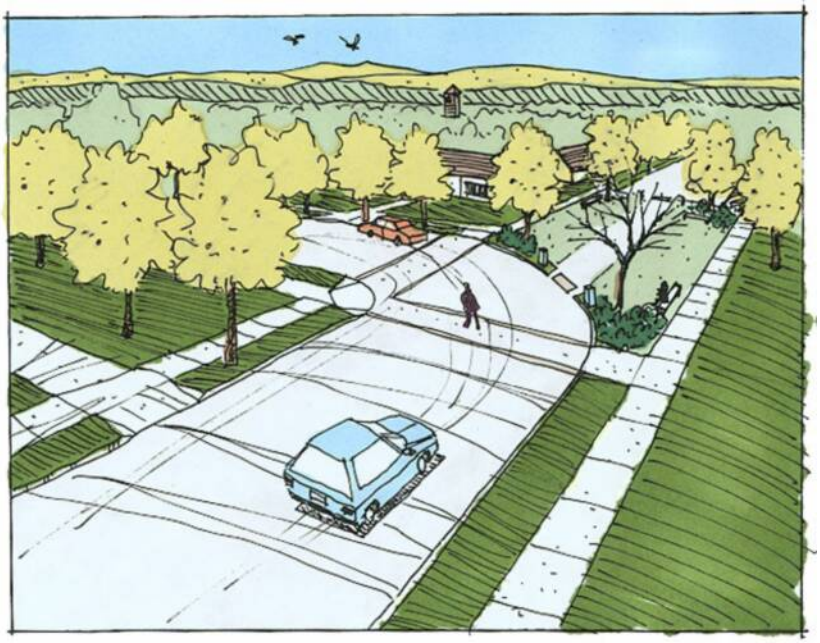
Mapping the Intersection of Physical Activity & the Built Environment

A Baseline Profile of Indianapolis



Drawing courtesy of City of San Jose, prepared by Paul Tuttle of Moore Iacofano Goltsman

A Working Document
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The Project Coordinator and author is Tess Weathers, MPH. Ms. Weathers is a Research Associate with the Indiana University School of Medicine - Department of Public Health, also located in Indianapolis, Indiana.

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We thank the following colleagues for contributing their time and expertise to peer-review this document:

Jay Arekere, PhD, MPH Associate Professor Indiana University School of Medicine Department of Public Health	Laurence Brown Transportation Planner Indiana Department of Transportation
Robert T. Glenn Senior Planner City of Indianapolis Department of Metropolitan Development	Kim Irwin, MPH, CHES Health Promotions Manager American Lung Association of Indiana
Elizabeth L. Hamilton-Byrd, MD Medical Epidemiologist Indiana State Department of Health Division of Chronic Disease and Environmental Epidemiology	

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1. The Problem & Purpose

"For generations, the American dream has been luring us out to the suburbs – to a gadget-packed house on a big, roomy lot with a couple of late-model cars in the drive. Safe from the dirt, din, and crime of big cities, the suburbs would be good for us, we thought.

And maybe they were, for a while. Then we noticed that highways had clogged with cars as we toiled back and forth in a haze of gray smog. Even worse, an epidemic slowly crept across the suburbs – an epidemic of obesity and its deadly accomplices, diabetes and cardiovascular disease. …

The cause? Fast food and too much television are the usual suspects. ***But increasingly, researchers in planning and public health have begun to implicate a less obvious culprit --- what they called the 'built environment,' much of which was built around cars. …When communities organize themselves around the automobile as the primary mode of transportation, they effectively engineer physical activity right out of the equation."***[1]

Neil Caudle for Endeavors, UNC-Chapel Hill, Winter 2004
(Interview with Richard Killingsworth of Active Living by Design, emphasis added)

One-fourth of all trips made by Americans today are for distances under one mile. Of these, three-fourths are made by car.[2] Clearly, most of us do far less walking or biking as a part of our daily lives than our parents or grandparents did. In 1969, 90% of those living within a mile of school walked or biked to school and 42% of all children, at any distance from school, walked or biked to school. [3, 4] Thirty years later, only 16% of school children use these forms of active transport to school.

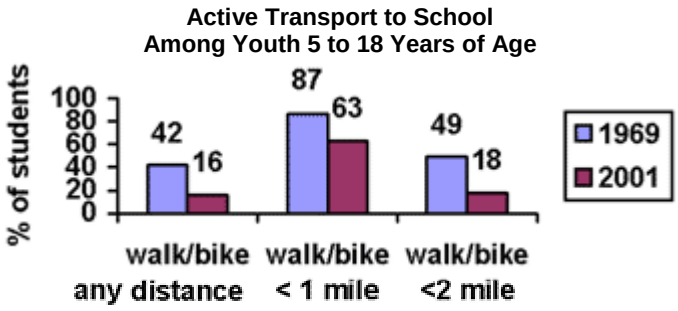
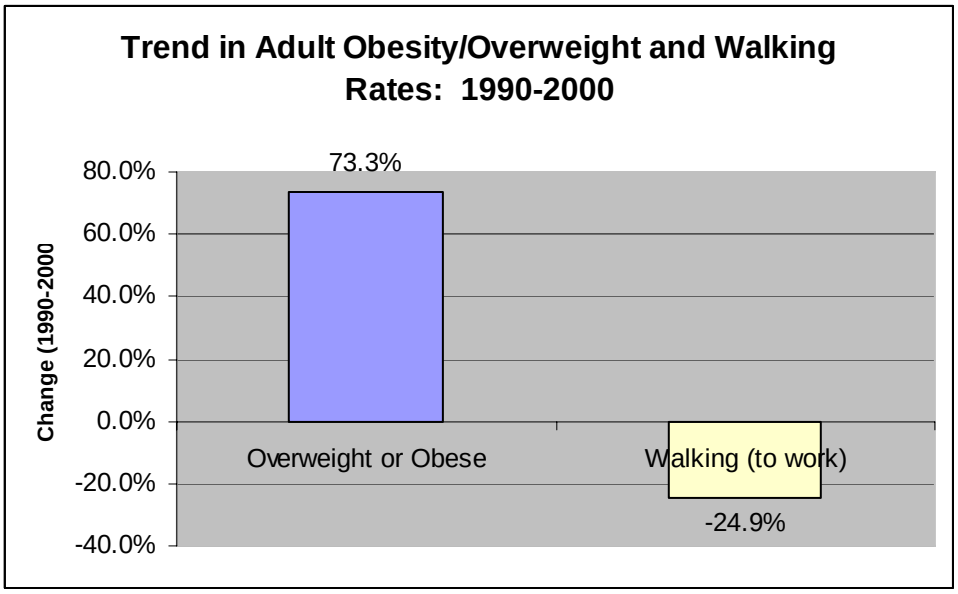


Figure from Centers for Disease Control, KidsWalk-to-School [3]. Data Source: 1969 Nationwide Personal Transportation Survey (USDOT, 1972) and 2001 National Household Travel Survey (analyzed by S. Ham DNPA, Spring 2005)

Similarly, in just one decade (1990-2000), the proportion of adults who walked to work dropped by 25%. In that same time period, the number of obese or overweight adults increased more than 70%. [5]



Adapted from Mean Streets 2004[5]

There is a growing movement to reverse this trend and promote "active living," [2] that is to increase physical activity by consciously designing our communities to promote physical activity as a part of our daily routines. This movement has fostered the development of new, "multi-disciplinary partnerships that include representatives from public health, city planning, transportation, architecture and other fields."[2] The recommended minimum physical activity level for adults is 30 minutes of moderate physical activity at least five days a week,[6] a goal that can easily be met through walking to school, to work, or for errands. However, barriers in the built environment often make this difficult to achieve.

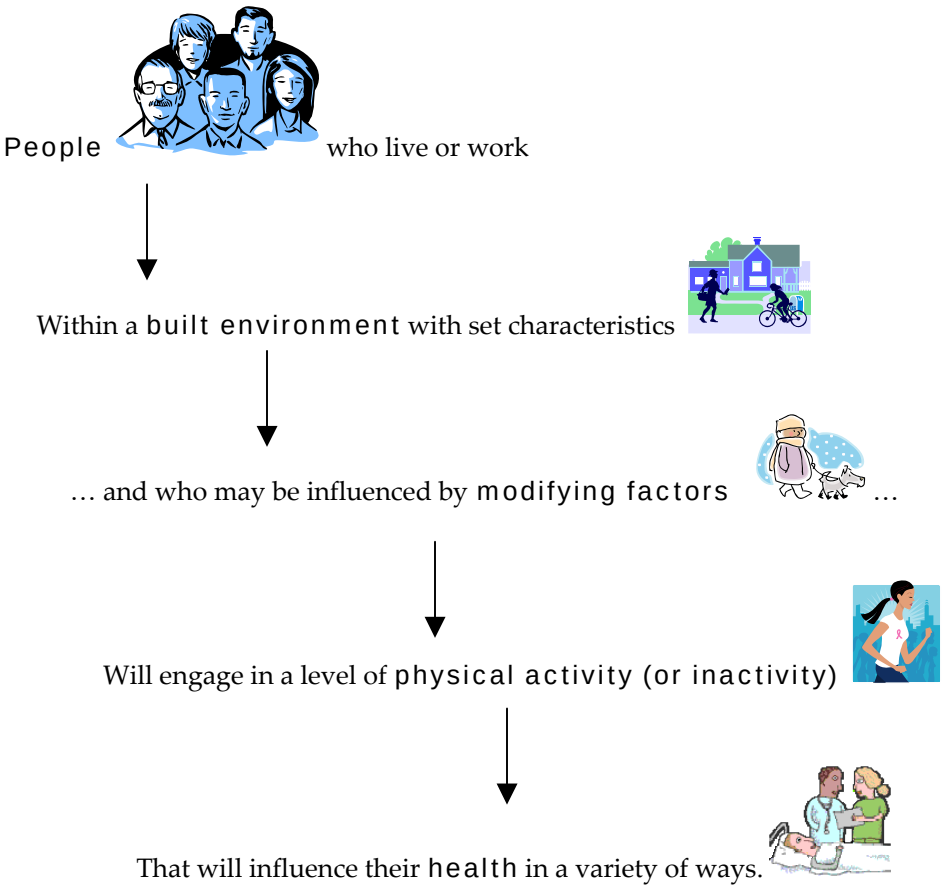
So, what is "the built environment," and what features of the built environment affect our likelihood of being physically active? The built environment "encompass(es) aspects of a person's surroundings which are human-made or modified, as compared with naturally occurring aspects of the environment."[7] Key components of the built environment include urban design, land use, and the transportation system, including consideration of "patterns of human activity within the physical environment."[8] Community design features which promote physical activity are described by researchers who characterize *activity-friendly* communities as follows:

> "*Such communities are relatively dense; they contain various kinds of places including homes, stores, restaurants, and recreational destinations, and they are well supplied with sidewalks, paths, and other settings for activity. They offer appealing scenery that attracts people out of their homes, into parks, and onto paths. Other people can also be seen getting physical activity, and (perhaps related) crime is uncommon. Some studies also suggest additional features, such as absence of nearby heavy traffic, absence of busy streets that impede access to parks and paths, and good lighting. Together, these features paint a picture of communities very different than the usual sprawling suburbs*."[9] (Frumkin, et al, excerpt pages 104-105)

Often our homes and worksites are places that are not connected, either by proximity or feasible means of passage, to any destination we would want to visit on foot or bike. Common barriers in the built environment include absent or disconnected sidewalks and crosswalks, no direct through streets or walkways, multi-lane streets without medians, lack of shade and visual appeal, and isolated destinations (schools, parks, grocery stores, office buildings). [10]

Of course, other factors influence one's likelihood of walking or biking aside from the built environment, and some will differentially affect various groups, such as women versus men, or more vulnerable citizens like children and seniors. External factors can also modify the likelihood a person will be active, such as inclement weather or perception of crime. These intrinsic and extrinsic factors will modify the level of activity among people in any community setting. The basic logic of this relationship between people, the built environment, modifying factors, and their consequent level of physical activity and health is demonstrated in the following schematic.

How does the built environment impact physical activity?



As we map out the intersection of the built environment and physical activity, measures of all these dimensions belong on the map, even though it is at *the level of the built environment* that we seek to introduce change and influence this physical activity and health pathway.

Although interventions within the built environment to increase physical activity are a relatively new field of interest and scientific inquiry, sufficient evidence has accumulated to support the effectiveness of this approach. "Environmental and policy approaches (to promote) physical activity… complement … more frequently used individual behavior … strategies because *they can benefit all people exposed to the environment rather than focusing on changing the behavior of one person at a time* (emphasis added)." [11]

The main purposes of this document are to:

- Raise awareness and knowledge throughout the Indianapolis area about the relationship between the built environment and our ability to be physically active in our daily routines;
- Serve as a resource to members of the community about the current state of the science on this topic;
- Profile, *in very broad strokes*, the Indianapolis-area's built environment and physical activity features, by assembling key available indicators in one document;
- Aid in prioritization and planning by placing Indianapolis in context with peer cities;
- Provide broad measures from which future progress by the city can collectively be gauged and serve as a community average against which specific neighborhoods or developments may be assessed;
- Foster multi-disciplinary collaborations toward improvements to the built environment that promote physical activity;
- Identify data needs and methodological tools for future planning.

2. The Evidence

The influences of the built environment are among many other influences that have contributed to declining physical activity levels and rising rates of obesity. There is no *one* solution to this pervasive problem. To the contrary, "The most effective … strategies… (take) an integrated approach that incorporates many sectors … and adopts multiple level strategies implemented concurrently. It offers the greatest potential for having an impact on the health of the population as a whole, addressing health inequalities, and sustaining these changes over the long term."[12] In this context, we summarize the scientific evidence regarding the effectiveness of various built-environment approaches to increasing physical activity in communities.

Physical activity confers many health benefits, whether or not a person is obese, overweight, or normal weight. A 2003 Evidence Briefing prepared for Britain's National Health Service cites research that shows that "*people who are fit and fat are actually less likely to die than people who have a healthy weight but are not fit or active.*"[13] Regular physical activity is associated with a healthier, longer life.

Among the known benefits of regular physical activity are: [14]

- reduced risk for heart attack, colon cancer, diabetes, and high blood pressure and possibly lower risk for stroke;
- better weight control;
- healthier bones, muscles, and joints;
- reduced falls among older adults;
- relief of arthritis pain;
- reduced symptoms of anxiety and depression;
- lower rates of hospitalizations, physician visits, and medication use;
- lower rates of mobility limitations and improved physical function;
- therapeutic benefits for people with heart disease, high blood pressure, high cholesterol, osteoporosis, arthritis, lung disease, and other chronic diseases.

"Despite all the benefits of physical activity, most Americans are sedentary: only 25% of adults and 27% of high-school students get moderate exercise regularly. In addition, lack of physical activity has contributed to a sharp rise in childhood obesity over the last 20 years. … Since regular physical activity helps people stay healthier, the question is: what strategies work best in helping people to become more physically active? (emphasis added) "[15] This is exactly the question that the U.S.-based Task Force for Community Preventive Services addressed.

The Task Force is a non-federal, independent decision-making body that "serves to filter the scientific literature on specific health problems" in order to "summarize what is known about the effectiveness, economic efficiency, and feasibility of interventions to promote community health."[16] Their recommendations stem from rigorous systematic reviews of the scientific literature. In assessing strategies to promote physical activity, the Task Force's findings underscore the need for public health practitioners, planners, and other community decision makers to consider the built environment and how it can be designed to encourage physical activity. What follows is a summary of their findings.

