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# Evaluating Household Chauffeuring Burdens

## *Understanding Direct and Indirect Costs of Transporting Non-Drivers*

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*In automobile-dependent communities non-drivers are often chauffeured. In more multimodal communities non-drivers have more independence, which reduces drivers' chauffeuring burdens and traffic problems (Santa Clarita Valley Signal 2012)*

### Abstract
*Household chauffeuring* (also called *escort*, *serve passenger* and *caregiving travel*) refers to personal motor vehicle travel specifically made to transport *independent non-drivers* (people who could travel on their own if they had suitable travel options). This additional vehicle travel imposes various direct and indirect costs. This report identifies factors that affect the amount of chauffeuring that occurs in a community. It develops a *Chauffeuring Burden Index*, which can be used to quantify chauffeuring costs and therefore the savings and benefits of transport improvements that reduce chauffeuring burdens. This analysis indicates that in automobile dependent communities, chauffeuring costs often exceed congestion costs. As a result, motorists often benefit from improved transport options that reduce their chauffeuring burdens even if they do not use those options themselves.

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## Introduction

*Chauffeuring* (also called *escort*, *serve passenger* and *caregiving travel*) refers to vehicle travel made specifically to transport non-drivers. Chauffeuring can include commercial transport, such as taxi services, but this report focuses on *household chauffeuring*: additional unpaid vehicle travel specifically made to transport independent non-drivers (people capable of independent travel if suitable mobility options are available). Table 1 categorizes non-drivers' transport options and their impacts on total vehicle travel.

**Table 1 Non-Drivers' Transport Options**

| | Non-Auto Travel | Ridesharing | Chauffeuring that Increases Vehicle Travel | Chauffeuring with Empty Backhaul |
|---|---|---|---|---|
| **Description** | Walking, bicycling and public transit | Passengers in a vehicle that would make the trip anyway | Vehicle travels farther to transport non-driver | Driver makes special trips to transport non-driver and returns empty |
| **Impacts on total vehicle travel** | No increase | No increase | Increases vehicle travel | Doubles total mileage |

*Independent non-drivers have several possible transport options, some of which increase total vehicle travel.*

Chauffeuring imposes various direct and indirect costs, including increased drivers' time and vehicle costs, plus external costs including congestion, road and parking facility costs, crashes and pollution emissions. Time spent chauffeuring is not always negative, it is often an opportunity for drivers and passengers to socialize, but sometimes imposes large costs such as when drivers must interrupt important activities to fulfill chauffeuring obligations or when non-drivers deprived of independence. Chauffeuring burdens contribute to time poverty and stress (1, 2). Seniors with declining abilities may be reluctant to give up driving because they don't want to impose chauffeuring burdens on family and friends. When alternative transport options are available non-drivers often use them, indicating that non-drivers and drivers would often prefer to avoid chauffeuring.

High chauffeuring rates indicate that a transport system fails to serve non-drivers' travel demands, described as *automobile dependency* (3). A more diverse transport system with better non-automobile transport options (walking, cycling, public transit, taxi services and delivery services), and more compact development patterns can give non-drivers more independent mobility and reduce chauffeuring burdens and associated costs. Conventional transport planning tends to overlook these values: it recognizes and quantifies the value of increased travel speeds but not the value of improved transport diversity.

Non-automobile travel demand is sometimes evaluated based on the number of *zero-vehicle households* (4), which assumes that drivers will chauffeur non-driver household members. This approach ignores the costs of this chauffeuring.

This report explores these issues. It develops a *Chauffeuring Burden Index*, which estimates chauffeuring rates in a community, discusses the costs of this travel and explores its implications for transport planning. This analysis should be of interest to transportation and land use planners, policy makers and individuals affected by chauffeuring burdens.

## Previous Research

Popular literature on family caregiving (5, 6), often mentions chauffeuring burdens as a stress factor (7). Parents often describe their role as "taxi driver" and their vehicles as "mom's taxi."

