

The State of Health Equity in Pennsylvania

**Office of Health
Equity**

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pennsylvania
DEPARTMENT OF HEALTH

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Message from the Secretary of Health

Living healthy and the opportunity to do so where you live, is a fundamental human right. The health of our communities is reflected not just in disease prevalence, but in our economic development, educational growth and overall stability.

Health equity is the bedrock of good public health. **Health equity** means that every resident can live healthy no matter their race, location, education or income level.

In order to better understand health equity in Pennsylvania, we need to illuminate health inequities and highlight the social determinants of health that drive these preventable gaps. By establishing where these gaps exist, we can begin to help all residents achieve their optimal health outcomes ... the impact of which will be felt in every community.

There is no greater responsibility than ensuring our fellow citizens are safe and healthy. Please join us as we work to embody a state that ensures every citizen has the same opportunity to live a healthy life, regardless of their race, ethnicity, gender, sexual orientation, gender identity and expression, religion, geographic location or ability. As Martin Luther King Jr. said many years ago, "Of all the forms of inequality, injustice in health care is the most shocking and inhumane."

Sincerely,



Rachel Levine, MD
Secretary of Health

Message from the Deputy for Health Promotion and Disease Prevention

Health equity is the bedrock of public health. Our task is to help those who are in need achieve optimal health, no matter one's race, color, creed, religion, physical and/or mental ability, sexual orientation, sexual identity, sexual preference or any difference that may exist.

The State of Health Equity in Pennsylvania Report provides a snapshot, a glimpse at a moment in time, of the health landscape for all Pennsylvanians, specifically as it relates to the social determinants of health. Beyond one's genetic code, the factors within someone's zip code can impact the health of individuals and populations.

In the introduction to this report, you will learn more about the social determinants of health. Please use this information to learn more about where the most help is needed to improve health across the commonwealth. As a department, we look forward to partnering with individuals, organizations, clinics, hospitals and communities as we continue our mission to promote healthy lifestyles, prevent injury and disease and assure the safe delivery of quality health care for all commonwealth citizens.

Sincerely,

A handwritten signature in black ink, appearing to read 'Loren Robinson', written in a cursive style.

Loren Robinson, MD, MSHP, FAAP
Deputy Secretary for Health Promotion and Disease Prevention

Message from Director Office of Health Equity

We have seen significant change to the health landscape both nationally and within Pennsylvania. Within the commonwealth, we continue to grapple with the opioid epidemic, Lyme disease and other afflictions.

Amid an ever-changing political landscape, health disparities persist throughout Pennsylvania and the nation. For many years, residents in rural and urban areas across the state have been dying prematurely and living with a poor quality of life due to social, economic and environmental factors (social determinants of health).

This State of Health Equity in Pennsylvania Report will reveal the ways in which a myriad of factors contributes to the superior health outcomes of some communities and poor health outcomes suffered by others. The mechanisms through which housing, education, transportation, poverty and recreation influence health will be examined. The critical role of the environments in which we live, learn, work and play will be highlighted to show their impact on life expectancy.

This report is intended to be a clarion call to those who aspire for Pennsylvania to be something to be proud of; a state in which everyone has the same right to achieve the highest level of health and quality of life. Increasing health equity and reducing health disparities will not be easy, but nothing worthwhile and lasting ever is. We hope this report will be a catalyst for change, dialogue and most of all action.

With much appreciation to everyone who helped make this report a reality!



David Saunders
Director, Office of Health Equity

Executive Summary: Health Equity, Health Disparities and Social Determinants of Health

The Commonwealth of Pennsylvania is the fifth most populous state in America with 12.8 million residents. Within our boundaries, there are major metropolitan areas like Philadelphia and Pittsburgh and extreme rural areas like Elk and Forest counties. In many parts of the state, the citizens thrive – children attend good schools; parents have good paying jobs; the air, water and land are clean; crime is rarely seen and residents live a long, quality life. However, there are other areas in Pennsylvania where residents are more vulnerable. These residents' health is at risk because they don't have the same access to health care, education, jobs, clean environment and safety. Given Pennsylvania's unique geography and population distribution, this reality affects many: urban and rural populations; racial and ethnic minorities; gender and sexual minorities; the young and old and many more.

The goal of *The State of Health Equity in Pennsylvania Report* is to illuminate these common threads outside of the health care setting that determine the quality of one's health.

What is Health Equity?

Many organizations have provided different definitions for the term "health equity."

- **The American Public Health Association** defines health equity as everyone having the opportunity to attain their highest level of health.
- The **Center for Disease Control and Prevention (CDC)** says that health equity is achieved when every person has the opportunity to "attain his or her full health potential" and no one is "disadvantaged from achieving this potential because of social position or other socially determined circumstances."
- **Robert Wood Johnson Foundation (RWJF)** provides the following definition: "Health equity means that everyone has a fair and just opportunity to be healthier. This requires removing obstacles to health such as poverty, discrimination and their consequences, including powerlessness and lack of access to good jobs with fair pay, quality education and housing, safe environments and health care."

Health equity, in its simplest terms, involves providing every person, regardless of location, religion, race, ethnicity, sexual orientation or gender identity and expression, the same opportunity to live their healthiest life and reach their full potential.

It is important to note that equity is not the same as equality. To "level the playing field," those with worse health and fewer resources need more efforts expended to improve their health and systematic barriers to be removed. This also means that those with more resources may have their resources re-allocated to improve the conditions for those with less.

What are health disparities?

A lack of health equity contributes to health disparities. Health disparities happen when some communities have better health outcomes than others. They are preventable differences in health outcomes in one population that are worse compared to others. In Pennsylvania, we know there are significant health disparities because:

- Approximately 1.7 million Pennsylvanians, or 14 percent, experienced food insecurity in 2015;
- Blacks/African Americans and Hispanics/Latinos made about \$15,000 to \$18,000, respectively, less than whites in 2016;
- Pennsylvanians living in rural areas have limited access to health care oftentimes because they don't have transportation to get to a doctor who may be 20-30 miles away;
- Based on 2012-2016 data, blacks/African Americans had a death rate from heart disease nearly 21 percent higher than white Pennsylvanians (213.6 versus 177.1 per 100,000 people);
- LGBTQ teens are significantly more likely to experience bullying and sexual violence than their heterosexual peers; two in five LGBTQ teens experience bullying compared to one in five heterosexual teens; and
- The black/African American community accounts for a disproportionate number of homicides and suicides in Pennsylvania.

What are the Social Determinants of Health?

Health disparities arise when people do not have the same opportunity to attain their highest level of health. Health equity exists when social determinants of health, or the factors that affect where people live, learn, work and play, are favorable for all citizens. The choices people make, such as whether they smoke or eat a healthy diet, are dictated by what resources are available to them, what they can afford and how they are marketed. The chances of living a fruitful life are mostly predicted by the social conditions under which people live.

Social determinants of health include:

- Socioeconomic status;
- Education;
- Racism and discrimination;
- Food security and nutrition;
- Housing;
- Built environment;
- Access to health care;
- Environmental hazards; and
- Safety.

Reaching our full potential

Multiple factors need to be addressed for **all** Pennsylvanians to reach their full health potential. The unfair and avoidable differences seen in health status across the state make it important to highlight and analyze the available health-related data to develop strategic plans to address these inequalities. In addition to the health data, underlying social, economic and environmental information was analyzed because these conditions contribute to the health and inequities for Pennsylvanians and their

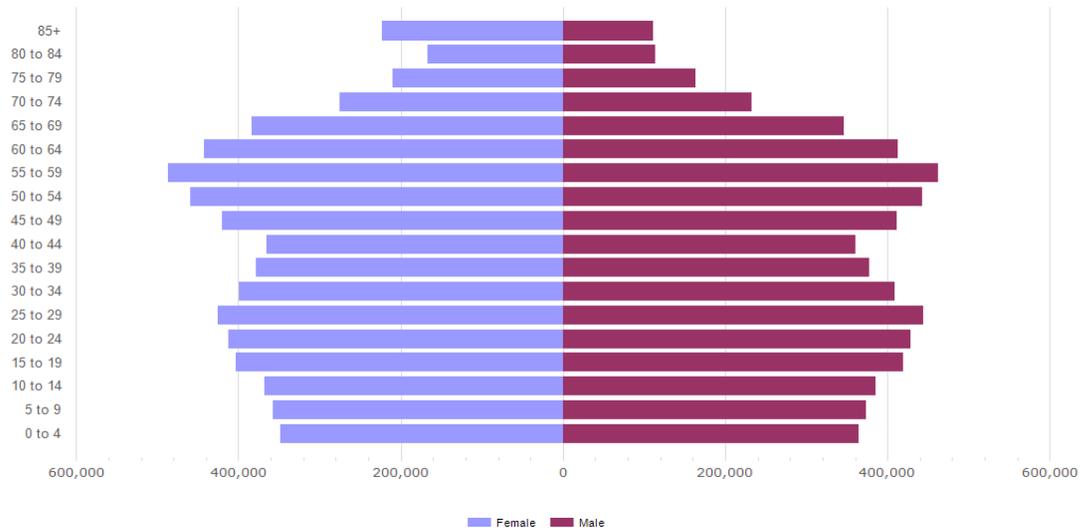
communities. The information provided in this report serves as a benchmark to inform current strategic plans with an overall goal of eliminating these issues from Pennsylvania completely. Key recommendations include:

- Provide commonwealth-wide leadership to advance health equity;
- Formalize and maintain community relationships and mutual partnerships to advance health equity across existing and emerging communities;
- Invest in the collection, analysis, meaningful use, secure sharing and accessible translation of data to advance health equity;
- Continuously raise awareness of existing and emerging health disparities;
- Address and remediate structural inequities that have resulted from discriminatory policies and practices;
- Improve living conditions where people live, learn, work and play;
- Advance health equity across sectors;
- Establish the Office of Health Equity by statute; and
- Expand current health equity initiatives.

Who Are Pennsylvanians and Where Do They Live?

Pennsylvania’s Enterprise Data Dissemination Informatics Exchange (EDDIE) reports the commonwealth has a population of 12,784,227 who reside on 44,743 square miles of land. Across Pennsylvania the population is aging, as illustrated by Figure 1. Twenty-two percent of Pennsylvanians are over the age of 60. Pennsylvania’s fertility rate, like much of America, is dropping, further contributing to the commonwealth’s aging population.

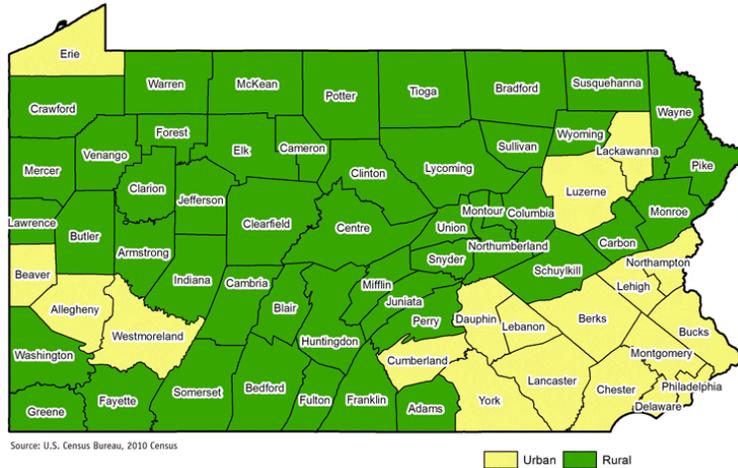
Figure 1. Population Age Distribution, Pennsylvania, 2016 Estimates.



Source: Enterprise Data Dissemination Informatics Exchange (EDDIE). Data adopted from U.S. Bureau of Census for 1990, 2000 and 2010 and Pennsylvania State Data Center at Penn State Harrisburg for non-census years.

