PLAN PERFORMANCE

PUBLIC HEALTH

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

2016 2040 RTPSCS

APPENDIX

ADOPTED | APRIL 2016

2016 2040 RTPSCS

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PLAN PERFORMANCE | PUBLIC HEALTH

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EXECUTIVE SUMMARY

Metropolitan Planning Organizations (MPOs) and Departments of Transportation (DOTs) across the country are expanding their analysis of public health due to the prevalence of chronic diseases such as obesity, hypertension, asthma and heart disease. Despite being mostly preventable, chronic diseases increase mortality rates and are responsible for increasing health care costs. Evidence shows that built environment factors and related conditions can play a role in supporting healthy behavior and reducing rates of chronic diseases.

The Southern California Association of Governments (SCAG) has a long history of considering air quality and transportation safety in the development of the Regional Transportation Plan. However, during the 2012-2035 Regional Transportation Plan/ Sustainable Communities Strategy (2012 RTP/SCS) development process, SCAG received numerous comments from public health stakeholders and direction from the Regional Council to address public health more broadly in its planning process. SCAG has taken steps to implement this direction by establishing a Public Health Subcommittee, a Public Health Working Group and developing a Public Health Work Program. To guide the integration of public health considerations into the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS), SCAG adopted the following guiding principles:

- To reflect and provide information on the ways in which investments and strategies of the 2016 RTP/SCS provide an opportunity to improve public health outcomes across the region and advance Plan goals, SCAG shall provide robust public health data and information, as feasible.
- Recognizing that public health outcomes are influenced by multiple policy elements of the plan (transportation and land use), SCAG will utilize a "Health in All Policies" approach to engage a wide range of stakeholders, support inter-agency coordination and conduct analysis across relevant plan elements as appropriate.
- Provide support and assistance as requested, to local jurisdictions interested in using the public health analysis, policy support and data from the 2016 RTP/SCS to increase competitiveness for grants and promote information sharing.
- Consolidate areas of the Plan that relate to public health in the Public Health Appendix.

This Public Health Appendix organizes and summarizes analysis completed in the Plan using a public health lens. The following framework will be used to present public health analysis in the appendix:

- Analysis of the public health impacts will be targeted to focus areas where literature supports the relationship between public health and the built environment.
- SCAG will compile performance metrics that relate to each focus area for the Plan. The reporting of these metrics will not be weighted or presented in a manner prioritizing one focus area over another.
- Metrics will be reported at the regional-level to allow for comparison between the baseline (a 2040 projection without the Plan's implementation) and the Plan itself.

Based on these guiding principles, SCAG has conducted analyses on the following seven focus areas. The 2016 RTP/SCS is expected to improve public health outcomes by supporting improvements related to the built environment in each area. These improvements will be achieved through a combination of transportation and land use changes from publicly funded investments, private sector innovations and changes in public policy.

- **Access to Essential Destinations:** Improve access for the region to a variety of essential destinations and employment hubs.
- **Affordable Housing:** Promote residential infill development with proximity to jobs and essential services in mind.
- **Air Quality:** Reduce criteria pollutants and greenhouse gas emissions by reducing vehicle miles traveled (VMT) per capita and supporting clean vehicle technologies and new mobility options. Also, promote reduced exposure to emissions through land use decisions.
- **Climate Adaptation:** Support efforts to mitigate climate change and make the region more resilient to future changes with reductions in VMT and greenhouse gas emissions.
- **Economic Opportunity:** Support economic activity by providing regional competitiveness and jobs through the construction of transportation projects.
- **Physical Activity:** Support increased rates of activity with better access to transit, improved conditions for walking and bicycling, improved access to parks and more compact development patterns.
- **Transportation Safety:** Improve transportation safety with increased rates of transit, walkable and bikeable neighborhoods, and improvements to the regional roadway network.

Following the adoption of the 2016 RTP/SCS Plan, SCAG proposes to continue to engage on the issue of public health as outlined in the Plan Implementation section of this Appendix. Plan Implementation consists of three strategies and a number of actions aimed at incorporating public health into regional planning processes, and it provides support to local agencies that are working toward healthier communities. The strategies include 1) provide leadership and facilitate collaboration, 2) develop policy and analysis tools and 3) provide regional support.

INTRODUCTION

Unlike the field of medicine, public health does not focus on individual patients or the treatment of particular diseases. Rather, public health initiatives seek to prevent disease and injury while promoting good health and prolonging life among the population as a whole. While traditionally, public health outcomes were widely believed to be soley the result of individual behaivior and access to health care, a large body of evidence now shows that many public health outcomes are highly influenced by the Social Determinants of Health (SDOH), or the circumstances in which people are born, grow up, live, work, play and age. Economic opportunities, government policies and the built environment all play a role in shaping these circumstances and influencing public health outcomes. The Office of Disease Prevention and Health Promotion's Healthy People 2020 Initiative organizes the SDOH into five key domains as shown in **FIGURE 1**.[1]

A growing body of evidence links neighborhood and built environment characteristics such as transportation and land use patterns to health behaviors that can either support or discourage healthy, active and safe lifestyles. This has led to interest, both nationally and across California, in expanding consideration of health outcomes of regional land use and transportation planning efforts. MPOs such as SCAG, which have historically analyzed air quality and transportation safety as key outcomes, are now analyzing a wider range of impacts in their long-range planning processes, including:

- Accessibility to essential destinations such as hospitals and schools
- Climate change impacts such as extreme heat events
- Regional economic opportunities influenced by transportation and land use patterns

FIGURE 1 Social Determinants of Health

Source: http://www.cproundtable.org/media/files/sdoh/CPR_SDOH_2015_Final.pdfsdoh/CPR_SDOH_2015_Final.pdf

- Physical activity through active transportation, first/last mile connections to transit and access to natural lands.

SCAG has the opportunity to provide leadership for the region by adopting a Health in All Policies (HiAP) strategy to integrate public health considerations into its planning processes through ongoing partnerships with regional partners, local public health departments and other stakeholders. HiAP is a collaborative strategy that aims to improve public health outcomes by including health considerations in the planning process across sectors and policy areas.

HiAP addresses the SDOH by encouraging transportation practitioners to work with nontraditional partners who have expertise related to public health outcomes, such as city and county public health departments.[2] For example, California's Strategic Growth Council created a HiAP Task Force in 2010, bringing together 22 state agencies and departments. The five key tenants of HiAP as defined by the California Department of Public Health include:

- Promote Health Equity and Sustainability
- Support Inter-agency Collaboration
- Benefit Multiple Partners
- Engage Stakeholders
- Create Structural or Procedural Change

SCAG seeks to promote the use of the HiAP framework into its regional planning by implementing the strategies and actions outlined in this Appendix. SCAG expects a number of benefits to be achieved through the incorporation of health into the RTP/SCS and the adoption of a HiAP strategy for the region. These include:

- Improved inter-agency coordination and new partnerships
- Improved policy analysis due to expanded co-benefit modeling
- Regional readiness for future federal and state grants and other funding sources
- A sustainable and healthy region
- Improved regional economic outcomes from health care savings
- Extended capacity for outreach and engagement

SCAG has identified seven focus areas for further analysis and implementation related to the built environment's impact on health outcomes: accessibility, affordable housing, air quality, climate adaptation, economic opportunities, physical activity and transportation safety. The goals of the 2016 RTP/SCS that support improving public health in each of the seven focus areas can be seen in **TABLE 1**.

TABLE 1 Public Health Focus Areas and Plan Goals

RTP Goals	Access to Essential Destinations	Affordable Housing	Air Quality	Climate Adaptation	Economic Opportunities	Physical Activity	Transportation Safety
Maximize mobility and accessibility for all people and goods in the region.	✓	✓			✓	✓	✓
Ensure travel safety and reliability for all people and goods in the region.	✓						✓
Preserve and ensure a sustainable regional transportation system.			✓	✓	✓	✓	
Maximize the productivity of our transportation system.	✓	✓			✓		
Protect the environment and health of our residents by improving air quality and encouraging active transportation.		✓	✓	✓		✓	✓
Actively encourage and create incentives for energy efficiency, where possible.			✓	✓	✓		
Encourage land use and growth patterns that facilitate transit and non-motorized transportation.	✓	✓	✓	✓		✓	
Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies.							✓

TABLE 2 2012 CHTS Travel Mode

Walk	Bike	School Bus	Drove/Carpool, Motorcycled	Transit & All Other Modes	Distance
79.80%	1.90%	0.80%	16.80%	0.80%	<1/4 mile
68.80%	1.70%	0.70%	27.70%	1.10%	<1/2 mile
56.70%	2.20%	0.90%	38.50%	1.80%	<3/4 mile
47.90%	2.10%	1.10%	30.60%	18.40%	<1 mile
20.70%	1.40%	3.60%	58.70%	15.60%	<3 miles
0.50%	0.30%	6.10%	87.70%	5.30%	>3 miles
14.50%	1.00%	4.40%	52.40%	27.70%	All School commute Trips

Source: 2012 California Household Travel Survey, CA DOT

SCAG has conducted research and reviewed available literature on links to public health for each of these areas. While the 2016 RTP/SCS represents an increased focus on public health, SCAG plans to expand its understanding of these relationships prior to the adoption of the 2020 RTP/SCS.

BACKGROUND

The prevalence of chronic diseases in the U.S. has become a major public health problem. Despite being mostly preventable, chronic diseases account for about 80 percent of deaths in California.[3] **FIGURE 2** shows that just five chronic diseases resulted in 72 percent of all deaths in the SCAG region in 2013.[3] Evidence shows that healthier lifestyles and improved air quality can improve outcomes, and built environment factors and related conditions can play a role in supporting healthy behaviors.

The costs of poor public health and chronic disease, and treating those diseases, pose a serious challenge to the region's economic wellbeing. Health care expenditures in the United States are about 18 percent of GDP, and they are projected to rise sharply.[4] If health care costs continue to grow at historical rates, the share of GDP devoted to health care in the United States is projected to reach 34 percent by 2040.[5] In 2010, 86 percent of all United States health care costs were spent on patients with one or more chronic medical conditions.[6]

In addition to chronic diseases, changes to the Southern California climate may put more people at risk of poor public health outcomes. Finally, poverty, access to goods and services and transportation safety continue to be major public health drivers across the region.

ACCESS TO ESSENTIAL DESTINATIONS

Access to daily needs and activities, such as schools, healthy food options, jobs, parks and open space and primary care is central to maintaining and improving public health. Through the provision of transportation networks and the development of land use patterns, the RTP/SCS has the opportunity to improve access to many of these essential destinations.

It is well known that education leads to better jobs and higher incomes, but research also links education with reduced risk of illness, including some of the most common acute or chronic diseases such as heart disease and diabetes. Likewise, individuals with four or more years of higher education are less likely to be overweight or obese.[8,9] The SCAG region is home to more than three million primary and secondary students who rely on the transportation system to access schools. While rates of walking and bicycling to primary and secondary school in Southern California are higher than national averages, most students arrive to school via private automobiles. As seen in **TABLE 2**, currently only four percent of all SCAG region primary and secondary students use a school bus to access their schools.

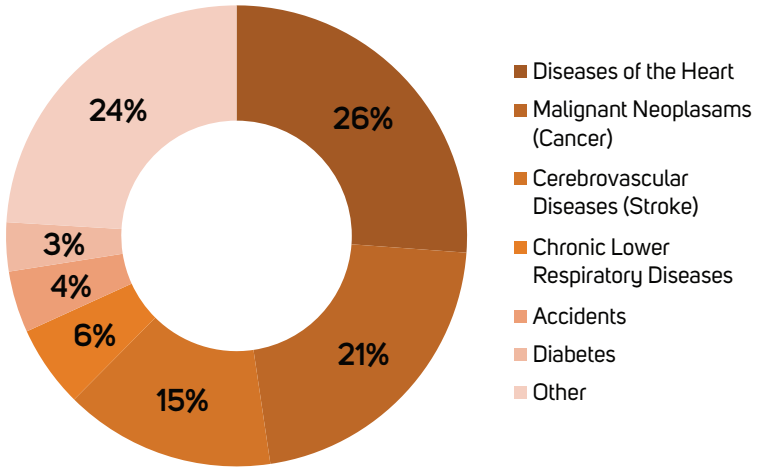
Access to healthy food environments such as grocery stores, farmers' markets and community gardens can play an important role in food insecurity and obesity.[10] Access to healthy food is affected by the availability, accessibility, cost of transportation and the time it takes to travel to food assets and food retail outlets.[11,12] Expanding access to healthy food environments often requires the support of land use policies, regulations and collaboration with the business community.[13]

Access to jobs and housing affect health outcomes, especially for low-income families. Employment income, benefits and stability are necessary for good health while job loss and unemployment are associated with a variety of negative health effects.[14]

For those without cars, public transit provides a lifeline to jobs and other services.[15] For example, providing transportation access to parks and open spaces, provide community residents with opportunities for physical activity, social interaction and improved mental health.[16,17,18,19] Local parks can be accessed through investments in active transportation, transit and by automobiles, while equitable access to regional parks such as the San Gabriel Mountains National Monument requires larger regional strategies.[20] **EXHIBIT 1** shows current park access across the SCAG region. As of 2012, there are 3.27 acres of park space per 1,000 residents. About half of the region's population lives within a 1/2 mile of a local park. For more information on park access see the Environmental Justice Appendix.

