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# Accessibility-Based Transportation Planning: Literature and Applications for Shrinking Cities

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*DRAFT FINAL REPORT*

## **Accessibility-Based Transportation Planning: Literature and Applications for Shrinking Cities**

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university transportation center for livable communities.*



## **Accessibility-Based Transportation Planning: Literature and Applications for Shrinking Cities**

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# **Accessibility-Based Transportation Planning: Literature and Applications for Shrinking Cities**

Abstract: For 15 years, scholars have claimed that accessibility-based transportation planning was at the brink of becoming a new paradigm, and yet this hope remains unrealized. Its implementation may lag due to vague definitions when compared to mobility, or because those who would benefit from accessibility-based planning lack political power to rally its support. Possibly, the lag in implementation reflects the missing linkages between theory and application for many contexts. This literature review synthesizes knowledge regarding the applications for accessibility-based transportation planning for shrinking cities along the themes of environmental, social, and economic sustainability. While residents in shrinking cities might especially benefit from such applications, context-specific challenges will require attention.

Key words: accessibility, mobility, shrinking cities, sustainability

## Introduction

For 15 years, scholars have written that the dawn of accessibility-based transportation planning has arrived (e.g., Cervero, Rood, and Appleyard, 1999; Litman, 2013). The motivations for accessibility-based transportation planning are many, spanning all three branches of sustainability planning—environmental, social, and economic—and extending beyond sustainability-focused planning into other fields and more traditional sub-fields within planning. Yet mobility continues to dominate transportation planning in practice and in the literature (e.g., Bartholomew, 2009; Levine et al., 2012; Martens, 2006). The reasons for this are twofold. First, those benefitting from accessibility-based planning lack political clout. Secondly, accessibility

“is a theoretical construct based on the somewhat obtuse notion of ‘opportunities’” (Cervero, Rood, and Appleyard, 1999, p. 1277), while mobility is a more straightforward concept. Further limiting the potential implementation of accessibility planning is the fact that linkages between theory and application have not been considered beyond the urban versus rural distinction (e.g., Farrington and Farrington, 2005) and the needs of a growing senior population (e.g., Alsnih and Hensher, 2003). This issue is particularly vital to transportation planners in “shrinking” or “legacy” cities such as Detroit, Buffalo, and Cleveland. In such cities, increased competition for limited resources constrains planners’ ability to pursue accessible transportation options. Compounding this is the fact that decreasing population density limits the efficiency of public transportation as a whole (Schwanen and Mokhtarian, 2005). Finally, issues of social inequality challenge planning efforts in general in some shrinking cities, particularly in the Rust Belt (i.e., Galster, 2012), but elsewhere as well (i.e., Silver, 1984).

The goal of this paper is to synthesize applications and knowledge gaps in the accessibility-based transportation planning literature in order to apply them specifically to a shrinking city context. Issues of accessibility apply to shrinking cities across economic, social, and environmental spheres. As such, this manuscript is organized around a sustainability framework. The review focuses on definitional issues for accessibility, and a synthesis of the literature presenting accessibility as motivated by the triple bottom line of sustainability (economy, social equity, and environment). The literature review excludes papers dealing with issues like transportation engineering and methodological advancements in system performance measurements. This review also excludes literature focusing on issues of rural accessibility (i.e., Bristow, Farrington, Shaw and Richardson, 2009; Comber, Brunson, and Radburn, 2011; Farrington and Farrington, 2005; Rajé, 2007). Finally, this review does not focus on the immense

literature discussing ways to create or improve transportation accessibility, but rather on the motivations for and implications of pursuing increased accessibility. Ideally, the synthesized knowledge from this manuscript can interface with the ongoing work on inequitable urban decline in shrinking cities (Schilling and Vasudevan, 2013; redacted for anonymity), and a range of study areas where work specific to shrinking cities is still needed. These studies might focus on jobs-housing balance (i.e., Stoker and Ewing, 2014), urban form and vehicle miles traveled (i.e., Ewing and Cervero, 2001), and capital spending programs.

### Definitions

This manuscript proceeds in three main sections: Definitions, Literature Review, and a synthesizing Conclusion. The first of these sections, Definitions, provides an overview of shrinking cities, sustainability, and accessibility.

### *Shrinking Cities*

Within planning, shrinking cities have recently received substantial attention (e.g., Dewar and Thomas, 2013; Hollander, 2011; Hollander and Nemeth, 2011; Ryan, 2012). This attention is warranted; shrinking cities have specific planning needs, but do not fit within traditional planning frameworks. Hollander (2011) explains that planning traditionally operates under assumptions of growth, and that planners in declining places are often either in denial or ill-equipped to match strategies to the reality of decline. Shrinking cities are also pervasive enough to warrant attention. In the U.S. alone, the universe of shrinking cities lies somewhere between about 40 (Beauregard, 2009) and “well over 100” (Mallach, 2010) depending on definitions. According to one scholar, one quarter of the world’s cities shrank during the 1990s (Oswalt, 2006). The topic has also gained substantial attention in Europe (e.g., Pallagst, 2010).