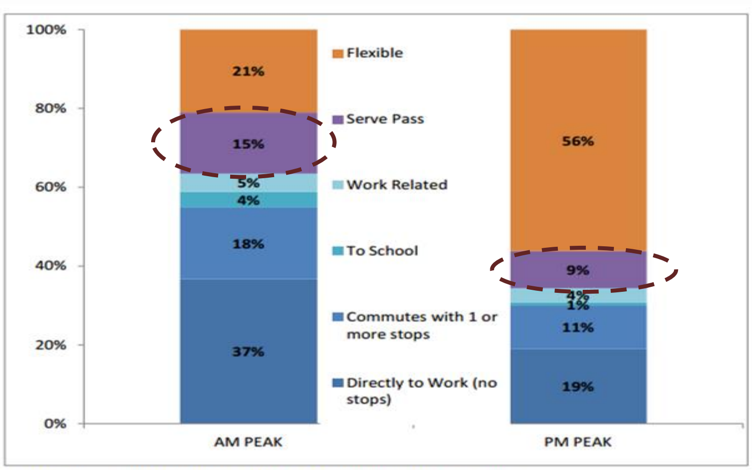
***Table 2*** **2009 NHTS Vehicle Trip Summary** (8)

| Trip purpose | Vehicle Trips | Percent Trips | Distance (vehicle miles) | Percent VMT | Duration (minutes per trip ) | Percent Travel Time | Avg. trip length |
|---|---|---|---|---|---|---|---|
| **Not ascertained** | 15 | 0.0% | 1,102 | 0.0% | 84.7 | 0.0% | 73.5 |
| **Don't know** | 131 | 0.0% | 1,625 | 0.0% | 18.5 | 0.0% | 12.4 |
| **Refused** | 102 | 0.0% | 1,003 | 0.0% | 17.8 | 0.0% | 9.8 |
| **Home** | 253,533 | 34.2% | 2,320,912 | 33.7% | 18.3 | 35.0% | 9.2 |
| **Work** | 100,896 | 13.6% | 1,317,402 | 19.1% | 22.4 | 17.1% | 13.1 |
| **School/daycare/ religious activity** | 19,406 | 2.6% | 145,694 | 2.1% | 15.8 | 2.3% | 7.5 |
| **Medical/dental** | 15,481 | 2.1% | 158,234 | 2.3% | 21.0 | 2.5% | 10.2 |
| **Shopping/errands** | 161,438 | 21.8% | 944,661 | 13.7% | 13.2 | 16.1% | 5.9 |
| **Social/recreational** | 63,619 | 8.6% | 958,218 | 13.9% | 24.2 | 11.6% | 15.1 |
| **Family personal business/obligations** | 24,448 | 3.3% | 251,724 | 3.7% | 18.9 | 3.5% | 10.3 |
| ***Transport someone*** | *51,078* | *6.9%* | *392,831* | *5.7%* | *15.5* | *6.0%* | *7.7* |
| **Meals** | 49,596 | 6.7% | 353,188 | 5.1% | 14.7 | 5.5% | 7.1 |
| **Other reason** | 1,430 | 0.2% | 42,034 | 0.6% | 36.4 | 0.4% | 29.4 |

*According to the 2009 National Household Travel Survey (NHTS), 6.9% of trips, 5.7% of vehicle travel and 6.0% of travel time is devoted to "Transport someone." This is probably a lower-bound estimate since some chauffeuring travel is probably misclassified into other categories such as travel to "Home," or "Family obligations."*

Although not all travel surveys specifically measure chauffeuring, those that do indicate that such trips generate significant amounts of vehicle travel (9, 10, 11). For example, the 2009 U.S. *National Household Travel Survey* (NHTS) indicates that at least 6.9% of total personal trips, 5.7% of total personal vehicle travel (Table 1), 15% of morning peak, and 9.4% of afternoon peak travel, is to *serve passengers* (i.e., chauffeur) (Figure 1).

