SAFETY

1) Map annual number of pedestrian and bicycle collisions (and severity of injury/fatality): per capita, per geographic area, by daytime population

2) Total number of vehicle, bike and pedestrian collisions per capita, broken down by severity: fatalities and injuries

**Measurement:** In California, the Statewide Integrated Traffic Records System (SWITRS) records data for all vehicle, bicycle and pedestrian collisions that are reported. This data is available at the intersection level and therefore able to be aggregated by census tract, neighborhood, city or region-wide. When calculating collisions per capita, the daytime population (when available) may have a more reliable denominator, however collisions before 5 AM and after 7 pm should be excluded. Another option is to use the residential population overall. SWITRS data is available annually and can be geocoded to census tracts, allowing for stratification by geography. Race/ethnicity data is largely missing from SWITRS, so extrapolations for racial inequity may be difficult.

TIMS (Transportation Injury Mapping System) will map SWITRS data by census track, traffic zones, schools, etc. [http://www.tims.berkeley.edu/](http://www.tims.berkeley.edu/). MPOs need to be careful with TIMS data as it doesn't include all collisions (only those that are severe or fatal). For complete data use the SWITRS site.

**Resources:**

*Monitoring:* Serious and fatal injuries are geocoded and available at no cost from UC Berkeley SafeTREC ([http://www.tims.berkeley.edu/](http://www.tims.berkeley.edu/))

San Francisco Department of Public Health- Healthy Development Measurement Tool: Indicator ST.3.c

*Number of bicycle collisions:* [http://www.thehdmt.org/indicators/view/59](http://www.thehdmt.org/indicators/view/59)

*Forecasting:* An example of the development and use of a multivariate, area-level regression model of vehicle-pedestrian injury collisions that has been applied to predict area-level change in vehicle-pedestrian injury collisions associated with land use development and transportation planning decisions:


[http://www.sfphes.org/transportation/Pedestrian_Injuries_and_Fatalities_SF.pdf](http://www.sfphes.org/transportation/Pedestrian_Injuries_and_Fatalities_SF.pdf)

ACCESS TO GOODS, JOBS & SERVICES

3) Proportion of households that can walk or bike (10 minutes) to meet at least 50% of their daily needs. Public daily needs defined as: schools, parks, healthcare institutions and transit. Private daily needs defined as: restaurants, grocery stores, food markets and childcare.

**Measurement:** Use GIS to map the distribution of daily goods and services in a particular region and households that can access them by biking or walking. Display the proportion of parcels that can access a minimum of four out of the eight public and private goods/services, those above 50 percent and those below. This analysis should produce two different maps, one showing bike access and one pedestrian access, as well as a display of the geographic equity of distribution.
4) Proportion of households and proportion of jobs within 1/4 mile of local public transit (including both bus and rail) or 1/2 mile of a regional public transit, that has less than 15 minute frequencies

**Measurement:** Enumerate both bus and rail public transit stops with less than 15 minute frequencies from local transit authorities; Estimate distance between stops and each household/job or intersection location. Using GIS network analysis so that true distance to transit is captured rather than “as the crow flies” will avoid underestimates of travel distance.

MPO’s should use their region-specific Travel Demand Models that include data on residents, jobs and transit for this performance metric. MPO’s should also use local transit authorities to gather information on transit frequency.

**Resources:**
Example of transit access methodology: SFDPH-HDMT Indicator ST.2.b Proportion of households with 1/4 mile access to local bus or rail link [http://www.thehdmt.org/indicators/view/52](http://www.thehdmt.org/indicators/view/52)

Examples of transit frequency methodologies:
MTC Appendix C: Regional Snapshot Analysis Detailed Methodology. [http://www.mtc.ca.gov/planning/snapshot/Appx%20C-Detailed%20Methodology.pdf](http://www.mtc.ca.gov/planning/snapshot/Appx%20C-Detailed%20Methodology.pdf)
SFDPH-HDMT: Indicator ST.2.c Local transit service frequency, morning peak commute [http://www.thehdmt.org/indicators/view/223](http://www.thehdmt.org/indicators/view/223)

