

The High Costs of Urban Sprawl

Reid Ewing

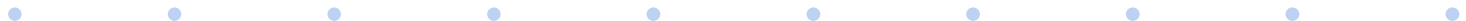
**Distinguished Professor
City and Metropolitan Planning
University of Utah
ewing@arch.utah.edu**

The Debate

“Classic” Articles

Gordon, Peter and Richardson, Harry W. “Are Compact Cities a Desirable Planning Goal,” JAPA, Vol. 63, No. 1, Winter 1997, pp. 95-106. (Response: Ewing, Reid. “Is Los Angeles-Style Sprawl Desirable,” pp. 107-126.)

Ewing, Reid. “Is Los Angeles-Style Sprawl Desirable?,” JAPA, Vol. 63, No. 1, Winter 1997, 107-126 (Response: Gordon, Peter and Richardson, Harry W. “Are Compact Cities a Desirable Planning Goal,” pp. 95-106.)



Are Compact Cities a Desirable Planning Goal?

Peter Gordon and Harry W. Richardson

This paper considers some key issues that help to evaluate whether or not the promotion of compact cities is a worthwhile planning goal. These are: the pressures on prime agricultural land; residential density preferences; energy resource savings; the potential for expanding transit use and promoting TODs (transit-oriented developments); the costs and benefits of suburbanization; the efficiency gains from compactness; the impact of telecommunications on the density of development; the prospects for downtowns; the influence of rent-seeking on the promotion of downtown projects; the social equity of compactness; and the effects of competition among cities. Our evaluation of these issues does not support the case for promoting compact cities.

The revolution in information processing and telecommunications is accelerating the growth and dispersion of both economic activities and population, possibly moving towards the point where “geography is irrelevant.” Yet, at the same time, many planners (and policymakers) advocate “compact cities” as an ideal, in contrast to the reality of increasingly spread-out metropolitan development. The term “compact cities” is in increasingly common use in planning discussions, conferences and other similar venues. It can take on different meanings, each with different planning implications. To mention merely three possibilities: (1) a macro approach, based on high average densities at the city-wide or even metropolitan level, but more likely to be applied to a freestanding small town;¹ (2) a micro approach, reflecting high densities at the neighborhood or community level; and (3) a spatial structure approach, emphasizing a pattern oriented to downtown or the central city versus a polycentric (or dispersed) spatial pattern, with obvious density consequences. All three meanings are touched upon in this paper, although the micro approach is the one that has received most attention in the literature. An alternative classification is to distinguish among low-density, strip, scattered, and leapfrog development as forms of “sprawl,” sometimes used as an antonym for “compactness” (Ewing 1995).

In this paper, we revisit several issues relevant to the compact cities discussion. Although the analysis is probably general enough to apply to most of the developed world’s major cities, we restrict our remarks to

Is Los Angeles-Style Sprawl Desirable?

Reid Ewing

This article reviews the literature on characteristics, causes, and costs of alternative development patterns. In doing so it debunks arguments by Gordon and Richardson in favor of Los Angeles-style sprawl. Sprawl is not suburbanization generally, but rather forms of suburban development that lack accessibility and open space. Sprawl is not a natural response to market forces, but a product of subsidies and other market imperfections. The costs of sprawl are borne by all of us, not just those creating it, and include inflated public spending, loss of resource lands, and a waning sense of community. The only realistic cure for sprawl is active planning of the sort practiced almost everywhere except the United States (and beginning to appear here out of necessity).

Peter Gordon and Harry Richardson (G & R) have made a cottage industry out of challenging, time and again, planners' steadfast belief in compact development (Gordon and Wong 1985; Gordon et al. 1986; Gordon et al. 1988; H. W. Richardson 1988; Gordon and Richardson 1989; Gordon et al. 1989a; Gordon et al. 1989b; Richardson and Gordon 1989; Richardson et al. 1990; Gordon et al. 1991; Gordon et al. 1992; Bae and Richardson 1993; Richardson and Gordon 1993; Gordon and Richardson 1994a; Gordon and Richardson 1994b; Gordon and Richardson 1996a; Gordon and Richardson 1996b; Gordon and Richardson 1997). Their articles tend to counterbalance inflated claims by some on the other side of the issue. Their arguments are thought-provoking and, at least superficially, credible.

Yet, like most planners, I remain convinced that sprawl is undesirable. As background to the drafting of Florida's anti-sprawl rule (part of Florida's growth management apparatus), I wrote an article some time ago titled "Characteristics, Causes, and Effects of Sprawl" (Ewing 1994). It was all negative. Where did I go wrong, or where did Gordon and Richardson?

Asked to respond to G & R's latest, I have at last taken the time to compare our definitions, premises, logic, and empirical claims. Our differences become clearer when the alternative to compact cities is iden-

Disagreed About Almost Everything

- Characteristics of Sprawl
- Causes of Sprawl
- Costs (and Benefits) of Sprawl
- Cures for Sprawl



MRC Research at Many Geographic Scales

- Region
- Community
- Neighborhood
- Campus
- MXD
- TOD
- Block/Street





• • • • • • • • • •

To Model Something ...

