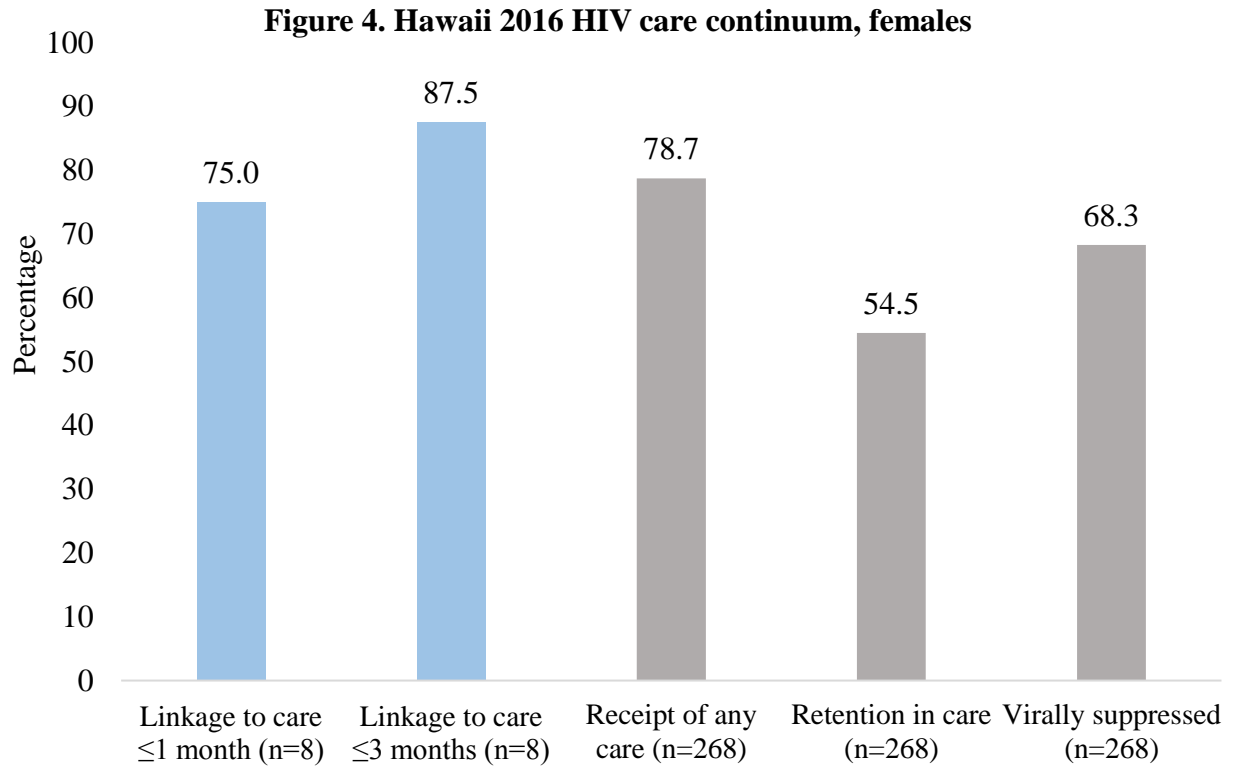
Persons aged  $\geq 13$  years at year-end 2015 with HIV infection diagnosed by year-end 2015 and who were alive and residing in Hawaii at year-end 2016 were included in the analysis as the denominator for all selected indicators, except for linkage to care. Among the 2,393 persons included in the analysis, 1,934 (80.8%) received any HIV medical care, 1,410 (58.9%) were retained in care, and 1,756 (73.4%) were virally suppressed in 2016. The denominator for linkage to HIV medical care was the total number of new diagnoses among persons aged  $\geq 13$  years and residing in Hawaii at the time of HIV diagnosis in 2016. Among the 79 new diagnoses in 2016, 62 (78.5%) were linked to HIV medical care  $\leq 1$  month and 70 (88.6%) were linked to care  $\leq 3$  months after HIV diagnosis (Figure 3).

Figure 3 Hawaii 2016 HIV Care Continuum



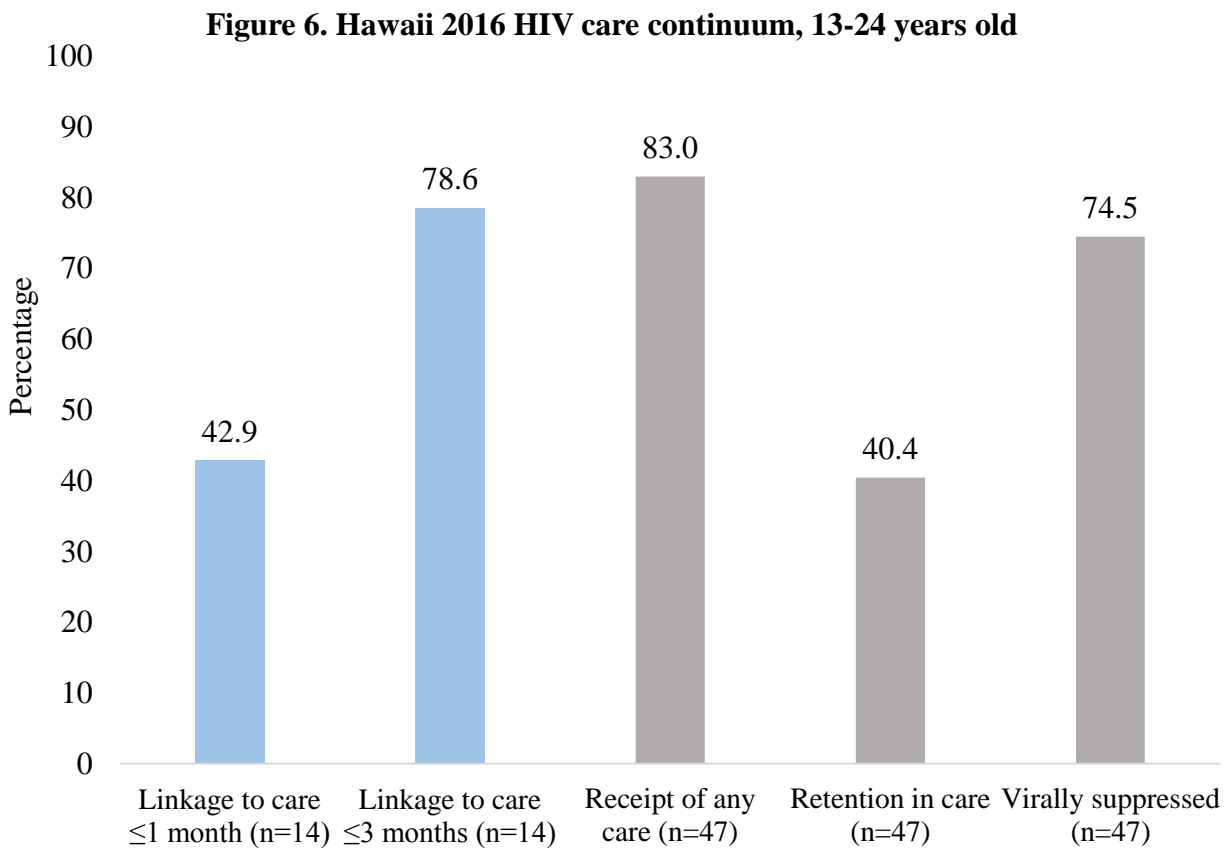
Figures 4 and 5 present Hawaii's 2016 HIV care continuum by birth sex.

Males overall did slightly better in all indicators than females. Nevertheless, the only significant difference was in viral suppression ( $P=0.03$ ).



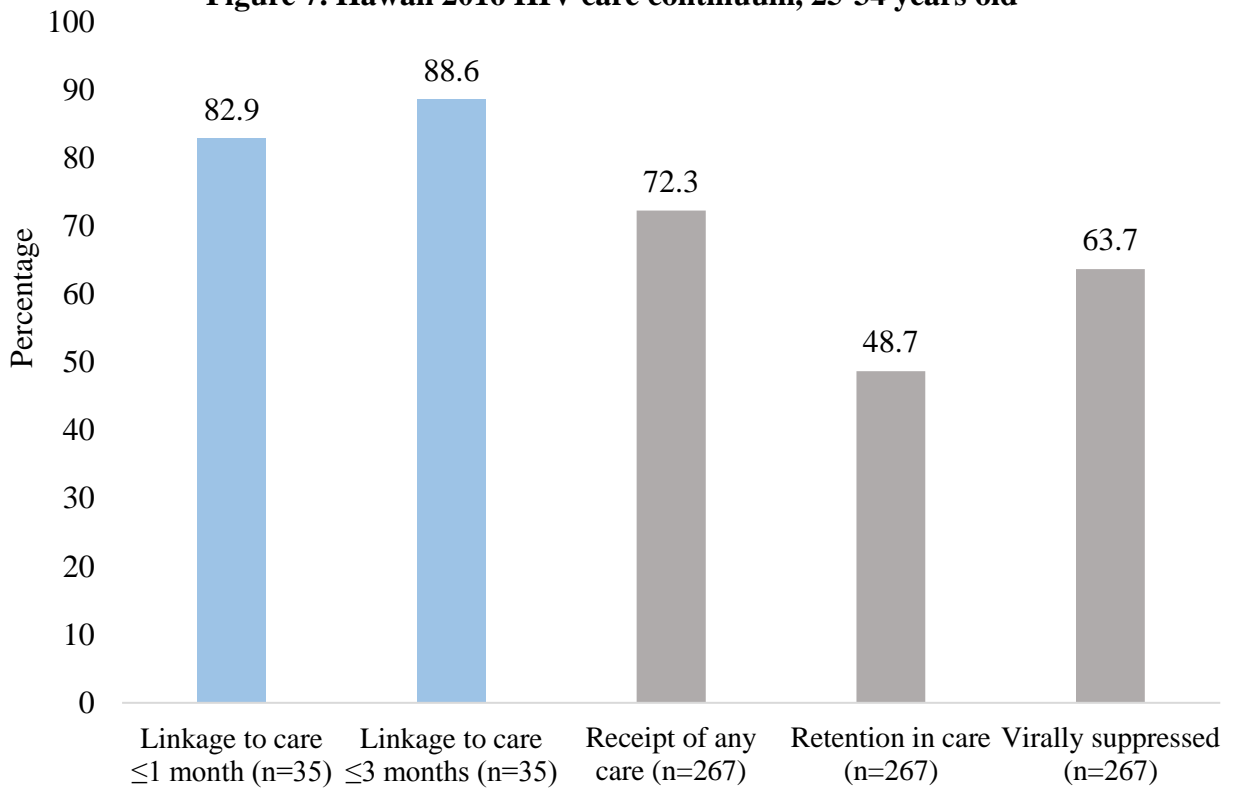
**Figures 6 to 10 describe Hawaii’s 2016 HIV care continuum by age groups.**

In general, percentages of receipt of any HIV medical care, retention in HIV medical care, and viral suppression increased as age increased. The highest percentage was among persons aged  $\geq 55$  years (84.4%, 64.1%, and 78.2%, respectively) and the lowest percentage was among persons aged 25-34 years (72.3%, 48.7%, and 63.7%, respectively), except for retention in care, where persons aged 13-24 years had the lowest (40.4%). Linkage to HIV medical care also improved as age increased, with the lowest among persons aged 13-24 years (42.9%  $\leq 1$  month after HIV diagnosis and 78.6%  $\leq 3$  months after HIV diagnosis).

