

# The Business Case for Racial Equity in Michigan: Technical Notes

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This document provides additional detail on original technical research conducted in support of “The Business Case for Racial Equity in Michigan,” published by the W. K. Kellogg Foundation and Altarum Institute in May 2015. Data and methods are summarized for three research efforts:

1. Estimating the economic burden of health disparities in Michigan;
2. Projecting to 2040 the share of Michigan’s population by age group and gender who are persons of color; and
3. Estimating the gap in average earnings at each age between non-Hispanic whites and persons of color in Michigan, and the economic impacts of closing the earnings gap.

## 1. Estimating the economic burden of health disparities in Michigan

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The estimation of the economic impact of health disparities on Michigan was conducted in three separate, but related economic analyses:

- Estimation of the direct medical costs;
- Value of lost productivity associated with health disparities; and
- Estimated costs of premature death.

We used data from the Medical Expenditure Panel Survey (MEPS) (Cohen et al. 1996/97; AHRQ 2009) for the years 2006-2009 to estimate the potential cost savings of eliminating health disparities for racial and ethnic minorities. We divided the sample into 14 cohorts based on gender and seven age groups: 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, and 75 and over. Within each cohort, we computed the prevalence for several health conditions for four mutually exclusive racial/ethnic groups: African Americans, Asians, Hispanics, and whites. Hispanics are persons of Hispanic origins regardless of race. The other racial groups include only non-Hispanics.

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The health status and health conditions measures were:

- Self-reported general health status (ranging from excellent to poor)
- Self-reported mental health status (ranging from excellent to poor)
- Presence of a functional limitation
- Body mass index (BMI)/obesity measure
- Presence of chronic conditions (diabetes, asthma, asthma attack, high blood pressure, heart attack, angina, other heart disease, stroke, emphysema, joint pain, or arthritis).

We computed these values for Michigan and the Midwest Census Region. The MEPS data contain sufficient numbers of African American and white respondents to compute prevalence rates for Michigan. However, there are insufficient numbers of Asian and Hispanic respondents in the data from Michigan; therefore, we used prevalence rates for the Midwest as proxies for these groups.

We determined which racial/ethnic group had the best health outcomes within each age/gender cohort for each health status/condition. In most cases, it was Asians, but in a few cases whites and Hispanics had the best health profile within a given age/gender group. We estimated the impact of these health conditions on health care expenditures, days off work because of the health condition, annual hours off work because of the health condition, and reduced hourly wages because of the health condition. We then simulated the health care and labor market outcomes by assigning each minority group the best health profile, i.e., eliminating disparities in health in the corresponding age/gender cohort. We computed the costs of disparities as the difference between the predicted outcomes with the actual health conditions and predicted outcomes with the simulated health conditions.

We used econometric models developed for prior studies to simulate direct health care costs and labor market productivity (LaVeist, Gaskin and Richard 2011; Gaskin, LaVeist and Richard 2012).

Using 2009 data, we developed a model to estimate health care expenditures for each racial/ethnic group (African American, Asian, Hispanic, and white). Total expenditures in MEPS include both out-of-pocket and third-party payments to health care providers, but do not include health insurance premiums. Expenditures for hospital-based services include inpatient, emergency room, outpatient (hospital, clinic, and office-based visits), prescription drugs, and other services (e.g., home health services, vision care services, dental care, ambulance services, and medical equipment). Prescription drug expenditures do not include over-the-counter purchases. We estimated health care spending as function of demographic, socioeconomic, geographic, and health status measures.

We used a two-part health care expenditure model (Manning et al 2001; Buntin and Zaslavsky 2004; Manning et al, 1987; Manning and Mullahy 1998a, 1998b, 2001). First, we used a logistic regression model to estimate the probability of having any type of health care expenditures. Second, we used generalized linear models to predict levels of expenditures for individuals with positive expenditures.

