METHODS: The Medical Monitoring Project (MMP) is a Centers for Disease Control and Prevention (CDC)-sponsored initiative housed within the HIV surveillance program. Part of the goal of the project is to ascertain the met and unmet needs of those living with HIV.[1] There are a total of 23 project areas in the United States, consisting of cities, states, and territories.[1] Annually from 2009 until 2014, MMP used a 3-stage sampling design to obtain nationally representative, cross-sectional samples of HIV-infected adults receiving outpatient medical care for HIV.[2-5] In 2009-2014, the sampling method was three-tiered; with project areas being sampled first, then HIV care facilities, and finally individual participants. For city, state and territory samples, probability of selection was proportionate to AIDS prevalence (Michigan was sampled as a medium morbidity state); for facility samples, probability of selection was proportionate to the number of HIV-infected patients seen from January to April in each cycle year. A sample of 400 participants were drawn for each cycle year. Data were collected via interviews and medical record abstractions during June - following May of each cycle year. A summary of unadjusted Michigan facility and patient response rates is shown in Table 1. Data were weighted on the basis of known probabilities of selection at city, state or territory, facility, and patient levels.[6] In addition, data were weighted to adjust for nonresponse by using predictors of patient-level response.[6,7] Since MMP uses a complex sampling scheme, survey regression modeling of the weighted data is required for accurate data analysis. These analysis procedures were used to assess significant changes in annual proportions of the participant population by sex, age, race, education level, income level, insurance coverage, and duration of HIV infection since diagnosis. For the purposes of this summary, "significant" indicates statistical significance assessed at p<0.05.

KEY FINDINGS

- Increased STD Testing
- Increased ART use
- Increased Viral Suppression
- Increased utilization of dental services

Table 1. Summary of Michigan response rates from 2009-2014

MMP Cycle	Participating Facilities (Unadj.) %	Patients with MRA and Interview Data (Unadj.) %
2009	53	37
2010	65	31
2011	59	37
2012	69	41
2013	77	41
2014	77	48

DEMOGRAPHICS: No significant changes in proportions of sex, age, and race were found across MMP cycles from 2009 to 2014. For each MMP cycle, on average males made up about 76% of participants, females about 22%, and transgender about 1% (Figure 1).

The proportion of age groups did not change significantly across the cycle years. On average, 18-29 year age group made up about 12% of the participant population, 30-39 year age group made up about 15%, 40-49 year age group made up about 33%, and 50+ year age group made up about 40% (Figure 2).
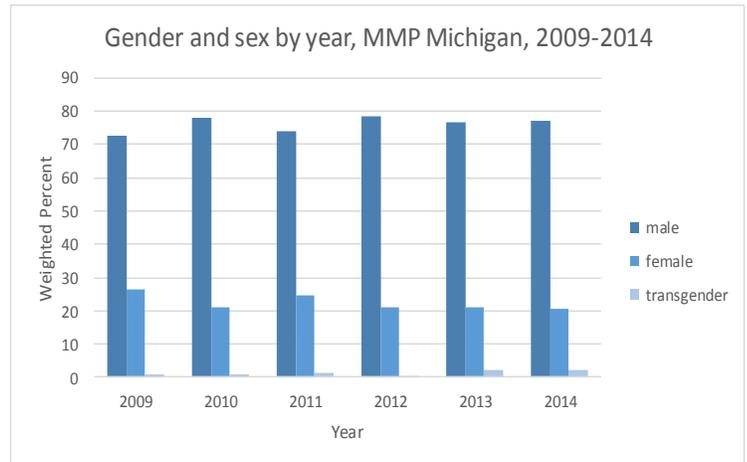
Figure 1. Gender and Sex by Year