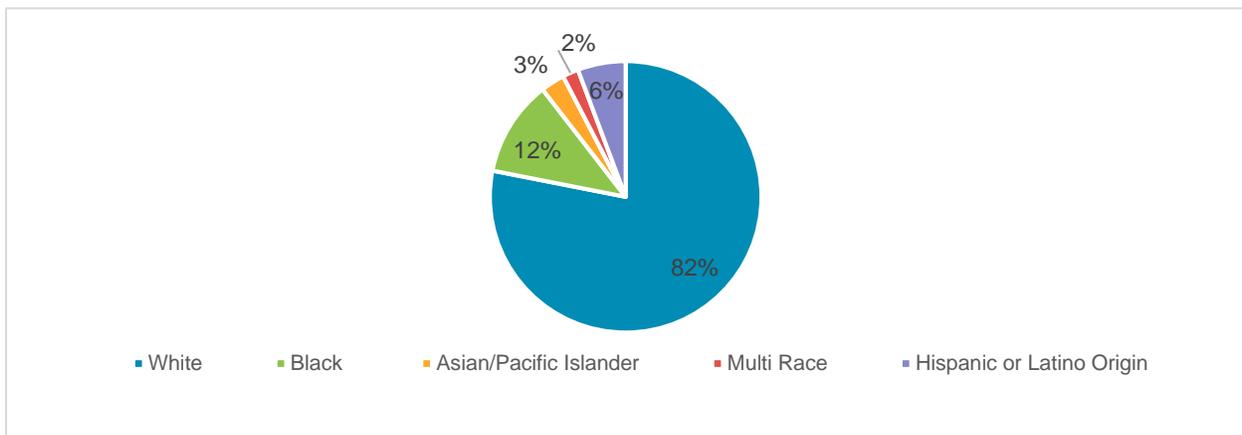
Pennsylvania also has a large rural population represented by 48 rural counties (of the state’s total 67 counties), which are home to almost a third of the state’s residents. The remainder live within the 19 urban counties (Figure 2).¹

Figure 2. Rural and Urban Counties, Pennsylvania, 2010



Most of Pennsylvania’s population is white, not Hispanic or Latino (Figure 3) and yet blacks/African Americans are experiencing worse health outcomes, have lower life expectancy and are dying at higher rates, including both infant and maternal mortality, as compared to the white population (Table 1).

Figure 3. Racial and Ethnic Makeup, Pennsylvania, 2017



Source: US Census Quick Facts, 2017.

Table 1. Birth and Death Rates by Race, Pennsylvania, 2016

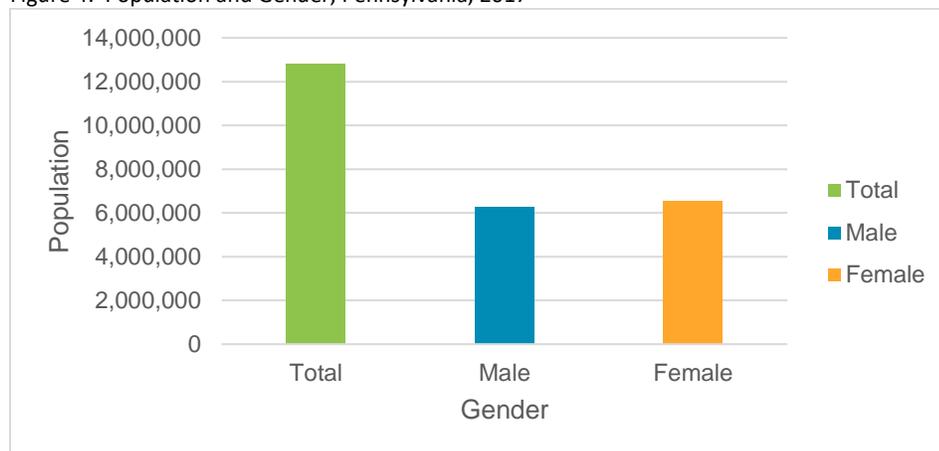
	Number of Live Births	Population	Crude/Age-Specific Birth Rate (per 100,000 population)
<i>All Races</i>	139,356	6,523,033	21.4
<i>White</i>	97,939	5,359,724	18.3
<i>Black/African American</i>	19,033	778,468	24.4
<i>Asian/Pacific Islander</i>	6,467	234,754	27.5
<i>Multi-Race</i>	4,410	127,120	34.7
<i>Hispanic Origin</i>	15,323	441,507	34.7
	Number of Deaths	Population	Age-Adjusted Death Rate (per 100,000 population)
<i>All Races</i>	132,724	12,784,227	768.4
<i>White</i>	116,528	10,531,113	748.6

	Number of Infant Deaths	Number of Live Births	Age-Adjusted Infant Death Rate (per 1,000 live births)
<i>Black/African American</i>	12,656	1,505,204	932.8
<i>Asian/Pacific Islander</i>	976	451,917	323.4
<i>Multi-Race</i>	429	249,223	466.2
<i>Hispanic Origin</i>	2,583	900,814	546.7
<i>All Races</i>	856	139,356	6.1
<i>White</i>	447	97,939	4.6
<i>Black/African American</i>	277	19,033	14.6
<i>Asian/Pacific Islander</i>	15	6,467	2.3
<i>Hispanic Origin</i>	114	15,323	7.4

Source: PA Vital Statistics, 2016

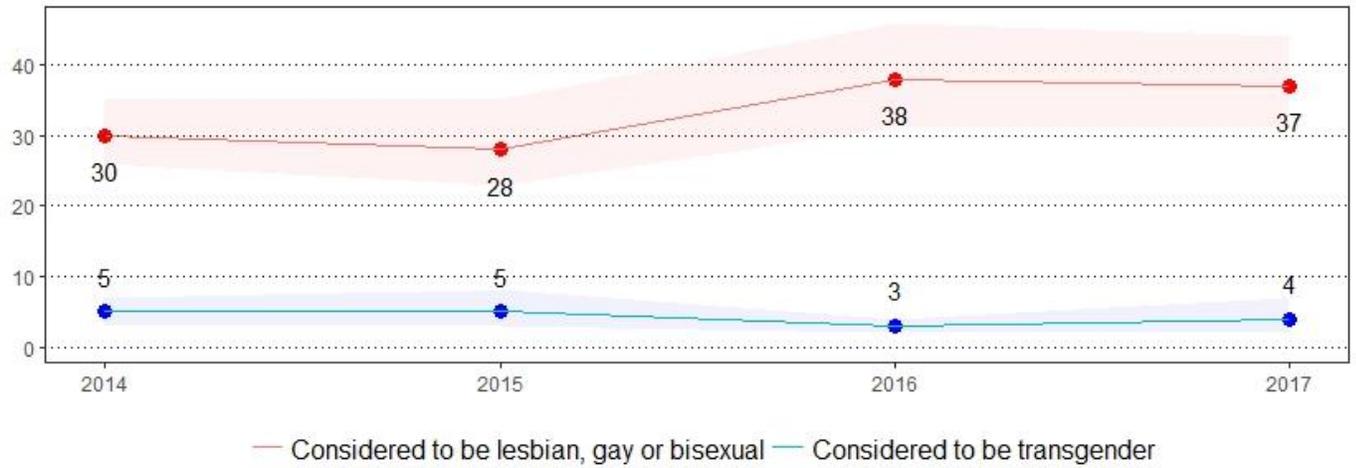
Pennsylvania’s population is made up of nearly 48 percent of people who identify as male and 51 percent of people who identify as female (Figure 4). Four percent of the population identify as lesbian, gay, bisexual or transgender (Figure 5).

Figure 4: Population and Gender, Pennsylvania, 2017



Source: U.S. Census Quick Facts, 2017.

Figure 5. Sexual Orientation and Gender Identity and Expression Prevalence per 1,000 Pennsylvania Population, Pennsylvania Adults, 2014-2017



Source: BRFSS, 2017.

Health Impacts Pennsylvanians Face

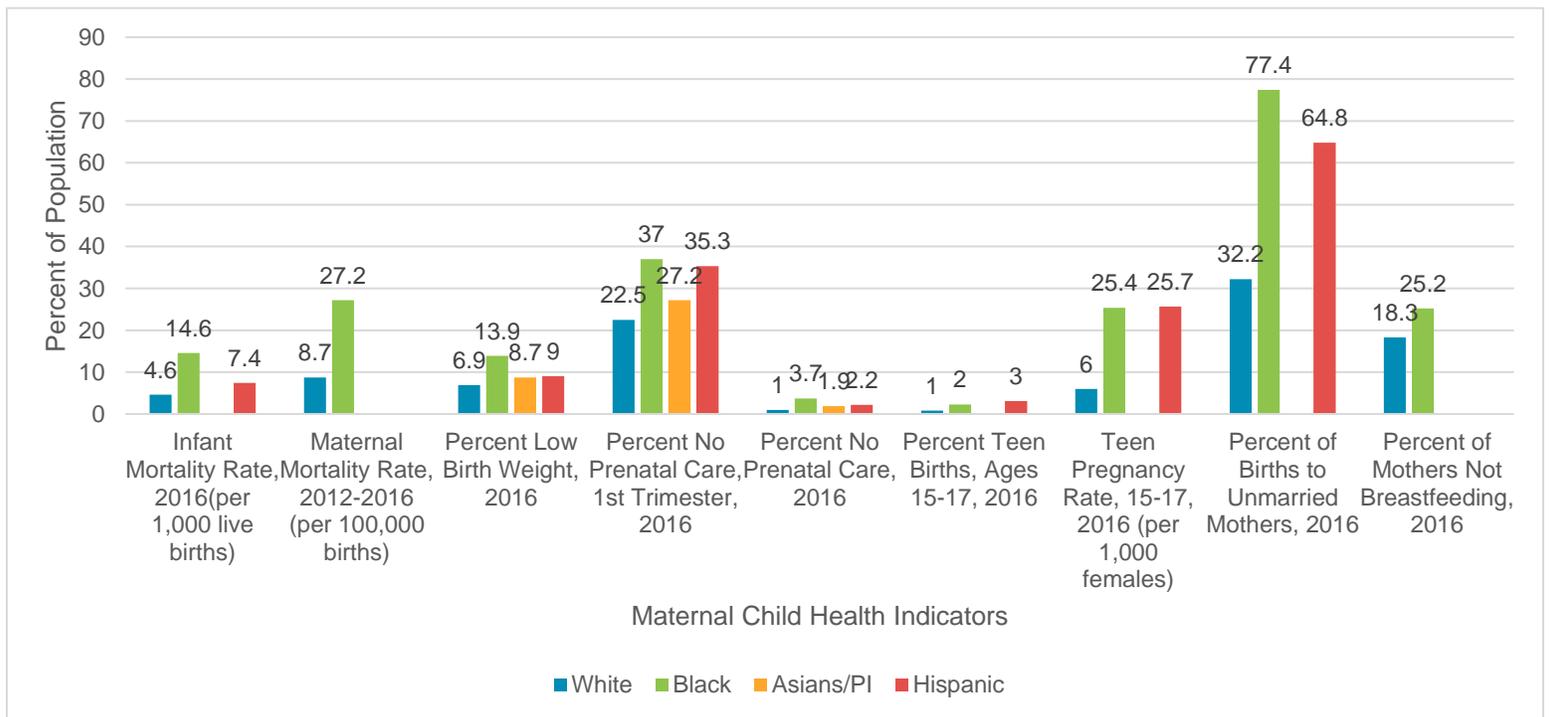
Infant and Maternal Mortality

The Centers for Disease Control and Prevention (CDC) defines infant mortality as the death of an infant before their first birthday. The infant mortality rate is the number of infant deaths for every 1,000 live births. The infant mortality rate is an important marker of the overall health of a society. In 2016, the infant mortality rate in the United States was 5.9 deaths per 1,000 live births.² The incidence of infant death overall in Pennsylvania is 6 percent (Figure 6), while black/African American population in the state is 15 percent, notably higher than that of other races. The Hispanic/Latino population experiences infant mortality at nearly double that of the white population.

Maternal mortality also serves as a major indicator of the health of a state³ and is defined as, “the death of a woman while pregnant or within 42 days of the end of pregnancy, regardless of duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes.”⁴ For black/African Americans, the maternal mortality rate for the five-year period 2011-2015 was also three times as high (27.2 per 100,000 births) compared to whites (8.7)⁵, shown in Figure 6.

Figure 6: Infant and Maternal Health Statistics, Pennsylvania, 2011-2016

Source: Pennsylvania Department of Health, 2016. Data adopted from Pennsylvania Certificates of Birth and Certificates of



Death. Illustrates maternal child health outcomes derived from status indicators for this population.

Disease Prevalence in Pennsylvania

Disease prevalence is defined as the proportion of the population who have a particular disease or attribute at a specified point in time or for a specified duration. Incidence refers to the occurrence of new cases of disease or injury in a population over a specified time.⁶ Table 2 is a chart of the rate of incidence of the most common chronic diseases in Pennsylvania.

Table 2. Chronic Disease Incidence Rates, Pennsylvania, 2016

<i>Disease</i>	<i>Incidence Rate</i>
<i>COPD/Emphysema/Chronic Bronchitis</i>	7%
<i>Skin Cancer</i>	6%
<i>Other Cancer</i>	7%
<i>Chronic Kidney Disease</i>	2%
<i>Cardiovascular Disease</i>	13%
<i>Diabetes</i>	11%
<i>High Blood Pressure (2015)</i>	33%

Source: Pennsylvania Department of Health, 2016.