To compute the value of lost productivity, we developed three labor market models using the 2009 MEPS. We estimated the impact health status, disability and illness had on sick days, annual hours of work and wages for working age adults, ages 25-64. The model specifications depended upon the dependent variables. For missed days of work, we estimated the impact of health on the probability of missing a workday during the year, followed by generalized linear models to predict levels of days of work missed for individuals with positive days of work missed.

We used two-part models for hours worked and wages as well. The first part estimated the impact of health status on the probability that an adult is working. The second part estimated the impact of health on hours worked and hourly wages.



Combining the results from these different parts of the models, we computed the productivity costs associated with health disparities. We used a two-step estimator for labor supply to predict lost productivity due to health disparities, and adjusted the models by using an inverse mills ratio to account for potential selection bias (Greene 2005, Cameron and Trivedi 2008). The health expenditure and labor market models were estimated using the survey regression procedures in STATA 12, which appropriately incorporates the design factors and sample weights.

We used data from Michigan State Vital Statistics to compute the costs of premature death. Specifically, we obtained the number of deaths and crude death rates by age and race for 2012 (the data included seven age groups: under 1, 1-14, 15-24, 25-34, 35-44, 45-54, 55-64, and 65-74). We then estimated the number of deaths that would have occurred for each racial/ethnic group if every group's death rate were equal to that of the racial/ethnic group with the lowest death rate within the age/gender category. The difference between the actual number of deaths and the estimated deaths represents "excess deaths." For each age group, we computed number of years of life lost by subtracting its midpoint from 75, hence assuming that death prior to age 75 is premature. We valued each year of life lost at \$50,000 (Hirth et al. 2000). This figure is based on the standard value used in cost-effectiveness analysis for medical intervention. Given that recent studies have valued a quality-adjusted life year at \$95,000 to \$264,000 (Braithwaite et al. 2008), \$50,000 is a conservative estimate.

Final estimates of the economic burden of health disparities in Michigan are displayed in the table below.

**Direct Medical Care Costs, Loss of Productivity Costs and Costs of Premature Death Attributable to Health Disparities for the State of Michigan, 2009**

| (\$ billions)            | Blacks  | Hispanics | Total   |
|--------------------------|---------|-----------|---------|
| Direct Medical Costs     | \$ 1.96 | \$ 0.07   | \$ 2.03 |
| Productivity Costs       |         |           |         |
| Days                     | \$ 0.09 | \$ 0.01   | \$ 0.10 |
| Hours                    | \$ 0.68 | \$ 0.25   | \$ 0.93 |
| Wages                    | \$ 0.26 | \$ 0.10   | \$ 0.36 |
| Sub-total Indirect Costs | \$ 1.03 | \$ 0.36   | \$ 1.39 |
| Premature Death          | \$ 6.09 | \$ 0.39   | \$ 6.48 |
| Grand Total              | \$ 9.08 | \$ 0.82   | \$ 9.90 |

References for estimating the economic burden of health disparities in Michigan:

Agency for Healthcare Research and Quality Center for Financing, Access, and Cost Trends: Medical Expenditure Panel Survey Household Component, 2010. Table 4.a Total population and uninsured persons under age 65: Percent by selected population characteristics, United States, 2010. [http://meps.ahrq.gov/mepsweb/data\\_stats/summ\\_tables/hc/hlth\\_insr/2010/t4a\\_d10.htm](http://meps.ahrq.gov/mepsweb/data_stats/summ_tables/hc/hlth_insr/2010/t4a_d10.htm) accessed November 2012.

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Buntin MB, Zaslavsky AM. 2004. "Too Much Ado About Two-Part Models and Transformation? Comparing Methods of Modeling Medicare Expenditures." *Journal of Health Economics* 23: 525-542.

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Cohen JW, Monheit AC, Beaugard KM, et al. 1996/1997. "The Medical Expenditure Panel Survey: A National Health Information Resource." *Inquiry* 33: 373-389.



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Greene WH. 2005. *Econometric Analysis*. Upper Saddle River: NJ: Prentice Hall.

