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METROPOLITAN AREA PLANNING COUNCIL
SMART GROWTH AND REGIONAL COLLABORATION

HIA Assessment 101
Methods for Quantitative Assessment

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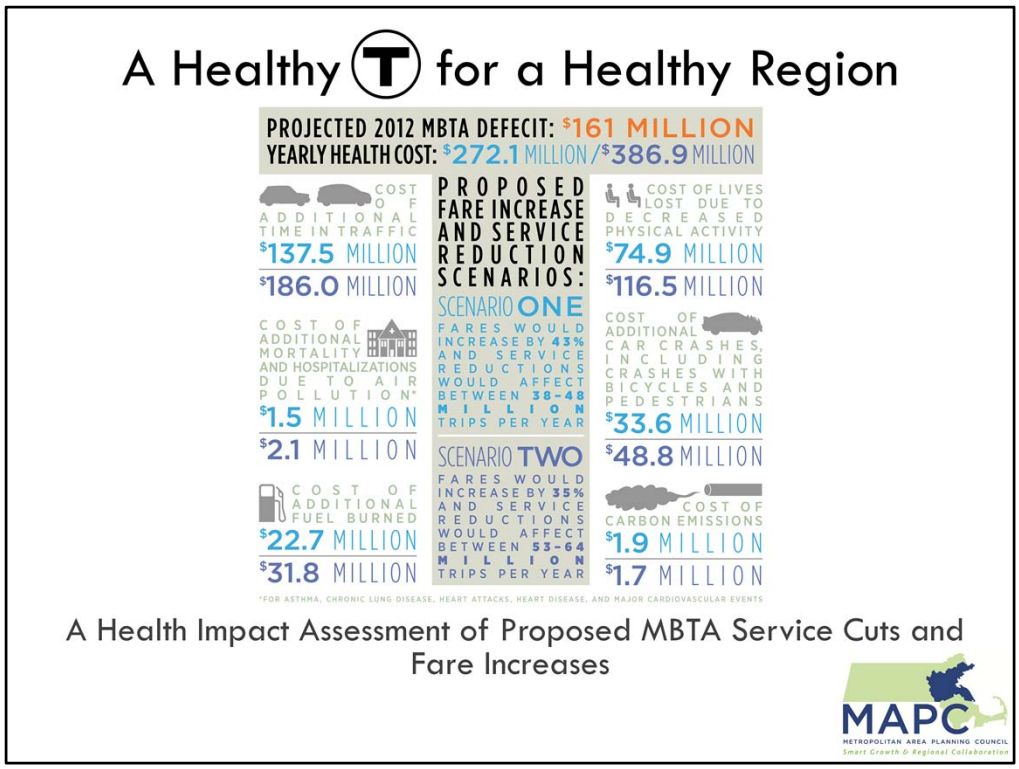

Frame issue:
Explain MBTA deficit of $161 million
Obligated to fill this deficit

The T is a Health Resource

- Free Time ↑
- Physical Activity ↑
- Access to Health Care ↑
- Disposable Income ↑
- Air Pollution ↓
- Accidents ↓
- Noise ↓

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Methodology

- The Central Transportation Planning Staff (CTPS), which is the transportation planning staff for the Boston Region Metropolitan Planning Organization, had projected changes to ridership, automobile travel, and vehicle emissions
- MAPC applied findings from peer reviewed scientific literature to the CTPS transportation model results
- Consulted local experts on air quality, environmental health, and physical activity

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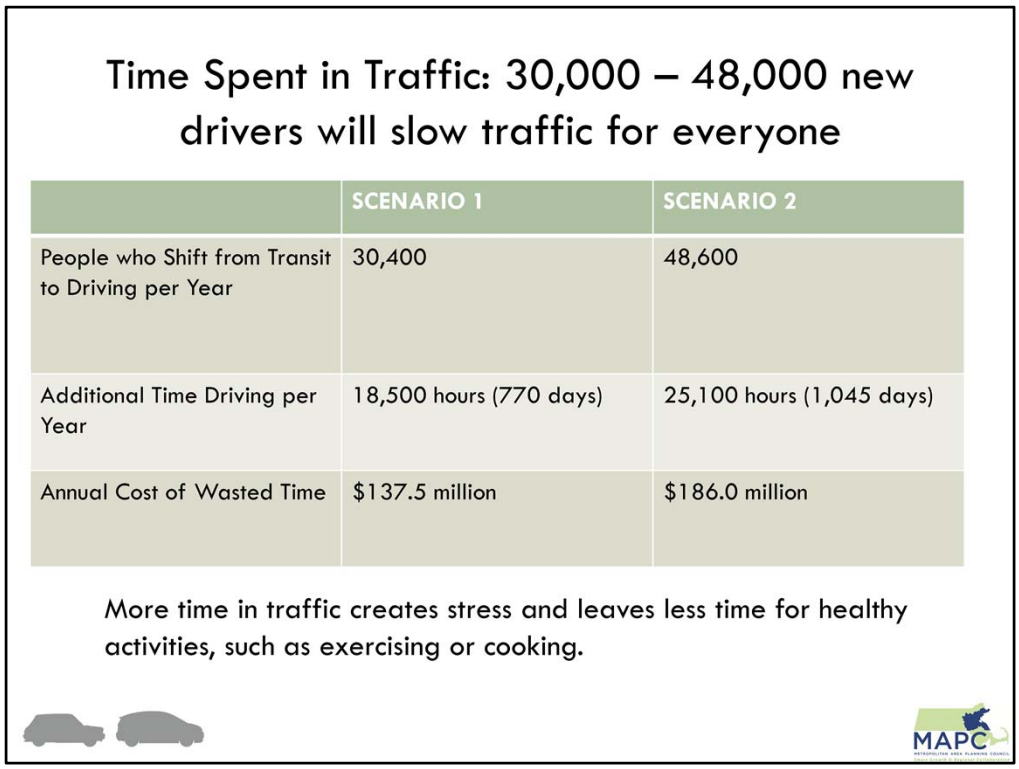

