## Overall trends in new Michigan HIV diagnoses

METHODS. To evaluate trends in new HIV diagnoses in Michigan over time, we estimated the number of persons newly diagnosed with HIV infection between 2011 and 2015 by adjusting the number of reported cases to account for those who may not have been reported to the health department by January 1, 2017. These adjustments were made by weighting the data.

Unless otherwise noted, numbers cited include persons living with all stages of HIV infection*. We used regression modeling on the adjusted data to assess significant changes in annual rates of new diagnoses overall and by race, sex, and age. Rates for race and sex subgroups were calculated using annual population estimates released by the Census Bureau in mid-2016. Rates for age at diagnosis were calculated using the 2015 Bridged-Race Population Estimates produced by the Population Estimates Program of the U.S. Census Bureau in collaboration with the National Center for Health Statistics. For risk groups, we analyzed annual counts since there are no reliable denominator data available for rate calculation. Trends overall and in subgroups are described using *average annual percent changes* in rates (or counts) of new diagnoses. Only significant trends and their corresponding percent changes are shown. "Significant" indicates statistical significance assessed at *p*<0.05.

For concurrent diagnoses, defined as progression to stage 3 HIV infection within 30 days of HIV diagnosis, we used the Chi Square Mantel-Haenszel test for trend to assess changes over time. This test allows us to assess increases and decreases in the *proportion* of new diagnoses that are concurrent for a particular race/sex combination.

The date of new HIV *diagnosis* does not tell us when persons were first *infected*, because HIV diagnosis may take place months or years after infection. From 2005 to 2016, the Michigan Department of Health and Human Services (MDHHS) conducted incidence surveillance, which estimates new infections rather than new diagnoses using the Serologic Testing Algorithm for Recent HIV Seroconversion (STARHS). All STARHS Incidence reports are available on our website, including the most recent report encompassing new HIV infections from 2010 - 2014.

Figure 1. Number and rate of new HIV diagnoses in Michigan, 2011—2015
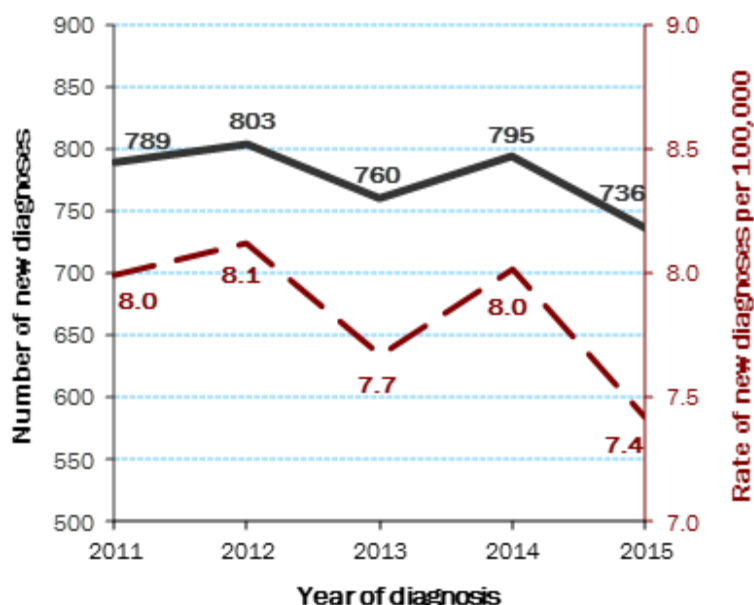
KEY FINDINGS

- Overall Rates of new diagnoses in Michigan decreased between 2011 and 2015 but statistically, remained stable.
- Decreases occurred for those ages 13-19 at diagnosis and females of other race.
- Concurrent diagnoses remained stable overall.
- Rates of new diagnoses remained stable among persons living in SE MI and in Out-state Michigan.