Hirth RA, Chernew ME, Miller E, et al. 2000. "Willingness to Pay for a Quality-Adjusted Life Year: In Search of a Standard." *Medical Decision Making* 20: 332–342.

LaVeist T, Gaskin D, Richard P. (2011). Estimating the economic burden of racial health disparities in the United States. *International Journal of Health Services*, 41(2), 231-238.

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Manning WG, Mullahy J. 2001. "Estimating Log Models: To Transform or Not to Transform?" *Journal of Health Economics* 20(4): 461-494.

Mullahy J. 1998. "Much ado about two: Reconsidering retransformation and the two-part model in health econometrics." *Journal of Health Economics* 17:241-281.

## 2. Projecting the share of Michigan's population by age and gender who are persons of color

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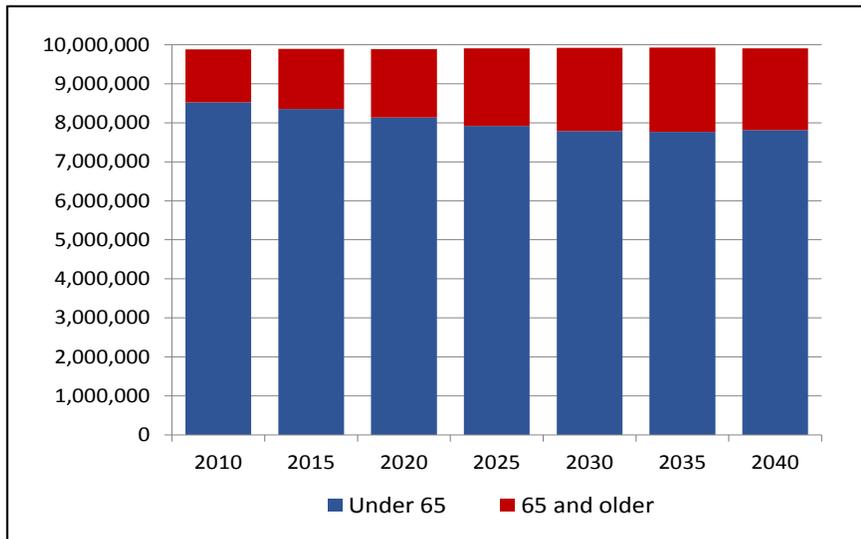
Projecting the economic impacts of current racial and ethnic disparities into the future required Michigan population projections by age, sex, and a measure of race/ethnicity. The U.S. Census Bureau no longer provides long term population projections at the state level. Most states develop their own projections, but they may not include the dimension of race/ethnicity.

The most detailed population projections available for Michigan were based on projections developed for the Michigan Department of Transportation by Dr. Donald R. Grimes and Dr. George A. Fulton of the Institute for Research on Labor, Employment, and the Economy at the University of Michigan in March 2012. The original projections were modified by the Michigan Department of Technology, Management, and Budget to be fully consistent with population counts from the 2010 Census and to reflect actual statewide survival patterns between the 2000 Census and the 2010 Census for the population age 65 and over. The modifications were based upon the 2010 Census, survival rates between the 2000 Census and the 2010 Census, estimates of relative mortality rates by age and sex developed by the U.S. Census Bureau, and calculations of the population turning 65 each year and county shares of state population derived from the projections developed for the Michigan Department of Transportation.



The projections show that Michigan’s population is expected to be stable over the next thirty years at just under 10 million people, but the proportion age 65 and older is growing (see figure), from about one in seven to about one in five people.

**Projected growth and aging of the Michigan population**



To project the proportion of the population by age and gender expected to be non-Hispanic white versus persons of color, the Altarum team first applied the 2012 American Community Survey (ACS) share of persons of color by individual age and gender for Michigan to the Census population data, then ‘aged’ the 2012 population for non-Hispanic whites and persons of color to 2020 and to 2040. We made birth projections for male and female non-Hispanic whites and persons of color for 2013–2040 by calculating a birth rate from the average of most recent three years of births (ages 0, 1, and 2 in 2012) and the number of females of child bearing age (18 – 34). We estimated births by applying these birth rates to the projected number of women of child bearing age in each future year.

