Sustainable and Equitable Financing for Sidewalk Maintenance

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Sustainable and Equitable Financing for Sidewalk Maintenance

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ABSTRACT

In many communities’ sidewalks are discontinuous, inaccessible to those with physical disabilities, and poorly maintained. Correcting these problems would be a first step in providing infrastructure to achieve the active travel and related transportation goals of many communities. One nearly universal challenge to maintaining sidewalks is an adequate, sustainable and equitable source of funding. Municipalities typically maintain and repair their streets; however, most require residents to maintain and repair public sidewalks adjacent to their property. These policies are difficult to enforce and may be at least partly responsible for the poor condition of many sidewalks. They also place a relatively high cost on low-income households. We evaluate three sidewalk maintenance funding alternatives for public sidewalks in Albuquerque, New Mexico: increasing the gross receipts tax (GRT), the gasoline excise tax, or the property tax. We show that any of the alternatives would perform better than policies that require adjacent property owners to maintain public sidewalks. They are generally less regressive, cost less on average, and would allow municipalities to manage sidewalk assets more effectively. The differences between the alternatives are relatively minor compared to their benefits. Additional considerations should include how the revenue from each tax may change over time.

Keywords: Sidewalks; Pedestrians; Finance; Equity; Asset Management
INTRODUCTION

Increasing the share of trips made using active modes of transportation such as walking can provide many benefits (Frank et al., 2006; Frumkin, 2002; Mueller et al., 2015; Sallis et al., 2004). Walking provides physical activity that provides health benefits; walking is relatively inexpensive; walking does not (directly) emit toxic or greenhouse gas emissions or consume non-renewable energy; walking requires less infrastructure than motorized transportation; and walking can increase community interactions that build stronger neighborhoods and local economies. Improving pedestrian infrastructure, particularly in places where amenities are within walking distance, can also increase property values (Li et al., 2015). Despite these and other benefits, there appears to be a wide gap between the provision and quality of pedestrian infrastructure such as sidewalks and that for motorized travel (Evans-Cowley, 2006; Rannila & Mitchell, 2016; Truong & Meyer, 2015).

In many communities, pedestrian infrastructure is discontinuous, inaccessible to those with physical disabilities, and poorly maintained (Evans-Cowley, 2006; New Jersey DOT, 2006; Rannila & Mitchell, 2016; Shoup, 2010), including in Albuquerque, New Mexico (City of Albuquerque, 2017; Harper, 2017). Correcting these problems would be a first step in providing infrastructure to achieve the active travel and related transportation goals of many communities.

While there are many reasons for the varying provision and quality of pedestrian infrastructure within and among different communities, one nearly universal challenge is an adequate, sustainable, and equitable source of funding for pedestrian infrastructure maintenance and reconstruction (Evans-Cowley, 2006; Hicks, 2014; Legarza, 2000; New Jersey DOT, 2006; Shoup, 2010).

Municipal governments across the country maintain and repair their streets and roadways; however, most require residents to maintain and repair public sidewalks adjacent to their property (Evans-Cowley, 2006; Hicks, 2014; New Jersey DOT, 2006; Shoup, 2010). For example, a survey of 82 cities in 45 states by the Los Angeles Bureau of Street Services conducted in 2008 found that 71 cities required adjacent property owners to pay at least some portion of the cost of sidewalk repairs while only 11 cities assumed full responsibility for maintaining sidewalks (Shoup, 2010). Policies requiring adjacent property owners to pay for sidewalk maintenance date back to at least the 19th century in the United States (Ehrenfeucht & Loukaitou-Sideris, 2007).

Placing the responsibility for maintaining public sidewalks and financing their repair costs on adjacent property owners may contribute to the challenge that most cities have with maintaining their sidewalks in a state of good repair. Several studies have documented that property owner compliance with requirements to maintain public sidewalks adjacent to their property is generally lacking and that many cities are reluctant or incapable of enforcing these policies (Evans-Cowley, 2006; Hicks, 2014; Legarza, 2000; Rannila & Mitchell, 2016). Sometimes there are no penalties for non-compliance (Rannila & Mitchell, 2016). Furthermore, many cities do not have a routine program to identify maintenance needs (Shoup, 2010), property owners may not be aware of what conditions require repair (Legarza, 2000) and property owners may not know that they are responsible for sidewalk maintenance (Hicks, 2014).