Many of these diseases contribute to the most common causes of death in Pennsylvania, as shown below in the top 10 causes of death:

Table 3. Top 10 Causes of Death, Pennsylvania

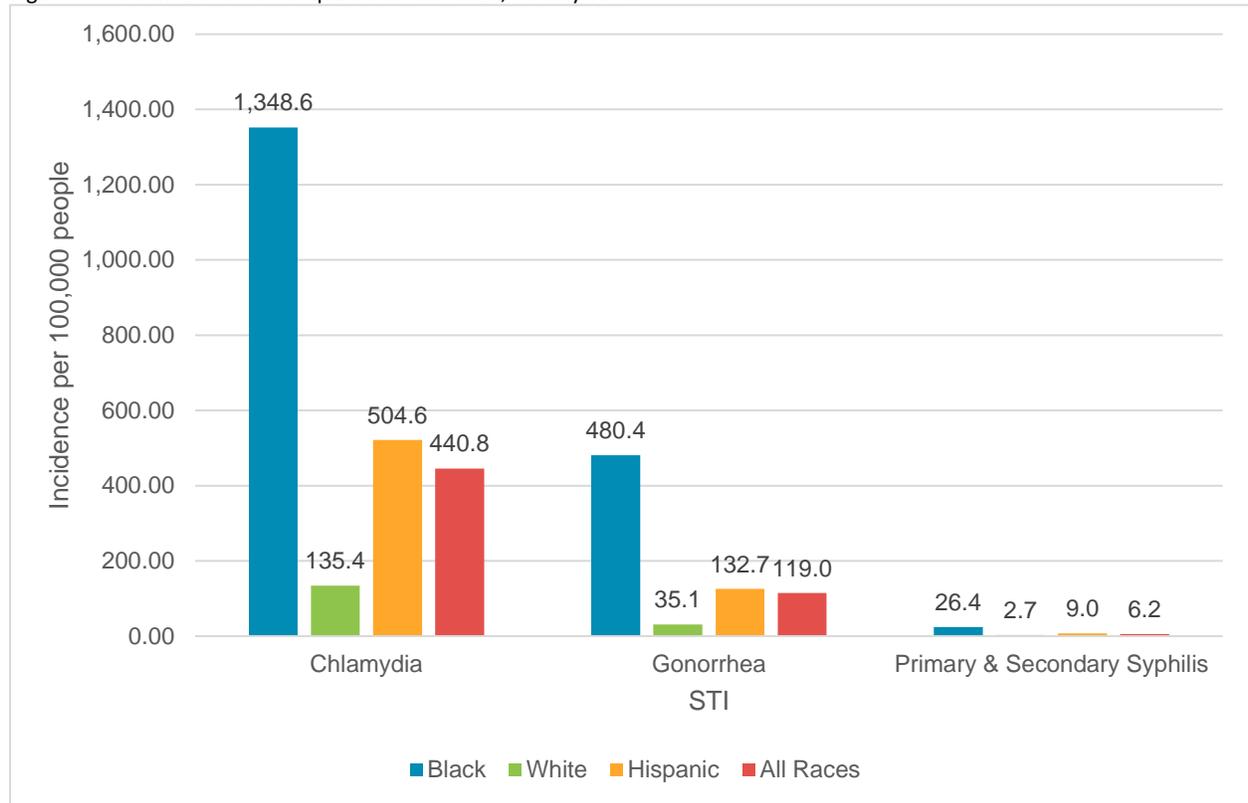
<i>Cause of Death</i>	<i>Number of Deaths</i>	<i>Percent of All Deaths</i>
<i>Heart Disease</i>	31899	24.03%
<i>Cancer</i>	28363	21.37%
<i>Non-transportation Accidents</i>	6986	5.26%
<i>Cerebrovascular Disease</i>	6694	5.04%
<i>Chronic Lower Respiratory Disease</i>	6503	4.90%
<i>Septicemia</i>	4178	3.15%
<i>Diabetes Mellitus</i>	3537	2.66%
<i>Kidney Disease</i>	2808	2.12%
<i>Influenza/Pneumonia</i>	2468	1.86%
<i>Alzheimer's Disease</i>	2350	1.77%

Source: Pennsylvania Department of Health, 2016.

Sexual Transmitted Infections

Sexually transmitted infections (STIs) also contribute to disease burden and significant morbidity in Pennsylvania. They are another area wherein disparities are easily identified. STIs are more prevalent in communities of color as compared to all races, as seen in Figure 7.

Figure 7. Incidence of STI's Compared across Races, Pennsylvania



Source: Pennsylvania Department of Health, 2017.

HIV/AIDS

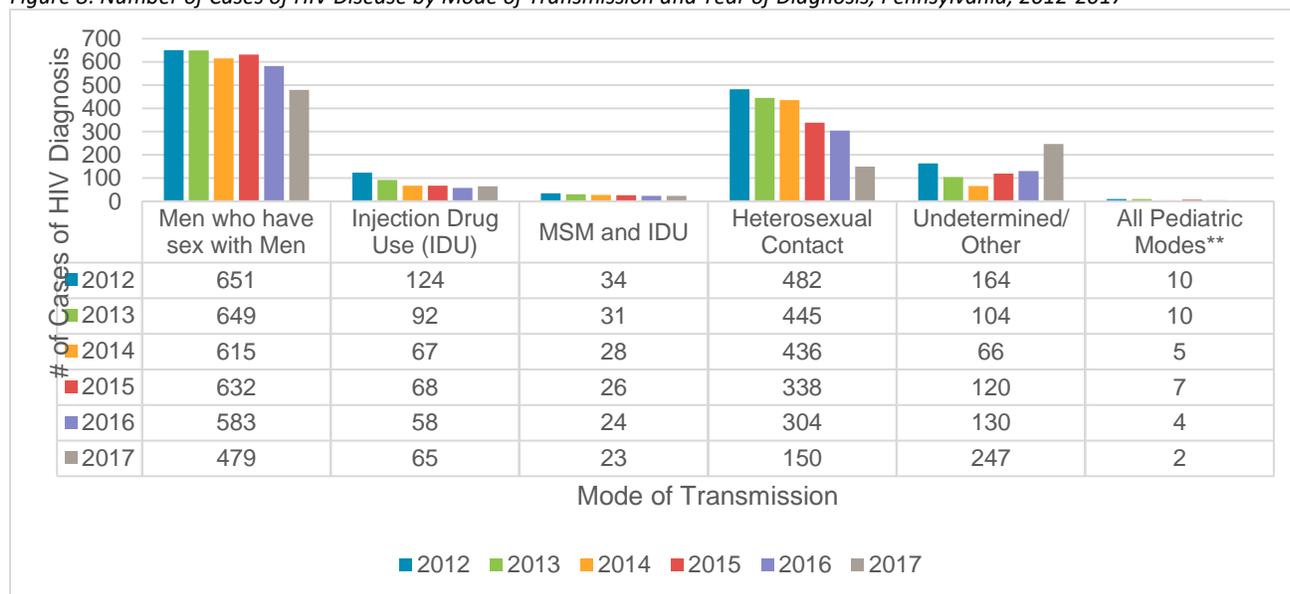
Human immunodeficiency virus (HIV) weakens a person's immune system by destroying cells that are important to fighting infection. HIV can lead to acquired immunodeficiency syndrome (AIDS) and can be transmitted by exposure to body fluids or tissue from an infected individual. The most common methods of transmission are sex between men, heterosexual sex and injection drug use.⁷ Identified through retrospective review, the first cases of AIDS were described in 1981 and confirmed cases in Pennsylvania date back to 1980.⁸

The following is based on data collected by the Pennsylvania Department of Health for cases diagnosed by the end of 2017 but reported through March 31, 2018. Since 1981, more than 61,000 Pennsylvania residents have been diagnosed with HIV disease. Approximately 25,000 of these persons have died and an estimated 36,000 are currently living with the disease. There has been a steady decline in the proportion of HIV disease since the mid-1990s. Although cases have been diagnosed and people are living with HIV disease in nearly every county in Pennsylvania, HIV disease has had a disproportionate impact on blacks/African American and is more common in large population centers.⁸

The number of new diagnoses peaked in the early to mid-1990s when almost 3,000 new diagnoses were reported annually. In 2017, less than 1,000 new diagnoses were reported. It is important to note there was a decrease in cases of disease in the population of men who have sex with men, a population experiencing the highest rates of HIV prevalence and incidence in Pennsylvania.⁸

Approximately three times as many males have been diagnosed with HIV disease than females. Blacks/African Americans and Hispanics/Latinos make up 11 percent and 7 percent of the population of Pennsylvania, respectively, but account for 49 percent and 14 percent of all new diagnoses among Pennsylvania residents. Although a person can be infected at any age, most of new diagnoses occur in persons who are between the ages of 20 and 49 years.⁸

Figure 8: Number of Cases of HIV Disease by Mode of Transmission and Year of Diagnosis, Pennsylvania, 2012-2017



Source: Pennsylvania Department of Health, Division of HIV, 2017.

Report Note: Figure does not include the number of coagulation disorder or transfusion received transmissions, as there were zero reported between 2012-2017

Figure 8 provides a summary of all reported HIV disease among Pennsylvania residents from 2012-2017, by the most likely mode of transmission of the virus. During this period the most common means of transmission is men who have sex with men, heterosexual sex and injection drug use. Men who have sex with men have had the most accounts of transmission over the past five years and account for about 50 percent of transmission, followed by heterosexual contact.

Social Determinants of Health

There are many factors that contribute to the social determinants of health for an individual and the communities in which people live, work, play and learn. Social, economic and environmental circumstances contribute to shaping one's health status. The World Health Organization (WHO) explains there are a wider set of forces and systems that help to shape the conditions of everyday life, which include but are not limited to: economic policies and systems; social norms and political systems.¹ Additionally, WHO illustrates that the social determinates of heath are mostly responsible for health inequalities.²

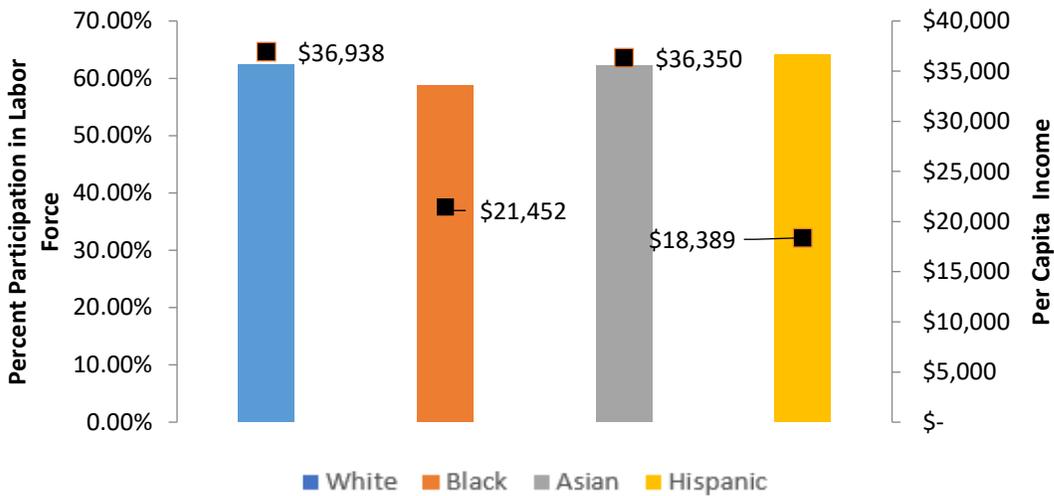
Socioeconomic Status

Socioeconomic status is broadly defined as an individual's ability to access financial, social, cultural and human capital resources. Family income, parental educational attainment and parental occupational status are key measures, however household, neighborhood and school resources are among several additional variables.² Financial resources are a major contributor to health disparities, as research reveals that those with lower income experience worse health outcomes when compared to the wealthier population.³ Poverty can be quantified and measured under the construct of socioeconomic status. There are proxies, such as the free and reduced lunch program eligibility and the use of federal assistance for food through the Supplemental Nutrition Assistance Program (SNAP), that give an indication of one's ability to pay for necessities.^{4,5,6}

Low socioeconomic status has also been linked to risky behaviors such as tobacco use,⁷ sedentary lifestyles,⁸ poor dietary habits,⁹ unintentional and intentional injuries,¹⁰ risky sexual practices resulting in unintended pregnancy,¹¹ alcohol use¹² and drug use.¹³ Similarly, it has been associated with a variety of adverse health outcomes including low birth weight, childhood asthma, deaths resulting from firearms, cardiovascular disease, breast cancer mortality and osteoporosis.¹⁴

While employment is a main contributing factor to a person's income, access to other economic assets like a bank account and home equity give a person greater economic freedom and life stability. With financial resources, people can choose to live in safe neighborhoods with good schools and access to healthy lifestyle choices like eating nutritious foods, getting routine preventive care and safe spaces to be active and exercise. In 2016, Pennsylvania's per capita, or average, income was approximately \$31,272.¹ Across race populations, studies show a similar percentage of people are participating in the labor force (i.e. a proxy to employment rates) however, whites earned above the statewide average income, while blacks/African Americans earned almost \$15,000 less than the statewide income. Hispanics/Latinos earned nearly \$18,400 less than their white counterparts (Figure 9). Additionally, compared to whites, a greater percentage of blacks/African Americans and Hispanics/Latinos lived below the poverty level (Figure 10), which was about \$24,000 for a four-person family in 2016.² The threshold used to measure poverty is defined as the cost of a minimum food diet per year, accounting for the different compositions of a family unit. Without the ability to secure the necessities of life, Pennsylvania's minority populations are more vulnerable to poor health outcomes, creating the wide health disparities and inequities outlined in this report.