We combined the “aged” 2012 population counts to estimated numbers of new births and collapsed the counts into the eleven age groups used in the Michigan population projections by age and sex. For each age group and gender combination, we computed the proportion of the population expected to be persons of color in 2012, 2020, and 2040, and applied these percentages to the projected population counts in each group. This method maintained total population projections by age and gender but added the dimension of race/ethnicity. Results are summarized in the table below.

**Michigan population projections by age group and measure of race/ethnicity**

|                      | Persons of Color |           |           | Non-Hispanic Whites |           |           | Total     |           |           |
|----------------------|------------------|-----------|-----------|---------------------|-----------|-----------|-----------|-----------|-----------|
|                      | 2012             | 2020      | 2040      | 2012                | 2020      | 2040      | 2012      | 2020      | 2040      |
| Children (0-18)      | 731,000          | 742,800   | 819,100   | 1,571,800           | 1,445,300 | 1,331,400 | 2,302,900 | 2,188,000 | 2,150,500 |
| Working age (18-64)  | 1,413,800        | 1,512,600 | 1,750,300 | 4,742,600           | 4,436,300 | 3,911,000 | 6,156,400 | 5,948,900 | 5,661,300 |
| Retirement age (65+) | 196,200          | 276,100   | 441,000   | 1,223,500           | 1,475,200 | 1,653,800 | 1,419,800 | 1,751,400 | 2,094,800 |
| All Ages             | 2,343,012        | 2,533,520 | 3,012,440 | 7,539,912           | 7,358,820 | 6,898,240 | 9,881,112 | 9,890,320 | 9,908,640 |



### 3. Estimating the economic impact of closing the earnings gap for persons of color

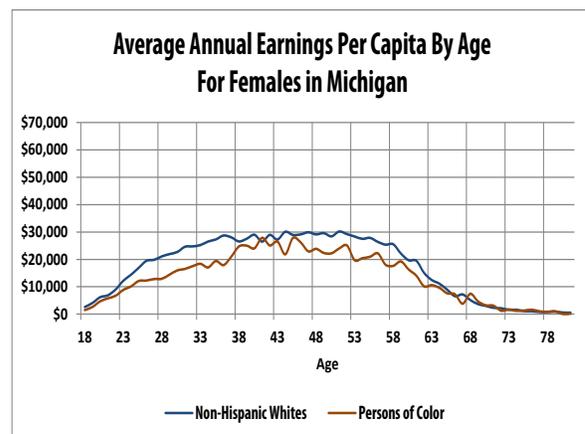
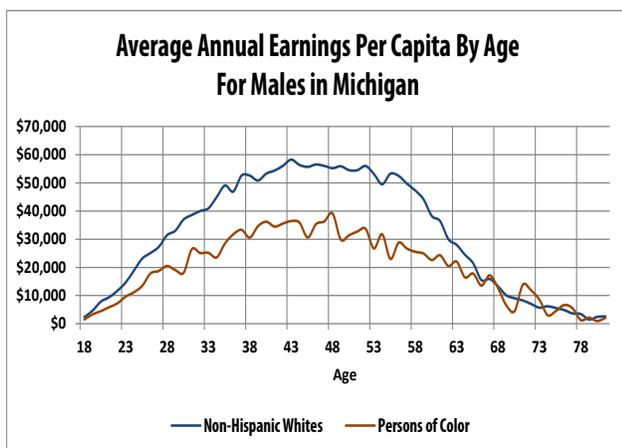
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Differences in average earnings are a good summary measure of the economic impact of inequities because earnings potential depends on so many areas where there are disparities, including health, education, employment opportunities, and rates of incarceration.

