**ACTIVE TRANSPORTATION AS A PUBLIC HEALTH INTERVENTION IN**

**ALLEGHENY COUNTY**

by

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**ABSTRACT**

A review of the literature indicates that carefully planned active transportation initiatives can increase physical activity, reduce motor vehicle fatalities, decrease air pollution, and improve mental health. This research aims to review the public health significance of active transportation, reveal best practices regarding active transportation initiatives, and provide recommendations for Allegheny County, Pennsylvania to operationalize active transportation as a public health intervention. I conducted a descriptive, multi-case study analysis of active transportation initiatives across the nation. I selected four communities with successful active transportation initiatives for which literature is available and analyzed efforts that were employed using the Social Ecological Model. This framework promotes integrated multi-level interventions by organization of efforts at individual, relational, community, and societal levels. Then, I organized Allegheny County’s current initiatives using the same framework and compared it to the other communities. Best practices among the four communities included proactively defining goals, the target population, and the plan of action (societal level); improving infrastructure to support active transportation (community level); forming partnerships with defined leadership structure (relational level); and promoting awareness and engagement of the initiative (individual level). Several strengths of Allegheny County’s current active transportation efforts were identified (including reforming policy, developing a subcommittee, and securing funding), but a number of gaps in the initiative exist. Allegheny County has not yet established goals, a target population, or an overarching plan for an active transportation initiative. Further infrastructure improvement is also required to provide a safe environment for active transportation and the public must be engaged through promotional activities. Allegheny County has made promising strides towards operationalizing the health benefits of active transportation, however, this study recommends many strategies to maximize benefits.

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preface

I would like to acknowledge the faculty members of the Graduate School of Public Health for their mentorship and dedication to my educational pursuits. Additionally, I thank Dr. Patricia Documet for her continued advising throughout my program.

# Introduction

The current transportation system in the United States has been shaped by decades of policy and programmatic decisions from planning professionals and elected officials on local and national levels. Community design with minimal investments in public transportation has engineered active modes of transportation (walking or biking) out of most people’s daily lives. Traffic patterns illustrate this trend. Since 1997, the amount of people who walked to their destination in the United States declined by more than 42% while the percentage of those driving increased by about 90% (USDOT, 1997).

While the current transportation system is designed to maximize efficiency; there is also growing awareness among public health practitioners that transportation systems can impact health. Poor transportation systems can negatively impact health through increased obesity, increased air pollution, and increased motor vehicle fatalities (Franco, 2005; CDC, 2003; Murray, 1996; Berke, 2007). Furthering health disparities, vulnerable populations—elderly, children, low-income communities—typically bear the greatest burden regarding negative health impacts (USDHHS, 2013). However, carefully planned transportation systems may result in many positive heath impacts.

Active transportation is any form of transportation that involves physical activity, which includes walking and cycling (Davis, 1999). I will review the health benefits of active transportation and then utilize a framework, the Social Ecological Model, to analyze active transportation initiatives of four communities in the United States (Portland, Oregon; Jackson, Michigan; Columbia, Missouri; and Cleveland, Ohio). Using this framework, I will compare the active transportation initiatives of the four communities to Allegheny County, Pennsylvania to identify gaps for further development. Finally, I will provide recommendations for Allegheny County to operationalize active transportation as a public health intervention.

# BAckground

Recognizing the many health benefits of physical activity, the United States Physical Activity Guidelines of 2008 made evidence-based recommendations to help children and adults in the United States improve their health through physical activity. Although these guidelines will end in December 2018, the Office of Disease Prevention and Health Promotion plans to release the second edition of the Physical Activity Guidelines for Americans before then. The 2008 Guidelines recommended moderate intensity physical activity for two hours and 20 minutes per week for all adults. Moderate activity was defined as the amount of effort required for the individual to notice an increase in heart rate, measured as 3.0-6.0 Metabolic Equivalents (METs). A MET is used to describe the energy expenditure of a specific activity and is calculated as the ratio of the rate of energy expended during an activity to the rate of energy expended at rest. The 2008 Guidelines also recommended vigorous activity defined as the amount of effort required to cause rapid breathing and a substantial increase in heart rate (measured >6.0 METs) performed in 10 to 15-minute episodes for one hour and 15 minutes per week (Physical Activity Guidelines Advisory Committee, 2008).

In recognition of the health consequences of physical inactivity, the federal government implemented national-level strategies in 2010 through Healthy People 2020 (USDHHS, 2013). Physical activity objectives included in Healthy People 2020 (Table 1) suggest methods to encouraging physical activity and increase the amount of time that Americans are active:

Table 1. Strategies of Healthy People 2020 Relevant to Active Transportation

|  |  |
| --- | --- |
| **Strategy Number** | **Strategy** |
| Physical Activity-2 | Increase the proportion of adults who meet current Federal physical activity guidelines for aerobic physical activity and for muscle-strengthening activity. |
| Physical Activity-3 | Increase the proportion of adolescents who meet current Federal physical activity guidelines for aerobic physical activity and for muscle-strengthening activity. |
| Physical Activity-13 | Increase the proportion of trips made by walking |
| Physical Activity-14 | Increase the proportion of trips made by bicycling |
| Physical Activity-15 | Increase legislative policies for the built environment that enhance access to and availability of physical activity opportunities |

While these national strategies address physical inactivity and promote an active lifestyle, they can notably be met by effective active transportation initiatives. Active transportation is any form of transportation that involves physical activity, which includes walking and cycling (Davis, 1999). Consider these examples of improved health from active transportation:

* A randomized clinical trial of 250 sedentary men and women across the United States found that active transportation as part of everyday travel is as effective as structured workouts for improving health (Dunn, 1999).
* A systematic review of how much time is spent in physical activity among adults using public transport reviewed 1,733 articles and found that public transit users take 30% more steps and spend roughly eight more minutes walking each day than drivers (Edwards, 2008).
* A meta-analysis of eighty studies (nearly 175,000 participants) examined the association between active commuting that incorporates cycling and walking with cardiovascular risk and found that active commuting was associated with an 11% reduction in cardiovascular risk (Hamer, 2007).

Communities across the nation (representing varied geographic, economic, and social contexts) are implementing active transportation interventions to encourage these health benefits (Hendricks, 2009; Adler, 2008; Sayers, 2012; Miller, 2009). Active transportation as a public health intervention can lead to the following public health outcomes: increased physical activity, decreased motor vehicle fatalities, decreased air pollution, and improved mental health. I will describe each of these outcomes in detail throughout the following sections.

## Increased physical activity

In 2011, researchers at the National Center for Health Statistics reported that nearly 50% of American adults do not perform physical activity at levels recommended (National Center for Health Statistics, 2011). Inadequate physical activity is highly correlated with increased body weight (CDC, 2010). Obesity contributes to cardiovascular diseases, diabetes hypertensive diseases, osteoporosis, colon cancer, breast cancer, and depression (CDC, 2010). Currently, 64% of Americans are overweight or obese, while childhood obesity has almost doubled (12.9% to 18.5%) in the past 20 years (CDC, 2010). Furthermore, obesity costs account for approximately 9% of all health care spending in the U.S (APHA, 2010).

The United States Department of Transportation’s 2009 Nationwide Personal Transportation Survey revealed that automobiles accounted for 89.3% of all trips whereas walking and bicycling accounted for only 6.4% of trips (USDOT, 2009). These results are consistent with the lack of physical activity among the U.S. population. Active transportation systems would facilitate physical activity by the U.S. population by providing safe and convenient walking and bicycling facilities to connect the places where people travel. Active transportation presents an opportunity to improve physical activity among across all ages and socioeconomic levels (WHO, 2003; Gilbert and O’Brien, 2005).

Improved public transportation complements active transportation initiatives, because most public transit trips involve walking links. For example, Wener and Evans (2007) used tracked walking activity among 111 car commuters and 111 train commuters in New York City. Compared to car commuters, Wener and Evans reported that those commuting by train averaged 30% more walking activity (of at least 10 minutes), and more likely to achieve the 10,000 daily steps by four-fold (Wener and Evans, 2007). Lachapelle, et al. (2011) analyzed walking activity of 1,799 study participants in Baltimore, Maryland and Seattle, Washington and found that those using public transit averaged 5-10 more minutes of physical activity and walked more to destinations than those traveling by automobile, regardless of community infrastructure.

## Decreased Motor Vehicle Fatalities

Traffic crashes are one of the largest causes of deaths among people under 45 years in the U.S. (CDC, 2003). Despite improvements in vehicle safety (i.e. seat belts and air bags), the traffic fatality rate has changed very little since 1960, likely attributed to increases in total vehicle miles travelled (NCIPC, 2017). In 2016, greater than 40,200 traffic-related fatalities occurred in the United States. In 2017, the National Center for Injury Prevention and Control reported that traffic crashes resulted in an estimated 1,186,070 years of life lost in the United States, which indicates a 0.4 year reduction in lifespans (NCIPC, 2017).

Communities with active transportation tend to have improved safety. Active transportation community residents have been seen to drive fewer annual miles (annual miles in the United States average 25,000 while annual miles in Sweden average 5,000) and avoid high risk driving (ie. Driving under the influence) by employing other transit options (Litman, 2016). Increased walking and cycling also prompts communities to implement safety improvements, such as the addition of sidewalks or crosswalks (Litman, 2016). Creating safer and more active communities could decrease the overwhelming amount of motor vehicle crashes and deaths (Litman, 2016).