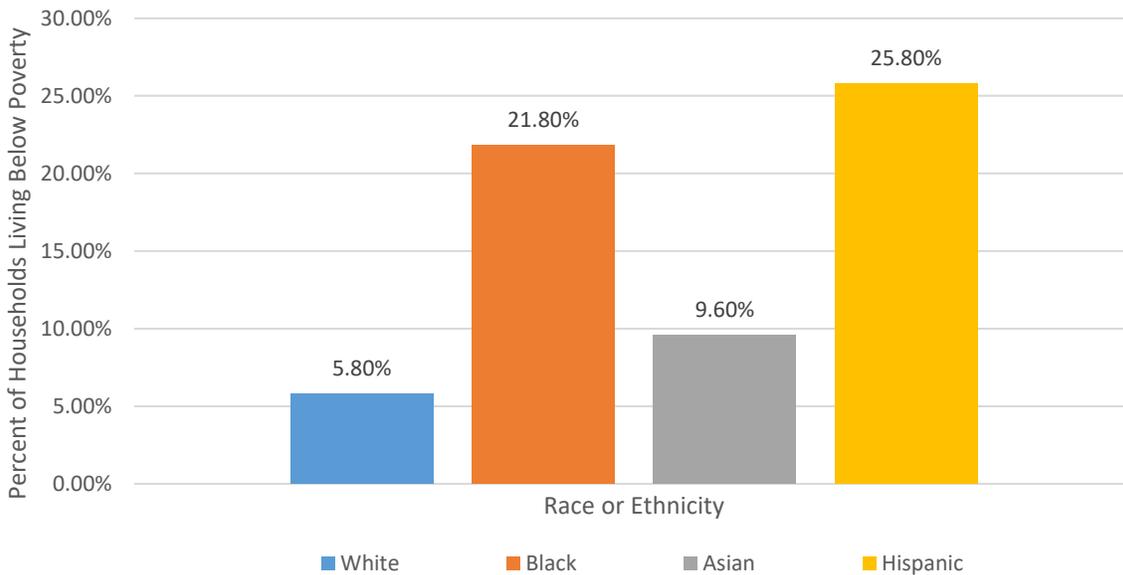
Figure 9. Percent participation in the labor force and per capita income in the past 12 months by race, Pennsylvania, 2016



Source: US Census Bureau, 2016.

Percent participation in labor force determined by the ratio of participants in labor force to total racial or ethnic population. Bars indicate labor force participation rate and square dots indicate per capita income (adjusted for the 2016 inflation rate).

Figure 10. Percentage of households living below the poverty level by race, Pennsylvania, 2016



Source: US Census Bureau, 2016.

While black/African Americans and Hispanic/Latinos, provide nearly an equal percentage of participation to the labor force (Figure 9), these populations largely face poverty, four times the rate of their white counterparts (Figure 10). Additionally, figures 9 and 10 highlight that the annual per capita income correlates with the prevalence of poverty.

Education

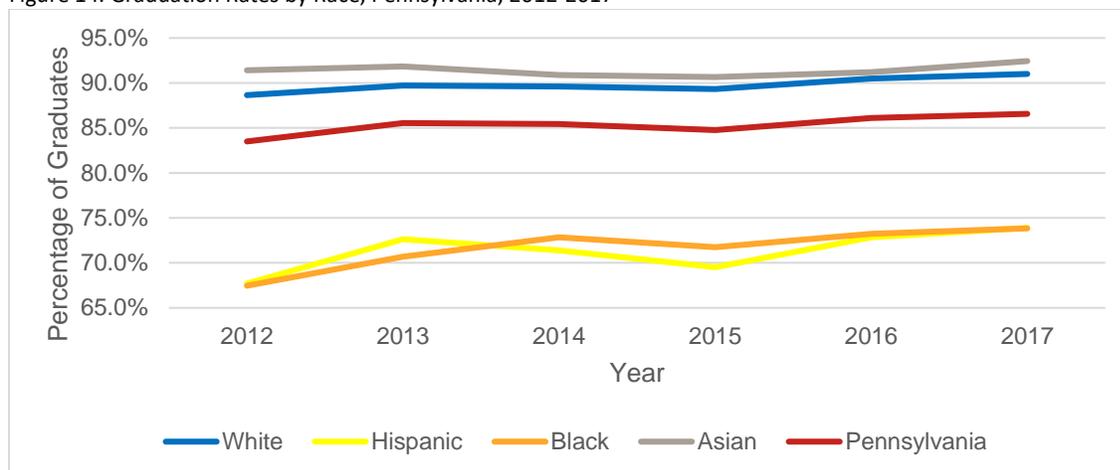
Education is a key element of socioeconomic status because it impacts job placement, income and access to health-related information and resources.¹⁵ Individuals with minimal education are less likely to be informed about risk. Further, these individuals are more apt to live in poor neighborhoods with limited access to recreational facilities and markets with fresh produce. Poverty and lack of education are inextricably linked in Pennsylvania, much like in other areas of the country and world. Children who are born to parents that have achieved less than a high school diploma are more likely to live in poverty and this issue is seen across all racial and ethnic groups.¹⁷

Education is not only a strong predictor of health outcomes, but it is also known to directly and indirectly improve health.¹ People with higher educational attainment are more likely to live longer and have healthier habits, like regular exercise, routine preventive medical care, moderate drinking habits and not smoking.² Those with higher educational attainment also have a better chance at maintaining consistent employment and income, which help to support healthy habits and improve outcomes.

Steps must be taken in the early years of a child's life to help them succeed in school. Paving the road to high educational attainment begins with investing in early childhood learning and well-being. Early child development programs not only prepare young children to begin school by fostering better cognitive, language and social skills, but they are also known to help kids perform better in high school and beyond. Examples of early childhood education programs include child care centers, nursery schools, day care programs, pre-kindergarten (pre-k) programs and Head Start Supplemental Assistance Programs.³ Unfortunately, many Pennsylvania children do not have access to high quality programs. This lack of access disproportionately impacts people of color. In 2016, more than 467,000 children 5 years old or younger were enrolled in nursery school, preschool, Kindergarten or first grade; the largest percentages of kids under 5 years-old not enrolled in school were Hispanic/Latino and black/African American children (40 percent and 37 percent, respectively). Additionally, in 2017, approximately 36 percent of children ages 3 to 4 in Pennsylvania had access to, what is considered, high-quality pre-K programs.⁴

The racial discrepancy in access to early childhood education programs is later reflected in high school graduation rates. Though graduation rates have been steadily increasing over the last five years, black/African American and Hispanic/Latino students are still completing high school at lower rates than their white and Asian classmates (Figure 14). This gap is also reflected in higher education attainment rates, where black/African American and Hispanic/Latino adults 25 years or older (17 percent and 15 percent, respectively) are less likely to obtain a bachelor's degree or higher compared to white and Asian adults (30 percent and 54 percent, respectively). Students who graduate on time are more likely to pursue postsecondary education and training, which leads to greater employment opportunities, opening up more choices in adulthood. In 2016, those who had a bachelor's degree made more than \$20,000 greater on average than those who stopped their formal education after earning a high school diploma. Those with a graduate or professional degree made more than \$40,000 greater on average than those with high school diplomas.⁵

Figure 14. Graduation Rates by Race, Pennsylvania, 2012-2017



Source: Pennsylvania Department of Education, 2012 – 2017.

The chart shows the graduation rates among each race from 2012 to 2017 in comparison with the Pennsylvania average. The rates were calculated by dividing the number of students who graduated by the number of students who entered high school in ninth grade.

While high quality education starting in early childhood is a priority in Pennsylvania, the resources needed to accomplish this are not equally available to all families. To give a child the best chance at success, parents and guardians need the resources to provide their family with a safe and healthy home life. This includes housing stability, food security, health insurance, access to preventive health care and activities that stimulate healthy emotional and cognitive development. When parents are unable to be productive or are limited by under-paying jobs, the support parents can give their children is compromised, increasing the inequality gap in educational opportunities for income-insecure families.

Poor physical and emotional health in childhood can also be influenced by a child’s environment and can have significant effects on health and wellbeing outcomes later in life. For example, early exposures to racial prejudice and discrimination can severely dampen a student’s sense of self-efficacy and lead to thinking that working hard in school is not worth it.⁶ Kids residing in areas of higher poverty often experience poor-performing schools, higher rates of crime and violence, higher rates of teen births and barriers to job opportunities, making it difficult for them to achieve success.

Individuals with more education are likely to live longer and experience better health outcomes than individuals with less education. In fact, the gap in life expectancy between those with a formal education and those without has been widening since the 1960’s.⁷ Americans with lower educational attainment are more likely to have major diseases, like heart disease and diabetes – two of the top ten leading causes of death. Taking steps to decrease the prevalence of educational disparities will drastically improve the health and well-being of residents throughout the state. Healthier residents with more opportunities means a healthier, more successful commonwealth.

Racism, Discrimination and Geographic Isolation

Nationally and throughout Pennsylvania, racism and discrimination has perpetually contributed to income disparities for people of color and between genders.¹⁸ These disparities affect many influential factors, including education, employment opportunities, residential location and occupational differences.¹⁹ Undeniably, socioeconomic status and education contribute to health disparities. Generally, those who have a higher income have access to more choices for nutritious food, physical activity and quality preventive care. However, racism and discrimination lead to the creation of systematic policies, the effects of which can still be felt today. Federal housing policies and individual practices instituted in the 1930s increased the separation between whites and blacks/African Americans.²⁰ Practices such as redlining, restrictive covenants and discrimination in the rental and sale of housing not only led to residential segregation by race, but also consequently affected health and health access for generations.²¹

Despite the judicial and legislative victories of the civil rights movement like the landmark *Brown v. Board of Education of Topeka* case, the *Kansas* Supreme Court case, the Civil Rights Act of 1964, the Voting Rights Act of 1965 and the Fair Housing Act of 1968, residential segregation persists because of the legacy of entrenched, unfair historical policies embedded into American society. In fact, because of the tendency of both wealth and poverty to accumulate, segregation has grown in many cases, creating de facto school re-segregation in major urban settings.^{16,21}

In rural Pennsylvania, geographical isolation contributes to disparities in health outcomes. Low primary care physician and healthcare provider numbers and even lower numbers of specialists are a major contributing factor. Dental care is sparse, while obesity and tobacco use are high. As is the case in pockets of urban environs, unemployment and poverty plague the rural citizens of the state due to traditional industries of coal and steel being phased out, along with the jobs associated with these previously booming enterprises.