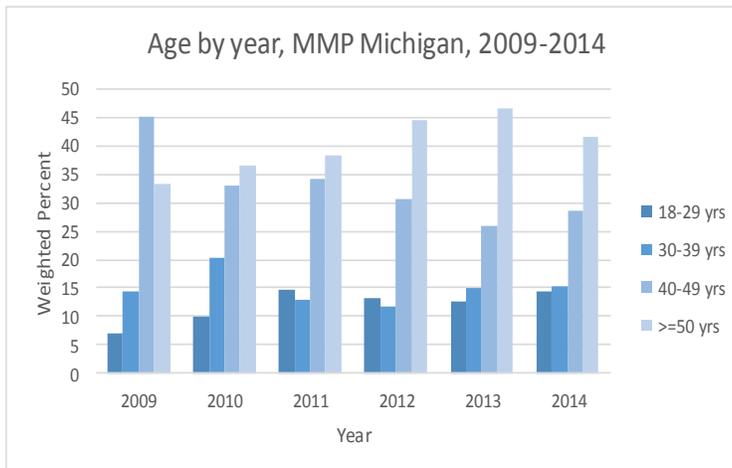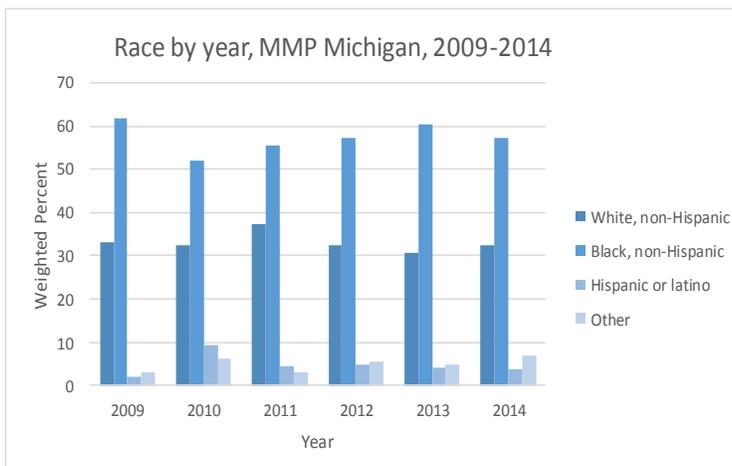*Figure 2. Age by Year*

Figure 3. Race by Year

The racial makeup of the MMP participant population also did not change significantly across the MMP cycle years. On average, white, non-Hispanic participants made up 33%, black non-Hispanic participants 57%, Hispanic or Latino participants 5%, and other races made up about 5% (Figure 3).

Distribution of education level was also consistent across MMP cycle years. About 16% of the MMP participant population had less than a high school education, 28% had a high school diploma or equivalent, and about 56% had more than a high school education as the highest level of education achieved (Figure 4).

Income level also did not differ significantly from year to year across the MMP cycles. On average, about 43% of MMP participants had an income less than 100% of the Federal Poverty Level (FPL).

Figure 4. Education Level by Year

Education Level by Year, MMP Michigan, 2009-2014

Figure 5. Income Level by Year

Income Level by Year, MMP Michigan, 2009-2014
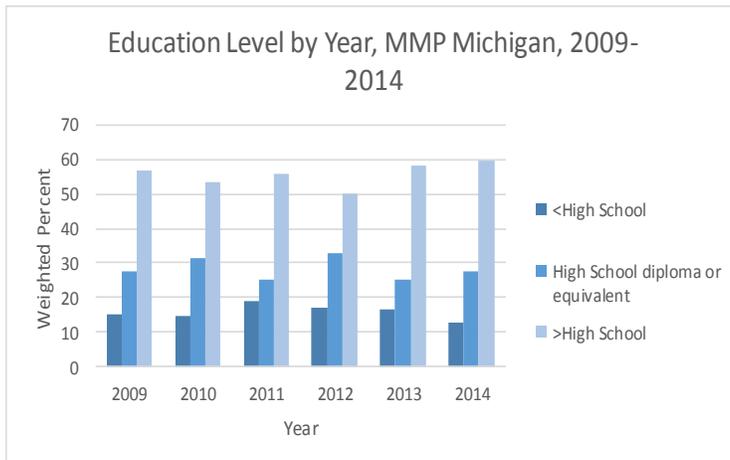
In 2014, the FPL for a single-person household was an income of $11,670/year, and it increased by $4,060 for each additional household member.[8] Further, about 15% of the MMP participant population had an income level of ≥ 100% - < 139% FPL, about 29% had an income level of ≥ 139% - < 400% FPL, and about 13% had an income level of ≥ 400% FPL (Figure 5).
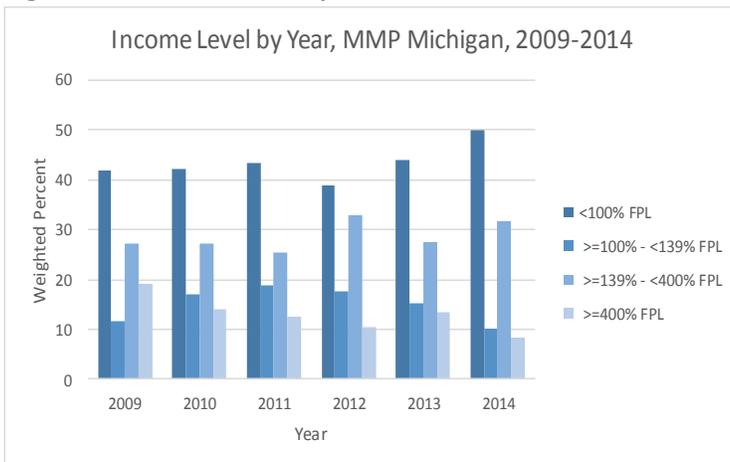
While a trend in specific type of insurance participants claimed could not be assessed, general insurance coverage in the 12 months prior to the interview was examined, and no significant change in the proportion of individuals having insurance or losing insurance was observed (data not shown). Many MMP participants claimed that their health care and prescription drug costs were covered by Private Insurance, Medicaid, Medicaid and Medicare, and ADAP coverage (Figure 6).