Taken literally, a shrinking city could be any municipality classified as a city that is losing population. While definitions can clearly vary tremendously, generally speaking a shrinking city meets three criteria: 1) the city is situated within a Metropolitan Statistical Area (MSA) (this criterion is not binding, but does appear often in operationalizations); 2) the city has a declining population, and 3) the city is the central city of the MSA. In the U.S., of the top 10 largest shrinking cities identified by Mallach (2010), U.S. Census data shows that eight are situated in MSAs that are also losing population (all but Cincinnati and St. Louis).

### *Sustainability*

The framework of sustainability planning structures the discussion of motivations to study or prioritize accessibility over mobility. Indeed, European planners increasingly see accessibility planning in terms of sustainability (Bhat et al., 2000). Though sustainability is operationalized many ways, the triple bottom line represents one popular conceptualization. The triple bottom line refers to balancing environmental sustainability, social sustainability, and economic sustainability. Shrinking cities often have complicated relationships with these three areas of study. By definition, shrinking cities are losing population (challenging social sustainability), and often this occurs due to loss of an industrial base (challenging economic sustainability). Brownfields and environmental justice issues pose particular environmental challenges.

### *Accessibility and Mobility*

One impediment to planning for transit accessibility in shrinking cities lies in defining terminology (issues of operationalization exist as well, certainly, and are given brief consideration later in the manuscript). There is no clear definition, in practice or theory, of what constitutes a fair distribution of benefits from transport projects. There are no widely-accepted

standards, goals, or performance measures against which agencies can measure success (Martens, Golub, and Robinson, 2012), though calls for consistent definitions and outcome metrics exist (Curl, Nelson, and Anable, 2011). The lack of systematic definitions may be caused by the diverse interests of scholars and practitioners studying accessibility, which range from traffic engineering to equity planning. Further complicating the call for consistency, accessibility is possibly relative to or contingent on the society in which it is applied (Farrington, 2007), and some scholars go so far as to claim that the related principle of social exclusion has no single definition (Cebollada, 2009).

The broadest definition of accessibility is offered by Bhat et al. (2000, p. 1): “a measure of the ease of an individual to pursue an activity of a desired type, at a desired location, by a desired mode, and at a desired time.” Much of the literature reflects this definition with only subtle variations (e.g., Curl, Nelson, and Anable, 2011; de Sousa Vale, 2007; Farrington and Farrington, 2005; Geurs and Van Wee, 2004; Litman, 2013; Martens, 2012). However, a number of scholars implement competing definitions.

The most pervasive source of definitional incoherence stems from distinguishing mobility from accessibility in practical terms. Though a lengthy literature exists to contribute continual improvements to the metrics for each, the distinction is most efficiently summarized by Stopher (2004): mobility is measured as the generalized cost of travel (time and money) per kilometer, and accessibility is measured as the generalized cost of travel per destination. Using this distinction, it logically follows that mobility and accessibility are related, but not mutually dependent. Increased mobility can increase accessibility, but accessibility is not dependent on mobility, as accessibility can be improved by the ability to walk, bicycle, or use other modes of



transportation to reach destinations (Bartholomew, 2009; Levine et al., 2012; see also Cherry, 2007).

However, at least one author directly contradicts this distinction between accessibility and mobility. Berdica (2002) writes that accessibility is a function of mobility, and is effectively the same issue framed from the demand side, whereas mobility is a supply-based concept. Other authors, while not contradicting the dominant distinction between mobility and accessibility, introduce meanings of either term that confuse the distinction. First, reliance on the concept “quality of life” to define either term produces ambiguity. Alsnih and Hensher write that mobility is “access to places of desire such as visiting family and friends; the psychological benefits of travel where social contact and independence are important aspects of mobility; the benefits of physical movement; maintaining social networks; potential travel” (2003, p. 905). Meanwhile, Curl, Nelson, and Anable write that accessibility planning is related “to quality of life, social inclusion/exclusion and use of non-car travel modes” (2011, p. 9). Second, various authors try to define mobility and accessibility in terms of each other in ways incongruous with the definitions presented by Bhat et al. (2000) and Stopher (2004). Bertolini and Dijst, for example, write that “Combinations of accessibility and proximity features” are “mobility environments” (2003, p. 28).