So why do so many municipalities require property owners to maintain public sidewalks adjacent to their property when evidence suggests that such policies are ineffective? The answer is
unclear, but history provides a few clues. It may be a policy held over from early British common law that required property owners to maintain a public right of way through their property (New Jersey DOT, 2006); however, this does not explain the differing treatment of roadways. While some municipalities, especially in the 18th and 19th centuries, built public sidewalks, it may also have been common for property owners to finance the construction of public streets and sidewalks adjacent to their property in order to increase their property values (Ehrenfeucht & Loukaitou-Sideris, 2007). In some places, public sidewalks were privately owned, and, therefore, requiring the owners to maintain them seems logical (Rannila & Mitchell, 2016). Requirements to clear snow and ice (and other debris) from public sidewalks may have also lead to broader maintenance requirements (“An Ordinance to Cause the Removal of Obstructions on the Sidewalks Caused by Snow or Ice,” 1857; J. Messier, personal communication, June 14, 2017). The inability of municipalities to gain public support for levying new taxes to pay for sidewalk maintenance has also been raised as a possible explanation (Hicks, 2014; Shoup, 2010). What is absent from the literature are arguments and evidence supporting the superiority or benefits of adjacent property owner maintenance policies over other public asset management models – and curiously, little discussion of why the roadways adjacent to sidewalks are not similarly maintained by adjacent property owners.

In this study we evaluate several alternative options for financing the maintenance of public sidewalks in Albuquerque, New Mexico. We consider increments to three broad-based taxes that many municipalities, including Albuquerque, already levy to pay for public infrastructure, including streets. Each alternative can raise the same amount of needed revenue, but who pays and when, and who performs the maintenance differs. Raising revenue through broad-based taxes would generally avoid the costs and difficulty associated with enforcing the current policy (and similar policies in other cities) and eliminate the prospect of homeowners facing unexpected and potentially large sidewalk repair costs. We suspect that placing the municipality in charge of maintaining sidewalks would also be more cost-effective as maintenance needs could be tracked and prioritized, preventative maintenance might be a possibility, repairs could be combined with other street maintenance projects, and economies of scale in repair work could lower marginal costs. Another important consideration, and the focus of our study, is the distributional impact of each sidewalk financing alternative, including the current policy. Equity is an important concern in most transportation policy and planning decisions (Litman, 2002). A large and expanding literature explores many dimensions of transportation equity, particularly with respect to transit (Carleton & Porter, 2018), accessibility and regional transportation planning (Bills & Walker, 2017), road pricing (Levinson, 2010), and health (Wu et al., 2019); however, relatively little attention has been paid to equity concerns revolving around pedestrian infrastructure and how it is financed.

There are other ways to pay for sidewalks that we do not consider in our study. For example, tax increment finance districts, special assessment districts, and various federal grant funding programs. Tax increment finance districts and special assessment districts are generally used to reimburse developers or the government, respectively, for building new infrastructure, including sidewalks and roadways among other things. These are generally not used for routine infrastructure maintenance, although they could be appropriate for dealing with a large maintenance backlog. There are several federal programs to which municipalities may apply for sidewalk construction funding, but they are generally not meant, and often explicitly prohibit,
funding maintenance activities. For example, the federal Surface Transportation Block Grant (STBG) funding set aside for Transportation Alternatives (TA) and the Community Development Block Grant (CBDG) are two programs that provide funding which can be used for building new sidewalks or improving their accessibility; however, maintenance and repair activities are ineligible. In our study, we focused on broad-based taxes that are commonly used to finance the day-to-day operation of a municipality, which we argue should include maintaining public sidewalks.

Each policy we considered had two potential, important, distributional impacts. First, to the extent that the current policy is insufficient at maintaining sidewalks in a state of good repair, which local evidence strongly suggests (City of Albuquerque, 2017; Harper, 2017), there is the possibility that some communities have more well-maintained sidewalks than others. Prior studies have found some evidence of poorer sidewalk conditions in lower income and minority communities (Bostock, 2001; Kelly et al., 2007; Neckerman et al., 2009; Zhu & Lee, 2008), and an audit conducted by the City of Albuquerque (Harper, 2017) suggested that sidewalk conditions are worse in Albuquerque’s lower-income communities. Furthermore, even if sidewalk conditions were similar across the city, lower-income households may be more dependent on walking for transportation which would also raise equity concerns regarding poor sidewalk maintenance. Additionally, the financial burden placed on households of different income levels should also be considered for each alternative and the current policy. The cost of replacing a concrete sidewalk in one neighborhood is generally the same as another (although differing widths may cause some variation); however, the ability of households to pay may vary greatly. The current policy is likely regressive (i.e., places a greater burden on lower-income households) since all households face similar costs but have differing income levels (i.e., lower income households would have to pay a larger share of their income). Furthermore, if low-income communities have greater deferred maintenance needs, then enforcement of the current policy would be even more regressive. Each of the alternatives that we considered in this study would spread the costs of sidewalk maintenance out differently and possibly more fairly. The revenue generated by each alternative is also likely to vary over time, therefore we also discuss the long-term sustainability of each alternative since raising taxes or levying new taxes is often a difficult task to accomplish.

