

Natural Sprawl*

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Abstract

Sprawling and leapfrogging suburbs, as opposed to compact central cities, appear peaceful, clean and safe. They appear happy and healthy. On the other hand, suburbs look and feel fake, dull and alienating. Which one is happier and healthier, sprawling or compact areas? I discuss pros and cons of sprawling and compact counties drawing on social and natural sciences. I also perform a simple quantitative exercise—I regress several wellbeing/health measures on sprawl and density at county level. Sprawl is measured with Ewing's (2003) index. Sprawling and low-density counties are healthier in terms of mentally and physically healthy days than non-sprawling counties, controlling for many predictors of health. I interpret it as the advantage of low density living close to nature. Given rather unaesthetic nature of American suburbia, I argue that, if we left more nature in suburbs, people living there would be even happier.

KEYWORDS: CITY, SPRAWL, POPULATION DENSITY, NATURE, HEALTH, HAPPINESS, U.S. COUNTIES

It is a common wisdom in public policy and public administration that sprawl/suburbanization is bad for people. But is it? Nobody has tested the link between sprawl/suburbanization and wellbeing—I will do it here. A major motivation for this study is to try to understand better the paradox of apparent happiness among suburbanites despite problems of sprawl: Americans prefer suburbs to big cities and are more satisfied with community and with their lives in suburbs than in cities.¹ First, let's go back in time—why did we want suburbs in the first place?

The Problem: Old, Dirty, Crowded, Dangerous, Stressful and Expensive Metropolis

In a rather deep hole, in a curve of the Medlock and surrounded on all four sides by tall factories and high embankments, covered with buildings, stand two groups of about two hundred cottages, built chiefly back to back, in which live about four thousand human beings, most of them Irish. The cottages are old, dirty, and of the smallest sort, the streets uneven, fallen into ruts and in part without drains or pavement; masses of refuse, offal and sickening filth lie among standing pools in all directions; the atmosphere is poisoned by the effluvia from these, and laden and darkened by the smoke of a dozen

*This provocative title has two meanings: It is natural for people to live close to nature and hence sprawl away from cities. Second, sprawl could be done, as I argue here, in a more nature-friendly way than what is currently happening in the U.S.

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¹Residential preferences are shown in Fuguitt and Zuiches (1975), Fuguitt and Brown (1990). More recent data (and also community satisfaction) are at <http://today.yougov.com/news/2012/07/05/suburban-dream-suburbs-are-most-popular-place-live/>. Happiness is shown in Berry and Okulicz-Kozaryn (2011, 2009). Adams (1992) does not find such effect, but he studies Detroit only. Rehdanz and Maddison (2005) do not find the effect either, but they include both population density and percent of population living in urban areas in the same model and the lack of significance may be to collinearity. More importantly, they lump all countries together, while Berry and Okulicz-Kozaryn (2009) showed that the unhappiness with city life happens only in developed countries, and more than half of their sample is developing countries. Ewing et al. (2003) and Ewing (2005) found that obesity is more prevalent in sprawling than compact areas. This finding was challenged by Eid et al. (2008) who using panel data found that sprawl does not cause obesity—obese people simply chose to live in suburbs.

tall factory chimneys. A horde of ragged women and children swarm about here, as filthy as the swine that thrive upon the garbage heaps and in the puddles. In short, the whole rookery furnishes such a hateful and repulsive spectacle as can hardly be equalled in the worst court on the Irk. The race that lives in these ruinous cottages, behind broken windows, mended with oilskin, sprung doors, and rotten door-posts, or in dark, wet cellars, in measureless filth and stench, in this atmosphere penned in as if with a purpose, this race must really have reached the lowest stage of humanity (Engels 1987).

This is how industrialization started a modern city. How did industrialization leave the city? In 2012, over 150 years after Engels wrote the above description of Manchester, I came to Philadelphia, one of the “rust belt” (postindustrial) cities, and here are my impressions:²

I saw in Philadelphia rotten infrastructure. There are old brick houses that are literally falling apart. In worst areas, for instance in Camden, which is a part of Philadelphia metropolitan area, there are streets where about every tenth house is either burnt down or part of it fell down. Most houses have ugly bars around the porch to prevent a burglary, many houses have either windows broken or covered with a piece of wood. There is a commuter train, PATCO speedline. It is old, dirty and quite repulsive³. But the attractiveness of the physical capital is secondary. What matters is people, and that's the problem, too. There are people stumbling and lying on the streets, you have to be careful when you drive. There are many disabled people and many beggars. People push shopping carts on the sidewalks. I have seen in those carts collected cans and bottles, groceries, babies, and pets—sometimes all of them in the same cart.⁴ Every time I go to work, and I only drive about half a mile through Camden, I see a beggar, often the same one, sitting on the ground, whether it rains or snows. Usually I see several beggars, some on wheelchairs. City of Camden motto is an irony: “I saw a city invincible.”