*Michigan discontinued use of the term 'AIDS' in January 2012 in accordance with the language in the 2008 HIV Case Definition released by the CDC. HIV infection is now classified by stage of disease, with stage 3 representing AIDS.

OVERVIEW OF TRENDS. Figure 1 shows the number and rate of new HIV diagnoses in Michigan by year for 2011 to 2015. The number and rate of new HIV diagnoses in Michigan remained stable during this time period for the seventh consecutive trend report. There was an average of 777 new cases per year and an average rate of 7.8 cases per 100,000 population.

Each year, there are more new diagnoses of HIV infection than deaths. As a result, the reported number of persons living with HIV in Michigan is increasing. MDHHS estimates that 17,660 persons were living with HIV infection in Michigan as of July 2016.

New HIV diagnoses by age at diagnosis

Between 2011 and 2015, the rate of new diagnoses decreased significantly among persons 13-19 years of age (an average 13% per year). Rates in all other age groups remained stable (Table 1).

For the past several years, we have noted stable rates among this group, but this is the first time we have seen a significant decrease in rates of new diagnoses among 13-19 year olds. In the recent past we have seen increases in rates among 25-29 year olds. This is the second year in a row to show stable rates among this group. Past trend reports have also shown decreases among 40-44 year olds but rates have remained stable in recent years. Almost three quarters (71%) of teen and young adult cases combined are residents of Southeast (SE) Michigan. Of these cases, 59% were residents of the city of Detroit at the time of HIV diagnosis.

Before 2005, 35-39 year olds represented one of the highest rates of HIV diagnoses of all age groups. This group now represents one of the lowest rates, with the rates among 20-24, 25-29, and 30-34 year olds surpassing this group. These trends represent the continued shift in the epidemic to younger adults and highlight the large gap in rates among younger persons and older persons. It is important to note that, although not significant, rates have been decreasing for these younger age groups since 2012.

Of all teens diagnosed in the last five years, 85% are black compared to 60% of persons diagnosed at older ages. Furthermore, teens are much more likely to be black males who have sex with males (MSM) compared to adults 20 years and older (67% vs. 32%, respectively) (figure 2, page 3). This underscores a continued need for prevention campaigns tailored to young black MSM as the rates in this group have widened the already large racial gap among persons living with HIV.
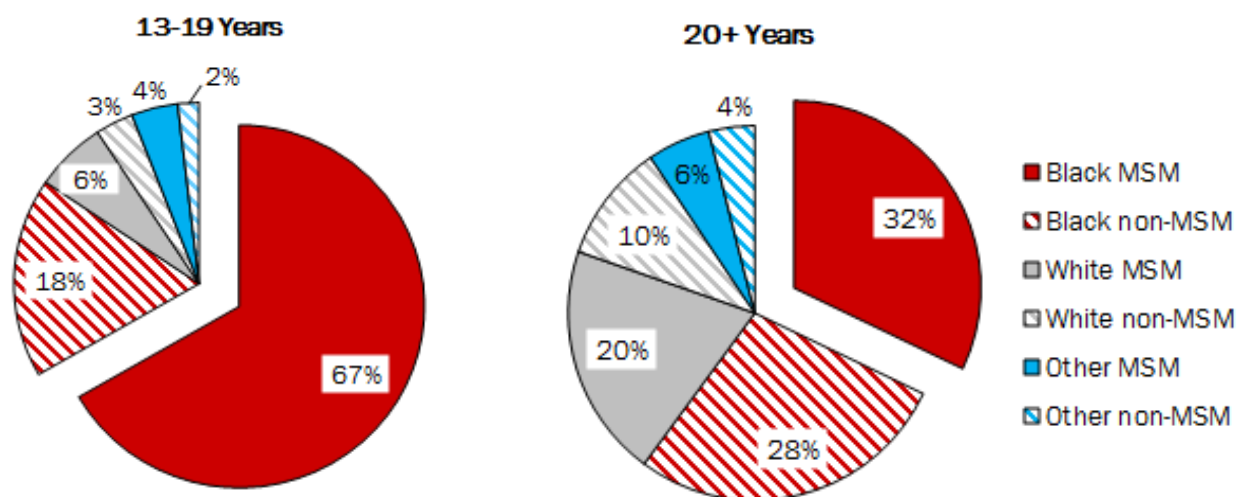
Table 1. New HIV diagnoses by age at diagnosis, 2011-2015