Task Force for Community Preventive Services Review of Environmental and Policy Approaches to Increase Physical Activity
Street-scale urban design and land use policies and practices [11, 17] • These interventions involve street-scale urban design and land use policies that support physical activity in small geographic areas, generally limited to a few blocks. • These interventions involve the efforts of urban planners, architects, engineers, developers, and public health professionals. • Policy instruments employed include building codes, roadway design standards, and environmental changes. • Design components include improved street lighting, infrastructure projects to increase safety of street crossing, use of traffic calming approaches (e.g. speed humps, traffic circles), and enhancing street landscaping. • Overall, the median improvement in some aspect of physical activity (e.g., number of walkers or percent active individuals) was 35%. • The Task Force recommends implementing such efforts on the basis of *sufficient* evidence.
Community-scale urban design and land use policies [11, 18] • These interventions involve community-scale urban design and land use policies that support physical activity in urban areas of several square miles or more. • The interventions involve the efforts of urban planners, architects, engineers, developers, and public health professionals. • Policy instruments employed include zoning regulations, building codes, other governmental policies, and builders' practices. • Design elements include the proximity of residential areas to stores, jobs, schools, and recreation areas; the continuity and connectivity of sidewalks and streets; and the aesthetic quality and safety aspects of the physical environment. • Overall, the median improvement in some aspect of physical activity (e.g., number of walkers or bicyclists) was 161%. • The Task Force recommends implementing such efforts on the basis of *sufficient* evidence.
Transportation and travel policies and practices [11, 19] • These interventions encourage walking and bicycling as a means of transportation by facilitating walking, bicycling, and public transportation use; increasing the safety of walking and bicycling; reducing car use; and improving air quality. • The interventions can encourage environmental change through policy and practice approaches such as changing roadway design standards, creating or enhancing bike lanes, expanding or subsidizing public transportation, providing bicycle racks on buses, and increasing parking costs. • *Because only one study of adequate quality was available*, the Task Force found insufficient evidence to determine the effectiveness of transportation and travel policies and practices in increasing physical activity levels. • The single qualifying study was effective in increasing walking in conjunction with free transit among university students at 6 months and 1 year follow-up.
Creation of or enhanced access to places for physical activity combined with informational outreach activities [20, 21] • These interventions involve the efforts of worksites, coalitions, agencies, and communities in attempts to change the local environment to create opportunities for physical activity.

- Such changes include creating walking trails, building exercise facilities, or providing access to existing nearby facilities.
- In all 10 studies reviewed, creating or enhancing access to places for physical activity was effective in getting people to exercise more; the median estimates suggest that these interventions can result in a 25% increase in the percent of persons who exercise at least 3 times a week.
- These interventions are recommended by the Task Force on the basis of *strong* evidence.

Important take-home messages are:

The most substantial improvements in physical activity levels (161%) were observed in conjunction with community-scale urban design and land use policies. Thus, policies and design elements that address proximity between homes and destinations of interest, continuity and connectivity of sidewalks and streets, and the aesthetic quality and safety aspects of the physical environment yield the highest projected return on investment.

The Task Force also found sufficient evidence that street-scale urban design and land use policies are effective in increasing physical activity. Although the degree of improvement (35%) was less than for community-scale strategies, the effect is still substantial.

While transportation and travel policies appear promising, there has been too little research completed as yet to determine their impact on physical activity.

The strongest evidence for increasing regular *exercise* (25%) was associated with the creation of or enhanced access to places for physical activity, such as walking trails or exercise facilities. (The emphasis of these interventions was placed more on leisure time activity rather than incorporation of activity into daily routines.)

3. Mapping People

Into every decision that a person makes about whether or not to be physically active, they bring a set of personal characteristics that influences that choice. From gender to age to education level, researchers have identified many personal characteristics that are associated with a varying likelihood of engaging in physical activity.[9] For example, women and seniors have a greater concern for safety in the places where they choose to be physically active.[22] These distinctions between people also vary by the intent of the activity, that is whether it is for recreation, like a walk in the park, or utilitarian reasons, such as a visit to the post office.[23]

Question:

What groups of people in Indianapolis are at risk of suffering disparities in health associated with limited physical activity?

Why is this important?

While research studies have identified many personal characteristics that appear to be associated with a higher or lower propensity for physical activity, the most vexing aspect of these distinctions is captured in the word "disparity." A study published in 2006 reportedly provided "the first empirical evidence to suggest that all major categories of physical activity–related resources are distributed inequitably, with high minority, low-educated neighborhoods at a strong disadvantage." [24]

This study, involving over 20,000 adolescents across the U.S., found that "Lower-SES (socioeconomic status) and high-minority block groups had reduced access to facilities (for physical activity), which in turn was associated with decreased PA (physical activity) and increased overweight."[24] Even among those facilities we would expect to be equitably distributed (YMCAs, parks, schools, youth organizations, and public facilities), this disparity held. As the number of facilities per block group increased, the relative odds of achieving recommended weekly activity levels also increased, while the relative odds of overweight decreased. "For every 100% increase in the proportion of individuals in a census-block group with college or greater education, there (was) … a greater than two-fold increase in facility access."[24]

This connection between people, disparate built environments, and the issue of place has been evaluated among children in Indianapolis by a team of researchers from Indiana Children's Health Services Research and The Polis Center.[25] The children studied were HMO patients during the years 1996-2000 and were age 4-18 years. Some of the conclusions of this research are inconsistent with findings of the national study discussed above. For example, this team did not find that proximity to the nearest play space was predictive of obesity. However, this study concluded that "Children living in areas of lower income are more likely to be obese than other children. For each $10,000 increase in median household income, the odds of obesity decrease by 11 percent."[25]

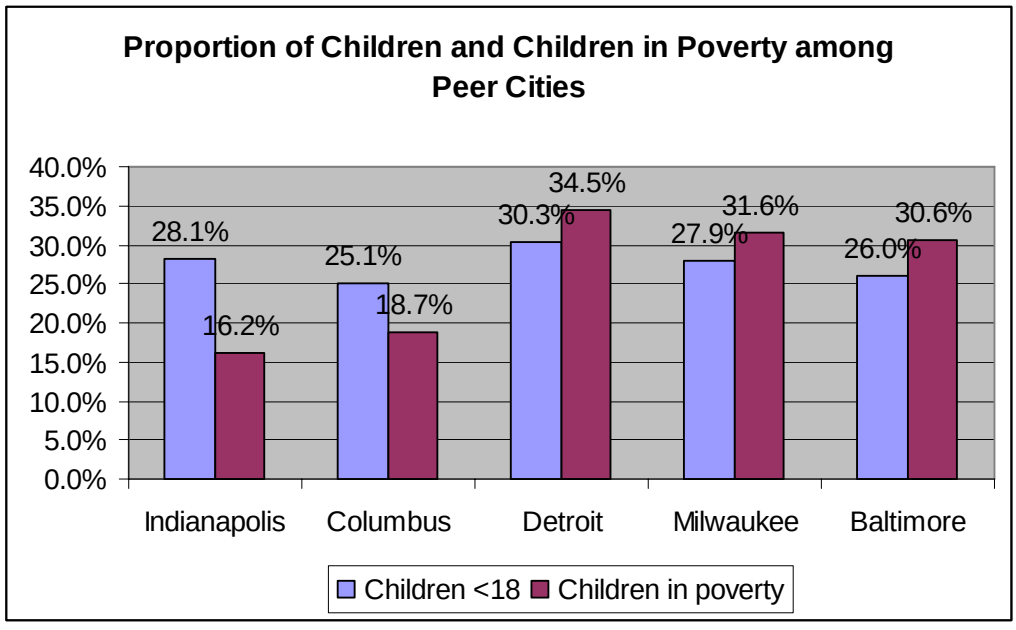
Answer:

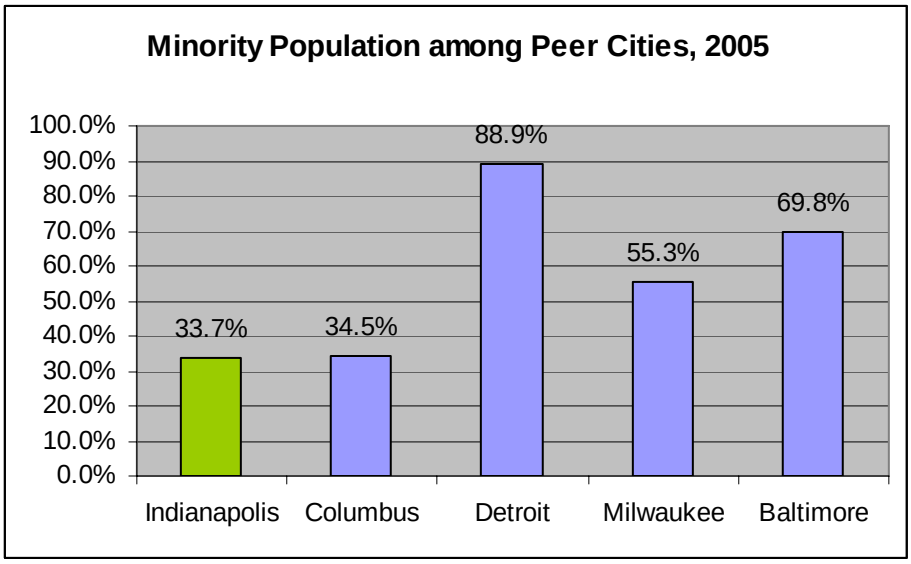
The "people" measures shown below reflect groups which have been associated with disparities in health, and in some cases specifically disparities involving physical activity, the built environment and/or obesity. Higher proportions of these groups mean greater concern about disparities in our city. In comparison to the peer cities, selected as "peers" on the basis of similar population size and weather characteristics (see Appendix for details), Indianapolis has the highest proportion of children under age 5

and under age 18. We are tied with Detroit for the 2nd highest percentage of seniors. For all poverty measures, Indianapolis ranks lowest (best) among all the peer cities. Similarly, Indianapolis has a lower percentage of adults without high school degrees than all cities but Columbus, and Indianapolis has a lower minority racial proportion than any of the peer cities. That said, these vulnerable groups still account for thousands of people in our city, and interventions to improve daily physical activity through the built environment must carefully consider these groups. Research among children of Indianapolis has shown that lower income and childhood obesity often appear to share an address in our city. With these concerns in mind, "Intervention strategies must be tailored to the socio-demographic profile of target communities."[26]

"People" Measures	Indianapolis	Columbus	Detroit	Milwaukee	Baltimore
Children, under age 18 (2004)	28.1%	25.1%	30.3%	27.9%	26.0%
Children, under age 5 (2004)	8.7%	8.2%	7.5%	8.3%	7.5%
Seniors, age 65 and over (2004)	10.4%	8.6%	10.4%	9.8%	12.2%
Individuals below poverty (2004)	13.1%	16.7%	33.6%	26.0%	23.9%
Children (< 18 years) below poverty (1999)	16.2%	18.7%	34.5%	31.6%	30.6%
Families below poverty (2004)	11.4%	13.3%	29.1%	21.8%	19.3%
Adults without high school degree (2004)	15.8%	12.9%	26.8%	21.4%	26.1%
Minority Racial Percentage, non-white (2005)	33.7%	34.5%	88.9%	55.3%	69.8%

Source: Urban Environment Report[27]




Minority Population among Peer Cities, 2005
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
33.7%
34.5%
88.9%
55.3%
69.8%
Indianapolis
Columbus
Detroit
Milwaukee
Baltimore

4. Mapping the Built Environment

The built environment "encompass(es) aspects of a person's surroundings which are human-made or modified, as compared with naturally occurring aspects of the environment."[7] The built environment includes the buildings where we live, work, learn and shop. It includes all the streets, highways, sidewalks, or bike lanes that connect us from place to place, as well as all the lights, signs, and painted lines. Earlier we described the qualities of "activity-friendly" communities. Studies have shown that living in activity-friendly communities could: [28]

- Generate 2 more walk/bike trips per person per week;
- Prevent up to 1.7 pounds of weight gain per person per year;
- Increase walking and cycling for transport;
- Increase the total minutes of physical activity by 40%;
- Decrease the amount of time spent in a car and thereby decrease a person's likelihood of obesity;
- Increase life expectancy by 4 years.

The features of a community's built environment which broadly impact physical activity levels include density; connectivity; land use mixture; trails, sidewalks, and bike lanes; parks and other recreational facilities; and neighborhood aesthetics.[29] Obviously, these features will vary within a city. In Indianapolis, some neighborhoods would score quite well on measures of activity-friendliness, while some neighborhoods would not. However, on the whole, what measures of the Indianapolis area provide some indication of how we are doing? Are we providing built environments that encourage physical activity? In this section we address the following related questions.

- Does Indianapolis suffer from "sprawl?"
- How do people in Indianapolis get to work?
- How much do Indianapolis-area residents use their car(s)?
- What proportion of trips, for either recreation or utilitarian purposes, do Indianapolis-area residents make by walking or biking?
- Does the built environment in the Indianapolis area promote walking and biking?
- Are homes and workplaces in the Indianapolis area *connected* to destinations where residents would have reason to walk or bike?
- Does the Indianapolis area provide ready access to places for physical activity, including walking trails and public parks?
- How do public policies in Indianapolis, such as ordinances and zoning laws, measure up in terms of promoting built environments that encourage physical activity?

Question:

Does Indianapolis suffer from "sprawl?" How close together are the places where we live, and how many residents do we accommodate in our city area?

Why is this important?

Sprawl has been defined as "dispersed, auto-dependent development outside of compact urban and village centers, along highways, and in rural countryside," but more broadly sprawl refers "to the way land is used, the way people travel from place to place, and even the way a place 'feels'." [9]

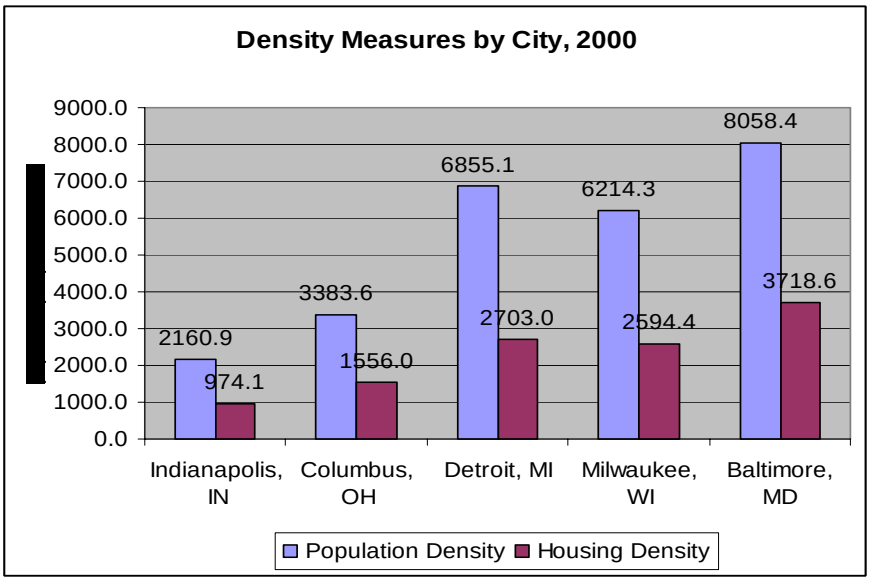
- In a study by Ewing and colleagues, "Residents of sprawling counties were likely to walk less …, weigh more, and have greater prevalence of hypertension than residents of compact counties. "[30]
- Walking trips tend to substitute for automobile trips in dense urban neighborhoods.[2]
- Studies have shown that the closer people live to destinations, like workplaces, stores, restaurants, libraries, schools, etc., the more likely they are to walk to these destinations.[31] With urban sprawl, our homes have generally become farther away from such destinations of interest.
- Higher residential density is "positively associated with walking sufficiently to meet health recommendations."[32] Neighborhoods that mix single-family homes with apartment buildings are one means of achieving the recommended density levels for walkability, which in this study, exceeded 20 units per acre.
- Doubling residential density can lessen family driving by 25-30%.[33, 34]

Answer:

The residents and homes in Indianapolis are more spread out than in all the peer cities. In fact, Indianapolis ranked in the lowest third of the 72 cities included in the Urban Environment Report for population and housing density.[27] While density is only one aspect of sprawl, our population and housing density reflects a high degree of sprawl in our city.