Was it all worth it to build the cities? Yes. Civilization is the cities, but we pay the price: the misery of city life.⁵ Civilization's wonders are made in cities, but so are its problems. Labor specialization, economies of scale, invention and creativity are all made possible by high-density living (e.g. Florida 2008, O'Sullivan 2009, Glaeser 2011). But high density living also fosters crime, disease spread, stress, cognitive overload and other problems.⁶ A great achievement of our civilization is ever-increasing standard of living. Since Engels time, 1800s, standard of living has improved tremendously. By one estimate, today's bottom decile has better standard of living than everyone, but top decile one hundred years ago (Bok 2010). On the other hand, despite all that progress, we did not become any happier over time (Easterlin 1974), and among all places we are least happy in cities (Berry and

²I must admit that I may be biased in my description—the potential bias comes from the shock that I have experienced moving to Philadelphia from the sun-belt suburbia of Dallas, TX with new and shiny physical capital and segregated human capital.

³I must note that some of my colleagues find PATCO “historical”.

⁴I have seen permutations of all of the above items except a baby and a pet in the same cart, but I have seen a young man pushing a stroller with a fake toddler inside (a huge rubber doll).

⁵I do not suggest that poverty is caused by cities, neither that crumbling city infrastructure is caused by cities. If anything, it is actually sprawl that causes cities to lose population, tax money and as a result leads to decline. It is, however, in the cities where we experienced the misery of high density living in the first place. And then in a vicious cycle, as if cities were to attain lower density, their losing of population results in further city decline—cities by definition, either have high density or they decline. Another reason why people may flee the cities is desegregation—people prefer to live among like-minded individuals, among their social class, among their kin, and so forth. This has, of course, bad long-run consequences for the society as a whole, but that's what individual persons prefer.

⁶There is a synergy in the cities: its goods and bads (e.g. innovation and crime) increase at the rate of 1.15 relative to the population (Bettencourt et al. 2007, 2010). For a quick overview of this phenomenon see West (2011).

Okulicz-Kozaryn 2011).

In a classic critique of city life, Wirth (1938) complained about alienation, impersonality, superficiality, lack of social support and crime. And there is recent evidence corroborating Wirth's complains about cities: density and heterogeneity predict lower trust (Helliwell and Wang 2010). Trust is a measure of social capital (e.g. Putnam 2001) and we know that social capital is good for mental health, and in general for overall health: "Socially isolated people die at two or three times the rate of people with a network of social relationships and sources of emotional and instrumental support" (Kawachi and Kennedy 1997). Low social capital is associated with poor health (Kawachi et al. 1997, Subramanian et al. 2002). And there is more direct evidence. Lawless and Lucas (2011), Fassio et al. (2013)⁷ find that high density predicts low happiness. Also, there is recent neurological evidence showing that city living is not healthy for our brains (Lederbogen et al. 2011). Finally, cities have high crime, and high crime predicts poor health (Lynch et al. 2004, Zimmerman and Bell 2006).

The Solution: Soothing and Restorative Nature

The beauty of the country, besides, the pleasures of a country life, the tranquility of mind which it promises, and wherever the injustice of human laws does not disturb it, the independency which it really affords, have charms that more or less attract everybody (Smith 1776, :IIIi).

Solitude in the presence of mutual beauty and grandeur is the cradle of thoughts and aspirations, which are not only good for life for the individuals, but which society could ill do without (J.S Mill cited in Pretty 2012).

E.O. Wilson's "biophilia" hypothesis says that humans have innate/instinctive attraction to nature/other living organisms.⁸ Animals, plants, landscapes, and wilderness benefit our health (Frumkin 2001). Exposure to nature produces positive emotions and positive affect (Mayer et al. 2009). People want to be close to nature: being close to nature is not only aesthetic, but also soothing and restorative—it helps to escape city turmoil. In short, contact with nature improves health. An excellent review of benefits coming from contact with nature is Pretty (2012), which is briefly summarized in the following paragraph.

Nature helps us recover from pre-existing stress, immunizes and protects from future problems, helps us concentrate and think more clearly. There are likely to be evolutionary reasons for it—we have lived close to nature for almost all human history—it's only past few hundred years, since industrialization, that we have abandoned nature. Why do we need nature? Nature provides sensory stimulation: colors, sounds, smells, and so forth. Humans have a need for connection (bond) with nature. It is almost spiritual. Physical activity and manual tasks in natural settings (e.g. chopping wood, building a fire) provide enjoyment. Green spaces increase life expectancy and decrease risk of mental health problems. Even window views and gardens have health benefits: fewer illnesses, less frustration and more patience. Pretty (2012) cites Gary Snyder: "nature is not a place to visit, it is home"—and this is the message of his book.

⁷My study is similar to Lawless and Lucas (2011). My contribution is multiple regression over their correlations and I use the sprawl index, while they only use density.

⁸The "biophilia" term was coined by Fromm (1964). This idea makes sense—think about it—do you feel better in a forest, by the lake, or in a parking lot or on the sidewalk? It also makes evolutionary sense—for almost all of human species history there were no sidewalks nor parking lots—there is no reason for a human being to feel good there. The good thing about sidewalk and parking lot is that there are some living organisms—people, birds and so forth; but the setting is unnatural.