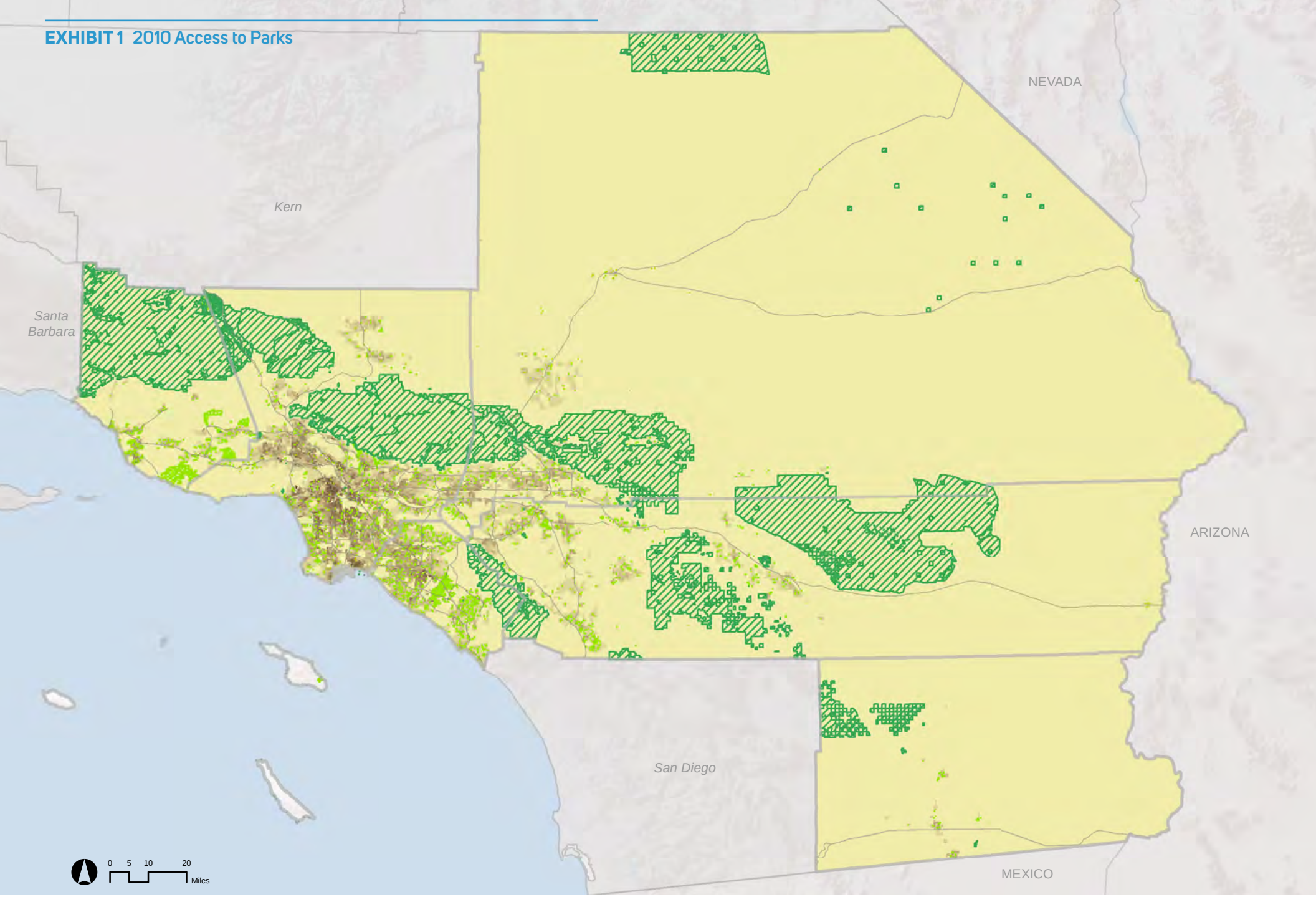
Convenient and affordable transportation is vital for access to health care.[21] This can be especially true in rural areas where travel distances are large and access to transit is less prevalent.[22] Greater access to health care has been related to better health status, more

FIGURE 2 Leading Causes of Death CDPH 2013



Source: http://www.cdph.ca.gov/data/statistics/Documents/VSC-2013-0520.pdf

EXHIBIT 1 2010 Access to Parks



County Boundaries

Freeway

State & Federal Open Space

Local Parks

Population Density - Persons per Acre (2012)

0 - 3 | 4 - 8 | 9 - 13 | 14 - 18 | 19 - 24 | 25 - 32 | 33 - 43 | 44 - 61 | 62 - 97 | 98 - 185

(Source: SCAG Existing Land Use 2012, and California Protected Area Database, 2014)

frequent use of preventative services and lower hospitalization rates.[23] According to the California Health Interview Survey (CHIS), half of all SCAG residents report using public transportation to get to the doctor's office.

AFFORDABLE HOUSING

A lack of affordable housing can lead to over-crowded and unsafe housing conditions and result in less disposable income for food, clothing and other necessities. It may also cause people to move to places with fewer jobs, public services or educational opportunities.

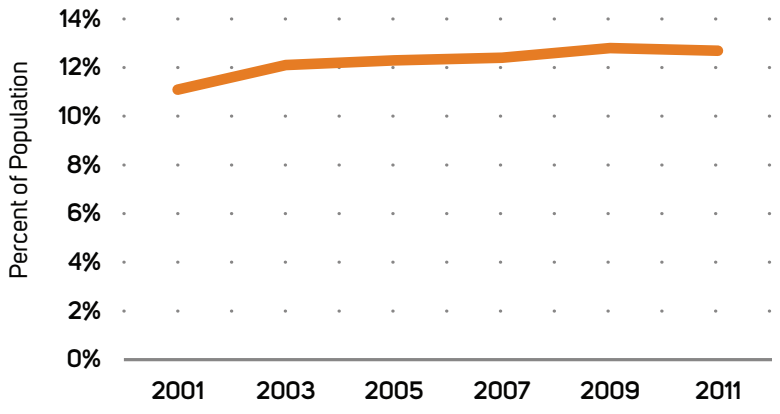
Affordable housing throughout Southern California remains a very challenging issue, particularly as the economy continues to recover and grow. Housing prices are rising steadily and affordability is declining. While residential construction has improved notably since the recession, the production of affordable housing has not kept pace with demand. However, recent funding developments suggest progress in producing affordable housing is achievable in the SCAG region. For example, programs such as California's Affordable Housing Sustainable Communities (AHSC) program have appropriated $27.5 million in its first round of funding to ten projects in the SCAG region to build affordable housing and will result in 842 affordable units. Additionally, recently proposed state legislation covers the full spectrum of affordable housing construction, including the replacement of demolished low-income units, initiatives to revitalize communities and the establishment of a permanent statewide source of affordable housing.

AIR QUALITY

The transportation system contributes to air pollution through vehicle emissions and fine particulate matter. Exposure to such air pollution can lead to asthma and other respiratory illnesses and trigger strokes and cardiac events.[24] Studies such as the University of Southern California's Children's Health Study show that poor air quality has a negative impact on children's lung function growth and is associated with new asthma cases and more acute asthma events, which can lead to more school absences.[25] [26] Research also shows that low income and minority residents often suffer disproportionate health consequences from air pollution due to their proximity to emission sources.[28] Data from 2009 shows that 9,000 premature deaths in the South Coast Air Basin area are directly related to PM 2.5. **FIGURE 3** and **FIGURE 4** show CHIS data for current asthma prevalence among adults in the SCAG region over a ten-year period.

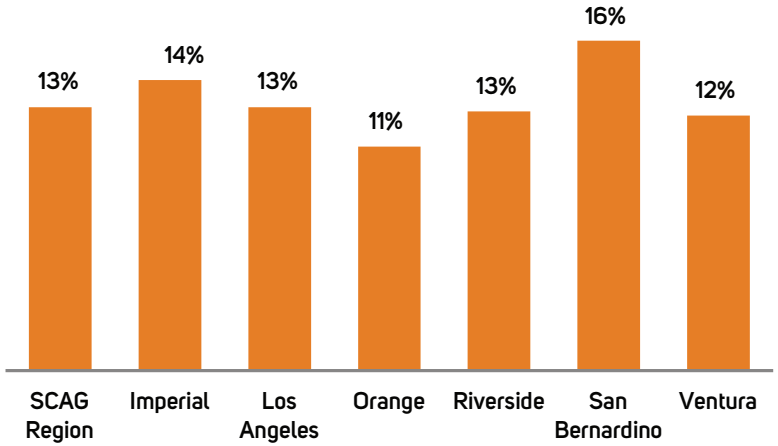
Health-based air quality standards have been established by California and the federal government for the following criteria pollutants: carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter 2.5 microns or less in diameter (PM 2.5), particulate matter ten microns or less in diameter (PM 10) and lead (Pb). California also includes standards for Hydrogen Sulfide, Vinyl Chloride, Sulfate and Visibility Reducing Particles. A more detailed analysis of the air quality impacts on public health are included in the Transportation Conformity Appendix and the Programmatic Environmental Impact Report (PEIR) for the 2016 RTP/SCS. SCAG currently collaborates with multiple regional agencies to improve air quality across the region.

FIGURE 3 Asthma Trends by Year 2001-2011



Source: http://healthpolicy.ucla.edu/chis

FIGURE 4 Asthma Rates by County 2011



Source: http://healthpolicy.ucla.edu/chis

On a positive note, air quality across the region has improved significantly over the past few decades. A recent study by the California Air Resources Board (ARB) shows that "the cancer risk from exposure to the state's most significant air toxics declined 76 percent over a 23-year period in California, a direct result of regulations targeting unhealthful emissions from these air pollutants."[27]

CLIMATE ADAPTATION

The State of California has outlined several sectors where we can expect, and in some cases are already experiencing, impacts from climate change. A changing climate poses unique challenges to public health outcomes and the region's adaptation to climate change will be influenced by where and how it grows. Climate change is increasingly being linked to heat stress, air pollution health effects, extreme weather events and vector-borne illnesses.[29] [30] [31] [32] [33] The 2015 Lancet Commission on Health and Climate Change recently concluded that tackling climate change could be the greatest global public health opportunity of the 21st century.[34]

In the SCAG region, extreme heat will be of particular concern by the end of the century.[35] [36] The poor and communities of color are expected to disproportionately suffer from heat stroke, damage and loss of property due to a lack of weather insurance (for fires, wind and rain), and respiratory-related illnesses.[37] Particularly vulnerable subpopulations include children, pregnant women, older adults, impoverished populations, people with chronic conditions, mobility and cognitive constraints, outdoor workers and those in coastal zones.[38] Scientists also predict increased risk of wildfires as a result of climate change. Land preservation strategies that provide "vegetated areas of the wild land-urban interface" can reduce impacts.[39] [40]

Many state and local governments have begun preparing for expected impacts of climate change through mitigation and adaptation plans.[41] [42] [43] Some measures for mitigating the effects of climate change include investing in cleaner fuels and vehicles, active transportation and public transit to minimize transportation's contribution to climate change. Two examples of strategies for adaptation include incorporating trees into plans and projects to clean the air and offset the urban "heat island" effect and mapping projected impacts to make informed decisions about the location of future growth.[44] [45] The state's "Safeguarding California: Reducing Climate Risk" plan is one of many efforts providing policy guidance for decision makers and is part of continuing efforts to reduce impacts and prepare for climate risks.

For more information on expected temperature changes, fire danger and sea level rise in the Southern California region, visit the Cal Adapt website (http://cal-adapt.org). An additional discussion of how Climate Change will impact Environmental Justice Communities can be found in the Environmental Justice Appendix.

ECONOMIC OPPORTUNITY

Job security and economic opportunities are significant determinants of health. Today, 17 percent of residents in the SCAG region are living in poverty (less than $23,550 annual income for a family of 4), up from 13 percent in 1990. [46] The poverty rate for children is even higher, with 22 percent of children living in poverty. Living in poverty is associated with poor health outcomes across all demographics and communities.[47] Providing access to jobs with a living wage, education and job training aligned with job opportunities in the region is critical to ensuring communities become and stay healthy.[48] [49] [50] Transportation systems support the larger economy through the delivery of goods and services. The construction, operation and maintenance of transportation projects also creates jobs that spur economic development.