**METHODOLOGY**

The research consists of three main tasks. In the first step, we created an inventory of maintenance needs by neighborhood. We then used that inventory to estimate current maintenance costs and evaluate disparities in current sidewalk states of repair. In the final step, we used neighborhood maintenance costs to evaluate the equity of several alternative sidewalk financing policies and compared them to Albuquerque’s current policy.

**Sidewalk Inventory**

During 2016 the City of Albuquerque worked with a consultant to conduct an inventory of the location, physical attributes and condition of sidewalks within the city (City of Albuquerque, 2017). We obtained from the city a georeferenced database of the data used to create their sidewalk inventory. The database includes the location, length, width and a physical condition rating of each segment of public sidewalk within city limits as shown in Figure 1. Sidewalk conditions are classified into one of five categories: very poor, poor, fair, good and excellent.
Overall, 38 miles (1%) of sidewalk were in very poor or poor condition, 832 miles (29%) were in fair condition and 1,983 miles (70%) were in good or excellent condition.

**Figure 1 Albuquerque sidewalk inventory and condition rating.**

To facilitate a neighborhood level analysis of sidewalk maintenance needs and the distributional impacts of alternative maintenance financing policies on households several data preparation steps were required. First, we intersected the sidewalk inventory data with the boundaries of census block groups that were fully contained within the municipal boundaries of Albuquerque using a geographic information system (GIS). Next, we obtained parcel level land use data from the City of Albuquerque. The land use dataset includes classifications for single dwelling unit and multi dwelling unit residential parcels. We created eight-meter buffers around every residential parcel (a distance that ensures sidewalks adjacent to each parcel are overlapped by the buffers), and then intersected the buffers with the sidewalk dataset. This procedure creates a sidewalk dataset that contains information identifying which sidewalk segments are adjacent to residential properties and which block group they fall within.
Estimating Maintenance Costs

The sidewalk inventory database contains a sidewalk condition rating. For the purpose of understanding the spatial patterns of current sidewalk maintenance needs and the distributional impacts of different approaches for financing maintenance, we assumed that sidewalk segments with a condition rating of very poor or poor would need to be completely replaced and that half of each segment of sidewalks with a fair condition rating would need to be replaced. We assumed that sidewalks in good or very good condition would require no maintenance. These assumptions are likely to over or underestimate the true cost of sidewalk maintenance needs; however, we believe they provide a reasonable basis for estimating the magnitude of potential sidewalk maintenance costs borne by households in Albuquerque and the distribution of maintenance costs across neighborhoods and socioeconomic strata.

We estimated the cost for replacing sidewalk segments with unit construction cost data from the city of Albuquerque (City of Albuquerque 2018). The city’s cost data are based on the average costs of prior projects within the city. We assumed that each segment of sidewalk that needed to be replaced would be constructed out of nonreinforced four-inch-thick portland cement concrete and that the adjacent curb and gutter would not need to be replaced. The sidewalk inventory database contained the length and width of each sidewalk segment, allowing us to calculate the area of sidewalk needing replacement. Sidewalk repair costs included the cost of constructing four-inch-thick concrete slabs ($40 per square yard), demolition of the existing sidewalk ($8 per square yard), construction mobilization (4.29% of construction cost), and traffic control (3.43% of construction cost). The total cost to repair all sidewalk needing replacement in Albuquerque was estimated to be $54,400,000.

Unit repair costs for relatively small sidewalk repair jobs contracted by homeowners and other adjacent property owners could be higher than the city’s unit costs which are derived from larger projects that likely benefit from an economy of scale. We did not have any data on the cost of smaller, privately contracted, sidewalk repair projects and therefore use the city’s unit costs for evaluating each policy in our study.

Equity and Sustainability Analysis

We evaluated three alternative policies for raising funds to cover the sidewalk maintenance cost estimated above. These included raising the City of Albuquerque’s gross receipts tax (GRT, which is similar to a sales tax but also applies to many services), property tax, and New Mexico’s gasoline excise tax, a portion of which is currently returned to municipalities. We also evaluated the current policy of charging adjacent property owners. We did not consider income taxes because most municipalities do not collect them. Each of these financing methods can raise the required revenue to clear the city’s backlog of sidewalk maintenance but how their costs are distributed across neighborhoods and socioeconomic groups is likely to differ. Some taxes may be fairer than others. We considered progressive taxes (where lower-income households pay a tax that is a smaller share of their income than higher income households) to be more fair than regressive taxes (where lower-income households pay a tax that is a higher share of their income than higher income households).