The Contemporary Suburban Solution:

Asphalt, Malls, Landscaping, Pools, Fountains and McMansions (aka Cookie Cutter Housing)

We must create the mass-production spirit.

The spirit of constructing mass-production houses.

The spirit of living in mass-production houses.

The spirit of conceiving mass-production houses. (Le Corbusier 1985, p.228)

Suburbs look and feel fake and they are fake⁹—they did not develop naturally, but were engineered to look as good as possible at prices as low as possible, like fast food. Hence the name for the suburban housing: McMansions (like McDonald's). Why do people live there? You get the best value for your dollar: new construction, lots of space, not much noise, low rent, low crime, good schools, and so forth. But, like at McDonald's, there are “unanticipated” (we don't realize them) bad consequences: traffic, congestion, long commute, environmental degradation, and so forth (Duany et al. 2001).¹⁰

Americans have a “love of newness” and a desire to be “next to nature” (Berry 1976). But what came out of this love and desire is “fake” nature—just look around suburbs—fountains in fake ponds and fake trees around them. By fake I mean human-made/human-planted.¹¹ It defeats the purpose. Sprawl takes up the space that was covered by natural nature. Natural nature means nature that was not altered by humans. A fundamental problem with suburbanization is waste—we destroy nature and replace it with fake nature, and we also leave the infrastructure unused in the city, let it deteriorate, and build the new infrastructure from scratch outside of the city (e.g. Duany et al. 2001). A balanced overview of goods and bads of sprawl is Frumkin (2002). To summarize, sprawl means more nature than city living, but it also eats up lots of nature for highways, parking lots, strip malls and McMansions: we need smart sprawl: leave as much of nature as untouched as possible.

Escaping Engels' Manchesters to nature we ended up with nature caricature, a contemporary suburb.¹² How did it happen? I already gave one explanation—best value for your dollar: shiny, roomy and luxurious, yet cheap construction is what sells well. A related explanation is consumerism (Veblen 2005a,b). You can consume more and more cheaply in suburbs than in the cities. The bad news is that consumerism/conspicuous consumption does not result in a lasting happiness. Material possessions, such as SUVs and McMansions, at which sprawling suburbia excels, don't make you happy—you are on hedonic treadmill, and you adjust to material possessions. We should buy experiences (bowling, vacations, etc), not things (Louis Vuitton handbags, Lexuses, McMansions, etc). According to economic theory, the burden of commuting is chosen when compensated either on the labor or on the housing market so that individuals' happiness is equalized. But people with longer commutes are less happy (Stutzer et al. 2003). Actually, commute is the least enjoyable thing you can do (Kahneman et al. 2004).¹³

⁹This is a generalization made for sake of simplicity. There are some good suburbs, of course. I mean here a “typical” suburb as described by Duany et al. (2001).

¹⁰Still, McMansions are better for you than McDonald's—the only good thing about McDonald's is (short term) price (in the long-run you will pay more in healthcare expense).

¹¹There are also those suburban puppies that you can see peering out of Lexuses—they look as fake and ridiculous as McMansions in which they live.

¹²I say “caricature”, because these suburbs are more about materialistic consumption than about nature enjoyment. Nature is a decoration of suburbs. It should be the other way round—nature should prevail.

¹³Kahneman et al. (2004) only looked at everyday experiences. He did not look at slavery, torture, or other nasty things that must

Many (if not most) suburban houses, SUVs, LV handbags, and so forth are positional goods—you buy them to have a better position in a society, not to have a better quality of life. But the problem with positional goods is that acquiring them leads to consumption arms-race. You can never win—you are on hedonic treadmill. Due to this arms-race we ended up with ridiculously big and expensive McMansions, SUVs, and other building blocks of American suburbia. Even worse, we adapt to big houses and shiny cars—they don't make us any happier after some time, and in a vicious cycle we need ever bigger cars and houses. But we don't adapt to our commutes—it consistently makes us miserable (Frank 2005).

America is suburbanizing: over the 20th century the share of population living in central cities went up from 20% to 30%, while the corresponding increase for suburbs is 10% to 50%. Today, more than half of the population lives in suburbs (Hobbs and Stoops 2002, p.33).¹⁴ And we're actually doing the opposite to what we should to increase happiness: we pour more concrete, instead of leaving nature untouched. The median square footage of a single-family home built in the 1960s or earlier is 1,500 square feet today, and a corresponding number for houses built between 2005 and 2009 is 2,200 square feet—our houses are 50% bigger than in the 60s. At the same time, the median lot size remained flat at 0.25 acres, so we have more concrete and less nature.¹⁵

To summarize, we escaped Engel's Manchesters to nature, but due to irrational consumerist drive we ended up with contemporary suburbs. Now the problem is that scholars mistakenly, I think, advocate to go back to cities (Jacobs 1993, Duany et al. 2001, Dreier et al. 2005). Ed Glaeser recently pronounced "Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier."— the last two "healthier and happier" appear false. People are happier in plastic-fantastic contemporary suburbs than Glaeser's triumphant cities. This was the point of this section to show that suburbs have many problems, yet people are happier there than in cities. Humans want to be close to nature, and by definition, you cannot have much nature in cities, but there could be more nature in suburbs.