Access to Food and Nutrition

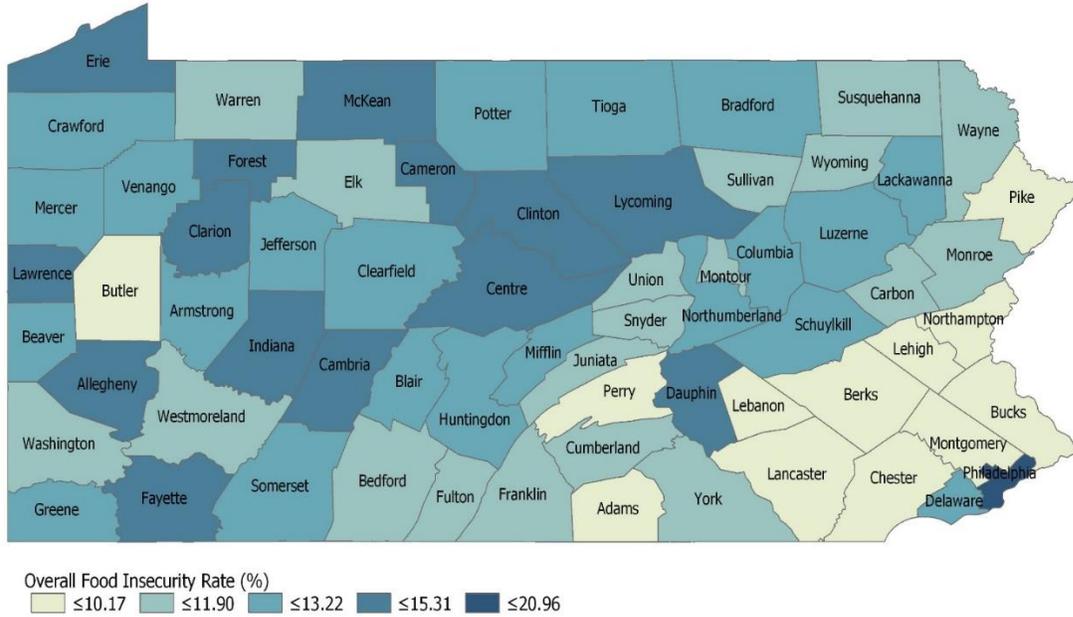
Access and ability to obtain adequate nutritious food every day are foundational to achieving health. Chronic hunger and malnourishment can have serious health consequences. Globally they are the most common risk factor for illness and death.¹ This is especially true for children, who are most vulnerable to lower nutrient intake² and general health,² mental health issues,³ behavioral problems,⁴ and oral health problems.⁵

Malnourishment is not an uncommon issue, although it stems from a relatively simple and seemingly easily curable problem: people not consuming enough fruits and vegetables. Adults are recommended to have at least 2 ½ cups of vegetables and 2 cups of fruits per day.⁶ In 2013, a national survey found that in every state most adults consume too few fruits and vegetables.⁷ In Pennsylvania, only 15 percent of adults consume five or more servings of fruit and/or vegetables per day.⁷ Unfortunately, solutions to this problem are not as obvious as they may seem and understanding the reasons why people are not consuming enough fruits and vegetables is a prerequisite to forming a sustainable solution. As previously stated, this a complex issue, but in Pennsylvania some of the most relevant factors include lack of access to affordable, nutritious foods and its consequences.

In 2015, about 13 percent of all households nationwide experienced food insecurity, or the inability to fulfill daily nutritional needs. In Pennsylvania, about 14 percent of households were food-insecure in

2015– that’s 1.7 million people who were unable to meet their nutritional needs in a state known as a world leader in agricultural production.⁸

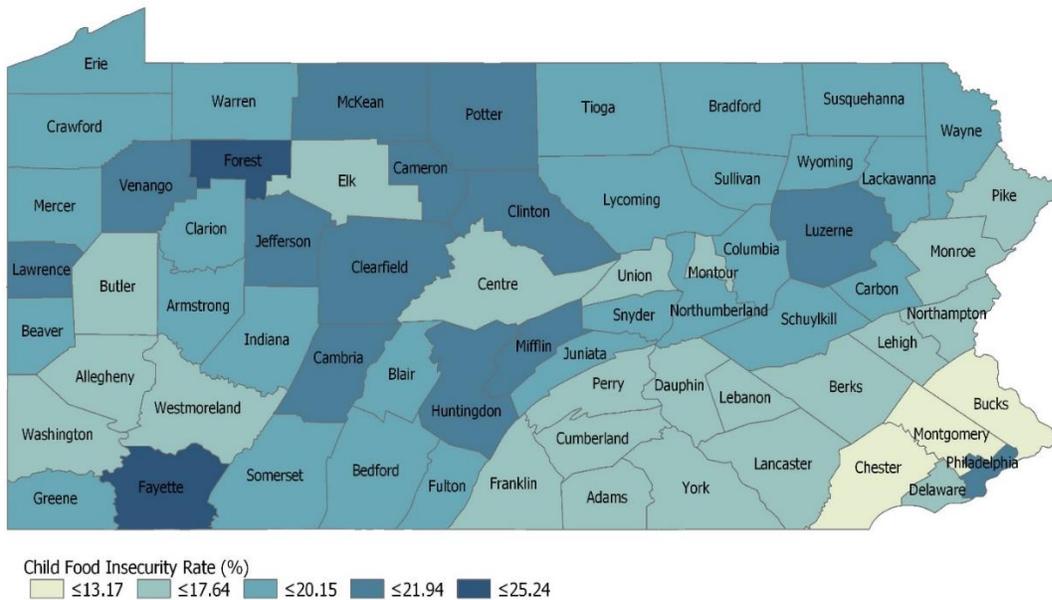
Figure 11. Percentage of adults and children who experience food insecurity by County, Pennsylvania, 2016



Source: FeedingAmerica.org, 2016.⁹

Percentages are calculated by dividing the estimated number of food insecure individuals per county (based on income) by county population.

Figure 12. Percentage of children ages 0 to 18 who experience food insecurity by county, Pennsylvania, 2016

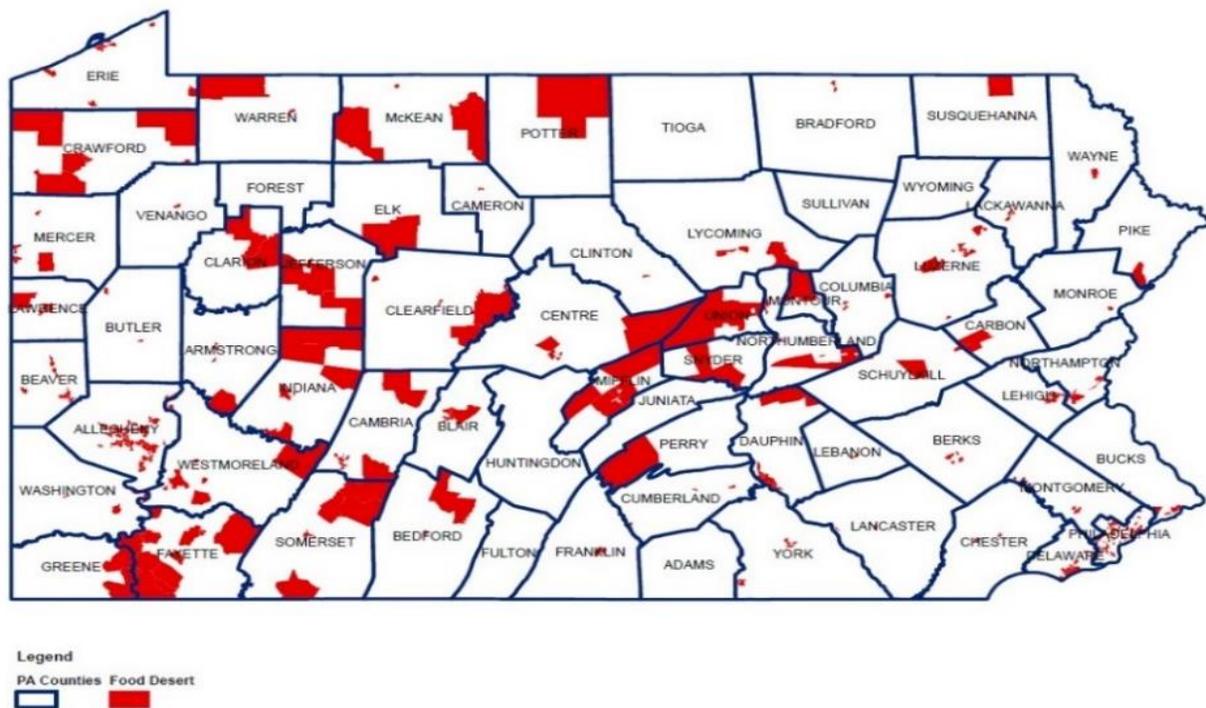


Source: FeedingAmerica.org, 2016.⁹

Percentages are calculated by dividing the estimated number of food insecure individuals per county (based on income) by county population.

Major contributors to food insecurity are food deserts, which are defined as low-income census tracts where several households live more than 20 miles from the nearest full-service grocery store that offers options to affordable fruits, vegetables, whole grains, low-fat milk and other foods that make up a full and healthy diet.¹⁰ However, it is important to note that living within 20 miles of a grocery store does not guarantee access to nutritious foods. Lack of transportation and grocery stores not aligning with public transportation stops can present prohibitive barriers in locations that do not meet this definition of a food desert.

Figure 13. Food Deserts by County, Pennsylvania, 2014



Source: U.S. Department of Agriculture (USDA), 2014.

In these areas and for those with transportation or financial challenges, people must rely on what is available and affordable. For many, that means relying on convenience or small neighborhood stores for groceries, which may offer fewer healthy food options, if any. Consequently, it is difficult for people in these situations to get their daily recommended servings of fruits and vegetables. The options that are available and affordable often contain enormous amounts of added sugar. The primary source of sugar added to the average American diet comes from sugar-sweetened beverages.¹¹ Consumption of sugar in an adult diet can lead to obesity,¹² poor nutrition and cardiovascular disease.¹³

Understanding that Pennsylvania has the resources to achieve full food security, Governor Tom Wolf issued an executive order in September 2015 to eliminate food insecurity in Pennsylvania. The administration created the Governor's Food Security Partnership, a group of private and public-sector leaders that are responsible for providing nutrition and food assistance to the commonwealth. This

involves a collaboration with Pennsylvania departments of Aging, Agriculture, Community and Economic Development, Education, Health and Human Services. Together, the partnership created the report, “Setting the Table: A Blueprint for a Hunger-Free PA,” with a list of nine goals to pursue and eliminate hunger in Pennsylvania by 2020.

Pennsylvania’s Department of Health is also home to the federally funded Pennsylvania Special Supplemental Nutrition Program for Women, Infant and Children (WIC). This program serves pregnant women, infants and children under 5 years-old living in low-income households, providing nutrition services and healthy foods for the commonwealth’s most vulnerable families.

To target the food deserts in the state, Pennsylvania created the Pennsylvania Healthy Corner Store Initiative. This program brought healthy foods into the corner stores where many families buy their groceries. Using Philadelphia’s Healthy Corner Store Initiative as a model, the state replicated this idea in more than 50 corner stores across the commonwealth, with the goal of providing easily accessible healthy food choices. To expand upon this work, Pennsylvania moved toward the Pennsylvania Healthy Pantry Initiative, hoping to increase access to healthy foods and beverages through food banks and food pantries.

Housing

Poor quality, unaffordable or inaccessible housing can have a wide range of negative impacts on both physical and mental health. However, stable, safe and affordable housing not only protects families from the adverse impacts of poor housing, it provides families with a safe, reliable place to practice healthy habits. From offering a place to sleep that is sheltered from the environment, to providing a space to cook nutritious meals and allowing an area for medication to be stored, housing is integral to helping Pennsylvanians live healthy lives.

In a state where more than 15,000 people are experiencing homelessness and the number of homeless residents increases by approximately 5 percent each year, increasing access to homes would improve health for many residents.¹ With a place to live, Pennsylvanians who are currently homeless would have access to more sanitary conditions and places to safely store medication. Furthermore, people with homes report less stress and better mental health than those with unstable housing. Living in a house also means having an address, which makes it easier for people to apply for jobs, use various social services and maintain continuity of health care.²

Given the strong ties between housing and health, the rising rate of homelessness across Pennsylvania endangers the health of many residents. Without shelter, people are exposed to dangerous weather and extreme temperatures. Temporary shelters are often crowded, which allows infectious disease to spread more quickly. Homeless children experience higher rates of mental health problems than children living in stable housing. By working to ensure access to housing and decreasing the rate of homelessness, Pennsylvania can improve these health outcomes.¹ Seeing the challenges associated with homelessness, the Pennsylvania Department of Human Services has developed a five-year housing strategy that seeks to increase the availability of housing to low income residents among other tactics.²

For housing to truly serve as a foundation on which to build a healthy lifestyle, it needs to be affordable. Housing is considered affordable when the cost of living quarters and utilities is 30 percent or less of a family’s income. Nearly 47 percent of Pennsylvanians pay more than 30 percent of their income toward housing, which means almost half of the state lives in unaffordable housing.² People who identify as an

ethnic minority are more likely to live in unaffordable housing which means they are also more likely to face the associated health challenges.³

When compared to those living in affordable housing, people living in unaffordable housing have higher rates of fair or poor health, stress and depression. They also reported more instances of being unable to fill prescriptions or follow healthcare treatment recommendations because they could not afford to pay. People living in unaffordable housing also spend a smaller proportion of their income on food and healthcare. Access to nutritious food and necessary healthcare is essential to living a healthy life.²

Some of the people who would benefit the most from affordable housing encounter additional barriers in accessing it when compared to the population of Pennsylvania as a whole. People who have recently been released from prison and survivors of domestic violence face many specific health challenges. Affordable, accessible housing is key to helping them stay healthy as they start a fresh chapter of their lives.