Estimate Tax Increments

The first step of the tax analysis was determining how much each of the three taxes would need to be increased to generate enough revenue to cover the estimated maintenance costs. For our
study, we considered tax increments required to pay for the backlog of repairs over five years, which represents an aggressive timeframe. Changing the timeframe for completing the repairs affects the magnitude of our results, but the distribution of the tax burden, which is the focus of our study, would be the same. The general approach for calculating each tax increment is given by equation 1. Note that this simplified analysis does not account for possible substitution or other effects on the local economy (e.g., the potential of each tax increment to reduce consumer spending on the goods and services being taxed).

\[
\Delta TR = \frac{C}{R} TR
\]  

(1)

where, \( \Delta TR \) = tax rate increment, 

\( C \) = estimated annual cost of annual sidewalk maintenance, 

\( R \) = total annual revenue currently generated by the tax, and 

\( TR \) = current tax rate.

Existing tax rates for Albuquerque were obtained from multiple state and local government sources. GRT rates were obtained from the New Mexico Taxation and Revenue Department and Albuquerque GRT revenue forecasts were obtained from the City of Albuquerque’s 2015 five-year budget (City of Albuquerque 2015). Property tax rates and revenue were obtained from the New Mexico Taxation and Revenue Department’s “Property Tax Facts 2016” report (New Mexico Department of Finance & Administration 2016). Gasoline excise tax revenue distributed to the City of Albuquerque was obtained from the New Mexico Taxation and Revenue Department’s Combined Fuel Tax Distribution Report (New Mexico Department of Taxation & Revenue n.d.). The current tax rates, current revenue produced by each tax and the required tax increment calculated from Equation 1 are shown in Table 1.

<table>
<thead>
<tr>
<th>Tax</th>
<th>Actual Year 2016</th>
<th>Increase to Cover Sidewalk Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tax Rate</td>
<td>Tax Revenue</td>
</tr>
<tr>
<td>GRT(^a)</td>
<td>0.5678%</td>
<td>$87,868,000</td>
</tr>
<tr>
<td>Property Tax(^b)</td>
<td>0.6389%</td>
<td>$80,907,542</td>
</tr>
<tr>
<td>Gasoline Excise Tax(^c)</td>
<td>$0.01765</td>
<td>$4,832,434</td>
</tr>
</tbody>
</table>

\(^a\)GRT collected by city for general purposes (estimated at .5678% out of total 7.1875% GRT).  
\(^b\)City portion of county property tax; revenue-weighted average of residential and nonresidential rates.  
\(^c\)State gasoline excise tax that is distributed to City of Albuquerque (10.38% of $0.17/gallon state gasoline excise tax).

Cost of Current City Policy

Under the City’s current policy, property owners are responsible for maintenance of sidewalks adjacent to their property. We estimated the expected cost of this policy for the average household in each block group using equation 2. We first aggregated the estimated cost of repairs to sidewalks adjacent to residential properties by block group. The total cost of residential repair liability in each block group was then divided by the number of households in each block group.
Data for the number of households at the block group level were obtained from the 2016 ACS 5-year dataset. This method assumed that each household in each block group had an equal chance of having to repair the sidewalk adjacent to their property which caused some error in our calculations. For example, some households live in multifamily housing units, and therefore the cost of sidewalk repairs would be shared among multiple households (assuming costs are passed through tenants in their rent). Additionally, some lots are larger than others, creating greater exposure to sidewalks in need of repair. Overall, our cost estimation method captures differences in average household costs due to differences in maintenance needs and the average area of sidewalk per household in each block group.

\[ E_{Ci} = \frac{\sum_{r=1}^{n} C_{r,i}}{HH_i} \]  

where, 

- \( E_{Ci} \) = the expected cost of annual sidewalk repairs for the average household in block group \( i \), 
- \( C_{r,i} \) = estimated cost of sidewalk maintenance for residential segment, \( r \), in block group \( i \), and 
- \( HH_i \) = number of households in block group \( i \).

To evaluate the burden of the current policy on households with different levels of household income, we divided the average household sidewalk repair cost in each block group by each block group’s median household income. Block group level median household income data were obtained from the 2016 ACS 5-year dataset. This provides the share of the average household’s income in each block group spent on sidewalk repairs.

**Gross Receipts Tax Burden**

To evaluate the average household repair costs by incrementing the GRT we first determined how much households from different income groups spent on goods and services subject to the GRT. We obtained national expenditure data by income decile from the U.S. Bureau of Labor Statistics’ 2016 Consumer Expenditure Survey. Expenditure data by income decile are tabulated nationally; for select metropolitan regions, but not Albuquerque, and the midwest, northeast, south and west regions of the country. Although Albuquerque is located in the western U.S., we chose to use the national dataset instead of the west dataset since Albuquerque’s lower cost of living and lower incomes are somewhat unique among other western U.S. cities. We identified consumer expenditure categories subject to New Mexico’s GRT and summed expenditures in these categories for each of ten household income quantiles. We then estimated the share of household income subject to New Mexico GRT for each income decile (Table 2).