	Population Density - 2000 (people per square mile of land area)	Ranking*	Housing Density – 2000 (units per square mile of land area)	Ranking*
Indianapolis, IN	2160.9	56th	974.1	53rd
Columbus, OH	3383.6	33rd	1556.0	28th
Detroit, MI	6855.1	16th	2703.0	19th
Milwaukee, WI	6214.3	19th	2594.4	20th
Baltimore, MD	8058.4	12th	3718.6	9th

*1=Best (most dense), 72= Worst (least dense)
Source: U.S. Census 2000; Urban Environment Report



Question:

How do residents of Indianapolis get to work?

Why is this important?

- Walking or biking to work helps people meet minimum requirements for physical activity. Health benefits of physical activity include a reduced risk of premature mortality and reduced risks of cardiovascular disease, colon cancers, and type 2 diabetes mellitus.[11]
- Twenty nine percent of people using public transit to get to work meet their daily requirements for physical activity by walking to and from transit stops enroute to work. [35]
- Public transportation produces 95% less carbon monoxide (CO), 90% less volatile organic compounds (VOCs), and about half as much carbon dioxide (CO2) and nitrogen oxide (NOx), per passenger mile, as private vehicles. [36]

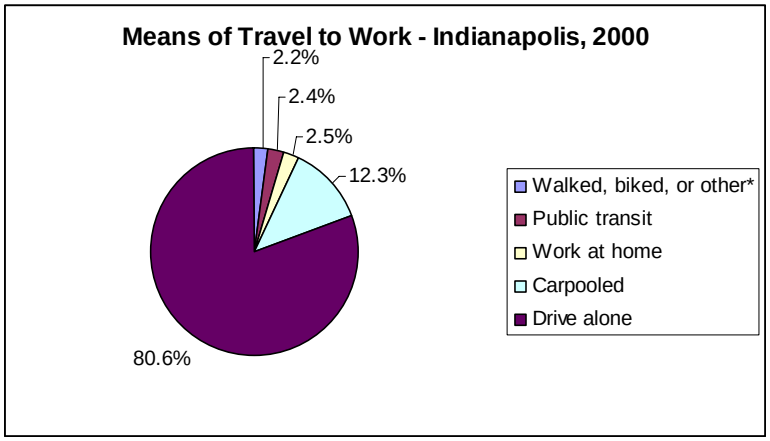
Answer:

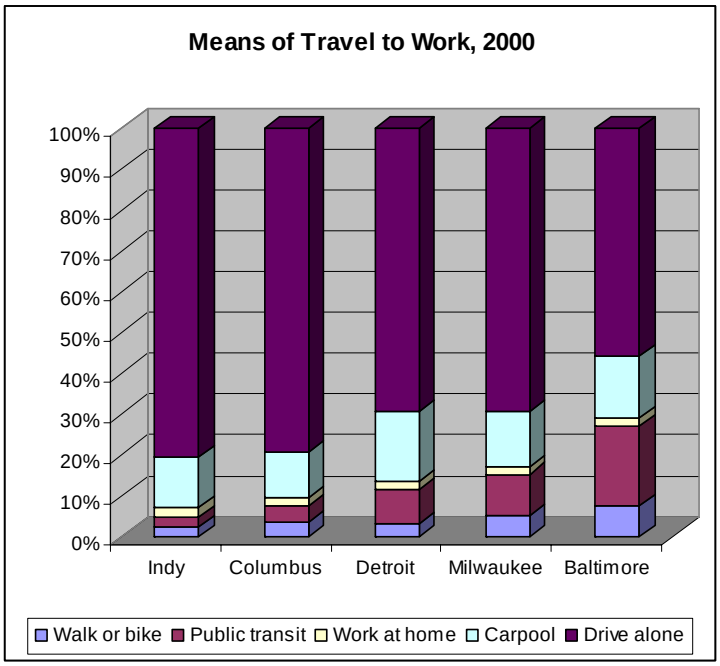
Most people in Indianapolis drive alone to work, while only 2.2% walk or bike and only 2.4% use public transit. Fewer people in Indianapolis walked or biked or used public transit than in any of the peer cities or in the U.S. on the whole.

Means of Travel to Work - 2000	Indy	Indy Rank*	Columbus	Detroit	Milwaukee	Baltimore	U.S.
Walk or bike	2.2%	56th	3.5%	3.0%	5.0%	7.4%	4.1%
Public transit	2.4%	50th	3.9%	8.7%	10.3%	19.5%	4.7%
Work at home	2.5%	45th	2.3%	1.8%	1.7%	2.3%	3.3%
Carpool	12.3%	47th	10.8%	17.1%	13.6%	15.2%	12.2%
Drive alone	80.6%	---	79.5%	69.4%	69.4%	55.6%	75.7%

*1=best, 72=worst

Source: U.S. Census 2000; Urban Environment Report





Question:

How much do Indianapolis-area residents use their car(s)?

Why is this important?

- Extensive travel in motor vehicles (many trips and/or long travel times), choosing driving over other transportation modes, and unsafe traffic mixes of motor vehicles, pedestrians, and cyclists all lead to increased risk of injury and death. [37]
- Areas with high levels of vehicle miles traveled per capita also tend to have higher accident and injury rates. [38, 39] Compact areas with lower levels of vehicle miles traveled per capita tend to have lower accident and injury rates. [40]
- Vehicle miles traveled are directly proportional to air pollution and greenhouse gas emissions.[41] Exposure to air pollution contributes to the development of cardiovascular diseases, heart disease, and stroke. [42]
- Time spent commuting in the Indianapolis region is projected to increase 66% over current conditions by 2025. Vehicle miles traveled are also projected to increase by 49%. [43]

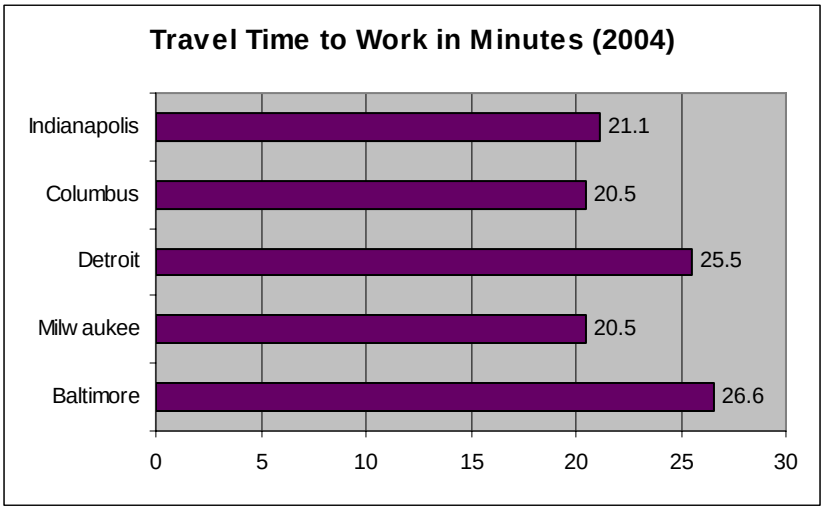
Answer:

In 2004, Indianapolis residents spent about 21 minutes driving one-way to work. This is less drive time than residents of Detroit and Baltimore, and only slightly longer drive time than Columbus and Milwaukee. Annual congestion cost (value of travel delay and excess fuel consumption) for peak travelers (those who begin a trip between 6-9 am or 4-7 pm) followed the same pattern, with Indianapolis in the middle of the other four urban areas. However, Indianapolis residents drive more each day than residents of peer cities, when daily vehicle-miles traveled (freeway plus arterial) per person are compared. With substantial increases projected by 2025 for Indianapolis-area drivers, both in time spent commuting and vehicle miles traveled, we can also expect to see less physical activity and more air pollution, disease, injury, and death.

City	Travel Time to Work, 2004 (Minutes)	Rank*
Indianapolis, IN	21.1	27th
Columbus, OH	20.5	23rd
Detroit, MI	25.5	57th
Milwaukee, WI	20.5	23rd
Baltimore, MD	26.6	61st

*1=Best, 72= Worst

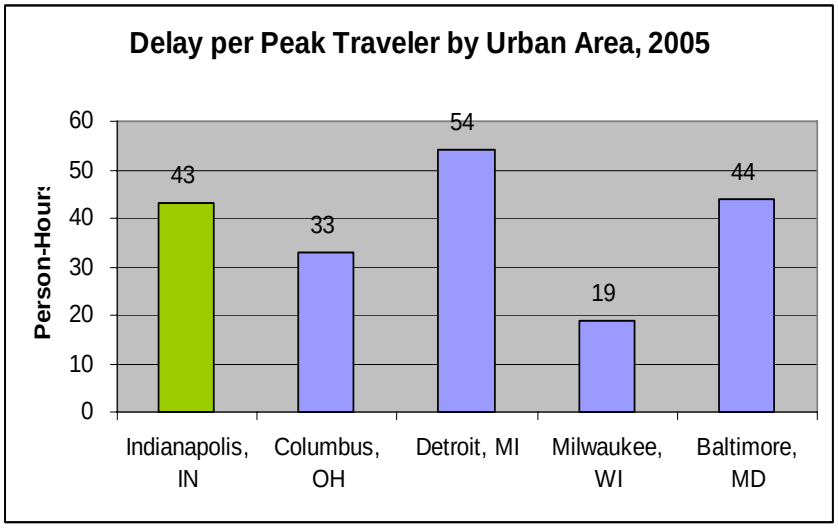
Source= U.S. Census in Urban Environment Report[27]



Urban Area*	Delay per Peak Traveler* - 2005 (person-hours)	Annual Congestion Cost* per Peak Traveler - 2005
Indianapolis, IN	43	$836
Columbus, OH	33	$620
Detroit, MI	54	$1,010
Milwaukee, WI	19	$354
Baltimore, MD	44	$881

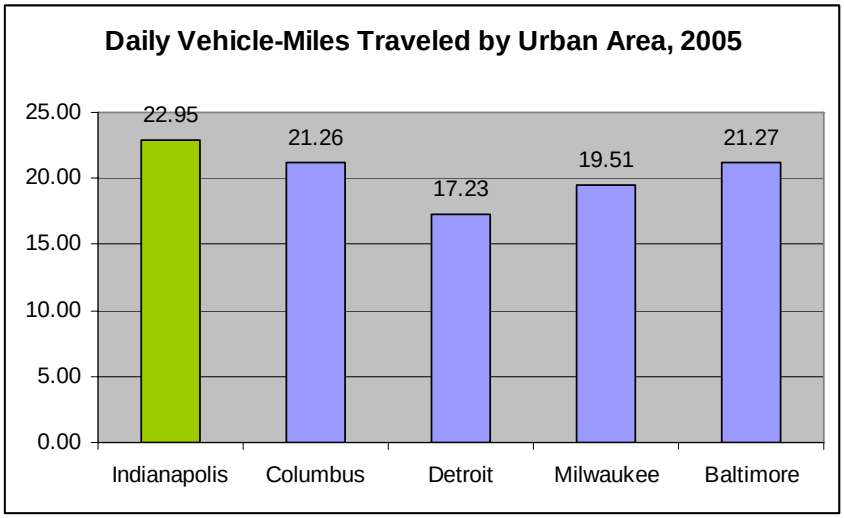
*See Appendix for definitions of urban area, peak traveler, and congestion cost

Source= 2007 Urban Mobility Report[44]



Daily Vehicle-Miles Traveled by Urban Area, 2005	Indianapolis	Columbus	Detroit	Milwaukee	Baltimore
Freeway	11,050,000	14,960,000	10,750,000	26,455,000	33,045,000
Arterial	12,700,000	10,440,000	14,400,000	18,720,000	53,200,000
Combined:	23,750,000	25,400,000	25,150,000	45,175,000	86,245,000
Urban Area Population	1,035,000	1,195,000	1,460,000	2,315,000	4,055,000
Daily VMTs per Person:	22.95	21.26	17.23	19.51	21.27

*Source= 2007 Urban Mobility Report



Question:

What proportion of trips, for either recreation or utilitarian purposes, do Indianapolis-area residents make by walking or biking?

Why is this important?:

- Walking and biking are modes of transportation that engage the individual in physical activity, known to benefit health. The levels of physical activity recommended for health may be achieved by incorporating more walking and biking into daily routines.
- "Walking is the most common form of adult physical activity. Brisk walking has been identified as protective of physical health, …,particularly if done consistently."[29]

Answer:

We do not have information to answer this question, though it central to the focus of this paper. The only piece of this question that we can answer at present is the percentage of people who walk or bike to get to work (see page 13). The National Household Travel Survey (NHTS) provides "authoritative data on travel by *all* modes of transportation for *all* travel purposes, and *all* travel distances." [45] This survey is conducted every 5-7 years. However, data are not available for the city of Indianapolis, Marion County, or the state of Indiana because geographic areas must pay for adequate sampling in the region. The opportunity is presently open for inclusion in the 2008 survey. These data would greatly enhance what we know about a variety of personal transportation issues and inform planning and policy-making.

Specifically, data from the NHTS are needed to gauge progress on the following Healthy People 2010 objectives:

No.	Objectives	1995 Baseline – U.S.	2010 U.S. Target
22-14a	Increase the proportion of trips made by walking; Trips of 1 mile or less made by adults aged ≥18 years	17%	25%
22-14b	Increase the proportion of trips made by walking; Trips to school of 1 mile or less made by children and adolescents aged 5-15 years	31%	50%
22-15a	Increase the proportion of trips made by bicycling; Trips of 5 miles or less made by adults aged ≥18 years	0.6%	2.0%
22-15b	Increase the proportion of trips made by bicycling; trips to school of 2 miles or less among children and adolescents aged 5 to 15 years	2.4%	5.0%

Source: Healthy People 2010 Database[46]

Question:

Does the built environment in the Indianapolis area promote walking and biking?

Why is this important?