## Decreased Air Pollution

Murray et al. reported that air pollution from motor vehicles causes a similar amuont of premature deaths as motor vehicle crashes, but that these cases tend to be among the elderly and therefore result in fewer years of life lost (Murray, 1996). Air pollutants from motor vehicles are among the worst contributors to poor quality (Friedman, 2001). In urban areas, it is estimated that harmful motor vehicle emissions are responsible for anywhere between 50 and 90% of air pollution (Friedman, 2001). Exposure to traffic emissions has been associated with many adverse health effects including: premature mortality, worsened cardiac ability, exacerbation of asthma symptoms, and worsened function of the lungs (Friedman, 2001). Further, children are more susceptible to developing respiratory illnesses, especially when exposed to pollutants early in life (Litman, 2016). Active transportation has the ability to reduce motor vehicle travel and the associated emissions.

## Improved Mental Health

Active transportation also may affect mental health. Ensuring opportunities for active transportation in a community may relieve emotional stress by improving mobility to access goods and services, improving access to social activities, and reducing stress of vehicular traffic (Allen, 2008; Appleyard, 1981; Bell and Cohen, 2009). Furthermore, improved community walkability may reduce symptoms of depression (Berke, 2007).

## the social ecological model

Public health practitioners should employ theory during the design phase of active transportation initiatives to maximize public health benefits. A review of the literature indicates that designing a community intervention from an ecological perspective is the most effective way to achieve improvements in public health (Claus et al., 2012; McLeroy, 1988; Bors et al., 2009). An ecological approach places emphasis on determinants of health at many impacting levels. The Center for Disease Control and Prevention (CDC) supports this claim and promotes that successful interventions for any health issue necessitate integrated multi-level initaitives within a Social Ecological Model (SEM) (CDC, 2017). The SEM is a framework of several tiers used to inform corresponding program strategies. On a scale of increasing magnitude, the four levels I examined are: individual, relational, community, and societal. Individual level factors pertain to person characteristics such as knowledge, attitudes, and beliefs surrounding the health concern and intervention. Relational factors are formal and informal social networks and social support systems. The community level includes the built environment, neighborhood infrastructure, housing, businesses, and parks. Societal factors involve larger scale issues such as policies and funding. The SEM has been applied to a variety of public health interventions, from health promotion (McCormack et al., 2017) to immunication uptake (Kumar et al., 2009).

# objective

In Allegheny County, 62% of adults are overweight, air quality is among the top ten worst counties in the United States, the rate of car crashes is the highest in Pennsylvania, and over 18% of adults report depression; thus, action is needed to improve the public’s health. Active transportation initiatives have resulted in significantly improved health of several communities. I will utilize the Social Ecological Model to compare successful active transportation initiatives of four communities to Allegheny County, Pennsylvania and determine best practices. I will describe Allegheny County’s need for further initiative development, as little effort has been taken in comparison to successful initiatives across the nation. Lastly, I will provide recommendations for Allegheny County to operationalize active transportation as a public health intervention.

# Methods

I apply the descriptive, multi-case study design developed by Yin (1994). Yin explained that descriptive case studies describe natural phenomena that occur within the data in question and are the preferred strategy when “how” and “why” questions are posed. I investigate *how* communities have reached success in their active transportation initiatives (i.e., best practices). In addition, Yin explained that multiple-case design could be adopted with real-life events that show numerous sources of evidence through replication rather than sampling logic. For this reason, multi-case study design was chosen.

According to Yin, the case study design requires five components: the research question, its study propositions, its unit of analysis, a determination of how the data are linked to the propositions, and criteria to interpret the findings. I posed the research question: *how* have communities reached success in their active transportation initiatives (i.e., best practices)?

While some case study designs limit generalizations, Yin argued that theory development as part of the design phase is essential. Rather than following a traditional approach to case analysis using replication logic, he suggested that case study must focus on drawing comparisons between the cases. I guided this study by the proposition that designing a community intervention from an ecological perspective is the most effective way to enact public health change. The SEM helps to understand factors affecting behavior and provides guidance for developing successful programs through social environments (Centers for Disease Control Prevention, 2014). The SEM emphasizes multiple levels of influence (such as individual, relational, community) and the idea that behaviors both shape and are shaped by the social environment. The criteria used to interpret findings included strategies at the societal, community, relational, and interpersonal levels of the SEM.

The unit of analysis for this descriptive multi-case study design is a community in the United States. Yin explained that the “logic” underlying the use of multiple-case studies is: each case must be selected so that it either 1) predicts similar results (a literal replication) or 2) produces contrasting results but for predictable reasons (a theoretical replication). Strategies of active transportation initiatives of four communities in the literature were reviewed in the context of the SEM: Portland, Oregon; Jackson, Michigan; Columbia, Missouri; and Cleveland, Ohio. Communities for comparison were chosen based upon the success of their initiative and the amount of evaluation data available in the literature. Searches were conducted using PubMed and Google. Additional communities were considered, however the four chosen for study had an appropriate amount of published data to report on. I chose a cross-section of communities that would represent communities of varying geographic, economic, and social contexts.

The analysis began with a literature assessment of strategies by community (Tables 2-5, 7), and followed by a comparison of strategies by SEM level (Tables 8-11 or the Appendix). Assessments included in the results section through comparison tables linked the proposition (SEM) to the data (community strategies) and resulted in recommendations (best practices) to improve upon the active transportation strategies in Allegheny County.

# REsults

The following sections include a community profile and a table describing the active transportation strategies implemented in each community. The review of Allegheny County contains an extensive community profile, a summary of community need, and a review of current active transportation initiatives. Finally, strategies are compared by SEM level to further reveal similarities among successful initiatives.

## Portland, Oregon

### Community Profile

Portland, Oregon is a large city with the population of 693,863, a land area of 130 square miles, and 4,400 people per square mile. The median household income is $58,423.00 (U.S. Census, 2016). Portland is often promoted as a successful illustration of an active transportation initiative. The active transportation initiative began in 1990, and there have been many studies on its effectiveness. Portland launched the Portland Area Active Transportation Initiative in 2005 with nearly one million dollars in funding (City of Portland, 2013).

### Social Ecological Model Assessment

An assessment of active transportation strategies employed in Portland, Oregon analyzed through the SEM is included in Table 2.

Table 2. Social Ecological Assessment of Active Transportation in Portland, Oregon

|  |  |
| --- | --- |
| **Social Ecological Level** | **Strategy**  (Source: Adler et al., 2008) |
| Societal | * Began initiative by developing the Damascus/Boring Concept Plan with Clackamas County Portland Metropolitan Government, Oregon Department of Transportation, and area organizations, including goals and design concepts for development of transportation systems and zoning ordinances * Secured $400,000 in grant funding and over $1 million in private or in-kind funding * Supported efforts to develop urban growth boundaries * Served on the Community Advisory Committee to make zoning changes and dictate land use, making communities more accessible for bike and pedestrian commuters * Passed a Complete Streets ordinance- a Complete Streets policy refers to policy that directs the community’s transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation |
| Community | * Assessed community active transportation infrastructure needs every five years beginning in 1990 * Advised on the implementation of bike lanes and sidewalks * Advised on the implementation of upgrades to local trail networks * Hired a planning and design company to conduct a trailhead study to find a site for the trailhead of the Springwater Corridor Trail that is easily visible and accessible by the community * Improved the Springwater Corridor Trail, a bicycle and pedestrian former rail-trail that runs in and around the Lents neighborhood and a section of Portland’s 40 Mile Loop trail system * Worked on beautification projects with the Lents Springwater Habitat Restoration Project, Kelly Elementary School, and the local high school such as habitat restoration, tree planting, and resurfacing of a twelve-block section of the trail |
| Relational | * Developed more than 20 strategic community partnerships * Divided into pilot specific collaborations (steering committees) to achieve multiple set goals at once * Collaborated with Safe Routes to School |
| Individual | * Provided a comment period for community members regarding the changes they would like to see included in the Damascus/Boring Concept Plan * Implemented an awareness event around each project * Implemented themed tours along walking paths, such as gardens and neighborhood history * Implemented an annual stroll/bike ride for seniors and a separate one for women, targeting two audiences that have showed lower levels of participation in active transportation |

## Jackson, michigan

### Community Profile

Jackson, Michigan has a population of 33,500, and is 10.87 square miles. There are 3,000 people per square mile (U.S. Census, 2016). The median household income is $28,087.00 (U.S. Census, 2016). The community has been promoted as an excellent example of cycling and pedestrian initaitives. Jackson implemented its active transportation initiative, Project U-Turn, in 2002 (Hendricks et al., 2009; City of Jackson, 2013) with fund-raising efforts over $2 million.

### Social Ecological Model Assessment

An assessment of active transportation strategies employed in Jackson, Michigan analyzed through the SEM is included in Table 3.