Data

I measure sprawl with Ewing's index: its components are shown in table 1. wellbeing is measured using the County Health Rankings dataset and I supplement it with data from ICPSR Study No. 20660. Datasets are described in the data appendices on page 9. The main variables are defined in table 2, and variable distributions are shown in appendix on page 11. Many variables are measured over time interval, which makes them more reliable, because these measures are estimates, not the actual values (they have a confidence interval).

be even less enjoyable than commute.

¹⁴Although in few recent years, due to the 2008 depression, people rent in cities, because they cannot afford to buy in suburbs. For more discussion see for instance http://www.nytimes.com/2012/04/05/us/census-data-shows-recessions-toll-on-outer-suburbs.html?_r=0 or http://www.huffingtonpost.com/2012/06/28/young-adults-cities-generation-rent_n_1632952.html or <http://www.brookings.edu/research/opinions/2012/06/29-cities-suburbs-frey>.

¹⁵Census Working Paper, "How American Homes Vary By the Year They Were Built", <https://www.census.gov/housing/patterns/publications/HousingByYearBuilt.pdf>.

Table 1: County Sprawl Index Variables and Factor Loadings (Ewing et al. 2003).

measure	factor loading (correlation)
Gross population density in persons per square mile	0.846
% of population living at densities <1500 persons per square mile	20.698
% of population living at densities >12,500 persons per square mile	0.846
County population divided by the amount of urban land in square miles	0.849
Average block size in square miles	20.698
% of blocks 1/100 of a square mile or less in size (about 500 feet on a side, a traditional urban block)	0.821

Table 2: Variable definitions

name	description
mentally unhealthy days	"average number of reported mentally unhealthy days per month, for adults, Behavioral Risk Factor Surveillance System (BRFSS), 2002-2008"
physically unhealthy days	"average number of reported physically unhealthy days per month for adults, Behavioral Risk Factor Surveillance System (BRFSS), 2002-2008"
years lost	"age-adjusted years of potential life lost (YPLL) rate per 1000 persons, 2004-2006"
% low birthweight	"percent of births with low birth weight (<2500g),2000-2006"
sprawl index/100	"Ewing's sprawl index"
% obese	"percent of adults that report BMI \geq 30, 06-08; National Center for Chronic Disease Prevention and Health Promotion"
gini	"gini coefficient, decennial census, 2000"
persistent poverty	"20 percent or more of residents were poor as measured by each of the last 4 censuses, 1970, 1980, 1990, and 2000"
ERS rural-urban	"2003 ERS Rural-Urban Continuum Code"
per capita income	"per capita personal income (USD 1,000), 2005"
no social-emotional support	"percent of adults that report not getting social/emotional support (2005-2008);BRFSS"
crime rate	"Index crime rate (per 100,000 persons), 2004"
% smokers	"Percent of adults that report smoking at least 100 cigarettes and that they currently smoke, Behavioral Risk Factor Surveillance System (BRFSS) 2002-2008"
% uninsured	"percent of adults 18-64 without insurance, Census/Current Population Survey (CPS) Small Area Health Insurance Estimates (SAHIE), 2005 "
% college	"percent of population age 25+ with 4-year college degree or higher, American Community Survey (ACS), 2005-2007"
% unemployed	"percent of population age 16+ unemployed and looking for work, Local Area Unemployment Statistics, Bureau of Labor Statistics, 2008"
%> 65	"percent population over 65, 2005"
% black	"percent black, 2005"

Results

Analysis is at county level. First, I focus on MSAs (Metropolitan Statistical Areas) only and look at sprawl. There are about 1,000 metropolitan counties. Later I will look at all counties, about 3,000 of them.¹⁶ In the choice of controls for regressions I follow Ewing et al. (2003). I add few more controls: Older people may disproportionately live in low density areas (%>65). There may be a difference in income inequality (GINI) between compact and sprawling areas, and income inequality may affect wellbeing (Kawachi 2006). Compact areas may be miserable because there are poor people stuck there (PERSISTENT POVERTY), and of course, poverty depresses wellbeing.

¹⁶The actual number of observations in regressions are about 750 and 2,000 due to missing data.

Heterogeneous areas (% BLACK) have lower trust (Luttmer and Singhal 2008, Luttmer 2001) and trust predicts higher wellbeing (Putnam 2001). Finally, I control for CRIME and LACK OF SOCIAL SUPPORT that predict lower wellbeing (Kawachi and Kennedy 1997, Lynch et al. 2004, Zimmerman and Bell 2006), and they are also likely to be lower in dense areas than in compact areas.¹⁷ The purpose of controlling for the above factors is, of course, to show that there is an independent effect of sprawl/density on wellbeing/health in addition to these factors.