For shrinking cities, the prevailing definition of accessibility as ensuring that all transportation system users can avail opportunities of the type, in the location, by the mode, and at the time of their choosing may not be feasible. Beyond the budgetary shortfalls existing in many shrinking cities that would prevent such systems from being implemented, there are real issues of personal safety associated with walking to or from, or waiting at public transportation stations (and other public places) in declining neighborhoods. Research has shown that the use of

public transportation varies according to multiple influences, including the degree to which a neighborhood is pedestrian-friendly (Schwanen and Mokhtarian, 2005b), and crime would logically impact the perception of walkability. Addressing these broader quality of life issues thus becomes part of attaining transportation accessibility in neighborhoods where blight and loss of economic opportunity have come to define change. The broader sustainability paradigm—environmental, social, and economic—is presented as a framework through which to inspect the various, complex issues that challenge accessibility in shrinking cities as, perhaps optimistically, defined by Bhat et al. (2000).

### Sustainability and Accessibility-Based Transportation Planning in Shrinking Cities

Shrinking cities stand distinctly apart from the United States as a whole and certainly from growing cities. As Table 1 shows, across a sample of shrinking cities, unemployment rates surpass that of the U.S., while incomes (household and per capita) remain substantially below the U.S. median with only one exception (per capita income in Pittsburgh). The percentage of residents receiving cash public assistance is higher in shrinking cities, as is the percentage of people receiving food stamp or SNAP benefits in the previous 12 months. As commuting by private vehicle is largely a socioeconomically-driven choice, the economic situation in shrinking cities also likely contributes to a lower percentage of workers commuting by private vehicle, which Table 1 also reflects. Nationally, commuting via public transportation takes approximately twice the time required by private vehicle (driving alone), 48.2 minutes versus 24.4 minutes (U.S. Census Bureau, American Community Survey, 2012 1-year data, Table S0802). Thus, in places where residents might more often wish to find additional work to supplement household income, the additional time spent commuting limits a person's hours available to work. In places

where households may be more compelled to comparison shop grocery stores and other consumer product retailers for cost, both the time involved and the logistics of carrying such goods home via transit and walking works against them. Beyond this, the implications of the shrinking city context span environmental, social, and economic issues, which are considered in this section.

Table 1: Characteristics that Distinguish Shrinking Cities in the U.S., 2012

	<b><i>U.S.</i></b>	<b><i>Buffalo</i></b>	<b><i>Cincinnati</i></b>	<b><i>Cleveland</i></b>	<b><i>Dayton</i></b>	<b><i>Detroit</i></b>	<b><i>Flint</i></b>	<b><i>Pittsburgh</i></b>	<b><i>Youngstown</i></b>
Unemployment Rate	5.9	13.6	12.1	19.4	14.6	27.7	24.9	9.3	18.2
Median household income	<i>\$51,371</i>	\$30,422	\$30,188	\$24,257	\$27,033	\$23,600	\$27,149	\$39,884	\$23,009
Per capita income	<i>\$27,319</i>	\$19,973	\$22,858	\$16,236	\$16,129	\$13,956	\$14,180	\$27,572	\$13,238
% with cash public assistance income	2.9	6.6	4.4	6.9	8.3	7.9	8	4.5	5.9
% with food stamp/SNAP benefits in past 12 months	<i>13.6</i>	32	25.7	37.4	31.5	44	39.4	17.2	37.1
% Commuting to work via private vehicle	<i>76.3</i>	67.3	71.6	69	70.4	68.1	78.9	56.7	74.1
% Population change, 2000-2010	<i>9.9</i>	-10.7	-10.4	-17.2	-14.9	-25.2	-18.2	-8.6	-18.5

Source: US Census Bureau, American Community Survey 2012, 1-year data. Table DP03: Selected Economic Characteristics. Population data from 2000 Census and 2010 ACS 1-year population count. Sample chosen from Mallach's (2010) list of top 10 shrinking U.S. cities

## *Environmental Sustainability*

Areas in decline, and thus, as Table 1 suggests, areas more likely to have low incomes, also suffer disproportionately from environmental factors, including transportation-generated pollution. As Larsen et al. explain, “The realities of impoverished neighborhoods and the structural/societal constraints imposed upon them often effectively pit social and environmental issues against each other. As Campbell wisely noted, ‘poor urban communities are often forced to make no-win choices between economic survival and environmental quality’ (1996, p. 299)” (2014, p. 6). As these environmental inequalities are sometimes linked to highway location or other transit-related conditions, the issue of improving regional transportation systems also extends into the environmental realm in shrinking cities.

Various scholars claim that increasing accessibility can improve environmental sustainability (Banister, 2008; Bartholomew, 2009; de Sousa Vale, 2007), largely through decreasing vehicle miles traveled (VMT). Such improvement will be accomplished through enhancing the local jobs-housing balance and increasing access to transit (de Sousa Vale, 2007), “making the best use of technology, including investment in technology in transport modes, information systems and in the transport system itself” and increasing fuel prices (Banister, 2008, p. 78), and shifting transit investments away from highway construction and toward accessibility-focused projects (Bartholomew, 2009; economic benefits for this recommendation are also found by Geurs, Zondag, de Jong, and de Box, 2010). Reducing VMT has also preoccupied scholars and practitioners aiming to jointly improve environmental sustainability and reduce road congestion (e.g., Joh et al, 2008; Lovejoy et al., 2013; Manaugh, Miranda-Moreno, and El-Geneidy, 2010; Srinivasan, Provost, and Steiner, 2013; van Wee, 2011).