Table 3. Social Ecological Assessment of Active Transportation in Jackson, Michigan

|  |  |
| --- | --- |
| **Social Ecological Level** | **Strategy**  (Source: Hendricks, Wilkerson, Vogt, & TenBrick, 2009) |
| Societal | * Developed a new city transportation master plan including active living principles and non-motorized transportation * Created a school district wellness project, which mandated policy for safe routes to school * Received Safe Routes to School grant to support new sidewalks and bike racks at elementary schools * Passed a Complete Street resolution- a Complete Streets policy refers to policy that directs the community’s transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation * Secured funding for a community a bike recycling and education program for parolees |
| Community | * Installed sidewalks * Coordinated more than 60 crosswalks * Added new bike lanes * Installed bike racks on public buses * The elementary school children collaborated with the Safe Routes to School program to build community-level support for the active transportation initiative among their peers; Safe Route to School provided education to parents and students, advocacy for physical changes around the school, and walking/biking encouragement * Designed the Cool Bus-concept for a bus interior and exterior as well as a special evening route to popular youth destinations (e.g., movies, mall) |
| Relational | * Developed a coalition of 20 interdisciplinary members called the Walkable Communities Task Force, serving as an advisory council to the Mayor * Developed a permanent advisory committee: Walkable Communities Task Force * Task force led by non-profit organization called Fitness Council of Jackson * Defined target groups: Children, Working Adults * Established a school district Safe Routes to School Coordinator |
| Individual | * Provided working-age adults with maps, bike facilities such as racks and lockers, and bikes for employees to borrow through pilot project called Foot Energy * Offered working-age adults a city-wide promotional event called Smart Commute Day— community businesses agreed to participate in a competition with other businesses, and the winner was determined by the business with the most employees choosing active transportation over motorized vehicles * Planned a variety of activities surrounding annual Walk to School Day * Provided parolees with a bike, helmet, and street riding lessons through Michigan Prisoner Reentry Initiative |

## Columbia, missouri

### Community Profile

Columbia is a Missouri city with a population of 110,500, sized at 635 square miles, with 1,700 people per square mile (U.S. Census, 2016). The average annual household income of residents is $45,907 (U.S. Census, 2016). This city introduced an active transportation initiative, GetAbout Columbia, when they were awarded a Federal Highway Administration’s Non-Motorized Transportation Pilot program of $20 million in 2005 (City of Columbia, Missouri, 2013).

### Social Ecological Model Assessment

An assessment of active transportation strategies employed in Columbia, Missouri analyzed through the SEM is included in Table 4.

Table 4. Social Ecological Assessment of Active Transportation in Columbia, Missouri

|  |  |
| --- | --- |
| **Social Ecological Level** | **Strategy**  (Source: Sayers et al., 2012) |
| Societal | * Initiative began within its government, which gave it immediate political support, for example movement for sales tax and acquisition of federal funding * Awarded a $22 million Federal Nonmotorized Transportation Pilot Program grant to plan, build, and promote use of a network of pedestrian, bike, and wheelchair accessible paths throughout the city * Obtained a $3.5 million voter-approved city sales tax for the street design standards initiative * Passed a Complete Streets ordinance- a Complete Streets policy refers to policy that directs the community’s transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation * Passed a Street Standards ordinance * Incorporated Columbia’s active living initiative in the regional transportation plan |
| Community | * Utilized initial federal grant dollars to make infrastructure improvements: Sidewalks, trails, Connecting bike and walking infrastructure to existing street infrastructure * Created a 1-mile Douglass Neighborhood Trail in a lower income area * Converted a regular crosswalk into a “Flag Crosswalk” and installed push-button-activated crosswalk lights over Stadium Boulevard at College Park and Rollins Road Increase in school wide activity program * Institutionalized the Walking School Bus program and supported Missouri’s Safe Routes to School program |
| Relational | * Developed partnerships with community stakeholders * Hired a Bike/Pedestrian Coordinator position to GetAbout Columbia initiative * Established the Department of Non-Motorized Transportation |
| Individual | * Disseminated educational and motivational messages through radio advertisements, print media, and posters displayed throughout the community |
|  |  |

## cleveland, ohio

### Community Profile

Cleveland, Ohio has a total population of 396,806 people, measuring 77.7 square miles, with 5,107.2 people per square mile (U.S Census, 2016). The average annual household income of residents is $27,551 (U.S Census, 2016). The city is an urban environment. Cleveland began the initiative, “A Community on the Move” in 2003 (Miller and Scofield, 2009).

### Social Ecological Model Assessment

An assessment of active transportation strategies employed in Cleveland, Ohio analyzed through the SEM is included in Table 5.

Table 5. Social Ecological Assessment of Active Transportation in Cleveland, Ohio

|  |  |
| --- | --- |
| **Social Ecological Level** | **Strategy**  (Source: Miller & Scofield, 2009) |
| Societal | * Developed a pedestrian/bike/public transit master plan, “Transportation for livable communities” * Incorporated opportunities for physical activity into the school facilities plan * Obtained approval and funding to support pedestrian and bike improvements * Funded mini-grants to community partners that were setting up their own walk/pedestrian programs * Passed a Complete Streets resolution- a Complete Streets policy refers to policy that directs the community’s transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation |
| Community | * Improved pedestrian and bicycle access to East 55th at Rapid Station to increase access to public transportation * Improved pedestrian and bicycle access to the Broadway-Miles intersection, with its high-speed traffic and barriers to connections between neighborhoods, parks, and trails. * Rebuilt the Foot Bridge, a pedestrian bridge connecting two neighborhoods * Constructed a new park and trail, the Mill Creek Park, Trail and Waterfall * Made improvements to Hyacinth Park and Trail, including some reconstruction and a public art project * Developed the Morgana Run Trail and Washington Park Reservation Trail through a “rails-to-trails” project to create a safe place for active transportation * Installed amenities along public trails, including public art, benches, lighting, trash bins * Provided input into the design of 2 new schools |
| Relational | * Developed Connecting Cleveland Partnerships, as a lead agency, a non-, comprised of the Broadway Area Housing Coalition and the Slavic Village Broadway Development Corporation * Formed a subcommittee of the Mayor’s Bike/Pedestrian Advisory Committee to establish Local Design Standards for Complete Streets requiring specific bike and pedestrian accommodations in all infrastructure projects * Defined target groups: school and work audience |
| Individual | * Developed Cleveland-wide Community on the Move social-marketing plan * Developed trail maps for community members * Promoted trail awareness and respect through grassroots advocacy efforts, encouraging trail safety and etiquette |

## Allegheny County, Pennsylvania

### Community Profile

Allegheny County is located in southwestern Pennsylvania (PA) and covers 730 square miles, accounting for 1.6% of Pennsylvania’s total land area (U.S. Census, 2016). Allegheny County is located in a portion of the Appalachian Plateau. The plateau surface is dissected by valleys, which covers about 50-70% of the area (“Pittsburgh: Economy”, 2018). Known for many bridges and tunnels, Pittsburgh is located where the Allegheny and Monongahela rivers meet to form the Ohio River.

Allegheny County is the second most populous county in Pennsylvania (U.S. Census, 2016). In 2016, the estimated population of the County was 1,225,365 people, which represents 9.6% of Pennsylvania’s total population. According to census data, the majority of Allegheny County residents are White (81.5%), 13.5% of residents are Black, 2.1% are Asian, 0.5% were categorized as other race, and 1.8% were two or more races. Approximately 1.8% of the population was Hispanic (U.S. Census, 2016). 19.8% of Allegheny County residents were less than 18 years old and 16.8% of Allegheny County residents were 65 years or older, which was higher than the national percentage of 13.0% (U.S. Census, 2016).

Public transportation options are available, and connect people living outside the city with a downtown area that covers 50 acres. Port Authority of Allegheny County services link the downtown and surrounding neighborhoods using various public transit options, including more than 875 buses, 80 light rail vehicles (known as “the T”), and two inclines (Port Authority, 2016). In January 2018, Port Authority of Allegheny County changed from a two-tiered fare system that charged $2.50 for shorter rides and $3.75 for longer rides to a flat $2.50 fare for riders who use the prepaid ConnectCard and $2.75 for cash.

The 2012 American Community Survey revealed that 29.2% of Pittsburgh residents walk, bike, or use public transit when travelling to work. Further breakdown reveals, 1.4% bike to work, 10.6% walk and 17.2% take mass transit (American Community Survey, 2012). Echoing these findings, Port Authority of Allegheny County has reported that about 230,000 people use public transportation services every weekday. Bus trips account for about 180,000 of 214,000 riders on a typical weekday. Light rail accounts for about 28,000 rides per day.

While Port Authority has reported a slight decrease in evening bus ridership, which the agency has attributed to ride-sharing services, they have seen an increase in rush-hour ridership. Overall, this has accounted for a 0.6% decline in ridership since 2016, a smaller decline than the national average of 3.17% in bus ridership for the 37 largest bus agencies in the country.

### Community Need

**Physical Activity**

Allegheny County faces pressing public health issues, especially in obesity and chronic disease. Preventable chronic diseases, including cancer, heart disease, and stroke, account for 71% of deaths in the County (ACHD, 2010). Rates for diabetes and cardiovascular disease are also higher in Allegheny County than the state and nation as a whole (ACHD, 2010).