Table 3: OLS regressions of various health measures. State dummies included.

	mentally un- healthy days	physically unhealthy days	years lost	% low birth- weight
sprawl index/100	0.42***	0.45***	-0.14	0.09
no social-emotional support	0.04***	0.03***	0.06	0.00
crime rate	0.00**	-0.00	0.00***	0.00*
% obese	0.02*	0.01	0.59***	0.00
% uninsured	-0.02***	-0.02**	-0.47***	-0.05***
% college	0.00	-0.02***	-0.64***	-0.02***
% unemployed	0.02	0.02	-0.13	-0.07**
persistent poverty	-0.03	-0.01	-3.75	0.32
% > 65	0.02*	0.00	0.77***	0.02*
gini	0.01	0.02*	1.05***	0.08***
% black	-0.02***	-0.01***	0.38***	0.07***
ERS rural-urban	-0.01	-0.01	-0.52	-0.00
per capita income	-0.02***	-0.02***	-0.15	-0.01
% smokers	0.04***	0.03***	0.75***	0.03**
constant	1.78**	2.77***	18.50	5.22***
N	769	769	769	769

*** p<0.001, ** p<0.01, * p<0.05; robust std err

The higher the value of the sprawl index, the more compact is the place.¹⁸ There is a highly significant effect on mental and physical health: the more compact place the more unhealthy are people.

In the second step I look at about 3,000 counties. And instead of sprawl index I will use density– they correlate at 0.8. I expect results to be similar and if anything more significant due to more observations.

¹⁷In this exercise I keep models simple, and I limit the interpretations–I am only interested here in showing that there exists a fairly robust negative relationship between sprawl/density and wellbeing/health: the more compact (less sprawl) or the more dense the area, the less wellbeing and health.

¹⁸Sprawl averages by state are in appendix on p. 9.

Table 4: OLS regressions: Density instead of sprawl. State dummies included.

	mentally un- healthy days	physically unhealthy days	years lost	% low birth- weight
population/(land area*10,000)	0.14***	0.23***	3.38**	-0.04
no social-emotional support	0.04***	0.02***	0.30**	0.01
Index crime rate (per 100,000 persons), 2004	0.00**	0.00	0.00***	0.00***
% obese	0.00	0.00	1.25***	-0.01
gini	0.02**	0.04***	1.26***	0.05***
% uninsured	-0.03***	-0.04***	-0.52***	-0.05***
% college	-0.00	-0.02***	-0.41***	-0.03***
% unemployed	0.01	0.03	0.64	-0.03
persistent poverty	0.01	0.29***	8.95***	0.14
% > 65	0.02***	-0.01	0.23	0.01
% black	-0.01***	-0.02***	0.12*	0.06***
2003 ERS Rural-Urban Continuum Code	-0.01	0.03**	0.95***	0.01
% smokers	0.04***	0.03***	0.98***	0.01*
per capita personal income (USD 1,000)	-0.02***	-0.02***	-0.24**	0.00
constant	2.35***	3.03***	-19.66	6.43***
N	1917	1917	1902	1848

*** p<0.001, ** p<0.01, * p<0.05; robust std err

Results are similar to those for MSAs, except that now (YEARS LOST) is significant as well.¹⁹ What have we learned? Both cities and suburbs have their problems²⁰, but people are happier in less densely populated areas, and policy makers should take a note: people want low-density living.

Sprawl is treated as a problem by policy makers. A popular and reasonable strategy to deal with it is so called “smart growth” (<http://www.smartgrowthamerica.org>). It promotes high-density living and redevelopment of cities. It is a reasonable strategy, but it misses the point that I am trying to make here that people who live in low-density areas are likely to be happier, despite commute and “fake” feel of contemporary American suburbia. If we could redevelop low-density areas by retaining more nature there, people would be even happier there.²¹ My point is that you can stay eco-friendly while living in suburbs, but you cannot have lots of nature in cities.²² (Reynolds 2002) is one example of a discussion of how suburbs can be nature-friendly. I believe that we can have natural suburbs and I think that most people know such suburbs. I know several: Prairie Creek Dr in Richardson, TX feels quite natural as opposed to fake River Rock Ln in Plano TX or Maidens Castle Dr., Lewisville, TX. Again, the rule is to leave the nature untouched as much as possible, to keep the nature natural, instead of building fake ponds with fake fountains and plant fake trees around it. Given that people are still happier in these fake, ugly and unnatural suburbs than in big cities, we will have even more happiness if we have natural suburbs.²³

¹⁹Note that there are many missing values especially on CRIME and LACK OF SOCIAL SUPPORT variables; but if anything, results are stronger including more observations by dropping those variables.

²⁰A major problem with living in a natural setting is commute, but as more and more people work from home this becomes less and less of a problem.

²¹There are recently some strategies proposed for redeveloping/retrofitting suburbs, e.g. http://www.ted.com/talks/ellen_dunham_jones_retrofitting_suburbia.html

²²On the other hand, one of the suburbs appeals, newness, will be lost as they are aging; then you can go yet farther away from the city, but you cannot continue that forever, at some point it is cheaper to redevelop what is left behind.