• • • • • • • • • •

Region

COSTS OF SPRAWL



Reid Ewing and Shima Hamidi

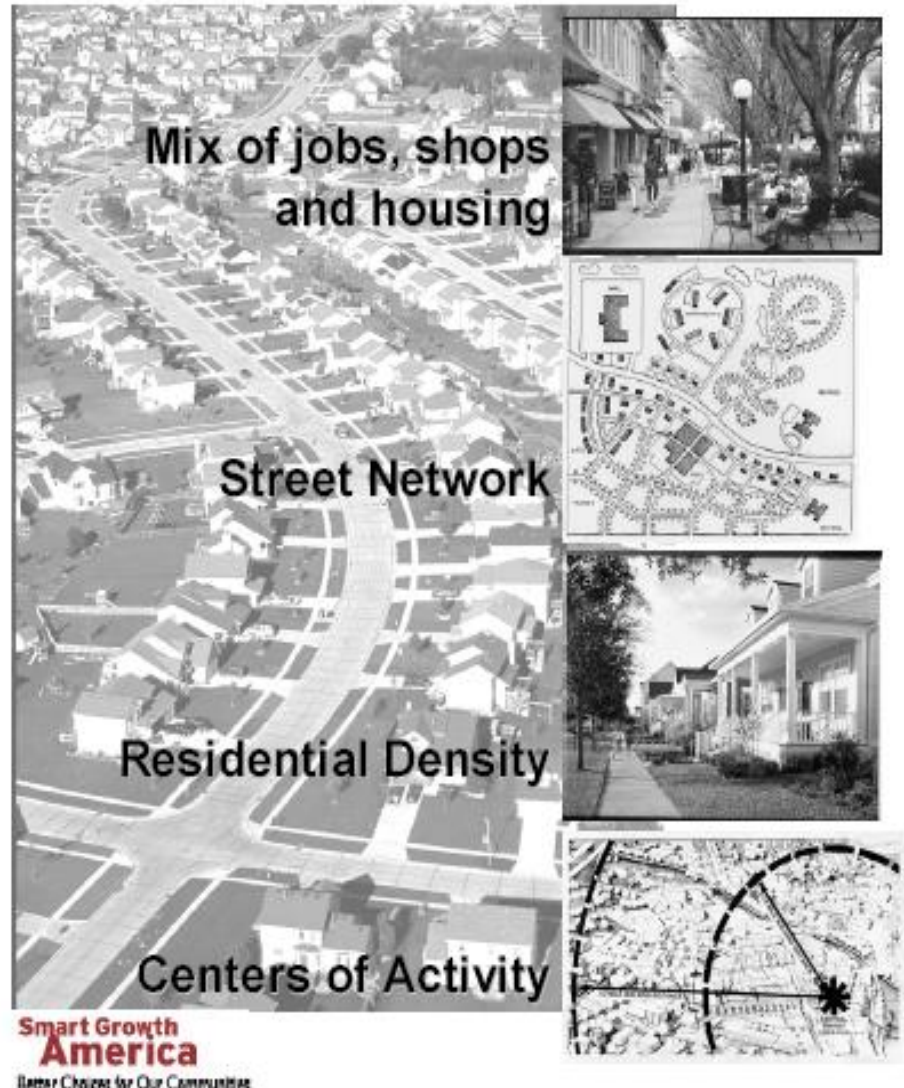
-
-
-
-

MEASURING SPRAWL AND ITS IMPACT

Reid Ewing, Rutgers University, Rolf Pendall, Cornell University, Don Chen, Smart Growth America

Measuring Sprawl and Its Impacts

- Low Density
- Segregation of Uses
- Lack of Strong Centers
- Sparse Street Network



Released October 2002

SPRAWL IS A MULTIDIMENSIONAL PHENOMENON

Galster et al, 2001; Ewing et al, 2002; Ewing et al., 2003; Cutsinger et al, 2005; Wolman et al., 2005; Frenkel and Ashkenazi, 2008; Torrens, 2008; Jaeger et al., 2010; Mubareka et al., 2011; Sarzynski et al., (forthcoming)



Low Density



Single Use



Weak Centers



Poorly Connected Streets



Compact Development a la U.S.



Sprawl a la USA



- popden
- empden
- lt1500
- gt12500
- urbden
- jobpop
- jobmix
- wlkscore
- popcen
- empcen
- varpop
- varemp
- smlblk
- avgbk
- intden
- pct4wy

Principal Component Analysis

DENSITY



MIX USE



CENTERING



STREET

COMPACTNESS

The Washington Post

FRIDAY, AUGUST 29, 2003

THE WASHINGTON POST

NATIONAL NEWS

DC MD VA R

FRIDAY, AUGUST 29,

Suburbia USA: Fat of the Land?

Report Links Sprawl, Weight Gain

By ROB STEIN
Washington Post Staff Writer

Suburban sprawl appears to be contributing to the nation's obesity epidemic, making people less likely to walk and more likely to be overweight, researchers reported yesterday.

In the first comprehensive examination of whether suburbs spreading across the U.S. landscape are affecting Americans' health, the researchers studied more than 200,000 people in 448 counties, producing the first concrete evidence supporting suspicions that sprawl is aggravating the nation's growing weight crisis.

People who live in the most spread-out areas spend fewer minutes each month walking and weigh about six pounds more on average than those who live in the most densely populated places. Probably as a result, they are almost as prone to high blood pressure as cigarette smokers, the researchers found.