**Table 2 Average 2016 Household Consumer Expenditures Subject to New Mexico GRT by Household Income Decile (dollars)**

<table>
<thead>
<tr>
<th>Expenditure Category</th>
<th>All</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
<th>9th</th>
<th>10th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food away from home</td>
<td>4,049</td>
<td>2,407</td>
<td>2,596</td>
<td>3,089</td>
<td>3,136</td>
<td>3,526</td>
<td>3,868</td>
<td>4,257</td>
<td>5,219</td>
<td>5,509</td>
<td>6,876</td>
</tr>
<tr>
<td>Alcoholic beverages</td>
<td>484</td>
<td>143</td>
<td>173</td>
<td>230</td>
<td>291</td>
<td>312</td>
<td>388</td>
<td>514</td>
<td>624</td>
<td>785</td>
<td>1,378</td>
</tr>
<tr>
<td>Household maintenance, repairs, insurance,</td>
<td>1,437</td>
<td>544</td>
<td>703</td>
<td>909</td>
<td>1,149</td>
<td>1,128</td>
<td>1,207</td>
<td>1,379</td>
<td>1,877</td>
<td>2,121</td>
<td>3,353</td>
</tr>
<tr>
<td>and other expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As shown in Table 2, lower-income households spend a larger share of their income on GRT
than higher income households. For our analysis, we need to estimate the share of household
income subject to GRT for households of various income levels that differ from those tabulated
by the Bureau of Labor Statistics. Therefore, we used ordinary least squares regression to
develop a simple function to estimate the share of household income subject to GRT by income
(see equation 3). The intercept and income coefficient estimate were both statistically significant
with p-values less than 0.001 and the overall coefficient of determination (R² value) was 0.97.

\[
\ln(S_{grrt}) = 4.95 - 0.548 \cdot \ln (I) 
\]  
(3)

where,

\( S_{grrt} \) = share of household income subject to GRT,

\( I \) = average household income.

We then estimated the additional GRT paid by households earning different annual incomes
using the share of household income subject to GRT from equation 3 in equation 4. The share of
household income spent on the GRT increment is then estimated by dividing equation 4 by
annual household income.
\[ \Delta T_{GRT,i} = I_i S_{GRT,i} \Delta T_{GRT} \] 

where,

\[ \Delta T_{GRT,i} = \text{additional GRT paid by household with income level } i, \]

\[ I_i = \text{annual household income}, \]

\[ S_{GRT,i} = \text{share of household income subject to GRT for households with income level } i \] and,

\[ \Delta T_{GRT} = \text{increment in GRT tax rate}. \]

**Property Tax Burden**

To evaluate the average household costs of paying for sidewalk repairs by incrementing the local property tax and the burden on different income groups, we first need to determine how much households from different income groups spend on property taxes. The same CES dataset used in our analysis of the GRT contains household expenditures on property taxes by household income decile (Table 3).

**Table 3 Average 2016 Household Consumer Expenditure on Property Taxes by Household Income Decile (dollars)**

<table>
<thead>
<tr>
<th>Expenditure Category</th>
<th>All</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
<th>9th</th>
<th>10th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Tax</td>
<td>1,969</td>
<td>566</td>
<td>861</td>
<td>1,018</td>
<td>1,319</td>
<td>1,350</td>
<td>1,587</td>
<td>1,990</td>
<td>2,402</td>
<td>3,110</td>
<td>5,498</td>
</tr>
<tr>
<td>Mean Income</td>
<td>74,664</td>
<td>6,502</td>
<td>16,229</td>
<td>24,432</td>
<td>33,499</td>
<td>43,931</td>
<td>57,192</td>
<td>73,568</td>
<td>94,739</td>
<td>127,268</td>
<td>269,644</td>
</tr>
<tr>
<td>Share of Income Spent on Property Tax</td>
<td>0.03</td>
<td>0.09</td>
<td>0.05</td>
<td>0.04</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Similar to the GRT, lower-income households spend a greater share of their annual income on property taxes (Table 3). Also, as with the GRT analysis, the CES data are from a national sample of household expenditures, therefore, there is some error in these estimates. For example, property tax rates and property values can vary significantly from across communities and we assume that property taxes for rental units are passed on to renters.