Just as the economy impacts health, health and health care costs also play a significant role on the overall economy. Health care expenditures in the United States are about 18 percent of GDP. The Milken Institute projects that by 2023 health care costs in California will total $431 billion annually. Of that amount, about $117 billion could be avoided through prevention strategies.[73] [74] [75] In the SCAG region, according to California Breathing's county asthma profiles, asthma hospitalizations alone cost about $540 million annually.[52] Health costs must also take into account lost productivity. For example, asthma-related incidents cause millions of school and work absences nationwide each year and millions of dollars of lost productivity.[51]

PHYSICAL ACTIVITY

The built environment affects factors that enable people to lead active lives.[54] [55] Creating supportive policies, community conditions and facilities that encourage active transportation such as biking and walking provides opportunities for residents to increase their rates of physical activity. Since public transportation is often accessed by active transportation modes, transit trips also include physical activity at the beginning and end of the trip. Providing communities with mixed land uses and retail options within short distances to people's homes also increase the likelihood they will walk or bicycle for these short trips.

Physical inactivity has many negative health consequences.[56] It can lead to obesity and chronic diseases such as type 2 diabetes,[57] [58] hypertension,[59] [60] [61] [62] heart disease,[63] [64] [65] and stroke .[66] [67] [68] The SCAG region suffers from high chronic disease rates as can be seen in **FIGURE 8**, **FIGURE 9**, **FIGURE 10** and **FIGURE 11**. The Centers for Disease Control and Prevention (CDC) Chronic Disease website cites each of these chronic conditions as risk factors for the next, compounding each other. For example, as shown in **FIGURE 5**, physical inactivity is a risk factor for obesity and overweight and both of these are risk factors for type 2 diabetes and others.

The Surgeon General recommends that adults get 30 minutes of physical activity five days per week and children recive 60 minutes of physical activity every day in order to maintain good health and lower their risk of chronic disease. Currently, most adults in the SCAG

region utilize walking as one of the primary means of being physically active as can be seen by **FIGURE 6** and **FIGURE 7**. Research shows that health care costs resulting from physical inactivity and obesity reached an estimated $41.2 billion in 2006 in California.[76]

Building off of a large body of research, SCAG has examined the connection between the built environment, physical inactivity and obesity.[69] SCAG found that there is a significant association between neighborhood land use/built environment characteristics and levels of obesity. The study shows that living in a neighborhood with higher residential density and employment density, rail service and higher bus stop density are associated with a lesser likelihood to be obese. These results also show that people in a well-designed transit-oriented development (TOD) neighborhood tend to use active transportation modes to access their daily activities and reach transit services and this physical activity helps reduce their weight.

TRANSPORTATION SAFETY

The safety of people and goods as they travel is one of the key characteristics of any transportation system. The importance of providing a safe and secure transportation system is emphasized by transportation and law enforcement agencies at all levels and is recognized as one of the chief responsibilities of transportation planners.

Despite roadway design changes and improvements in vehicle safety such as seat belts and air bags, the number of yearly fatalities has not declined significantly since 1963 due to increases in total vehicle miles traveled (VMT). National health costs for traffic crashes total about $180 billion annually, after taking into account everything from healthcare costs and lost wages to property damage and travel delay.[70]

FIGURE 5 Built Environment and Physical Inactivity Health Outcomes

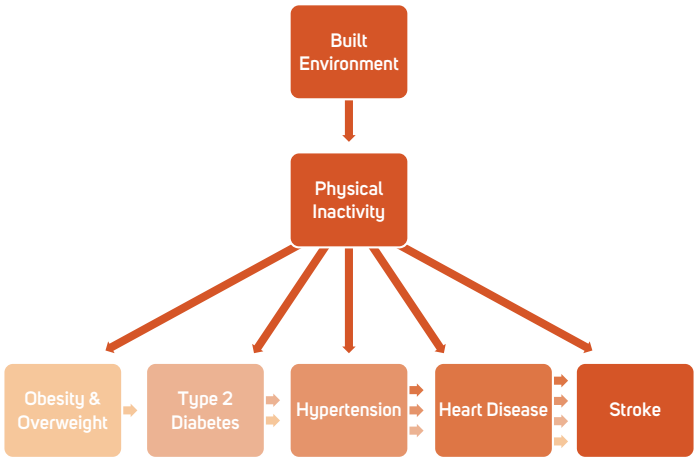
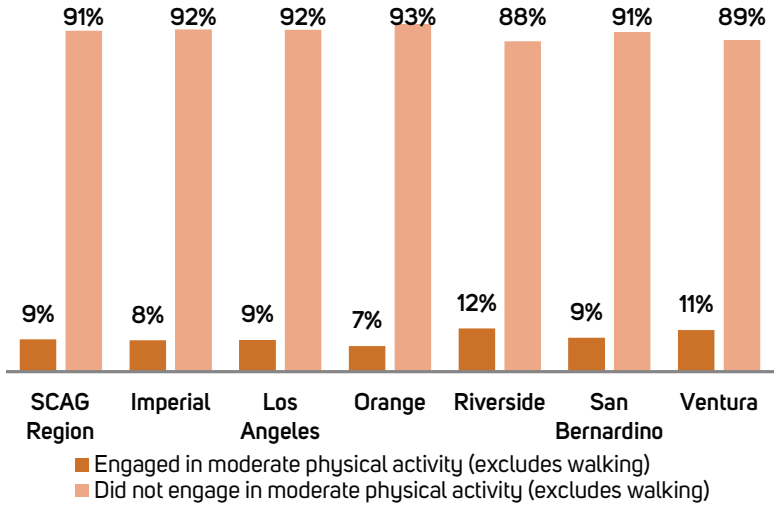
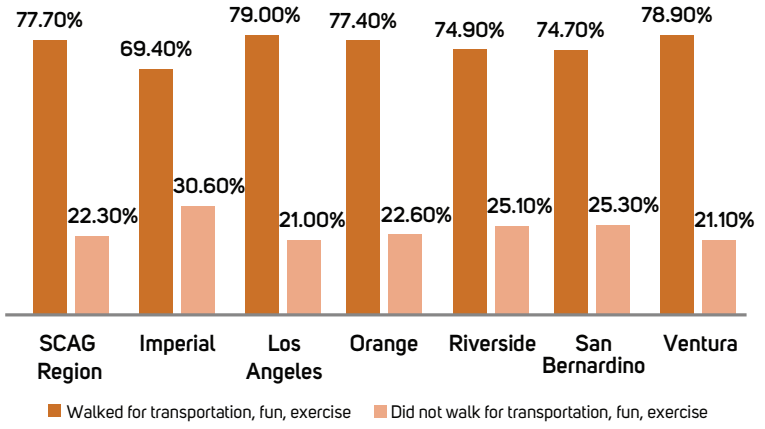


FIGURE 6 Adult Physical Activity Rates by County 2009



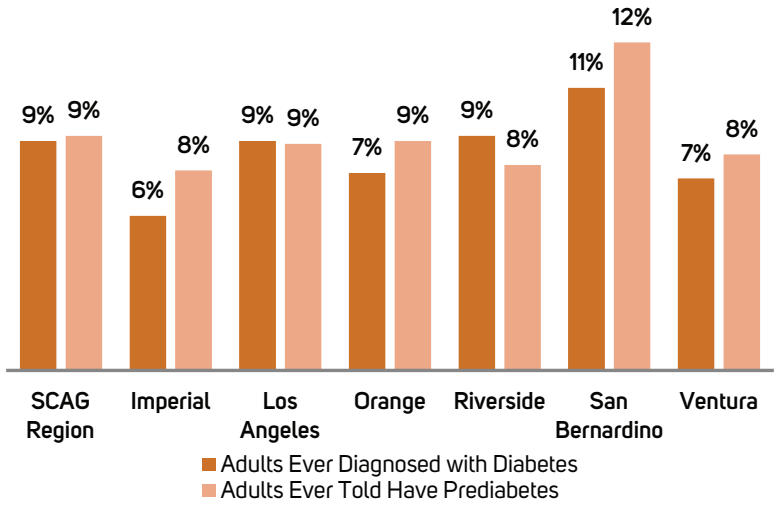
Source: http://healthpolicy.ucla.edu/chis

FIGURE 7 Adult Walking Trends by County



Source: http://healthpolicy.ucla.edu/chis

FIGURE 8 Diabetes and Prediabetes by County 2011



Source: http://healthpolicy.ucla.edu/chis

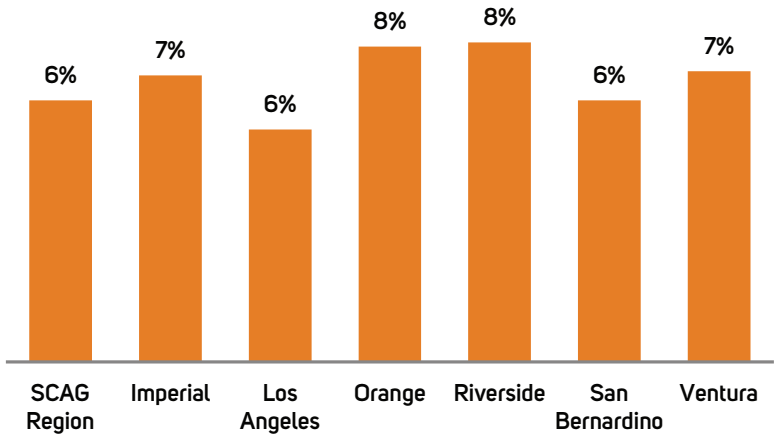
FIGURE 9 Overweight and Obesity Trends by Year 2001-2011

Source: http://healthpolicy.ucla.edu/chis

FIGURE 10 Hypertension Trends by Year 2001-2011

Source: http://healthpolicy.ucla.edu/chis

FIGURE 11 Heart Disease by County 2011



Source: http://healthpolicy.ucla.edu/chis

Average costs estimates in 2012 by the National Safety Council for each traffic death, traffic injury, or property damage were[70]

- **Death** $1,410,000
- **Severe Injury** $78,900
- **Property Damage** $8,900

While the overall number of collisions has not declined significantly, the rate of fatal and injury collisions on California's highways per mile traveled has declined dramatically since the California Highway patrol began keeping such data in the 1930s. California has led the nation in roadway safety for much of the past 20 years. Only recently have roadways nationally become as safe as those in California. However, while overall collision rates have declined, rates for vulnerable users such as pedestrians and bicyclists have remained high. Currently, bicyclists and pedestrians represent a third of all roadway fatalities in the SCAG region (5 percent and 27 percent, respectively), and about twelve percent of all roadway injuries. The table below used Statewide Integrated Traffic Report System (SWITRS) 2012 report data and shows transportation-related injuries and fatalities in the SCAG region. In 2012 there were 6,810 severe traffic-related injuries and 1,321 traffic fatalities in the SCAG region.

Studies show that people from low income and minority neighborhoods face a disproportionate risk of being involved in a pedestrian collision. One study demonstrates that pedestrian crashes are four times more frequent in low income communities.[72] This discrepancy may result partly from higher rates of walking, bicycling and transit use in areas with low automobile ownership rates, as well as from urban form characteristics such as lighting and sidewalk conditions.[77] SCAG also conducted a risk assessment as part of the Environmental Justice Appendix on Active Transportation Hazard for environmental justice communities.

Research reveals that transportation and roadway safety can have dramatic impacts on people's mental health. For example, studies show that 14 percent of car crash survivors suffer from post traumatic stress disorder (PTSD) and a quarter of survivors have psychiatric problems one year after a collision.[78] In addition, traffic noise has been shown to be associated with increased nervousness, depression, sleeplessness, irritability, high blood pressure and heart disease.[79] [80]

The pavement condition of our regional roadways also contributes to the level of safety for travelers of all modes. Smooth road conditions allow for better vehicular and bicycle control and reduced hazards such as potholes . Currently, 16 percent of the state highway system in the SCAG region is considered distressed, meaning it will require some level of maintenance or rehabilitation to improve safety. Much of our local arterial system is also in need of pavement improvements, as local roadways in the SCAG region average a score of 69 out of 100 in the Pavement Condition Index (PCI), where a score of 70 or less typically translates to conditions that are more costly to repair.

Many studies demonstrate that implementation of complete streets engineering and design standards for all modes can increase roadway safety.[81] Design interventions that reduce the number of severe crashes include: striping narrower lane widths, creating bicycle lanes, increasing the width and availability of sidewalks and improving intersection design. While SCAG does not have authority over local streets and roads, it does support local agencies to plan for and prioritize complete streets improvements.

CHALLENGES AND OPPORTUNITIES

Public health outcomes directly affect the quality of life of every resident of Southern California. By 2040 the region is expected to add an additional 3.7 million residents. These added residents will put additional strain on the existing transportation network and innovative solutions will be needed to maintain and improve the quality of life in Southern California. Ensuring that the built environment fosters healthy communities will improve economic outcomes, increase the desirability of our region and make the healthy choice the easy choice for all of our residents.

Creating healthy communities comes with its own set of challenges and opportunities. Fortunately, agencies and stakeholders across the region have already begun to implement many of the policies and plans that will make our future healthier.