***Figure 1*** **Vehicle Travel in AM and PM Peak Periods** (12)



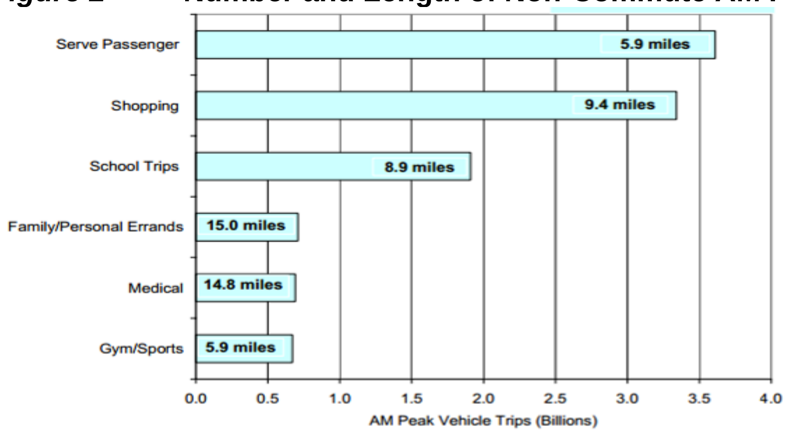

Source: Author's analysis of the 2009 National Household Travel Survey

*The 2009 National Household Travel Survey indicates that 15% of morning peak and 9% of afternoon peak travel is to "serve passengers" (i.e. chauffeur).*

These are lower-bound estimates since some chauffeured travel, such as traveling home after delivering a non-driver to a destination, or special trips to drive somebody to school, medical or dental appointments, to errands, social or religious events, may be coded based on their destination rather than as "serve passenger" trips. The 2001 National Household Travel Survey indicates that of morning chauffeur trips, 78% were to drive children to school and 12% were to drive someone to work (13). Of married mothers' 5.0 total average daily trips, 2.3 included children, 36% of which were chauffeur trips (14).

Figure 2 illustrates the average number and length of various morning peak non-commute trips; "serve passengers" was the largest category. They are relatively short, averaging 5.9 miles compared with the 9.9 overall average.

***Figure 2*** **Number and Length of Non-Commute AM Peak Trips** (15)




*The 2001 National Household Travel Survey indicated that about 8% of total morning peak trips were to "serve passengers" (chauffeur). These are relatively short, averaging 5.9 miles compared with a 9.87 overall average.*

Various time-use surveys indicate that chauffeuring is a major time demand on parents, averaging approximately two weekly hours (100 annual hours), with higher rates for mothers than fathers (16). Some studies have quantified the value of this travel time and travel time savings (17, 18).

Children's travel to school has been widely studied. The 2009 NHTS indicated that 10%–14% of total morning-peak private vehicle trips and 5%–7% of total vehicle travel consists of children 5 to 12 years of age being driven to school (19, 20), rates that increase with distances to school. A survey of 1,237 British parents found that they average 1,664 annual vehicle-miles chauffeuring children (21), 23% of the 7,115 total annual vehicle-miles per private car (22). Chauffeuring is common for destinations other than schools (jobs, recreation and social events) and for other groups (adolescents, adults who lack vehicles, visitors, seniors, etc.) (23).

Researcher Nancy McGuckin analyzed the travel patterns of seniors living in households with their adult children (24). Of these, 64% do not drive, 27% only drive during daytime, and 67% frequently ask to be chauffeured. She explains, "The elderly parents living in multi-generational households who do not drive need assistance to travel to daily activities – for more than 4 out of 5 trips the parent is a passenger in a vehicle, and the caregiver is the driver on most of these trips. While the elderly parent who does not drive travels on average less than half the rates of comparable drivers there is one critical exception: non-driving elderly parents report more than four times the number of medical trips as do those who drive."