Like the GRT analysis, we used ordinary least squares regression to create a simple equation for estimating the share of a household’s income spent on property taxes by income level (equation 5). The intercept and income coefficient estimate were both statistically significant with p-values 0.05 and less than 0.001, respectively, and the overall coefficient of determination (R² value) was 0.93.

\[ \ln(S_{prop}) = 0.858 - 0.394 \cdot \ln (I) \] 

where,

\[ S_{prop} = \text{share of household income spent on property tax}, \]

\[ I = \text{average household income}. \]
We then estimated the additional property tax paid by households earning different annual
incomes using the share of household income spent on property taxes from equation 5 in
equation 6. The share of household income spent on the property tax increment is then estimated
by dividing equation 6 by annual household income.

\[ \Delta T_{\text{prop},i} = I_i S_{\text{prop},i} \left( \frac{\Delta TR_{\text{prop}}}{TR_{\text{prop}}} \right) \]  \hspace{1cm} (6)

where,
\[ \Delta T_{\text{prop},i} = \text{additional property tax paid by household with income level } i, \]
\[ I_i = \text{annual household income}, \]
\[ S_{\text{prop},i} = \text{share of household income spent on property tax for households with income level } i, \]
\[ \Delta TR_{\text{prop}} = \text{increment in property tax rate and}, \]
\[ TR_{\text{prop}} = \text{current property tax rate}. \]

**Gas Tax Burden**

To evaluate the average household costs of paying for sidewalk repairs by incrementing the
gasoline excise tax and the burden on different income groups, we first need to understand the
relationship between household income and vehicle miles traveled (VMT). To do this, we
evaluated household travel survey data collected by the Mid Region Council of Governments in
2013 (see Westat (2014) for survey design and summary). The household travel survey
questionnaire asked a sample of residents in the Albuquerque metropolitan area to record all of
their travel for one weekday during 2013, from which the distance of each trip was calculated.
The questionnaire also asked respondents about their household income (respondents reported
income in one of 10 ranges) and other socio-economic information. The survey data also
contained household and trip sample weights that we used to estimate population statistics from the
survey sample.

We evaluated the household travel survey data by first aggregating the number of households
and the total distance of trips by household income category. We then estimated the average
annual trip distance (annual VMT) per household for each income group as shown in Figure 2.
Since the relationship is nearly linear, we fit a linear equation to these data using ordinarily least
squares regression (equation 7) so that we could estimate VMT for households of various income
levels. The intercept and income coefficient estimate were both statistically significant with p-
values less than 0.001 and the overall coefficient of determination (R^2 value) was 0.91. We
excluded the high-income category in our regression analysis since it is based on a relatively
small number of households and included a very wide range of incomes.

\[ VMT = 7,059 + 0.067 \cdot (I) \]  \hspace{1cm} (7)

where,
\[ VMT = \text{annual household vehicle miles traveled}, \]
\[ I = \text{average household income}. \]
We then estimated the additional gas tax paid by households earning different annual incomes using VMT estimated from equation 7 and an average fuel economy of 22.0 miles per gallon in equation 8. The average fuel economy is an estimate of the 2016 U.S. light-duty fleet average fuel economy made by the Federal Highway Administration (FHWA, 2016). The share of household income spent on the gas tax increment is then estimated by dividing equation 8 by annual household income.

$$\Delta T_{gas,i} = \left(\frac{VMT_i}{22.0}\right) \Delta TR_{gas}$$  \hspace{1cm} (8)

where,

$$\Delta T_{gas,i}$$ = amount of additional gas tax paid by a household with income level \(i\),

$$VMT_i$$ = annual vehicle miles traveled by a household with income level \(i\) and,

$$\Delta TR_{gas}$$ = increment in gas tax rate.

**FINDINGS**

We first present aggregate cost and cost burden results for each sidewalk repair finance policy option and then present spatially detailed analysis of these same quantitates. In addition to our evaluation of costs, we also evaluated how defect rates correlate with neighborhood income levels. Figure 3 shows the percentage of sidewalks in a deficient condition, which we defined as those rated as in fair, poor or very poor condition by the City of Albuquerque (City of Albuquerque, 2017), grouped by block group average median household income level. The results in Figure 3 indicate that lower income block groups tend to have sidewalks that are in worse condition, although sidewalk condition is quite variable across all income groups. This result is similar to what prior studies have found, including an audit conducted by the City of Albuquerque inspector general (Harper, 2017).
Figure 3 Deficient sidewalks by block group average household income (deficient sidewalks are those rated as being in fair, poor or very poor condition)

Our analysis also found that each sidewalk finance policy alternative would affect the average annual cost paid by households in Albuquerque as well as how those costs are distributed across households with different income levels (Figure 4a). Average annual costs vary between the alternative financing policies because each has a different tax base. Incrementing the GRT would be the least expensive option for Albuquerque households, with direct household costs totaling $15 million, and most households paying between $7 to $20 annually over five years. The GRT policy has the lowest overall cost because it has a large tax base that includes business transactions and consumption by those visiting the city. Incrementing the gas tax would also be a relatively low-cost option for Albuquerque households, with direct household costs totaling $22.6 million, and most households paying between $14 to $29 annually. Like the GRT, the gas tax has a large tax base that includes fuel purchases for business travel and visitors. The property tax alternative would be the most expensive policy alternative for Albuquerque households, with direct household costs totaling $39.4 million, which is close to the total estimated cost of residential repairs, $40.1 million. Under the property tax alternative, almost all households would pay more than they would under the other policy alternatives, with annual costs ranging from $14 to $62. Higher income households would have much higher costs than lower-income households with the property tax alternative.