One of the largest challenges that SCAG faces in improving public health outcomes is the sheer size and diversity of the region. With more than 18 million people, 191 cities, six counties and hundreds of local and regional agencies, improving public health outcomes in Southern California poses unique challenges. Within the region, health outcomes vary widely based on geography, income and race. A "one size fits all" approach does not work to address all of these needs.

Comprehensively incorporating and evaluating the effects that the built environment has on public health outcomes is relatively new for regional transportation and land use planning agencies such as SCAG. As such, new tools and data sets are required to evaluate planning outcomes. SCAG has employed a new state of the art Public Health Module as part of the UrbanFootprint Scenario Planning Model to expand SCAG's analysis of the public health benefits derived from physical activity and is continuing previous analysis of other public health related topics such as air quality and accessibility.

In addition to these challenges, improving public health outcomes from transportation and land use decisions offers a number of opportunities. Chief among these is the opportunity

to improve the image of Southern California. For decades the SCAG region has been known for its smog and traffic. The implementation of the RTP/SCS has the opportunity to capture the current energy around creating healthy communities to re-brand the SCAG region as a sustainable region that is invested in improving the quality of life for its residents. By improving the health of our residents through smart investments in transportation and land use we can reduce medical costs, reduce the cost of transportation and housing, provide jobs, improve access to essential destinations and improve the livability of the region.

The integration of public health into the planning process also provides opportunities for improved inter-agency coordination and information sharing. While public health departments traditionally do not participate in planning efforts for the built environment, there is growing interest from these agencies to engage with and assist in transportation and land use planning efforts moving forward. Likewise, federal and state agencies are including public health as a key consideration in many of their funding and planning efforts that will have a direct impact on the SCAG region's ability to leverage the funds necessary for implementing the RTP/SCS.

PLAN PERFORMANCE

To guide the integration of public health considerations into the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS), SCAG adopted the following guiding principles:

- To reflect and provide information on the ways in which the investments and strategies of the 2016 RTP/SCS provide an opportunity to improve public health outcomes across the region and advance Plan goals, SCAG shall provide robust public health data and information, as feasible.
- Recognizing that public health outcomes are influenced by multiple policy elements of the plan (transportation and land use), SCAG will utilize a "Health in All Policies" approach to engage a wide range of stakeholders, support inter-agency coordination and conduct analysis across relevant plan elements as appropriate.
- SCAG will provide support and assistance to local jurisdictions interested in using the public health analysis, policy support and data from the 2016 RTP/SCS to increase competitiveness for grants and promote information sharing.
- In response to stakeholder interest, SCAG will consolidate the relevant areas of the Plan that relate to public health in the Public Health Appendix. The Public Health Appendix will organize and summarize analysis completed in the plan using a public health "lens." The following framework will be used to present public health analysis in the appendix:
  - Analysis of the public health impacts will be targeted to focus areas where there is literature to support the relationship between public health and the built environment.
  - Within each focus area, SCAG will compile the plan performance metrics that relate to each focus area. The reporting of the metrics will not be weighted or presented in a manner that would prioritize one focus area over another.
  - The metrics will be reported at the regional-level to allow for comparison between the Baseline and the Plan.

The 2016 RTP/SCS is expected to improve health outcomes through transportation and land use strategies that address each of the seven focus areas identified below within the neighborhood and built environment category of the social determinants of health. SCAG has consolidated data for each priority area based on the performance measures of the plan and other complementary analyses as shown in **TABLE 3**. For more information on the performance measures discussed below, see the Performance Measures Appendix and the Environmental Justice Appendix.

ACCESSIBILITY

The investments in the 2016 RTP/SCS are expected to improve and maintain accessibility across the region to essential destinations and support positive health outcomes. The Plan identifies a comprehensive set of strategies that work in concert to optimize the operational performance of the transportation system and allow residents to access schools, healthy food, jobs, housing, parks/open space, health care facilities and other essential destinations. **TABLE 4** highlights outcomes of the plan that will influence the ability of residents across our region to access essential destinations. These outcomes are directly related to public health improvements at the neighborhood level and aim to extend the reach to destinations that support healthy living.

While the Plan will provide a wider variety of transportation options, the vast majority of Southern Californians will still use automobiles to complete a majority of trips, especially those over three miles. The highway and arterial investments included in the Plan attempt to optimize the existing system and expand it where necessary to ensure that the mobility needs of the region are met. In addition, SCAG and its partners will strengthen their efforts to encourage ridesharing and other trip reducing strategies that aim to reduce vehicle trips, energy consumption and air emissions. The highway system will continue to be an important part of the system as mobility innovations change the way people own and drive cars.

The transportation investments of the Plan are supported by a growth strategy that aims to locate more housing and jobs in High Quality Transit Areas (HQTAs), as part of transit oriented developments (TOD). Infill development in HQTAs increases the number of destinations that are easily accessible via transit and creates more compact communities where many goods and services can be reached by walking or biking.

TABLE 3 Performance Measures by Focus Area

Relevant Performance Measures		Public Health Focus Areas						
Metric	Data Source	Accessibility	Affordable Housing	Air Quality	Climate Adaptation	Economic Wellbeing	Physical Activity	Safety
Additional jobs supported by improving competitiveness	Regional Economic Model REMI					X		
Additional jobs supported by transportation investments	Regional Economic Model REMI					X		
Net contribution to Gross Regional Product	Regional Economic Model REMI					X		
Criteria pollutant and greenhouse gas emissions	Travel Demand Model/ARB EMFAC Model			X	X			
Share of growth in High Quality Transit Areas (HQTAs)	RTP/SCS socio-economic small area data	X	X					
Average distance for work and non-work trips	Travel Demand Model	X						
Percent of trips less than 3 miles	Travel Demand Model	X					X	
Work Trip Length Duration	Travel Demand Model	X						
Land Consumption	Scenario Planning Model				X			
Mode share of walking and bicycling	Travel Demand Model						X	

TABLE 3 Performance Measures by Focus Area: Continued

Relevant Performance Measures		Public Health Focus Areas						
Metric	Data Source	Accessibility	Affordable Housing	Air Quality	Climate Adaptation	Economic Wellbeing	Physical Activity	Safety
Air pollution-related health measures	Scenario Planning Model			X				
Physical activity-related health measures	Scenario Planning Model						X	
Collison/accident rates by severity by mode	CHP Accident Data Base, Travel Demand Model Mode Split Outputs							X
Per HH Costs (fuel +auto)	Scenario Planning Model		X			X		
Per Household Utilities (energy + water)	Scenario Planning Model		X			X		
For those in poverty, # destinations that can be reached in 45 mins.	Travel Demand Model	X						
Building Water Use, cumulative	Scenario Planning Model				X			
Share of new growth within 500 ft of freeway	Scenario Planning Model			X				
Multifamily vs Single family	Scenario Planning Model		X					
State of Good Repair	Pavement Condition Index							X

The Plan also promotes residential infill development in areas that are not yet well served by transit, but where jobs, schools and other amenities are in close proximity. This strategy reduces the distance and time required to reach essential destinations.

As households, jobs and transportation investments are added to existing communities, there is potential for gentrification, or the displacement of lower-income residents, if the new development raises real-estate values and housing costs. Displacement of low-income residents to less accessible locations can place significant burdens on household finances and contribute to poor health outcomes. For a more detailed analysis of how the Plan impacts gentrification, see the Environmental Justice Appendix. The Plan promotes production of a wide range of zoning types to accommodate all income groups. There are a variety of tools and resources available to local jurisdictions to address displacement through the development or preservation of affordable housing.

TABLE 4 Plan Performance - Accessibility*

Metric	Result of Plan	
	2040 Baseline	2040 Plan
Share of growth in High Quality Transit Areas (HQTAs) from Base Year (% of Households in in HQTAs)	36%	47%
Jobs/Housing Balance in HQTAs	36% Housing 44% Employment	46% Housing 55% Employment
Average distance for work trips (miles)	15.1	15.5
Average distance for non-work trips (miles)	7.8	7.9
Percent of work trips less than 3 miles	20.4%	20.3%
Percent of non-work trips less than 3 miles	41.7%	41.9%
Work Trip Length Duration	Auto 25.3 min Transit 79.9 min Walk 25.7 min Bike 26.9 min	Auto 22.0 min Transit 76.3 min Walk 25.4 min Bike 26.5 min
Percentage of PM Peak transit trips <45 min	26.2%	30.1%
Percentage of PM Peak HOV Trips <45 min	72.9%	78.4%
Percentage of PM Peak SOV Trips <45 min	82.2%	88.6%

**Please see the Performance Measures Appendix for more information on data sources and methodology used to calculate these outcomes.*

Growth in High Quality Transit Areas (HQTAs)

Compared to the Baseline, the 2016 RTP/SCS will increase new household and job growth in HQTAs from 36 percent to 47 percent. This will result in improved access to a wide variety of destinations by placing more residents, jobs and destinations near transit. The jobs/housing balance within HQTAs is also projected to improve as a result of the Plan. The ratio of jobs to housing within HQTAs by 2040 is expected to be 1.6 jobs for every household.

Trip Length

Shorter trip lengths can improve regional accessibility by reducing the time and increasing the travel options for reaching essential destinations. Forty-two percent of all non-work trips and 20 percent of work trips are expected to be under three miles as a result of the Plan. The average distance traveled for work trips is projected to increase slightly as a result of the Plan, from 15.1 to 15.5 miles, but remains constant for non-work trips under both the Baseline and the Plan.

Commute Travel Time

The duration of work trips is expected to decrease across all modes as can be seen in TABLE 4. By reducing the time that it takes to access jobs, residents will have improved opportunities for securing economic stability for themselves and their families.

Access for those in poverty

Accessibility by auto and transit to employment, shopping and open space destinations was higher in 2012 for households in poverty than was seen for higher income groups. One reason for this is that housing prices can generally be lower in dense neighborhoods where the number of destinations are more concentrated, and transit opportunities are higher. The 2016 RTP/SCS calls for improvements in transit and will result in improved accessibility to employment, shopping and open space destinations for households in poverty. With the Plan, there will be a 33 percent increase in access to jobs by car and 23 percent increase to shopping destinations over Baseline. By transit, those numbers are 104 and 107 percent, respectively. Additional detail on this can be found in the Environmental Justice Appendix for the Plan.

AFFORDABLE HOUSING

Access to affordable housing continues to be a challenge despite an improving economy. Wages have not kept pace with rising housing costs, which includes one's standard of living, transportation costs and access to health care. When affordable housing is difficult to obtain, the ability to pay for healthy food or preventative care is severely restricted and access is often hindered. People will often sacrifice longer commutes and live further from

work to manage housing costs, taking time away from other important needs. Recent state legislation, such as California Senate Bill 628 (Beall) and California Assembly Bill 2 (Alejo), provide jurisdictions with an opportunity to establish funding sources to develop affordable housing, supportive infrastructure, and amenities.

Per household transportation costs

With the implementation of the Plan there will be a 13 percent reduction in transportation and fuel costs for the SCAG region, as shown in **TABLE 5**. More compact and strategic land use patterns, combined with transportation network improvements, will result in improved pedestrian and bicycle access to community amenities, shorter average trip lengths, and reduced vehicle miles traveled. A reduction in transportation costs for families has a direct impact on quality of living and housing opportunities.

Per household utility costs

With the implementation of the Plan there will be a 9 percent reduction in utility costs for households. As growth in the region is more concentrated in HQTA's and denser communities, efficiencies in energy and water consumption per person will reduce demand on natural resources.

Single-family and multifamily households

The concentration of new housing development in HQTAs means denser communities that can more effectively utilize transportation options besides driving. The current housing mix in the SCAG region is 55 percent single family households and 45 percent multifamily households. With the Plan's implementation, 33 percent of new growth will be single-family housing, while 67 percent will be multifamily housing.

TABLE 5 Plan Performance - Affordable Housing*

Performance Measures	2040 Plan
Per Household Transportation Costs (fuel + auto)	13% less than 2040 Baseline
Per Household Utilities (energy + water)	9% less than 2040 Baseline
Multifamily homes as percentage of all new home construction	67% Multifamily

Please see the Performance Measures Appendix for more information on data sources and methodology used to calculate these outcomes.

AIR QUALITY

The federal Clean Air Act (CAA) establishes air quality standards and planning requirements for certain air pollutants. To comply with the CAA in achieving the National Ambient Air Quality Standards (NAAQS), the California Air Resources Board (ARB) develops State Implementation Plans (SIPs) for federal non-attainment and maintenance areas. In California, SIP development is a joint effort of the local air agencies and ARB working with federal, state and local agencies (including the Metropolitan Planning Organizations [MPOs]). Local Air Quality Management Plans (AQMPs) are prepared in response to federal and state requirements.

The 2016 RTP/SCS will improve air quality in the region from mobile sources. The Plan will reduce the volumes of criteria pollutants through improvements in vehicle technology (including goods movement) and by increasing the number of trips by transit, walking and biking through land use changes and transportation investments. Reducing air pollution will have a direct effect on public health, reducing the number of sick days, lost productivity, and cutting air pollution-related health costs. **TABLE 6** highlights air quality related outcomes of the plan that will contribute to public health.