A few studies examine chauffeuring burden costs. Barnett and Reisner found that the availability of non-automobile transport options (walking, cycling, public transit, school buses), significantly affects parental chauffeuring burdens and work schedules: inadequate options force parents, usually mothers, to work fewer hours to allow more time to transport children (25). A household survey by Piatkowski, "Exploring Support for and Solutions to Family CABs (Chauffeur-Associated Burdens)" found that 39% of respondents report transporting either aging relatives or children dependents, and most drivers who transport dependents spend more than two hours per week and hundreds of dollars annually on chauffeuring (26).

Some studies examine the problems that inadequate non-automobile travel options impose on particular groups, including seniors (27), adolescents (28, 29) and low-income households (30, 31). Some recent studies have quantified various economic, social and environmental impacts of automobile dependency (32, 33).

Other studies identify savings and benefits of improving transport diversity (34, 35), sometimes called "option value" (36). Among these benefits are reduced drivers' chauffeuring burdens and increased non-drivers' independence (37). Piatkowski found that most drivers with chauffeuring burdens would like to move to a place where it was easier to take dependents places without driving, and most hope that autonomous vehicles become available as a way to reduce chauffeuring burdens; men are much more likely to support autonomous vehicles and women are much more likely to want to move to more multimodal neighborhoods. There is significant literature on vehicle costs, including direct user costs (vehicle expenses, time and risk) and external costs including congestion, roadway facility costs, accidents and pollution costs imposed on others (38, 39, 40). Virtually all of these costs apply to chauffeured trips, including incremental vehicle ownership costs if households purchase more or larger vehicles for chauffeuring sake. Litman identified "avoided chauffeuring" as a public transit benefit, and described how to quantify it (41). Godavarthy, Mattson and Ndembe, used this methodology in their transit benefit analysis (42). Estimating that chauffeuring costs (including vehicle operation and drivers' time) average $5.25 per avoided motor vehicle trip or $1.05 per vehicle-mile, they calculate that rural and small urban transit services save $332 million annually in reduced chauffeuring costs, 8% of the $4,276 million total economic benefits.

## The Chauffeuring Burden Index

The *Chauffeuring Burden Index* estimates incremental vehicle travel caused by inadequate non-automobile travel options. Here is the calculation:

(1) Ratio of independent non-drivers to drivers
X
(2) Independent non-drivers' vehicle trip generation rates
X
(3) Portion of independent non-drivers' trips that are chauffeured
X
(4) Empty backhaul factor (1 + percentage of trips that require an empty link)
X
(5) Average trip length (if measured in miles) or duration (if measured in hours)

These five factors are discussed below.

### *1. Ratio of independent non-drivers to drivers*

*Independent non-drivers* are people who can travel independently if they have suitable transport options. There are many possible reasons that independent people cannot drive as summarized in Table 3. This suggests that in a typical community, 20-40% of travellers cannot, should not (for example, because car ownership is unaffordable), or prefer not to drive, with higher rates in areas with more seniors and adolescents, lower incomes, and dense cities. The portion of non-drivers is likely to increase in rural areas due to aging population.

***Table 3*** **Non-Auto Travel Demands** (43, 44, 45)

| Type | Prevalence | Costs if not Served |
|---|---|---|
| Seniors who do not or should not drive. | 5-10% of population. | Non-drivers lack mobility, require chauffeuring (special vehicle travel to transport a non-driver), must use higher-cost options (such as taxis and ridehailing) or move to another community with better transport options. |
| People with mobility impairments. | 5-10% of population. | |
| Adolescents (12-20 years). | 10-20% of population. | |
| Drivers who share vehicles. | 5-15% of motorists. | |
| Drivers who temporarily lack vehicles. | Varies. | |
| Lower-income households. | 20-40% of households. | Lack mobility or bear excessive transport costs. |
| Tourists and visitors. | Varies. | Lack mobility or visit other areas. |
| People who do not drive for religious or cultural reasons. | 0-3% of households. | Lack mobility during religious days or move to more walkable areas. |
| Impaired or distracted travelers. | Varies. | Drive impaired or distracted, increasing crashes. |
| People who walk and bike for health and enjoyment. | 40-60% of residents. | Must spend time and money exercising at a gym or have insufficient exercise. |
| Families with pets to walk. | 20% of households. | Pets lack exercise or owners drive to walking areas. |
| Motorists who benefit from better travel options for others. | Most motorists. | Motorists bear more congestion, risk and chauffeuring burdens. |