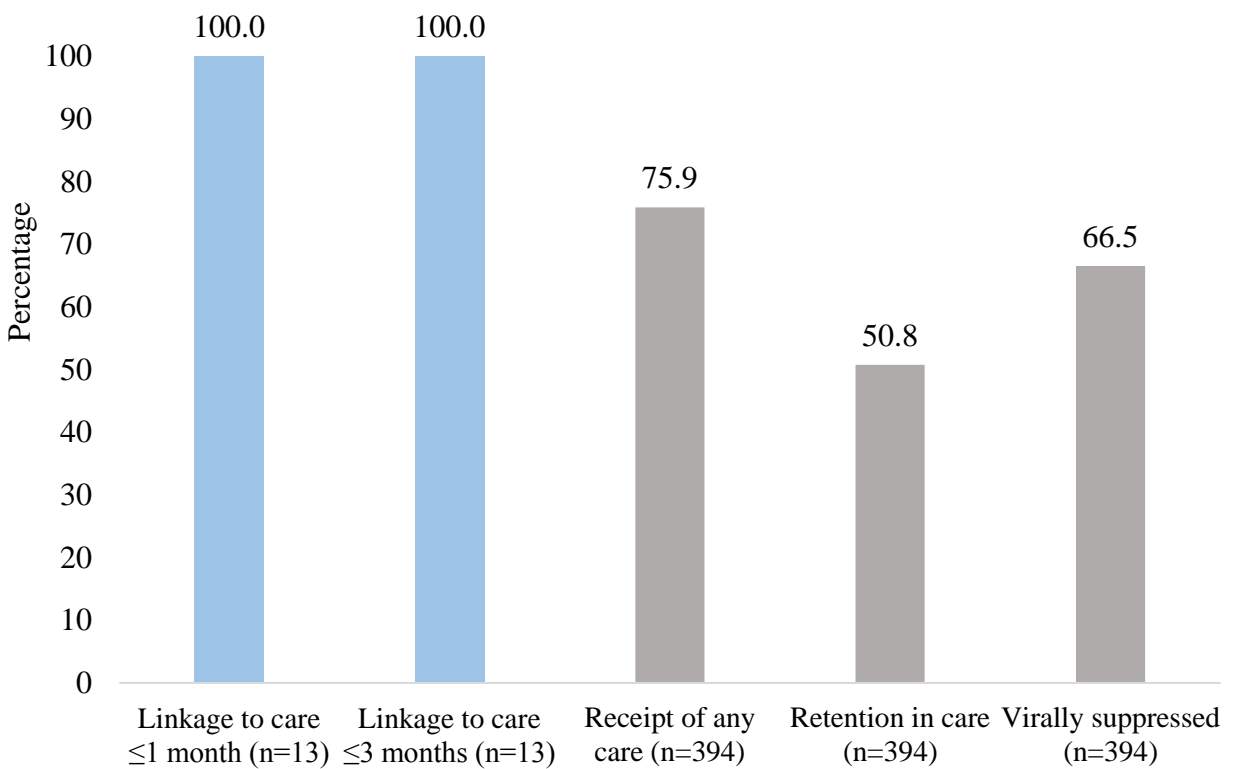




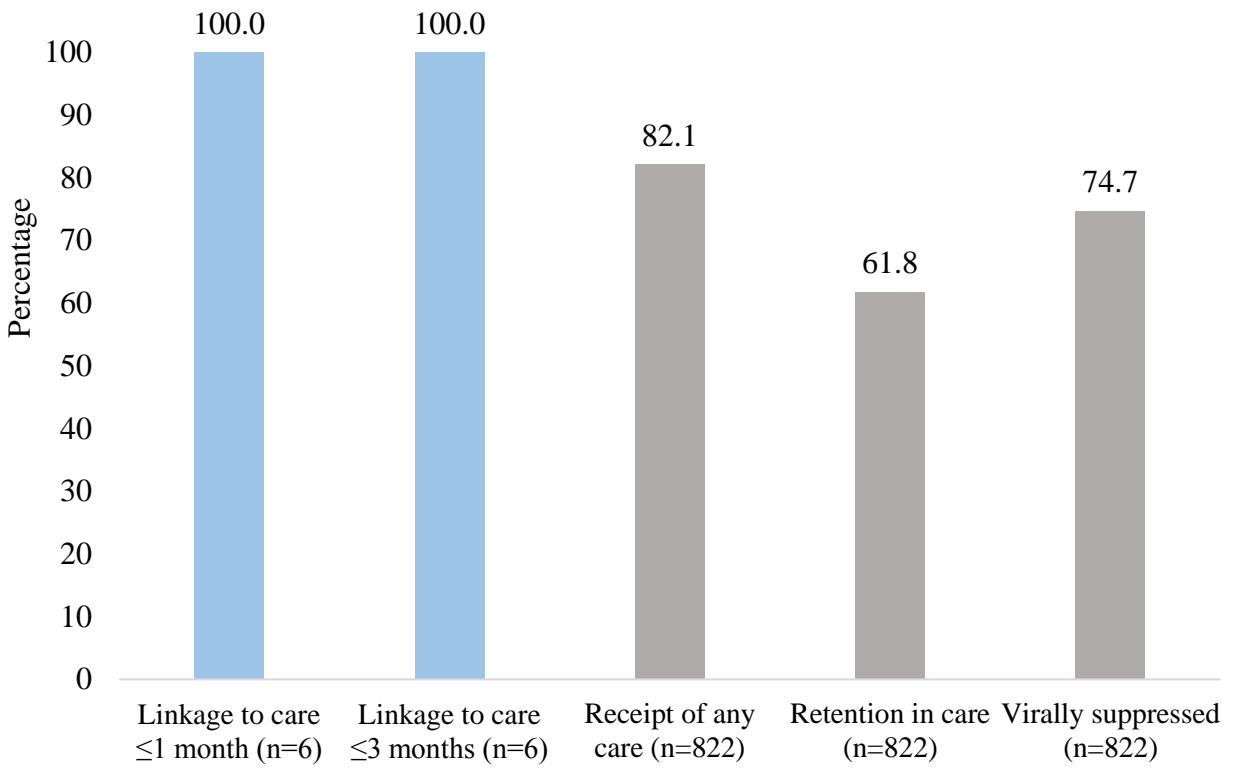
**Figure 7. Hawaii 2016 HIV care continuum, 25-34 years old**



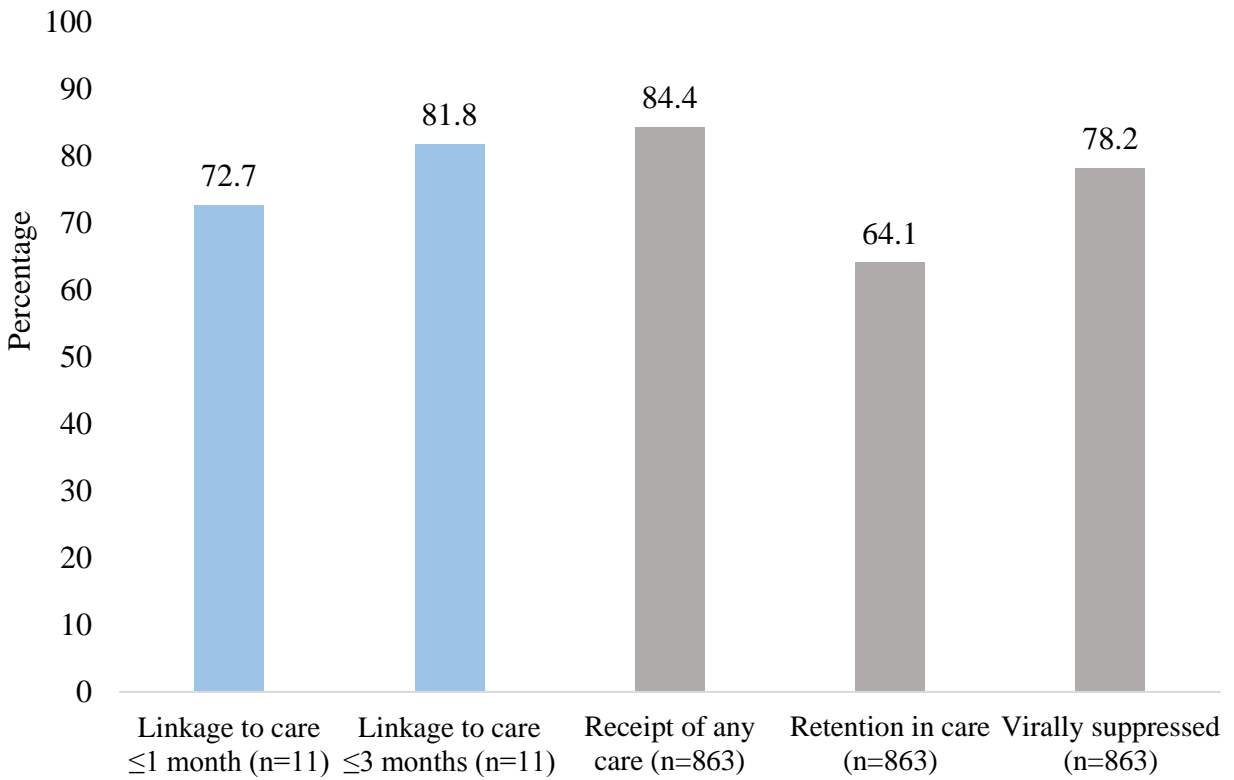
**Figure 8. Hawaii 2016 HIV care continuum, 35-44 years old**



**Figure 9. Hawaii 2016 HIV care continuum, 45-54 years old**



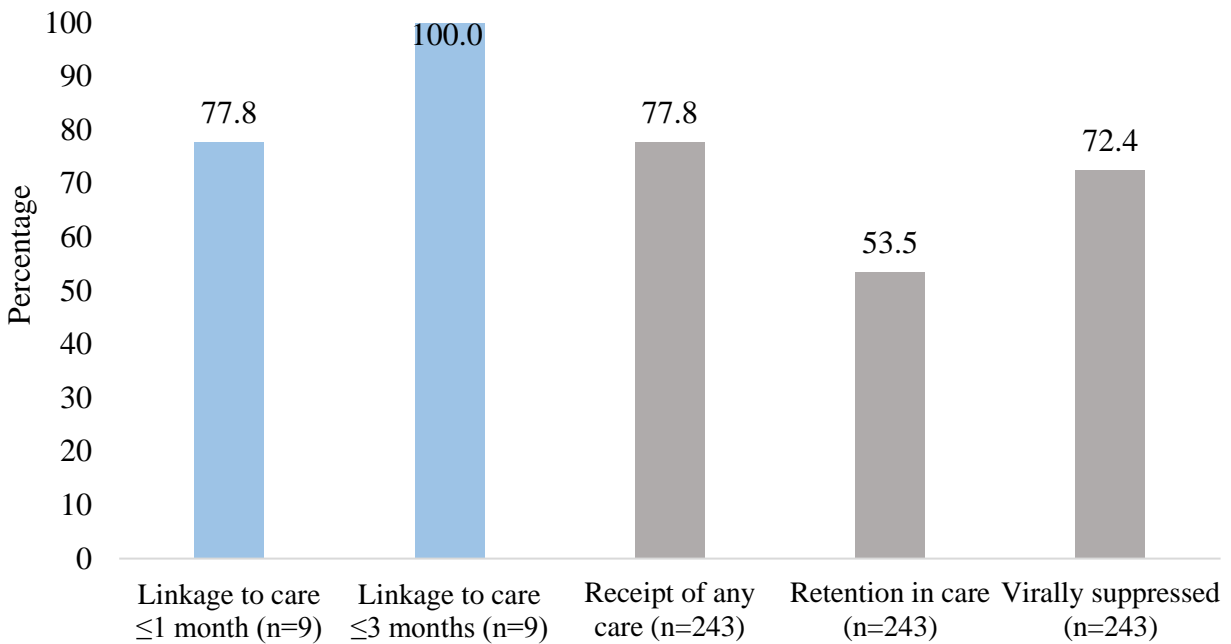
**Figure 10. Hawaii 2016 HIV care continuum,  $\geq 55$  years old**