However, the majority of the discussion intersecting accessibility and environmental sustainability targets an audience at the median of American society, not policy makers focused on improving conditions in shrinking cities. This is reflected clearly in Banister, who writes that “however good public transport is, there will always be an additional reason for still using the car”, and, perhaps more clearly, that “sustainable mobility has a central role to play in the future of sustainable cities, but it is only through the understanding and acceptance by the people that it will succeed” (2008, p. 76; see also Lucas, 2006, on the strong belief rooted in the middle and upper classes in the UK that technology will solve environmental risk problems). This branch of research is concerned with reducing reliance on the automobile as a means of increasing sustainability. This view of the relationship between accessibility and sustainability is certainly valid, but overlooks the value of accessibility in shrinking cities, where transit (or increased car ownership) can provide *a* means of transportation, rather than a *replacement* mode. The environmental emphasis of accessibility planning still overshadows consideration for social justice concerns, and the two concepts remain largely disconnected (Martens, 2006).

Understandings of environmental sustainability tailored to social equity issues in shrinking cities are limited. Larsen et al. provide a pedagogically-oriented exception in their study of Detroit. Interestingly, they conclude that neighborhood-level sustainability in poor neighborhoods must focus on livability, not on attaining the demanding standard of the triple bottom line. They reference Glasmeier and Farrigan (2003), who argue that sustainability "has limited value as a planning framework in impoverished neighborhoods that lack basic services, strong institutions, and an engaged public sector." They also reference Agyeman, Bullard and Evans' (2002) notion of just sustainability, which "needs to ensure a better quality of life for all" (2014, p. 78). While Larsen et al. (2014) do not focus their discussion around issues of

accessibility, their work can influence research via its contribution to the context-specific understanding of sustainability.

If environmental sustainability arguments are to influence considerations of accessibility in shrinking cities, the focus should be on policy mechanisms that reduce car-based emissions and improve the liveability in declining neighborhoods. One possibility might combine the recommendations of Banister (2008) to increase fuel prices and Bartholomew (2009) to divert investments to non-highway projects. However, as increased fuel prices would disproportionately impact low-income car owners (due to the increased marginal utility of a dollar at the lower income level), a more equitable source of revenue from car-based transportation would glean funds from costs that fluctuate with income, such as car registration fees in states where registration is tied to car value. The diversion of funds away from highway-based projects might move toward improving street design around transit stations, providing incentives for neighborhood-specific commercial developments, or investing in car sharing programs (though research on the effectiveness of such programs is scarce (Fol, Dupuy and Coutard, 2007)) in accessibility-poor neighborhoods. Perhaps more to the point of integrating environmental sustainability and environmental justice, policy should be tailored to reduce the emissions that disproportionately plague low-income neighborhoods, as chronicled in Larsen et al. (2014). Accomplishing this, however, would require drastic changes, such as re-routing highways, limiting the volume of freight traffic, or relocating entire neighborhoods, all of which would face strong and logical opposition.

## *Social Equity*

Decline is largely an issue of race and place in shrinking cities. As Figure 1 shows, the phenomenon of shrinkage disproportionately affects minority households and communities relative to their white counterparts across a sample of U.S. shrinking cities. In each case, and with few neighborhood-level exceptions, the Census tracts with larger shares of non-white population in 1970 are the same tracts that led the hollowing out of the cities by 2010. Thus, if decline is associated with the characteristics given in Table 1, and minority neighborhoods serve as the epicenters of population decline, it stands to reason that the issues of accessibility in shrinking cities are felt unevenly as well. Indeed, in Cleveland in 2012, 74% of White alone workers ages 16+ commuted by private vehicle, versus 65% for Black alone workers. In St. Louis, these statistics were 80% and 62%, respectively (U.S. Census Bureau, American Community Survey, 2012 1-year data, Table B08105).