*In a typical community, 20-40% of travelers cannot, should not, or prefer not to drive for most trips, and will use non-auto modes if they are convenient, comfortable and affordable.*

### *2. Independent non-drivers' trip generation rates*

Independent non-drivers (who include adolescents, seniors and people with low-incomes), tend to have lower than average trip generation rates since they are less likely to be employed or have family management responsibilities (shopping and errands), although this effect is surprisingly modest. For example, 2009 National Household Travel Survey data indicate that both under-16 and over-65 age groups generate on average 3.2 daily trips, just 16% less than the overall average of 3.8 daily or 1,387 annual trips (46), and that 16-24 year olds generate on average 17.4 daily vehicle-miles, which is 32% less than the 25.8 overall average daily VMT (47). This analysis assumes that independent non-drivers generate 60% the overall average, or 733 annual vehicle trips.

### *3. Portion of independent non-drivers' vehicle trips that are chauffeured*

Chauffeured trip generation rates are affected by the quality of travel options in a community, which can range from *multi-modal* (areas where most destinations can be easily reached without an automobile) to *automobile-dependent* (areas where most destinations require automobile travel). Useful indicators of multi-modalism include WalkScore (which counts to number of common destinations that can be reached within convenient walking distance) and transit accessibility (the quality of transit service within convenient walking distance).

Christopher Leinberger estimates that 5-10% of U.S. housing stock is located in walkable urban places (48), and the *National TOD Database* indicates that about six million households (about 5% of total households) are located within a half-mile of a fixed guideway transit stop (49). This suggests that only about 10% of U.S. residents live in highly multi-modal communities, although residents of other communities have some non-automobile travel options.

Adolescent school trip chauffeuring rates, which are available from travel surveys, provide an indicator of the quality of local travel options available to independent non-drivers. According to the 2009 National Household Travel Survey, 40.5% of middle schools (12-14 year old) students were chauffeured (50), with higher chauffeuring rates for longer-distance trips. This suggests that chauffeuring rates for independent non-drivers range from about 10% in compact, multi-modal areas to more than 60% in sprawled, automobile-dependent areas.

### *4. Empty backhaul factor*

The incremental vehicle travel generated by chauffeuring can vary:

- Chauffeuring is sometimes integrated with vehicle trips that would occur anyways, such as a parent driving a child to school on their way to work, which often requires some incremental vehicle travel.
- Drivers sometimes accompany their passenger for the entire trip, such as to and from an appointment, so the incremental vehicle travel equals the total passenger-travel.
- Some chauffeured trips involve dropping off a passenger and returning with an empty backhaul, so each passenger-mile generates two vehicle-miles traveled.

Travel surveys indicate that the portion of parents who return directly home after chauffeuring children to school averages 44% in the U.S. (51) and 72% in the UK (52). Other types of chauffeuring trips, such as medical appointments, sport and social events, probably have equal or higher empty backhaul rates since school commutes are relatively easy to coordinate with work commutes and errands. This analysis assumes that on average, half of all chauffeured trips have empty backhauls, so the backhaul factor is 1.5.

### *5. Average trip length (if measured in miles) or duration (if measured in hours)*

This varies depending on factors such as land use density and mix, and therefore the distances and travel speeds to common destinations. Overall, U.S. vehicle trips average about 10 miles in length (53), but are shorter in compact communities and longer in sprawled communities. Chauffeuring trips (e.g., driving children to school and local shopping centers, and seniors to medical services) tend to be relatively short, averaging about 6 miles in length (Figure 2). This analysis assumes that chauffeur vehicle trip lengths average 4 miles in compact communities and 8 miles in sprawled communities.