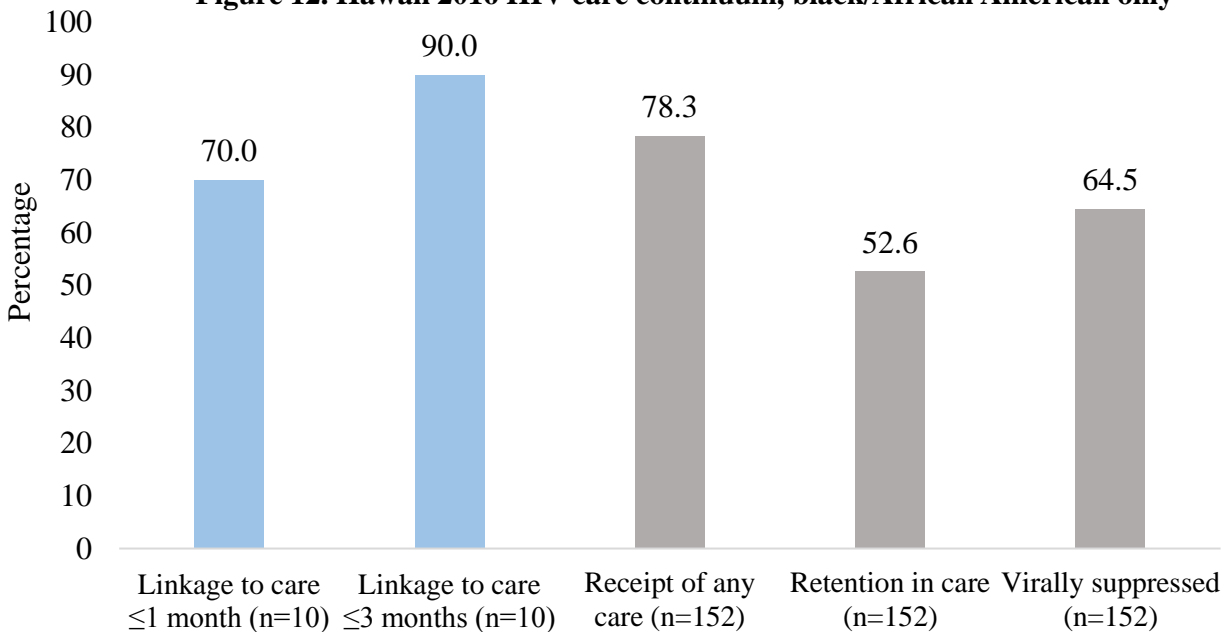
**Figures 11 to 16 describe Hawaii’s 2016 HIV care continuum by race/ethnicity.**

HIV care continuum was not done for American Indian/Alaska Native due to small number of persons in this group. Among all other race/ethnicity groups included, NHPIs did best in linkage to care  $\leq 1$  month (88.9%) while Asians did best in receipt of any HIV medical care (85.8%), retention in HIV medical care (66.7%) and viral suppression (80.3%). Hispanic (77.8%, 53.5%, and 72.4%, respectively) and blacks/African Americans (78.3%, 52.6%, and 64.5%, respectively) did worst among these three indicators.

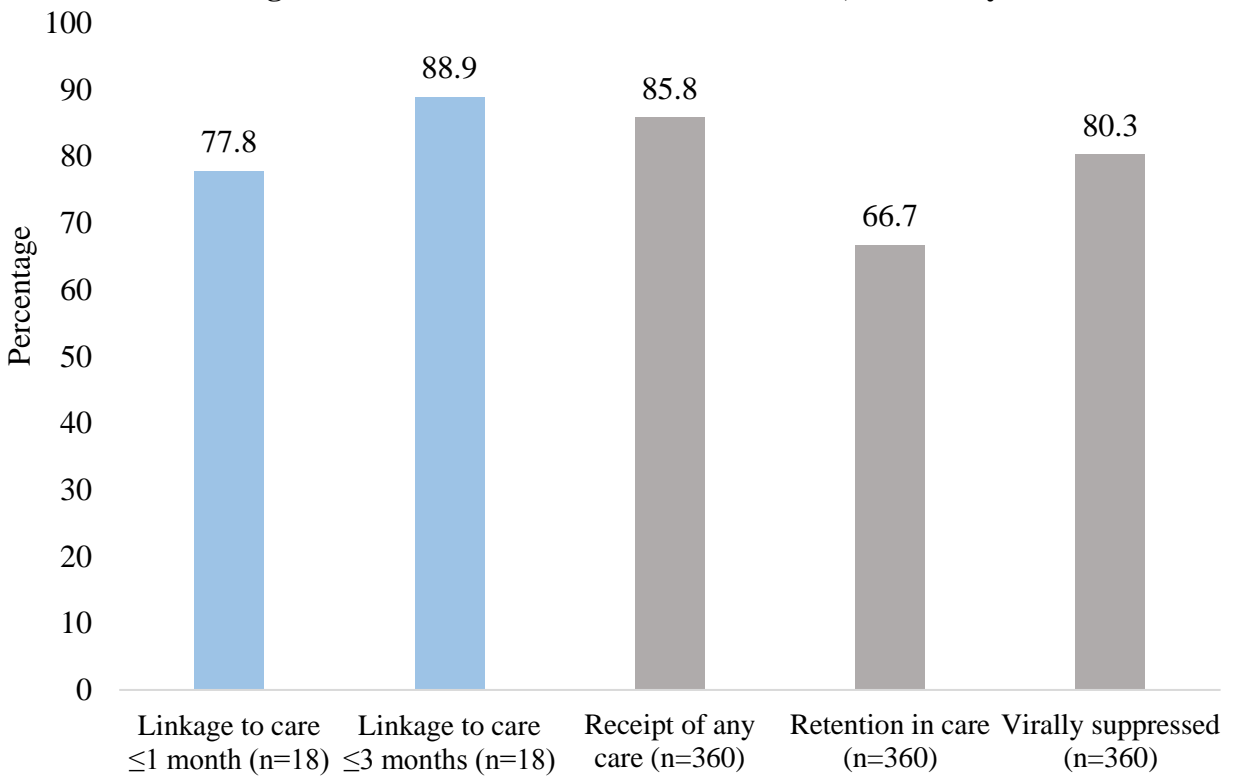
**Figure 11. Hawaii 2016 HIV care continuum, Hispanic, all races**



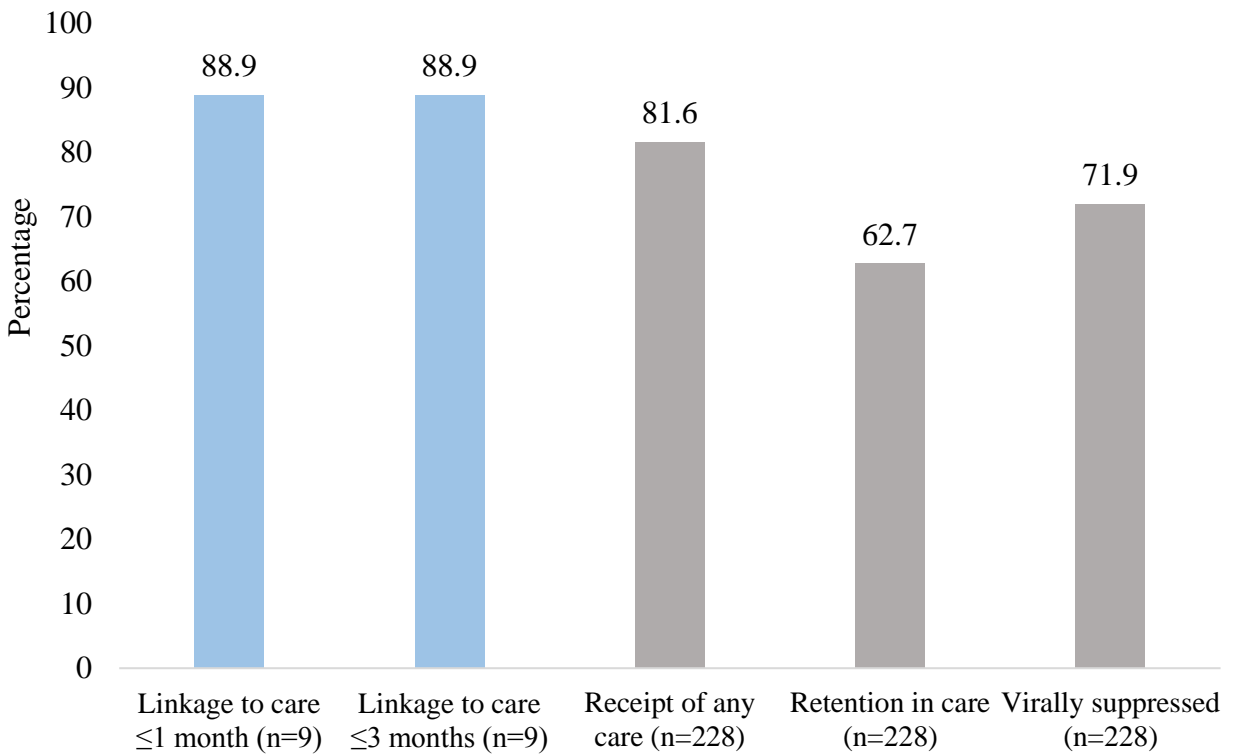
**Figure 12. Hawaii 2016 HIV care continuum, black/African American only**



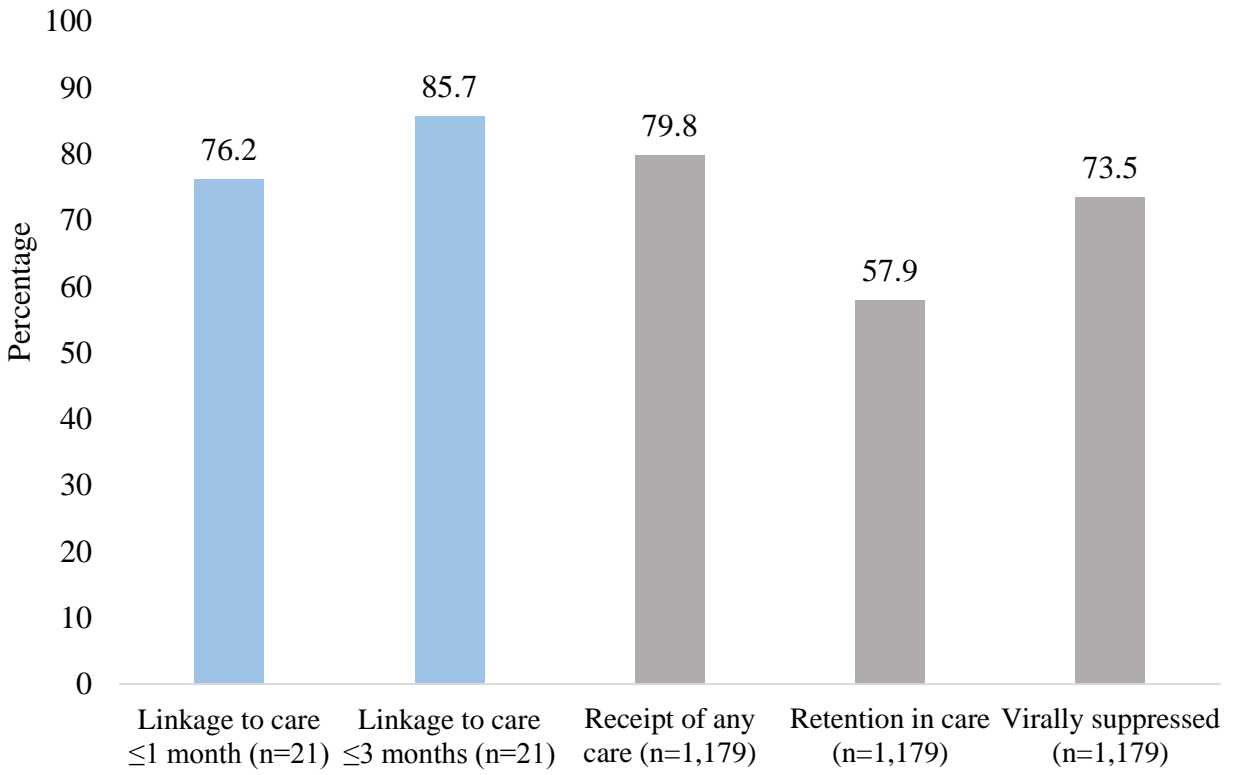
**Figure 13. Hawaii 2016 HIV care continuum, Asian only**