In Allegheny County, 62% or almost two-thirds of adults ages 18-64 are overweight or obese (ACHD, 2010). Additionally, 31.8%, or almost one-third of children in the County ages 2-19 are overweight or obese (ACHD, 2010). There are also significant disparities in obesity between racial/ethnic and socioeconomic groups, with Black adults significantly more likely to be obese compared to white adults (ACHD, 2010).

Obesity and associated chronic disease can be prevented by physical activity, but many residents do not achieve adequate levels of physical activity. In fact, 11% of County residents reported not engaging in moderate or vigorous physical activity in a typical week, putting them at increased risk for obesity and chronic diseases like diabetes and heart disease (ACHD, 2010; Physical Activity Guidelines Advisory Committee, 2008). Black adults and adults with low income or education were less likely to be physically active compared to white adults and those with more income and education (ACHD, 2010; Physical Activity Guidelines Advisory Committee, 2008).

While Pittsburgh is often described as a “bike friendly city”, Pittsburgh and other parts of the County still lack adequate infrastructure for active transportation, including in inadequate bike parking facilities and failure to consistently incorporate bicycle infrastructure, sidewalks, and crosswalks into new developments (Allegheny County Department of Economic Development, 2014). While Allegheny County is home to two state parks and nine county parks that provide opportunities for physical activity, Allegheny Places noted that access to these green spaces is inhibited by lack of sufficient public transit access to County parks, outdated and inadequate park equipment and facilities, and insufficient connectivity of trails (Allegheny County Department of Economic Development, 2014). This likely influences physical activity levels found among County residents.

**Motor Vehicle Accidents**

Allegheny County has the highest rate of reportable crashes in the state of Pennsylvania. In 2015, there were 12,735 reported crashes from all causes in Allegheny County. This is an increase of 552 crashes from 2014 (ACHD, 2016). While crashes increased, the number of traffic fatalities reduced from 121 in 2014 to 114 in 2015 in the County. This is a multi-year trend and fatalities are lower than ever recorded since PennDOT began keeping records. Pedestrian-related crashes represent 3.3% (ACHD, 2016).

**Environment**

Air quality has greatly improved in Allegheny County over time. However, the County remains among the top ten worst counties for air quality in the United States, according to the American Lung Association (ALA, 2014). Criteria air pollutants (CAPs) are measured when studying air pollution. CAPs include particulate matter (PM), ozone, nitrogen dioxide (NO2), carbon monoxide (CO), lead, and sulfur dioxide (SO2). Reported levels for four criteria pollutants increased in 2014. CO emissions increased 5.9% countywide; NO2 emissions increased 5.7%, SO2 emissions increased 42.9%, and PM increased 14.7%. Notably, diesel- and gasoline-burning trucks and cars can be sources of PM, and PM concentrations are commonly elevated along major roadways.

**Mental Health**

According to self-reported data, 18.2% of Allegheny County residents reported being diagnosed with a form of depression, in line with 18% of Pennsylvania residents and 17.6% of United States residents in 2010 (ACHD, 2015). In 2010, 43% of Allegheny County adults said that they had at least one poor mental health day in the previous month. Women, Adults 44 years and older, and Black adults were more likely to report at least one poor mental health day (ACHD, 2015).

### Recent Initiatives

Several recent policies, plans, and programs have been employed at the local level support planning and implementation for active transportation in Allegheny County. These are described in the following section. Strategies are included in the context of the SEM in the following table (Table 7).

The Allegheny County Health Department (ACHD) has utilized the lens of Health in all Policies to support and improve the consideration of health impacts during transportation design across Allegheny County (NACCHO, 2017). This has resulted in active transportation planning within the Transit-Oriented Development Guidelines, Complete Streets Policy, and the Plan for a Healthier Allegheny.

In April 2016, Port Authority of Allegheny County released Transit-Oriented Development (TOD) Guidelines, to provide the entire community of TOD stakeholders with a common frame of reference (Port Authority, 2016). Transit-oriented development is deliberately planned, higher-density, mixed-use development within walking distance of a transit station. Port Authority embraced the creation of TODs with the goal to provide several benefits to the community including: increased transit ridership, economic development, diverse transportation choices, stable property value, and reduced air pollution. During the creation of the TODs, ACHD aided Port Authority in the inclusion language regarding public health impacts. This language can be found in the TOD Goals and Principles section (Port Authority, 2016).

Subsequently, on April 2, 2017, Pittsburgh City Council passed the Complete Streets Policy for the City of Pittsburgh (City of Pittsburgh, 2018). A Complete Streets policy aids the community to ensure that the right of way enables safe access for all users. ACHD offered comments to the Complete Streets Advisory Group during the drafting phase of the Complete Streets Policy, to ensure the inclusion of public health as a key principal (City of Pittsburgh, 2018). The policy aims to, “create a safe, accessible, and livable mobility network for users of all ages and abilities including, but not limited to, pedestrians, bicyclists, motorists, transit riders and freight carriers.” The Complete Streets Policy does not require immediate restructuring of roadways, but improvement over time as roadways are maintained created (City of Pittsburgh, 2018).

The Plan for a Healthier Allegheny, the 5-year community health improvement plan developed by the Allegheny County Health Department (ACHD), has mobilized a Transportation Subcommittee which has strategized five objectives to improve County transportation regarding healthcare access and chronic disease (ACHD, 2015). The value of the subcommittee has resulted in collaborative efforts with several County stakeholders as well the momentum to undertake additional interventions and measurably improve the health of County residents. Strategies of the Plan for a Healthier Allegheny relevant to active transportation are included in Table 6.

Table 6. Strategies of the Plan for a Healthier Allegheny Relevant to Active Transportation

|  |  |
| --- | --- |
| **Strategy**  **Number** | **Strategy**  **(Source: ACHD, 2017)** |
| **Strategy 1.4.1** | Conduct assessment of multi-modal transportation options in Allegheny County (sidewalks, paratransit, bike routes, bike shares, car shares) |
| **Strategy 1.4.2** | Assess ways to improve visibility of public and private transportation options for both consumers and providers |
| **Strategy 1.4.3** | Work with providers and consumers to prioritize transportation considerations for healthcare decision making |
| **Strategy 1.4.4** | Develop public health and transportation collaborative interventions based upon gaps/barriers identified in multi-modal transportation assessment (car seats, family support center vans, concierge service, other use of vans for Uber) |
| **Strategy 1.4.5** | Provide resources for design and integration of active, safe, walkable/bikeable spaces into municipalities |

On the community level, Live Well Allegheny is an initiative to improve the health and wellness of county residents through a collaborative effort that involves multiple stakeholders, partners and residents (Live Well Allegheny, 2018). Communities, schools and businesses are encouraged to gain “Live Well” status so they can contribute to the goal to make Allegheny County the “healthiest county’ in the nation.” Specifically, Live Well focuses on obesity prevention and physical activity promotion. There are currently 55 communities (out of 130 total municipalities in Allegheny County), 14 school districts (out of 42 total school districts in Allegheny County), 45 restaurants, and 16 workplaces committed to the Live Well mission (Live Well Allegheny, 2018).

A recent effort of Live Well Allegheny was a joint initiative with Allegheny County Economic Development (ACED), which helps communities increase opportunities for their residents to be physically active. Recent funding from the Richard King Mellon Foundation allowed the Active Allegheny Grant Program to implement transportation projects to increase physical activity and improve access (Live Well Allegheny, 2018).

Finally, regarding promoting active transportation on the individual level, the Traffic Safety Education Project (TSEP) aims to reduce local injuries and deaths due to avoidable vehicle crashes (ACHD, n.d.). Programming, information, education, and collaboration is provided in Allegheny County through a grant from the Pennsylvania Department of Transportation. A number of traffic safety services are offered free-of-charge to community residents and groups, including pedestrian safety promotion and bicycle safety education (ACHD, n.d.).

### Social Ecological Model Assessment

An assessment of active transportation strategies employed in Allegheny County, Pennsylvania analyzed through the SEM is included in Table 7.

Table 7. Social Ecological Assessment of Active Transportation in Allegheny County, Pennsylvania

|  |  |
| --- | --- |
| **Social Ecological Level** | **Strategy** |
| Societal | * Utilized the lens of Health in all Policies to support and improve the consideration of health impacts during transportation design across Allegheny County * Released Transit-Oriented Development (TOD) Guidelines, to provide the entire community of TOD stakeholders with a common frame of reference * Passed Complete Streets Policy was adopted by the Planning Commission and recommended for City Council to adopt * Provided financial assistance to communities to develop plans and design transportation projects to increase residents’ opportunities for physical activity and provide |
| Community | * Launched Live Well Allegheny—an initiative to improve the health and wellness of county residents through a collaborative effort that involves multiple stakeholders, partners and residents—communities, school and business are encouraged to gain “Live Well” status so they can contribute to the goal to make Allegheny County the “healthiest county’ in the nation * Helped communities develop plans and design transportation projects to increase residents’ opportunities for physical activity and provide connections to important local destinations and transportation systems |
| Relational | * Mobilized a Transportation Subcommittee which has strategized five objectives to improve County transportation regarding healthcare access and chronic disease |
| Individual | * Implemented the Traffic Safety Education Project (TSEP), which aims education individuals and reduce local injuries and deaths due to avoidable vehicle crashes |

## SOcial ecological model assessment

Strategies were compared by SEM level to further reveal similarities among successful initiatives in Tables 8-11. These tables are further broken down in the Appendix, with further comparable detail (Tables 12-15).