## Estimate

Table 3 uses the previously described assumptions to estimate and compare chauffeuring burdens between compact, multi-modal communities with sprawled, automobile-dependent communities. It assumes that in both types of communities the ratios of non-drivers to drivers, non-driver vehicle trip generation rates, and the portion of chauffeured trips that generate empty backhauls are the same, but in compact, multi-modal communities non-drivers only require chauffeuring for 10% of trips while in automobile-dependent, communities they require chauffeuring for 60% of trips. This indicates that automobile dependency and sprawl causes an average driver to spend an additional 52 hours and 66 gallons of fuel to drive 1,318 annual vehicle miles compared with the same households located in a compact, multi-modal community.

***Table 3*** **Chauffeuring Burdens per Driver**

| | Compact, Multi-Modal | Sprawled, Auto-Dependent | Differences |
|---|---|---|---|
| 1. Ratio of non-drivers to drivers | 0.33 | 0.33 | |
| 2. Non-drivers annual motor vehicle trips | 733 | 733 | |
| 2. Portion of trips chauffeured | 10% | 60% | 50% |
| 4. Avg. chauffeured trip (miles) | 4.00 | 8.00 | 4.00 |
| 4. Avg. chauffeured trip (minutes) | 12.00 | 20.00 | 8.00 |
| 5. Empty backhaul factor | 1.5 | 1.5 | |
| Totals vehicle-Miles | 146 | 1,757 | 1,611 |
| Totals vehicle hours | 7 | 73 | 66 |
| Gallons of fuel | 7 | 88 | 81 |

*In a compact, multi-modal community a typical driver spends about nine hours and consumes about 7 gallons of fuel driving 146 annual miles to chauffeur non-drivers in their household. In a sprawled, automobile-dependent community they spend 73 hours and 88 gallons to drive 1,611 annual chauffeuring miles.*

This estimate of chauffeuring burdens in automobile dependent communities is consistent with Piatkowski's finding that about 40% of drivers reporting chauffeuring family members, most of whom spend more than two hours and $25 per week on those trips, totaling more than 100 hours and $1,300 annually. It is also similar to the 1,237 annual vehicle-miles driven per UK child reported in the 2008 AA Insurance survey. Although they differ in perspective (for example, the Chauffeuring Burden Index reflects all chauffeuring per driver in automobile-dependent communities, the AA Insurance survey reports the additional vehicle travel per child) it suggests that this estimate is a reasonable order of magnitude.

Of course, these burdens vary. Drivers with no independent non-drivers in their households have minimal chauffeuring burdens, while "sandwich generation soccer moms" responsible for multiple children and a senior non-driver located in automobile-dependent communities may spend many hours a week chauffeuring. Piatkowski found that, of drivers with chauffeuring burdens, 75% chauffeur children, 33% chauffeur older dependents and 17% chauffeur both.

In addition to increased vehicle travel, chauffeuring responsibilities may cause motorists to purchase more, larger, more costly vehicles. For example, a household might consider a small car adequate for most trips if located in a multi-modal community but purchase a larger vehicle such as a van or SUV for chauffeuring if located in an automobile-dependent community. Such shifts can significantly increase both user costs and external costs such as parking space size requirements, accident risk to other road users, and pollution emissions.

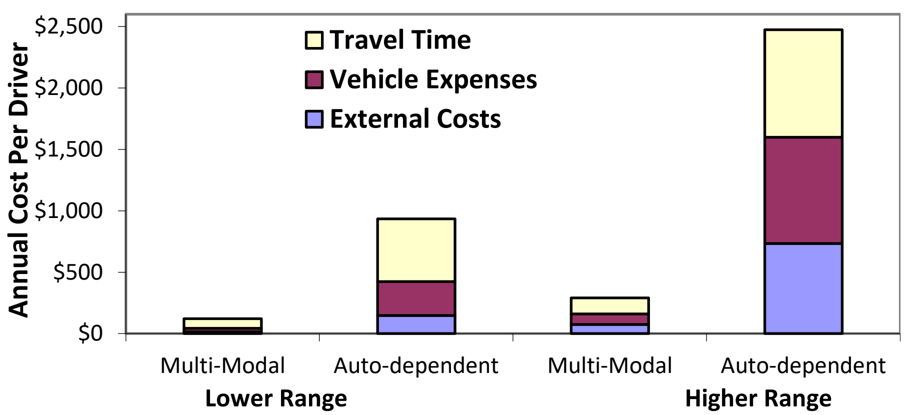
***Table 4*** **Estimated Chauffeuring Burden Costs Per Driver**