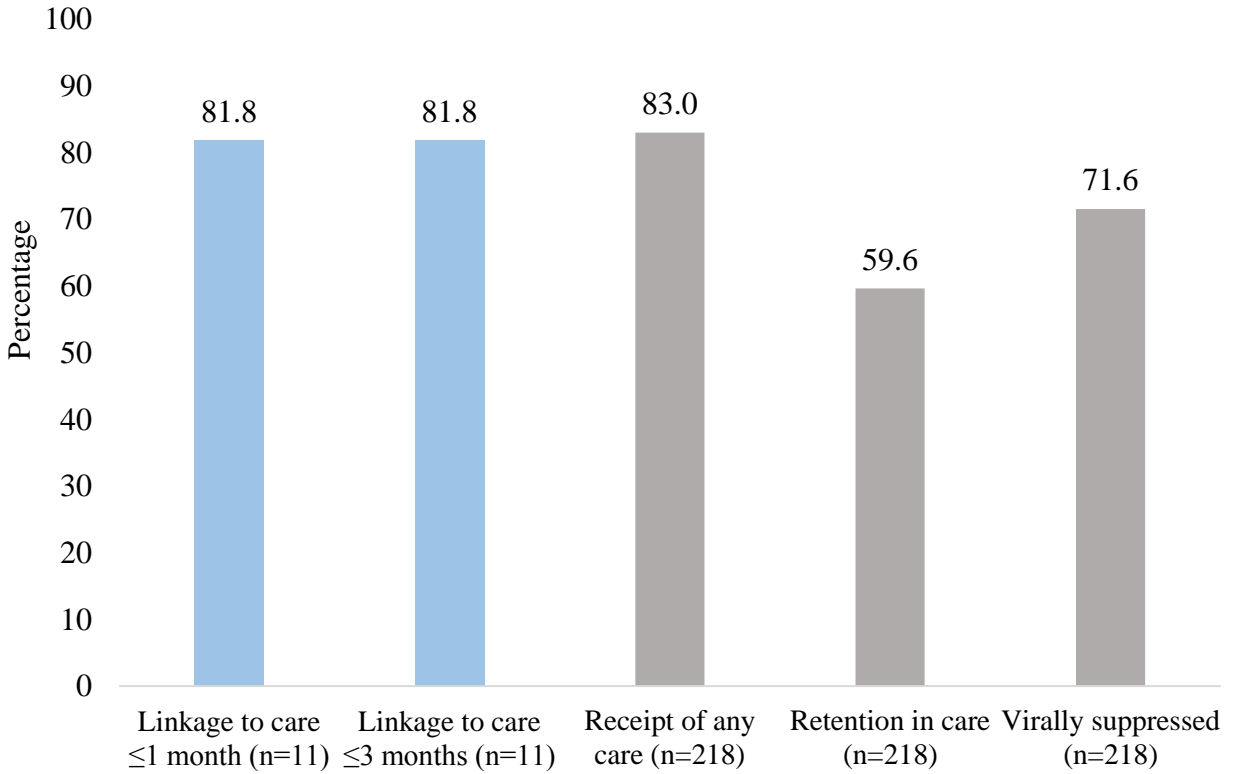
**Figure 14. Hawaii 2016 HIV care continuum, Native Hawaiian / Other Pacific Islander only**



**Figure 15. Hawaii 2016 HIV care continuum, white only**



**Figure 16. Hawaii 2016 HIV care continuum, multiple races**

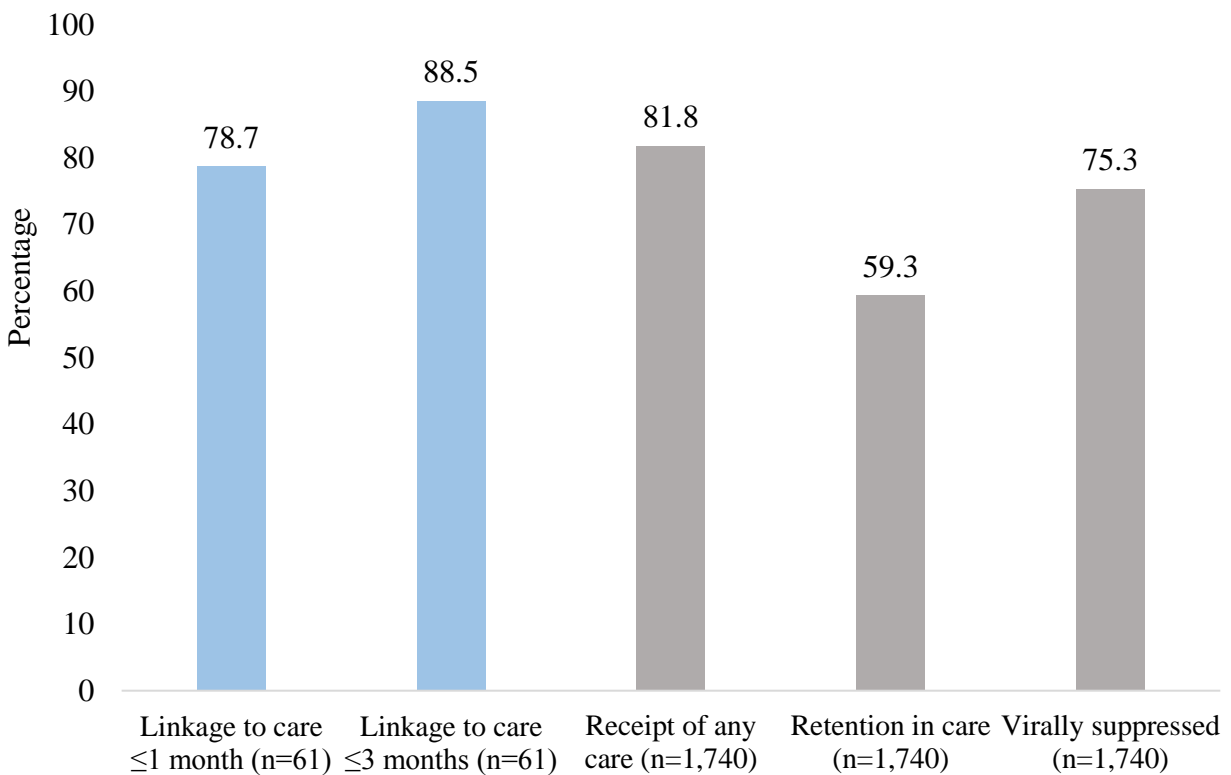


**Figures 17 to 23 describe Hawaii’s 2016 HIV care continuum by transmission categories.**

HIV care continuum was not done for infections attributed to perinatal transmission due to small number of persons in this group. Data (percentage) is suppressed if the total counts of a certain type of transmission categories is <5.

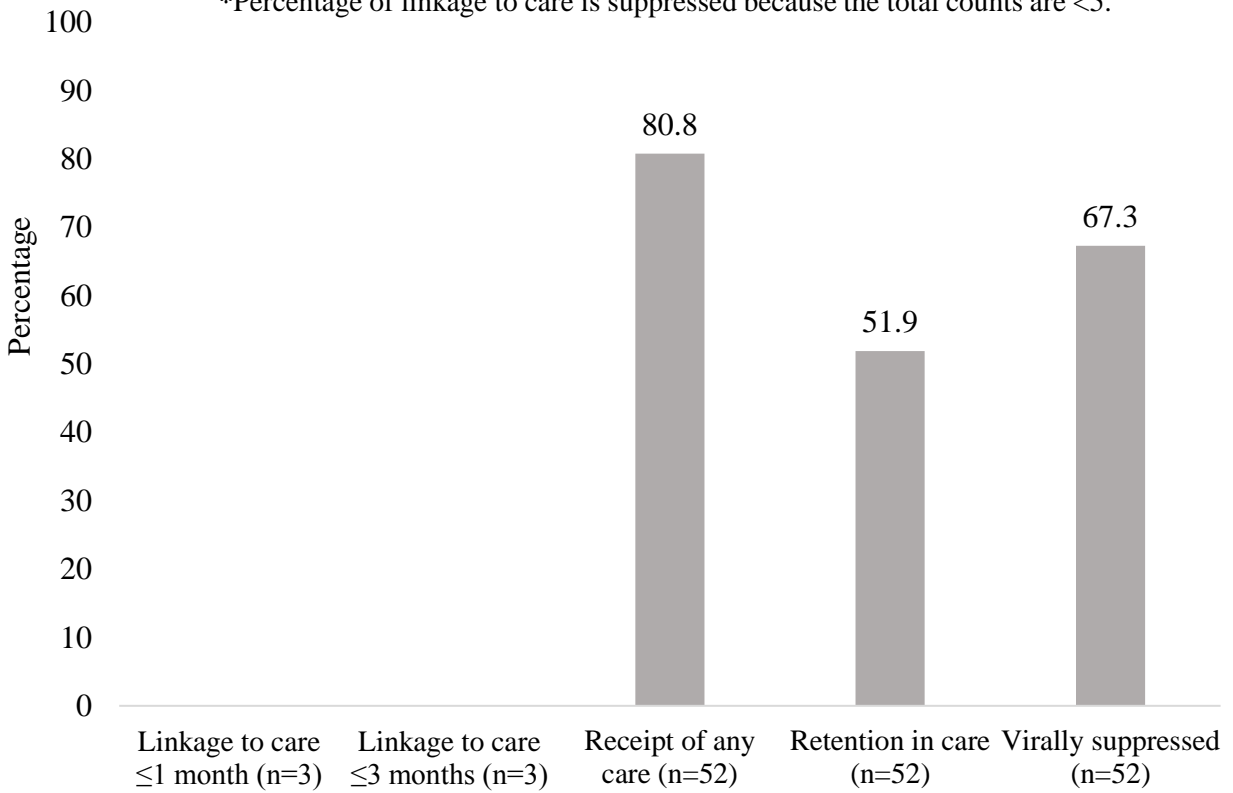
Infections due to heterosexual contacts had the highest percentages of receipt of any HIV medical care, retention in care, and viral suppression (male: 90.0%, 73.3%, and 81.1%, respectively; female: 84.8%, 61.4%, and 75.4%, respectively). Infections due to the other category, including hemophilia, blood transfusion, and risk factors not reported or identified had the lowest percentage (54.8%, 33.3%, and 48.8%, respectively).

**Figure 17. Hawaii 2016 HIV care continuum, male-to-male sexual contact**

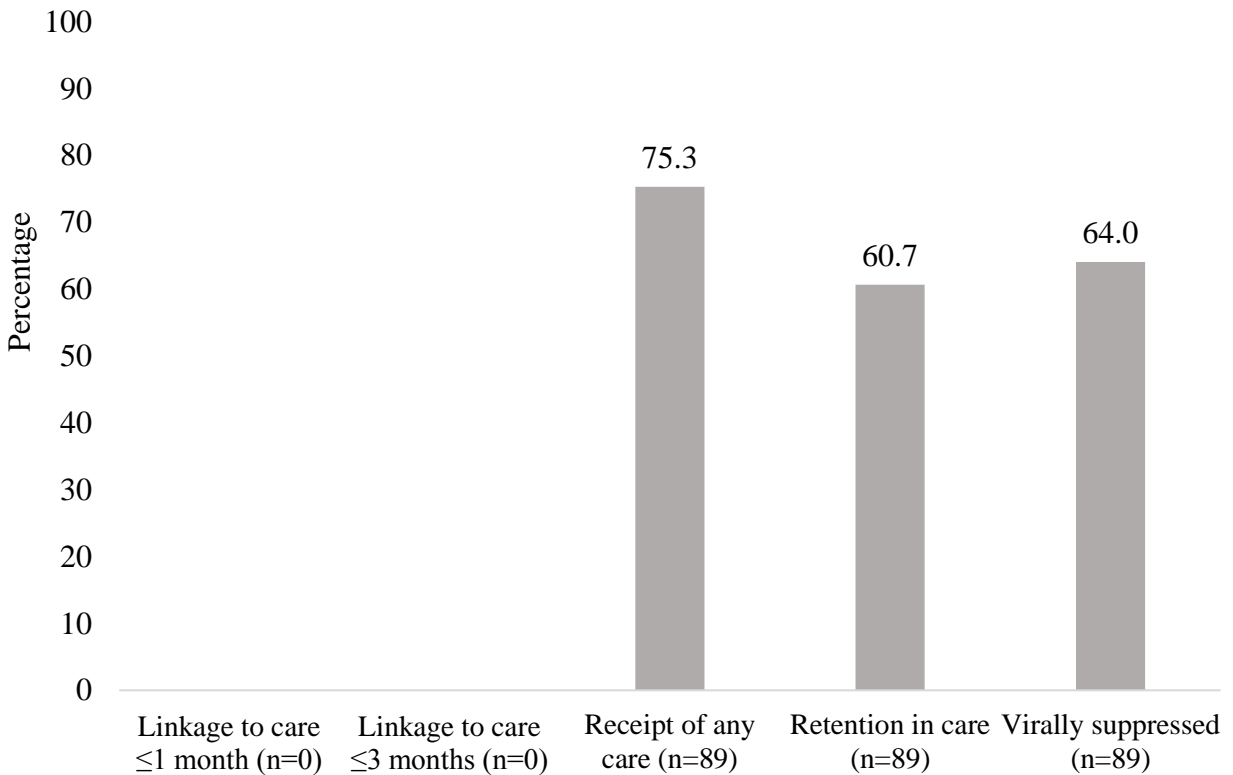


**Figure 18. Hawaii 2016 HIV care continuum, female injection drug use**

\*Percentage of linkage to care is suppressed because the total counts are <5.

