

The impact of built environment on reliance on motor vehicles

[Environment](#), [Climate Change](#)



Thesis statement:

Climate change is the single most Important issue that we face today. While there certainly are many different social and economic problems that we can attempt to solve through architecture, if our world is destroyed in the process then there is no point. An overwhelming majority of the harmful carbon emissions causing this problem are coming from two places: Buildings, and transportation. As architects, we know how to build sustainable buildings that use far less energy than what we currently do. The major crisis that has not been solved however, is the one of suburban traffic and congestion.

On the city scale, as a society we have many models and examples of how to handle urban public transportation. We have sustainable methods of transportation that people in dense cities currently use. These methods help cut down on harmful emissions within cities and allow people a means of travel without having to own a car. These methods of travel are also accepted by people of all social stature, and provide everyone access to transportation, regardless of income levels or social stature.

However, once we move to the suburban scale, there is a large problem which has not been addressed at all. Most people do not live near where they work and commute a substantial distance every day. Not only does this arguably contribute the largest amount of harmful emissions from the transportation sector, but with our ever-growing population, congestion is rapidly becoming a major problem.

Something must be done to address this growing problem. With climate change having greater effects on the environment around us, and with a steadily rising global population, this is a very real and growing problem. Are there more sustainable methods of transportation than cars? Can these methods be implemented on a larger, suburban scale? How can we get people to use these new methods of transportation instead of driving by themselves, in their own cars? Finally, can architecture somehow facilitate and promote a new method of transportation through buildings and communities?

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“ High-resolution mapping of traffic related air pollution with Google street view cars and incidence of cardiovascular events within neighborhoods in Oakland, CA” Environmental Health, Vol 17, Iss 1, (2018) Pp 1-13
<https://doaj.org/article/92040976af63410c9aaa8bc8fcec8eb3>

Based on street level measuring and google data, there is evidence that exposure to air pollutants from vehicles over a long period of time may increase your risk of a cardiovascular event. It was also found that concentrations of air pollutants increased up to 5-fold in intra-urban environments. The study highlighted findings that among the elderly, the risk of a cardiovascular event was at a higher rate than that of younger persons. The findings of this study are consistent with previous studies conducted on the same topic, suggesting that this is an issue that has been known for

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some time. A referenced study had found that increased exposure to NO₂ over long periods of time was associated to a significant increase in cardiovascular events.

Douglas, Margaret J, Stephen J. Watkins, Dermot R. Gorman, Martin Higgins.
“ Are cars the new tobacco?” Journal of Public Health, Vol. 33, Iss 2, (2011)
Pp 160-169 doi: 10. 1093/pubmed/fdr032

While the notion “ cars are the new tobacco” is somewhat far-fetched, the authors aim to correlate health risks, individual choices, and government policy as similar between using tobacco and driving cars. It is argued that both harm the health of the primary and second-hand users. The authors show that the methods employed by tobacco companies through lobbyists and front organizations, which have been very effective, are also employed by car companies. The authors move on to our dependence of cars, distinguishing the differences between personal dependence and societal dependence. While these are different methods of dependence, it is suggested they are just as hard to break free from. The authors primary conclusion is that while cars and tobacco both harm their users, cars have a greater impact on the larger community.

Kassu¹, Aschalew, Michael Anderson. “ Determinants Of Severe Injury And Fatal Traffic Accidents On Urban And Rural Highways” International Journal for Traffic & Transport Engineering, Vol. 8, Iss 3, (2018) Pp 294-308 doi:
[http://dx. doi. org/10. 7708/ijtte. 2018. 8\(3\). 04](http://dx.doi.org/10.7708/ijtte.2018.8(3).04)

In this article the authors suggest that based on their findings, motor vehicle crashes are becoming the number one cause of death in America, based on research from 2014, 2015, and 2016. The data also shows that in most states, the number of fatalities is increasing year over year. While severe weather impacts were not factored in to this research, the majority of these deaths are occurring during the day, on dry pavement. They also found that increasing speed limits on highways did not increase the severity of traffic crashes. Finally, there was no statistical difference between urban and rural highway sections, suggesting that they are equally as dangerous.