### Societal-Level

Table 8: Comparison of Societal-Level Initiatives in the Four Cities under Study

|  |  |
| --- | --- |
| **Community** | **Strategy** |
| Portland, OR | * Began initiative by developing the Damascus/Boring Concept Plan with Clackamas County Portland Metropolitan Government, Oregon Department of Transportation, and area organizations, including goals and design concepts for development of transportation systems and zoning ordinances * Secured $400,000 in grant funding and over $1 million in private or in-kind funding * Supported efforts to develop urban growth boundaries * Served on the Community Advisory Committee to make zoning changes and dictate land use, making communities more accessible for bike and pedestrian commuters * Passed a Complete Streets ordinance |
| Jackson, MI | * Developed a new city transportation master plan including active living principles and non-motorized transportation * Created a school district wellness project, which mandated policy for safe routes to school * Received Safe Routes to School grant to support new sidewalks and bike racks at elementary schools * Passed a Complete Street resolution |
| Columbia, MO | * Initiative began within its government, which gave it immediate political support, for example movement for sales tax and acquisition of federal funding * Awarded a $22 million Federal Nonmotorized Transportation Pilot Program grant to plan, build, and promote use of a network of pedestrian, bike, and wheelchair accessible paths throughout the city * Obtained a $3.5 million voter-approved city sales tax for the street design standards initiative * Passed a Complete Streets ordinance * Passed a Street Standards ordinance * Incorporated Columbia’s active living initiative in the regional transportation plan |
| Cleveland, OH | * Developed a pedestrian/bike/public transit master plan, “Transportation for livable communities” * Incorporated opportunities for physical activity into the school facilities plan * Obtained approval and funding to support pedestrian and bike improvements * Funded mini-grants to community partners that were setting up their own walk/pedestrian programs * Passed a Complete Streets resolution |
| Allegheny County, PA | * Utilized the lens of Health in all Policies to support and improve the consideration of health impacts during transportation design across Allegheny County * Released Transit-Oriented Development (TOD) Guidelines, to provide the entire community of TOD stakeholders with a common frame of reference * Passed Complete Streets Policy was adopted by the Planning Commission and recommended for City Council to adopt * Provided financial assistance to communities to develop plans and design transportation projects to increase residents’ opportunities for physical activity and provide |

### Community-Level

Table 9: Comparison of Community-Level Initiatives in the Four Cities under Study

|  |  |
| --- | --- |
| **Community** | **Strategy** |
| Portland, OR | * Assessed community active transportation infrastructure needs every five years beginning in 1990 * Advised on the implementation of bike lanes and sidewalks * Advised on the implementation of upgrades to local trail networks * Hired a planning and design company to conduct a trailhead study to find a site for the trailhead of the Springwater Corridor Trail that is easily visible and accessible by the community * Improved the Springwater Corridor Trail, a bicycle and pedestrian former rail-trail that runs in and around the Lents neighborhood and a section of Portland’s 40 Mile Loop trail system * Worked on beautification projects with the Lents Springwater Habitat Restoration Project, Kelly Elementary School, and the local high school such as habitat restoration, tree planting, and resurfacing of a twelve-block section of the trail |
| Jackson, MI | * Installed sidewalks * Coordinated more than 60 crosswalks * Added new bike lanes * Installed bike racks on public buses * The elementary school children collaborated with the Safe Routes to School program to build community-level support for the active transportation initiative among their peers; Safe Route to School provided education to parents and students, advocacy for physical changes around the school, and walking/biking encouragement * Designed the Cool Bus-concept for a bus interior and exterior as well as a special evening route to popular youth destinations (e.g., movies, mall) |
| Columbia, MO | * Utilized initial federal grant dollars to make infrastructure improvements: Sidewalks, trails, Connecting bike and walking infrastructure to existing street infrastructure * Created a 1-mile Douglass Neighborhood Trail in a lower income area * Converted a regular crosswalk into a “Flag Crosswalk” and installed push-button-activated crosswalk lights over Stadium Boulevard at College Park and Rollins Road Increase in school wide activity program * Institutionalized the Walking School Bus program and supported Missouri’s Safe Routes to School program |
| Cleveland, OH | * Improved pedestrian and bicycle access to East 55th at Rapid Station to increase access to public transportation * Improved pedestrian and bicycle access to the Broadway-Miles intersection, with its high-speed traffic and barriers to connections between neighborhoods, parks, and trails. * Rebuilt the Foot Bridge, a pedestrian bridge connecting two neighborhoods * Constructed a new park and trail, the Mill Creek Park, Trail and Waterfall * Made improvements to Hyacinth Park and Trail, including some reconstruction and a public art project * Developed the Morgana Run Trail and Washington Park Reservation Trail through a “rails-to-trails” project to create a safe place for active transportation * Installed amenities along public trails, including public art, benches, lighting, trash bins * Provided input into the design of 2 new schools |
| Allegheny County, PA | * Launched Live Well Allegheny—an initiative to improve the health and wellness of county residents through a collaborative effort that involves multiple stakeholders, partners and residents—communities, school and business are encouraged to gain “Live Well” status so they can contribute to the goal to make Allegheny County the “healthiest county’ in the nation * Helped communities develop plans and design transportation projects to increase residents’ opportunities for physical activity and provide connections to important local destinations and transportation systems |

**Table 9** Continued

### Relational-Level

Table 10: Comparison of Relational-Level Initiatives in the Four Cities under Study

|  |  |
| --- | --- |
| **Community** | **Strategy** |
| Portland, OR | * Developed more than 20 strategic community partnerships * Divided into pilot specific collaborations (steering committees) to achieve multiple set goals at once * Collaborated with Safe Routes to School |
| Jackson, MI | * Developed a coalition of 20 interdisciplinary members called the Walkable Communities Task Force, serving as an advisory council to the Mayor * Task force led by non-profit organization called Fitness Council of Jackson * Defined target groups: Children, Working Adults |
| Columbia, MO | * Developed partnerships with community stakeholders * Hired a Bike/Pedestrian Coordinator position to GetAbout Columbia initiative * Established the Department of Non-Motorized Transportation |
| Cleveland, OH | * Developed Connecting Cleveland Partnerships, as a lead agency, a non-, comprised of the Broadway Area Housing Coalition and the Slavic Village Broadway Development Corporation * Formed a subcommittee of the Mayor’s Bike/Pedestrian Advisory Committee to establish Local Design Standards for Complete Streets requiring specific bike and pedestrian accommodations in all infrastructure projects * Defined target groups: school and work audience |
| Allegheny County, PA | * Mobilized a Transportation Subcommittee which has strategized five objectives to improve County transportation regarding healthcare access and chronic disease |

### Interpersonal-Level

Table 11: Comparison of Interpersonal-Level Initiatives in the Four Cities under Study

|  |  |
| --- | --- |
| **Community** | **Strategy** |
| Portland, OR | * Provided a comment period for community members regarding the changes they would like to see included in the Damascus/Boring Concept Plan * Implemented an awareness event around each project * Implemented themed tours along walking paths, such as gardens and neighborhood history * Hosted a stroll/bike ride for seniors and a separate one for women, targeting two audiences that have showed lower levels of participation in active transportation |
| Jackson, MI | * Provided working-age adults with maps, bike facilities such as racks and lockers, and bikes for employees to borrow through pilot project called Foot Energy * Offered working-age adults a city-wide promotional event called Smart Commute Day— community businesses agreed to participate in a competition with other businesses, and the winner was determined by the business with the most employees choosing active transportation over motorized vehicles * Planned a variety of activities surrounding annual Walk to School Day * Provided parolees with a bike, helmet, and street riding lessons through Michigan Prisoner Reentry Initiative |
| Columbia, MO | * Disseminated educational and motivational messages through radio advertisements, print media, and posters displayed throughout the community |
| Cleveland, OH | * Developed Cleveland-wide Community on the Move social-marketing plan * Developed trail maps for community members * Promoted trail awareness and respect through grassroots advocacy efforts, encouraging trail safety and etiquette |
| Allegheny County, PA | * Implemented the Traffic Safety Education Project (TSEP), which aims education individuals and reduce local injuries and deaths due to avoidable vehicle crashes |

# discussion

As a review of the literature indicates and many community initiatives support, active transportation has the ability to promote health through improved physical activity, reduced traffic fatalities, improved air quality, and improved mental health. Each community reviewed had active transportation strategies at every level of the SEM, indicating that it is an appropriate model for designing successful active transportation initiatives. In addition, the case study review revealed best practices. I will discuss these best practices and determine which strategies would be appropriate for application in Allegheny County. Recommendations will follow this analysis.