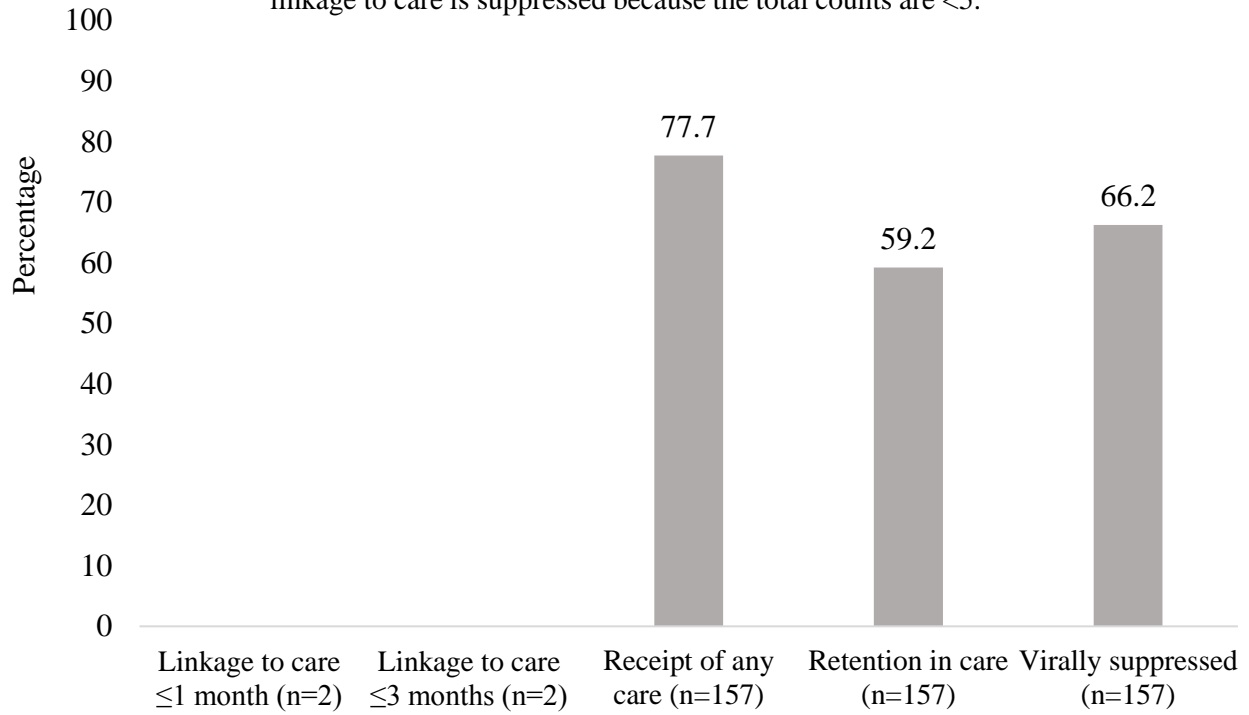


**Figure 19. Hawaii 2016 HIV care continuum, male injection drug use**



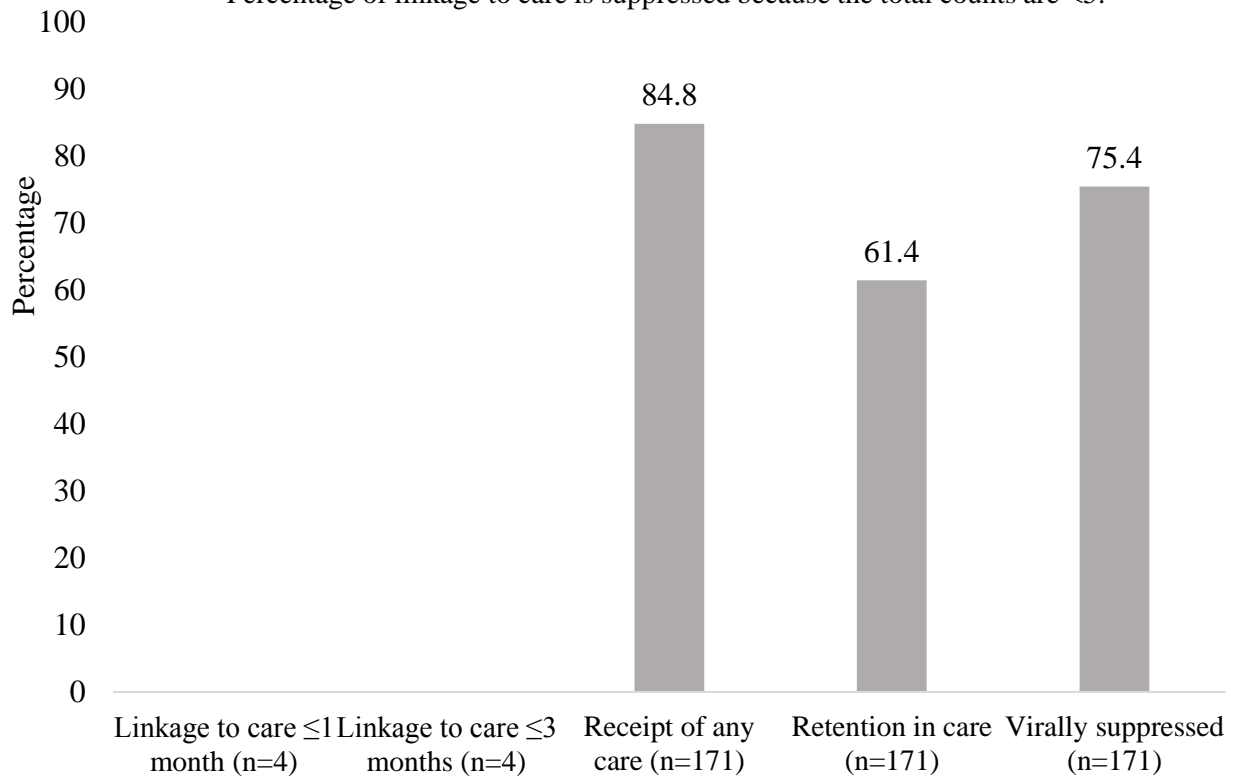
**Figure 20. Hawaii 2016 HIV care continuum, MSM&IDU**

\*MSM&IDU: male-to-male sexual contact & injection drug use; percentage of linkage to care is suppressed because the total counts are <5.



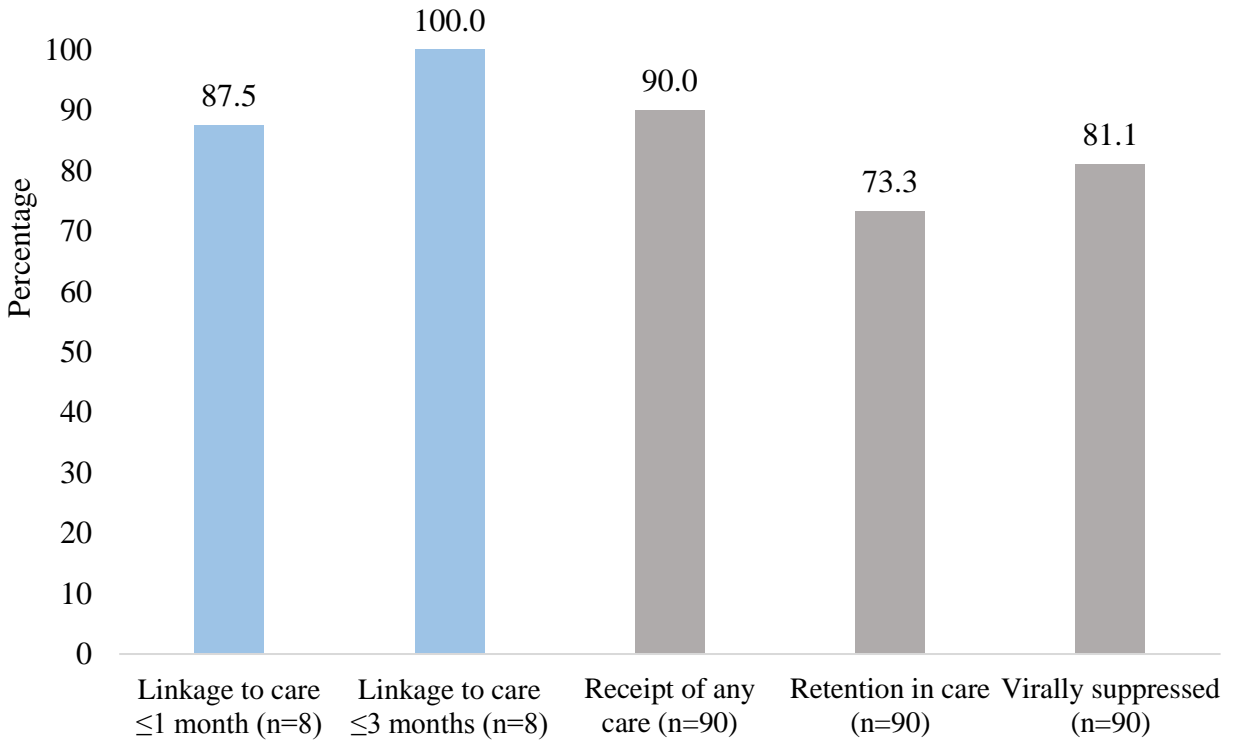
**Figure 21. Hawaii 2016 HIV care continuum, female heterosexual contact with a person known to have, or to be at high risk for, HIV infection**

\*Percentage of linkage to care is suppressed because the total counts are <5.



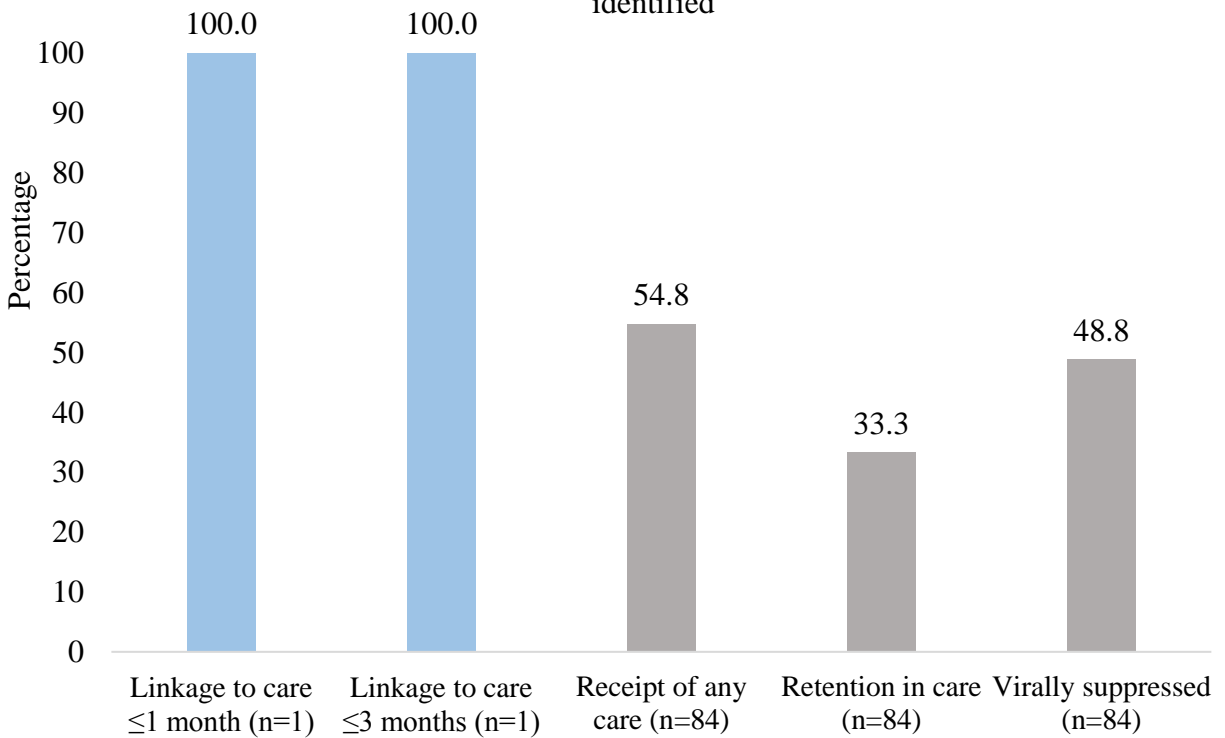


**Figure 22. Hawaii 2016 HIV care continuum, male heterosexual contact with a person known to have, or to be at high risk for, HIV infection**