Sugiyama , Takemi, Ding Ding, Neville Owen “ Commuting by Car:

Weight Gain Among Physically Active Adults” American Journal of Preventive Medicine, Vol 44, Iss 2, (2013) Pp 169-173 doi: 10. 1016/j. amepre. 2012. 09. 063

While it is generally known that sitting for prolonged periods is not good for our health, the authors of this study aimed to find data that specifically sitting in cars while commuting is detrimental to health. The study identifies that over $\frac{3}{4}$ of working Americans use cars as their primary mode of transportation to work. The main findings of this study indicate a slightly higher risk for obesity and a dramatically higher risk for a cardiovascular event with a one-hour commute to work each way. The authors also found women were more likely to gain weight than men, and that even if you exercise, you are still likely to gain weight from commuting.

Ayed , Sadoon, Mladen Tomić, Predrag Živković “ A Specific Approach for Estimating Traffic-Induced Urban Pollution” Polish Journal of Environmental Studies, Vol 24, Iss 6,)2015) Pp 2739-2744 doi: 10. 15244/pjoes/58763

The authors of this paper aimed to specifically identify motor vehicles contribution of carbon pollution in the overall city. In this study, they excluded heavy trucks (semi's) from their study. This study concluded that in this city of Nis, Serbia, they determined that motor vehicles contribute 15% of the total of the total harmful carbon emissions. It is good to have a reference study from another part of the world, according to their data, more people in this city use public buses as their mode of transportation than Americans do. This study can be used to make a case for public transportations immediate positive impact on harmful emissions.

Levy, Jonathan I, Jonathan J Buonocore, Katherine von Stackelberg “ Evaluation of the public health impacts of traffic congestion” Environmental Health, (2010) 9: 65 url: <http://www.ehjournal.net/content/9/1/65>

This study provides a health risk assessment of the consequences of traffic congestion. Throughout this study, the authors quantify the health hazards caused by congestion as significant enough to warrant further evaluation as to the benefits of reducing congestion. They also provide many monetary figures, and total economic burden of both the time wasted by sitting in congestion as well as from the premature deaths of people from ingesting harmful emissions. A very interesting fact arising from this research, is that over the years fuel wasted has been going down (due to higher fuel

efficiency of vehicles), however time wasted is steadily increasing. The authors finally used this data to make predictions into the future, and even in 2030, public health risks will still remain high.

Campbell, Patrick, Yang Zhang, Fang Yan, Zifeng Lu, David Streets “ Impacts of transportation sector emissions on future U. S. air quality in a changing climate. Part I” Environmental Pollution, Vol 238, (2018) Pp 903-917 URL: <https://doi.org/10.1016/j.envpol.2018.04.020>

Through this study, national emissions levels are analyzed, by state, and also by vehicle type. Predications are made based on this data and future3 trends to give estimated data for the years 2046-2050. The overall conclusion is that most emissions will be reduced due to more stringent emissions requirements. However, on a world scale, more developing countries will gain access to motor vehicles, and impose far less restrictions on emissions requirements. This will offset any gains in reduction of emission here in America. It is also interesting to note that the study predicts an increase in emissions from off road engines, such as lawn equipment.

Schweitzer, Lisa, Abel Valenzuela “ Environmental Injustice and Transportation: The Claims and the Evidence” Journal of Planning Literature, Vol 18, Iss 4, (2004) Pp 383-398 DOI: 10.1177/0885412204262958

The author explorers the relationships between transportation and its effects on poor and minority communities. This is studied through two avenues: cost and pollution. A major problem identified is that while people want access to transportation, many do not want to live near a transportations center,

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because of the implied drawbacks, including noise and pollution. A very disturbing fact stated it that there is an “ inverse relationship between income and air pollution created”. “ Along with climate change, people of color internationally contend with the environmental costs of transportation during the lifecycle of both fuel and vehicles throughout extraction, transport, and disposal.”

Culver, Gregg “ Death and the Car: On (Auto)Mobility, Violence, and Injustice” ACME: An International Journal for Critical Geographies, Vol 17, Iss 1 (2018) Pp 144-170 URL: <https://www.acme-journal.org/index.php/acme/article/view/1580/1429>