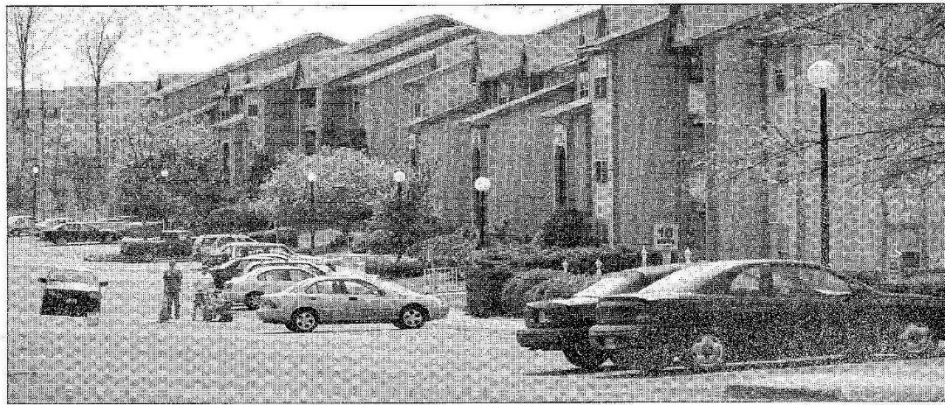
"There are lots of other reasons why we should work to contain sprawl," said Reid Ewing of the University of Maryland's National Center for Smart Growth who led the

study. "There is a lot of circumstantial evidence that sprawl is related to health," Ewing said in a telephone interview. "This is certainly the first national study to make the direct connection between the built environment and health."

Ewing and his colleagues analyzed data collected about 206,992 U.S. adults between 1998 and 2000 by the Behavioral Risk Factor Surveillance System, an ongoing federal survey. Using data from the Census Bureau and other federal sources about population density, block size, street patterns and other factors, the researchers calculated a "sprawl index" for 448 counties in the largest metropolitan areas nationwide, where two-thirds of the population reside, including the Washington region.

The index ranged from a low of 63 for the most sprawling county—Geauga, Ohio, just outside Cleveland—to a high of 352 for the densest—New York City.

Frederick County in Maryland,



People who live in the most spread-out areas were found to weigh about six pounds more on average than those in the most densely populated places.

25 densest counties.

People in more sprawling counties are also likely to have a higher body mass index (BMI), a standard measure of weight. A 50-point increase in the degree of sprawl was associated with an average weight gain of a little more than one pound per person, researchers found.

While researchers found no association between sprawl and diabetes or heart disease, they did find that people who live in the least sprawling areas had a 29 percent lower risk of developing high blood pressure than those in the most sprawling areas.

Sprawl and Obesity

New research links suburban sprawl to obesity. You are more likely to be overweight if you live in an area with low population density and a more expansive street grid.

STATE/COUNTY	THE LOWER THE SPRAWL INDEX SCORE, THE GREATER THE AMOUNT OF SPRAWL	MORE SPRAWL MEANS YOU ARE MORE LIKELY TO HAVE A HIGHER BODY MASS INDEX...	... THE MORE POUNDS YOU ARE LIKELY TO WEIGH...	... THE HIGHER YOUR RISK OF HIGH BLOOD PRESSURE...	... THE HIGHER YOUR RISK OF BEING OVERWEIGHT...
	SPRAWL INDEX SCORE	EXPECTED BMI**	EXPECTED WEIGHT**	PERCENT DIFFERENCE FROM AVERAGE RISK	PERCENT DIFFERENCE FROM AVERAGE RISK
Maryland					
Anne Arundel	107.75	26.07	166.47	-0.92%	-1
Calvert	90.84	26.13	166.84	1.10	1
Charles	89.72	26.14	166.87		2

Pickens County, S.C. (83.8) 3.5%

Geauga County, Ohio (63.1) 8.1%

Source: Smart Growth America Surface Transportation Policy Project

at the University of Maryland.

The study also looked at heart disease and diabetes, but didn't find any statistically relevant relationship between sprawl and these diseases.

The study did find that the

on weight, obesity, hypertension and other health factors were gleaned from a continuing phone survey of more than 200,000 adults by the CDC.

The study found that for every 50-point increase in sprawl

Between 2003 and 2014

Physical activity, obesity (Ewing et al, 2003; Kelly-Schwartz et al, 2004; Sturm and Cohen, 2004; Doyle et al, 2006; Fan and Song, 2009; Plantinga and Bernell, 2007; Lee et al, 2009)

Traffic fatalities (Ewing et al, 2003)

Air quality (Kahn, 2006; Stone et al, 2010; Schweitzer and Zhou, 2010)

Residential energy use (Ewing and Rong, 2008)

Emergency response times (Trowbridge et al, 2009)

Teenage driving (Trowbridge and McDonald, 2008; McDonald and Trowbridge, 2009)

Social capital (Kim et al, 2006; Nguyen, 2010)

Private-vehicle commute distances and times (Ewing et al, 2003; Zolnik, 2011; Holcombe and Williams, 2012)

2014



- **National Press Release:**
more than 100 national and regional newspapers and magazines
- **One Book**
- **8 journal articles**