**Figure 23. Hawaii 2016 HIV care continuum, other category\***

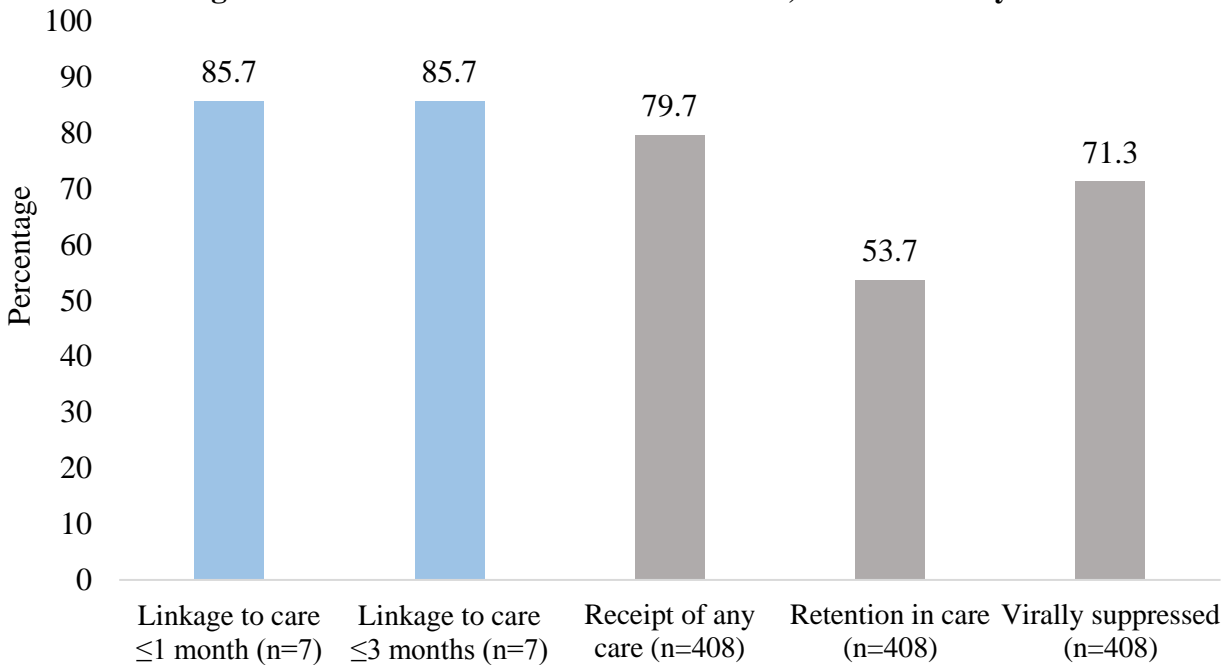
\*Including hemophilia, blood transfusion, and risk factors not reported or identified



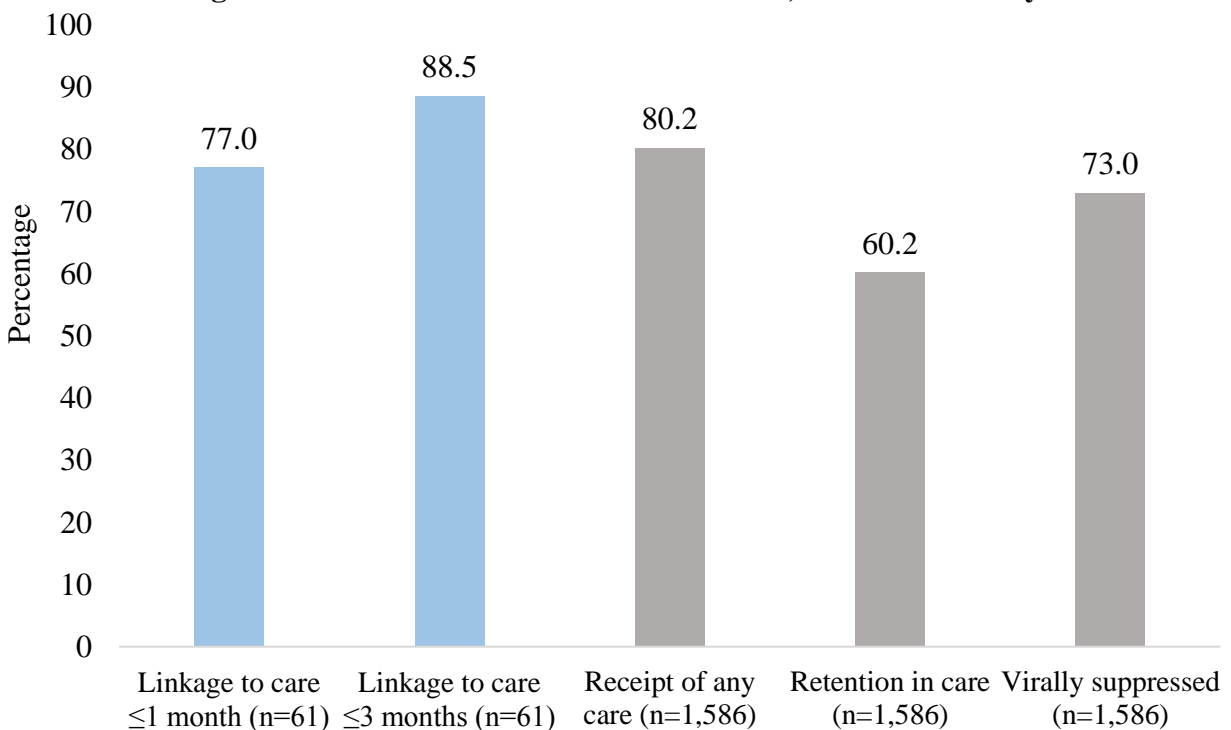
**Figures 24 to 27 describe Hawaii’s 2016 HIV care continuum by county.**

Among the 2,393 persons included in the data analysis, 95 (4.0%) had missing data on county of residence. Missing data on county of residence were redistributed back according to the proportion each county had among persons with data on county. No significant difference was found in the percentage of any indicators presented here by county of residence at year-end 2016.

**Figure 24. Hawaii 2016 HIV care continuum, Hawaii County**

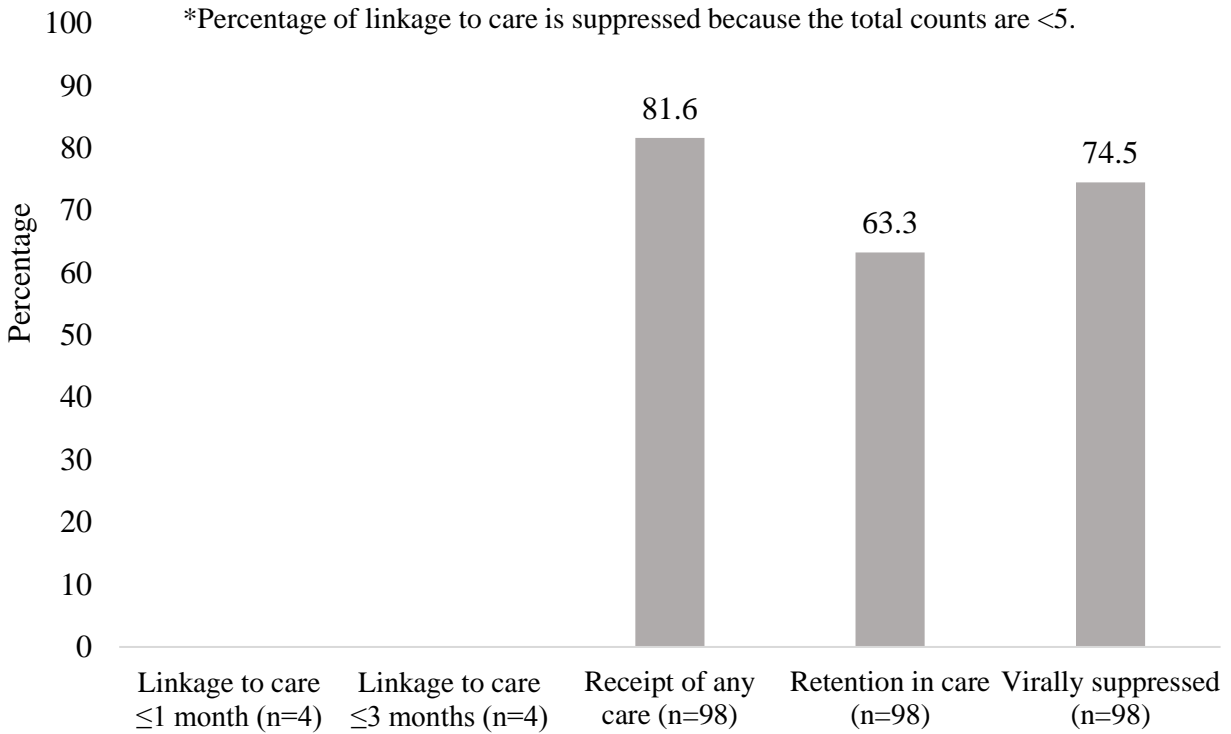


**Figure 25. Hawaii 2016 HIV care continuum, Honolulu County**

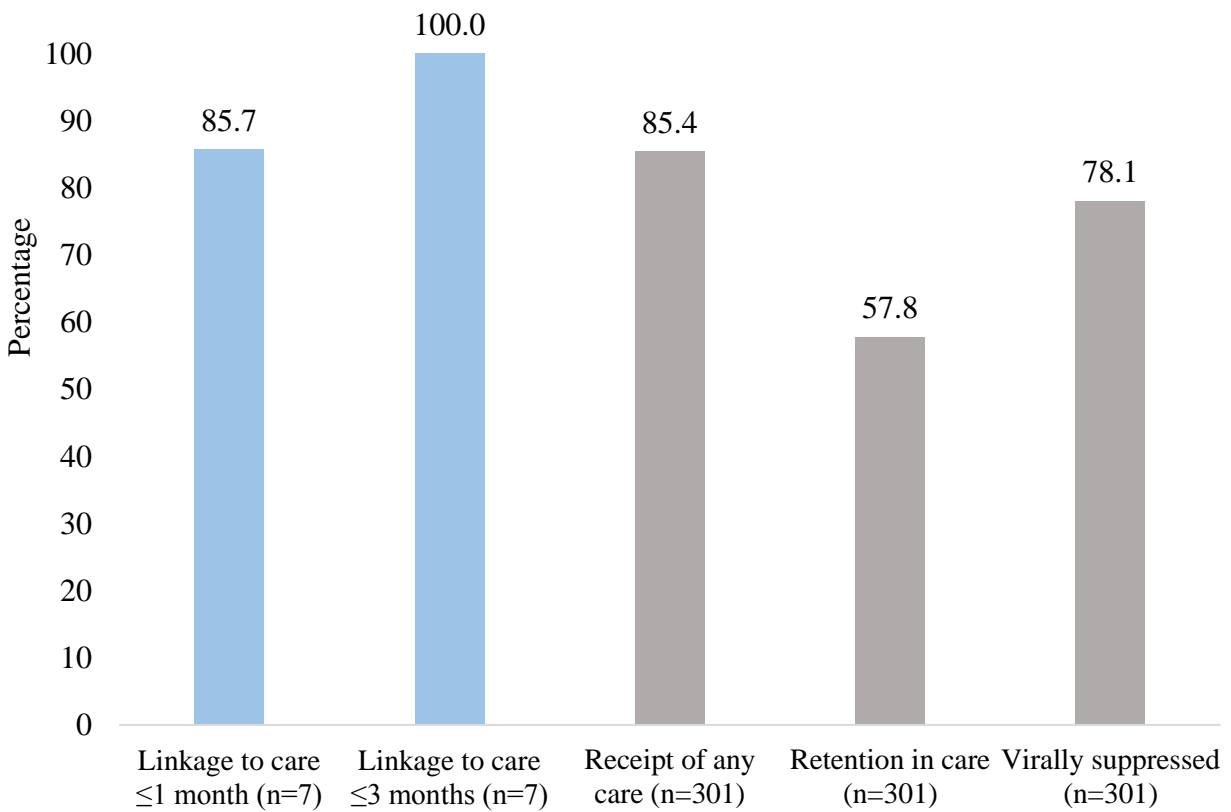


**Figure 26. Hawaii 2016 HIV care continuum, Kauai County**

\*Percentage of linkage to care is suppressed because the total counts are <5.