The Plan will also reduce exposure to pollutants that are generated from mobile sources. The Plan encourages limiting the siting of sensitive land uses within 500 feet of freeways and urban roads carrying more than 100,000 vehicles per day, consistent with the guidelines provide by the Air Resources Board Air Quality Manual. To balance air quality and accessibility goals, the policy growth forecast accommodates growth within HQTAs, but beyond 500 feet of freeways and urban roads whenever possible. As a result, the Plan places very limited growth within 500 feet of freeways and urban roads beyond those provided by local jurisdictions. For more detailed analysis of this strategy see the Environmental Justice Appendix. A more detailed analysis of the air quality impacts of the plan evaluated in accordance the State California Environmental Quality Act (CEQA) Guidelines can be found in the Programmatic Environmental Impact Report (PEIR) for the 2016 RTP/SCS.

Air pollution-related health measures

With reductions in VMT due to increased active transportation and transit use and a cleaner fleet, health impacts related to respiratory and pollution related disease incidences are expected to decrease 13 percent by 2040. It is expected that this will save the SCAG region approximately $596 million dollars annually.

Share of new growth within 500 feet of a freeway

The Plan promotes development of housing and jobs in high-quality transit areas, which often intersect with freeways and heavily traveled transportation corridors where exposure to emissions can be dangerously high. Regionwide, about ten percent of the land area

within HQTAs is within 500 feet of freeways and urban roads. To balance regional policy goals, the Plan accommodates the vast majority of growth within HQTAs beyond 500 feet of freeways and urban roads, per the guidance provided by the California Air Resources Board (ARB) air quality manual. With the Plan, 44 percent of all new households will be located within HQTAs, 91 percent of which will be located beyond 500 feet of freeways and urban roads. There is an increase between the Baseline and Plan in the percentage of households within 500 feet of freeways and urban roads. With the Plan, 4.4 percent of all households will be within 500 feet region-wide by 2040, compared to 3.5 percent of all households under the Baseline.

Criteria pollutant and greenhouse gas emissions

Criteria pollutants are expected to be reduced across the board through implementation of the Plan. Greenhouse gas emissions will be reduced from 2005 levels by 8 percent in 2020, 19 percent in 2035, and 21 percent in 2040.

CLIMATE ADAPTATION

Under SB 375, the primary goal of the SCS is to provide a vision for future growth in Southern California that decreases per capita greenhouse gas emissions from automobiles and light trucks. By meeting the region's reduction targets for greenhouse gas emissions under SB 375, the 2016 RTP/SCS will support the mitigation of climate change impacts on the region. Other than air quality improvements, these outcomes aim to address public health concerns, such as providing reliable drinking water and securing concentrated and adequate housing in areas that are less vulnerable to rising sea levels, wildfires or floods.

SCAG is not an implementing agency and has few opportunities to implement adaptation strategies. However, by working with local jurisdictions and regional partners, SCAG can help the region recognize the regional challenges of the future and assist in addressing them with planning that supports local action. By building on actions already underway, the region can further integrate climate and sustainability into the range of regional and local approaches we take to grow our economy, protect the environment and improve public health. SCAG can help the region improve its adaptation to the impacts of drought by encouraging implementation of the policies of the Policy Growth Forecast, which is the basis of the region's SCS and promotes more compact, resource-efficient development. More compact development will also reduce the amount of land that is consumed by new development, allowing for natural lands to be preserved to buffer communities from the impacts of wildfires. **TABLE 7** highlights climate adaptation related outcomes. For more information on how the Plan addresses open spaces, see the Natural Lands Appendix.

Greenhouse gas emissions

The Plan is expected to reduce greenhouse gas emissions from cars and light trucks by 21 percent per capita by 2040 from 2005 levels, which will support efforts to reduce the impacts of climate change. These reductions include the Plan's clean freight strategies and land use strategies that yield energy savings.

Water Consumption

The Plan is expected to reduce water consumption compared to the Baseline in buildings by approximatley 862,000 acre feet by 2040. This amounts to enough water for 150,000

TABLE 6 Plan Performance - Air Quality*

Metric	Result of Plan	
	2040 Baseline	2040 Plan
Air pollution-related health incidences (annual)	270,328	234,363
Air pollution-related health costs (annual)	$4.5 Billion	$3.9 Billion
Share of New Growth within 500 Feet of Freeway	3.5%	4.4%
Criteria pollutant and greenhouse gas emissions	N/A	-8% in 2020 -19% in 2035 -21% in 2040

Please see the Performance Measures Appendix for more information on data sources and methodology used to calculate these outcomes.

TABLE 7 Plan Performance - Climate Adaptation*

Metric	Result of Plan	
	2040 Baseline	2040 Plan
Criteria pollutant and greenhouse gas emissions from 2005 levels	N/A	-8% in 2020 -19% in 2035 -21% in 2040
Building Water Use, cumulative (2012-2040) compared to Baseline	134 million Acre Feet	133 million Acre Feet
Land Consumption (Greenfield land consumed in square miles)	154	118

Please see the Performance Measures Appendix for more information on data sources and methodology used to calculate these outcomes.

people to use annually between 2012 and 2040. More efficient use of water will become increasingly critical as our region aims to accommodate more growth with water resources that are becoming more unreliable and constrained by a changing climate.

Land Consumption

Land use patterns in the Plan encourage development across the region that reduces new land consumption by about 22,655 acres compared to Baseline by 2040. By reducing the amount of new land developed, the Plan will support infill development and other land use strategies that reduce VMT and greenhouse gas emissions. Furthermore, the Policy Growth Forecast will allow for the development of natural land buffers in areas facing extreme wildfire danger.

ECONOMIC OPPORTUNITY

It is expected that the 2016 RTP/SCS will improve economic opportunities in the region by improving regional transportation efficiency, reducing household travel costs, reducing health care costs, reducing local costs for energy and water and producing jobs through the construction of transportation infrastructure. From a public health perspective, these improvements increase disposable incomes that can be used for preventative health care and greater access to job centers and essential destinations.

There is growing evidence that transportation infrastructure spending is positively associated with two distinct sources of economic growth: initial construction jobs, and improvements in economic productivity, efficiency and competitiveness. The RTP can boost employment in two ways: providing jobs for persons in highway and rail construction, operation and maintenance; and boosting the economic competitiveness of the SCAG region by making it a more attractive place to do business. SCAG's economic model considers the following costs:

- **Commuting costs:** Reductions in commuting costs increase the ability of firms to draw from larger labor pools, improving opportunities for a employer-employee match.
- **Accessibility costs:** Reductions in the cost of transportion inputs within the region allows firms to produce at lower cost, or more productively.
- **Transportation Costs:** Reduced costs for transporting outputs allow firms to access larger markets.
- **Amenity/Externality Costs:** Improvements in amenities such as reduced congestion or improved air quality will draw migrants to the region and improve competitiveness through labor market pooling effects.
- **Operation Costs:** Reductions in expenditures on fuel or vehicles frees income for residents to spend elsewhere, supporting the regional economy.

In addition to these considerations, the Plan supports reduced health care costs, transportation costs, energy and water costs and local fiscal impacts by supporting land use patterns that reduce expenditures on infrastructure and supporting healthy lifestyles.

The Plan places a strong emphasis on implementing a goods movement strategy designed to ensure the region continues to play a vital role in the global supply chain while balancing economic, mobility, environment, livability, health and quality of life goals. The SCAG region is the largest international trade gateway in the U.S., supported by marine ports, air cargo facilities, railroads, regional highways and state routes. The 2016 RTP/SCS includes clean goods movement initiatives jointly developed with regional stakeholders, such as the Port of Los Angeles Clean Trucks Program. Jobs supported by the goods movement industry, and those being generated to support greener/cleaner technologies, play a significant role in the health of the region. **TABLE 8** highlights economic opportunity outcomes. For more information on the Goods Movement components of the Plan see the Goods Movement Appendix.

Job creation

By supporting the movement of goods and people across the region the Plan is expected to increase the competitiveness of the region and support public health outcomes related to economic opportunity. The Plan is expected to increase the number of annual jobs over the life of the Plan by an average of 351,000 per year resulting from improvements and efficiencies to the transportation system. An additional 188,000 average annual jobs are expected to be generated over the life of the Plan through transportation projects and construction.

TABLE 8 Plan Performance - Economic Opportunity*

Metric	Result of Plan
	2040 Plan
Additional annual jobs supported by improving competitiveness	351,000+
Additional annual jobs supported by transportation investments	188,000+
Household Savings: Transportation Costs (fuel + auto)	13% less than 2040 Baseline
Household Savings: Utilities (energy + water)	9% less than 2040 Baseline

Please see the Performance Measures Appendix for more information on data sources and methodology used to calculate these outcomes.

Household savings

In addition to generating jobs, the Plan also contributes to the economic well-being of the region by reducing, on average, household costs for transportation, energy and water. The cost of transportation for families, including fuel, automobile ownership and maintenance and transit costs, is expected to decrease by 13 percent with the Plan, when compared to the Baseline. Per household utility costs (energy and water) will decrease 9 percent when compared to the Baseline. In addition to utilities and transportation costs, SCAG is currently developing a methodology to quantify savings in health care.

PHYSICAL ACTIVITY

The 2016 RTP/SCS improves physical activity outcomes by increasing opportunities for people to access their jobs, transit, schools and many of their daily needs by walking and biking. The Plan encourages the development of more compact, accessible and walkable communities. The Plan also invests nearly $13 billion in the development and enhancement of active transportation networks, including first/last mile improvements, safe routes to school projects and regional bikeway infrastructure. There is also greater opportunity for physical activity by incorporating open space into new developments and increasing access to existing open space and parks. By enabling greater levels of physical activity, the Plan is expected to reduce rates of obesity and chronic disease, as further described in **TABLE 9**.

TABLE 9 Plan Performance - Physical Activity*

Metric	Result of Plan	
	2040 Baseline	2040 Plan
Percent of work trips less than 3 miles	20.4%	20.3%
Percent of non-work trips less than 3 miles	41.7%	41.9%
Mode share of walking	10.7%	13.5%
Mode share of bicycling	1.6%	2.2%
Obese population*	26.3%	25.6%
High blood pressure*	21.5%	20.8%
Heart Disease*	4.4%	4.2%
Diabetes Type 2*	6.1%	6.0%

*Results are for areas experiencing land use and population changes not the entire SCAG region. *Please see the Performance Measures Appendix for more information on data sources and methodology used to calculate these outcomes.

SCAG has collaborated with the Sacramento Area Council of Governments (SACOG) and the State's Strategic Growth Council (SGC) to develop a new Public Health Module for the Urban Footprint Model that measures the Plan's impacts on physical activity and chronic diseases as it relates to physical inactivity. The model was reviewed by a statewide panel consisting of representatives of state, regional and local agencies. The model currently only captures impacts resulting from land use change. Therefore, the benefits that will be generated from active transportation investments are not reflected in the reported outcomes. For broader discussion of the Scenario Planning Model, see the SCS Documentation Appendix.

Percent of trips less than 3 miles

Shorter trips are easily completed by walking and biking. Trips under 3 miles can be completed by the average person riding a bike in about 15 minutes. 42 percent of all non-work trips and 20 percent of work trips are expected to be under three miles as a result of the Plan.

Mode share of walking and bicycling

Walking and biking mode shares in the SCAG region are expected to increase by 28 percent and 71 percent, respectively, when compared to existing (2012) conditions. The growth will be more significant in urban areas with the increased number of close destinations and activities, and less so in rural areas where distances and lack of infrastructure may make some walk and bicycle trips impractical.

Physical activity related health measures

Using the Public Health Module of the Scenario Planning Module (SPM), SCAG estimates that the increased rates of active transportation generated from land use changes will result in reductions in rates of chronic disease. The Plan is expected to result in four additional minutes of physical activity per day, improving health outcomes related to obesity, high blood pressure, heart disease and Type 2 diabetes. **TABLE 9** highlights physical activity outcomes.

TRANSPORTATION SAFETY

One of SCAG's goals is to ensure transportation safety, security and reliability for all people and goods in the region. SCAG will continue efforts toward working with county transportation commissions, Caltrans and subregions to improve transportation safety across the region as outlined in the Transportation Safety Appendix. **TABLE 10** shows annual decreases in both severe injuries and fatalities projected to be achieved by the Plan.