To examine differences in earnings between non-Hispanic whites and persons of color in Michigan, we analyzed four years of data (2009-2012) from the U.S. Census Bureau’s American Community Survey (ACS) 1% samples of the US population. We filtered these 1% samples to identify only Michigan records, and inflated the four-year average to represent earnings in 2012 dollars. We divided the sample into two categories: non-Hispanic whites and all others (which we refer to as persons of color).

To compute average earnings by age and sex, we first computed the population sizes by age and sex. These population counts included everyone, regardless of whether they had any earnings and whether they were institutionalized (e.g., incarcerated). Next we added up all earnings, by age and sex, including wages, salaries, and self-employment income. Average earnings were then computed as the ratio of total earnings to total population for each age-sex combination, for non-Hispanic whites and persons of color.

Average earnings by age are plotted below for males and females. The same scale is used to ease comparisons between the charts. The earnings gap for males is larger than for females. Between ages 40 and 60, the male gap averages about \$21,000, more than four times the female gap, which averages about \$5,000. The male gap represents an earnings advantage of 69% for non-Hispanic whites within this age group. For females, the advantage is about 22%. Looked at another way, earnings for persons of color are 33% below those of non-Hispanic whites after adjusting for age and sex. For males, this figure is 41% and for females it is 18%. Eliminating the top 1% of earners from the analysis does not materially change these figures.



Summing across all ages, if age-sex specific earnings for persons of color were raised to that of non-Hispanic whites, total earnings in Michigan would have been 7.5% higher in 2012, representing \$16.2 billion. In 2012, persons of color represented 23% of the working age population, defined here as ages 18 to 64. According to our Michigan-specific population projections described in the previous section of these Technical Notes, this figure will rise to 25% by 2020 and 31% by 2040. By 2020, closing the earnings gap for the growing share of the population that are persons of color would represent 8.1% higher earnings in the Michigan economy, and by 2040 this figure would rise to 10.1%.



The difference in earnings represents both differences in pay among those employed and differences in unemployment and incarceration rates. Indicators reported in the National Equity Atlas produced by PolicyLink and the University of Southern California Program for Environmental and Regional Equity show a similar earnings gap for Michigan, and their analysis indicates that about two-thirds of the gap in Michigan and in the nation is associated with differences in employment, while one-third is associated with differences in wages.

With higher earnings, a proportional increase in income, property, sales, and other taxes paid would increase state tax revenues by \$1.9 billion and local tax revenues by \$900 million in 2012. By 2020, combined tax revenues would be over \$4 billion higher and by 2040, over \$11 billion higher.

If we assume that the elevation in earnings is accomplished through higher levels of productivity achieved through improvements in factors such as education, health, and reduced incarceration, the higher earnings reflect increased economic output and, therefore, proportionally higher state gross domestic product (GDP). Elimination of the earnings gap in 2012 would have raised GDP by \$31 billion. By 2020, GDP would be \$48 billion higher, and by 2040, closing the earnings gap through increased productivity would raise Michigan's GDP by \$126 billion.

In addition to increased tax revenues, higher earnings will reduce the need for public spending on safety net programs. We estimated the reduction in Medicaid and public assistance expenditures associated with closing the earnings gap using a method similar to the earnings gap analysis. We identified rates of use of Medicaid and public assistance by age and sex for non-Hispanic whites and persons of color from the 2009-2012 ACS data. Bringing the rates for persons of color to the white rates of use at each age would decrease Medicaid use by about 20% and use of public assistance by 38%. Combined, closing the earnings gap and thereby closing the gap in use of Medicaid and public assistance would reduce use of these services by 26% as of 2012.

Michigan spending on Medicaid in 2012 was reported at \$12.3 billion and public assistance spending was about \$600 million, for a total of \$12.9 billion (National Association of State Budget Offices, 2013). Reducing these expenditures by 26% would represent a savings of \$2.7 billion in government expenditures. We would expect the potential savings from reduced safety net spending due to closing the earnings gap to grow as the share of people of color grows in Michigan. Assuming an increase in the impact proportional to the increase in the estimated impact of closing the gap on earnings produced estimates of a 28% reduction in this spending by 2020 (\$4 billion) and a 35% reduction by 2040 (\$7 billion).