- A high quality pedestrian environment can support walking both for utilitarian purposes and for pleasure. Recent studies in the United States have demonstrated that people walk on average 70 minutes longer in pedestrian-oriented communities. [47, 48]
- In a cost analysis of bike and pedestrian trails in Lincoln Nebraska, the average cost per user was $235 (2002 dollars). The estimated savings in direct medical costs from physical inactivity was

nearly three times this amount at $622 (2002 dollars). Authors conclude that "developing trails may be a cost-effective means to promote physical activity."[49]

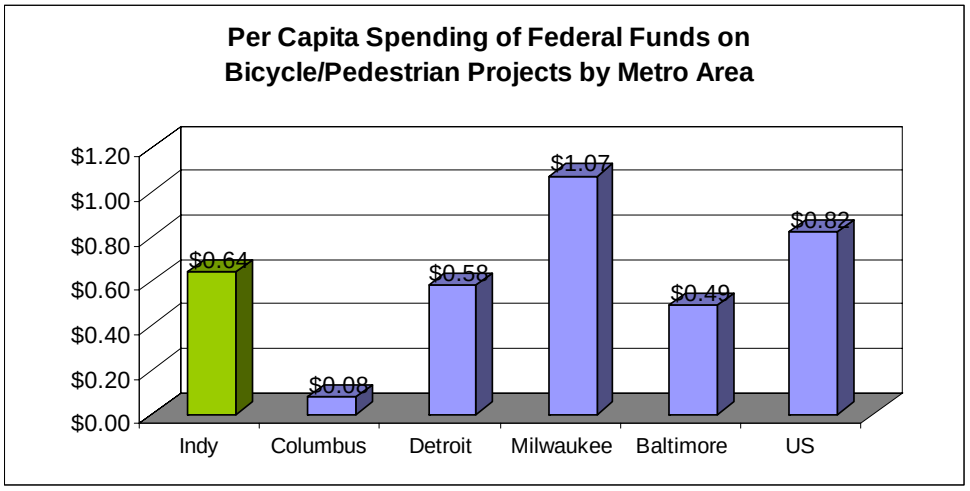
Answer:

In comparison to peer MSAs, Indianapolis spent more *federal* money on bicycle and pedestrian projects per person (1998-2003) than Columbus, Baltimore, or Detroit. Spending is a rough indicator of the quality of the built environment for walking/biking, and this ranking would seem to indicate some commitment by the Indianapolis MSA to these projects. However, road miles outnumber sidewalk miles 2 to 1, and there are more than 40 road miles for each biking lane/path mile.

The quality of the built environment for walking and biking can and does vary greatly from neighborhood to neighborhood in Indianapolis. Assessments using tools designed for this purpose, often referred to as "walkability instruments," would be most helpful to identify target areas for improvements. Several such tools have been developed. [50-53] These tools may assess *objective* measures of the built environment and/or *subjective* perceptions of the built environment, both of which contribute to decisions about walking and biking.

Metro Areas	Average Yearly Spending of Federal Funds on Bicycle/Pedestrian Projects per Capita (FY1998-FY2003)
Indianapolis, IN MSA	$0.64
Columbus, OH MSA	$0.08
Detroit-Ann Arbor-Flint, MI CMSA	$0.58
Milwaukee-Racine, WI CMSA	$1.07
Baltimore-Washington DC CMSA	$0.49
US Average	$0.82

Source= Means Streets, 2004; Surface Transportation Policy Project[5]



Marion County Surface Measures – 2007*	
Sidewalk miles	1,466
Bike path miles	65
Bike lane miles	14
Road miles	3,161
Ratio of Road-Miles to Sidewalk-Miles	2.16
Ratio of Road-Miles to Biking-Miles	40.01

Source: City of Indianapolis, Department of Public Works, 2007

* Includes bike lane mileage that is budgeted and approved for 2008. Bike lanes are on thoroughfares only. Bike paths are along the Monon Trail, White River, and similar areas.

Question:

Are homes and workplaces in the Indianapolis area *connected* to destinations where residents would have reason to walk or bike?

Saelens, et al, describe the inter-related concepts of mixed land use, proximity, connectivity, and street design in this way:

> "Factors that influence the choice to use motorized or nonmotorized transport are based primarily on two fundamental aspects of the way land is used: (a) proximity (distance) and (b) connectivity (directness of travel). … Whereas proximity considers straight-line distances between land uses, connectivity characterizes the ease of moving between origins (e.g. households) and destinations (e.g. stores and employment) within the existing street and sidewalk-pathway structure. Connectivity is high when streets are laid out in grid pattern and there are few barriers (e.g. walls, freeways) to direct travel between origins and destinations. With high connectivity, route distance is similar to straight-line distance. In addition to direct routes, grid patters offer the choice of taking different routes to the same destination. By contrast, low connectivity is found in the layout of modern suburbs and is characterized by a low density of intersections (e.g. long block size), barriers to direct travel (e.g. cul-de-sacs), and few route choices. Methods for systematically evaluating pedestrian connectivity of a given area have been developed." [29] (Excerpt from pages 81-82)

Why is this important?

- Neighborhoods with diverse land uses (mixed uses) can create proximity between residences, employment, and goods and services, reducing vehicle trips and miles traveled and increasing active transportation such as walking and biking. [41]
- Mixed land use increases the number and percentage of walking and biking trips; for trips less than one mile, mixed-use communities generate up to four times as many walking trips. [2, 54]
- A study of Los Angeles neighborhoods found that those people who owned cars and traveled farther to their grocery stores had a higher body mass index (BMI). [55]
- Moudon, et al, found that the "… presence of proximate grocery stores, restaurants, and retail facilities (was) … strongly associated with walking sufficiently to meet recommendations for health."[32] Proximate, in this study, was within 860-1445 feet (approximately ¼ mile).

- In a survey of parents of school children in 2004, parents cited distance to school (61.5%) as the top barrier to their children walking to and from school.[4] Between 1968 and 2001, the proportion of children living within one mile of school dropped from 34% to 21%, and the proportion of children living within two miles also declined from 52% to 35%. [3]
- In a study evaluating the association between obesity and various measures of the built environment, "land-use mix had the strongest association with obesity"; increases in land-use mix corresponded with reduced likelihood of obesity across gender and ethnicity.[56]

Answer:

While peer comparators are not available, the proximity measures shown below for Marion County highlight some obvious built environment concerns. Just over half of residents live within ¼ mile of public transit (local bus), less than a third of residents live within ¼ mile of a park or greenway, and less than one-fourth live within ½ mile of a supermarket. These estimates, provided by the City of Indianapolis's Department of Metropolitan Development, Division of Planning, show that about 50% of Marion County residents live within ½ mile of a public school, but this percentage may be inflated because it considers proximity among *all* residents and not just those who would need an elementary school. In contrast, the American Housing Survey of 2004 reported that less than 15% of Indianapolis metro-area households with children aged 0-13 (of school age) were located within 1 mile of a public elementary school.

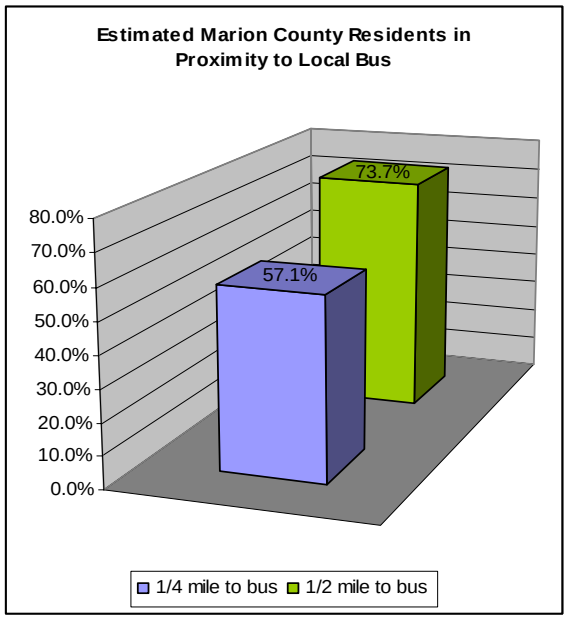
An interactive map demonstrating residential proximity to community destinations throughout Marion County (parks and greenways, bus routes, public schools, and supermarkets) was prepared by the City of Indianapolis, Department of Metropolitan Development, Division of Planning, and it will be made available at the Health by Design website (www.healthbydesignonline.org) to supplement this report. Such maps can assist in the identification of problem areas to target for built-environment interventions in the future. A single map of the parks and greenways of Marion County in proximity to residential parcels is shown below as an example.

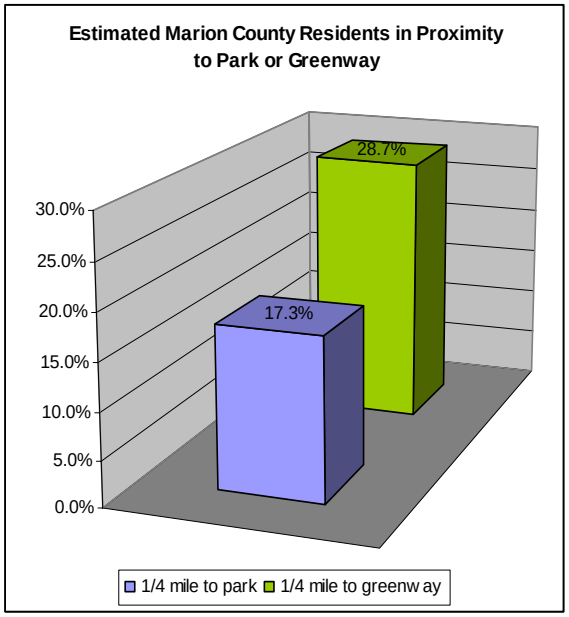
Proximity Measures, 2007*	Estimated Population*	Percentage of Marion Co. Population
1/4 Mile to Local Bus	491,567	57.1%
1/2 Mile to Local Bus	633,778	73.7%
1/4 Mile to Public Park	148,612	17.3%
1/4 Mile to Greenway***	246,514	28.7%
1/2 Mile to Public School	412,016	47.9%
1/2 Mile to Supermarket	197,636	23.0%
American Housing Survey for the Indianapolis Metropolitan Area: 2004		Percentage of MSA Households
1 Mile to Public Elementary School** (of households with children aged 0-13)	NA	14.6%

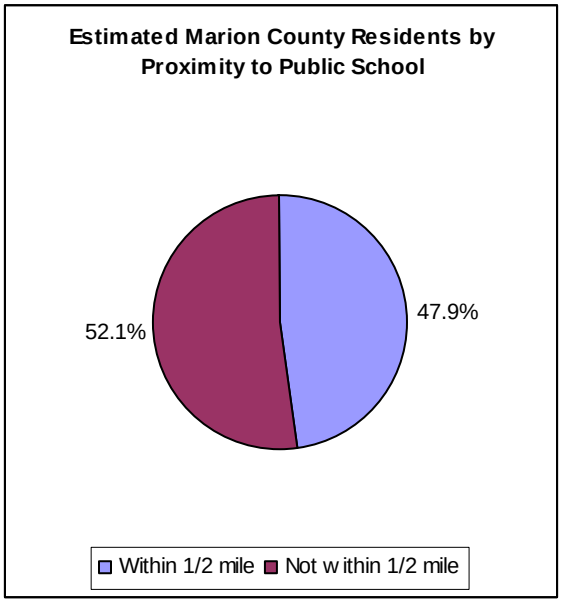
*Marion County Assessor's Counter Book (April 2007) and U.S. Census Bureau, Census 2000 Summary File 1 (SF1) 100-Percent Data, see Appendix for Methods

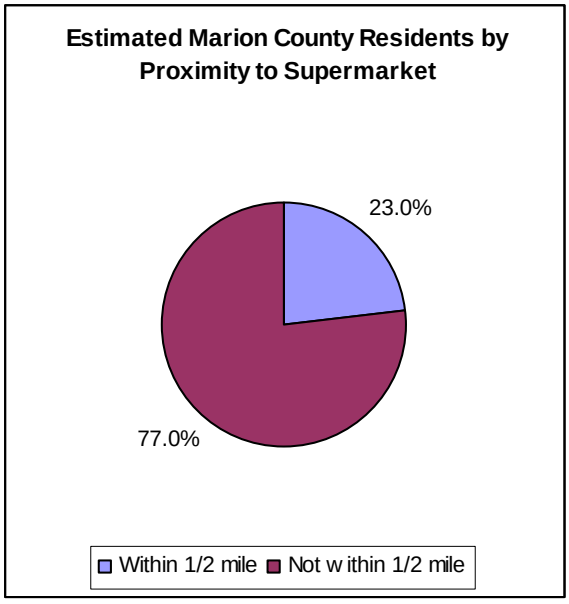
**Source: American Housing Survey, Table 2-8. Neighborhood-Occupied Units[57]

***Greenways are any linear green space, such as along creeks, rivers, etc. The Monon, Canalwalk, and the Canal Towpath are all considered greenways.



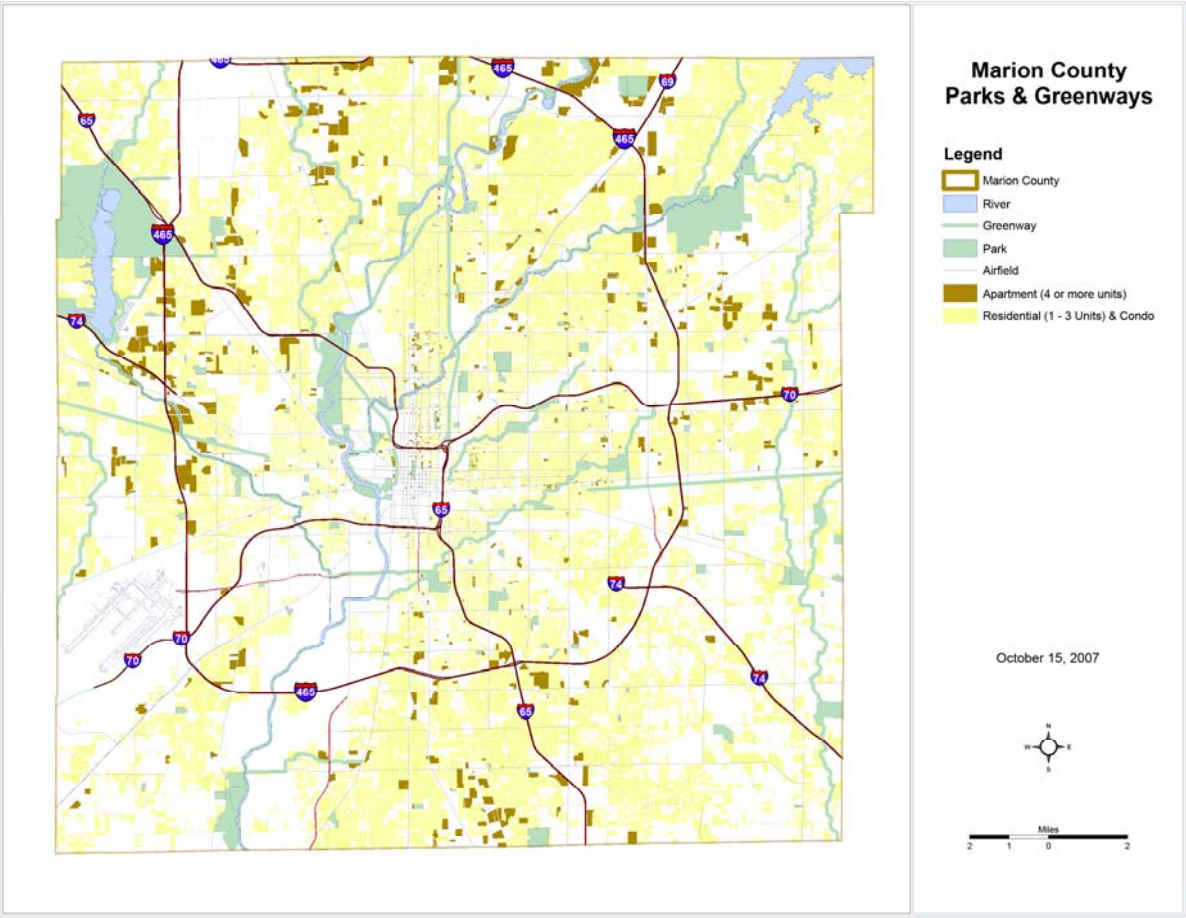






The following indicators of connectivity (not just proximity) would be useful to obtain in the future for Indianapolis:

- Proportion of residential neighborhoods that have a grid street network rather than cul-de-sac design
- Average block size
- Density of intersections
- Walkability assessments
- Proportion of new developments that mix residential, commercial, and employment uses



Question:

Does the Indianapolis area provide ready access to places for physical activity, including walking trails and public parks?