²³Still, the root of the problem may be consumerism—many Americans may actually want fake suburbs that we have now. Hence, in addition to leaving suburbs natural, we should fight consumerism. One way to do it is to tax luxuries (including McMansions).

Limitations

Does sprawl and low-density make us healthier and happier? I do not answer this question here. This study is ecological (county-level), not causal. Counties and MSAs are big areas. Most counties include some urban, suburban and rural areas. There are population density data at lower resolution, but there is a problem with health and wellbeing measures and some of the controls at lower resolution. There is no sprawl index at lower resolution, either.

Data Appendix: County Health Rankings and ICPSR County Health characteristics

The following comes from <http://www.countyhealthrankings.org/ranking-methods/data-sources-and-measures> (and there is more information available).

The County Health Rankings team synthesizes health information from a variety of national data sources to create the Rankings. Most of the data we use are public data available at no charge. Measures based on vital statistics data, sexually transmitted disease rates, and Behavioral Risk Factor Surveillance System (BRFSS) survey data were calculated for us by staff at the National Center for Health Statistics and other units of the Centers for Disease Control and Prevention (CDC). The same is true for our health care quality measures, which were calculated for us by the authors of the Dartmouth Atlas of Healthcare, using Medicare claims data. Another key data source, primarily for social and economic variables, is the American Community Survey. We download these data sets and, where needed, calculate the estimates ourselves. Similarly, we downloaded publicly available data on violent crime and some built environment measures, and calculated point estimates.

The following comes from <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/20660/detail>.

This file contains an array of county characteristics by which researchers can investigate contextual influences at the county level. Included are population size and the components of population change during 2000-2005 and a wide range of characteristics on or about 2005: (1) population by age, sex, race, and Hispanic origin, (2) labor force size and unemployment, (3) personal income, (4) earnings and employment by industry, (5) land surface form typography, (6) climate, (7) government revenue and expenditures, (8) crimes reported to police, (9) presidential election results (10) housing authorized by building permits, (11) Medicare enrollment, and (12) health profession shortage areas.

Subject Terms: age, arson, assault, auto theft, birth rates, burglary, climate, counties, crime, demographic characteristics, disabled persons, economic conditions, election returns, employee benefits, employment, gender, geography, government expenditures, government revenues, group homes, Hispanic or Latino origins, housing, housing construction, income, labor force, larceny, manufacturing industry, Medicare, migration, mortality rates, murder, natural environment, occupations, older adults, pensions, physician availability, poverty, public assistance programs, race, rape, retail trade, robbery, taxes, unemployment, wages and salaries, weather data, workers

Additional Descriptive Statistics

Table 5: Sprawl, density and health measures by state. Data is sorted on sprawl. Note: these are averages by state for MSAs—data are not weighted by number or size of MSAs.

State	sprawl	population/(land area*10,000)	mental-un-health days	physical-un-health days	years lost	% low birth-weight
Mississippi	0.80	0.01	4.13	4.05	109.56	11.00
Kansas	0.84	0.03	2.78	3.02	72.17	7.10
North Dakota	0.85	0.00	2.47	2.73	54.55	6.67
Georgia	0.85	0.04	3.51	3.84	86.43	8.98
North Carolina	0.85	0.03	3.27	3.71	84.00	8.99
Vermont	0.86	0.01	2.83	2.93	56.13	7.06
Virginia	0.87	0.05	3.19	3.26	70.61	7.87
Tennessee	0.87	0.03	3.32	3.99	91.96	8.77
Alabama	0.88	0.02	4.16	4.40	101.62	9.67
South Carolina	0.88	0.02	3.56	3.67	94.25	9.84
Iowa	0.88	0.01	2.81	2.89	56.87	6.62
Missouri	0.88	0.03	3.44	3.57	77.76	7.05
Arkansas	0.88	0.01	3.82	3.92	97.53	8.88
Maine	0.88	0.02	3.60	3.53	65.57	6.50
Indiana	0.89	0.03	3.48	3.56	74.40	7.50
Michigan	0.89	0.05	3.69	3.43	68.73	7.61
Minnesota	0.90	0.04	2.84	3.27	51.84	6.36
Oklahoma	0.90	0.02	3.90	4.05	89.52	7.68
Ohio	0.91	0.05	3.89	3.64	71.97	7.91
Wisconsin	0.91	0.04	2.96	3.04	57.09	6.23
Kentucky	0.92	0.03	4.13	4.19	80.06	8.53
New Mexico	0.92	0.01	3.41	3.69	76.90	7.84
Nebraska	0.92	0.03	2.52	2.90	54.97	6.93
New Hampshire	0.93	0.04	3.37	3.31	54.66	6.68
Arizona	0.93	0.01	3.29	3.51	76.26	7.10
Idaho	0.93	0.01	3.30	3.52	67.38	6.58
South Dakota	0.94	0.01	2.81	2.88	65.12	7.10
Montana	0.95	0.00	3.03	3.20	67.19	7.10
Utah	0.95	0.03	3.04	3.26	60.44	6.82
Texas	0.96	0.03	3.34	3.69	77.78	7.84
Illinois	0.96	0.05	3.09	3.23	66.90	7.54
Louisiana	0.97	0.03	3.09	3.62	105.45	10.48
Wyoming	0.97	0.00	3.12	3.14	80.06	8.30
Connecticut	0.97	0.08	3.14	2.96	55.56	7.38
Maryland	0.98	0.10	3.50	3.25	74.30	8.49
West Virginia	0.99	0.02	4.40	4.65	87.35	8.69
Oregon	0.99	0.03	3.29	3.58	60.37	5.61
Washington	1.00	0.02	3.31	3.65	62.30	5.91
Delaware	1.01	0.07	3.53	3.47	79.83	9.47
Florida	1.03	0.05	3.63	3.67	81.18	8.22
Colorado	1.03	0.02	2.94	3.03	61.25	8.90
Pennsylvania	1.03	0.09	3.64	3.54	71.14	7.66
California	1.09	0.10	3.58	3.72	64.90	6.24
Massachusetts	1.09	0.17	3.42	3.38	58.69	7.42
Nevada	1.11	0.02	3.63	3.74	82.36	7.91
Rhode Island	1.13	0.11	3.32	3.29	55.99	6.98
New Jersey	1.15	0.21	3.34	3.42	65.87	7.83
New York	1.16	0.50	3.28	3.47	60.57	7.39
Hawaii	1.27	0.15	2.50	2.57	59.08	8.24