Figure 6. Insurance Type by Year

Mutually Exclusive Insurance and ARV Coverage Type by year, MMP Michigan, 2009-2014
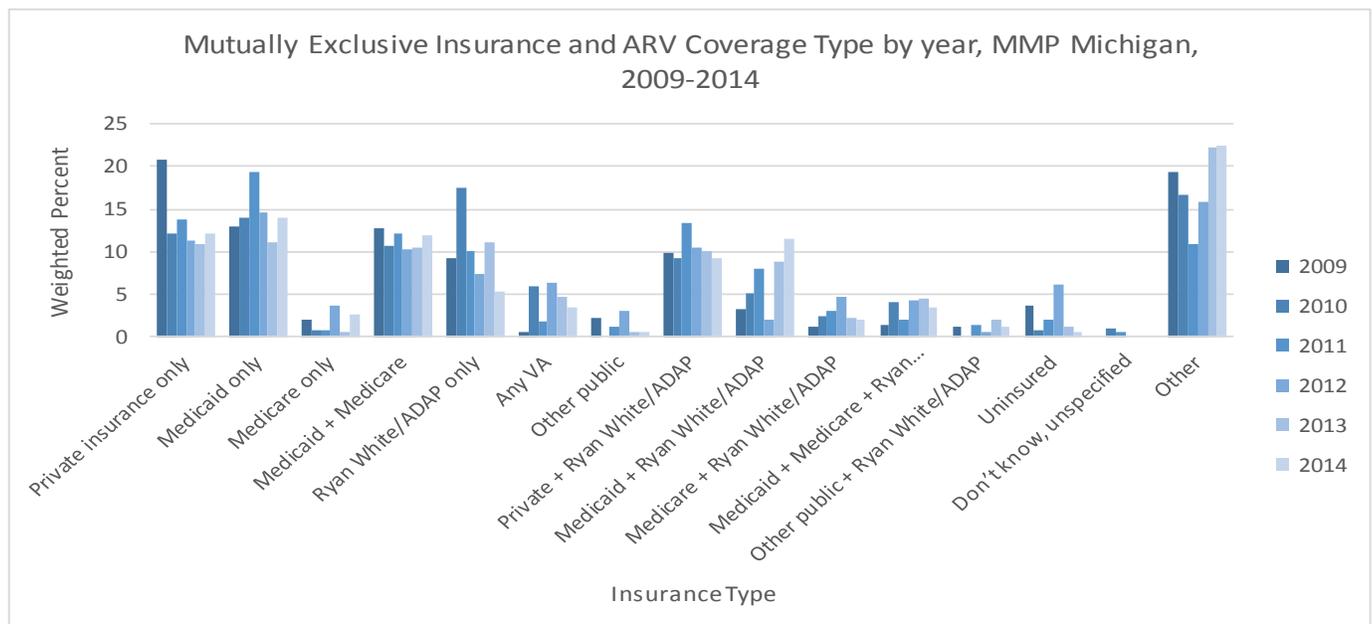
The amount of time that had elapsed since diagnosis, a proxy for length of infection, did not change among participants across MMP cycles (Figure 7). Approximately half of all participants in each cycle had been living with HIV infection for more than 10 years, with the other half almost evenly divided between the other two categories– diagnosed less than 5 years before the interview or diagnosed 5-9 years before the interview.