## best practices by SOcial ecological model level

When examining the societal level of the SEM (Tables 8 and 12), it is clear that these successful initiatives all began with a defined planning period. Dedicating time to assemble a team, determine goals, and gather resources ensures that the conditions are in place to reach sustainable improvement. A review of the literature supports “capacity building” for optimal interventions, and Hawe et al. defined this as, “an approach to the development of sustainable skills, organizational structures, resources and commitment to health improvement to prolong and multiply health gains many times over.” All four communities developed a comprehensive plan, an organizational structure, and goals that would guide the initiative. When considering active transportation initiatives, equity in decision making is a critical consideration. Active transportation has the opportunity to ensure equity, “the distribution of benefits and costs over members of society” (Miller, 1999, p. 187), especially among those who are not able to drive or bicycle. It is crucial to ensure that equity issues are taken into consideration at the planning stage. Uniquely, Portland allowed community members the chance to provide input during the plan development phase, including individuals from the beginning and likely increasing buy-in. In addition, active transportation initiatives were given creative titles (such as “GetAbout Columbia”), which would prove a unifying tool, especially when partnerships were developed or when activities were promoted to the public.

With a unified plan, each community motivated policy change and secured funding, setting the environmental landscape to support changes at the community and individual levels. My literature review indicates that initiatives have pursued many strategies to fund active transportation projects. These include partnerships with both public agencies (such as health departments) and private entities (such as corporations and foundations). Community partnerships likely helped facilitate the ability to secure funding through multiple streams. Columbia employed a unique funding stream, a $3.5 million voter-approved city sales tax for the street design standards initiative. Other communities have also employed similar strategies. For example, Seattle, Washington established Seattle Parks District with taxing authority, and Houston, passed an ordinance requiring development to include parks in their plans or pay a fine (Bors, 2009).

Regarding policy initiatives, all communities of study employed Complete Streets resolutions. A review of the literature indicates that Complete Streets have many benefits, including increased safety and physical activity. Infrastructure improvements (e.g.., sidewalks or crosswalks), allow for physical activity across all ages and socioeconomic statuses. Complete Streets not only support better health for all residents, but are an investment. A review of Complete Streets passed across the United States found economic impacts such as higher property values and higher rates of employment. In addition, the review found that safety improvements saved $18.1 million over the course of one year through reduction in collision and injury costs (Geoff, 2015). Many states and communities are already passing complete streets policies. According to Smart Growth America, 712 jurisdictions nationwide have Complete Streets policies in place (including states, regional planning organizations, counties, municipalities) (Geoff, 2015).

Community-level strategies (Tables 9 and 13) targeted infrastructure and varied the most, likely due to the specific needs of the target population. For example, one program (Jackson, MI) served people who were recently released from prison, while another program (Portland, OR) served working commuters. For this reason, several of the communities defined the target population and developed program surrounding their unique needs. Each program, however, worked to empower community non-profit organizations to provide services to the community. Comparing program-related activities reveals that many communities were involved with Safe Routes to School. In a study 570 schools, Orenstein (2007) reports that the promotion of safe routes to school for children resulted in a 6-25% increase in walking and cycling. Investing in a needs assessments to identify high-priority projects likely enhanced the magnitude of effects from infrastructure projects in Portland. Portland assessed community active transportation infrastructure needs every five years and conducted a trailhead study to determine the site for a new trailhead.

Transport infrastructure is expensive but may be necessary given healthcare spending due to the health impacts of little physical activity and growing rates of obesity. Findings from a 2008 systematic review revealed cost effectiveness of walking and cycling infrastructure interventions. In addition, literature supports that environments considered walkable “facilitating walking through higher destination accessibility, street connectivity, presence and quality of active transport infrastructure, etc.” (Smith, 2017) are associated with higher rates of physical activity. Further, Yang et al. reported an increase in cycling after cycling infrastructure improvements (Yang 2010).

For successful initiatives, partnerships and leadership within the analyzed communities were paramount (Tables 10 and 14). A coalition can be an effective means to achieve a coordinated approach to promoting public health change. A review of the literature indicates that community coalitions are increasingly utilized to address public health issues at the local level (Geoff, 2015). A coalition of diverse members working towards a singular goal combine resources of many independent sources. Thus, coalitions enable a larger scope of expertise. By collaborating around a specific goal, coalitions offer the opportunity to coordinate services and limit duplication of efforts. Diverse membership also offers avenues to develop and increase public support or buy-in for the cause.

Despite the considerable challenges inherent with collaboration, multidisciplinary partnerships within the communities of study generated important outcomes in a short period of time and in a variety of settings. These partnerships were opportunities for joint efforts among partners who had various goals. For example, health professionals supported bicycling as a form of active transportation while conservationists hoped to reduce carbon emissions by reducing motor vehicle trips. The most productive partnerships had strong leaders, although leaders differed from within local government to community non-profit organizations. In fact, a variety of organizations successfully led these partnerships, including public health departments, healthcare providers, local governments, community development corporations, environmental advocacy groups, academic institutions, and trails organizations. The development of subcommittees and leadership boards facilitated the development of simultaneous projects.

Strategies targeting individual behavior change (Tables 11 and 15) tended to include health promotion activities aimed to increase awareness and engagement in active transportation. (Table 11). The communities employed various awareness events and social marketing plans. Some communities, e.g., (Jackson, MI), had the events regularly such as once or twice a year, but other communities had them with the introduction of a new project (Portland, OR). Changes in the built environment often do not occur in isolation. For example, infrastructural interventions may have associated social media campaigns or to support behavior change (Hunter, 2014). In one systematic review of 28 studies, Pucher (2009) reported that all studies that combined built environment and physical activity promotion efforts led to increased engagement of community members, whereas only 50% of the infrastructure interventions showed a positive impact on activity.

## Allegheny county implications

When comparing Allegheny County’s recent initiatives to the best practices of the other four communities, some similarities exist, and Allegheny County has made strides on many SEM levels. On the societal level, Allegheny County has gained support from local government agencies to ensure the success of active transportation initiatives. Policy reform has been one of the strongest aspects of the County’s efforts. With the Allegheny County Health Department’s commitment to the Health in All Policies lens, the Port Authority of Allegheny County’s Transit-Oriented Development Guidelines and the passing of the Complete Streets Policy, efforts are certainly supported from an environmental aspect. In addition, funding for the Active Allegheny Grants Program from the Richard King Mellon Foundation will provide resources to the community to reach goals. Success is also seen on the community level; Live Well Allegheny and the Active Allegheny Grants Program have built community coalitions and aided communities to design and plan for change. Relationships have also proved critical to success, as efforts are being led by The Plan for a Healthier Allegheny’s Transportation Subcommittee, a group of community stakeholders led by local government leadership. Finally, programs such as the Traffic Safety Education Project have started to promote the idea of safe transportation to individuals in the community.

However, given the situation in Allegheny County, with 62% of adults overweight, a continuing rise in increase in air pollution, over 10,000 reported motor vehicle crashes, and over 18% of adults reporting depression, Allegheny County needs to expand efforts within each level of the SEM to ensure a comprehensive active transportation initiative that will have profound impact on the health of residents.

From the societal perspective, I recommend that Allegheny County develop a comprehensive active transportation plan, defining community need, determining the target population (and any vulnerable populations to ensure equity), finalizing goals and strategies, and setting the time period. To date, many projects are occurring, however there is no unifying plan or set of goals. Therefore, progress is not measured on a larger scale. Overarching project goals should include, but not be limited to: securing funding and political support, optimizing existing community assets to provide multiple mobility options and prioritize connections to jobs and education, developing partnerships to support goals, and promoting and incentivizing active transportation modes. To ensure that the plan is diverse in its scope and meets the needs of its stakeholders (the residents of the County), development of the plan should include a community comment period. With the plan set, Allegheny County should unite the mission with a creative title. This will allow the County to pursue funding streams to sustain infrastructure projects (discussed below). While Allegheny County already has a number of policy accomplishments, the County can continue to explore land use policies to make bike/pedestrian commuting safer and more accessible.

At the community level, infrastructure projects would ensure that the appropriate systems are in place to allow for active transportation modes. This process would begin with an inventory of needs including current sidewalks, bicycle facilities, recreational trails, and shared-use paths. Once the needs assessment is complete and prioritizes actions, development should promote safe and convenient opportunities for physical activity by supporting active transportation infrastructure, such as: well-lit sidewalks, shared-use paths, and recreational trails, safe roadway crossings, bicycle-supporting infrastructure including shared-use paths and interventions that reduce motor vehicle traffic and vehicle speed on neighborhood streets (e.g. bicycle boulevards), pedestrian and bicycling connections to public transportation, safe and convenient pedestrian and bicycling connections to public park and recreation areas.

To increase commuter transit access, the County should provide coordinated, reliable rapid transit services to several prioritized areas. The area from Cranberry to Pittsburgh is one of the fastest growing corridors in the region. Congestion is growing, as new communities and job opportunities continue to increase. Yet, there is currently no public transit option connecting this area to the major job center in downtown Pittsburgh, or vice versa. There is the potential to provide coordinated, reliable rapid transit service in this corridor to meet commuter, business, and local resident demand while decreasing congestion. In addition, Washington County has been steadily growing in the last decade, due in large part to the momentum of being the hub for many shale gas operations. The route between Washington and Pittsburgh is a major commuting corridor in both directions today. Some public transit options do exist, but there is the potential to provide coordinated, reliable rapid transit service in this corridor to meet commuter, business, local resident, and visitor demand while decreasing congestion and preparing for long-term growth. Finally, The Parkway West corridor contains the region’s major airport, multiple company headquarters, significant retail destinations, post-secondary education providers, and residential areas. It is an important shared regional corridor with well-known traffic congestion issues and long-expressed desires for a better public transit connection. Furthermore, an effective, high-quality Bus Rapid Transit link between Downtown Pittsburgh and Oakland would create an attractive mass transit link between the two largest job centers in the region and stimulate development opportunities in the three-mile-long corridor.