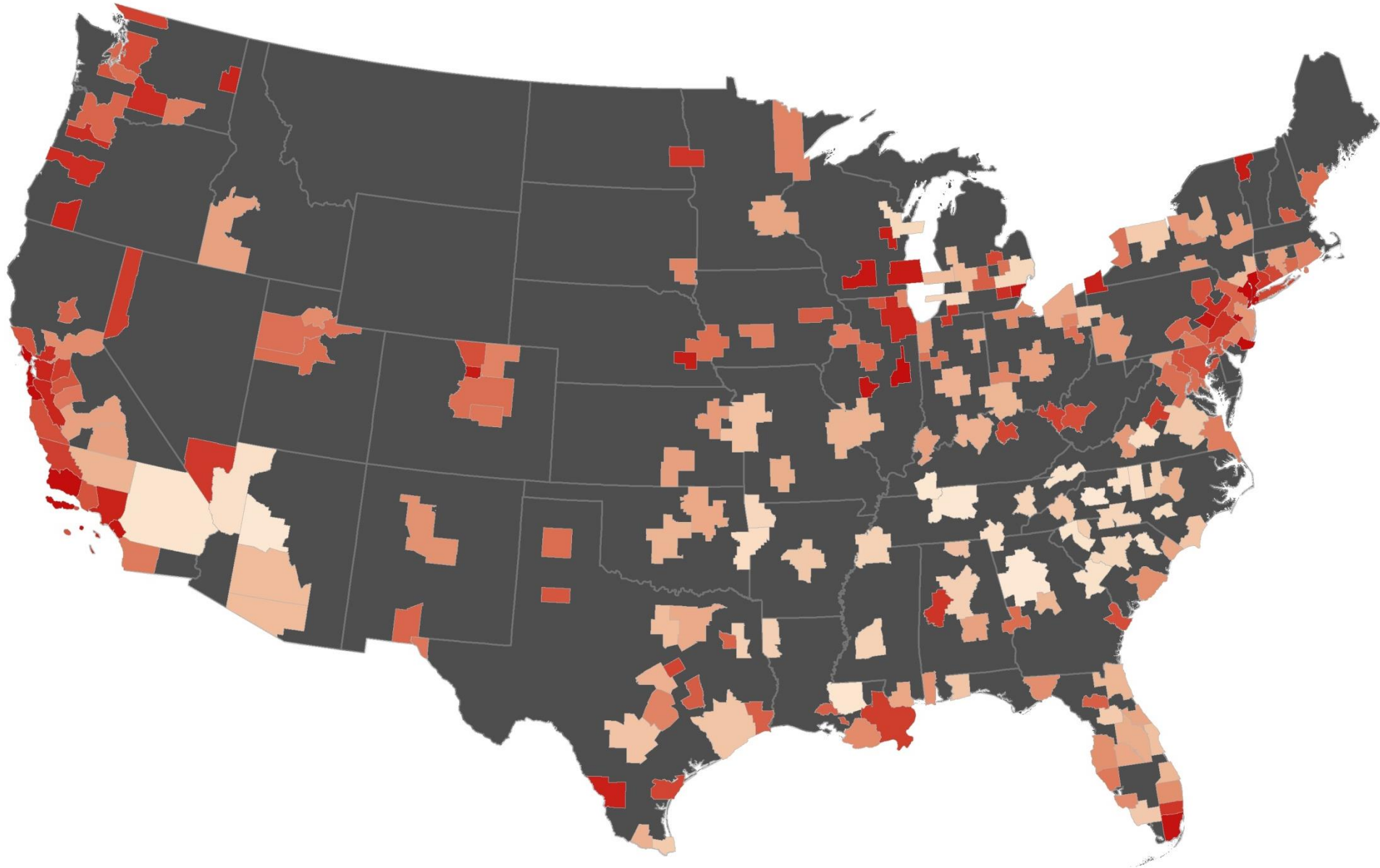
MEASURING URBAN SPRAWL AND VALIDATING SPRAWL MEASURES

Reid Ewing and Shima Hamidi

Prepared for:


National Cancer Institute, National Institutes of Health
Ford Foundation
Smart Growth America

Compactness Scores for 221 Metropolitan Areas and Divisions in the U.S



Measuring Sprawl and Its Impacts: An Update

Shima Hamidi¹, Reid Ewing¹, Ilana Preuss², and Alex Dodds²

Journal of Planning Education and Research
2015, Vol. 35(1) 35–50
© The Author(s) 2015
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/0739456X14565247
jpe.sagepub.com


Abstract

Across the nation, the debate over metropolitan sprawl and its impacts continues decade after decade. To elevate the debate, a decade ago, researchers developed compactness/sprawl indices for metropolitan areas and counties that have been widely used in health and other research. In this study, we develop refined compactness/sprawl indices based on definitions and procedures in earlier studies by Ewing and colleagues and validate them against transportation outcomes. The indices are being made available to researchers who wish to study the causes, costs and benefits, and solutions to sprawl and to practitioners who wish to check their community's success in containing sprawl.





ELSEVIER

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace



Relationship between urban sprawl and physical activity, obesity, and morbidity – Update and refinement[☆]



Reid Ewing^{*}, Gail Meakins¹, Shima Hamidi², Arthur C. Nelson³

Department of City and Metropolitan Planning, College of Architecture and Planning, 375 S 1530 E RM 235, Salt Lake City, UT 84112, USA

ARTICLE INFO

Article history:

Received 11 April 2013

Received in revised form

10 December 2013

Accepted 15 December 2013

Available online 21 December 2013

Keywords:

Obesity

Compactness

Sprawl

Physical activity

Built environment

ABSTRACT

Aims: This study aims to model multiple health outcomes and behaviors in terms of the updated, refined, and validated county compactness/sprawl measures.