The Transportation Safety Appendix outlines the 15 Challenge Areas outlined in the State's Strategic Highway Safety Plan (SHSP). As of 2014, a majority of the established targets as presented were met, and a new goal has been set to further reduce fatalities and injuries

by reducing fatalities at rate of three percent, and severe injuries by a rate of one and a half percent on an annual basis. In addition, since the SHSP is currently in the draft phase the challenge areas, goals and measurable objectives presented may be subject to change. The 15 Challenge Areas are:

1. Roadway Departure & Head-On Collisions
2. Intersections, Interchanges and Other Roadway Access
3. Work Zones
4. Alcohol and Drug Impairment
5. Occupant Protection
6. Speeding and Aggressive Driving
7. Distracted Driving
8. Driver Licensing and Competency
9. Pedestrians
10. Bicycling
11. Young Drivers
12. Aging Road Users
13. Motorcyclists
14. Commercial Vehicles
15. Emergency Medical Vehicles

In an effort to help make our streets safer, SCAG recommends an extensive set of strategies to reduce fatality and severe injury rates on roadways within the SCAG region. More detailed information can be found in the Transportation Safety Appendix.

Collision rates

The Plan is expected to reduce traffic related fatalities and injuries down to 0.31 and 1.60 per 100 million vehicle miles respectively as seen in **TABLE 10**. It should be noted that improvements may not show overall decreases in the number of collisions, especially for certain modes if those modes increase their overall share of trips. However, we anticipate a drop in the number of collisions that occur per mile traveled. For example, if the number of total bicycle fatalities remains the same but the rate of bicycling doubles, the actual rate of collisions would be reduced by half.

Pavement Condition

Conditions of the region's roads are critical to ensuring traffic safety. The average existing pavement condition is 69 (ranked out of 100), which increases to 83 with the Plan. Without the Plan, pavement conditions would deteriorate to 46.

PLAN IMPLEMENTATION

By adopting a Health in All Polices approach, SCAG will support improved health outcomes across the region. To do so, SCAG will seek to implement the following work program which will support an improved understanding of the role of the built environment and public health outcomes both within the agency and by our partners. Given that Public Health is a relatively new focus for SCAG, the following strategies have been developed in a manner that seeks to build off of the work of SCAG's local jurisdictions and to provide support to those agencies working to adopt public health policies as a focus in transportation and land use planning.

STRATEGY 1 - LEADERSHIP AND COLLABORATION

Provide leadership in collaboration with regional partners (the county transportation commissions, the county and city departments of public health, subregional partners, health industry leaders, local cities, and other local stakeholder groups) to measure and improve public health and health equity outcomes by increasing awareness of the relationship between the social determinants of health and the built environment throughout the region.

- Action A: Increase regional engagement and collaboration on the issue of public health, as related to the built environment and SCAG core planning functions, by defining the issue and raising awareness among policy leaders, agency staff, businesses and the public.
- Action B: Facilitate information exchange and region-wide collaboration through SCAG Committees, health forums, and issue integration within other SCAG-led forums (active transportation, poverty, economy, etc.).
- Action C: Develop and sustain partnerships with governmental agencies, local non-profit organizations, colleges and universities, private foundations, and other stakeholder groups to identify, coordinate and leverage existing and planned public health activities.

TABLE 10 Plan Performance - Transportation Safety*

Metric	Result of Plan	
	2012 Rate	2040 Plan
Transportation Fatality Rate per 100M VMT	0.83	0.31
Transportation Severe Injury Rate per 100M VMT	4.29	1.60

*Please see the Performance Measures Appendix for more information on data sources and methodology used to calculate these outcomes.

- Action D: Promote, develop and where feasible accelerate the adoption of policies that support public health considerations across the region in day-to-day planning activities that relate to the built environment.

STRATEGY 2 - POLICY AND ANALYSIS

Develop and support balanced regional policies using a "Health in All Policies" approach to facilitate positive, equitable health outcomes for all residents of the SCAG region related to accessibility, air quality, affordable housing, climate resiliency, economic wellbeing, physical activity and transportation safety.

- Action A: Integrate public health considerations as related to the built environment throughout SCAG's decision making processes and planning activities.
- Action B: Collaborate with regional partners to develop information on a broad spectrum of health issues through data/statistics collection, modeling enhancements and research.
- Action C: Collaborate with interested County Transportation Commissions to integrate public health related analyses and planning projects related to the built environment into the Joint Work Programs.
- Action D: Support local and regional agencies in the application of health, equity and sustainability consideration in transportation and land use policy efforts.
- Action E: In collaboration with regional partners, identify policies and examples of existing conditions that may create barriers to improving public health outcomes and identify solutions.
- Action F: Support opportunities for cooperative multi-agency/multi-municipality data systems, data sharing and resource pooling.

STRATEGY 3 - REGIONAL SUPPORT

Provide support, if requested, to regional and local initiatives, agencies and partners, including the sharing of data, statistics, benchmarks, analysis tools and best practices, to help local agencies integrate public health and health equity considerations into the multimodal transportation, economic development, job creation and land use planning processes.

- Action A: Provide technical assistance to local agencies to support implementation of the 2016 RTP/SCS, such as continued support through the Sustainability Program Grants for transportation, land use and sustainability planning efforts that support improved health outcomes or providing support and assistance to local agencies seeking grant funding for projects that align with the public health goals of the RTP/SCS.
- Action B: Eliminate knowledge gaps by developing resources such as fact sheets, documentation of best practices, policy templates, Toolbox Tuesday trainings and website resources to support local jurisdictions interested in incorporating public health considerations into their planning processes.
- Action C: Seek funding to support local regional, countywide and local planning efforts and consider implementing regional demonstration programs aimed at integrating elective public health considerations into planning efforts.

REGIONAL AND LOCAL INITIATIVES

Since the adoption of the 2012 RTP/SCS, SCAG has supported efforts by local cities and regional agencies to implement projects and plan that support improved public health outcomes. For example, SCAG partnered with each of the six County Transportation Commissions on Joint Work Programs that outline a range of planning activities and programs to implement the active transportation, sustainability and land use provisions of the 2012 RTP/SCS. Likewise, through SCAG's Sustainability Grant Program, SCAG has funded numerous land use planning efforts, active transportation plans and transit access plans. Finally, through a statewide partnership with the Sacramento Area Council of Governments (SACOG), SCAG has partnered on the development of a Public Health Module for SCAG's scenario planning process. The Public Health Module, as it continues to be developed, will assist SCAG in determining the possible public health benefits of increased rates of physical activity resulting from land use changes and active transportation investments.

Below is an initial survey of local and regional initiatives from across the six counties of the SCAG Region that support improved public health outcomes. Implementation of these projects has been undertaken by a variety of county and local jurisdictions, some with the support of SCAG and others through the initiative of the implementing agency. By providing regional examples of successful initiatives, SCAG hopes to encourage and support the wide spread adoption of similar initiatives. SCAG will continue to report on additional initiatives over the coming years in order to assist its stakeholders in making the region a healthier place to live, work and play.

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Access to Essential Destinations	
Agency	**Los Angeles County Metropolitan Transportation Authority**
Title	**The First Last Mile Strategic Plan & Planning Guidelines**
Description	The First Last Mile Strategic Plan & Planning Guidelines outlines a specific infrastructure improvement strategy designed to facilitate easy, safe, and efficient access to the Metro system, in line with the principles and goals of SCAG's 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS).
Goals	• Expand the reach of transit through infrastructure improvements • Build on the RTP/SCS & Countywide Sustainable Planning Policy (multi-modal, green and smart)
Outcome	The First Last Mile Strategic Plan & Planning Guidelines helps integrate the various modes provided by Metro (i.e. Bus and Rail) and also allows the integration of non-Metro provided solutions into a more seamless user experience. In so doing, the Pathway aims to support broader policy directives related to clean air, health, and economic sustainability
Status	Active
Link	http://media.metro.net/projects_studies/sustainability/images/path_design_guidelines_draft_november_2013.pdf
Agency	**Omnitrans**
Title	**sbX Bus Rapid Transit Program**
Description	sbX is designed to provide more frequent and direct transit service along major corridors in the Omnitrans service area. While Omnitrans' traditional network of local bus services provides good coverage in its general service area, sbX provides a "premium" level of service that is more competitive with the automobile in capturing riders who are making medium- to long-distance trips
Goals	Provide speedy, frequent, and affordable transportation to major destinations in the cities of San Bernardino and Loma Linda
Outcome	The sbX Green line, San Bernardino County's first-ever express passenger service, offers quick, convenient, comfortable, and affordable transportation to major destinations in the cities of San Bernardino and Loma Linda. The sbX fleet consists of fourteen deluxe 60-foot articulated vehicles powered by environmentally-friendly compressed natural gas.
Status	Active
Link	http://www.omnitrans.org/services/sbx/

Affordable Housing	
Agency	Los Angeles County Metropolitan Transportation Authority
Title	**Joint Development Program**
Description	The Metro Joint Development (JD) Program is a real estate management program that collaborates with qualified developers to build transit-oriented developments (TODs) on Metro-owned properties. The JD program ensures that 35% of these development's units are affordable for residents earning 60% or less of the Area Median Income (AMI).
Goals	• Reduced auto use/increased transit use • Pedestrian orientation • Sustainable development • Density, consistent with surrounding neighborhood • Incorporation of first/last mile and active transportation improvements
Outcome	Metro will be prioritizing affordable housing in HQTAs, ensuring equitable access in dense communities that traditionally price low-income families out. The program also provides discounted Metro passes for affordable housing occupants.
Status	In Progress
Link	https://www.metro.net/projects/joint_dev_pgm/

Climate Adaptation	
Agency	**City of San Gabriel**
Title	**Greening the Code**
Description	Greening the Code is an effort to make San Gabriel's zoning code "greener" by promoting development practices that are more sustainable and environmentally friendly by looking at: landscaping and water conservation; open space; parking, mobility, and connectivity; water quality; resource conservation; urban agriculture. Phase 1 involves evaluating the City's current approach to regulating development and identifying alternative approaches that would better implement sustainability principles. Phase 2 will include drafting recommended zoning code and development standard amendments.
Goals	• Evaluate current development regulations and identify better alternatives • Implement sustainable goals and policies for more efficient use of resources • Implement zoning laws to remove barriers • Provide incentives to further promote sustainability goals • Add predictable, understandable, and enforceable regulations for all stakeholders
Outcome	"Greening the Code" is being adopted through two separate ordinances, Ordinance 601 C.S. and Ordinance 608 C.S. Ordinance 601 C.S. deals with landscaping and open space requirements, while Ordinance 608 C.S. amends municipal code sections addressing parking requirements, development standards and land uses. Ordinance 601 C.S. was adopted by Council and became effective on April 4, 2014. Ordinance 608 was adopted by Council and became effective on June 20, 2014.
Status	Adopted
Link	http://www.sangabrielcity.com/index.aspx?NID=777
Agency	**Western Riverside Council of Governments**
Title	**Climate Action Plan**
Description	Twelve cities in Western Riverside County joined efforts to develop the Climate Action Plan, which sets forth a subregional emissions reduction target, emissions reduction measures, and action steps to assist each community to demonstrate consistency with California's Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32).
Goals	• Energy measures will increase community-wide building and equipment efficiency and renewable energy use, and promote energy efficiency and renewable energy generation throughout our communities, supporting municipal operations • Transportation and land use measures will reduce single-occupancy vehicle travel, increase nonmotorized travel, improve public transit access, increase motor vehicle efficiency, and promote sustainable growth patterns • Solid waste measures will reduce community and municipal solid waste sent to landfills • Water measures will increase community water conservation and reduce water consumed to support municipal operations in our communities
Outcome	If fully implemented, the CAP will exceed the subregional 2020 goal by 2.1%, achieving an overall 17.1% reduction in GHG emissions by 2020. Annual progress reports will allow the Plan to evolve along with local budget priorities, carbon markets, and technology.
Status	Active
Link	http://www.wrcog.cog.ca.us/uploads/media_items/wrcog-climate-action-plan-final-draft-april-2014.original.pdf

Economic Opportunity	
Agency	City of Lancaster
Title	**The BLVD**
Description	The City of Lancaster has taken a decaying nine-block stretch of downtown and transformed it into a vibrant, walkable destination through improved public transportation, affordable housing, regulations encouraging mixed use, and hiring an architecture/planning firm to further advance the landscape of the city.
Goals	Revitalize and improve the Downtown as a place of historic, cultural, social, economic and civic vitality; create a destination place with a mix of commercial, retail, dining, entertainment, residential, and transit uses; create a pedestrian-friendly environment.
Outcome	• Reduced speeds to 10 to 15 mph • Injury-related traffic collisions are down 85% in just two years • Economic returns have also been impressive for the $41-million project: » Downtown property values are up 9.5% » Over 800 permanent jobs have been created » Unemployment has dropped to 11.6% » Revenue from the downtown area is up 96% » Overall, the project has been estimated to have generated $273 million in economic output
Status	Complete
Link	Article: http://buildabetterburb.org/the-blvd-transformation/ Plan: http://www.cityoflancasterca.org/index.aspx?page=484