In addition to transit improvements, the Pittsburgh region is central to more than 1,450 miles of current and planned bicycle trails throughout western Pennsylvania, eastern Ohio, northern West Virginia and the southwest corner of New York. However, there are still many gaps in these trails that keep them from being a complete network, and the region from enjoying the benefits a complete network could provide in terms of realizing the potential of this tourism and recreation asset. There are several trail projects that are in development in the region to address missing connections, such as the Ohio River Trail (Beaver and Allegheny Counties) and the Allegheny River/Three Rivers Heritage Trail (Allegheny, Butler, Armstrong, Westmoreland Counties).

To encourage mix-modal transportation modes, park-and-ride lots are one approach to providing commuter transit service in low-density outlying areas. Expanding park-and-ride capacity, particularly along routes that use the Port Authority’s T and busway network, has the potential to provide more transit access in a cost-effective manner. While bicycling has primarily been a recreational or exercise activity in the region, there is a growing interest in this mode as an active commuting option. For the education institutions and job centers in the region that are fortunate enough to have a trail nearby, there is the possibility of making it a viable commuting option through the thoughtful placement of “Park-and-Bike” lots.

Active transportation provides a unique opportunity to address the health disparities of the region. Infrastructure modifications may not only provide additional bus transit options but would ensure that public transit options stretch throughout the County, reaching businesses and schools and areas of low-income. Further, completing trails development and bike paths throughout the County ensures physical activity options for all residents, simply through active transportation modes.

Additionally, targeting the aging population of Allegheny County (which is a significantly high proportion) has the potential to increase active transportation rates. A review of the literature indicates that about 21% of Americans over 65 years of age do not drive (Berke, 2007). Unfortunately, more than half of these older nondrivers do not normally leave their home. Improved mobility through active and public transportation can foster improved quality of life and a sense of independence among older adults. In a recent study of adults over 45, more than half responded that living somewhere where it is easy to walk was “extremely” or “very important” to them. Being in a walkable neighborhood was seen as less important than being near friends, family, but was seen as more important than being near good schools, work, or transit. The preference of walking over public transportation is in line with existing research indicating that walking is far more common among older adults than public transit ridership. Consistent with this survey, a review of the literature indicates that older adults engage in less active transportation than younger adults. While older adults make up 13% of the United States population, they represent only 10% of all transportation walking trips and 6% of all transportation bicycling trips (Berke, 2007). For these reasons, it appears that the population may need focus on neighborhood walkability (for example, sidewalk improvements), and could also benefit from engagement surrounding public transit options (for example, marketing campaigns or outreach events).

To provide leadership and organization surrounding this plan, Allegheny County must form a partnership with representation from local government and non-profit organizations with diverse expertise, starting with the Plan for a Healthier Allegheny Transportation Subcommittee. Currently the committee is very government focused, but the partnership should ensure that adequate community stakeholders are involved. Committee leadership should be established by hiring a full-time coordinator responsible for building and maintaining community partnerships, managing programs, promotion, and projects surrounding the bike/walk movement. Further, the committee can be divided into several subcommittees, with one targeting each of the goals from the comprehensive active transportation plan and a leadership board can be comprised of a leader from each subcommittee. Finally, partnerships should be further explored with transportation network companies (e.g., Uber or Lyft) to provide an opportunity to improve the nature of public transit.

While these infrastructure developments could have impacts on the community, a truly lasting uptake of new behaviors will result from strong promotion and incentivizing of active transportation modes. To that end, a marketing plan to supplement the comprehensive plan should be established from the beginning. This plan would provide clear branding to the initiative. Further, the County should develop social marketing campaigns aimed at the target populations defined in the comprehensive plan. This can include kick-off events to launch each new program, community awareness events, marketing materials such as trail maps, and 1-page promotional documents about the health impacts of active transportation to the public. Seasonal events and media campaigns would connect with target audiences year-round. In addition, the County should disseminate print, radio, and television information. Incentivizing public/active transit may also assist in behavior change, through modifications such as strategic transit-priority traffic corridors (i.e., traffic signal prioritization, intersection modifications). The County should also ease the burden of public/active transit options by offering real-time availability information (e.g., time until arrival, availability of space) at the Park-and-Ride lots.

## study limitations

Findings can have a large impact on the transportation landscape of Allegheny County and the health of Allegheny County residents. Although the research has reached its objective of identifying best practices among active transportation initiatives and applying these findings to Allegheny County, there were some unavoidable limitations given the available resources. The report relied heavily upon the published literature of active transportation initiatives. Communities for comparison were chosen based upon the success of their initiative and ability to apply strategies to the SEM. To that end, Allegheny County is compared to communities across the nation with different economic, social, and geographical settings. While these communities offer best practices, it is important to note that these strategies must be “translated” to success in Allegheny County during active transportation policy and program development, and due to competing needs and the target population, every strategy may not be relevant or appropriate. Overall, these case studies highlight the importance of applying the SEM to planning in order to achieve success.

# conclusion

Active transportation may provide significant health benefits. People who live or work in communities with high quality opportunities for active transportation tend to own fewer vehicles, drive less, and use alternative modes (i.e. walking or bicycling) more than they would in more automobile-oriented locations (Dunn, 1999; Hamer, 2007; Luoto, 2000). Active transportation would also result in large reductions in traffic crashes and pollution emissions and increases in physical activity and mental health (Litman, 2016; Friedman, 2001; Berke, 2007).

Recent initiatives in Allegheny County have made strides towards becoming a community for active transportation. By applying the Social Ecological Model to planning and employing best practices revealed by other successful communities, Allegheny County can be more equipped to address all aspects of successful community change and ultimately promote health through active transportation. Specifically, I recommend that Allegheny County take the actions below. Priority should be placed on strategies such as the development of a comprehensive plan and the formation of a structured community partnership.

**Improve strategies at the societal level including:**

* Develop a comprehensive active transportation plan, defining community need, determining the target population, finalizing goals and strategies to meet the goals, and setting the time period;
* Goals should include, but not be limited to: optimize existing assets, prioritize connections to jobs and education, provide multiple mobility options, promote and incentivize active transportation modes;
* Allow a community comment period before finalizing the comprehensive active transportation plan;
* Utilize a creative name to unite the initiative;
* Look for funding streams to sustain infrastructure projects;
* Explore land use policies to make bike/pedestrian commuting safer and more accessible; and
* Make use of the Pennsylvania Transportation Partnership Act, giving municipalities the authority to work with business property owners to establish a “fair and reasonable” assessment to pay for transportation improvements.

**Improve strategies at the community level including:**

* Explore additional modes that Live Well Allegheny can encouraging active transportation across the Live Well communities, restaurants, school districts, and workplaces;
* Inventory infrastructure needs include current sidewalks, bicycle facilities, recreational trails, and shared-use paths;
* Promote safe and convenient opportunities for physical activity by supporting active transportation infrastructure, such as: well-lit sidewalks, shared-use paths, and recreational trails, safe roadway crossings, bicycle-supporting infrastructure including shared-use paths and interventions that reduce motor vehicle traffic and vehicle speed on neighborhood streets (e.g. bicycle boulevards), pedestrian and bicycling connections to public transportation, safe and convenient pedestrian and bicycling connections to public park and recreation areas;
* Increase commuter transit access via bus by providing coordinated, reliable rapid transit services to Cranberry (one of the fastest growing corridors in the region), Washington (steadily growing over the last decade), the airport/parkway west (well-known traffic issues and long-expressed desire for better transit);
* Increase commuter transit access via the Bus Rapid Transit link between Downtown Pittsburgh and Oakland, the two largest job centers in the region;
* Complete trail network trails beginning with the Ohio River Trail and Three Rivers Heritage Trail (both already in development);
* Expand park-and-ride capacity, particularly along routes that use Port Authority’s T and busway network;
* Develop park-and-bike lots; and
* Partner with Safe Routes to School is an essential program to any community working to develop a walkable neighborhood.

**Improve strategies at the relational level including:**

* Form a partnership (starting with the Plan for a Healthier Allegheny Transportation Subcommittee) with representation from local government and non-profit organizations with diverse expertise;
* Include community citizen representation on the committee;
* Establish committee leadership by hiring a full-time coordinator responsible for building and maintaining community partnerships, managing programs, promotion, and projects surrounding the bike/walk movement;
* Break the committee into a number of subcommittees, with one targeting each of the goals from the comprehensive active transportation plan;
* Establish a leadership board comprised of a leader from each subcommittee and the coordinator, to drive the initiative; and
* Explore partnership with transportation network companies (e.g., Uber or Lyft) to provide an opportunity to improve the nature of public transit.