OnTheMap is a tool by the U.S. Census's LEHD project that maps a number of different layers, including education, transportation and workforce categories: [http://lehdmap.did.census.gov/](http://lehdmap.did.census.gov/)

The National TOD Database is a GIS platform that includes every fixed-guideway transit system in the U.S. and demographic and land-use data for the half-mile radius around all stations: [http://toddata.cnt.org/](http://toddata.cnt.org/)

5) Proportion of daily trips less than 3 miles and less than 1 mile by mode (walking/biking/bus and rail transit/driving)

**Measurement:** MPOs should use their region-specific Travel Demand Models to measure this metric


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**GENERAL TRANSPORTATION**

6) Daily amount (in minutes) of work-trip and non-work trip related physical activity

Every day people travel throughout cities as they travel to work, run errands, and go to doctor's appointments, dentist appointments, get haircuts and pick up groceries. Because most adults in this country...
do not meet the minimum requirement for daily exercise, we support a performance metric related to the amount of physical activity people obtain during their daily travel trips.

**Measurement:** MPOs could consider using an activity-based model to calculate the amount of physical activity from daily work and non-work trips. The Metropolitan Transportation Commission in the Bay Area is developing such a process, although it is not complete yet.

If the MTC model is not workable, we suggest MPOs using either the American Community Survey (ACS) or the National Household Transit Survey (NHTS) (in conjunction with regional transportation surveys, if available) to calculate this metric.

- Using the time distribution by mode, the ACS gives the number of persons spending a threshold number of minutes it takes to get to work. Using a standard threshold (e.g. 15 minute or more), calculate the amount of physical activity for walking and bicycling, when available. The ACS is collected every 1 and 3 years on the city level.
- If using the NHTS, disaggregate work and non-work trips. Calculate daily duration of walking and cycling trips per capita by dividing the daily minute totals by mode by the number of persons, yielding average trip times. Both the 2001 and 2009 NHTS data contain information regarding bike and pedestrian travel modes by work and non-work trips. The NHTS is available at the state- and Metropolitan Statistical Area (MSA)-level and conducted every 5-7 years. Additional add-on samples, along with random national samples collected in the add-on area, are available for purchase and compiled into a cleaned geocoded database for ready application to local planning and forecasting.
- Examples of journal articles using the NHTS for transportation decision making:
  

- See attached example of Census tables B08006 and B08134. If you are able to get mode share of miles traveled from other sources you won’t need Census table B08006. Census table B08134 has the distribution of time in minutes in 5-minute intervals. Picking a threshold, such as the percent of the population walking 15 minutes or more, would be the indicator. Biking usually gets lumped in with other modes so this indicator cannot be calculated for cycling. The changing share of journey to work by bicycle can be tracked over time using Census table B08006.

**Resources:**

**Monitoring:**

- Metropolitan Transportation Commission.
- For more information regarding CDPH methodology (replicating the London Woodcock Active Transportation modeling), contact Neil Maizlish, PhD, MPH. California Department of Public Health at Neil.Maizlish@cdph.ca.gov

**Measurement:** MPO's should use regional transportation surveys or region-specific travel demand models to analyze mode share. If MPO's do not have modeling capabilities, the National Household Travel Survey (NHTS) collects data on daily trips by mode.
Resources:
Monitoring & Forecasting: Forecasting pedestrian and bicycle travel demands using travel demand model and mode share/trip length data: http://www.bicyclinginfo.org/library/details.cfm?id=4461

FUTURE GROWTH

8) a. Share of housing growth in transit priority areas, targeting measure of how many large (3-4) bedroom units, senior housing, low-income units will be built;
b. Proportion of projected population growth located in transit priority areas;
c. Proportion of projected jobs in transit priority areas

Measurement: Through the SB375 Sustainable Communities Strategy process, MPOs should use their region-specific analysis of housing, population and workforce growth in proposed transit priority areas.