Histograms of variables

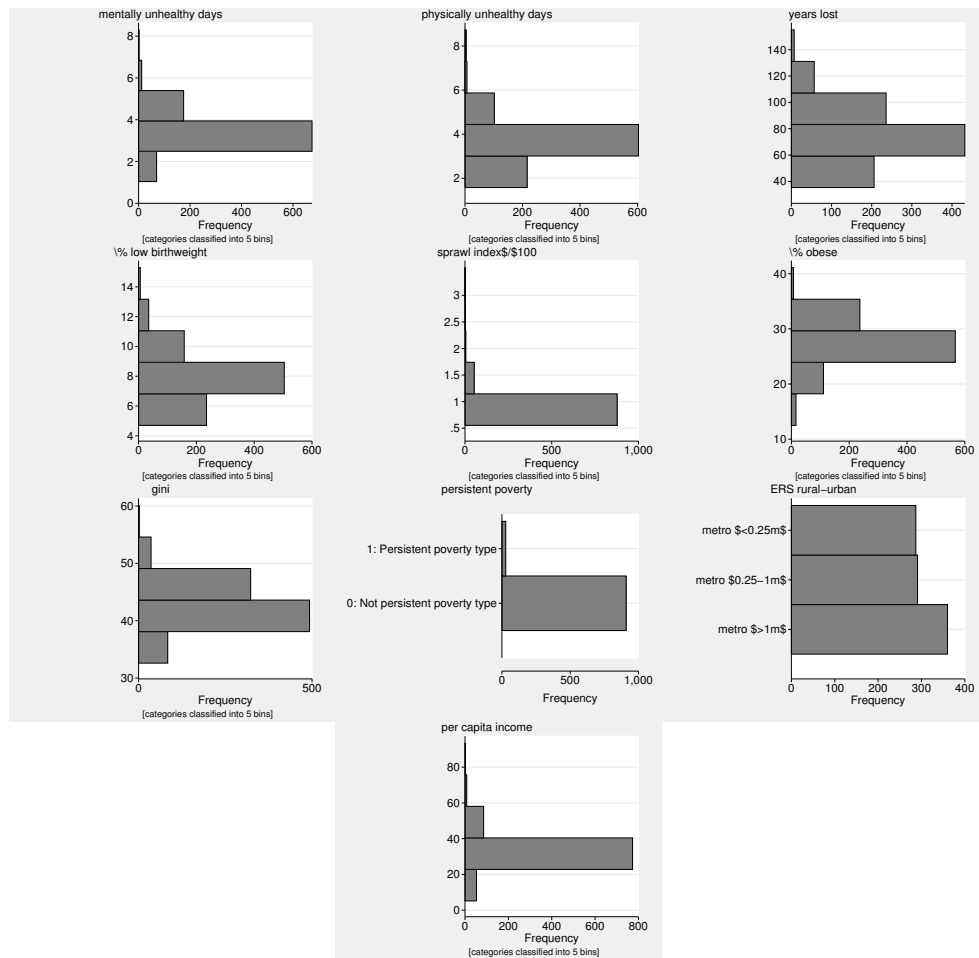


Figure 1: Variables' distribution.