Age at diagnosis	2011			2012			2013			2014			2015		
	Num	%	Rate	Num	%	Rate	Num	%	Rate	Num	%	Rate	Num	%	Rate
0 - 12 yrs	9	1%	0.6	3	<1%	0.2	1	<1%	0.1	5	1%	0.3	1	<1%	0.1
13 -19 yrs	65	8%	6.6	64	8%	6.6	62	8%	6.5	45	6%	4.8	35	5%	3.7
20 -24 yrs	178	23%	25.6	192	24%	26.8	163	22%	22.5	192	24%	26.3	183	25%	25.5
25 -29 yrs	117	15%	19.9	135	17%	23.0	130	17%	21.9	155	19%	25.4	136	18%	21.5
30 -34 yrs	87	11%	15.0	86	11%	14.7	83	11%	14.0	97	12%	16.3	88	12%	14.9
35 -39 yrs	78	10%	13.5	72	9%	12.7	62	8%	11.0	67	8%	11.9	57	8%	9.9
40 -44 yrs	68	9%	10.3	80	10%	12.2	61	8%	9.5	56	7%	9.0	64	9%	10.6
45 -49 yrs	77	10%	10.7	63	8%	9.0	72	9%	10.6	66	8%	10.1	60	8%	9.2
50 -54 yrs	53	7%	6.9	52	6%	6.9	57	8%	7.7	44	6%	6.0	60	8%	8.3
55 -59 yrs	27	3%	3.9	31	4%	4.3	29	4%	4.0	41	5%	5.6	26	4%	3.6
60 and over	30	4%	1.5	24	3%	1.2	38	5%	1.8	25	3%	1.2	26	4%	1.2
Total	**789**	**100%**	**8.0**	**803**	**100%**	**8.1**	**760**	**100%**	**7.7**	**795**	**100%**	**8.0**	**736**	**100%**	**7.4**

(13-19 yrs row: ↓13%)

TABLE FOOTNOTES:

- The number of new diagnoses shown are not reported case counts. These are estimates based on the number of reported cases that are adjusted to account for reporting delay. As a result, summed counts will not always match the column total shown due to rounding error.
- Bold/Colored text indicates that statistically significant trends occurred in that group. The arrow indicates the direction of change in rates over the 5-year period, while the percentage is the *average change per year* in the rates, as calculated using regression modeling.
- Rates are per 100,000 population.

Figure 2. MSM vs. non-MSM risk by race and age at HIV diagnosis, 2011-2015

13-19 Years

20+ Years

- Black MSM
- Black non-MSM
- White MSM
- White non-MSM
- Other MSM
- Other non-MSM

New HIV diagnoses by race/sex

The rate of new diagnoses decreased among females of other race (average 9% per year) between 2011 and 2015. Rates among all other race/sex groups remained stable. This is the third of six trend reports not to show increases among black females. The rate of new diagnoses remained highest among black persons of both sexes compared to all other race/sex groups. In 2015, the rate among black males was 11 times that of white males, and the rate among black females about 15 times that of white females. These disparities have persisted since we began analyzing HIV trends in MI, and although we've seen some decreases in new diagnoses among black males and females over the years, the rate difference between black and white females and between black and white males seems to have remained relatively stable.