*Figure 7. Time Since Diagnosis by Year*
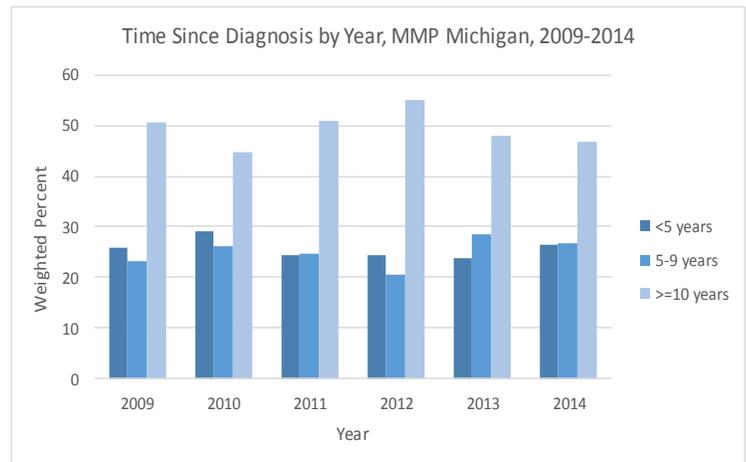
UNMET NEEDS: The MMP cycles of 2009-2014 saw a change in the economic environment experienced by the participants. Since data collection for a particular cycle starts in May/June of the cycle year and continues into May of the following year, and questions reflect a time period including the preceding 12 months, a particular cycle year can reflect the economic situation of the previous year. The most recent economic recession started in December 2007 and ended in June 2009.[9] During this time period, the unemployment rate in Michigan was 7.3% in December 2007 and peaked at 14.9% in June 2009.[10] By January 2014, the unemployment rate had dropped to 7.9% and continued to drop to 6.2% by December 2014. The economic downturn during the 2009-2014 MMP cycle years is reflected in statistically significant increases in the utilization of services designed to bridge the gap in service needs of HIV-infected patients.

A statistically significant increase in the percentage of participants who received dental care from assistance programs was noted over the years examined (Figure 8). Dental care included both prevention (e.g., cleaning) and treatment. In 2009, 49% of MMP participants received dental care from assistance programs. By 2011 (reflecting a 2010 economy), 60% of participants received dental care. Utilization of dental services stayed constant with 60% of participants receiving dental services through 2014.

Figure 8. Utilization of Dental Services by Year
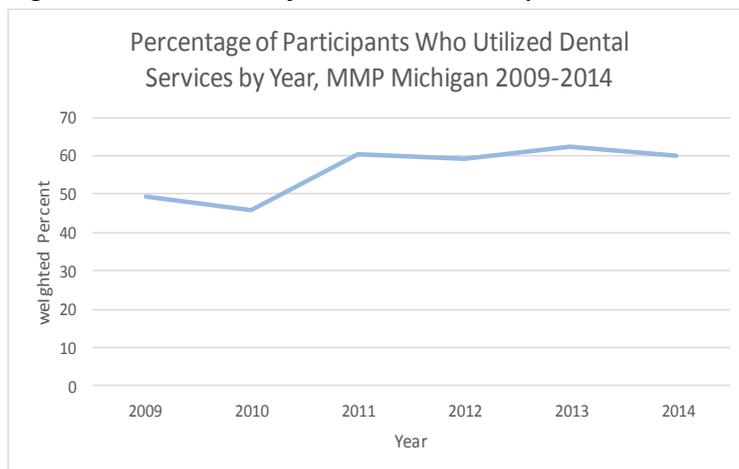
During the same time period, unmet need for dental services (meaning that patients needed dental services but were not able to receive them) did not change. This implies that the assistance programs were able to accommodate the increase in need for dental services.

The need for meal or food services significantly decreased during the 2009-2014 MMP cycles. Meal or food services included soup kitchens, food pantries, food banks, church dinners, or food delivery services. In the 2009 MMP cycle, about 35% of participants responded 'yes' when questioned whether they had gotten meal or food services in the preceding 12 months (Figure 9). By 2014, the percentage had dropped to approximately 18%. It is clear that this decrease in participants receiving meals and food services was not due to the lack of availability of such services since during the same time period; there was a significant increase in the percent of participants who answered 'yes' when asked whether they did not need and did not receive meals and food services (Figure 10). There was no change in the need or unmet need for meals or food services.