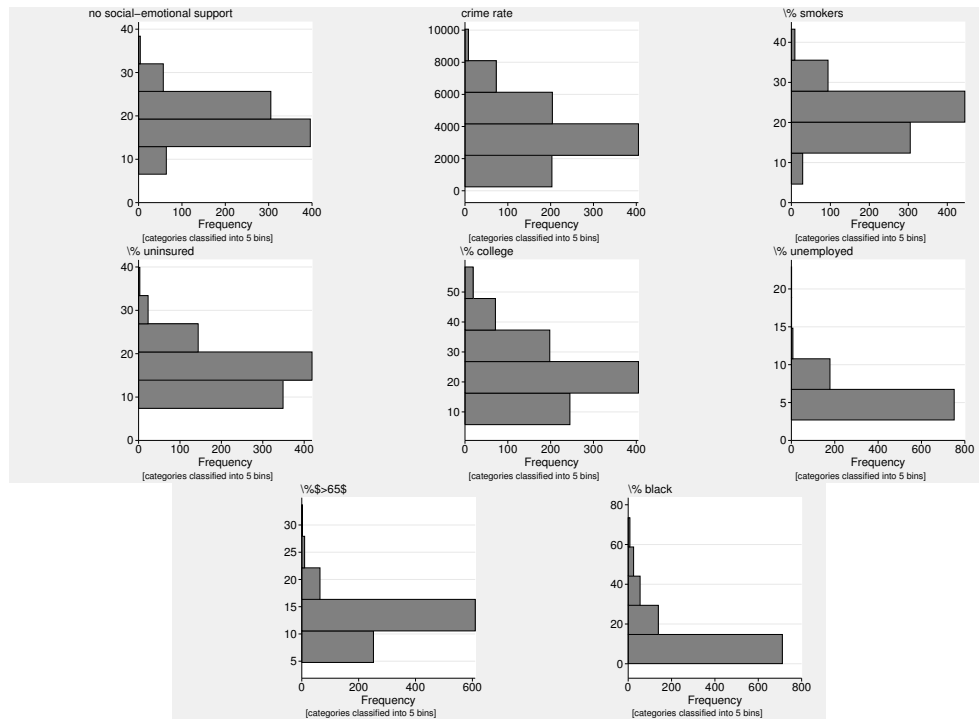


Figure 2: Variables' distribution.

Table 6: Health outcomes in 10 most sprawlig (first panel) and unequal (second panel) counties.

county name	sprawl index/100	population/area*10,000	% obese	mentally un-healthy days	physically un-healthy days	years lost	% low birth-weight	violent crime rate	no social-emotional support
Jackson County, Kansas	1	0	28	2	4	74	7		16.94
Bedford County and City, Virginia	1	0	27	4	4	65	8	94	18.03
Geauga County, Ohio	1	0	27	3	3	49	6		14.02
Chester County, Tennessee	1	0	31	3	4	78	9	341	12.75
Greene County, North Carolina	1	0	34	2	3	99	12		17.97
Morrow County, Ohio	1	0	30	6	9	78	8		
Clinton County, Michigan	1	0	28	3	4	49	7	111	14.91
Fulton County, Ohio	1	0	30	3	3	73	6		
Franklin County, Kansas	1	0	30	3	3	71	7		14.44
Saunders County, Nebraska	1	0	28	3	3	58	7		14.93
Baltimore city, Maryland	2	1	32	4	4	153	13	1692	28.25
Richmond County, New York	2	1	24	3	4	60	8	638	21.73
Suffolk County, Massachusetts	2	1	21	3	3	68	9	1185	25.13
Philadelphia County, Pennsylvania	2	1	29	4	4	121	11	1505	29.05
Hudson County, New Jersey	2	1	23	3	4	66	8	683	31.05
San Francisco County, California	2	2	16	3	3	62	7	840	25
Queens County, New York	2	2	23	3	3	52	8	637	32.01
Bronx County, New York	3	3	25	4	4	84	10	637	32.7
Kings County, New York	3	3	25	4	4	70	9	636	30.12
New York County, New York	4	7	15	4	4	55	8	639	26.32

What is best and worse in cities and countryside

The following comes from

<http://today.yougov.com/news/2012/07/05/suburban-dream-suburbs-are-most-popular-place-live/>:

The best thing about living in the countryside is...

- "It's near a national forest and the ocean"

- “The environment and access to outdoor activities”
- “It’s private and quiet”
- “No close neighbours and my kids have a large yard to play in”
- “Being able to ride a bicycle and not have to worry about cars”

The best thing about living in the city is...

- “Just about everything I need is within half a mile, 10 minute walk, or less”
- “Centrally located between work and family”
- “Overall diversity in people and geography”
- “Number of choices for shopping and leisure activities”
- “I have the school, train, park, library, grocery stores, expressway all close to my home”

The worst thing about living in the countryside is...

- “It’s miles to the nearest big city. If you need something you can’t just run and grab it”
- “Too much yard work”
- “Have to have a dependable vehicle”
- “Modern conveniences like high speed internet not available where I live”
- “Too small – I’m not from the country and treated like an outsider”

The worst thing about living in the city is...

- “Becoming more crowded and congested, especially automobile and truck traffic”
- “The expense”
- “Crime and too much traffic”
- “Living next to an airport can get noisy sometimes”
- “Quite a few people are down and out”

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