Finally, overall, the current policy is the most expensive since households pay the entire estimated cost of residential sidewalk repairs, $40.1 million. The current policy is the most expensive method to finance sidewalks for most low to moderate income households, with annual costs ranging from $21 to $54. The current policy would cost middle-income households the most. The higher costs for middle-income households are likely a product of two factors: these households are more likely to have larger lots (and therefore more sidewalk to maintain per
household) than lower income households and sidewalks in these neighborhoods are also more likely to be in worse condition than those found in neighborhoods with higher income households that also have large lots (see Figure 3). Furthermore, if the unit cost to repair sidewalks is higher for homeowners and other adjacent property owners than the city’s unit costs that our analysis is based on, which seems likely, the current policy requiring adjacent property owners to contract and pay for repairs would be more expensive for all income groups and could be the most expensive policy option.

While each finance option generally requires higher income households to pay more, these costs would be a smaller share of their annual household income (Figure 4b). In other words, all of the options we evaluated are regressive since they would require lower-income households to pay a larger share of their annual income towards sidewalk repairs. The current policy appears to be the most regressive option, followed by the gas tax. The property tax and GRT are similar in terms of regressivity, although the GRT would cost all households less.

![Figure 4 Average annual household repair costs (A) and percentage of annual household income spent on sidewalk repairs (B) by household income for each sidewalk finance policy.](image)

We also looked at the equity of each policy alternative across age and race groups using data from the U.S. Census Bureau’s American Community Survey (ACS). To evaluate potential racial disparities, the population was split into three categories of “White,” “Hispanic/Latino,” and “Other Non-White” because the population in Albuquerque is predominantly white and Hispanic or Latino. Figure 5 shows the distribution of the average percentage of annual household income spent on repairs by block group median age quartiles and block group mean racial composition (percentage race) quartiles. Many younger neighborhoods would pay a somewhat higher share of their income towards repairs under each of the alternative financing policies, but the differences between quartiles is not very large. Costs within each age quartile are much more variable under the current policy and there is not a clear trend with age.
Residents of neighborhoods with larger proportions of Hispanic or Latino populations would pay a higher share of their incomes towards repairs under all of the policies we evaluated, but the disparity across quartiles is largest in absolute and relative terms for the current policy. The opposite trends are found for neighborhoods with larger proportions of white residents. There is relatively little difference between the predominance of other non-white populations and average repairs costs for any of the policies we evaluated, including the current policy.
We also evaluated the spatial distribution of average household costs and cost burdens. As shown in Figure 6, each alternative affects the distribution of repair costs across neighborhoods. The current policy results in the greatest neighborhood to neighborhood variability in annual household repair costs followed by the property tax alternative. The current policy places the greatest costs on neighborhoods with the most defects, which are on average those with lower household incomes, while the alternative policies distribute costs based on other factors (i.e.,

**Figure 5** Percentage of annual household income spent on sidewalk repairs by block group median age quartiles and block group racial composition quartiles
driving, property value, and spending) that are closely related to household income. The property
tax alternative places greater costs on neighborhoods with higher household incomes and fewer
defects. The other alternatives spread costs out relatively evenly.

Figure 6 Block group level average household repair costs for each sidewalk finance policy.

Since each financing alternative distributes cost differently across the city’s neighborhoods, and
since household income levels also vary across the city, each financing alternative results in a
different spatial distribution of cost burden (Figure 7). The current policy results in the greatest
neighborhood to neighborhood disparities in the share of a household’s income spent on
sidewalk repairs. Each of the alternative policies result in very little spatial disparity.
CONCLUSIONS

In this study, we set out to evaluate alternatives to the common municipal policy of requiring property owners to maintain public sidewalks adjacent to their property. Our review of the literature did not turn up any evidence in support of either the efficiency or effectiveness of this common policy. The origins of this policy and why it differs from how streets are maintained are still unclear. That many municipalities, including Albuquerque, have failed to maintain sidewalks suggests that the adjacent property owner asset management and financing policy is ineffective. Furthermore, we did not identify any prior research evaluating the equity and environmental justice concerns related to the adjacent property owner responsibility policy.
However, prior research suggests that this policy is likely to raise concerns since lower income communities may be more likely to have less maintained pedestrian facilities and because lower income households may also depend on walking for transportation to a greater degree than higher income households. Our analysis of sidewalk conditions in Albuquerque finds that lower income neighborhoods generally have a higher proportion of sidewalks in poor condition and that this lack of maintenance presents equity and environmental justice concerns. While we cannot conclude that the property owner responsibility policy is responsible for the inequitable state of sidewalk condition, the current policy seems unlikely to address these concerns.