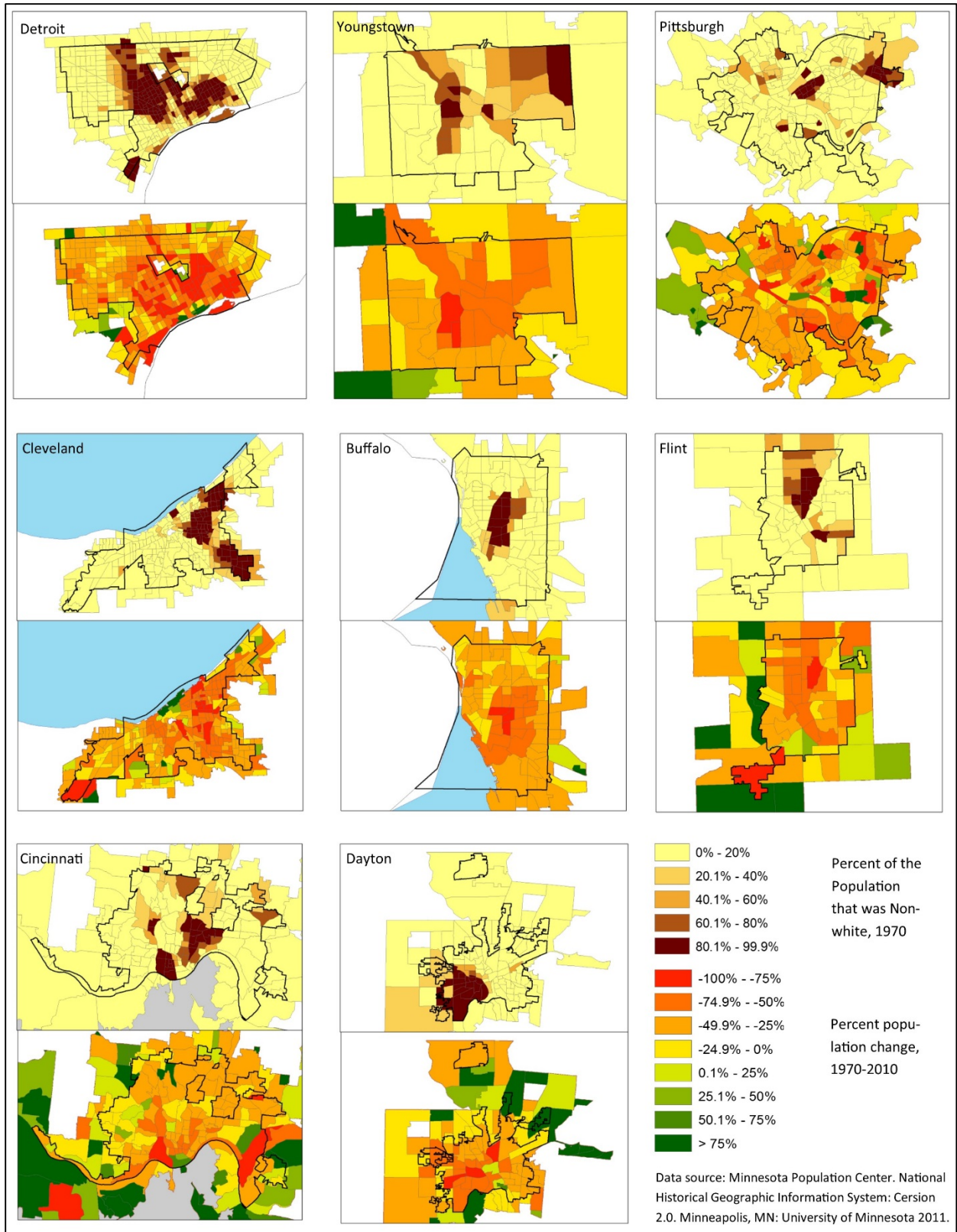


Figure 1: Non-white population and population change in U.S. shrinking cities, Census tracts, 1970-2010

Research shows that the ability to reliably access choice destinations improves social equity. The benefits of private car ownership have been shown for health outcomes (Comber, Brunsdon and Radburn, 2011) and securing paid employment (Cebollada, 2009; Cervero, Sandoval, and Landis, 2002). Gaining access to fresh foods (usually via proximity) has been shown to improve health outcomes in under-served neighborhoods (i.e., Apparicio, Cloutier and Shearmur, 2007). In the UK, the government accepts that transport has an important role in helping people gain employment, improving health inequalities, raising educational attainment, reducing crime, and promoting neighborhood renewal (Lucas, 2006). Through its improvement in social inclusion, Farrington (2007) argues that improved accessibility facilitates social sustainability.

Despite these benefits of accessibility planning, transportation planning inadequately addresses equity, and this oversight produces grossly inequitable ramifications (Martens, 2006). Yet, change is difficult. Not only are issues of environmental sustainability difficult to convey to the majority of U.S. households (Banister, 2008), but the issues of environmental justice become decreasingly objectionable to residents amid decline, if Larsen et al. (2014) presents a generalizable case, making reversal even more difficult in shrinking cities. Traditional methods of demand-based modeling further stack the deck against conducting transit planning for accessibility-poor neighborhoods. These models derive from activities of people with an ability to pay; therefore, models will suggest increasing services for those who are already served (Martens, 2006; see also Farrington and Farrington, 2005). Research also shows that accessibility planning agendas are largely correlated with pre-existing biases and agendas of planning agencies, rather than responses to metrics-driven analyses of need (Lucas, 2006). Unfortunately,

this finding resonates with the broader equity planning literature, which finds that equity planning is largely driven by an alignment of personalities and circumstances (Krumholz, 1982; Metzger, 1996).