Among the incarcerated population, more than half have a mental health condition, half have a chronic illness and 20 percent have had an infectious disease during their incarceration.⁷ With rates of chronic illness and mental health conditions much higher than the general population, continuity of care following release from prison is essential to living a healthy life.⁷ However, former inmates across Pennsylvania struggle to find affordable housing that would allow them to afford health care and provide a safe place to store medication. Prisons across the state are partnering with community reentry programs to develop and support housing for recently released inmates. However, finding long-term, affordable housing is difficult. In a study by Drexel University, researchers found that recently released inmates often had a hard time finding affordable housing especially after they were no longer able to use post incarceration temporary housing.⁸ Despite the presence of many community-based housing programs, only a few counties referred recently released formerly incarcerated individuals to these housing services. Recently released formerly incarcerated individuals in urban areas also struggle because there are less housing programs per 10,000 people in urban areas than elsewhere in the state.⁹ With such competitive housing, the stigma associated with a criminal record can make it difficult for former prisoners to find housing. However, access to housing reduces recidivism rates and improves continuity of care, which also reduces recidivism.¹⁰

Every year, thousands of people across Pennsylvania, mostly women and children, experience domestic violence.⁴ This violence causes damage to both mental and physical health. As they try to escape the violence, many survivors seek shelter that provides them with a place to live and protection from the abuser. However, this shelter is only temporary and affordable housing can be difficult to find for a survivor who has lost the support of income from the abuser and may be independently supporting children. Housing provides safety and security that can help survivors recover physically and emotionally. Without access to affordable housing, victims of domestic abuse may become homeless or return to the abuser.² Affordable housing is the number one unmet need among domestic abuse survivors.⁵ This problem is especially severe in rural Pennsylvania where housing vouchers and transitional housing are less likely to be offered.⁶ By making housing more affordable, domestic abuse survivors and their children can find a safe space to recover and heal.

Accessible, affordable housing must also ensure the safety of its residents. Housing structures need to be structurally sound and have appropriate safety precautions like smoke detectors to decrease injuries in the home. About 40 percent of Pennsylvania homes have higher levels of radon than what the EPA

considers safe.¹¹ Over time, exposure to radon can cause cancer. Radon detection kits can be purchased and if the results show radon levels are too high, a radon mitigation system can be installed. However, many Pennsylvania residents are unaware of the danger radon poses and radon levels remain high across the state.¹²

Another threat to many residents is lead. Many homes in Pennsylvania were built before lead paint was banned, so Pennsylvanians living in these houses may be at risk of lead exposure if the lead paint was not painted over or if the walls are deteriorating. Residents are also at a greater risk of developing asthma and infectious diseases when a home isn't well-ventilated, clean and pest-free. In Pennsylvania, living in old homes can put children at increased risk for asthma due to the frequent presence of asthma triggers like mold, mildew and mites. The Pennsylvania Safe and Healthy Homes Program is working to educate Pennsylvanians, so residents can make sure their houses are the safest they can be.¹²

As Pennsylvania residents age, they often require modifications to their homes to make them safe. Without such modifications, which can be expensive for residents to pay for out of pocket, many Pennsylvanians need to move to facilities that offer assisted living or nursing services.² For some residents, these facilities are necessary and beneficial, but studies have shown that "aging in place," in one's home saves money in the long term and leads to happier, healthier lives for older Pennsylvanians. In fact, the annual cost of care for an elderly resident living in independent living is half that of a resident living in a nursing home.¹

Housing is a basic need that affects every Pennsylvanian throughout life. Access to affordable, safe housing is essential to helping people live healthy lives. The home is a place where nutritious meals can be cooked, a good night's sleep can be found and healthy habits can be formed. By making sure Pennsylvanians have access to affordable, safe homes, negative health impacts caused by homelessness and unaffordability can be prevented and people can be provided with a foundation to use healthy habits to build a healthy life.

Built Environment

The influence of built environments, or all human-made physical surroundings, on behavior is so ubiquitous that it is only too easy for its impact to go unnoticed. However, the built environment where people live, learn, work and play, has a direct impact on the health of communities. The design of communities can either hinder or foster health depending on whether they facilitate behaviors like physical activity. For example, communities that were designed with safe and complete sidewalks that are accessible to all regardless of ability are ones whose built environment promotes healthy physical activity. The Robert Wood Johnson Foundation Commission recommends that, "to improve the health of all Americans, communities be created 'that foster health-promoting behaviors'."¹ Built environments can contribute to or detract from health in complicated ways. They affect peoples' ability to maintain a healthy diet and engage in physical activity and thus prevent obesity. Poor street connectivity and a higher fast-food restaurants ratio is associated with higher obesity risk.² Lack of access to safe sidewalks, biking or walking trails, green spaces and lack of access to safe environments in general is associated with lower physical activity.² Though built environments influence many determinants like environmental health and food insecurity, physical activity represents a high priority for Pennsylvania.

Engaging in regular physical activity is foundational to achieving optimal health. To maintain a healthy weight and good cardiovascular health, the American Heart Association recommends that adults exercise 30 minutes a day, five days a week. However, in 2015, only half of adults in Pennsylvania met

the recommendation of 150 minutes of exercise per week.³ Lack of physical activity is a contributing factor to Pennsylvania's growing number of residents who meet the definition of obesity. According to the CDC, obesity is "weight that is higher than what is considered as a healthy weight for a given height is described as overweight or obese. Body Mass Index, or BMI, is used as a screening tool for overweight or obesity".⁴ Obesity is a complex health status linked with many health problems. It can impact peoples' physical, mental and social health. Obesity is associated with certain types of cancers, type 2 diabetes, hypertension, stroke, cardio vascular disease, asthma, musculoskeletal problems, pulmonary embolisms, disability and premature death.⁵ Obesity can result in low self-esteem, mood disorders, eating problems, impaired body image, interpersonal communication problems, sexual health problems and lower quality of life.⁶ Obese individuals can experience significant prejudice and discrimination.⁶

The Pennsylvania State Health Assessment found that since 2011, the percentage of Pennsylvania adults categorized as obese increased from 29 to 30 percent. Between 2013 and 2015, 65 percent of adults were either overweight or obese.⁷ According to a 2007 National Survey of Children's Health, Pennsylvania ranked 26th out of 50 states in prevalence of overweight or obese youth.⁷ Nearly 30 percent of Pennsylvania youth grades nine through 12, in 2015, were either overweight or obese, increasing from nearly 28 percent in 2009.

Developing complete built environments that promote healthy habits is an effective way to intervene in increasing obesity rates and other chronic illness outcomes. Existing environments can be altered and adapted to promote health. Increasing community walkability and access to trails and green spaces have been shown to be effective for improving the health of residents.

The Pennsylvania Department of Health's State Health Improvement Plan includes obesity as one of the top health priorities to address with an objective of decreasing the percentage of Pennsylvania adults who engage in no leisure-time physical activity from 26 percent in 2013 to 23 percent by 2020.⁸ To accomplish this objective, the department seeks to provide affordable and accessible opportunities for physical activity. Perhaps the simplest way to promote a physically active lifestyle is to increase community walkability. WalkWorks is an initiative implemented through a partnership with the department and the University of Pittsburgh Graduate School of Public Health Center for Public Health Practice.⁹ This initiative is designed to increase physical activity by identifying and promoting safe walking routes, offering social support through guided, community-based walking groups, helping schools to develop walk-to-school programs and addressing local policies to increase safe walking routes. The goal of these efforts is to create fun, fact-filled, community-based walking routes and walking groups.

One example of how this works is a collaboration between the Indiana County Office of Planning and Development, a community-based partner, and WalkWorks to increase opportunities for physical activity by designating safe and fun walking routes and creating walking groups to provide social support, behavioral and policy changes. The agency worked with Livable Indiana Neighborhood Connections (LINC), an organization comprised of private-sector representatives whose vision is to create "...a more livable community by promoting healthy lifestyles and neighborhoods through increased bicycling and walking." LINC's goal is "to improve the quality of life for all residents by fostering the development of a more livable, connected community." Together Indiana County, WalkWorks and LINC provided 14 boroughs and townships with a comprehensive plan including WalkWorks brochures and maps of suggested walking routes for their community.

Despite programs like WalkWorks, there are still many barriers to walkability in Pennsylvania. Unsafe streets, which includes disconnected and incomplete sidewalks, lack of pedestrian crosswalks and signals, warning signals, signs and paved shoulders serve as walkability barriers.¹⁰ Even in affluent areas, many of Pennsylvania's towns are simply not designed for walking, with complete lack of sidewalks in several key areas. These barriers are also problematic for bike riders. While recreational bike trails cover large swaths of Pennsylvania, in many parts of the state there are no specific bike paths that follow major roadways. This makes it difficult for people to commute within their towns via bike, which would otherwise be an easy way to build exercise into the daily routine of residents.

Lack of walkability and access to bike trails is also closely linked with lack of access to green spaces.¹⁰ Proximity to parks and lack of infrastructure serve as the top two obstacles that limit walkability to parks and ultimately options for affordable locations for physical activity. Research shows that people who have access to parks are 47 percent more likely to meet the recommended daily amount of exercise than those who do not have easy access. However, when the distance from a park doubles, the likelihood of park uses decreases by nearly 50 percent. Disparities in access to green spaces like parks exist across the country in both urban and rural areas.

In addition to proximity, lack of infrastructure presents another barrier to access. Unsafe streets, which includes disconnected and incomplete sidewalks, lack of pedestrian crosswalks and signals, warning signals, signs and paved shoulders, serve as walkability barriers.¹¹ In order to be considered a safe route to a park, the route must provide comfort, convenience, safety and accessible design.

Taking steps to increasing community walkability and access to trails and green spaces could tremendously help improve the physical health of Pennsylvania residents. Altering existing built environments and designing new built environments with a focus on promoting health represents an effective and essential strategy for decreasing physical health disparities.

Access to Quality Health Care

Access to quality health care is imperative to helping individuals establish and maintain good health, but many Pennsylvanians still face difficulties in getting quality medical care and preventive care services. Consequently, primary care and preventive services are the top two priority issues in the State Health Improvement Plan.

When discussing perceptions of health care access through a brief survey in 2017, various public health stakeholders throughout the state echoed concerns of disparities in provider accessibility and availability, with the majority identifying limited insurance coverage as the greatest access challenge. Respondents serving rural communities described a lack of providers, especially primary care, dental care and behavioral health care. For those working with other underserved communities (especially minority populations such as black/African American, Hispanic or LGBTQ populations) transportation, culturally competent providers and language barriers were the most serious obstacles.

The number of providers available to a patient population can either encourage or discourage people from seeking medical care. Health Professional Shortage Areas are defined by the critical shortage of primary care physicians, dentists and/or mental health providers in distinct geographic areas or population groups within a geographic area (such as the population under 200 percent of the poverty line). These shortages are found throughout Pennsylvania, with primary and dental care shortages mostly affecting the low-income in both urban and rural communities. These communities often must

visit clinics far from home or have limited access to public or personal transportation. They have difficulties getting appointments because of providers treating over their capacity. Additionally, if a clinic has limited hours (i.e. closed after regular business hours, like nights and weekends), those who don't get paid sick leave are putting their jobs at risk to be seen by a provider.