The three policy alternatives we evaluated would all raise the same amount of additional revenue, which equals the current estimated cost of repairing the backlog of deferred sidewalk maintenance in Albuquerque (ADA related sidewalk issues are not included) over a period of five years. We find that the current policy is both the most regressive (i.e., places a greater burden on lower-income households) and results in the most inequity in sidewalk repair costs across the city’s neighborhoods with minority populations (i.e., Hispanic and Latino) burdened with higher repair costs. The current policy is also relatively expensive and places the highest costs on middle-income households. Increasing the GRT or gasoline excise tax would be the least costly options since they have the largest tax bases (they both also collect revenue from nonresidents) and have the lowest, most evenly distributed costs as a share of household income among all ages and race/ethnicity groups. Increasing the property tax would cost many residents about the same on average as the current policy, assuming that homeowners and other adjacent property owners can contract maintenance work at the same unit cost of as the City of Albuquerque, which is unlikely. It should be kept in mind that our cost estimates for the current policy are averaged and annualized – if the current policy were enforced residents with broken sidewalks would have to pay sidewalk repair costs all at once. All of the policy alternatives we evaluated are also regressive, but less so than the current policy.

The estimated cost of fixing broken sidewalks is also relatively small. We estimate that it would cost approximately $54 million to repair all of Albuquerque’s deficient sidewalks if this could be done at rates published in the city’s construction unit cost guidance. The average cost per household ranges from $7 to $62 per year depending on the policy and neighborhood. To place these costs in perspective, the average US household in 2017 spent $9,737 on transportation, including $4,001 on vehicle purchases, $3,063 on other vehicle expenses such as maintenance and insurance and $1,968 on fuel and oil (BTS, 2018). Annual, ongoing sidewalk maintenance would likely cost much less than addressing the backlog of deferred maintenance needs considered in our study.

So, what should a city do? Each of the policy alternatives that we evaluated are better options than what is currently in place, for several reasons. First, the alternatives would turn over responsibility to the municipality, which, in turn, could reduce costs through more effective asset management, lower administrative costs, and increased economies of scale. Additionally, sidewalks are generally publicly owned or on public easements. They are an essential part of a municipality’s publicly owned and managed transportation network. Failure to maintain parts of the network can degrade the entire network. For example, a damaged sidewalk slab can require a large detour for a disabled pedestrian. The pedestrian network also connects most other modal trips to their final destinations (e.g., to walk to transit or to walk to a store from a parking space).
Second, the alternatives are more likely to address equity and environmental justice concerns. The alternatives are more likely to result in adequate sidewalk maintenance since they would not result in the enforcement difficulties of the current policy. This, alone, could eliminate the disparities in maintenance needs between neighborhoods. Furthermore, the alternatives are less regressive. They would place a smaller burden on low income and minority households.

Third, for most residents, the alternatives would be less expensive. Increasing the GRT would be the least expensive option followed by the gas tax because these taxes also generate revenue from non-residents. The property tax would cost about the same as the current policy since its tax base is Albuquerque residents and businesses – the same as the current policy.

An additional consideration should be the sustainability of each policy. Raising taxes is a difficult task; and therefore, a tax that requires fewer adjustments over time may be more desirable. The taxes under each policy alternative will generate more revenue as the region’s population grows, although growth likely means greater sidewalk maintenance costs as well. The gas tax is the least sustainable because the vehicle fleet is expected to become more fuel efficient over time as more stringent federal fuel economy standards come into effect and the fleet turns over. Furthermore, an increasing market share of electric vehicles could further erode gas tax revenue. For a period of time VMT per capita was also declining, further eroding gas tax revenue; however, that trend has reversed, and growth is expected to continue (FHWA 2019). Revenue from the GRT depends on the region’s economic activity. There is potential for both growth and decline. The GRT is likely the most volatile of the options but has a more sustainable future than the gas tax. Finally, property tax revenues are also tied to the regional economy but will likely respond more slowly to changing economic conditions than expenditures subject to the GRT.

While our analysis has been simplified in many ways, as described in the methods section, we believe it presents a very strong case for municipalities to reconsider how they manage sidewalks and how sidewalk repairs are financed. Our study is not necessarily about recommending a specific tax or tax rate but rather to encourage municipalities to consider funding alternatives that are more equitable and sustainable. Municipalities may consider conducting a more formal economic analysis of the wider economic impacts of any changes to current municipal tax rates that were not considered in our analysis. Since the increase in taxes that would be required are relatively small, significant economic impacts are unlikely. The potential benefits of the alternative sidewalk finance policies, which includes the potential of better-maintained sidewalks to increase property values and encourage economic development, reducing municipality liability to ADA and injury claims, and reducing overall sidewalk repair costs, would likely outweigh any negative economic impacts from increasing tax rates.
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