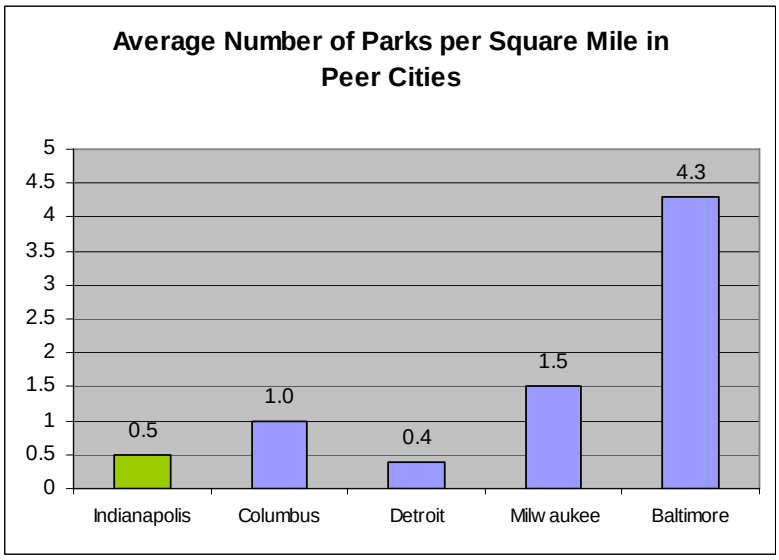
Why is this important?

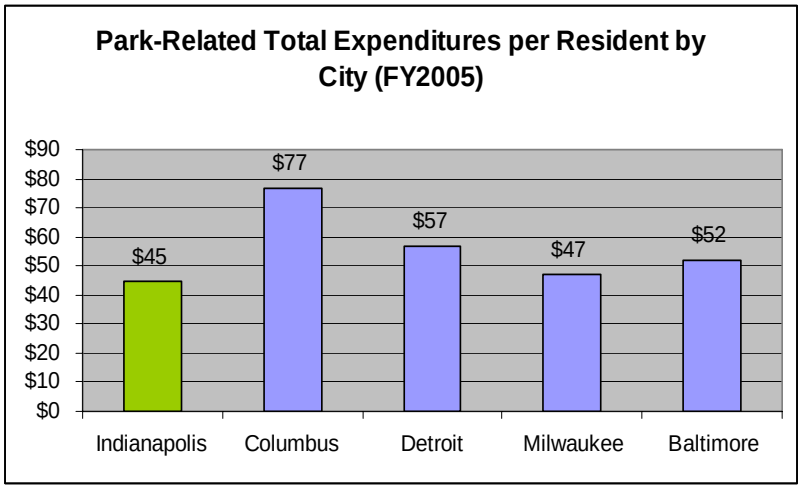
- Access to places for physical activity is associated with increases in the frequency of physical activity. [20]
- The number of neighborhood parks in proximity to one's residence and the types of amenities at the park are associated with physical activity in children. [58]
- Living in proximity to green space is associated with reduced self-reported health symptoms, better self-rated health, and higher scores on general health questionnaires. [59]
- The health benefits of urban street trees include increased motorized traffic and pedestrian safety as well as air pollution mitigation achieved both by filtering the air and by lowering urban air temperatures which worsen air pollution effects. Trees also encourage people to walk by providing an aesthetically-pleasing environment. [60] [61]
- Trees in urban areas are directly correlated with lower levels of fear, fewer incivilities, and less violent and aggressive behavior.[62]

Answer:

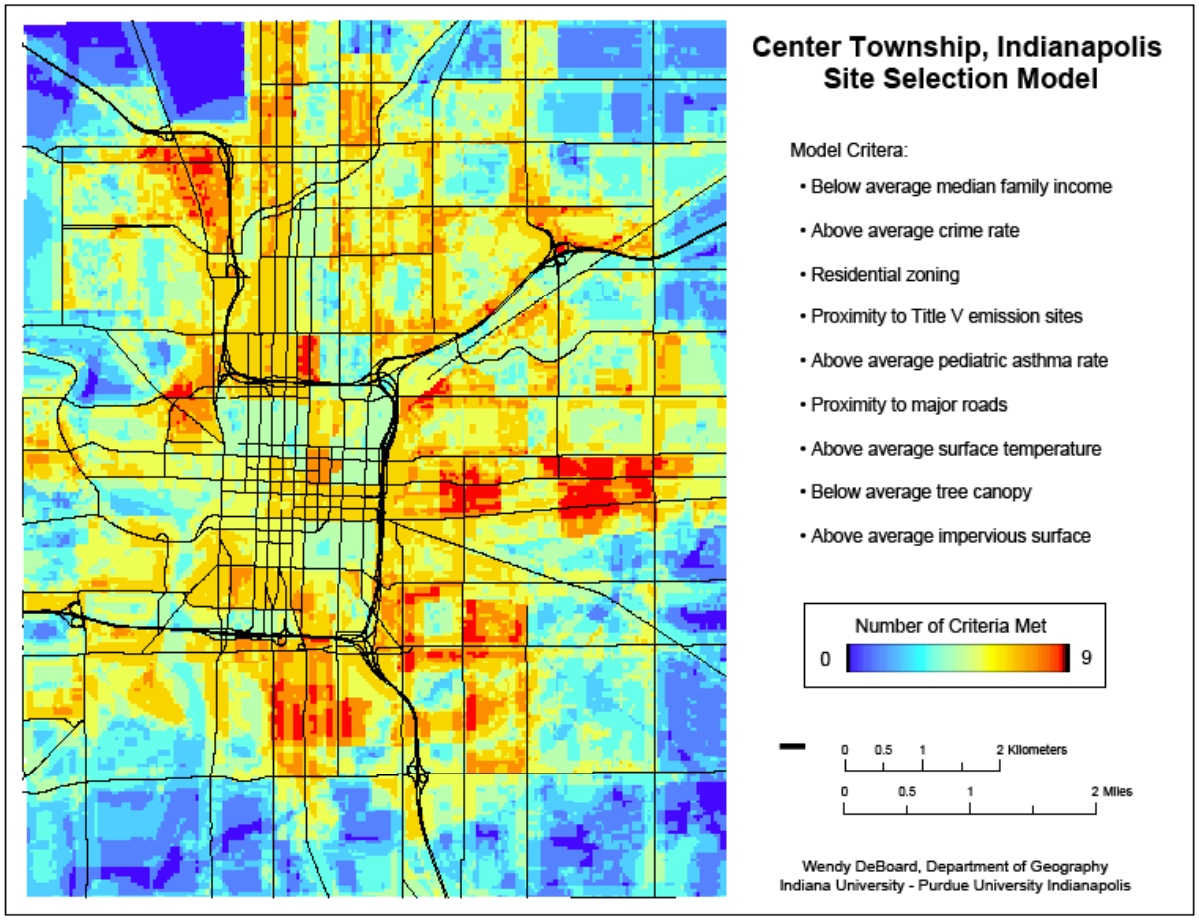
It is important that parks be easily accessible to residents, located throughout their communities and ideally within walking distance. Overall, Indianapolis does not compare favorably to peer cities on the park measures shown below. Indianapolis has less parkland (percent of city area used as parkland) and spends less per resident on parks than any of the peer cities. Indianapolis has fewer parks per square mile and less tree canopy than all but one of the other four peer cities. As our "best" park measure, park acreage per 1000 residents (15.0) places Indianapolis in the middle of the four other peer cities. In this regard, total park acreage may be favorably skewed by having one of the largest city parks in the country at Eagle Creek, though these park acres are not dispersed throughout the city for use by the optimal number of residents.

Park Measures[27, 63]	Indianapolis	Columbus	Detroit	Milwaukee	Baltimore	Average of 60 cities
Average number of parks per square mile	0.5	1.0	0.4	1.5	4.3	--
Park area per 1000 residents, acres (FY 2006)	14.2	18.0	6.6	16.3	7.7	18.8
Parkland as percent of city area (FY 2006)	4.8%	9.8%	6.6%	9.7%	9.5%	9.8%
Total City Tree Canopy (1992)	7.4%	17.5%	18.3%	6.9%	33.5%	--
Park-Related Total Expenditure per Resident, by City (FY 2005)	$45	$77	$57	$47	$52	$89





The issue of tree canopy is intermingled with parks, streetscapes, crime and traffic safety, and certainly air quality, which all in turn relate to outdoor physical activity. It could, perhaps, comprise its own question: Do we have enough trees to promote outdoor physical activity? The estimate of tree canopy cited for Indianapolis in the Urban Environment report (7.5%) is an old measure from 1992; we provided it, however, because there is comparable peer city data. Keep Indianapolis Beautiful, in conjunction with researchers at the IUPUI Department of Geography, prepared updated tree canopy coverage estimates for Center Township, utilizing satellite imagery dated April 25, 2005.[64] The percent tree canopy for Center Township from this assessment was 17.4%; a 25% canopy cover is recommended for urban residential areas east of the Mississippi River.[65] The researchers developed a map of "hot spots" where the tree canopy was much lower (9.6%-17.0%). Their map utilized an overlay of 9 criteria (median family income, crime rate, residential zoning, proximity to emission sites, pediatric asthma rates, proximity to major roads, surface temperatures, tree canopy, and impervious surfaces) to identify these hot spots for targeted planting of 100,000 trees over the next 10 years. The goal is to achieve the recommended 25% tree canopy in as many as six hot spots within Center Township. (See map below.)



Source: Keep Indianapolis Beautiful, Inc.

Last, the Indianapolis area is falling far short of the national standards for park acreage set by the National Recreation and Park Association.[66] In the Indiana Statewide Outdoor Recreation Plan 2006-2010, a park acreage deficit of 40,000 plus acres is reported for Region 8. Higher than average population growth rates in many of the Region 8 counties further compounds the acreage deficit problem.

	2005 Population	Recommended Acres (35 per 1,000 population)	Current Recreation Acres	Acres of Deficit
Region 8= Boone, Hamilton, Hancock, Hendricks, Johnson, Marion, Morgan,	1,588,480	55,597	15,216	**(40,380)**

Source: The Indiana Statewide Outdoor Recreation Plan, 2006 (page 71)[66]

Question:

How do public policies in Indianapolis, such as ordinances and zoning laws, measure up in terms of promoting built environments that encourage physical activity?

Why is this important?

Over many years a wide variety of policies have been put into effect that may now directly obstruct the design and use of our city's built environment to promote physical activity. For example, 6% of U.S. parents surveyed in 2004 reported that their schools have policies prohibiting children from walking to/from school. [4] Zoning ordinances and building codes may establish limits to increasing density. School site requirements often establish acreage minimums that move schools farther away from students' homes, and out of walking/biking distance. In many cases, the underlying policies must change in order for the built environment to change. One such example is the proposed sidewalk amendments to the zoning ordinances of Indianapolis, prepared for presentation to the City-County Council in upcoming months. Currently, sidewalks are required only for single-family subdivisions and mobile home parks. This proposal would require sidewalks in most commercial, industrial, multi-family residential and institutional areas.[67]

Policy Tools Used		Sample Initiatives
Zoning ordinances and building codes	>	Changing zoning codes to encourage mixed use development and higher density
Land use policies (policies designating land uses, density and growth patterns)	>	Encouraging residential development that is pedestrian and transit friendly
	>	Siting schools and public services close to destinations and transit
Transportation policies and funding	>	Improving public transit options
	>	Developing active transportation alternatives including on-street bicycle lanes and walking facilities
Capital funding and tax policies	>	Introducing tax or other incentives to encourage growth that is mixed use, transit-oriented and pedestrian-friendly

Table Source: Robert Wood Johnson Foundation Policy Brief Issue 11 [68]

Answer:

At this writing, there is a student group conducting an assessment of the policy landscape for the built environment of Indianapolis with direction from the IUPUI Center for Urban Policy and the Environment.

5. Mapping Modifying Factors

What is a modifying factor? For purposes of this profile, we will consider a modifying factor as something that can influence a person's decision to be physically active, but falls outside the parameters of the physical built environment. Earlier in this report we defined the built environment as the "aspects of a person's surroundings which are human-made or modified, as compared with naturally occurring aspects of the environment." [7] In this frame, weather generally fits quite well as an external modifier of physical activity that is not a part of the built environment itself. Weather is not humanly created nor do we generally consider it to be humanly-modified (though global climate change presents some exception to this). One could argue that the remaining factors we will discuss (crime, traffic safety, and air quality) are human-made or modified and should thus be categorized as components of the built environment. No matter how we choose to classify these factors, they *do* influence choices about physical activity and warrant presentation here.

Question:

Does the weather in Indianapolis promote outdoor physical activity, such as walking or biking?

Why is this important?

Daily weather can influence a person's likelihood of engaging in outdoor physical activity. In a study conducted by Lindsey and colleagues to model trail traffic in Indianapolis, results confirm that weather has an impact on trail use. "Deviations in average temperatures above the daily mean and greater percentages of daylight hours with sunshine increase trail traffic significantly, while increases in precipitation above average significantly decrease trail traffic." [69]

Answer:

Across the U.S., weather varies greatly. Variations in weather are associated with varying likelihood that residents will engage in outdoor physical activity. Among the peer cities, selected as "peers" on the basis of similar population size and weather characteristics (see Appendix), Indianapolis ranks in the middle position of the five cities for sunshine, average January temperature, and days of precipitation. Indianapolis ranks as the 2nd hottest for average July temperature, and 2nd least amount of snow and ice. While clearly there are aspects of the Indianapolis climate that discourage outdoor physical activity, this may provide greater incentive to eliminate barriers where possible, such as those found in the built environment.

Peer Cities	Average % Possible Sunshine	Average January Temperature	Average July Temperature	Average No. Days / Year Precipitation (≥.01 inch)	Snow & Ice, Annual Inches
Indianapolis, IN	51%	26.5	75.4	126	23.3
Detroit, MI	49%	24.5	73.5	135	40.7
Columbus, OH	48%	28.3	75.1	137	27.9
Baltimore, MD	58%	32.3	76.5	114	21.1
Milwaukee, WI	52%	20.7	72.0	125	47.1

Source: Urban Environment Report[27]

Question:

Is it safe (from traffic) to walk or bike in the Indianapolis area?

Why is this important?