Physical Activity	
Agency	**Orange County Transportation Authority**
Title	**OC Loop**
Description	The County of Orange is working with jurisdictions along the OC Loop on a feasibility study to close the remaining gaps of the bike loop. The study will provide the jurisdictions with grant-ready information about their segments including design concepts and costs. Jurisdictions can then use the feasibility work to secure funding and advance design to leverage prior investments for community benefit.
Goals	Develop 66 miles of seamless connections and an opportunity for people to bike, walk and connect to some of California's most scenic beaches and inland reaches.
Outcome	• 70% of the bike loop completed for a total of 46 miles • Gaps currently under study through a SCAG grant in partnership with OCTA
Status	In Progress
Link	http://www.octa.net/Share-the-Ride/Bike/The-OC-Loop/
Agency	**City of Santa Monica**
Title	**Bike Santa Monica**
Description	Based on the Santa Monica Bike Action Plan, Bike Santa Monica is a comprehensive effort to encourage more bicycling in the City through the development of programs (education, outreach, rides, classes, events, partnership, contests), facilities (bike lanes, trails, neighborhood greenways, key connections, bike boxes, signal detection, "sharrows"), and supporting facilities (Santa Monica Bike Center, Santa Monica Bike Campus, bike racks, bike rooms, and bike valet).
Goals	Increase bike ridership in the City of Santa Monica
Outcome	• Santa Monica has been recognized as a Bike Friendly City at the Silver Level by the League of American Bicyclists • Bicycling has become the fastest growing commute mode in the City and the number of peak hour bicyclists is up 34% and the bicycle commute share is over 5%.
Status	In Progress
Link	Plan: http://nelsonnygaard.com/wp-content/uploads/2014/03/Santa-Monica-Bicycle-Action-Plan.pdf Site: http://www.smgov.net/departments/pcd/transportation/bicyclists/

Physical Activity	
Agency	**Riverside County Department of Public Health**
Title	**Safe Routes to School Program**
Description	Safe Routes to School (SRTS) programs bring together parents, schools, community leaders and local, state, and federal governments to improve the health and well-being of children, including those with disabilities, by identifying the issues and finding ways to improve and make walking or biking to school more safe.
Goals	• Provide pedestrian and bicycle education and encouragement activities at schools in the city of Riverside • Secure funds for improvements in infrastructure around schools to promote walking and biking
Outcome	In the first 14 months of the two-year Cycle 1 project, staff conducted 138 outreach presentations, participated in 16 health fairs, fit and distributed 609 bicycle helmets, educated 5912 students, organized two Walk To School Day events with over 8,000 student participants, facilitated 159 Walking Wednesday programs with 5,991 students participating, conducted 10 Coalition meetings with 316 attendees, and conducted four SRTS Workshops.
Status	In Progress
Link	http://saferoutescalifornia.org/2011/04/27/riversidecounty-srts/
Agency	**Los Angeles Department of Transportation**
Title	**LADOT People St**
Description	People St is a one-stop-shop, citywide program for plazas, parklets, and bicycle corrals that facilitates partnerships between the community and the City of Los Angeles to allow community groups to reclaim and transform underutilized streets into pedestrian-oriented public spaces.
Goals	Expand public spaces to calm traffic and increase safety for people who walk, bike, and take transit, and thus, increase levels of walking and biking; Improve local business.
Outcome	• Pilot studies complete (Sunset Triangle Plaza, Silver Lake; York Boulevard Bike Corral, Highland Park; York Boulevard, Highland Park; Spring Street Parklets, Downtown Los Angeles; Huntington Drive Parklet, El Sereno) • Spring Street Parklets » People feel that Spring Street is cleaner, that their neighborhood is something special, and they're more likely to start a conversation with someone they don't know as a direct result of four parking spaces being turned over to the public as a recreational area
Status	In Progress
Link	http://peoplest.lacity.org/about/ Article on Spring St: http://la.streetsblog.org/2013/09/20/spring-street-a-parking-day-success-story/

Transportation Safety	
Agency	**Los Angeles County Metropolitan Transportation Authority**
Title	**Metro Complete Streets Policy**
Description	The Complete Streets Policy outlines short and long term strategies for leveraging urban design, partnerships and project development to create environments that promote walking, bicycling, transit use, and public health.
Goals	• Improve access to public transit by making it convenient, safe, and attractive for transit users • Maximize multi-modal benefits and efficiencies • Facilitate multi-jurisdictional coordination and leverage partnerships and incentive programs to achieve a "complete" and integrated transportation system that serves all users • Establish active transportation improvements as integral elements of the countywide transportation system • Foster healthy, equitable, and economically vibrant communities where all residents have greater mobility choices
Outcome	The Complete Streets Policy builds upon projects and programs already underway at Metro to increase mobility options, improve air quality and health, and strengthen the economy in Los Angeles County jurisdictions. The policy will be applied to Metro's future corridor planning and transportation funding activities to achieve the goals of the policy.
Status	Active
Link	http://www.metro.net/projects/countywide-planning/complete-streets/
Agency	**Orange County Transportation Authority**
Title	**Pedestrian Action Plan**
Description	OCTA hosted a Pedestrian Safety Workshop open to the general public, agency staff, pedestrian advocates, and law enforcement representatives in order to provide education and receive input regarding safety issues in the county. Based on these inputs, OCTA staff has identified recommendations for the Pedestrian Action Plan involving education, engineering, and enforcement as well as funding opportunities for pedestrian safety projects.
Goals	• Coordinate with the general public, local agencies, law enforcement officials, and statewide contacts to improve pedestrian safety throughout Orange County • Identify funding for regional items where OCTA is identified as the lead agency • OCTA involvement with a teen defensive driver training program (Be Responsible and Keep Everyone Safe Program) • OCTA is already involved in regular bicycle and pedestrian safety campaigns, hosting education webinars for community members and local agency staff, collaboration with the Southern California Association of Governments on a region-wide safety campaign, an inventory of sidewalks on major roadways, support to cities pursuing active transportation funding, and supporting legislation related to hit-and-run convictions
Outcome	Based on inputs received, staff has developed recommended additional actions involving education, engineering, and enforcement as well as funding opportunities for pedestrian safety projects.
Status	Drafted
Link	http://www.octa.net/Share-the-Ride/Safety-Awareness/Events---Workshops/

Agency	Orange County Council of Governments
Title	**Complete Streets Initiative**
Description	The Orange County Council of Governments (OCCOG) is leading the development of an Orange County Complete Streets Initiative (OC CSI). The OC CSI is aimed at providing a phased enhancement of Orange County's street system to accommodate growing multi-modal transportation needs as the county redevelops and invests in transit improvements, bikeway facilities, and mixed-use/transit oriented development.
Goals	• The primary goal of the OC CSI is to develop and implement enhanced street design policies, guidelines, processes and standards for a range of multi-modal transportation needs (including pedestrians, bicycles, transit, and automobiles) in a way that eases congestion, reduces pollution, promotes increased mobility choice, and boosts user safety.
Outcome	The CSI will provide a menu of policies that can be adopted by local jurisdictions into the Circulation Element of the General Plan to ensure compliance with California Assembly Bill 1358, also known as the California Complete Streets Act of 2008.
Status	In Progress
Link	http://www.occog.com/complete-streets/

NOTES

1 Notes Office of Disease Prevention and Health Promotion (2015). *Social Determinants of Health.* Center for Disease Control. Retrieved May 27, 2015 from Healthy People 2020: http://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health.

2 Rudolph, L., Caplan, J., Ben-Moshe, K., & Dillon, L. (2013). *Health in All Policies: A Guide for State and Local Governments.* Washington, DC and Oakland, CA: American Public Health Association and Public Health Institute.

3 Peck, C., Logan, J., Maizlish, N., & Van Court, J. (2013). The Burden of Chronic Disease and Injury:California, 2013. California Department of Public Health.

4 Chandra, A., Holmes, J. and Skinner, J., (2013). "Is This Time Different? The Slowdown in Health Care Spending." The Brookings Institute. Retrieved June 6, 2015 from The Brookings Institute: http://www.brookings.edu/~/media/Projects/BPEA/Fall-2013/2013b_chandra_healthcare_spending.pdf?la=en.

5 Executive Office of the President (2009). "The Economic Case for Health Care Reform. Council of Economic Advisors." Retrieved June 6, 2015, from The White House: https://www.whitehouse.gov/assets/documents/CEA_Health_Care_Report.pdf.

6 Gerteis, J., Izrael, D., Deitz, D., LeRoy, L., Ricciardi, R., Miller, T., Basu, J. (2014). "Multiple Chronic Conditions Chartbook." AHRQ Publications No, Q14-0038. Rockville, MD: Agency for Healthcare Research and Quality; 2014. Accessed November 18, 2014.

7 California Department of Public Health (2013). "Ten Leading Causes of Death, California Counties and Selected City Health Departments, 2013." California Department of Public - Health Death Statistical Data Tables. Retrieved June 22, 2015 from California Department of Public Health: http://www.cdph.ca.gov/DATA/STATISTICS/Pages/DeathStatisticalDataTables.aspx.

8 Robert Wood Johnson Foundation (2013). "Why Does Education Matter So Much to Health? Health Policy Snapshot." Public Health and Prevention. Retrieved May 29, 2015, from Robert Wood Johnson Foundation: http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2012/rwjf403347

9 Robert Wood Johnson Foundation (2009). "Education Matters for Health. Commission to Build A Healthier America." Retrieved May 29, 2015 from Commission on Health: http://www.commissiononhealth.org/PDF/c270deb3-ba42-4fbd-baeb-2cd65956f00e/Issue%20Brief%206%20Sept%2009%20-%20Education%20and%20Health.pdf

10 McCann, B. (2006). "Community Design for Healthy Eating: How land use and transportation solutions can help." Robert Wood Johnson Foundation.

11 Clifton, K. (2004). "Mobility Strategies and Food Shopping for Low-Income Families." Journal of Planning Education and Research 23(4): 402-413.

12 Ver Ploeg, M., Breneman, V., Farrigan, T., Hamrick, K., Hopkins, D., Kaufman, P., Lin, B., Nord, M., Smith, T., Williams, R., Kinnison, K., Olander, C., Singh, A. and Tuckermanty, E. (2009). "Access to Affordable and Nutritious Food—Measuring and Understanding Food Deserts and Their Consequences: Report to Congress." Washington, D.C.: U.S. Department of Agriculture, Economic Research Service.

13 Hodgson, K. (2012). "Planning for Food Access and Community-based Food Systems: A National Scan and Evaluation of Local Comprehensive and Sustainability Plans." American Planning Association.

14 Robert Wood Johnson Foundation (2013). "Stable Jobs = Healthier Lives." NewPublicHealth.org. Retrieved June 3, 2015 from the Robert Wood Johnson Foundation: http://www.rwjf.org/en/culture-of-health/2013/01/stable_jobs_health.html

15 San Francisco Department of Public Health (2004). "Unaffordable Housing: The Costs to Public Health." San Francisco.

16 Cohen, D., Sturm, R., Han, B. and Marsh, T. (2014). "Quantifying the Contribution of Public Parks to Physical Activity and Health." Rand Corporation and National Recreation and Park Association. Retrieved from National Recreation and Park Association on June 3, 2015: http://www.nrpa.org/uploadedFiles/nrpa.org/Publications_and_Research/Research/Papers/SOPARC-Report.pdf

17 Di Nardo, F., Saulle, R., & La Torre, G. (2010). "Green Areas and Health Outcomes: A Systematic Review of the Scientific Literature." Italian Journal of Public Health, 7(4), 402-413.

18 Maller, C, Townsend, M, St Leger, L, Henderson-Wilson, C, Pryor, A, Prosser, L, Moore, M. (2008, 2nd Edition). "Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context: A Review of Relevant Literature." Melbourne, Victoria, Australia: Deakin University and Parks Victoria.

19 White P et al. (2013). "Would You Be Happier Living in a Greener Urban Area? A Fixed-Effects Analysis of Panel Data." Psychological Science, published online 23 April 2013, DOI: 10.1177/0956797612464659.

20 Nina S. Roberts (2015). "Literature Review: Supplement to Tech Memo #2 Outdoor Recreation and Transportation Patterns and Preferences." United States Department of Agriculture - Forest Service. Retrieved June 22, 2015 from the United States Department of Agriculture: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5421428.pdf.

21 Syed, S., Gerber, B. and Sharp, L. (2013). "Traveling Towards Disease: Transportation Barriers to Health Care Access." J Community Health. 2013 Oct; 38(5): 976-993.

22 Mattson, J., (2010). Transportation, Distance and Health Care Utilization for Older Adults in Rural and Small Urban Areas." Fargo: Small Urban & Rural Transit Center Upper Great Plains Transportation Institute, North Dakota State University.

23 Bindman, AB., Grumback, K., Osmond, D. et al. (1995). "Preventable Hospitalizations and Access to Care." Journal of the American Medical Association 274 (4), 305-311.

24 U.S. Environmental Protection Agency (2009). "Integrated Science Assessment for Particulate Matter (Final Report)." U.S. Environmental Protection Agency, Washington, DC. Retrieved June 6,205 from U.S. EPA: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546

25 Peters, J., Avol, E., Navidi, W., London, S., Gauderman, J., Laurmann, F., Linn, W., Margolis, H., Rappaport, E., Gong, H. and Tomas, D. (1999). "A Study of Twelve Southern California Communities with Differing Levels and Types of Air Pollution." American Journal of Respiratory and Critical Care Medicine, Vol. 159, No. 3 (1999), pp. 760-767. doi: 10.1164/ajrccm.159.3.9804143.