Surprisingly, the need and utilization of transportation services did not change across MMP cycles. Multiple variables looking at the use and need for transportation services were analyzed, and they all consistently showed no change. Specifically, the percentage of participants receiving, needing, and needing but not receiving transportation services were analyzed and no statistically significant changes were found (not shown).

Figure 9. Meals and Food Services by Year

Percentage of Particpants Who Received Meals or Food Services by Year, MMP Michigan 2009-2014

Figure 10. Meals and Food Services Not Needed and Not Received by Year

Percentage of Particpants Who Did Not Need and Did Not Receive Meals or Food Services by Year, MMP Michigan 2009-2014

HEALTHCARE: Several aspects of HIV care among participants changed significantly during the 2009-2014 MMP cycles. STD testing among MMP participants increased significantly between 2009 and 2014.
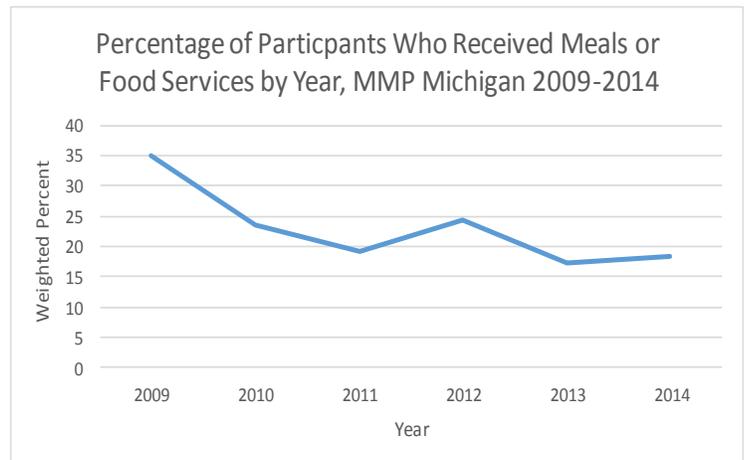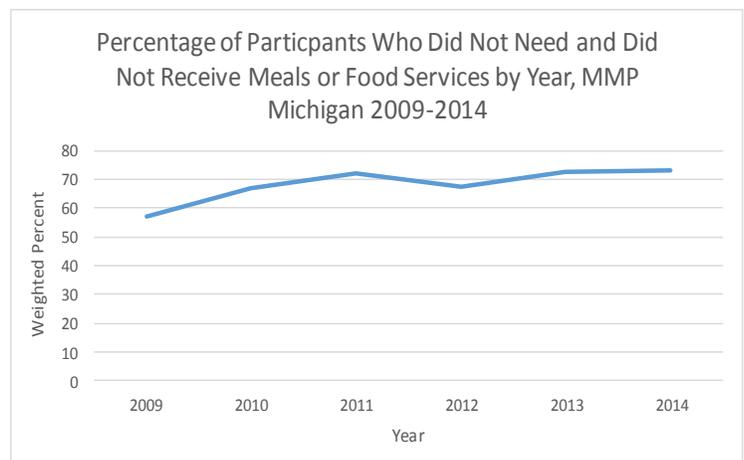
CDC's guidelines recommend STD testing among sexually active HIV positive patients at least annually. There was a significant increase in STD testing among all MMP participants (Figure 11), as well as just the self-reported sexually active participants (not shown). In 2009, approximately 11% of all MMP participants in Michigan received a test for gonorrhea, chlamydia, and syphilis and that number increased to 32% in 2014.