Resources:
  This report uses the Census Bureau’s Population Estimates Program. Using data from the last decennial census, more recent national surveys, and administrative records at all levels of government, the Population Estimates Program produces annual estimates of population, and its “components of change” (natural increase, domestic migration, and immigration), for all incorporated municipalities, counties, and states nationwide. The program also estimates state and county populations by age and race/ethnicity annually. http://www.census.gov/popest/topics/schedule.html
• ABAG (The Association of Bay Area Governments) is responsible for making long-term forecasts or population, housing, and employment for the nine-county Bay Area. These forecasts assist local governments in planning for our changing environment. ABAG produces updated forecasts every 2 years and publishes them as Projections. In recent updates, the Projections forecasts have presented a realistic assessment of growth in the region, while recognizing trends in markets and demographics, while also recognizing local policies that promote more compact infill- and transit-oriented development. http://www.abag.ca.gov/planning/currentfcst/

ECONOMIC

9) a. Percent of household income consumed by housing and transportation combined;
b. Percent of income going towards housing costs;
c. Percent of income going towards transportation costs

Measurement:
Monitoring: The Center for Neighborhood Technology (CNT), in collaboration with the Center for Transit-Oriented Development, has devised a methodology to estimate how much households of different income levels pay for both housing and transportation (H+T). The CNT’s Housing + Transportation Affordability Index covers most regions in California. We recommend that MPO’s use the CNT’s methodology in order to measure these affordability metrics.

10) For all daily trips, per capita miles traveled by mode (walking, biking, transit, vehicle)

**Measurement:** MPO-specific Travel Demand Models include information on per capita miles traveled by mode.

**Resources:** An example of an MPO data set and forecast of number of trips by mode by trip length, see [http://www.mtc.ca.gov/planning/2035_plan/tech_data_summary_report.pdf](http://www.mtc.ca.gov/planning/2035_plan/tech_data_summary_report.pdf) (pg 110), which is the Bay Area’s Metropolitan Transportation Commission (MTC)’s Change in Motion analysis. This analysis gives some level of background methodology in the text portion and tables defining their performance measures for the 2009 Regional Transportation Plan: Vision 2035. Table D4 beginning on page 81 is also of interest for this metric.

11) Working with a local public health department, university or air quality management district:

Estimate premature mortality attributed to traffic-related ambient PM 2.5, and estimate asthma incidence and asthma exacerbations attributed to traffic related NO2.

**METHODOLOGY**

Regarding premature mortality related to PM2.5: Find the population weighted average transportation-attributable PM2.5 concentration and NO2 (either by measurement or estimate by modeling e.g., CAL3QHCR or AERMOD Dispersion model using local traffic volumes, vehicle emissions models, topography, meteorology). Estimate parcel level population as share of total area residential building volume. To find premature mortality, asthma incidence and asthma exacerbations, apply the Exposure-Response Function (ERF) to population exposure. Use California ARB consensus on PM2.5-Mortality ERF.

Regarding asthma incidence and exacerbations related to NO2: contact Human Impact Partners for further assistance and information. Kim Gilhuly, kim@humanimpact.org.

**MEASUREMENT RESOURCES/EXAMPLES**

  - Pittsburg Railroad Ave. Specific Plan Health Impact Assessment
  - San Pablo Avenue Corridor
- SFDPH Road Pricing HIA. [http://www.sfphes.org/HIA_Road_Pricing.htm](http://www.sfphes.org/HIA_Road_Pricing.htm)
  For a copy of this paper, please contact Kim Gilhuly, kim@humanimpact.org
12) Proposed housing near busy roadways will require:
   a. Assessment by local air district or public health department of the need for environmental/health impact analysis when housing is proposed near (within 1,000 feet) busy roadways (over 100,000 Average Annual Daily Traffic (AADT)) or other significant pollution sources (e.g., rail yards, port terminals, refineries, power plants, etc); and
   b. Best practice mitigation requirements by local governments when the above assessment determines that environmental quality is below standard for such proposed housing, and if such housing is determined to be safe by local air districts and public health departments with identified mitigation.

For MPOs representing highly urban regions, we suggest an alternate metric due to the ongoing concern about the lack of developable land, the need for housing, and equity concerns about placing low-income residents near polluting emissions of cars and trucks.