Among scholars who acknowledge these challenges and promote change regardless, the issue of determining what *should* be done remains complex. How should transportation resources be distributed under accessibility planning? As Martens outlines, there are three conceptual approaches:

- Equality: "...a situation in which a good is distributed evenly over people, irrespective of the differences between those people" (2012, p. 12). However, since the choice to commute via private vehicle is largely socioeconomic, while the choice to commute by transit is largely based on land use (de Sousa Vale, 2007), it may not make sense to distribute transit-based goods evenly across people.
- Merit: the requirement of relying on moral judgment for allocations according to merit recommends against its use in a public policy setting.
- Principle of need.

The principle of need raises related issues, which have played out both in scholarly publications and very publicly through decades of policy experimentation: what is the opportunity cost, and who should benefit from public investments (Curl, Nelson, and Anable, 2011). In shrinking cities especially, these questions meet with tension, precisely because there has been a long history of public decision making to maximize profits, often at the expense of minority households or workers. While hard evidence is difficult to find, a few examples are illustrative. In St. Louis, the infamous 1973 Saint Louis Redevelopment Program (colloquially

known as the Team Four plan) stated that in the majority African American residential neighborhoods, largely labeled an “Interim Action Zone” neighborhoods, “major public development investments should not be programmed until detailed neighborhood plans have been developed by the City” (174). Meanwhile, the majority White residential neighborhoods were programmed differently:

“The Development Program recommends a higher relative priority, than has heretofore existed, to action programs designed to stop the spread of deterioration and abandonment into those still attractive neighborhoods which are along the edge of seriously deteriorated areas and threatened by the insidious expansion of blight. It makes little sense for millions of public and private dollars to be expended on reconstruction of neighborhoods while at the same time allowing stable neighborhoods to fall into decline.”

(Saint Louis City Plan Commission. 1973, p. 155)

In St. Louis, the Team Four plan was perceived to be a mechanism by which the City would funnel money into White neighborhoods while neglecting Black neighborhoods. The result has been long-standing skepticism regarding planning. Forty years later, the City still does not have an adopted comprehensive plan (the Team Four plan was quickly shelved without adoption, and in fact very few copies of it still exist), and elected officials continue to make public statements about the need to reverse the effects of Team Four (French, 2008). Galster (2012) provides detailed discussions of the auto industry and housing market discrimination laden on Blacks in Detroit, as well as those offenses issued directly from Henry Ford personally. As he chronicles, that history has created a city where racial divides define everything. Even ignoring the fact that Detroit favors private transportation especially, and that it is home to one of America’s largest failures in public transportation (the People Mover), it seems unlikely that a

municipal planning strategy to provide need-based transportation would meet with trust or broad public support within the region.

Beyond the issues of trust, social equity and environmental sustainability intersect around accessibility to create a separate debate regarding the balance of social and environmental costs. If accessibility improves opportunities in employment, health, and other areas, and if public transportation cannot provide accessibility in a manner consistent with time constraints, then it stands to reason that provision of private automobiles may provide more equitable accessibility. This follows logical argumentation, and its inverse is true; incentives to lessen auto dependence disproportionately affect low-income households (Fol, Dupuy, and Coutard, 2007). However, programs to increase auto availability for accessibility-poor households will exacerbate the related economic, social, and environmental costs for society at large. Providing socially equitable accessibility for shrinking cities thus creates a Catch-22.

Glaeser (2011) makes a similar argument at the global scale: automobile ownership and incomes are rising in tandem in countries like China and India. If trends continue, world carbon emissions will grow exponentially and unsustainably. In other words, as households globally become able to consume more, and consequently behave like the median American household, the environmental costs will be astronomical. Yet, if accessibility requires a car, some argue that it is unjust to restrict access to a car for low-income households (Fol, Dupuy, and Coutard, 2007).

As is clear, the question of what should be done arrives with complex ethical and social questions. Some scholars suggest a metrics-based compromise for the task of establishing normative service levels in the transportation system. The maximax principle builds on Rawls' distributive principles as alternatives to equality-based distribution. The maximax principle

would maximize the average level of accessibility while observing a maximum differential between individuals (households, or neighborhoods, depending on the unit of analysis) with the lowest and highest levels of accessibility. Under this approach, a city or region's transportation system could enjoy system-wide improvements, benefitting everyone, while ensuring that all neighborhoods would share in the improvement process (Martens, 2012; Martens, Golub, and Robinson, 2012).

Issues of operationalization will be important. If accessibility is measured as the generalized cost of travel per destination (Stopher, 2004), then an equity value of time must be incorporated (Martens, 2006), as well as a consideration for the marginal utility of dollars across income groups. Costs, including time, must also be compared across modes, since "low-income persons do not have a geographical disadvantage with respect to job opportunities; rather, many of them suffer from spatial disadvantage because they are dependent on relatively slow, inflexible and limited public transit services....Such evidence has been reported in the cases of Boston, Los Angeles and San Francisco and in the analysis presented here" (Sanchez, Shen and Peng, 2004, p. 1314).