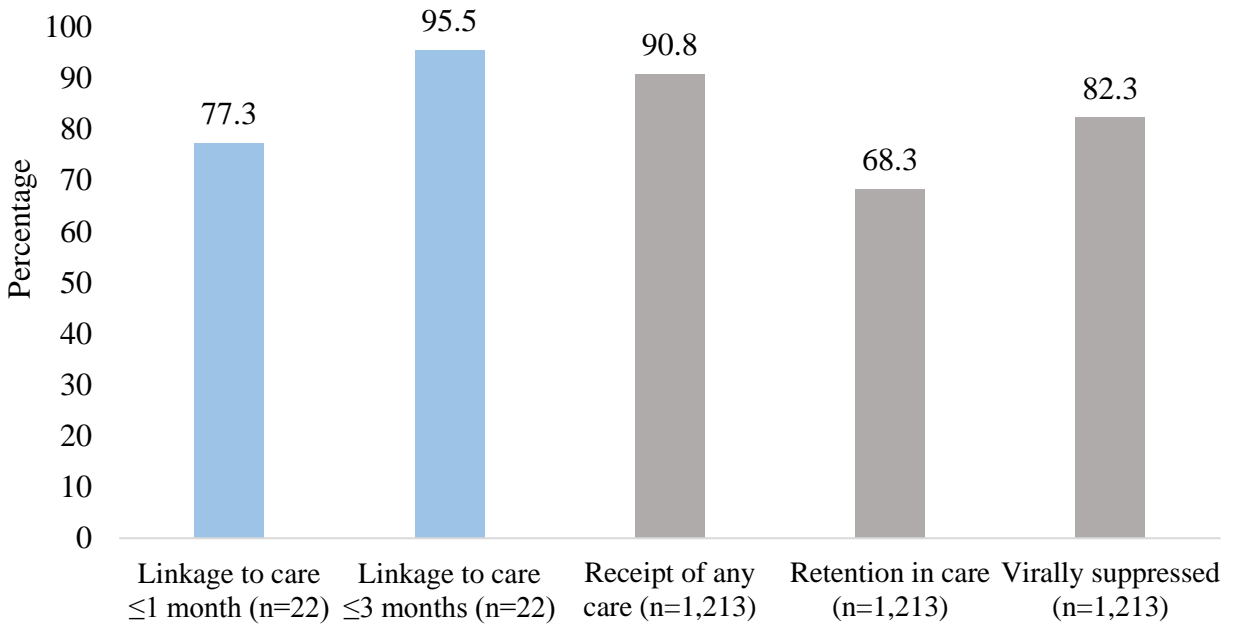


**Figure 27. Hawaii 2016 HIV care continuum, Maui County**

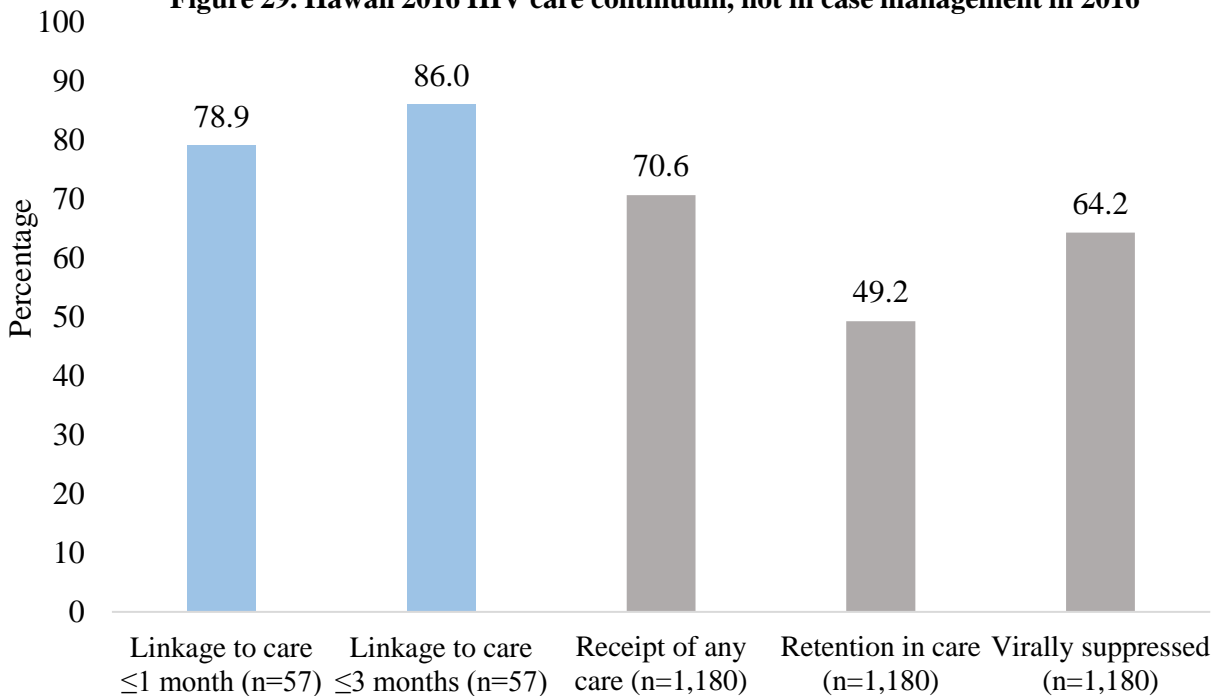


**Figures 28 and 29 present Hawaii’s 2016 HIV care continuum by whether the individual was in case management in 2016.** Among the 2,393 persons included, about half (50.7%) were in case management in 2016. Compared to those not in case management, persons in case management in 2016 did significantly better in receipt of any HIV medical care (90.8% vs. 70.6%), retention in care (68.3% vs. 49.2%), and viral suppression (82.3% vs. 64.2%).

**Figure 28. Hawaii 2016 HIV care continuum, in case management in 2016**



**Figure 29. Hawaii 2016 HIV care continuum, not in case management in 2016**



### C. Characteristics of persons not in care in 2016, Hawaii

The definition of “in care” in this document is the same as receipt of any HIV medical care, which was measured by documentation of  $\geq 1$  CD4 (count or percentage) test or viral load test performed in 2016. “Not in care” was defined as no documentation of CD4 (count or percentage) or viral load tests in 2016. Both “in care” and “not in care” was based on the 2,393 persons included in the 2016 HIV care continuum, which included data from persons aged  $\geq 13$  years at year-end 2015, whose HIV infection was diagnosed by year-end of 2015, and who were alive and residing in the state of Hawaii at year-end 2016. **Table 7** compares persons’ care status (in care vs not in care) in 2016 by sex at birth, age, race and ethnicity, residential county, transmission category, and case management status in 2016.

No significant difference was found in the distribution of a person’s care status by birth sex, county of residence, or race/ethnicity. Nevertheless, significant differences were observed in the distribution of a person’s care status by age, transmission category, and case management status in 2016 ( $P$ s  $< .001$ ). Persons not in case management were more likely to be not in care than persons in case management in 2016. Younger persons, in particular, persons in age groups 25-34 years and 35-44 years were more likely to be not in care compared to persons of older age groups. When examined by transmission category, persons whose infections were attributed to the other category, including hemophilia, blood transfusion, and risk factors not reported or not identified, were more likely to be not in care than all other categories (45.2% not in care vs state average of 19.2%).

Please be aware that a person’s care status described here was for year 2016 and does not necessarily correspond to their care status at the time of publication of this report. The total number of not in care individuals in the state of Hawaii may be different at different points in time.

**Table 7. Person characteristics by care status in 2016 (not in care vs in care), Hawaii**

Characteristics	Not in care (n=459)		In care (n=1,934)	
	No.	Percent	No.	Percent
In case management in 2016				
Yes	112	9.2	1,101	90.8
No	347	29.4	833	70.6
Birth sex				
Female	57	21.3	211	78.7
Male	402	18.9	1,723	89.1
Age at year-end 2015 in years				
13-24	8	17.0	39	83.0
25-34	74	27.7	193	72.3
35-44	95	24.1	299	75.9
45-54	147	17.9	675	82.1
≥55	135	15.6	728	84.4
Race/ethnicity <sup>a</sup>				
Hispanic, all races	54	22.2	189	77.8
American Indian/Alaska Native	3	33.3	6	66.7
Asian	51	14.2	309	85.8
Black/African American	33	21.7	119	78.3
Native Hawaiian/Other Pacific Islander (NHPI)	42	18.4	186	81.6
White	238	20.2	941	79.8
Multiple races	37	17.0	181	83.0
Transmission category				
Male-to-male sexual contact (MSM)	317	18.2	1,423	81.8
Injection drug use (IDU), female	10	19.2	42	80.8
Injection drug use, male	22	24.7	67	75.3
MSM & IDU	35	22.3	122	77.7
Heterosexual contact <sup>b</sup> , female	26	15.2	145	84.8
Heterosexual contact <sup>b</sup> , male	9	10.0	81	90.0
Perinatal	2	20.0	8	80.0
Other <sup>c</sup>	38	45.2	46	54.8
County of residence at year-end 2016				
Hawaii County	83	20.3	325	79.7
Honolulu County	314	19.8	1,272	80.2
Kauai County	18	18.4	80	81.6
Maui County	44	14.6	257	85.4

*Note:* “In care” was defined as documentation of  $\geq 1$  CD4 or viral load test in 2016. “Not in care” was defined as no documentation of any CD4 or viral load test in 2016.

<sup>a</sup> Excluding one person not differentiated between Asian and NHPI and three of unknown race/ethnicity.

<sup>b</sup> Included heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

<sup>c</sup> Included hemophilia, blood transfusion, and risk factors not reported or not identified.

<sup>d</sup> Missing data on county (n=95, 4.0%) were redistributed.

## **D. HIV infection among children, adolescents and young adults**

### **I. Diagnosis of HIV infection**

The designation “children” refers to persons younger than 13 years old. The designation “adolescents” refers to persons aged 13 to 19 years and the designation “young adults” refers to persons aged 20-24 years (8). From the beginning of the epidemic (around 1983) to 2016, a total of 441 Hawaii residents  $\leq 24$  years old were diagnosed with HIV infections, of which 26 (5.9%) were children, 76 (17.2%) were adolescents and 339 (76.9%) were young adults. Only one (3.8%) out of the 26 children, 10 (13.2%) out of the 76 adolescents, and 68 (20.1%) out of the 339 young adults were diagnosed between 2010 and 2016.

**Table 8** describes these populations by selected characteristics. Among children, over 60% were males, nearly a quarter were NHPs, nearly a third were Asians and over three quarters were residing in Honolulu County at the time of HIV diagnoses. Over half (57.7%) were due to perinatal transmission and the rest were attributed to hemophilia, blood transfusion, or risk factors not reported or not identified. Among both adolescents and young adults with HIV infections, males accounted for over three quarters (76.3%) among adolescents and 84.1% among young adults. More were whites than any other race/ethnicity (31.6% among adolescents and 44.9% among young adults). MSM was the main category of transmission (54.0% among adolescents and 65.5% among young adults).