**Improve strategies at the individual level including:**

* Develop a marketing plan to supplement the comprehensive plan;
* Develop social marketing campaigns aimed at the target populations defined in the comprehensive plan;
* Hold a kick-off event before the launch of every program or project introduced;
* Create community awareness events around each project;
* Developed marketing materials such as trail maps;
* Provide a number of 1-pager promotional documents about the health impacts of active transportation to the public and continue to advocate for healthy decision-making;
* Create seasonal events and media campaigns that connect with target audiences year-round;
* Disseminate print information, radio and television information, to help brand the initiative;
* Incentivize public transit through strategic transit-priority traffic corridors (i.e., traffic signal prioritization, intersection modifications); and
* Ease the use of park-and-ride by providing real-time space availability online.

APPENDIX: Comparison of active transportation strategies in the Four Cities under Study by level of the Social ecolocigal model

Table 12: Comparison of Societal-Level Initiatives in the Four Cities under Study

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Allegheny County, PA** | **Cleveland, OH** | **Columbia, MO** | **Jackson, MI** | **Portland, OR** |
| **Planning** | N/A | * Developed a pedestrian/bike/public transit master plan, “Transportation for livable communities” | * Incorporated Columbia’s active living initiative in the regional transportation plan * Initiative began within its government, which gave it immediate political support, for example movement for sales tax and acquisition of federal funding | * Developed a new city transportation master plan including active living principles and non-motorized transportation | * Began initiative by developing the Damascus/Boring Concept Plan with Clackamas County Portland Metropolitan Government, Oregon Department of Transportation, and area organizations, including goals and design concepts for development of transportation systems and zoning ordinances |
| **Funding** | * Utilized the lens of Health in all Policies to support and improve the consideration of health impacts during transportation design across Allegheny County * Provided financial assistance to communities to develop plans and design transportation projects to increase residents’ opportunities for physical activity and provide | * Obtained approval and funding to support pedestrian and bike improvements * Funded mini-grants to community partners that were setting up their own walk/pedestrian programs | * Awarded a $22 million Federal Nonmotorized Transportation Pilot Program grant to plan, build, and promote use of a network of pedestrian, bike, and wheelchair accessible paths throughout the city * Obtained a $3.5 million voter-approved city sales tax for the street design standards initiative | N/A | * Secured $400,000 in grant funding and over $1 million in private or in-kind funding |
| **Policy** | * Passed Complete Streets Policy resolution * Released Transit-Oriented Development (TOD) Guidelines, in order to provide the entire community of TOD stakeholders with a common frame of reference | * Passed a Complete Streets resolution | * Passed a Complete Streets ordinance * Passed a Street Standards ordinance | * Passed a Complete Street resolution | * Passed a Complete Streets ordinance * Served on the Community Advisory Committee to make zoning changes and dictate land use, making communities more accessible for bike and pedestrian commuters * Supported efforts to develop urban growth boundaries |
| **School Partnership** | N/A | * Incorporated opportunities for physical activity into the school facilities plan | N/A | * Created a school district wellness project, which mandated policy for safe routes to school * Received Safe Routes to School grant to support new sidewalks and bike racks at elementary schools | N/A |

**Table 12** Continued

Table 13: Comparison of Community-Level Initiatives in the Four Cities under Study

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Allegheny County, PA** | **Cleveland, OH** | **Columbia, MO** | **Jackson, MI** | **Portland, OR** |
| **Infrastructure Improvements** | N/A | * Improved pedestrian and bicycle access to East 55th at Rapid Station to increase access to public transportation * Improved pedestrian and bicycle access to the Broadway-Miles intersection, with its high-speed traffic and barriers to connections between neighborhoods, parks, and trails. * Rebuilt the Foot Bridge, a pedestrian bridge connecting two neighborhoods | * Utilized initial federal grant dollars to make infrastructure improvements: Sidewalks, trails, Connecting bike and walking infrastructure to existing street infrastructure * Converted a regular crosswalk into a “Flag Crosswalk” and installed push-button-activated crosswalk lights over Stadium Boulevard at College Park and Rollins Road Increase in school wide activity program | * Installed sidewalks * Coordinated more than 60 crosswalks * Added new bike lanes * Installed bike racks on public buses * Designed the Cool Bus-concept for a bus interior and exterior as well as a special evening route to popular youth destinations (e.g., movies, mall) | * Assessed community active transportation infrastructure needs every five years beginning in 1990 * Advised on the implementation of bike lanes and sidewalks |
| **Parks and Recreation Improvements** | N/A | * Constructed a new park and trail, the Mill Creek Park, Trail and Waterfall * Made improvements to Hyacinth Park and Trail, including some reconstruction and a public art project * Developed the Morgana Run Trail and Washington Park Reservation Trail through a “rails-to-trails” project to create a safe place for active transportation * Installed amenities along public trails, including public art, benches, lighting, trash bins | * Created a 1-mile Douglass Neighborhood Trail in a lower income area | N/A | * Advised on the implementation of upgrades to local trail networks * Hired a planning and design company to conduct a trailhead study to find a site for the trailhead of the Springwater Corridor Trail that is easily visible and accessible by the community * Improved the Springwater Corridor Trail, a bicycle and pedestrian former rail-trail that runs in and around the Lents neighborhood and a section of Portland’s 40 Mile Loop trail system * Worked on beautification projects with the Lents Springwater Habitat Restoration Project, Kelly Elementary School, and the local high school such as habitat restoration, tree planting, and resurfacing of a twelve-block section of the trail |
| **Community Partnerships** | * Launched Live Well Allegheny—an initiative to improve the health and wellness of county residents through a collaborative effort that involves multiple stakeholders, partners and residents—communities, school and business are encouraged to gain “Live Well” status so they can contribute to the goal to make Allegheny County the “healthiest county’ in the nation * Helped communities develop plans and design transportation projects to increase residents’ opportunities for physical activity and provide connections to important local destinations and transportation systems | * Provided input into the design of 2 new schools | * Institutionalized the Walking School Bus program and supported Missouri’s Safe Routes to School program | * The elementary school children collaborated with the Safe Routes to School program to build community-level support for the active transportation initiative among their peers; Safe Route to School provided education to parents and students, advocacy for physical changes around the school, and walking/biking encouragement | N/A |

**Table 13** Continued

Table 14: Comparison of Relational-Level Initiatives in the Four Cities under Study

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Allegheny County, PA** | **Cleveland, OH** | **Columbia, MO** | **Jackson, MI** | **Portland, OR** |
| **Partnerships** | N/A | * Developed Connecting Cleveland Partnerships, as a lead agency, a non-, comprised of the Broadway Area Housing Coalition and the Slavic Village Broadway Development Corporation | * Developed partnerships with community stakeholders | * Developed a coalition of 20 interdisciplinary members called the Walkable Communities Task Force, serving as an advisory council to the Mayor | * Developed more than 20 strategic community partnerships * Collaborated with Safe Routes to School |
| **Subcommittees** | * Mobilized a Transportation Subcommittee which has strategized five objectives to improve County transportation in regard to healthcare access and chronic disease | * Formed a subcommittee of the Mayor’s Bike/Pedestrian Advisory Committee to establish Local Design Standards for Complete Streets requiring specific bike and pedestrian accommodations in all infrastructure projects | * Established the Department of Non-Motorized Transportation | N/A | * Divided into pilot specific collaborations (steering committees) to achieve multiple set goals at once |
| **Target Group** | N/A | * Defined target groups: school and work audience | N/A | * Defined target groups: Children, Working Adults | N/A |
| **Leadership** | N/A | N/A | * Hired a Bike/Pedestrian Coordinator position to GetAbout Columbia initiative | * Task force led by non-profit organization called Fitness Council of Jackson | N/A |

Table 15: Comparison of Individual-Level Initiatives in the Four Cities under Study

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Allegheny County, PA** | **Cleveland, OH** | **Columbia, MO** | **Jackson, MI** | **Portland, OR** |
| **Community Engagement** | * Implemented the Traffic Safety Education Project (TSEP), which aims education individuals and reduce local injuries and deaths due to avoidable vehicle crashes | * Developed Cleveland-wide Community on the Move social-marketing plan | N/A | N/A | * Provided a comment period for community members regarding the changes they would like to see included in the Damascus/Boring Concept Plan |
| **Promotional Materials** | N/A | * Developed trail maps for community members * Promoted trail awareness and respect through grassroots advocacy efforts, encouraging trail safety and etiquette | * Disseminated educational and motivational messages through radio advertisements, print media, and posters displayed throughout the community | * Provided working-age adults with maps, bike facilities such as racks and lockers, and bikes for employees to borrow through pilot project called Foot Energy * Provided parolees with a bike, helmet, and street riding lessons through Prisoner Reentry Initiative | N/A |
| **Promotional Events** | N/A | N/A | N/A | * Planned a variety of activities surrounding Walk to School Day * Offered working-age adults a city-wide promotional event called Smart Commute Day— community businesses agreed to participate in a competition with other businesses, and the winner was determined by the business with the most employees choosing active transportation | * Implemented an awareness event around each project * Implemented themed tours along walking paths, such as gardens and neighborhood history * Hosted a stroll/bike ride for seniors and a separate one for women, targeting two audiences that have showed lower levels of participation in active transportation |

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