### *Economic Development*

Economic sustainability represents the third arm of the sustainability paradigm. Scholars study accessibility in order to better understand and plan for urban and regional economic development, though these scholars are often not motivated by sustainability concerns per se. In fact, the vast majority of research connecting transportation accessibility and economic development focuses on what Leigh and Blakely describe as the "traditional and most widely referenced definition of economic development," which is wealth creation (2013, p. 71). This

stands in contrast to Leigh and Blakely's definition, which focuses on minimum living standards, equity, and sustainable resource use. Other scholars have also noted the weak understanding of the relationship between transport, economic growth, and economic vibrancy to facilitate social progress (Lucas, 2006). While much has been written regarding the relationship between urban form and accessibility, urban form and VMT (e.g., Ewing and Cervero, 2001), transit and residential land values (e.g., Bartholomew and Ewing, 2011; Cao and Hough, 2008; Guiliano, Gordon, Pan, and Park, 2010) and related topics, this section pursues a much narrower research area. This section synthesizes the literature relating accessibility to economic development with explicit linkages to issues facing shrinking cities, namely race-oriented development inequalities.

As discussed, the spatial pattern of decline across US shrinking cities follows closely with patterns of non-White population distribution in 1970. In St. Louis, Cleveland, and elsewhere (although notably not in Detroit), the availability of private car use is significantly more limited among Black households than among White households, even when compared to the nation (nationally, 2012 ACS 1-year data shows that 78.6% of White alone workers commute by private vehicle, versus 71.8% for Black alone workers). The issue of population decline, already partially linked in the literature to a diminishing availability of employment opportunities (Ryan, 2012), is thus also tied to the question of whether transit might provide a partial solution to decline via connecting residents to employment.

While the dearth of jobs in the central city is frequently exaggerated in the literature (e.g., Cervero, Rood, and Appleyard, 1999; Martens, 2012; Martens, Golub, and Robinson, 2012; see Cervero, Sandoval, and Landis, 2002, for further discussion of related research), it is true that employment has dramatically suburbanized across the U.S. (Lang, 2003; Lee, Seo, and Webster, 2006). As a result, skill-matched job accessibility has been shown to be lower for low-income

neighborhoods than for high-income areas (Cervero, Rood, and Appleyard, 1999), despite the fact that (if one will allow the over-simplified conflation of geography and income) inner-city residents have better access to transit than do other metropolitan residents (Cervero, Sandoval and Landis, 2002). Accessibility also impacts neighborhoods through non-commute trips, when mode choice is more sensitive to land use mix and intensity, transit quality, and pedestrian friendliness (Schwanen and Mokhtarian, 2005b). The neighborhood-level economies in declining neighborhoods often fail to provide the full range of amenities necessary, resulting in excess spending and travel beyond the neighborhood. Consider, for example, that 500,000 residents in Detroit live with limited or no access to a grocery store, and residents spend over \$200 million on grocery expenditures outside their neighborhoods (Fair Food Network, 2012). The difficulty in connecting origins with desired destinations reflects an issue of accessibility.

However, the literature on the economic equity element of accessibility and mobility remains under-developed. Sanchez, Shen and Peng (2004) provide a compelling literature review regarding research on moving people from unemployment to employment. They criticize this literature for having often explicitly removed non-vehicle modes of transportation from accessibility measurements (i.e., Giuliano et al., 2012), or for not studying transit mobility or employment accessibility at all in welfare-to-work studies. They also discuss issues of causation found in the literature, namely that studies claiming that car ownership encourages employment do not establish that the car was purchased prior to the job search. Their discussion is aptly given:

“Even with the considerable amount of attention paid to the role of public transport in addressing inner-city mobility problems for workers of the past 30-40 years, very little evidence has been published that identifies successful mobility strategies. In other words,



very little empirical research has specifically focused on how labour participation is affected by increased public transport services across the US. A significant amount of research has dealt with the relationship between labour force participation and the spatial separation of jobs and houses; however, most analyses concentrate on commuting time or distance as a function of automobile accessibility. Few studies have considered the relative impacts of employment accessibility resulting from public transport services, while recommendations for increased public transport expenditures for addressing urban unemployment problems persist” (1326).

