DEMOGRAPHIA

HOW URBAN DENSITY INTENSIFIES TRAFFIC CONGESTION

One of the most frequently recurring themes of the critics is that suburbanization increases traffic congestion. This is usually accompanied by statements to the effect that things would be better if people rode transit or that new mass transit lines were built so that fewer people would drive. Like so many of the anti-suburban claims, the "sprawl makes traffic congestion worse" could not be more wrong.

In fact, greater suburbanization is associated with *less* intense traffic congestion. This is because, in higher densities, with more people, there are more cars and more driving. There is a modest reduction in the driving per capita, but not nearly enough to nullify the increase in overall use that the larger population produces.

It is true that lower population densities are likely to lead to greater volumes of traffic throughout the entire urban area. But that does not mean that traffic congestion is worse. Assuming equal roadway capacity, an urban area with higher densities will have higher traffic intensities than an avera with lower densities, because more cars are on the roadway system at any given time.

This means that people will generally be able to make their trips more quickly where there is more suburbanization and that less of their travel will be in stressful conditions of intense traffic congestion. Peter Gordon and Harry Richardson of the University of Southern California make this point by noting that "suburbanization has turned out to be the traffic safety valve.[1]

US Federal Highway Administration Evidence

An analysis prepared for the United States Department of Transportation indicated that traffic volumes in small sectors (census tracts) rise with population density (Figure).[2]

Further US evidence that traffic congestion is worse where there is less suburbanization is provided by Federal Highway Administration and Texas Transportation Institute data. In 2002 (Table 1):

> Traffic intensity (vehicle miles per urban square mile) was the greatest in the most dense urban areas at more than double the intensity of the least dense areas. Urban areas with

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[1] Peter Gordon and Harry W. Richardson," Prove It: The Costs and Benefits of Sprawl," *Brookings Review*, Fall 1998.

[2] Derived from Catherine Ross and Anne E. Dunning (1997). "Land Use and Transportation Interaction: An Examination of the 1995 NPTS Data," *Searching for Solutions: Nationwide Personal Transportation Survey Symposium.* Washington, DC: US Federal Highway Administration.

densities above 4,000 per square mile averaged 96,500 vehicle miles per square mile, while urban areas with less than 2,000 per square mile averaged 46,700 vehicle miles per square mile.

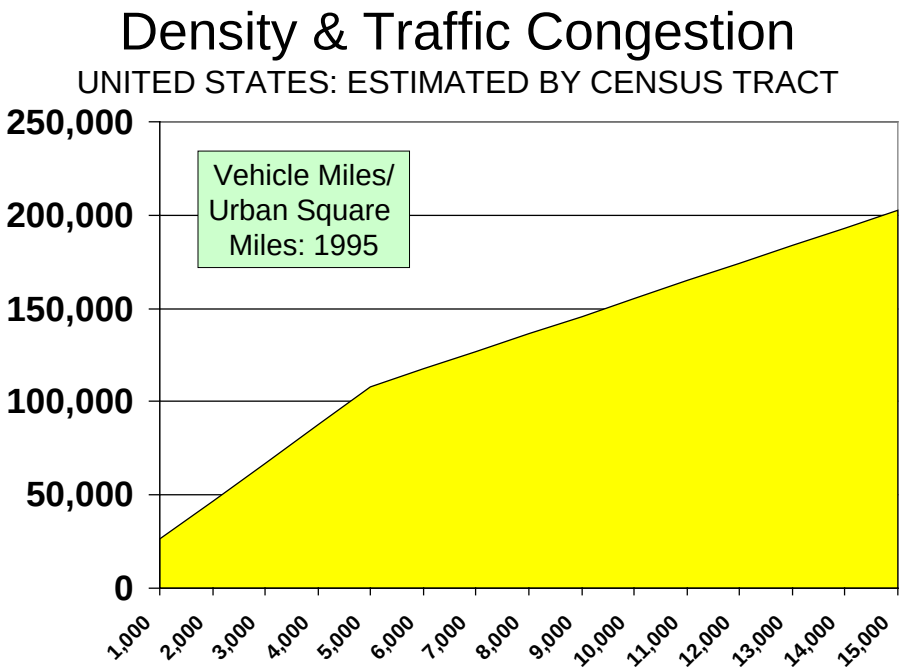
As would be expected, average speeds were associated with the greater traffic intensities of the more dense urban areas. The daily vehicle hours per square mile in the above 4,000 density category were 2.6 times the rate of the below 2,000 density category.