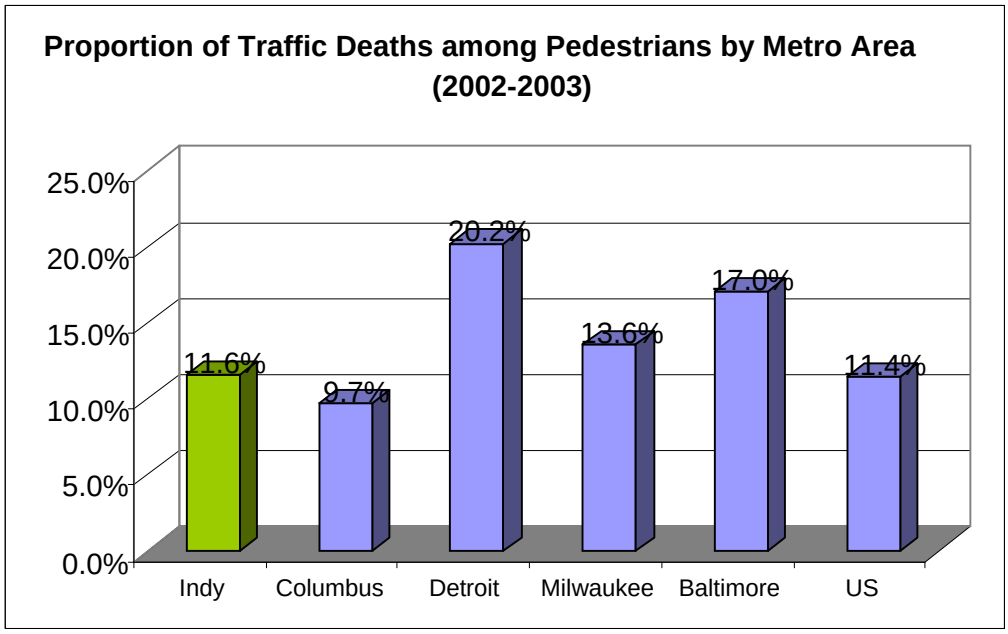
- People are more likely to be physically active when they perceive the place of activity as safe.[9] In a survey of parents in 2004, concerns about traffic-related danger were reported as the second most common barrier to their children walking to school (34%). [4]
- In a survey study of residents in a "large, Midwestern metropolitan area," their perception of neighborhood safety, inclusive of both crime and traffic, was found to be an important determinant of walking. "Women in safer neighborhoods were over four times more likely to walk in their neighborhoods than women in less safe neighborhoods."[22]
- Pedestrians, cyclists and motorized two wheeler users bear a disproportionate share of the global road injury burden and are all at high risk of crash injury. [37]
- Speed has an exponentially detrimental effect on safety. As speeds increase so do the number and severity of injuries. [41] Studies show that the higher the impact speed, the greater the likelihood of serious and fatal injury. Pedestrians have a 90% chance of surviving car crashes at 30 km/h (18 mph) or below, but less than a 50% chance of surviving impacts at 45 km/h (28 mph) or above. [37]
- The more walkers and bikers in an area, the *less* likely they are to be involved in a collision. "Accordingly, policies that increase the numbers of people walking and biking appear to be an effective route to improving (their) safety."[70]

Answer:

In Mean Streets 2004, prepared by the Surface Transportation Policy Project, a Pedestrian Danger Index (PDI) is calculated as a measure of the average yearly pedestrian fatalities per capita, adjusted for the number of walkers. This allows for comparison of the risk to pedestrians across metropolitan areas. [5] The higher the PDI, the higher (worse) the danger to pedestrians. Indianapolis ranks as the 2nd most dangerous of the five peer MSAs, with a PDI that is well above the U.S. average. On the other hand, Indianapolis has the 2nd lowest rate of all the MSAs for the percentage of traffic deaths incurred by pedestrians. The difference in these two measures appears to reflect that we have fewer people out walking to be at risk of death (and thereby fewer pedestrian deaths), but those who do walk here are exposed to a higher danger level (higher PDI) than most of the other peer MSAs. We do not have data to reflect biking safety.

	Indianapolis, IN MSA	Columbus, OH MSA	Detroit-Ann Arbor-Flint, MI CMSA	Milwaukee-Racine, WI CMSA	Baltimore-Washington DC CMSA	US Average
Average Annual Pedestrian Deaths per 100,000 (2002-2003)	1.20	0.97	2.03	1.00	1.76	1.68
Pedestrian Danger Index (PDI)*	71.5	40.9	111.3	36.1	59.2	57.5
Portion of All Traffic Deaths that were Pedestrians (2002-2003)	11.6%	9.7%	20.2%	13.6%	17.0%	11.4%

Source= Surface Transportation Policy Project; Mean Streets 2004[5]



Question:

Is it safe (from crime) to walk or bike in Indianapolis?

Why is this important?

- People are more likely to be physically active when they perceive the place of activity as safe.[9]
- Among respondents to the 1996 BRFSS, levels of inactivity increased as the perception of safety from crime in their neighborhood worsened from "extremely safe" to "not at all safe." This effect was strongest among women and the elderly. [9, 71]
- People's perception of safety from crime "is only indirectly related to actual crime safety," and is likely the most influential of the two in decisions to walk or bicycle. [50] In a survey study of residents in a "large, Midwestern metropolitan area," perception of neighborhood safety, inclusive of both crime and traffic, was found to be an important determinant of walking. "Women in safer neighborhoods were over four times more likely to walk in their neighborhoods than women in less safe neighborhoods." [22]
- Levels of neighborhood crime and perceptions of safety are determined by development / construction-related factors including resident participation in community development, sidewalk cleanliness and width, street design for pedestrian safety and speed control, poor street lighting, abundance of liquor stores, community isolation, and lack of services and housing for low-income persons, as well as other factors including presence of drugs or gangs, lack of police presence, gun availability, under- and un-employment, and lack of community activities for families and youth. [72]
- Community violence impacts the perceived safety of a neighborhood, inhibiting social interactions and adversely impacting on social cohesion. [73]
- In a problematic area of Sarasota, Florida, a team of city planners, police officers and architects successfully utilized a new zoning district and the key principles of "Crime Prevention Through Environmental Design" to reduce several measures of crime in that area. [74] The design of the built environment can lower crime and enhance opportunities for physical activity.

Answer:

Whether or not people feel safe from crime depends on many factors other than the actual rate of crime in an area. In fact, "Perceived crime safety may have the greatest influence on individuals' decision to walk or bicycle, since individuals rarely possess accurate or specific information on actual crime rates." [50] Furthermore, perceptions of safety vary by many factors, including age, gender, race, body size, and specific streets or neighborhoods within a community. As such, the crime rates shown below are *very rough* measures of whether an area is safe enough for people to feel free to be active outside. In 2004, Indianapolis was safer from violent crime than Detroit or Baltimore, but less safe than Columbus and Milwaukee. In 2004, Indianapolis had a higher rate of property crimes than Milwaukee and Baltimore, but a lower rate than Detroit and Columbus.

2004[27]	Violent Crime Rate (Incidents per 100,000 people)	Ranking*	Property Crime Rate (Incidents per 100,000 people)	Ranking*
Indianapolis, IN	882.7	41st	5870.4	42nd
Columbus, OH	808.9	38th	7800.4	61st
Detroit, MI	1740.4	68th	6279.3	49th
Milwaukee, WI	784.8	34th	5427.2	34th
Baltimore, MD	1839.4	69th	5685.0	39th

*1=Best, 72= Worst

Source: Urban Environment Report[27]

Question:

Is the air quality safe for physical activity outdoors in the Indianapolis area?

Why is this important?

- "Student athletes in high-ozone communities had more than 3 times the risk of developing asthma compared to their counterparts in low-ozone communities." [9, 75]
- "Dozens of studies have documented that children's respiratory symptoms, medication use, school absenteeism, emergency department visits, and hospitalizations all increase within a day or two of ozone peak levels."[9]
- In a study conducted by the CDC during the 1996 Olympic Games in Atlanta, peak daily ozone concentrations decreased 27.9%, weekday traffic counts decreased 22.5%, and ER visits for asthma *dropped by 41.6%* (while visits for other events remained unchanged).[76]
- Fine particle pollution [77-80] :
  - causes premature death in people with heart and lung disease, accounting for more deaths in the U.S. each year than either drunk driving or homicide;
  - triggers thousands of heart attacks each year;
  - worsens respiratory symptoms such as coughing, wheezing, and shortness of breath, and is estimated to trigger more than 20,000 asthma attacks per year in Indiana;
  - increases hospital admissions, emergency room visits and clinic visits for respiratory diseases and cardiovascular diseases;

- causes lung function changes, especially in children and people with lung diseases such as asthma;
- causes changes in heart rate variability and irregular heartbeat;
- is associated with the development of chronic respiratory disease in children.

- Children, the elderly, and people suffering from chronic illnesses are particularly vulnerable to the adverse health effects of air pollution. [77, 80, 81] "Poor and minority communities are also disproportionately affected by air pollution" because they often live closer to the emission sources. [78]
- Poor air quality can decrease lung function even in healthy people, and exercise makes us more vulnerable to health effects from air pollution because we take in more air during exercise. However, among sensitive groups, these health effects mean that they should consistently avoid outdoor activity on certain days or times of day or in certain places with poor air quality, such as close to congested roads.[82]

Answer:

- The air quality in Indianapolis, approximated by a measure of the year-round particle pollution, is worse than in three of the four peer cities and worse than 52 of the 72 other cities assessed in the Urban Environment Report.[27] With short-term particle pollution, which is a measure of the peak in a 24 hour period, Indianapolis has a lower (better) measure than all the peer cities except Milwaukee, yet, still ranks 48th in the nation (1st is best). Indianapolis falls right in the middle of the peer cities on number of High Ozone Days. The American Lung Association's State of the Air 2007 Report (based on air quality measures for the three-year period of 2003-2005) gave Marion County an "F" for particle pollution, and a "D" for High Ozone Days. This report also ranked The Indianapolis MSA among the 25 most polluted in the country for both short-term and year-round particle pollution.[83]

Air Quality	Indianapolis	Rank*	Columbus	Detroit	Milwaukee	Baltimore
High Ozone Days (Annual No, weighted average, 2002-2004)	8.5	42nd	12.2	5.7	6.5	10.5
Short-term Particle Pollution (Weighted average, 24 hour, 2002-2004)	3.5	48th	5.3	8.8	1.0	5.0
Year-round Particle Pollution (Annual PM2.5, 2002-2004)	16.0	53rd	15.7	18.6	12.5	14.9

*1=best, 72=worst

Source: Urban Environment Report[27]

25 MSAs Most Polluted by Short-term Particle Pollution (24-Hour)	
Indianapolis MSA	16th
Detroit MSA	8th
Baltimore MSA	11th
(Columbus and Milwaukee not listed among most polluted)	--
25 MSAs Most Polluted by Year-Round Particle Pollution (Annual)	
Indianapolis MSA	9th
Detroit MSA	4th
Baltimore MSA	20th
(Columbus and Milwaukee not listed among most polluted)	--
25 MSAs Most Polluted by Ozone	
Milwaukee MSA	17th
Baltimore MSA	11th
(Columbus, Detroit, and Indianapolis not listed among most polluted)	--

Source: ALA State of the Air 2007[83]

7. Mapping Physical Activity

This profile of the built environment in Indianapolis is intended to bring attention to ways we might improve the built environment for the purpose of promoting daily physical activity and improved health. The expanded rationale for this approach was discussed earlier in the paper.

Question:

Where is our starting point? How much physical activity are Indianapolis-area residents getting now?

Why is this important?

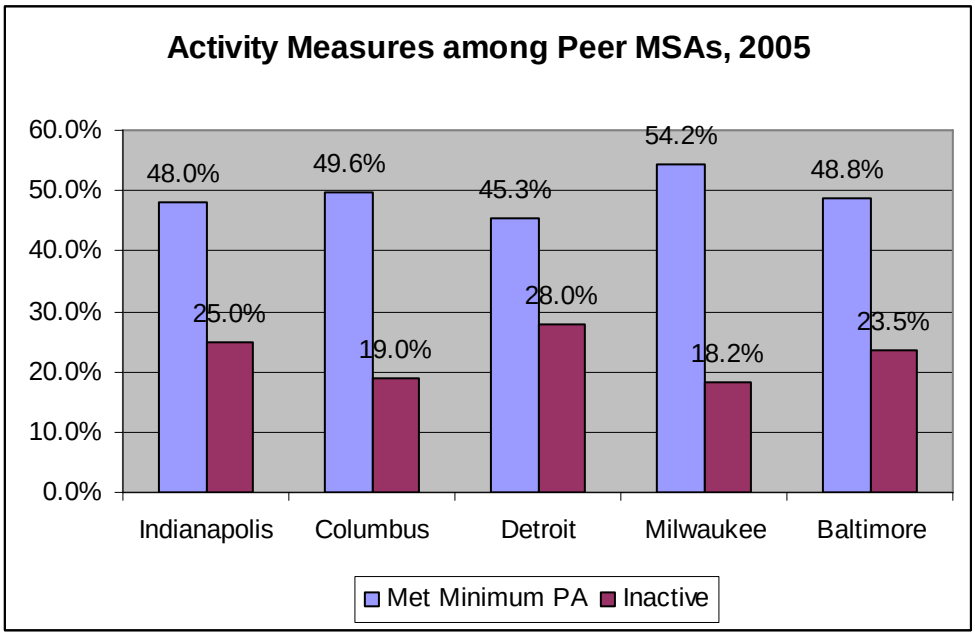
- Regardless of one's weight, the health benefits of physical activity are substantial. Research has established that "people who are fit and fat are actually less likely to die than people who have a healthy weight but are not fit or active."[84]
- Regular physical activity reduces the risk of early death from all causes and reduces the risk of developing several chronic illnesses, including cardiovascular disease, type 2 diabetes, and some cancers.
- The consequences of inactivity are also substantial. Poor diet and physical inactivity jointly accounted for an estimated 365,000 deaths in this country in 2000, second only to tobacco use as a leading cause of preventable death.[85, 86] The medical costs associated with physical inactivity exceed $100 billion per year. [28] ($1.6 billion is expended each year in Indiana alone.)

Answer:

The minimum recommended level of physical activity for adults is 30 minutes or more of moderate physical activity on 5 or more days of the week and/or 20 minutes or more of vigorous physical activity on 3 or more days of the week.[6] For children and adolescents, the minimum recommended level of physical activity is 60 minutes or more of moderate physical activity on 5 or more days of the week, preferably daily. Most of the adults and youth of Indianapolis are presently failing to achieve these minimum levels of daily activity. In 2005, less than half of the adults in the Indianapolis MSA reported meeting the minimum physical activity goal, and a full 25% reported getting *no* physical activity in the past month.[87] In comparison to the peer MSAs, Indianapolis had the 2nd lowest percentage of adults who met the activity recommendation and the 2nd highest rate of inactivity. Data for youth activity in Indianapolis is not available, but youth throughout Indiana are less active than youth throughout the U.S. on the whole. The 2005 Youth Risk Behavior Survey, conducted among students in grades 9-12, shows that only about one-third of Indiana youth are meeting the current recommendation for physical activity, and about 10% reported getting *no* physical activity in the past week.[88] (Because data for the Indianapolis MSA are not available, youth activity levels in peer cities is not shown; YRBS 2005 data are available for Baltimore, Detroit, and Milwaukee.)

	Metropolitan Statistical Areas					
Adult Physical Activity - 2005 BRFSS*	Indianapolis	Columbus	Detroit	Milwaukee	Baltimore	U.S.
Met Minimum Physical Activity Recommendation*	48.0%	49.6%	45.3%	54.2%	48.8%	49.1%
Inactive Adults (report *no* physical activity in past month)	25.0%	19.0%	28.0%	18.2%	23.5%	23.8%

*BRFSS = Behavioral Risk Factor Surveillance System[87]



Youth Physical Activity - 2005 YRBSS[88]	Indiana	U.S.
Students who had not participated in any vigorous or moderate physical activity during the past 7 days	10.5%	9.6%
Students who were physically active for a total of 60 minutes or more per day on 5 or more of the past 7 days (current youth recommendation)	32.2%	35.8%
Students who had participated in at least 20 minutes of vigorous physical activity on 3 or more of the past 7 days and/or at least 30 minutes of moderate physical activity on 5 or more of the past 7 days (prior youth recommendation)	65.9%	68.7%

8. Mapping Health

Question:

What is the burden of illness suffered by residents of the Indianapolis area that might be lessened with regular physical activity?

Why is this important?