While these authors find that “access to fixed-route transit and employment concentrations had virtually no association with the employment outcomes of TANF recipients in the six selected metropolitan areas” (2004, p. 1313; see also Cervero, Sandoval, and Landis, 2002), more recent research suggests otherwise. A new study by Pendall, Blumenberg and Dawkins (2014) shows that housing voucher recipients were twice as likely to find a job and four times as likely to keep the job if they had a car. However, it bears noting that the authors regret methodological issues with the way data on car access or ownership were collected. Qualitative research reinforces this more recent finding (Cebollada, 2009), and scholars continue to assume that lack of car accessibility hinders finding employment (e.g., Fol, Dupuy, and Coutard, 2007). For these studies focusing on car availability, accessibility to jobs is implicitly priced according to time, perhaps cost, and may be absolute in the sense that the jobs possibly cannot be reasonably accessed by public transit at all (though this is not known). Regardless of whether a job was secured, other work has found that accessibility *transit* planning can position the employment accessibility for formerly accessibility-poor neighborhoods above that of other neighborhoods (Martens, Golub, and Robinson, 2012).

## Conclusion

In total, the literature on transportation accessibility paints an uncertain picture regarding the potential for applications in shrinking cities. The prevailing definition of accessibility demands a transportation system that shrinking cities will be hard-pressed to deliver. Budgetary problems and crime in declining neighborhoods will make it difficult for any public agency in shrinking cities to provide a service that allows residents to go where they want, when they want, for any desired purpose. The alternative to public transit, private transportation via car, raises various environmental sustainability issues, some of which interface with issues of social equity. If the goal of increasing transit-based accessibility is to improve environmental sustainability in shrinking cities, then the focus must fall on diverting funds away from highway projects and towards transit, and on decreasing the disproportionate exposure that declining (often minority) neighborhoods have to vehicle-generated environmental risks. However, these approaches will be challenged by a public unwillingness to forego the private car (Rajé, 2007; Stopher, 2004), and even the possibility that private car ownership has propelled economic development (Stopher, 2004).

Social equity motivations for increasing transit accessibility face especially difficult challenges in shrinking cities. In some shrinking cities, issues of race and class make efforts at planning—of any sort—remarkably difficult. Accessibility plans that aim to reduce the disparity in travel time and cost between neighborhoods, which also largely follow racial divides, are unlikely to be met with public trust or support. Also, the groups or neighborhoods that might

benefit most from increased accessibility often lack the political clout to rally support (Cervero, Rood, and Appleyard, 1999). Finally, the economic sustainability challenges the implementation of accessibility in shrinking cities. Research is mixed regarding the role of accessibility in connecting job seekers with employment opportunities. While some studies find that car ownership may assist in securing and keeping employment, other scholars dispute the methods of such studies; while some studies find that public transportation does little to nothing to assist in the job search, others find that accessibility-based transit planning can improve employment opportunities in previously accessibility-poor neighborhoods.

The situation of decline is difficult. From the implications of Myrdal's theory of cumulative causation (1957) to the problems of maintaining reliable databases from which vacant land can be reliably sold (Pagano and Bowman, 2000; Thomas, 2013), decline is difficult to manage gracefully. Transportation accessibility is promoted in the literature by scholars convinced of its ability to improve environmental sustainability, neighborhood quality and life chances in arenas varying from health to employment. However, as has been noted, central city residents tend to have high transit accessibility paired with, according to socioeconomic status, reduced vehicle availability when compared to MSAs or the nation at large. Yet, residents of declining neighborhoods have been shown to invest more time and money in gaining access to employment centers, and employment centers have been shown to have higher accessibility to high-earner workers. Therefore, the application of accessibility planning must be operationalized in a manner consistent with goals, and this is difficult given the context.

As mentioned in the case of Detroit, residents of declining neighborhoods need safe, efficient means of accessing full-service grocery stores and other daily needs. Equalizing access to skill-matched employment opportunities also arises as a goal for shrinking cities, and access to

a bus line alone is insufficient for this. In these areas, residents should be able to use transit to access skill-matched employment opportunities in a manner that equalizes the time-value and financial value with non-transit modes. Improved accessibility should grant commercial vehicles and private car motorists access to their desired destinations without unduly polluting low-income neighborhoods, though attaining this goal may require unfeasible changes.

Accomplishing these goals relies on political will and metrics-based planning. While planners can do little to ensure political will or social backing, providing metrics-based planning falls under their purview. The manner in which metrics are operationalized will impact conclusions drawn considerably. As noted, traditional transportation planning relies on data of people with an ability to pay, and thus recommends systems to maximize utility for that audience. Studying accessibility while excluding non-car modes similarly undermines efforts. Operationalizing accessibility in ways that either do not account for the income-adjusted equality of time or money for system users will similarly recommend fewer services for low-income populations.

Sustainability in declining and low-income neighborhoods takes on a different meaning than a more broadly construed sense of sustainability; there, sustainability rests on quality of life issues, rather than on restricting consumption or pushing for wealth creation. If accessibility planning has, in fact, become a new paradigm in planning, it will have to be especially tooled to the contexts of shrinking cities in order to improve the context-specific meaning of sustainability. Hopefully this review has provided a framework for approaching that task.

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