The number of participants who were currently receiving antiretroviral treatment (ART) also increased significantly between 2009 and 2014 (Figure 12). In 2009, approximately 86% of MMP participants were currently taking ART. This number increased to almost 94% in 2014. During the same time period, the percentage of participants whose every viral load tests in the previous 12 months had undetectable result also increased. In 2009 almost 58% of MMP participants had consistently undetectable viral load tests in the previous 12 months. This number rose to almost 78% in 2014 (Figure 13). During this same time period, the percentage of participants who had only one viral load test every six months significantly decreased from almost 69% in 2009 to just under 62% in 2014 (not shown). All together, these findings seem to portray an HIV positive population in Michigan who is increasingly in care who are largely on ART and that enjoys consistently undetectable viral loads and thus no longer requires biannual viral load tests.
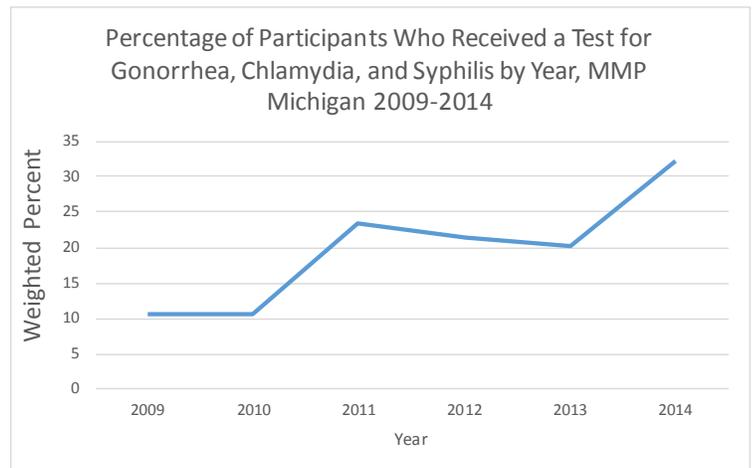
Figure 11. STD Testing by Year

Percentage of Participants Who Received a Test for Gonorrhea, Chlamydia, and Syphilis by Year, MMP Michigan 2009-2014

Figure 12. Currently Taking ART by Year

Percentage of Participants Currently Receiving Antiretroviral Treatment by Year, MMP Michigan 2009-2014
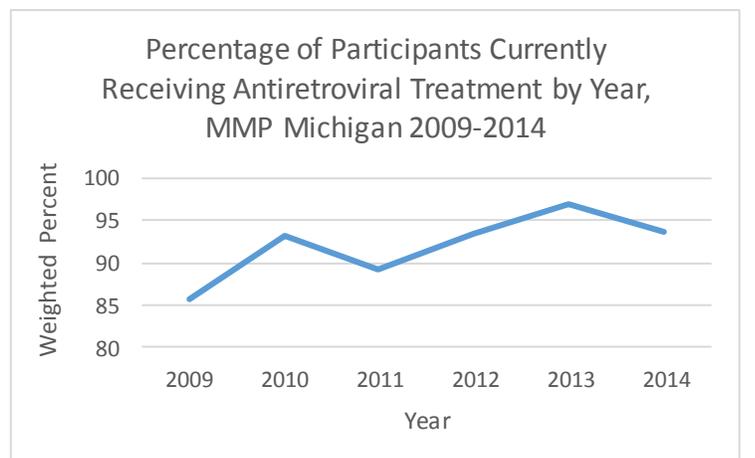
Figure 13. Viral Load Test Results by Year

Percentage of Participants Who Had All Viral Loads in the Previous 12 Months Undetectable, MMP Michigan, 2009-2014
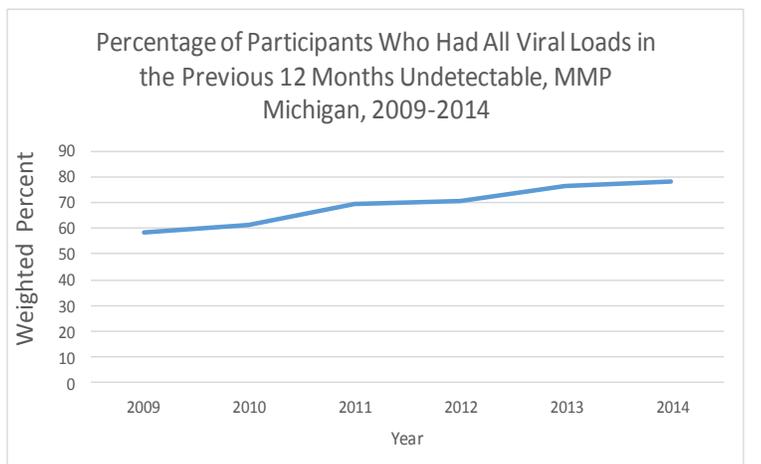
CONCLUSIONS: The MMP population between the years 2009 and 2014 closely resembled the general Michigan population of residents living with HIV. Specifically, sex and race proportions were consistently comparable.[11] Proportions of age groups differed somewhat, with the biggest difference occurring in the 40-49 year age group. The MMP population had 33% in the 40-49 year age group, while the prevalent Michigan HIV cases population has 24% in the same age group. This difference most likely reflects that older individuals living with HIV are more likely to be in care than younger individuals, independent of how long they have been infected.