Methods: Multiple health outcomes and behaviors are modeled using multi-level analysis.

Results: After controlling for observed confounding influences, both original and new compactness measures are negatively related to BMI, obesity, heart disease, high blood pressure, and diabetes. Indices are not significantly related to physical activity, perhaps because physical activity is not defined broadly to include active travel to work, shopping, and other destinations.

Conclusions: Developing urban and suburban areas in a more compact manner may have some salutary effect on obesity and chronic disease trends.

© 2013 The authors. Published by Elsevier Ltd. All rights reserved.

Urban sprawl as a risk factor in motor vehicle crashes

Reid Ewing

University of Utah, USA

Shima Hamidi

University of Utah, USA

James B Grace

US Geological Survey, USA

Urban Studies

2016, Vol. 53(2) 247–266

© Urban Studies Journal Limited 2014

Reprints and permissions:

sagepub.co.uk/journalsPermissions.nav

DOI: 10.1177/0042098014562331

usj.sagepub.com



Abstract

A decade ago, compactness/sprawl indices were developed for metropolitan areas and counties which have been widely used in health and other research. In this study, we first update the original county index to 2010, then develop a refined index that accounts for more relevant factors, and finally seek to test the relationship between sprawl and traffic crash rates using structural equation modelling. Controlling for covariates, we find that sprawl is associated with significantly higher direct and indirect effects on fatal crash rates. The direct effect is likely due to the higher traffic speeds in sprawling areas, and the indirect effect is due to greater vehicle miles driven in such areas. Conversely, sprawl has negative direct relationships with total crashes and non-fatal injury crashes, and these offset (and sometimes overwhelm) the positive indirect effects of sprawl on both types of crashes through the mediating effect of increased vehicle miles driven. The most likely explanation is the greater prevalence of fender benders and other minor accidents in the low speed, high conflict traffic environments of compact areas, negating the lower vehicle miles travelled per capita in such areas.

Is Sprawl Affordable for Americans?

Exploring the Association Between Housing and Transportation Affordability and Urban Sprawl

Shima Hamidi and Reid Ewing

Housing affordability has been one of the most persistent national concerns in the United States, mainly because housing costs are the biggest item in most household budgets. Urban sprawl has been proved by previous studies to be a driver of housing affordability. Previous studies, however, were structurally flawed because they considered only costs directly related to housing and ignored the transportation costs associated with a remote location. This study sought to determine whether, after transportation costs were taken into account, urban sprawl was still affordable for Americans. Multilevel modeling and the recently released location affordability indexes (LAIs) and metropolitan compactness indexes tested the relationship between sprawl and housing affordability. By controlling for covariates, this study found that in compact areas, the portion of household income spent on housing was greater but the portion of income spent on transportation was lower. Each 10% increase in a compactness score was associated with a 1.1% increase in housing costs and a 3.5% decrease in transportation costs relative to income. The combined cost of housing and transportation declined as the compactness score rose. As metropolitan compactness increased, transportation costs decreased faster than housing costs increased, creating a net decline in household costs. This is a novel finding, conditioned only on the quality of the data on which the LAI is based.

One result was the mortgage crisis and ensuing wave of foreclosures that swept the United States in the late 2000s and directly helped precipitate the global financial crisis (the Great Recession). Under traditional metrics of affordability, lenders granted loans to families who were unable to maintain mortgage payments, in many cases because of the crushing costs of transportation in an environment with record high prices for motor vehicle fuel. Foreclosures were centered in the Sunbelt states of Arizona and Nevada, where rapid suburban and exurban development occurred in automobile-dependent areas with virtually no transit access and no ability to walk to anything.

The recent foreclosure crisis raises the question of whether, after transportation costs are taken into account, urban sprawl is still affordable for Americans. This study seeks to answer this question and test the relationship between metropolitan sprawl and housing affordability by using the recently released location affordability indexes (LAIs) (funded by the U.S. Departments of Transportation and of Housing and Urban Development) and compactness indexes funded by the National Institutes of Health and the Ford Foundation. LAIs consider both housing and transportation costs, accounting for locational advantages and disadvantages usually ignored in housing affordability studies.

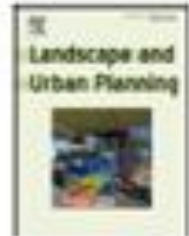


ELSEVIER

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan



Research Paper

Does urban sprawl hold down upward mobility?

Reid Ewing^{a,*}, Shima Hamidi^b, James B. Grace^c, Yehua Dennis Wei^d



^a College of Architecture+Planning, 220 AAC, University of Utah, 375 S 1530 E, Salt Lake City, UT 84112, United States

^b College of Architecture, Planning and Public Affairs, University of Texas at Arlington, Arlington, TX 76019, United States

^c U.S. Geological Survey, Lafayette, IA, United States

^d Department of Geography, University of Utah, Salt Lake City, UT 84112, United States



HIGHLIGHTS

- Upward mobility is significantly higher in compact areas than sprawling areas.
- The direct effect of compactness is attributed to better job accessibility in more compact areas.
- As compactness doubles, the likelihood of upward mobility increases by about 41%.
- Among indirect effects of compactness, only poverty segregation is significant and negative.