| | Compact, Multi-Modal | Sprawled, Auto-dependent | Differences |
|---|---|---|---|
| **Travel Time** (54) | | | |
| Low (35% average wages) | $77 | $510 | $434 |
| High (60% average wages) | $131 | $875 | $744 |
| **Vehicle Expenses** (55) | | | |
| Low (vehicle operating expenses) | $28 | $278 | $250 |
| High (total average expenses) | $87 | $867 | $780 |
| **External Costs** (56, 57) | | | |
| Low (lower congestion, crash & pollution cost estimate) | $15 | $146 | $132 |
| High (comprehensive cost estimates) | $73 | $732 | $659 |
| **Totals** | | | |
| Low | $119 | $935 | $816 |
| High | $291 | $2,474 | $2,183 |

*Chauffeuring burdens increases total motor vehicle travel, which increases time, vehicle and external costs.*

Transportation economists have developed estimates of the monetized value of various motor vehicle costs (58, 59). Table 4 summarizes lower- and higher-bound cost estimates using the USDOT (2011) valuation of drivers' travel time between 35% and 60% of average wages; the American Automobile Association (AAA) estimate that vehicle costs range from 19¢ (operating costs only) to 59¢ (average total vehicle costs) per vehicle-mile; and external costs between 10¢ and 50¢ per vehicle-mile. Figure 4 illustrates these estimates.

***Figure 3*** **Estimated Chauffeuring Burden Costs Per Driver**




*This figure illustrates estimated increases in travel time, vehicle expenses and external costs caused by chauffeuring burdens.*

As previously described, travel surveys indicate that 9-15% of U.S. peak-period vehicle travel consists of parents chauffeuring young children to school. Considering other types of chauffeuring trips it seems reasonable to conclude that chauffeuring generates 5-15% of total vehicle travel and vehicle costs, with drivers' travel time unit travel time costs (dollars per hour) somewhat lower than for other types of vehicle travel, but still significant in total. These costs tend to increase with automobile dependency.

## Chauffeuring Burdens Compared with Congestion Costs

It is interesting to compare chauffeuring and traffic congestion costs (60). The average 66 hours of driver time and 81 gallons of fuel estimated per motorist for chauffeuring in auto-dependent communities is much larger than the estimated 38 hours and 19 gallons that congestion imposes on average large city automobile commuters (61), as summarized in Table 5.

***Table 5*** **Annual Chauffeuring Burdens Compared With Congestion Costs**

| | Travel Time | Fuel Consumption |
|---|---|---|
| Chauffeur burdens per motorist in automobile-dependent areas | 66 | 81 |
| Congestion costs per commuter in large cities | 38 | 19 |

*In automobile-dependent communities, chauffeuring burdens increase motorists' time and fuel costs far more than congestion costs imposed on large city automobile commuters.*

There are, of course, differences. Commute trips tend to be higher value and less flexible than chauffeuring trips, so congestion delay time may have higher unit time costs than chauffeuring, but even if chauffeuring hours are valued at half congestion delay hours, total time costs would be comparable in magnitude to congestion delays, and incremental vehicle costs, fuel and pollution costs are larger. Since 8-15% of peak-period vehicle travel consists of chauffeuring trips, chauffeuring trips significantly increase congestion costs.