26 Künzli, N., McConnell, R., Bates, D., Bastain, T., Hricko, A., Lurmann, F., Avol, E., Gilliland, F. and Peters, J. (2003). "Breathless in Los Angeles: The Exhausting Search for Clean Air." American Journal of Public Health. v.93(9), Sep 2003, PMC1447999.

[27] Propper, R., Wong, P., Bui, S., Austin, J., Vance, W., Alvarado, A., ... & Luo, D. (2015). Ambient and Emission Trends of Toxic Air Contaminants in California.Environmental Science & Technology.

[28] Garcia, A., Wallerstein, N., Hricko, A., Marquez, J., Logan, A., Nasser, E., et al. (2013). "THE (Trade, Health, Environment) Impact Project: A Community-Based Participatory Research Environmental Justice Case Study." Environmental Justice, 17-26.

[29] Balbus, J. M. and Malina, C. (2009). "Identifying Vulnerable Subpopulations for Climate Change Health Effects in the United States." Journal of Occupational and Environmental Medicine 51(1): 33-37.

[30] Ebi, K. L., et al. (2006). "Climate Change and Human Health Impacts in the United States: An Update on the Results of the U.S. National Assessment." Environmental Health Perspectives 114(9): 1318-1324.

[31] Haines, A., et al. (2006). "Climate change and human health: Impacts, vulnerability and public health." Public Health 120(7): 585-596.

[32] McMichael, A., Woodruff, R. and Hales S. (2006). "Climate change and human health: present and future risks." The Lancet Commission 367.9513 (2006): 859-869.

[33] Luber, G. and McGeehin, M. (2008). "Climate Change and Extreme Heat Events." American Journal of Preventive Medicine 35(5): 429-435.

[34] Watts, N., Adger, W., Agnolucci, P., Blackstock, J., Byass, P., Cai, W., Chaytor, S., …, Costello, A. (2015). "Health and climate change: policy responses to protect public health." Lancet Commission on Health and Climate Change. Published Online June 23, 2015 http://dx.doi.org/10.1016/S0140-6736(15)60854-6

[35] Sun, F., Walton, D., Hall, A. and Capps, S. (2015). "A Hybrid Dynamical-Statistical Downscaling Technique. Part I: Development and Validation of the Technique." J. Climate, 28, 4597-4617.

[36] Sun, F., Walton, D. and Hall, A. (2015). "A Hybrid Dynamical-Statistical Downscaling Technique. Part II: End-of-Century Warming Projections Predict a New Climate State in the Los Angeles Region." J. Climate, 28, 4618-4636.

[37] Morello-Frosch, R., Pastor, M., Sadd, J., & Shonkoff, S. (2009). "The Climate Gap: Inequalities in How Climate Change Hurts Americans and How to Close the Gap." Los Angeles: USC Program for Environmental and Regional Equity.

[38] Balbus, J. M. and C. Malina (2009). "Identifying Vulnerable Subpopulations for Climate Change Health Effects in the United States." Journal of Occupational and Environmental Medicine 51(1): 33-37.

[39] Bryant, B. P. and Westerling, A. L. (2012)."Scenarios to Evaluate Long-Term Wildfire Risk in California: New Methods for Considering Links Between Changing Demography, Land Use and Climate. California Energy Commission." Publication number: CEC-500-2012-030.

[40] Bryant, B. P. and Westerling, A. L. (2014). "Scenarios for future wildfire risk in California: links between changing demography, land use, climate and wildfire." Environmetrics, 25, pages 454-471, doi:10.1002/env.2280

[41] Younger, M., et al. (2008). "The Built Environment, Climate Change and Health: Opportunities for Co-Benefits." American Journal of Preventive Medicine 35(5): 517-526.

[42] Institute for Local Government (2015). "Climate Action Plans: Local Examples." Retrieved June 22, 2015 from Institute for Local Government: http://www.ca-ilg.org/post/climate-action-plans-local-examples.

[43] California Governor's Office of Planning and Research (2014). "California Jurisdictions Addressing Climate Change." State of California. Retrieved June 22, 2015 from Institute for Local Government: http://www.ca-ilg.org/sites/main/files/file-attachments/california_jurisdictions_addressing_climate_change_pdf_0.pdf.

[44] Cohen, S. (2012). Creating Healthy Regional Transportation Plans. Oakland: TransForm.

[45] Maryland Department of Natural Resources Forest Service. (n.d.). "Trees Reduce Air Pollution." Retrieved October 30, 2014, from Maryland Department of Natural Resources: http://www.dnr.state.md.us/forests/publications/urban2.html

[46] American Community Survey (2009-2013. 2013 ACS 5-Yeare Estimates

[47] Rudolph, L., Caplan, J., Ben-Moshe, K., & Dillon, L. (2013). "Health in All Policies: A Guide for State and Local Governments." Washington, DC and Oakland, CA: American Public Health Association and Public Health Institute.

[48] Peck, C., Logan, J., Maizlish, N., & Van Court, J. (2013). The Burden of Chronic Disease and Injury: California, 2013. California Department of Public Health.

[49] Bhatia, R. and Katz, M. (2001) "Estimation of health benefits from a local living wage ordinance." Am J Public Health. 2001; 91(9):1398-1402.

[50] Cole, B., Shimkhada, R., Morgenstern, M., Kominski, G., Fielding, J. and Wu, S. (2005). "Projected health impact of the Los Angeles City living wage ordinance." J Epidemiol Community Health. 2005; 59:645-650.

[51] Milet, M., Tran, S., Eatherton, M., Flattery, J., & Kreutzer, R. (2007). "The Burden of Asthma in California: A Surveillance Report." Richmond, CA: California Department of Health Services, Environmental Health Investigations Branch.

[52] California Breathing (2015). "California County Asthma Profiles. California Department of Public Health." Retrieved May 15, 2015 from California Breathing:http://www.californiabreathing.org/asthma-data/county-asthma-profiles

[53] San Francisco Department of Public Health. (2004). "Unaffordable Housing: The Costs to Public Health." San Francisco.

[54] Craig, C. L., Brownson, R. C., Cragg, S. E., Dunn, A. L. (2002). "Exploring the Effect of the Environment on Physical Activity: A Study Examining Walking to Work." American Journal of Preventive Medicine, 23(2S), 36-43.

[55] Frank, L. D., Schmid, T. L., Sallis, J. F., Chapman, J., & Saelens, B. E. (2005). "Linking Objectively Measured Physical Activity with Objectively Measured Urban Form: Findings from SMARTRAQ." American Journal of Preventive Medicine, 28(2S2), 117-125.

[56] Kerr, J., Rosenberg, D., & Frank, L. (2012). "The Role of the Built Environment in Healthy Aging: Community Design, Physical Activity and Health among Older Adults." Journal of Planning Literature, 27(1), 43-60.

[57] Duclos, M., Oppert, J. M., Verges, B., Coliche, V., Cautier, J. F., Guezennec, Y…Strauch, G. (2013). Physical activity and type 2 diabetes. "Recommendations of the Francophone Diabetes Society diabetes and physical activity working group." Diabetes & Metabolism, 39, 205-216.

[58] LaMonte, M. J., Blair, S. N., & Church, T. S. (2005). “Physical activity and diabetes prevention.” Journal of Applied Physiology, 99, 1205-1213.

[59] Kerr, J., Rosenberg, D., & Frank, L. (2012). “The Role of the Built Environment in Healthy Aging: Community Design, Physical Activity and Health among Older Adults.” Journal of Planning Literature, 27(1), 43-60.

[60] Mujahid, M. S., Diez Roux, A. V., Morenoff, J. D., Raghunathan, T. E., Cooper, R. S., Ni, H., & Shea, S. (2008). “Neighborhood Characteristics and Hypertension.” Epidemiology, 19(4), 590-598.

[61] Kelley, G. A., Kelley, K. S., & Tran, Z. V. (2001). “Walking and Resting Blood Pressure in Adults: A Meta-analysis.” Preventive Medicine, 33, 120-127.

[62] Re, R. N. (2009). “Obesity-Related Hypertension.” The Ochsner Journal, 9(3), 133-136.

[63] Kerr, J., Rosenberg, D., & Frank, L. (2012). “The Role of the Built Environment in Healthy Aging: Community Design, Physical Activity and Health among Older Adults.” Journal of Planning Literature, 27(1), 43-60.

[64] Lovasi, G. S., Grady, S., & Rundle, A. (2012). “Steps Forward: Review and Recommendations for Research on Walkability, Physical Activity and Cardiovascular Health.” Public Health Reviews, 33(2), 484-506.

[65] Murtagh, E. M., Nichols, L., Mohammed, M. A., Holder, R., Nevill, A. M., & Murphy, M. H. (2014). “The effect of walking on risk factors for cardiovascular disease: An updated systematic review and meta-analysis of randomized control trials.” Preventive Medicine, 72, 34-43.

[66] Alevizos, A., Lentzas, J., Kokkoris, S., Mariolis, A., & Korantopoulos, P. (2005). “Physical Activity and Stroke Risk.” International Journal of Clinical Practice, 59(8), 922-930.

[67] Gillum, R. F., Mussolino, M. E., & Ingram, D. D. (1996). “Physical Activity and Stroke Incidence in Women and Men: The NHANES I Epidemiologic Follow-Up Study.” American Journal of Epidemiology, 143(9), 860-869.

[68] Gallanagh, S., Quinn, T. J., Alexander, J., & Walter, M. R. (2011). “Physical Activity in the Prevention and Treatment of Stroke.” ISRN Neurology, 2011, 1-10.

[69] Hu, H., Cho, j., Huang, G., Wen, F., Choi, S., Shih, M., & Lightstone, S. (2014). “Neighborhood Environment and Health behavior in Los Angeles Area.” Transport Policy, 33:40-47.

[70] Urban Design 4 Health, Inc. (2010). “Backgrounder: The Hidden Health Costs of Transportation.” American Public Health Association. National Safety Council (2012). Estimating Costs of Unintentional Injuries in 2012. Retrieved August 4, 2015 from National Safety Council: http://www.nsc.org/NSCDocuments_Corporate/Estimating-the-Costs-of-Unintentional-Injuries-2014.pdf

[71] Chakravarthy, B. Anderson, C.L., Ludlow, J., Lotfipour, S. and Vaca, F.E. (2010). “The Relationship of Pedestrian Injuries to Socioeconomic Characteristics in a Large Southern California County.” Traffic Injury Prevention, 508-513.

[72] Milken Institute (2014). “An Unhealthy America.” Milken Institute. Accessed June 10, 2015 at: http://www.chronicdiseaseimpact.org/ebcd.taf.

[73] Chatterjee, A., Kubendran, S., King, J. and DeVol R. (2014). “Check up Time: Chronic Disease and Wellness in America - Measuring the Economic Burden in a Changing Nation.” Milken Institute. Accessed July 10, 2015.

[74] DeVol, R., Bedroussian, A., Charuworn, A., Chatterjee, A., Kim, I. K., Kim, S., & Klowden, K. (2007). “An unhealthy America: The economic burden of chronic disease.” Milken Institute. Accessed July 10, 2015.

[75] Peck, C., Logan, J., Maizlish, N., & Van Court, J. (2013). “The Burden of Chronic Disease and Injury: California, 2013.” California Department of Public Health.

[76] Loukaitou-Sideris, A., Liggett, R. and Sung, H.G. (2007). “Death on the Crosswalk: A Study of Pedestrian-Automobile Collisions in Los Angeles.” Journal of Planning Education and Research, 338-351.

[77] Loukaitou-Sideris, A., Liggett, R. and Sung, H.G. (2007). “Death on the Crosswalk: A Study of Pedestrian-Automobile Collisions in Los Angeles.” Journal of Planning Education and Research, 338-351.

[78] Dora, C., & Phillips, M. (2000). “Transport, Environment and Health.” World Health Organization.

[79] Hammer, M., Swinburn, T., Neitzel, R. (2014). “Environmental Noise Pollution in the United States: Developing an Effective Public Health Response.” Environmental Health Perspectives, 115-119.

[80] Urban Design 4 Health, Inc. (2010). “Backgrounder: The Hidden Health Costs of Transportation.” American Public Health Association.

[81] Ding, D., Gebel, K., Phongsavan, P., Bauman, A. E., & Merom, D. (2014). Driving: A Road to Unhealthy Lifestyles and Poor Health Outcomes. PLoS ONE, 9(6), e94602. http://doi.org/10.1371/journal.pone.0094602

[82] De Hartog, J. J., Boogaard, H., Nijland, H., & Hoek, G. (2010). Do the health benefits of cycling outweigh the risks?. Environmental health perspectives, 1109-1116.

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