### **II. Prevalent cases at year-end 2016**

At year-end 2016, a total of 56 persons younger than 25 years old were living with diagnosed HIV in Hawaii, of which four (7.1%) were children, 6 (10.7%) were adolescents, and 46 (82.1%) were young adults living with HIV in Hawaii. Among the 46 young adults, 28 (60.9%) resided in Hawaii at the time of HIV diagnosis, 8 (17.4%) were females, 30 (65.2%) were due to male-to-male sexual contact, and 33 (71.7%) lived in Honolulu County.

**Table 8. Characteristics of children, adolescents, and young adults diagnosed with HIV infection (all stages) among Hawaii residents as of December 31, 2016**

Characteristics	Children		Adolescents		Young Adults	
	No.	Percen	No.	Percen	No.	Percent
<b>State total (n=441)</b>	<b>26</b>	<b>5.9</b>	<b>76</b>	<b>17.2</b>	<b>339</b>	<b>76.9</b>
Birth sex						
Female	10	38.5	18	23.7	54	15.9
Male	16	61.5	58	76.3	285	84.1
Race/ethnicity <sup>a</sup>						
Hispanic, all races	DS	DS	11	14.5	42	12.4
American Indian/Alaska Native	0	0	DS	DS	DS	DS
Asian	8	30.8	9	11.8	47	13.9
Black/African American	DS	DS	DS	DS	DS	DS
Native Hawaiian/Other Pacific Islander	6	23.1	14	18.4	44	13.0
White	5	19.2	24	31.6	142	41.9
Multiple races	DS	DS	11	14.5	35	10.3
Transmission category						
Male-to-male sexual contact (MSM)	0	0	41	54.0	222	65.5
Injection drug use, female	0	0	DS	DS	8	2.3
Injection drug use (IDU), male	0	0	0	0	10	3.0
MSM & IDU	0	0	DS	DS	36	10.6
Heterosexual contact <sup>b</sup> , female	0	0	10	13.2	36	10.6
Heterosexual contact, male	0	0	DS	DS	8	2.4
Perinatal	15	57.7	0	0	0	0
Other <sup>c</sup>	11	42.3	15	19.7	19	5.6
County of residence at HIV diagnosis						
Hawaii County	DS	DS	9	11.8	37	10.9
Honolulu County	20	76.9	50	65.8	254	74.9
Kauai County	DS	DS	7	9.2	13	3.8
Maui County	DS	DS	10	13.2	35	10.3

Notes: the designation “children” refers to persons younger than 13 years old, “adolescents” refers to persons aged 13 to 19 years, and “young adults” refers to persons aged 20-24 years. Only data from persons residing in Hawaii at the time of HIV diagnosis were included. Column percent total may not add up to 100 because of rounding. DS: data suppressed.

<sup>a</sup> Excluding one person not being differentiated between Asian and Native Hawaiian/Other Pacific Islander among young adults.

<sup>b</sup> Included heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

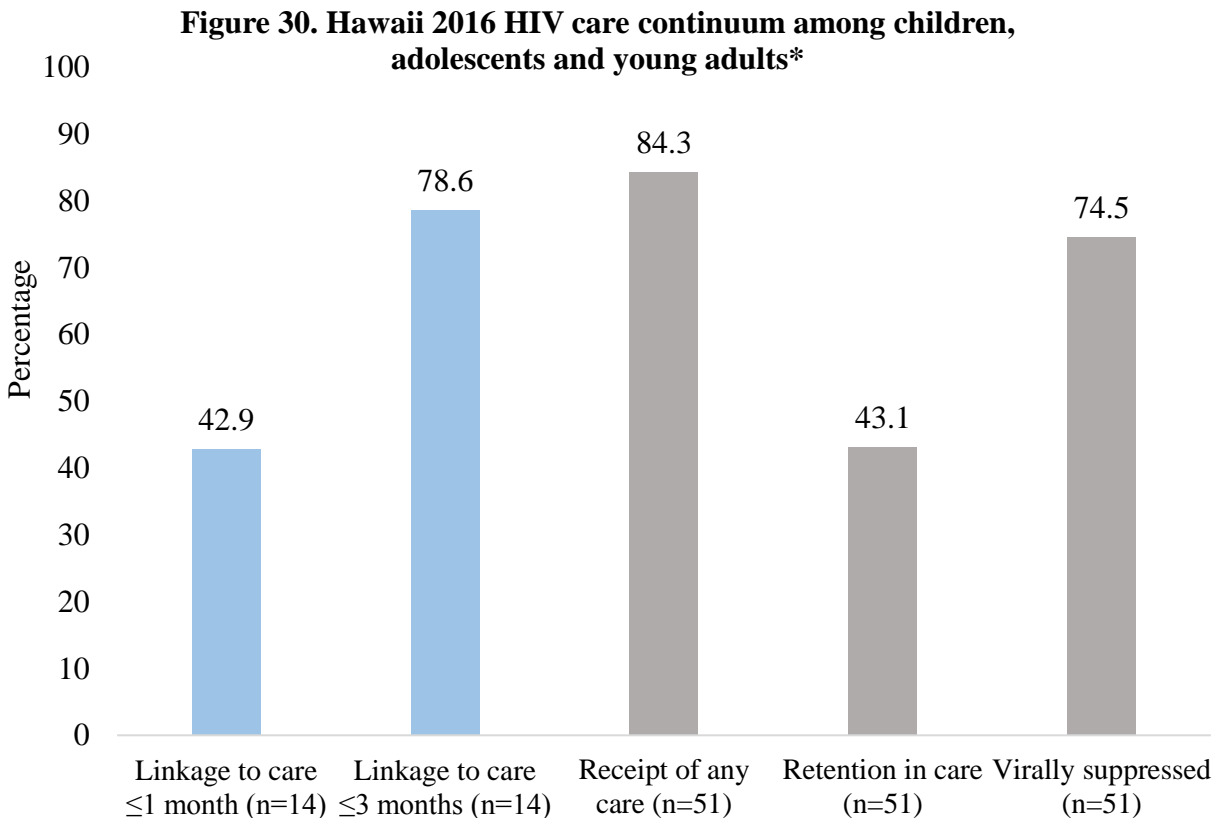
<sup>c</sup> Included hemophilia, blood transfusion, and risk factors not reported or not identified.



### III. 2016 HIV care continuum among children, adolescents, and young adults

Figure 30 presents 2016 HIV care continuum among children, adolescents, and young adults living with diagnosed HIV at year-end 2016. The study population for linkage to HIV medical care included a total of 14 Hawaii residents  $\leq 25$  years old with HIV infection diagnosed in 2016. Of those 14 persons, none was younger than 19 years old. Six (42.9%) of the 14 were linked to HIV medical care  $\leq 1$  month and 11 (78.6%) were linked to HIV medical care  $\leq 3$  months after HIV diagnosis.

The study population for receiving HIV medical care and viral suppression was based on persons younger than 25 years old at year-end 2015 with HIV diagnosed by year-end 2015 and who lived in Hawaii at year-end 2016. Among the 51 persons included, 43 (84.3%) received any HIV medical care, 22 (43.1%) were retained in HIV medical care, and 38 (74.5%) were virally suppressed in 2016.



\*The designation “children” refers to persons younger than 13 years old. The designation “adolescents” refers to persons aged 13 to 19 years and the designation “young adults” refers to persons aged 20-24 years.

## **E. HIV infection among transgender persons**

In this report, persons were classified as transgender if sex at birth and current gender (the gender with which a person identifies) reported by the person were different (9, 10). Transgender women refers to persons who reported that their sex assigned at birth was male, but identified their current gender as female. Transgender men refers to persons who reported that their sex assigned at birth was female, but identified their current gender as male (9, 10).

Data on sex at birth and current gender in eHARS are self-reported and collected and reported by the individual's medical provider (9, 10). There may be significant inconsistency among medical providers in how they report current gender, and there may be inconsistency in whether and how an individual identifies their gender identity to a medical provider. Data on sex at birth and current gender in eHARS may also come from information on laboratory reports, and such data may be more likely to reflect sex at birth or gender as listed on legal identification, rather than self-reported gender.

Sex at birth is a required field in eHARS and it was populated for all individual with values of either "Male" or "Female." In contrast, current gender is not a required variable in eHARS. Starting in 2009, jurisdictions had the option to submit information on current gender identity to CDC using eHARS with values of "male, female, male-to-female, female-to-male, and additional gender identity" (9, 10). As a result, data on current gender were mostly missing until more recent years, i.e., after 2009. For example, among the 2,473 prevalent cases of persons living with diagnosed HIV infections at year-end 2016 in Hawaii, only 1,071 (43.3%) had data on self-reported current gender.

CDC uses a hierarchical algorithm to assign transmission categories that incorporate an individual's HIV risk factors and sex at birth (10). Therefore, MSM would be the assigned transmission category for a transgender woman who had sexual contact with a male (10). In order to provide a more meaningful analysis of reported HIV among transgender individuals, we analyzed transgender cases by combining the transmission categories of MSM and heterosexual contact into one category, "sexual contact" (10). MSM/IDU was referred as 'sexual contact/IDU'.

At year-end 2016, a total of 27 persons living with HIV were identified as transgender persons, of which 26 were transgender women. Among the 26 transgender women, 6 (23.1%) were  $\leq 34$  years old, 10 (38.5%) were in age group 35-44 years and another 10 (38.5%) were  $\geq 45$  years old. Eighteen (69.2%) out of the 26 transgender women were diagnosed with HIV infections attributed to sexual contact, six (23.1%) attributed to sexual contact/IDU, and the rest of other factors or risk factors not identified or reported. The majority (88.5%) resided in Honolulu County and were in care management in 2016 (76.9%).

### **2016 HIV care continuum among transgender persons**

Among the 79 HIV infections diagnosed among Hawaii residents in 2016, 76 (96.2%) had data on both sex at birth and current gender. Among those 76 persons, one person was identified as a transgender woman.

A total of 25 persons identified as transgender persons were living with HIV infections diagnosed in or before 2015 and resided in Hawaii at year-end 2016. Twenty-four out of those 25 transgender persons were transgender women, of which 20 (83.3%) received any HIV medical care, 17 (70.8%) were retained in HIV medical care, and 19 (79.2%) were virally suppressed.

## Limitations

Several limitations need to be addressed in the development of this epidemiologic profile. First, despite extensive investigation of a person's most recent known address at year-end 2016, there remained 515 (18.9%) individuals of unknown whereabouts at year-end 2016. Among those 515 individuals, a total of 257 (49.9%) individuals whose HIV infections were diagnosed by year-end 2006 and who had not been in care since 2007 were excluded from further analysis. This might have resulted in underestimating prevalence cases and prevalent rates, but overestimating indicators such as receipt of any HIV medical care, retention in care and viral suppression.

Nevertheless, the bias should be minimal for the following reasons. First, among persons identified as residing in the state of Hawaii at year-end 2016 (n=2,215), only 15 (0.7%) were known to be diagnosed by year-end 2006 and had not been in care since 2007. Secondly, 163 (63.7%) of the 257 individuals excluded from further analysis were diagnosed by year-end 2000. Based on the natural disease progress of HIV infection, if a patient had not been in care for  $\geq 10$  years since HIV diagnosis, the odds of survival were likely low. It is therefore reasonable to assume that those individuals had moved away from Hawaii and were receiving care somewhere else.

Data on county of residence at year-end 2016 was missing for, 95 (3.8%) out of the 2,473 prevalent cases of PLWDH, 59 (4.1%) out of the 1,438 prevalent cases of PLWDA, and 95 (4.0%) of the 2,393 persons included as the denominator for receipt of HIV medical care and viral suppression. Cases missing data on county were redistributed among counties based on the proportion in each county of cases for which data on county was available. Therefore, the actual counts of persons with data on county of resident were smaller than what was presented in the report.

Due to missing data on self-reported current gender, estimates on prevalent cases of transgender persons living with HIV infection would be underestimated (10). As data collection on current gender improves each year, future data may provide a more accurate and comprehensive description of HIV infection among this population.

Lastly, results based on analysis on a dataset exported at a certain time point would be limited to the information available at the time when the data was exported. The surveillance system dataset is dynamic, which receives constant updates whenever new information is available. In addition, the data is updated as a result of ongoing national deduplication and data cleaning efforts. Hence, data reported from datasets exported at different time points would result in slight differences in selected outcomes, such as number of new diagnoses in the most recent years.

## References

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