Average travel delay during peak hours was also more than double in the most dense urban areas compared to the least dense. Urban areas with densities above 4,000 per square mile averaged a 48 percent peak hour delay compared to non-congested periods. Urban areas with less than 2,000 per square mile had an average 23 percent peak hour delay.

Table 1
Traffic in Large US Urban Areas: 2002

Urban Area Population Density	Peak Hour Delay	Vehicle Miles per Square Mile	Vehicle Hours per Square Mile
4,000 & Over	48%	96,545	1,675
3,000 – 3,999	40%	72,103	1,237
2,000 – 2,999	32%	54,524	911
Under 2,000	23%	46,724	609

Calculated from Texas Transportation Institute data
Vehicle hours is for freeways and principal arterials only.



Sierra Club Research

Even the Sierra Club agrees that higher densities increase traffic volumes. Dr. John Holtzclaw has conducted California research indicating that people who live in areas with greater density drive less. He estimates that driving per capita in 20 percent to 30 percent less per capita in a neighborhood that is double the density of another. This is a greater reduction in per capita driving than found in the FHWA research above.[3] However, this reduction in driving per capita is too small to keep traffic volumes from rising. The Sierra Club estimates would indicate that an increase in density of 100 percent would be associated with an increase in traffic volumes of from 40 percent to 60 percent.

International Evidence

The association between higher densities and more intense traffic congestion is even more stark in the international data. This is because, generally, urban areas outside the United States have higher densities.[4] Daily traffic per square mile in urban areas with more than 20,000 or greater density is more than 1.5 times the average and more than three times the rate for urban areas with densities below 3,000 (nearly all of the below 3,000 urban areas are US). But, the more intense traffic congestion slows down traffic. The most dense urban areas have considerably slower average vehicle speeds than the least dense areas. Speeds in the highest density urban areas are less than one-half that of the lowest density urban areas.

This means that vehicles operate for longer periods per square mile in the more dense urban areas. In the more than highest density urban areas, total travel time (vehicle hours) per square mile is more than seven times that of the urban areas with less than that of the lowest density urban areas (Table 2). This slower traffic, combined with the associated higher incidence of "stop and go" traffic means that air pollution emissions are more intense in local areas.

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[3] http://www.sierraclub.org/sprawl/articles/designing.asp, accessed January 5, 2005.

[4] This is the latest available data that includes both cars and trucks. This data includes some middle-income and low-income urban areas, which tend to be far more dense. As automobile ownership continues to increase in these areas, it can be expected that traffic intensities will increase even further, unless urban densities fall substantially.

Table 2 Traffic in International Urban Areas: 1990			
Density	Vehicle Miles per Square Mile	Average Speed	Vehicle Hours per Square Mile
20,000 & Over	153,590	15.2	11,373
10,000-19,999	118,000	19.3	6,187
5,000-9,999	98,111	24.2	4,183
3,000-4,999	69,510	30.0	2,340
Under 3,000	49,432	31.7	1,540
Average/Total	97,936	24.1	4,948
Data from 46 urban areas. Calculated from Kenworthy, Laube & Newman[5].			

[5] Jeffrey Kenworthy, Felix B. Laube and Peter Newman (1999). *An International Sourcebook of Automobile Dependence in Cities, 1960-1990.* Boulder CO: University of Colorado Press.