It is interesting to speculate why chauffeuring costs receive less consideration than congestion costs. A feminist perspective could argue that this reflects male dominance in planning, since the tendency of men to bear congestion costs and women to bear chauffeuring burdens (62). Another perspective emphasizes the shifting planning paradigm; the older paradigm evaluated transport system performance based primarily on traffic speeds and delays, and vehicle operating costs, giving less consideration to other objectives and impacts such as vehicle mobility for non-drivers, affordability and physical fitness (63).

## Strategies for Reducing Chauffeuring Burdens

Improving non-automobile modes (walking, cycling, public transit, taxi and delivery services), and more accessible community design can help reduce chauffeuring costs. These strategies allow non-drivers more independent mobility (for example, adolescents and people with disabilities can travel on their own), allows some chauffeured automobile trips to shift modes (for example, parents walk and bike rather than drive children to local schools and parks), and reduces chauffeured vehicle trip lengths and duration (64).

To be successful, such improvements must respond to non-drivers' travel demands and constraints. Non-drivers will be reluctant to use inconvenient, uncomfortable or unaffordable transport options, and many are limited in their walking and cycling ability. For example, McDonald found that urban adolescents relied more on parental chauffeuring than rural adolescents, apparently because travel on city streets and transit is considered unsafe (4). Some independent non-drivers, such as children, seniors and people with disabilities, may need better information programs concerning their travel options. Comprehensive programs that include a combination of improved transport options, more accessible land use development, and targeted information programs, are probably most effective at reducing chauffeuring burdens.

## Conclusions

Chauffeuring burdens increase vehicle travel and associated costs. Although few travel survey measure this factor directly, available data suggest that 5-15% of total vehicle travel consists of chauffeuring independent non-drivers (people who could travel on their own if they had suitable transport options). This imposes significant time and financial costs on drivers, and increases external costs including traffic and parking congestion, infrastructure costs, accidents and pollution emissions compared with those trips made by non-automobile modes.

Chauffeuring burdens are affected by the quality of mobility and accessibility options available in an area. In compact, multi-modal communities, non-drivers can travel independently for most trips and so impose lower chauffeuring burdens than in automobile-dependent communities. As a result, everybody can benefit from improving mobility and accessibility options, including people who never use them but benefit from reduced chauffeuring traffic.

Some transportation agencies recognize the value of improving transport options (65, 66), but there is no standard method for calculating chauffeuring costs and the value of improving transport options. In recent years interest groups have investigated some of these impacts, such as the value of improving mobility options for adolescents (67) and seniors (68), but these are often treated as special objectives with targeted solutions (for example, special bus services for students and seniors, and senior driver refresher courses) rather than a justification to increase overall transport system diversity and land use accessibility.

The *Chauffeuring Burden Index* can be used to quantify the costs of inadequate non-automobile travel options, and therefore the benefits of more multi-modal transport systems and more accessible development. Applying this index to typical conditions indicates that chauffeuring burden costs often exceed traffic congestion costs.

This is not to ignore chauffeuring benefits. Time spent chauffeuring is an opportunity for drivers and passengers to socialize, although this is limited since drivers can only give partial attention to, and have minimal eye contact with, passengers. Other travel modes (walking, cycling and public transit) provide equal or better socializing opportunities. The fact that independent non-drivers' chauffeuring rates are lower in more accessible, multi-modal communities indicates that many people would prefer to avoid chauffeuring. Given better mobility and accessibility options, chauffeuring and its associated costs would probably decline significantly compared with current patterns in automobile-dependent communities.

Chauffeuring burdens can be reduced by improving non-automobile travel options and creating more accessible communities. These strategies provide additional benefits including reduced traffic and parking congestion, consumer savings, increased traffic safety and environmental protection. Failing to consider chauffeuring costs biases planning decisions in favor of automobile-oriented solutions and undervalues improvements to alternative modes and land use accessibility. This analysis shows how drivers can benefit from more multi-modal planning, even if they never use non-automobile options, because it reduces the time and money they must spend chauffeuring non-drivers, reduced external costs including congestion, accident risk and pollution exposure. This can help justify the use of motor vehicle user fees to help fund alternative modes.

## Endnotes

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