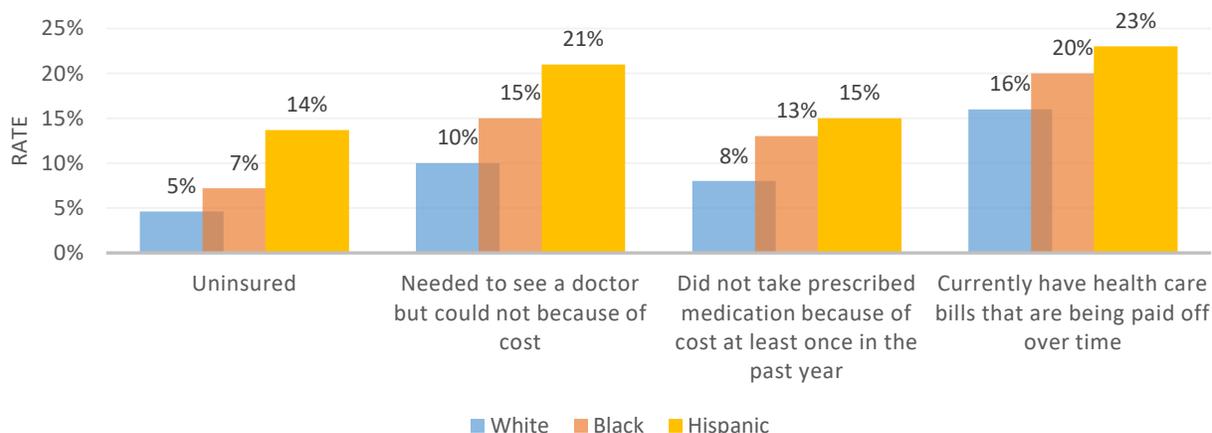
A 2014 report showed that rural counties have less physicians than urban counties, where there was one physician for every 586 residents in rural Pennsylvania and one physician for every 266 residents in urban Pennsylvania.¹ In 2015, rural counties have less dentists than urban counties, where there was one dentist for every 2,440 rural residents and one dentist for every 1,486 urban residents. Though access to medical care does not guarantee good health, the ability to see a provider when needed is critical for these communities' well-being.

Another barrier to health care access is the inability to pay for health services. Health insurance helps to financially cover the services needed to be and stay healthy. However, some do not have the means to afford health insurance premiums or extra out-of-pocket expenses for co-pays, deductibles or co-insurance. Moreover, navigating the health care and health insurance systems continuously get more difficult. Without good health insurance coverage or the financial and support system to understand how to pay for health care needs, it is harder to pay for services such as doctor's appointments, prescribed medications or accumulated health care bills.

Fortunately, the commonwealth's rate of uninsured people fell from 10 percent in 2010 to nearly 6 percent in 2016, the state's lowest rate on record.² This is largely due to Pennsylvania's implementation of the Affordable Care Act (ACA), with the health insurance Marketplace opening in January 2014 and Medicaid expansion in January 2015. The ACA is a health care reform law that addresses health insurance coverage and preventive care, with provisions to encourage the decrease of health disparities by expanding grants for medically-underserved areas, research in health inequities and funding health professionals of diverse backgrounds, among many other initiatives.

Year after year, the prevalence of uninsured estimates is higher for Pennsylvania's ethnic or racial groups, especially Hispanic/Latinos.³ When assessing several measures of financial access to health care, Hispanic/Latinos Pennsylvanians experienced the greatest disparities (Figure 15).

Figure 15. Racial Disparities in Ability to Pay for Health Care, Pennsylvania, 2016



Source: Uninsured rates from 2016 American Community Survey⁴; rates for other variables from 2016 Pennsylvania Behavioral Risk Factor Surveillance Survey. Data for other races are unreliable.

Minority populations often experience disparities in health care access due to cost as illustrated in Figure 15, which stresses the importance of culturally responsible and respectful (sometimes known as culturally competent) care. Structural and interpersonal discrimination can seriously decrease the quality of care, which affects how and when someone seeks care. People who experience discrimination in the health care setting are less likely to seek medical help when necessary or follow provider recommendations on lifestyle changes, medications or follow-up appointments.⁵ Many studies about perceptions of racial and ethnic discrimination have shown associations with poor physical and mental health status.⁶ In one study, those who spoke a language other than English, in particular, were more likely to report discrimination, regardless of race or ethnicity.⁷ Moreover, a study from the National Center of Transgender Equality has shown that the majority of transgender people have faced discrimination and/or violence in healthcare settings.⁸

One strategy being used to address the shortage of health workers and access to health clinics is the use of community health workers, or “lay members of communities who work either for pay or as volunteers in association with local physical health and/or mental health care systems in rural environments and usually share ethnicity, language, socio-economic status and life experience with the community members they serve.”⁹ Some core activities of community health workers include patient advocacy, social support and health education. To better understand the use of community health workers in rural Pennsylvania, researchers from Lock Haven University of Pennsylvania conducted surveys, focus groups and interviews with various organizations in 37 rural PA counties.¹⁰ Several health agencies reported better health outcomes, lower readmission rates, better quality of service and independence for seniors because of using community health workers. Both researchers and health agencies suggest the expansion of their usage by the development of more community health workers programs and a professional certification in Pennsylvania.

Environmental Health Hazards

Environmental health plays an essential role in caring for the physical health and wellbeing of Pennsylvanians. Communities cannot be safe and healthy if the relationship between people and their environment is not adequately addressed. Hazards to air, water, food, shelter and security represent serious public health risks and there are several direct and indirect pathways through which environmental health hazards negatively impact health and wellbeing.

Air particle pollution causes an increase in asthma, chronic obstructive pulmonary disease (COPD) and other upper respiratory issues because increased matter in the air harms the respiratory system. It is associated to greater risk for asthma attacks, heart attacks and strokes. According to the CDC, particle pollution can even cause lung cancer.¹ Those who are most susceptible to the negative effects of increasing air pollution include infants, children, adults with chronic upper respiratory diseases or heart diseases and people who are economically disadvantaged.

Extreme temperatures can cause heat stroke and dehydration and can affect the cardiovascular and nervous systems.² The accompanying increase in ground-level ozone, which further exacerbates respiratory issues, can increase length and severity of the pollen, or allergy, season.³ Ticks, which can carry Lyme disease, are more active in warmer weather, as well as the types of mosquitoes that can carry viruses like West Nile and Zika.

The risk of mental health problems, like depression, post-traumatic stress disorder, anxiety disorders, other chronic stress disorders and suicidality skyrocket after catastrophic events caused by these extreme temperature changes.⁴ There are numerous environmental health hazards; climate change, air pollution and water hazards are particularly concerning in Pennsylvania.

Climate change is known as the widespread and long-term change in weather patterns that can be directly or indirectly accredited to evident human activity.⁵ The most significant cause of climate change is industrial activity, which releases greenhouse gases (GHGs) into the atmosphere.⁶ Greenhouse gases trap heat, increasing the temperature in the atmosphere and ocean. Most greenhouse gas emissions result from human activity, like burning of fossil fuels (e.g. the coal, gas and oil used in homes and cars), deforestation, waste in landfills and manure management for livestock. Earth's rising temperatures can cause extreme heat and severe weather, which leads to pollution and can devastate our agricultural systems.

As the third largest producer of total energy in the U.S.,⁷ Pennsylvania is ranked:

- No. 1 for electricity exports;
- No. 2 for electric generation;
- No. 2 for natural gas productions;
- No. 4 for coal production;
- No. 2 for nuclear generation;
- No. 12 for solar capacity;
- No. 16 for total wind capacities installed; and
- No. 3 for carbon dioxide emissions.

As is evident from these rankings, Pennsylvania is taking steps towards adopting environmentally responsible energy practices, but still has a long way to go. Some of these steps are outlined in the climate change reports produced with the Pennsylvania Department of Environmental Protection (DEP). Climate change cannot be tackled without addressing social determinants of health. Socioeconomic status, access to healthcare, employment opportunities, safe housing and social support systems are essential to building an infrastructure resilient to the disasters that come from the effects of environmental hazards and climate change.

One way the excess heat produced by climate change affects health is through increased air pollution. Two of the most harmful types of air pollution are ground-level ozone (smog) and particle pollution (soot). In Pennsylvania, Philadelphia has the 22nd highest ozone level of all U.S. cities.⁸ Those cities that rank in the top 25 for highest levels of year-round particle pollution include Pittsburgh (No. 8), Philadelphia (No. 11), Johnstown-Somerset (No. 13), Altoona (No. 18), Lancaster (No. 20), Harrisburg (No. 22), and Erie-Meadville (No. 25).

The constant change in weather patterns resulting from climate change has not only disrupted people's lives, but it has also brought rates of heavy rains and flooding higher than Pennsylvania's historical averages.⁷ Flooding from hurricanes can contaminate water supplies with untreated sewage and chemicals. It can also increase water-borne diseases due to the higher levels of microbial contamination that flourish with warmer temperatures. Heavy rains can lead to more runoff, more nutrient runoff and more waterborne pathogens and harmful algal blooms. Pennsylvania has seen a 10 percent increase in annual precipitation over the last century as well as an increase in events of extreme precipitation. Consequently, the Chesapeake Bay, now contains more unhealthy nitrogen, phosphorus and sediment.

In rural areas, when this extreme weather results in power outages, it affects the water systems.⁷ Electricity is used to power water systems and produce clean drinking water. If the power is out for a long time, people lose access to clean drinking water and may end up consuming contaminated water. Flooding can also wipe out crop production.

Sea levels have also risen due to climate and change, and impacted communities and cities in the Delaware River Basin, including Philadelphia.⁷ Additionally, aging infrastructure lowers the water quality in both rural and urban communities.

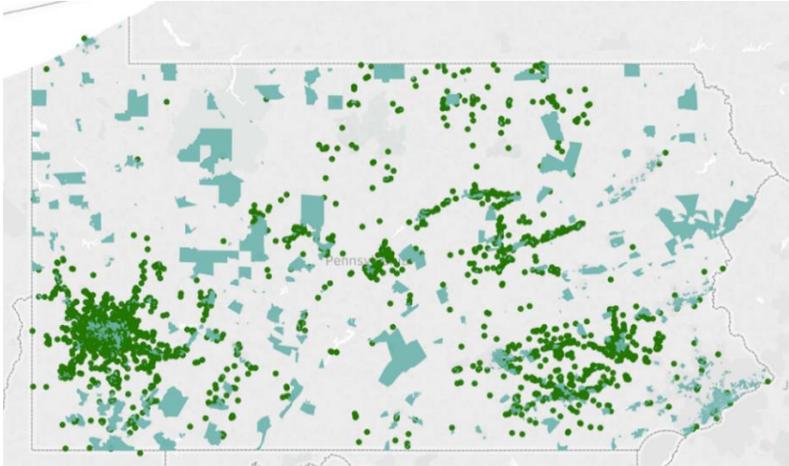
While everyone’s health is impacted by environmental health hazards, the health of Pennsylvania’s vulnerable communities is most at risk. This is especially true for children, the elderly, people of color, people with low mobility and income, and rural communities. More drastic changes in the environment often exacerbate the poor living conditions, leading to even larger health disparities. People of color and those living in poverty are more likely to have less access to secure housing, healthy foods and clean water, and are more likely to live with chronic exposure to air pollutants. Hazardous waste sites and chemical facilities are more likely to be in low-income communities, so risk for exposure to toxins is greater. By comparing the two maps below (Figures 15 and 16), it is apparent that DEP’s Captive Hazardous Waste Operations (responsible for regulating the generation, storage, transportation, treatment and disposal of hazardous waste) are localized in or around areas designated as “Environmental Justice Areas.” These are defined as any census tract where 20 percent or more individuals live in poverty and/or 30 percent or more of the population is a racial minority.

Figure 15. Environmental Justice Areas in Pennsylvania



Source: Pennsylvania Department of Environmental Protection, 2017.

Figure 16. Captive hazardous waste operations and environmental justice areas in Pennsylvania



Source: Pennsylvania Department of Environmental Protection, 2017.

When disasters strike, people living in environmental justice areas and those who are undocumented often have no resources and little recourse for figuring out how to make ends meet and how to rebuild their lives.

Safety and Trauma

Trauma is one of the most under-addressed social determinants of health and can impact anyone at any stage of life. According to The National Workforce Centre for Child Mental Health, a traumatic event is a deeply distressing or disturbing experience and can happen directly to a person or it can be something they have witnessed.¹ Trauma involves a loss of life or a threat to life, a loss of liberty or a threat to liberty, abuse, including physical, sexual, emotional and neglect and physical harm or a threat of harm.¹ The impact of trauma on mental and behavioral health is well-known and WHO attests that physical health is impossible to achieve if emotional needs are not met.² However, mounting research shows that not only can trauma have a devastating effect on mental health, it impacts physical health directly. The field of epigenetics has uncovered a biological mechanism through which people experience a causal relationship between trauma and poor health outcomes. Trauma activates the hypothalamic pituitary adrenal (HPA) axis, which is tied to immune function and inflammatory response.³ Traumatic activation of the HPA axis can result in chronic toxic stress, which can lead to ischemic heart disease, cancer, diabetes, chronic pulmonary disease (COPD, Pulmonary fibrosis), skeletal fractures, liver disease, malignancies and migraines.^{4,5} In order to fully understand the many ways trauma influences health and well-being, it is helpful to discuss it from a lifespan perspective.