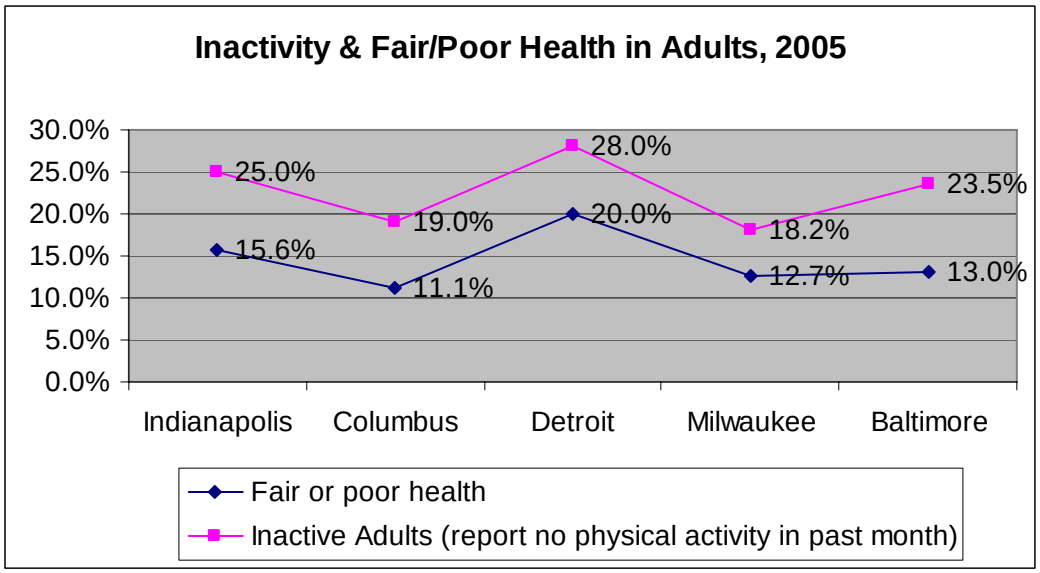
While improving physical activity is the short-term goal for implementing modifications to the built environment, it is for the ultimate, long-term goal of improving the health of our citizens. As stated in the opening section of this paper, physical activity can prevent or aid in the control of many diseases. Routine physical activity can:[14]

- reduce people's risk for heart attack, colon cancer, diabetes, and high blood pressure and may reduce their risk for stroke;
- help to control weight;
- contribute to healthy bones, muscles, and joints;
- reduce falls among older adults;
- help to relieve the pain of arthritis;
- reduce symptoms of anxiety and depression;
- reduce hospitalizations, physician visits, and medications;
- help people avoid developing functional limitations and can improve physical function;
- provide therapeutic benefits for people with heart disease, high blood pressure, high cholesterol, osteoporosis, arthritis, lung disease, and other chronic diseases. [14]

Answer:

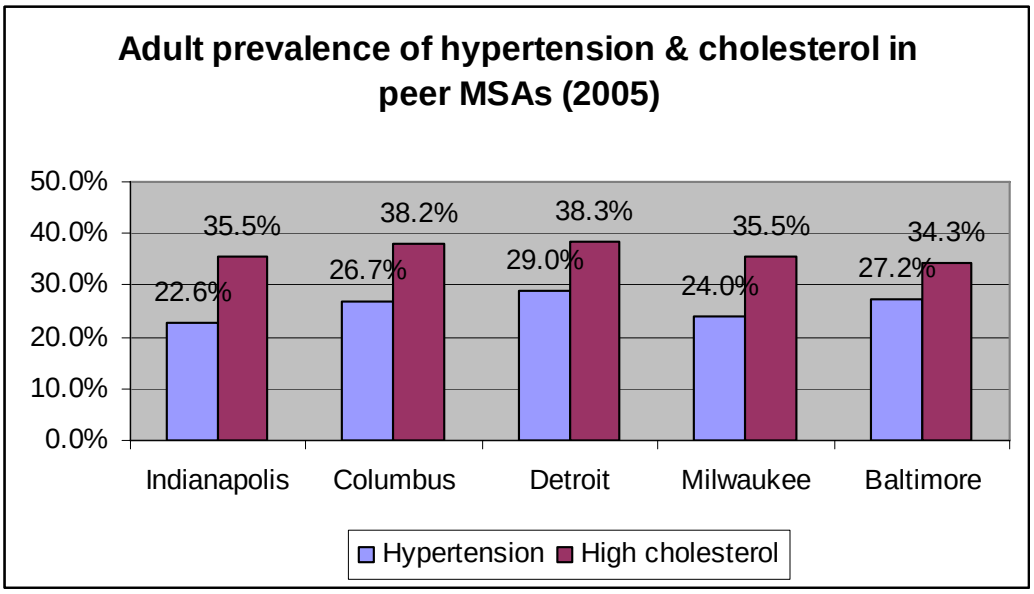
Adults

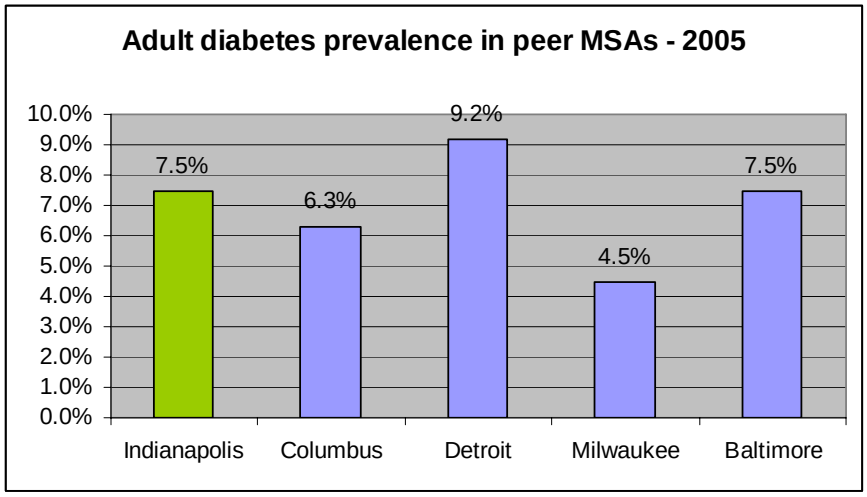
The adult prevalence of several health conditions which can be impacted by physical activity is collected in the national BRFSS survey. It is interesting to plot on the same graph 1) the percentage of residents in the peer MSAs who were inactive, and 2) the percentage of residents in the peer MSA were reported their health as fair or poor. Logically and visually, these two measures correlate. In general, as inactivity rises, so does the number of people who report fair-to-poor health status. In 2005, Indianapolis MSA residents had the lowest prevalence of the peer MSAs for hypertension, arthritis, and active asthma. Indianapolis MSA residents were in the mid-range of the peer MSAs for high cholesterol and obesity, and 2nd highest for prevalence of diabetes and self-reported fair-or-poor health status. In comparison to Detroit, the MSA with the highest prevalence of all these illnesses, Indianapolis is faring well. However, the overall burden is still substantial. In the 2007 report by the Trust for America's Health, called "F as in Fat: How Obesity Policies are Failing in America," Indiana is ranked as 9th highest among states for obesity rates, ranked 13th worst for inactivity, and ranked 14th worst for the rate of diabetes.[89] In comparison to the country as a whole, our state is not faring well.

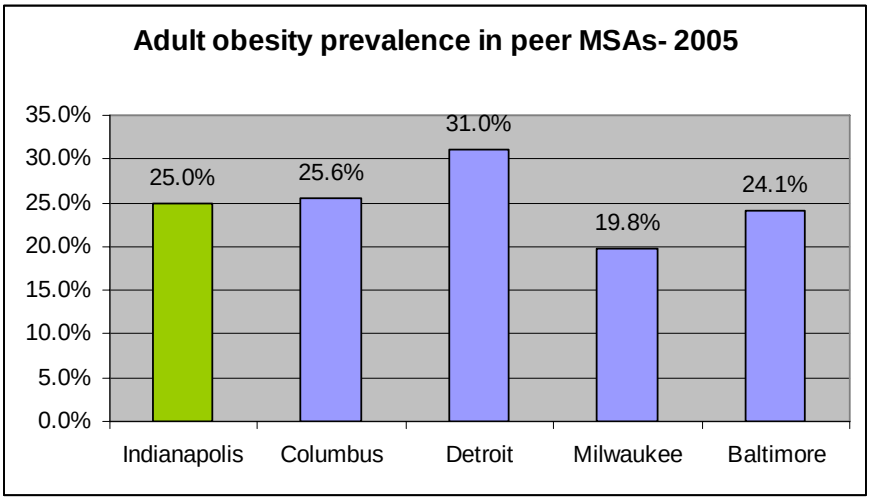


	Metropolitan Statistical Areas					
Adult Prevalence - 2005 BRFSS*	Indianapolis	Columbus	Detroit	Milwaukee	Baltimore	U.S.
Fair or poor health	15.6%	11.1%	20.0%	12.7%	13.0%	14.8%
Hypertension	22.6%	26.7%	29.0%	24.0%	27.2%	25.5%
Diabetes	7.5%	6.3%	9.2%	4.5%	7.5%	7.3%
Arthritis	26.2%	27.8%	31.6%	29.5%	28.8%	27.0%
Current Asthma	6.7%	8.7%	11.3%	8.5%	8.8%	8.0%
High cholesterol	35.5%	38.2%	38.3%	35.5%	34.3%	35.6%
Obesity	25.0%	25.6%	31.0%	19.8%	24.1%	24.4%

Behavioral Risk Factor Surveillance System[87]







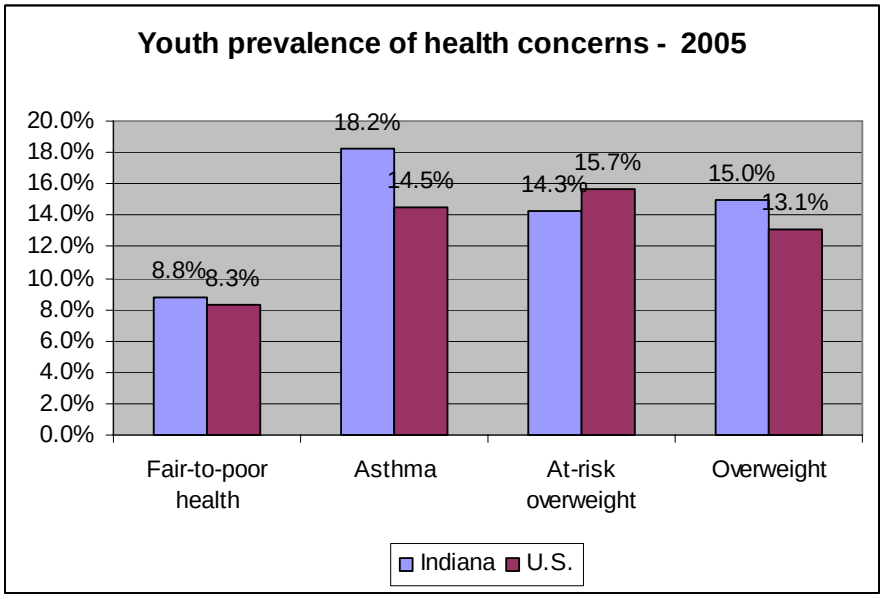
Youth

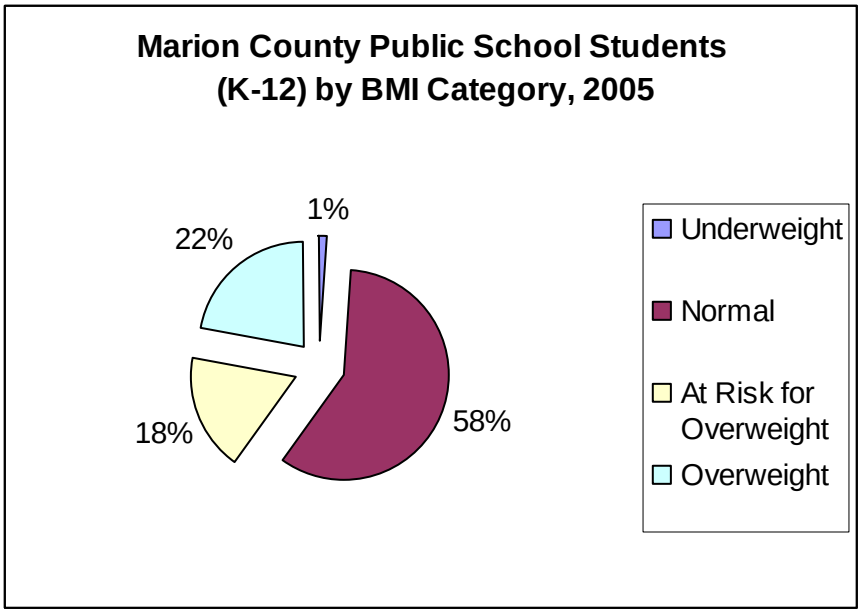
Data for youth health in Indianapolis are not available from the nationally-conducted Youth Risk Behavior Survey (YRBS), but youth throughout Indiana are less healthy (by self-report), have more asthma, and are more overweight than youth throughout the U.S. on the whole. The 2005 YRBS, conducted among students in grades 9-12, shows that 9% of Indiana youth do not consider themselves healthy, and 15% are overweight.[88] (Because data for the Indianapolis MSA are not available, youth health measures in peer cities are not shown; YRBS 2005 data are available for Baltimore, Detroit, and Milwaukee.)

In 2005, the Marion County Health Department (MCHD) worked with ten of the eleven public school districts in Marion County to measure the height and weight of students in grades K-12, ultimately assessing the body mass index (BMI) of over 90,000 students.[90] Among all the Marion County public school students in grades K-12 measured, 40% were either overweight or at risk of overweight. In contrast, in 1970, only 15% of U.S. students would have been in these weight categories. Among the high school aged students (15-19 years) measured, 37.8% were either overweight or at risk of overweight. This is substantially higher than the 2005 YRBS results for this age group, which reported a combined

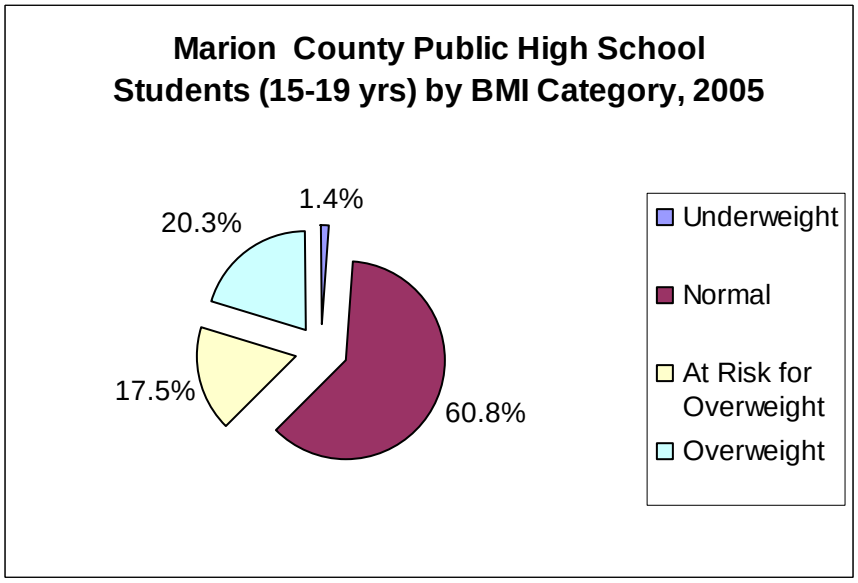
prevalence for overweight/risk of overweight of 29.3%. Because the YRBS data were self-reported by students and the Marion County data were based upon actual measures of height and weight, the higher Marion County prevalence is considered more reliable.