Article

Associations between Urban Sprawl and Life Expectancy in the United States

Shima Hamidi ^{1,*} , Reid Ewing ², Zaria Tatalovich ³, James B. Grace ⁴  and David Berrigan ⁵

¹ College of Architecture, Planning and Public Affairs, University of Texas at Arlington, Arlington, TX 76019, USA

² Department of City and Metropolitan Planning, University of Utah, Salt Lake City, UT 84112, USA; ewing@arch.utah.edu

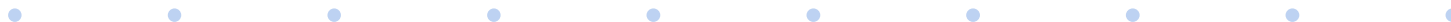
³ Division of Cancer Control and Population Sciences, Surveillance Research Program, National Cancer Institute, Bethesda, MD 20892, USA; tatalovichzp@mail.nih.gov

⁴ Wetland and Aquatic Research Center, U.S. Geological Survey, Lafayette, LA 70506, USA; gracej@usgs.gov

⁵ Division of Cancer Control and Population Sciences, Behavioral Research Program, National Cancer Institute, Bethesda, MD 20892, USA; berrigad@mail.nih.gov

* Correspondence: shima.hamidi@uta.edu; Tel.: +1-817-272-7406

Received: 25 March 2018; Accepted: 23 April 2018; Published: 26 April 2018





See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/325032397>

Does urban form matter for innovation productivity? A national multi-level study of the association between neighbourhood innovation capacity and urban sprawl

Article in *Urban Studies* · May 2018

DOI: 10.1177/0042098018767002

CITATIONS

16

2 authors:



Shima Hamidi

Johns Hopkins Bloomberg School of Public Health

55 PUBLICATIONS 740 CITATIONS

SEE PROFILE

READS

197



Ahoura Zandiatashbar

University of Texas at Arlington

9 PUBLICATIONS 33 CITATIONS

SEE PROFILE



Urban sprawl and the emergence of food deserts in the USA

Shima Hamidi 

University of Texas at Arlington, USA

Urban Studies

2020, Vol. 57(8) 1660–1675

© Urban Studies Journal Limited 2019

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/0042098019841540

journals.sagepub.com/home/usj



Abstract

Providing access to a variety of healthy and affordable foods has been the goal of several federal and state policy initiatives in the USA. The first step towards the successful implementation of these initiatives is to identify food deserts and to understand the mechanism by which food deserts arise. This national-level study investigates the association between urban sprawl and the emergence of food deserts at both regional and neighbourhood levels. Multilevel analysis is used to model the likelihood of a census tract being a food desert, controlling for sociodemographic and built environmental characteristics. We find that urban sprawl, measured via a compactness index, holds a significant association with the likelihood of a census tract being a food desert. Specifically, a one unit increase in the compactness index is associated with a 5.6% decrease in the odds of a census tract being a food desert. In conclusion, we recommend increasing the land use density, mix and walkability of neighbourhoods to create a supportive and attractive environment for food retailers in which to invest.

Annotation for The Many Costs of Sprawl by professor Reid Ewing

Annotator: Yunwei Hu

Part I. Literature

Gordon, Peter, and Harry W. Richardson. "Are compact cities a desirable planning goal?." *Journal of the American planning association* 63.1 (1997): 95-106.

Ewing, Reid. "Is Los Angeles-style sprawl desirable?." *Journal of the American planning association* 63.1 (1997): 107-126.

Hamidi, Shima, et al. "Measuring sprawl and its impacts: An update." *Journal of Planning Education and Research* 35.1 (2015): 35-50.

Ewing, Reid, et al. "Relationship between urban sprawl and physical activity, obesity, and morbidity." *American journal of health promotion* 18.1 (2003): 47-57.

Ewing, Reid, Shima Hamidi, and James B. Grace. "Urban sprawl as a risk factor in motor vehicle crashes." *Urban Studies* 53.2 (2016): 247-266.

Hamidi, Shima, and Reid Ewing. "Is sprawl affordable for Americans? Exploring the association between housing and transportation affordability and urban sprawl." *Transportation Research Record* 2500.1 (2015): 75-79.

Part II. Recent News

Elias, Thomas D. "Thomas D. Elias: Will Urban Sprawl Become the Housing Answer?" *The Napa Valley Register*, 29 Feb. 2024, [napavalleyregister.com/opinion/columnists/tom-elias-california-opinion-commentary-housing/article_6d4a4f68-d5ca-11ee-9740-3bc53990fc2e.html](https://www.napavalleyregister.com/opinion/columnists/tom-elias-california-opinion-commentary-housing/article_6d4a4f68-d5ca-11ee-9740-3bc53990fc2e.html).

Allen-Price, Olivia, and Adhiti Bandlamudi. "The 'american Dream' Led San José to Urban Sprawl, but the Future Requires Density." *KQED*, 16 Nov. 2023, www.kqed.org/news/11967490/the-american-dream-led-san-jose-to-urban-sprawl-but-the-future-requires-density.

Associated Press. "Oregon Lawmakers Consider Changing Beloved Anti-Urban Sprawl Law to Fight Housing Crisis." Fox News, FOX News Network, 26 Feb. 2024, www.foxnews.com/politics/oregon-lawmakers-consider-changing-beloved-anti-urban-sprawl-law-fight-housing-crisis.

Kaufman, Benjamin. "Smart Moves: How Auckland Can Get More for Its Money from On-Demand Public Transport." *The Conversation*, 24 May 2023, theconversation.com/smart-moves-how-auckland-can-get-more-for-its-money-from-on-demand-public-transport-205389.