Routine HIV surveillance does not collect education or income level on HIV-positive cases, therefore it is not possible to compare the MMP population to the HIV-positive Michigan population. However, MMP participants had comparable educational attainment to the general Michigan population. About 84% of Michigan MMP participants had at least a high school diploma or equivalent or higher, while almost 90% the general Michigan population had at least a high school diploma or equivalent or higher.[12] Part of the difference seen in education attainment between the MMP population and general Michigan population can be attributed to the fact that the MMP population includes individuals 18-24 years old, while the Census statistics exclude individuals less than 25 years of age for this particular measure[13] and therefore the younger age group assessed by MMP have not had the time to complete certain educational achievements. In the general Michigan population, the percentage of the 18-64 year old population with an income below the federal poverty level (FPL) ranged between 15.4 and 16.9% between 2009 and 2014.[13] This is very different from the MMP population, where the percentage of participants with an income <100% of the FPL ranged from a low of 39% to a high of 50%. The disparity in income between HIV positive individuals and the general population is not unexpected and the relationship between poverty and HIV transmission has been noted and described in other studies.[14]

The distribution for each category of 'time since diagnosis' for each year between 2009 and 2014 for MMP participants was similar to the same distribution in the general Michigan population of residents living with HIV (data not shown).

Utilization of assistance programs and services seem to have followed the economic trends experienced in Michigan for some programs, namely dental assistance. There was no change in the need for transportation services or their use during the MMP cycle periods.

Several notable improvements in healthcare access were observed across the trend period, specifically increased STD testing, increased ART use, and increased viral suppression.

References

1. http://www.cdc.gov/hiv/statistics/systems/mmp/index.html

2. McNaghten A, Wolfe M, Onorato I, et al. Improving the representativeness of behavioral and clinical surveillance for persons with HIV in the United States: the rationale for developing a population-based approach. *PLoS One.* 2007;2(6):7.

3. Blair J, McNaghten A, Beer L, et al. Clinical and Behavorial Characteristics of Adults Receiving Medical Care for HIV Infection, Medical Monitoring Project, 2005 Pilot Data Collection Cycle. HIV Special Surveillance Report 6; 2010. Available at http://www.cdc.gov/hiv/pdf/statistics_2005_mmp_no6.pdf [Accessed June 3, 2013.]

4. Blair J, McNaghten A, Frazier E, Skarbinski J, Huang P, Heffelfinger J. Clinical and behavioral characteristics of adults receiving medical care for HIV infection—Medical Monitoring Project, United States, 2007. *MMWR Surveill Summ.* 2011;60(SS-11):1-20.

5. Frankel M, McNaghten A, Shapiro M, et al. A probability sample for monitoring the HIV-infected population in care in the U.S. and in selected states. *Open AIDS J.* 2012; 6(suppl 1):67-76. doi:10.2174/1874613601206010067.

6. The American Association for Public Opinion Research. 2011. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 7th edition*. AAPOR.

7. Heeringa, S.G., West, B.T., Berglund, P.A. (2010). *Applied Survey Data Analysis*. Chapman and Hall, London.

8. U.S. Federal Poverty Guidelines Used to Determine Financial Eligibility for Certain Federal Programs https://aspe.hhs.gov/poverty-guidelines

9. BLS Spotlight On Statistics The Recession of 2007–2009. https://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf

10. BLS Data Finder 0.8. https://beta.bls.gov/dataQuery

11. Annual Michigan HIV Surveillance Report, New Diagnoses and Prevalence, 2015 http://www.michigan.gov/documents/mdhhs/State_stats_july_2016_531698_7.pdf

12. Michigan QuickFacts, US Census Bureau. https://www.census.gov/quickfacts/table/PST045216/26

13. American FactFinder. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_09_1YR_S1701&prodType=table

14. Pellowski, J. A., Kalichman, S. C., Matthews, K. A., & Adler, N. (2013). A pandemic of the poor: social disadvantage and the U.S. HIV epidemic. The American Psychologist, 68(4), 197–209. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3700367/

Contact Information

Lansing - HIV Surveillance Office
333 S. Grand Ave., 3rd Floor
Lansing, MI 48913
517-335-8165

www.michigan.gov/hivstd

Southfield - HIV Surveillance Office
MDHHS - South Oakland Health Center
27725 Greenfield Rd, Office 57A
Southfield, MI 48076
248-424-7910