**Impacts of Eliminating Earnings Gap in Michigan: 2012, 2020, and 2040**

| (\$billions)                   | With Gaps  | Gaps Eliminated | Dollar Impact | Percent Impact |
|--------------------------------|------------|-----------------|---------------|----------------|
| <b>2012</b>                    |            |                 |               |                |
| GDP                            | \$ 416.8   | \$ 447.9        | \$ 31.2       | 7.5%           |
| Earnings                       | \$ 216.2   | \$ 232.4        | \$ 16.2       | 7.5%           |
| State tax revenues             | \$ 25.0    | \$ 26.9         | \$ 1.9        | 7.5%           |
| Local tax revenues             | \$ 12.5    | \$ 13.4         | \$ 0.9        | 7.5%           |
| Medicaid and Public Assistance | \$ 12.9    | \$ 10.2         | \$ (2.7)      | -26%           |
| <b>2020</b>                    |            |                 |               |                |
| GDP                            | \$ 593.6   | \$ 641.6        | \$ 48.0       | 8.1%           |
| Earnings                       | \$ 307.9   | \$ 332.9        | \$ 24.9       | 8.1%           |
| State tax revenues             | \$ 35.6    | \$ 38.5         | \$ 2.9        | 8.1%           |
| Local tax revenues             | \$ 17.8    | \$ 19.2         | \$ 1.4        | 8.1%           |
| Medicaid and Public Assistance | \$ 18.4    | \$ 14.3         | \$ (4.1)      | -28%           |
| <b>2040</b>                    |            |                 |               |                |
| GDP                            | \$ 1,248.3 | \$ 1,374.2      | \$ 126.0      | 10.1%          |
| Earnings                       | \$ 647.6   | \$ 712.9        | \$ 65.3       | 10.1%          |
| State tax revenues             | \$ 74.9    | \$ 82.5         | \$ 7.6        | 10.1%          |
| Local tax revenues             | \$ 37.4    | \$ 41.2         | \$ 3.8        | 10.1%          |
| Medicaid and Public Assistance | \$ 26.2    | \$ 19.4         | \$ (6.9)      | -35%           |



This study focuses on the economic benefits associated with eliminating the earnings gaps between non-Hispanic whites and persons of color. It does not address the question of how this would be accomplished nor the associated investments that would be required. However, the huge potential benefits shown serve a useful purpose in terms of justifying substantial investments in programs that have been shown to be effective in reducing the gaps.

It is also important to recognize that the estimates in this study represent a hypothetical upper bound and leave many questions unanswered. An example concerns the degree to which earnings gaps are due to unequal pay for equal productivity. Elimination of this portion of the gap would improve equity but would not impact real GDP. Another question is the extent to which the economy can accommodate a significant increase in the average skill level of the workforce. Might some portion of the more highly trained persons of color simply represent increased competition for high paying jobs, thus producing winners and losers? While there may be some winners and losers, it is worth noting that the economy has been evolving in the direction of needing a more highly skilled workforce, and studies project that Michigan employers will require a workforce with more education than the current working age population (Carnevale et al; 2013). Thus the predominant impact of a more highly skilled workforce achieved through increasing opportunity and reducing disparities should be an increase in real GDP and the number of high-paying jobs.

References for estimating the economic impact of closing the earnings gap for persons of color in Michigan:

Carnevale A, Smith N, Strohl J. Recovery: Job Growth and Education Requirements Through 2020. Washington, DC: Georgetown University, Georgetown Public Policy Institute, Center on Education and the Workforce; June 2013.

National Association of State Budget Offices. State Expenditure Report: Examining Fiscal 2012–2013 State Spending. Washington, DC: National Association of State Budget Offices; 2013.

National Equity Atlas, PolicyLink and the University of Southern California Program for Environmental and Regional Equity, accessed April 2015 at <http://nationalequityatlas.org/indicators>.