Part III. Q & A

Questions from Jinhua

Q: You talked about many of the negative effects of sprawl, such as obesity and diabetes, but can you give us a sense of the **order of magnitude of the difference**?

A: Yes this is a great question. The difference between New York and Geauga County, outside of Columbus (I think here it should be Cleveland) is about **6 pounds**. That is the difference after controlling for diet, socioeconomic, and other variables. It has a very **pronounced effect on diabetes**, although I cannot remember the odds ratio.

When we first published the paper, it got a lot of attention, because it was the first (study on this topic), and others have since done some more sophisticated studies. We were challenged by exactly your question – what is the order of magnitude. While one pound is not great, **6 pounds of difference is indeed great across the entire population**. That is a large public health effect. That is significant despite people's seasonal weight change and increase in weight after eating.

Jinhua's follow-up: I read in the paper that one standard deviation change (in the score of compactness vs. sprawl) leads to a 2-pound change, which is half the effect of eating recommended serving of food and vegetables. So that is very significant.

Follow-up A: In some of the studies that relate sprawl to cancer, obesity comes close to smoking on its effect on cancer. People who smoke tend to weight less. And the effect of sprawl is about the same. (I did not quite get this part).

Q: another technical question: you incorporated 4 dimensions – density, segregation, center, and road network – into the concept of compactness. The beauty of that is that now that you have one concept, you can coordinate with many other dependent variables, and it is simple to understand. But the challenge is that it also compound all the effect of those 4 dimensions. **If I were a designer and I want to improve on 2 or 3 of those dimensions**, what shall I do? Have you done any decomposition analysis?

A: Not in all studies. In many studies we use a single measure that combines the 4 dimensions through PCA and summed together. We have done a few studies involving decomposition, or looking at individual factors or dimensions of sprawl. And (the dimension involved) are different in different studies. **For example, in terms of travel (to work), density is the most important variable** – more important than mix. As for centering, subcenters are important – think about Washington D.C. vs. Arlington and Bethesda. Street connectivity tends to be less important in most studies, but it is still significant for the signs (of the coefficients).

Q: We talked about so many problems of sprawl. The reality is that we have a lot of them. So there must be something good about it – why do people like it? Where are some causes of sprawl?

A: According to Gordon and Richardson, who wrote the piece *Is Compact Cities Desirable*, the main cause is **residential preference – people like to live in suburban areas**. But that was 1997, and people's tastes and preferences have changed since then. We (researchers of sprawl) believe that there are **market imperfections – external costs of sprawl**. We have **subsidies of sprawl** and have **limited the number of sellers and buyers of large tracts of land**. Monopoly is another cause – there is **not a real complete market for large landholdings**. We also looked

at **subsidies to automobile**, which are often 4 times the direct out-of-pocket cost of automobile use. So **we are subsidizing growth in low density sprawling areas**. By virtue of fact, **the cost of auto use is not internalized**. Almost all the conditions for a perfectly functioning market are not met in the real estate market. That is the number one cause of sprawl.

We also know from a survey done by National Association of Home Builders that **50% of Americans prefer low density sprawl to more village-like, walkable, higher density places**. The survey is conducted every 2-3 years, and the public is split between the two. But we are not building as many compact areas as low-density sprawly areas. And that is due to a lag effect. According to some research, in the real estate business, **it is common wisdom that developers lag behind public opinion**. If a subdivision here is sold out, there is likely another subdivision built in 5 years.

What we are seeing across the country is interest in more compact living. Here in Salt Lake City, I just bought a townhouse as an investment property along 400 South, which is one of our light rail lines. There is a premium associated with the transit access and access to public open space. So I think it is a lag in the real estate market. **And we are seeing a lot more compact development across the country – in part because we are forced to**. The cost of a single family home is now very high. People are now forced to look for alternatives – more compact and walkable areas. **People like walking. They don't like driving**. These walkable places that are compact have that appeal.

Q: from the first principle perspective, you mentioned the ultimate objectives of living longer, living healthier, being more creative, and consume less energy. There seems to be a strong rationale to do that. **But half of the people don't. Is that a lack of information? Or do people not trust science? Or what is the reason?**

Also, on the market side, you mentioned market imperfection, so what are some **cures of sprawl**? You mentioned some national trends that seems to be in the right direction, but what are some **active interventions to take**?

A: If we **price everything by their true social cost**, that would be terrific. In New York, the pricing structure (congestion pricing) in Manhattan discourages auto use. Therefore, if we price air pollution and congestion by their true costs, that would be good. My feeling for the cures of sprawl, there is more potential through **government intervention in the marketplace**. We have zoning and many other tools to affect land use patterns. We also have urban growth boundaries and transfers of development rights, all of which are government initiatives to create more compact development.

At this point, we are seeing many examples. Salt Lake City rezoned and put in light rail rather than spending all its money on roads – speaking of roads, the induced travel phenomenon also causes sprawl. We just wrote a paper for the journal of planning literature about 15 tools that can be used beyond zoning to create compact areas. **As SLC rezoned and put in light rail, we are seeing mid-rise buildings along the right-of-way and along the stations**.

So I think (government interventions) should focus on 2 things primarily. One of them is **land use**. Portland has its urban growth boundary, density targets, and commitment to light rail rather

than highway building. So Government really have a role to play, beyond **congestion pricing and carbon tax**, which will make driving less attractive.