Alternate Metric 12: Working with a local public health department, university and/or air quality management district:
   a. Estimate the number of sensitive sites (homes, schools, daycares, parks, etc.) within 1,000 feet of freeways and other major pollution sources, where that source contributes to more than 0.3 μg/m³ of PM2.5 or or cancer risk of greater than 10 additional cases of cancer/million. (Note these are based on BAAQMD’s CEQA thresholds.)
   b. Estimate proportion of affordable housing units vs. market rate units within above identified areas.

Measurement:
1) The MPO should engage the local air district or public health department to assess need for environmental/health impact analysis according to protocol similar to the Bay Area’s CEQA guidelines for all development located within 1,000 feet of busy roadways (see Resources below for link to detailed methodology)
2) The MPO should document whether local general plans and other policies require mitigations for housing proposed in areas with poor air quality.

This metric has raised some concerns about the potential conflict between the health dangers of placing homes and other sensitive uses near busy roadways and the need and desire in urban areas of California to create infill development that is often near freeways, in particular affordable housing options. Because there has been an ongoing statewide conversation regarding this issue, an effort was made to solicit input about which indicator would be best. Many organizations and agencies that have been most involved in the statewide discussion participated in the decision on this health and equity metric. Those organizations and agencies were: the American Lung Association of California, the California Department of Public Health, the Natural Resources Defense Agency, ClimatePlan, the Bay Area Air Quality Management District, the Sacramento Air Quality Management District, Housing California, the Sacramento Council of Governments, the San Diego Association of Governments, the Los Angeles County Public Health Department, Human Impact Partners, the Environmental Health Coalition, the Coalition for Clean Air, Reconnecting America, Prevention Institute, Public Health Law and Policy, the San Mateo County Health Systems, the Central Valley Air Quality Coalition, and East Yard Coalition for Environmental Justice.

Methodology for Alternate Metric 12 also exists. The San Francisco Department of Public Health has worked closely with the Bay Area Air Quality Management District to conduct hot spot analysis in the City and County of San Francisco to guide healthy development.

RESOURCES
• Bay Area Air Quality Management District. CEQA Guidelines. Tools and Methodology. 
  http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-
  Methodology.aspx

• Example mitigation recommendations: SFDPH HDMT (see "Policies/Design Strategies")
  http://www.thehdmt.org/objectives/view/55

• San Francisco’s Air Quality Ordinance and Frequently Asked Questions:
  http://www.sfphes.org/Policy_Air_Quality.htm

• Lepe, C. 2008. Addressing air quality related health impacts associated with siting residential development
  near high traffic roadways in California and the city of San Jose. Master’s Thesis, Dept. of Urban
  Planning. San Jose State University. For a copy of this resource email Kim Gilhuly at
  kim@humanimpact.org.

• San Francisco Department of Public Health Environmental Health: Air Quality: Assessment. Planning,
  Policy Development, and Regulation. Available at http://www.sfdph.org/dph/EH/Air/default.asp

EQUITY

13) Measure and stratify all indicators by race/ethnicity; income; geography (neighborhood, census
block or tract, or Community of Concern); age; disability.

Measurement: Not only is it important to understand the equity dimensions of each metric by stratifying by
each of the elements (race/ethnicity, income, place, age, and disability), but also the cumulative impact across
all the metrics. We suggest developing indices in a manner similar to the California Department of Public
Health.

Through the Strategic Growth Council, California Department of Public Health has developed indicators of
Healthy Communities. As part of that process CDPH has proposed three different composite scores that are
used to demonstrate levels of equity with regard to race/ethnicity, income and place. Depending on data
availability, each equity score can be applied city, county, or region-wide by drawing on information from
census tracts and individuals. We suggest that MPOs use similar analysis in order to stratify the proposed
metrics by these equity dimensions and identify communities with high or low levels of equity.

Resources:
For more information regarding CDPH methodology, contact Neil Maizlish, PhD, MPH. California
Department of Public Health at Neil.Maizlish@cdph.ca.gov