In order to estimate the number of individuals switching from transit to driving: difference between the number of daily transit trips that currently take place and those that would occur under Scenarios 1 and 2

We assumed, in consultation with CTPS, that each weekday transit rider completes two MBTA trips per day (i.e., to and from work) and that 95% of individuals shifting from transit would instead drive under the proposed scenarios

More time in traffic creates stress and leaves less time for healthy activities, such as exercising or cooking

From CTPS estimates, average travel speeds will drop from 32.7 miles per hour (mph) to 32.5 mph under Scenario 1 and to 32.4 mph under Scenario 2

To estimate how much time the region's drivers would spend in traffic due to driving at slower average speeds, we divided the current regional VMT by the speeds under the different scenarios

We multiplied this number of extra person-hours in cars by $16.94, or the value of one hour of travel time in the greater Boston region in 2012 dollars

We valued time spent driving in trucks at $91.60/hour per vehicle in 2012 dollars, assuming trucks are used for commercial purposes

It is important to note that we calculated these losses based on current vehicle-miles traveled (VMT), ignoring the impact of slower speeds on new drivers

Fuel Burned: New drivers take on new fuel costs; Congestion costs everyone

	SCENARIO 1	SCENARIO 2
Additional Annual Fuel Costs	$22.7 million	$31.8 million

Additional gas costs leave less disposable income for healthy foods, prescriptions, other health-related purchases.

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Fuel use under each scenario was calculated by using the Texas Transportation Institute

Report's equations to calculate average fuel economy in gallons per mile for trucks and automobiles separately

From CTPS estimates, we calculated the miles driven under each scenario by multiplying the VMT for automobiles and trucks

Miles driven for automobiles and trucks were then multiplied by the cost of fuel for each vehicle type and using the TTI estimates for Massachusetts 2010 average gasoline cost of $2.86 / gallon and an average diesel cost of $3.16 / gallon (2012 dollars)

Air Pollution: More cars mean less healthy air

	SCENARIO 1	SCENARIO 2
Deaths Caused by Worse Air Quality per Year	0.18	0.26
Hospitalizations Caused by Worse Air Quality per Year	0.17	0.24
Annual Cost of Exposure to Additional Air Pollution	$1.5 million	$2.1 million

More car exhaust produces air pollution, leading to increases in asthma, chronic lung disease, heart attacks, heart disease, and major cardiovascular events. "Near roadway" pollution will have additional impacts not quantified here.