Audience questions

Q: Continuing on the discussion of what we can do about it – you just talked about congestion pricing, zoning, light rail programs, etc. I observed that road design and parking minimums comes up a lot in the chat. Any comments on those?

A: Yes. **Parking is one of the areas that have huge subsidy**. When you go for grocery shopping at a supermarket, you park free – the person who work at the supermarket in fact subsidizes you indirectly. Across the country, even here in the red state, Utah, we are now **eliminating parking minimums**, meaning that we do not have an excessive amount of parking dictated by local governments as part of their zoning codes. We also looked at TODs, transit-oriented developments, in different regions of the country. **TODs**, which are compact, mixed-use, and pedestrian friendly, **requires one parking space per dwelling unit**. So parking is still being provided for TOD developments, but that requirement is **only half as much of the standard suburban parking requirement**. A lot of those spaces end up unoccupied – grossly oversupplied. We also know that in many places, **parking is bundled – you cannot opt out of the parking space** if you rent an apartment. Finally, we know that different places have different peak demands at different times of the day – residential at night. This creates opportunities for shared parking.

Q: Can you quantify for the audience the tradeoff between the cost of housing and the cost of transportation? You found that there is a net gain in cost associated with sprawl. Can you share some numbers on that?

A: I cannot recall the numbers without re-reading the papers, but they say **each automobile you own cost you \$10,000 a year**. If you shed a car – own 1 instead of 2, that would reduce the cost by \$10,000. My wife and I have one car. If we have 2 instead, we would be paying twice as much in terms of fixed costs. We also pay a premium of thousands of dollars for housing in an attractive, compact, and walkable area. So the numbers, while I cannot recall, are significant.

Part IV. Summary of Memos.

Themes from Other Memos

- Most memos include a reiteration of some main points of the forum presentation, including:
 - Characteristics of sprawl: low density, segregated uses, lack of strong centers, disconnected streets, etc.
 - Problems of sprawl: more traffic accidents, food desert, obesity and diabetes, less upward mobility in socioeconomic status, longer emergency response times, etc.
 - Causes of sprawl: societal preferences for single family homes, subsidized parking, etc.
 - Possible cures of sprawl: car-sharing, abandoning parking minimums, pricing the externalities, etc.
- A few other thoughts include:
 - Cost of living in sprawl vs. living in compact areas: is the comparison within metro areas or between different metro areas? (More details in Seamus' memo)
 - ◆ The 2015 Hamidi and Ewing paper seem to be about the latter, so the comparison within the same metro area is suggested.

- ◆ There's a good chance that this will not hold within the same metro area. There should be a balance between lower transportation costs in compact areas and lower housing costs in the suburbs.
- ◆ If that does hold, then choosing to live in sprawl-y suburbs will be economically irrational. Is it due to some American culture and values? Exogenous factors? More expensive to live in compact areas for people newly move(d) there?
- LA style density: opportunities for American cities? (More in Web's memo)
 - ◆ The Wilshire Blvd Corridor in LA is quite dense but currently does not have rail public transit (although it is under construction).
 - ◆ The Wilshire Corridor and many other parts of LA has the density to support transit, and transit may encourage more infill and density. Therefore, transit investment is likely an important cure for the sprawl of many American cities.
- Any quantitative definition of sprawl? How is it measured?
- Geographic context of sprawl: difference between the west coast vs. the east? (and possibly also the sun belt and the Midwest?)
- Social aspect: sprawl also contributes to less social interaction with its lower density and disconnected streets
- Equity and climate implications of sprawl: single family zoning creates a climate of housing commodification and limits building additional housing, leading to housing shortage and inequity
- Relationship between race and sprawl

My Reflection

Last Friday, we heard a mobility forum given by Professor Reid Ewing on the effect of sprawl (vs. compactness) on people's lives. As an enthusiastic city observer, I personally have been fairly familiar (and uncomfortable) with American style sprawl featured in cities like Los Angeles, Houston, Salt Lake City, Phoenix, Atlanta, (the outer areas of) San Francisco Bay Area, etc., and characterized by wide and pedestrian-unfriendly roads, low density single-family housing, loosely distributed business centers, and inadequate and unreliable public transportation. Through professor Ewing's talk, we learned that sprawl is not only poor from a city/regional design point of view, but it also negatively affect people's lives as well. Professor Ewing present his (and some relevant) research study involving some PCA analysis of characteristics of a compact city - the opposite of sprawl - including higher density, mixed use, strong centers, and well-connected streets. The most important takeaway is that sprawl is strongly linked to obesity, as it discourages people's physical activity, and the difference is about 6 pounds - a significant finding despite the variation of people's body weight within a day. Some other negative effects of sprawl include longer emergency response times, higher rate of teenage driving and motor vehicle crashes, less affordability despite lower housing prices, and lower upward mobility compared to compact areas. Despite all these negatives of sprawl, its causes include people's preferences of suburbs to cities back in the days and the policies subsidizing growth in suburban areas. Finally, as a response to why people "don't trust science" and would rather live in suburban sprawl, professor Ewing mentioned that pricing policies, such as congestion pricing, is an important solution to many problems - people pay the actual costs of auto uses including externalities. Overall, it is great to broaden my understanding of this American city design phenomenon. And I like the takeaway that living in compact areas encourages healthier lives. As professor Ewing showed his dogs during the talk, I believe that

compact cities are not only a more livable environment for humans, but for those adorable creatures as well!