Table 2. New HIV diagnoses by race/sex, 2011-2015

| | Year of diagnosis | | | | | | | | | | | | | | |
| | 2011 | | | 2012 | | | 2013 | | | 2014 | | | 2015 | | |
Race/Sex	Num	%	Rate	Num	%	Rate	Num	%	Rate	Num	%	Rate	Num	%	Rate
Male	628	80%	13.0	655	82%	13.5	626	82%	12.9	649	82%	13.3	605	82%	12.4
Black	372	47%	56.6	391	49%	59.4	400	53%	61.0	375	47%	57.3	363	49%	55.4
White	200	25%	5.4	206	26%	5.5	173	23%	4.7	201	25%	5.4	186	25%	5.0
Other	56	7%	12.0	58	7%	12.1	53	7%	10.8	72	9%	14.3	56	8%	10.7
Female	161	20%	3.2	148	18%	2.9	133	18%	2.6	146	18%	2.9	131	18%	2.6
Black	111	14%	15.2	102	13%	14.0	91	12%	12.6	108	14%	14.8	89	12%	12.3
White	30	4%	0.8	31	4%	0.8	33	4%	0.9	28	4%	0.7	31	4%	0.8
Other	20	3%	4.2	15	2%	3.1	9	1%	1.8	10	1%	2.0	10	1%	1.9
All	789	100%	8.0	803	100%	8.1	760	100%	7.7	795	100%	8.0	736	100%	7.4
Black	483	61%	34.9	493	61%	35.6	491	65%	35.5	483	61%	35.0	452	61%	32.8
White	230	29%	3.0	237	30%	3.1	206	27%	2.7	229	29%	3.1	218	30%	2.9
Other	76	10%	8.1	73	9%	7.6	62	8%	6.3	82	10%	8.1	66	9%	6.3

↓9% (for **Other** Female row)

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- Bold/Colored text indicates that statistically significant trends occurred in that group. The arrow indicates the direction of change in rates over the 5-year period, while the percentage is the *average change per year* in the rates, as calculated using regression modeling.
- Rates are per 100,000 population.

New HIV diagnoses by risk

Between 2011 and 2015, the number of newly diagnosed persons who injection drugs (PWID) remained stable after significant decreases in past reports. Recently, PWID have garnered national attention due to an outbreak of HIV infection among PWID in Indiana. Despite this, Michigan continues to see decreases among this group.

There were no significant changes in diagnoses among any other risk groups. This is the fourth trend report not to reflect decreases among heterosexuals in the past seven reports.

New diagnoses among persons with no identified risk (NIR) remained stable between 2011 and 2015. There is a targeted effort to reduce the number of new diagnoses with NIR. Risk information is important information for prevention efforts; thus, it is crucial that risk questions be answered on the adult case report form (ACRF). Protocols and partnerships are currently in place to achieve better risk ascertainment.

Table 3. New HIV diagnoses by risk, 2011-2015

Risk	Year of diagnosis									
	2011		2012		2013		2014		2015	
	Num	%	Num	%	Num	%	Num	%	Num	%
MSM	443	56%	460	57%	410	54%	485	61%	420	57%
PWID	27	3%	28	3%	34	4%	16	2%	21	3%
MSM/PWID	16	2%	12	1%	12	2%	13	2%	13	2%
Heterosexual	137	17%	127	16%	131	17%	139	17%	105	14%
Other known	9	1%	3	<1%	4	1%	7	1%	1	<1%
No identified risk	157	20%	173	22%	168	22%	135	17%	176	24%
Total	**789**	**100%**	**803**	**100%**	**760**	**100%**	**795**	**100%**	**736**	**100%**

TABLE FOOTNOTES:

- The number of new diagnoses shown are not reported case counts. These are estimates based on the number of reported cases that are adjusted to account for reporting delay. As a result, summed counts will not always match the column total shown due to rounding error.
- Bold/Colored text indicates that statistically significant trends occurred in that group. The arrow indicates the direction of change in number of new diagnoses over the 5-year period, while the percentage is the *average change per year* in the the number of new diagnoses, as calculated using regression modeling.
- The heterosexual category includes males whose female sexual partners are known to be HIV-infected or at high risk for HIV and females who reported sex with males regardless of what is known about their partners' HIV status or risk. The "other known" risk category includes perinatal and blood product transmission. The NIR category includes males who reported sex with females of unknown risk/HIV status as their only risk and males and females for whom no risk has yet been reported.
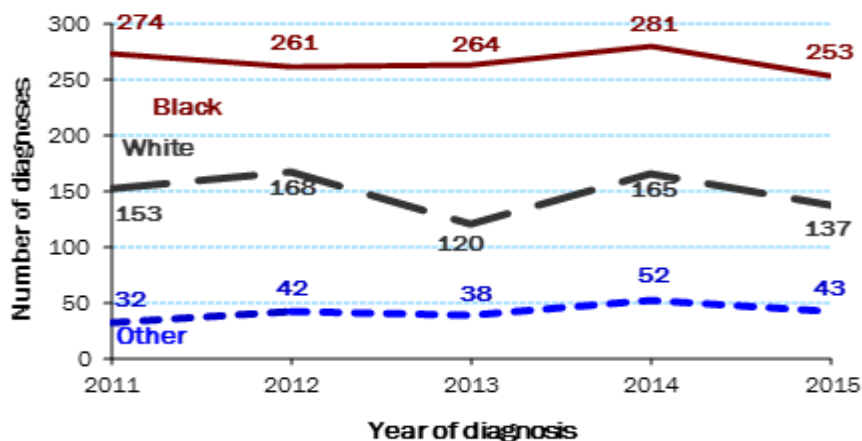
Figure 3. Race among MSM, 2011-2015

Figure 3 illustrates trends among MSM by race. MSM were more than half of all new diagnoses between 2011 and 2015 (57%). Of these newly diagnosed MSM, 58% are black. The number of MSM cases remained stable among all race groups between 2011 and 2015. Though there was no significant increase in the number of black MSM cases, as has been seen in past reports, black males continue to make up the largest proportion of all MSM HIV cases in Michigan.

Concurrent diagnoses

The proportion of persons diagnosed with stage 3 HIV infection within 30 days of diagnosis (concurrent diagnoses) remained stable between 2011 and 2015 (table 4). Similarly, the proportion of concurrent diagnoses among all race/sex groups remained stable as well during this time. There was no significant difference in the proportion of concurrent diagnoses between men and women, but persons of black race had significantly fewer concurrent diagnoses than persons of all other races (18% vs. 25%, respectively). Many concurrent diagnoses represent a failure to diagnose HIV early in the course of the infection and/or a failure to initiate early treatment. Persons who are unaware of their HIV infection cannot benefit from early antiretroviral therapy and have a poorer prognosis than those diagnosed earlier in

(Continued from page 4)

Concurrent *diagnoses (cont.)*

the disease course. They are also not accessible for primary prevention (transmission to uninfected individuals). Expanding routine HIV testing in medical settings and provision of HIV testing at community-based and outreach settings will promote and facilitate access to HIV testing, which may improve health outcomes for those who are infected.

Table 4. Concurrent HIV diagnoses by race/sex, 2011-2015

Race/Sex	Year of diagnosis											
	2011		2012		2013		2014		2015		Total	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Male	115	18%	134	20%	169	27%	122	19%	113	19%	654	21%
Black	57	15%	65	17%	97	24%	58	15%	51	14%	328	17%
White	51	25%	57	28%	54	31%	43	21%	53	28%	258	27%
Other	7	12%	12	21%	18	34%	21	29%	10	18%	68	23%
Female	33	20%	26	18%	29	22%	32	22%	29	22%	149	21%
Black	21	19%	20	20%	20	22%	26	24%	18	20%	105	21%
White	5	17%	2	6%	8	24%	6	21%	9	29%	30	20%
Other	7	35%	4	27%	1	11%	0	0%	2	20%	14	22%
All	148	19%	160	20%	198	26%	154	19%	143	19%	803	21%
Black	78	16%	85	17%	117	24%	84	17%	69	15%	433	18%
White	56	24%	59	25%	62	30%	49	21%	62	28%	288	26%
Other	14	18%	16	22%	19	31%	21	26%	12	18%	82	23%