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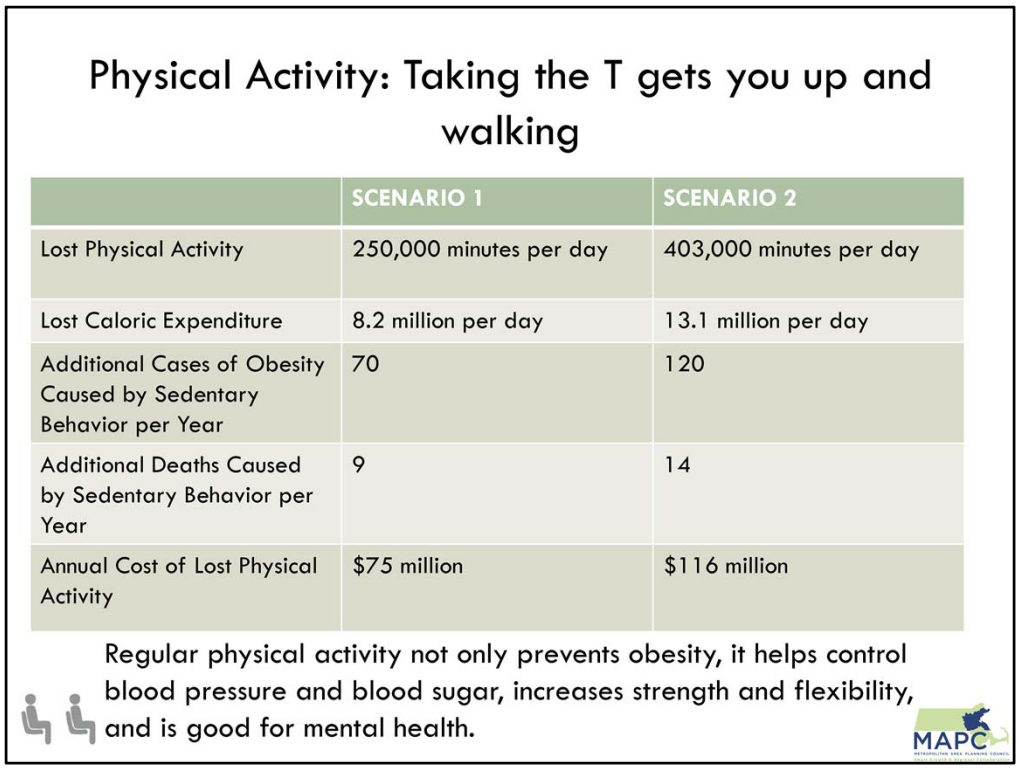
More car exhaust produces air pollution, leading to increases in asthma, chronic lung disease, heart attacks, heart disease, and major cardiovascular events. "Near roadway" pollution will have additional impacts not quantified here.
CTPS modeled emissions using EPA's MOBILE 6.2 software, which takes VMT and travel speeds to estimate air pollution emissions
Models gave emissions estimates for Particulate Matter smaller than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) and NO_x
We then used an EPA Source-Receptor Matrix to convert emissions data into concentrations of air pollution at the county level
Population counts by county were taken from the US Census
Hospitalization rates for asthma, cardiovascular disease, myocardial infarction, COPD, and ischemic heart disease were taken from Massachusetts Community Health Information Profile (MassCHIP) while mortality rates came from the CDC Wonder Database
Concentration-Response Function for $PM_{2.5}$ and NO_x were taken from EPA's Environmental Benefits Mapping and Analysis Program (BenMAP)
The value of statistical life (VSL) of $8.32 million in 2012 USD was used to monetize mortality endpoints
BenMAP includes costs for hospitalizations, which includes: the cost of illness to society, which includes the total medical costs plus the value of the lost productivity; the willingness to pay of the individual, as well as that of others, to avoid the pain and suffering resulting from the illness
Did not include the effects of exposure to other pollutants, including SO_2, CO, ozone, and ultrafine particles
EPA's MOBILE6.2 model does not incorporate additional emissions that would occur due to stop and go traffic
Did not calculate effects of air pollution on stroke, premature birth, infant mortality, and childhood asthma
Greater negative impact on lower income and minority communities, further exacerbating the disproportionate health burden that these communities face
Estimates also do not include increased exposures for commuters, who will be spending more time in traffic in close proximity to elevated concentrations



Regular physical activity not only prevents obesity, it helps control blood pressure and blood sugar, increases strength and flexibility, and is good for mental health.

Use estimate of how many people would switch from transit to driving from CTPS data
US DOT and FHWA National Household Travel Survey data indicates that transit users partake in 8.3 additional minutes of daily walking per day

Introducing this amount of daily walking can prevent 0.25% of that population from becoming obese despite upward national trends in obesity prevalence

Health Economic Assessment Tool (HEAT) from the World Health Organization (WHO)

Developed by WHO with the guidance of an advisory group of international experts in heath, epidemiology, health economics, transport economics, practice/advocacy, and policy development and implementation

Based on systematic reviews of the epidemiologic literature, this tool allows us to estimate changes in mortality based on population-level changes in physical activity

We used our CTPS-based estimate on those that would shift to driving and simulated an intervention using the HEAT Tool where 30,000-48,000 people would walk 8 minutes less 5 days a week

Total Cost: We Lose More than We Save

Annual Impact	Scenario 1 Cost	Scenario 2 Cost
Cost of additional time in traffic	$137.5 million	$186.0 million
Cost of additional fuel burned	$22.7 million	$31.8 million
Cost of additional car crashes, including crashes with bicycles and pedestrians	$33.6 million	$48.8 million
Cost of additional mortality and hospitalizations for asthma, chronic lung disease, heart attacks, heart disease, and major cardiovascular events due to air pollution	$1.5 million	$2.1 million
Cost of lives lost due to decreased physical activity	$74.9 million	$116.5 million
Cost of carbon emissions	$1.9 million	$1.7 million
Total annual cost	**$272.1 million**	**$386.9 million**

To balance a $161 million budget:
Costs exceed savings generated by service cuts and fare hikes

Outcomes

- Report released on March 13, 2012
- Presented to MBTA officials at the Massachusetts State House
- Over 25 unique press hits, MAPC's Executive Director interviewed for the local news, MAPC Staff interviewed on local radio
- Report was cited at final MBTA hearings on fare hikes
- On April 4, 2012, the MBTA board approved plans to hold average fare increases at 23% and to institute modest service cuts
  - Down from proposed 35% to 43% increases and deep service cuts

Voted **Most effective, efficient quantitative analysis** by Human Impact Partners HIPpy awards

Acknowledgements

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