In 2016, the Department of Human Service’s Child Protective Services identified 6,486 substantiated reports of child abuse, with 48 percent of those reports concerning sexual abuse and 30 percent consisting of physical abuse and bodily injury.⁶ Childhood maltreatment is particularly devastating because early traumatic HPA response results in chronic alterations in the HPA axis resulting in decreased resilience in the face of further trauma.³ Maltreatment and trauma-history exert a major impact on childhood health care utilization. Youth in the foster care system with a history of trauma cost Medicaid \$3,588 more per capita over the course of a year than children who have not experienced trauma.⁷ Researchers have concluded that, “early traumatic experiences evoke a cascade of system-wide changes that persist into adulthood and are associated with both deleterious psychological and physical health outcomes.”³

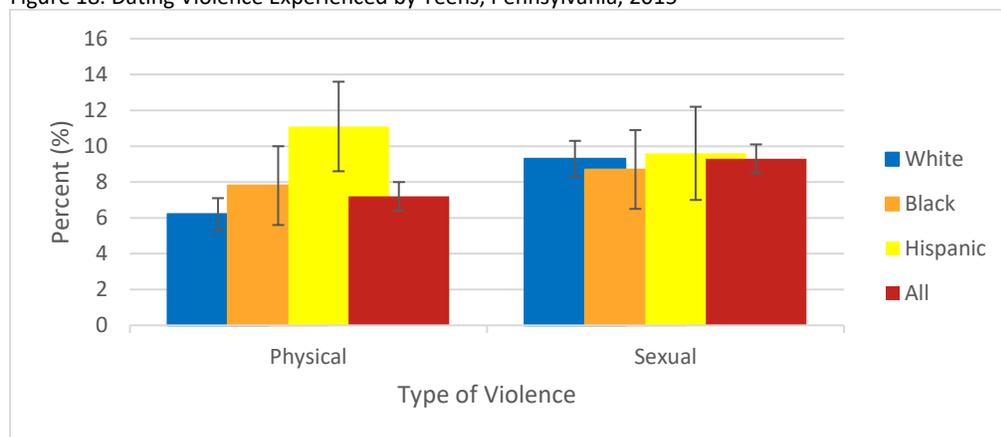
The Adverse Childhood Experiences (ACE) study explored this relationship between childhood trauma and adult health outcomes and found that both the prevalence and risk for smoking, severe obesity, physical inactivity, depressed mood, suicide attempts, alcoholism, illicit drug use, risky sexual behavior and all of the previously mentioned diseases and conditions all increase as exposure to ACEs increases.⁵ All of these negative outcomes are observed at even higher concentrations when poverty is concurrent with childhood trauma.⁸

In Pennsylvania, an ACE of concern is parental incarceration, which disproportionately affects poorer households and racial minorities. According to the Pennsylvania 2016 Behavioral Risk Factor Surveillance Survey, 15 percent of respondents with a household income of less than \$15,000 lived with someone who served time or was sentenced to serve time in a prison, jail or other correctional facility compared to the three percent of respondents with a household income of \$75,000 or more, a rate statistically significantly lower than that of those who made less than \$15,000.⁴ Additionally, the percentage of black/African American respondents and Hispanic/Latino respondents who lived with a previously incarcerated individual was 233 percent and 350 percent greater than the percentage of white respondents, respectively. Not only does this ACE impact future financial health, it is also statistically linked to asthma and smoking later in life.

The chronic toxic stress resulting from ACEs such as parental incarceration and abuse often leads to behavioral problems and poor academic performance in school and is often treated as Attention Deficit Hyperactivity Disorder (ADHD) or other mental health conditions.⁹ This misinformed approach fails to address the root cause of the problem, can cause further distress and thus leaves children vulnerable to all of the far-reaching consequences of low educational attainment.

During adolescence peer violence, and its consequences, becomes a common source of trauma. Abusive sexual/romantic interactions, bullying including cyber bullying and suicidality are of concern. The research shows that marginalized groups including LGBTQ teens and teens of color disproportionately experience these types of trauma. LGBTQ teens are significantly more likely to experience sexual violence and are also more likely than their heterosexual peers to experience either electronic or physical bullying, with nearly two in five LGB teens experiencing bullying as compared to one in five heterosexual teens.¹⁰ While rates of sexual violence hover around 10 percent for teens of all races, Hispanic/Latino and black/African American teens experience higher rates of physical violence.¹⁰ The below chart (Figure 18) highlights the prevalence of physical and sexual violence among racial groups.

Figure 18. Dating Violence Experienced by Teens, Pennsylvania, 2015



Source: Pennsylvania Youth Risk Behavior Survey, 2015.

Sexuality and race-based stratification is also observed in suicidality. LGBTQ and Hispanic/Latino teens experienced a statistically significantly higher risk of physical harm through a suicide attempt, with LGBTQ teens four times more likely than heterosexual teens and Hispanic/Latino teens nearly three times more likely than white teens to attempt suicide resulting in an injury requiring medical intervention.¹⁰

Sexual violence continues to be a main source of trauma in adulthood along with firearm homicides and suicides. Experiencing such adverse events can lead to multiple physical and mental health disorders and too often, death. Regardless of gender, many indicate experiencing adverse health effects following a history of sexual assault, particularly significant difficulty sleeping and heightened levels of limitations on activities.¹¹ Female Pennsylvanians also report that they have a significant number of headaches and chronic pain.

Although it is often thought of as an urban problem, sexual and domestic violence is prevalent in rural areas as well, where victims experience greater stigma in their small communities and fewer, poorly funded resources.¹² Consequently, domestic violence related death rates in rural areas are similar to those in urban areas; nine deaths per million people in designated rural counties and eight deaths per million people in urban Pennsylvania. This type of trauma is especially deadly because of its relationship with gun violence. Firearms are often used to intimidate, control and kill victims of abuse. Since 2007, firearms have been used in most of domestic violence related homicides almost every year, ranging from 46 to 59 percent.¹³

Gun violence also plays a significant role in homicide and suicide-related violence. In 2016, firearm homicides comprised 75 percent of total homicides and nearly 50 percent of total suicides. The black/African American community shoulders a disproportionate burden of these homicides and suicides. Age adjusted death rates for homicide for blacks were nearly 27 percent versus 2 percent for white and 6 percent for Hispanic.¹⁴

Trauma represents a significant and costly public health concern. Fortunately, research has found several trauma-informed interventions to be both effective and economical. Successful trauma interventions in childhood and adolescence have been shown to improve school behavior and performance, which leads to decreased demand for professional services and less involvement in and lower costs for child welfare, juvenile justice and other social services.¹⁵ The research shows that for every dollar spent on evidence-based therapy for delinquent adolescents, a \$7-\$31 return in savings is observed over their lifetimes.¹⁵ Schoolwide interventions like the Healthy Environments and Response to Trauma in Schools, which introduced trauma-informed practices and policies to the San Francisco Unified School District, have proven to be promising. Improved teacher and staff knowledge and skills, increased student attendance and performance and a significant drop in disciplinary office referrals and suspensions all resulted from this intervention as well as decreased trauma-symptomology in students.¹⁶

Trauma-informed practices and policies are beginning to be adopted in many fields and institutions like health care, policing and the justice system.^{17,18} Developing and implementing trauma-informed practices and policies needs to be an ongoing priority for Pennsylvania so that all commonwealth residents have an opportunity to achieve their highest level of health regardless of trauma.

Addressing Health Equity in Pennsylvania: The Office of Health Equity

Health equity is a complicated and intricate issue in Pennsylvania. To focus resources and develop solutions, the Office of Health Equity was formally integrated into the department under the leadership of former Health Secretary Dr. Calvin B. Johnson and Governor Ed Rendell through an Executive Order signed in May 2007. Its role is to:

- Provide leadership to increase public awareness of health disparities in Pennsylvania;
- Advocate for the development of programs to address health disparities;
- Work with policy makers, insurers, health care providers and communities to implement policies and programs that result in a measurable and sustained improvement in health status of underserved and disparate populations; and
- Collaborate with state agencies, academic institutions, community-based organizations, health partners, providers and others in the public and private sectors to eliminate health disparities in Pennsylvania.

Community partners are critical to the success of the Office of Health Equity. In 2007, an advisory committee was formed of community members to help increase public awareness; identify public/private funding and resources to address health inequities; assist in strategic planning; create, review and/or update a multi-year strategic work plan that promotes health equity through the reduction or elimination of health inequities; and recommend ways to improve Pennsylvanian's health regardless of location, socio-economic status, disability status, age, gender, gender identity, race, ethnicity, religion, immigrant or refugee status, sexual orientation or other differences that create barriers in access to health care services.

Public Health 3.0

Despite public health's increasing focus on how environments impact health, a person's ZIP code remains a more accurate determinant of health than his or her genetic code. As a public health principle, there is a collective responsibility to create conditions that allow all members of all communities to live healthy lives. The department holds regional events across the commonwealth to bring together different sectors (e.g. business, education, housing, transportation, local government, etc.) to plan and implement strategies to create conditions that allow all members of Pennsylvania's communities to live healthy lives.

Culturally Linguistic Appropriate Services (CLAS) Task Force

The Culturally Linguistic Appropriate Services Task Force provides training to senior leadership, developed a training video and administered several assessments.

Pennsylvania Interagency Health Equity Team (PIHET)

In February 2017, the OHE initiated the Pennsylvania Interagency Health Equity Team (PIHET). PIHET is a replication of the Federal Interagency Health Equity Team and is a component of the Office of Minority Health. The vision, mission and overarching goals are to bring commonwealth leaders together to end health disparities through equitable policies and programs, as well as strategic partnerships.

Health Equity by 2030: Action Plan

The following recommendations were developed, ratified and approved by the Office of Health Equity Advisory Committee for the Department of Health.

Provide Commonwealth-wide leadership to advance health equity.

The Department of Health should catalyze eliminating health disparities by 2030 and establish specific milestones to be achieved by 2020 and 2025 through policy implementation and the engagement of new and existing partnerships to infuse the concept of ongoing shared responsibility for the health of all Pennsylvanians. Mechanisms will be enacted to ensure the continued prioritization of health equity across commonwealth agencies.

Formalize and maintain community relationships and mutual partnerships to advance health equity across current and emerging communities.

The learned experiences of community members must be incorporated into planning processes. Therefore, the department will develop and implement a sustainable process for working with the community. Genuine efforts to reach out to community members for advice, support and engagement will help accelerate health equity efforts.

Invest in the collection, analysis, meaningful use, secure sharing and accessible translation of data to advance health equity.

Health equity and health disparity data must be defined, measured and understood. These data must then be used to assess the impact of programs, policies, practices and products. Interdisciplinary partnerships and collaborations will be established to realize this effort. Data and the stories behind the data, must drive progress. Continuously monitoring progress and making timely adjustments will help to ensure goal attainment. Data, particularly data gathered with the help of communities, will be distributed and disseminated to those communities to promote community engagement and empowerment.

Continuously raise awareness of current and emerging health disparities.

Health disparities and their impact must be highlighted and best practices that reduce them must be shared widely. Educational efforts will be made to help inform relevant parties such as physicians, healthcare organizations, hospitals, managed care organizations, health insurers, etc., of the relationship between the social determinants of health and their impact on health outcomes.

Address and remediate structural inequities that have resulted from discriminatory policies and practices.

Historical impediments, like racism, homophobia and discrimination, that place entire populations at a systematic disadvantage, must be acknowledged and remediation enacted, to address health disparities. Educational outreach will be conducted to help inform relevant parties as listed above of the relationship between historical policies and practices and the present day structural inequities they engendered.

Improving living conditions where people live, learn, work and play.

The most vulnerable areas of the state, both urban and rural environments, need improvements to basic living conditions. The Advisory Committee recommends targeting several social determinants of health

including, but not limited to: education; nutrition; healthcare services; environmental health; housing; safety; economic and occupational health.

Advance health equity across sectors.

Using a policy approach, Pennsylvania will need to take a broader outlook at what drives health and bring together many different sectors to achieve equity. From state government, local government and community-based organizations, resources should go where the need is greatest.

Establish OHE by statute.

To fully achieve health equity, resources and influence should be given to the OHE. To accomplish this, legislation to enact the office by statute should be considered.

Expand current health equity initiatives.

- Fully fund the Office of Health Equity commensurate with the size of the state and what other states provide;
- Expand upon current program offerings with proven success;
- Fully engage academia---go from research to action; and
- Engage with community groups currently working to impact social determinants of health.

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