TABLE FOOTNOTES:

- The number of new diagnoses shown are not reported case counts. These are estimates based on the number of reported cases that are adjusted to account for reporting delay. As a result, summed counts will not always match the column total shown due to rounding error.
- Percentages reflect the number of concurrent diagnoses for a race/sex/year combination divided by the total diagnoses for that race/sex/year combination.
- Bold/Colored text indicates that statistically significant trends occurred in that group. Significance was assessed using the Mantel-Haenszel chi-square test. The arrow indicates the direction of change while the accompanying percentage is the *change in proportion of concurrent diagnoses* from 2011 to 2015, which do not take into account the fluctuations from year to year.

New HIV diagnoses by residence at diagnosis

The rate of new HIV diagnoses remained relatively stable in Southeast Michigan (Lapeer, Macomb, Monroe, Oakland, St. Clair, and Wayne counties), as well as the rest of the state between 2011 and 2015 (table 5). It is also important to note that the burden of new diagnoses continues to disproportionately affect Southeast Michigan (SE MI).

Table 5. New HIV diagnoses by residence at diagnosis, 2011-2015

Residence	Year of diagnosis														
	2011			2012			2013			2014			2015		
	Num	%	Rate	Num	%	Rate	Num	%	Rate	Num	%	Rate	Num	%	Rate
SE MI	531	68%	12.5	550	69%	12.9	503	67%	11.8	523	66%	12.3	490	67%	11.5
Out-state	250	32%	4.4	250	31%	4.4	252	33%	4.5	266	34%	4.7	238	33%	4.2
Prison or Unknown	8	1%	N/A	3	0%	N/A	5	1%	N/A	6	1%	N/A	8	1%	N/A
Total*	781	100%	8.0	800	100%	8.1	755	100%	7.7	789	100%	8.0	728	100%	7.4

TABLE FOOTNOTES:

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- Rates are per 100,000 population.

Summary

- The number and rate of new HIV diagnoses in Michigan remained stable between 2011 and 2015 for the 7th consecutive trend report, with an average of 777 new cases per year and an average rate of 7.8 cases per 100,000 population.

- The highest rates (or counts) of new HIV diagnoses occurred among:

    - 20-24 and 25-29 year olds
    - Males
    - Black males and females
    - Men who have sex with men (MSM)*
    - SE MI residents

- There were no INCREASES in rates among any of the subgroups analyzed.

- DECREASES in rates occurred among:

    - 13-19 year olds
    - Females of other race

- Very few significant changes were found among the various subgroups analyzed, suggesting that new diagnoses overall are becoming increasingly stable each year.

- Almost three quarters of Michigan's new cases among 13-24 year olds were residents of SE MI at diagnosis. Of these SE MI young adults, 59% lived in the City of Detroit.

- 85% of new 13 - 19 year old cases are black (of whom 79% are MSM), whereas 60% of those aged 20 and older are black. This finding suggests that black teens and young adults in general, and young black MSM in particular, should continue to be the focus of aggressive prevention activities.

- Race and sex disparities in rates of new HIV diagnoses remain. Comparing the diagnosis rates of black persons and white persons in 2015:

    - **Overall:** The rate for black persons was over 11 times higher
    - **Males:** The rate for black males was over 11 times higher
    - **Females:** The rate for black females was over 15 times higher (this disparity improved from 20 times higher in 2014)

- Concurrent diagnoses remained stable overall.

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*Annual counts were analyzed for risk groups since there are no reliable denominator data available for rate calculation.