Youth Prevalence for Health Concerns - 2005 YRBSS[88]	Indiana	U.S.
Described their health as fair or poor	8.8%	8.3%
Current Asthma	18.2%	14.5%
At risk for overweight (≥ 85th and ≤ 95th percentile for BMI by age and sex)	14.3%	15.7%
Overweight (≥ 95th percentile for BMI by age and sex)	15.0%	13.1%





Sources: 2005 Marion County Health Department Child Health and Wellness Initiative[90]



Sources: 2005 Marion County Health Department Child Health and Wellness Initiative[90]

8. Stoplight Outcomes Summary

Map of the People	Green	Yellow	Red
Children, under age 18			
Children, under age 5			
Seniors, age 65 and over			
Individuals below poverty			
Children (< 18 years old) below poverty			
Families below poverty			
Adults without a high school degree			
Minority racial percentage (non-white)			
Map of the Built Environment	**Green**	**Yellow**	**Red**
Population density			
Housing density			
Taking public transit to work			
Walking or biking to work			
Travel time to work			
Annual congestion cost per person			
Daily vehicle-miles traveled per person (freeway + arterial)			
Number of parks per square mile			
Park area in acres per 1000 residents			
Parkland as a percent of city area			
Total city tree canopy			
Total park-related spending per resident			
Average yearly spending on bicycle/pedestrian projects per person (federal funds)			
Ratio of road-mile to sidewalk-miles (=2.16)		Note 1	
Ratio of road-miles to biking path/lane-miles (=40.01)		Note 1	
Proximity of residents to community destinations: Within ¼ mile of local bus = 57.1% Within ¼ mile of public park = 17.3% Within ¼ mile of greenway = 28.7% Within ½ mile of public school = 47.9% Within ½ mile of supermarket = 23.0%		Note 1	
Map of Modifying Factors	**Green**	**Yellow**	**Red**
Average % possible sunshine			
Average January temperature			
Average July temperature			
Average number of days / year with precipitation			
Annual inches of snow & ice			
Pedestrian Danger Index			
Proportion of all traffic deaths that were pedestrians			
Annual pedestrian death rate (per 100,000)			
Violent crime rate (per 100,000)			

Property crime rate (per 100,000)			
Annual number of high ozone days			
Short-term particle pollution			
Year-round particle pollution			
Map of Physical Activity	**Green**	**Yellow**	**Red**
Proportion of adults who met minimum physical activity recommendation			
Proportion of adults who are inactive			
Proportion of youth (grades 9-12) who are inactive			Note 2
Proportion of youth (grades 9-12) who met *current* physical activity recommendation			Note 2
Proportion of youth (grades 9-12) who met p*rior* physical activity recommendation			Note 2
Map of Health	**Green**	**Yellow**	**Red**
Adult prevalence of fair or poor health			
Adult prevalence of hypertension			
Adult prevalence of diabetes			
Adult prevalence of arthritis			
Adult prevalence of current asthma			
Adult prevalence of high cholesterol			
Adult prevalence of obesity			
Youth (grades 9-12) who described their health as fair or poor			Note 2
Youth (grades 9-12) with current asthma			Note 2
Youth (grades 9-12) who are at risk for overweight (≥ 85th and ≤ 95th percentile for BMI by age and sex)	Note 2		
Youth (grades 9-12) who are overweight (≥ 95th percentile for BMI by age and sex)			Note 2

Table Key

Green = 1st or 2nd best of 5 cities that include Indianapolis and four peers (cities listed in note 3)

Yellow = 3rd (middle) position of 5 cities that include Indianapolis and four peers

Red = 4th or 5th position (worst) of 5 cities that include Indianapolis and four peers

Notes

1. Data from peer cities is not available for comparison, so these indicators were not color-coded.
2. No city/county data for Indianapolis are available. Indiana (state-wide) youth did worse (red) or better(green) than their U.S. counterparts on these activity and health measures.
3. "Peer" cities were selected based upon comparable population size, sunshine, January and July temperatures and days of precipitation. These cities include Columbus (Ohio), Detroit, Milwaukee, and Baltimore.

9. The Destination

We began this working document by taking a look back in time to the post-war era of the 1950s and 60s, when the rush to the suburbs began. Now we look ahead. In his introduction to a special issue of the American Journal of Public Health devoted to the built environment and health, Dr. Richard Jackson calls on the power of human creativity, planning, and vision to set our sights on a new destination.

> "We humans often assume that what is, had to be that way. In reality, virtually everything in our built environment is the way it is because someone designed it that way….Despite the fact that many humans accept the world as it is, we have a remarkable capacity to plan ahead, shape the future, and adapt to new settings. . . . It is time for a shift to communities intentionally designed to facilitate physical and mental well-being. To effect this change, we need to draw upon the unique ability of humans to plan creatively for healthy communities. (Emphasis added) The first step is to understand better the elements of the built environment that promote health."[91]

In fact, promoting greater understanding of that relationship between the built environment, physical activity, and health is one of the key goals of this document. Providing community partners with information that will stimulate discussion, collaboration, and the development of common goals is yet another. As the community and transportation planners, designers, architects, builders, and public and environmental health professionals bring their diverse skills to bear on the issue of re-designing the built environment in the Indianapolis area, we can create places that encourage physical activity and promote health. What do those places look like? In their book called Urban Sprawl and Public Health, Frumkin, Frank, and Jackson describe activity-friendly places this way:

> "Such communities are relatively dense; they contain various kinds of places including homes, stores, restaurants, and recreational destinations, and they are well supplied with sidewalks, paths, and other settings for activity. They offer appealing scenery that attracts people out of their homes, into parks, and onto paths. Other people can also be seen getting physical activity, and (perhaps related) crime is uncommon. Some studies also suggest additional features, such as absence of nearby heavy traffic, absence of busy streets that impede access to parks and paths, and good lighting. Together, these features paint a picture of communities very different than the usual sprawling suburbs."[9] (Excerpt pages 104-105)

We hope that we have also presented a convincing case that there is much more at stake than "a walk in the park." The scientific link between physical activity and health is solidly established. What we still need to learn more about are what particular changes to the built environment will have the greatest impact on people's likelihood of taking that walk. The stakes are high: "We now realize that how we design the built environment may hold tremendous potential for addressing many of the nation's greatest current public health concerns, including obesity, cardiovascular disease, diabetes, asthma, injury, depression, violence, and social inequities."[91] We have set our sights on a new destination; may our steps resolutely follow.

Appendix: Data Documentation

Investigating the relationship between physical activity and the built environment is a relatively new endeavor, largely limited to the past decade. While there are many sources of data which pertain to the issue, often these are not at a level of aggregation that can be applied to one's city, much less neighborhood. National experts have promoted the expansion, linking, and geo-coding of national public health and travel surveys to provide a better foundation for understanding, research, and planning. "Currently, these data are spread across a variety of data sources from different fields that have often been developed to address different questions."[92] The data contained in this report are, therefore, subject to these contextual limitations.

All of the data shown in this report are drawn from several national and local sources, including databases, journals, and reports. In this profile, we have borrowed from these sources to place, in one document, data that describe the Indianapolis area in terms of the built environment, physical activity measures, and related health factors. Also, we have attempted to place Indianapolis in context with peer cities (MSAs or counties) whenever possible. In this section, we describe how the peer cities were selected as well as provide more detail regarding the sources of data used in the report.

Selection of Peer Cities

Peer cities/MSAs were selected based upon the process described here. A large portion of the data utilized in this report were extracted from the Urban Environment Report, prepared by the Earth Day Network.[27] This report includes data on 72 cities, selected either because they are among the largest 50 cities in the U.S. or because they are the largest city in a state (or District of Columbia) per the 2000 census. These 72 cities are classified as very small (<100,000), small (100,000 to 250,000), mid-size (250,000-500,000), large (500,000 to 1 million), or very large (> 1 million). Indianapolis shares the "large" classification with 21 other cities, so the selection of "peer" cities was first narrowed down to the 21 other cities in this large population grouping. Next, cities that were clearly different from Indianapolis in terms of geography or climate were eliminated, including : Portland, Seattle, Denver, Tucson, Las Vegas, Jacksonville, San Francisco, San Jose, Austin, Fort Worth, and El Paso. With the goal of selecting 3-5 peers, remaining cities were compared on the basis of 2005 population, average percentage possible sunshine, average January temperature, average July temperature, and days of precipitation. These factors were considered as variables that can influence outdoor activity levels.[69] Ultimately, the four cities we chose to represent in this report as peer cities were those cities that compared most closely to Indianapolis on these population and weather variables. Those cities were Columbus (Ohio), Detroit (Michigan), Milwaukee (Wisconsin), and Baltimore (Maryland). Indianapolis ranks in the middle position of the five cities for sunshine, average January temperature, and days of precipitation. Indianapolis ranks as the 2nd hottest for average July temperature. Certainly, more sophisticated methods for selecting peer cities might have been utilized, however, we believe this method to be reasonable for the purposes of this profile.

Peer Cities	Population (2005)	Average % Possible Sunshine	Average January Temperature	Average July Temperature	Average No. Days / Year Precipitation (≥.01 inch)
Indianapolis, IN	765,310	51%	26.5	75.4	126
Columbus, OH	693,983	48%	28.3	75.1	135
Detroit, MI	836,056	49%	24.5	73.5	137
Milwaukee, WI	556,948	52%	20.7	72.0	114
Baltimore, MD	608,481	58%	32.3	76.5	125

The Urban Environment Report

A large portion of data for the city of Indianapolis and peer cities was obtained from the Urban Environment Report (UER) prepared by the Earth Day Network.[27] The geographic unit of analysis is the municipality / city – not MSA or county. Below is a table showing all the data points taken from the UER with the corresponding primary data source. (The primary data source is the source from which the authors of the UER obtained the data.)

UER Data Point	Primary Data Source
Children, under age 18 (2004)	U.S. Census Bureau, Fact Finder, 2000 and 2004
Children, under age 5 (2004)	U.S. Census Bureau, Fact Finder, 2000 and 2004
Seniors, age 65 and over (2004)	U.S. Census Bureau, Fact Finder, 2000 and 2004
Individuals below poverty (2004)	U.S. Census Bureau, Fact Finder, 2000 and 2004
Children (<18 years) below poverty (1999)	U.S. Census Bureau, Journey to Work, 2000.
Families below poverty (2004)	U.S. Census Bureau, Fact Finder, 2000 and 2004
Adults without high school degree (2004)	U.S. Census Bureau, Fact Finder, 2000 and 2004
Minority racial percentage, non-white (2005)	U.S. Census Bureau, Fact Finder, 2005
Population density (2000)	U.S. Census Bureau, Journey to Work: 2000. <Factfinder.census.gov>
Housing density (2000)	U.S. Census Bureau, Journey to Work: 2000. <Factfinder.census.gov>
Means of travel to work (2000)	U.S. Census Bureau, Journey to Work: 2000. <Factfinder.census.gov>
Travel time to work (2004)	U.S. Census Bureau, Journey to Work - 2000 and American Community Survey - 2004. <Factfinder.census.gov>
Average number of parks per square mile	UER Calculation City-owned parks and city land area from http://www.infoplease.com
Park area (acres) per 1000 residents	UER Calculation Park acreage from Harnik, Peter. "The Excellent City Park System: What Makes it Great and How to Get There." The Trust for Public Land
Parkland as percent of city area	Harnik, Peter. "The Excellent City Park System: What Makes it Great and How to Get There." The Trust for Public Land
Total city tree canopy (1992)	UER Calculation - Based on data from American Forests

	CITYgreen, Urban Ecosystem Analysis Tool, http://ergwms.er.usgs.gov/citygreen.html
Adjusted park spending per resident (FY2001)	Harnik, Peter. "The Excellent City Park System: What Makes it Great and How to Get There." The Trust for Public Land
Average % possible sunshine (through 1998)	U.S. Census Bureau. Statistical Abstract of the U.S., Section 6: Geography and Environment. 2000
Average January temperature	Not stated
Average July temperature	Not stated
Average number of days per year of precipitation ≥ .01 inch	Not stated
Snow & Ice, annual inches	Not stated
Violent crime rate (2004)	FBI Uniform Crime Reports as prepared by the National Archive of Criminal Justice Data, U.S. Department of Justice Office and Justice Programs Bureau of Justice Statistics. 2004.
Property crime rate (2004)	FBI Uniform Crime Reports (as above). 2004.
High ozone days (2006)	American Lung Association - State of the Air 2006 Report
Short-term particle pollution (2006)	American Lung Association - State of the Air 2006 Report
Year-round particle pollution (2006)	American Lung Association - State of the Air 2006 Report

Urban Mobility Report, 2007

The following data points were extracted from the 2007 Urban Mobility Report, prepared by the Texas Transportation Institute at Texas A&M University.[44]

Data Points	Primary Data Source
Delay per Peak Traveler, person-hours, 2005	Federal Highway Administration's Highway Performance Monitoring system (HPMS) database, with supporting information from various state and local agencies.
Congestion Cost per Peak Traveler, dollars, 2005	

Report authors provide the following definitions:

- *Peak Travelers* are travelers (using any travel mode) who begin a trip during the morning or evening peak travel periods (6 to 9 am and 4-7 pm).
- *Congestion Cost* is the value of travel delay for 2005 and excess fuel consumption.
- *Urban Area* is the developed area (population density more than 1,000 persons per square mile) within a metropolitan region. For Indianapolis, the urban area is an area that is larger than the city but smaller than the metropolitan statistical area.

Surface Transportation Policy Project: Mean Streets 2004

Data regarding pedestrian-related fatalities and federal spending was taken from the Surface Transportation Policy Project report titled "Mean Streets 2004: How Far Have We Come?".[5] The geographic unit of analysis for this report was the metropolitan statistical area (MSA) or consolidated metropolitan statistical area (CMSA) as defined by the U.S. Census Bureau. These "metro areas" contain a "core urban area as well as any adjacent counties that have a high degree of social and economic

integration (as measured by commuting to work) with the urban core." [93] The Indianapolis MSA includes these counties: Boone, Hamilton, Hancock, Hendricks, Johnson, Madison, Marion, Morgan, and Shelby.

Surface Transportation Policy Project Data Points	Primary Data Source
Pedestrian Danger Index (2002-2003)	Calculated as a measure of the average yearly pedestrian fatalities per capita, adjusted for the number of walkers
Average yearly spending of federal funds on bicycle/pedestrian projects per capita (FY 1998-FY2003)	Fiscal Management Information System (FMIS) maintained by the Federal Highway Administration
Average annual pedestrian deaths per 100,000 Portion of all traffic deaths that were pedestrians (2002-2003)	National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS)

City of Indianapolis

Marion County "surface measures" including road miles, sidewalk miles and bike path and lane miles were provided by the City of Indianapolis, Department of Public Works and Division of Planning. These data pertain to Marion County and are current as of 2007. The bike lanes include mileage that is anticipated (budgeted and approved) for 2008.

The Division of Planning also prepared the estimates of Marion County population within a given proximity to community destinations. Residential parcel data from the April 2007 Marion County Assessor's Counter Book were used along with the U.S. Census 2000 population distribution to derive these estimates. The estimates assume uniform population distribution in census blocks.

American Housing Survey

The American Housing Survey provides some proximity data for 47 selected metropolitan areas on a rotating basis. [94] Data for Indianapolis were last reported for 2004, and we reported only one data point - the percentage of households with children aged 0-13 that are within 1 mile of a public elementary school.[57] None of the peer MSAs were reported for that year.

American Lung Association, State of the Air 2007

We extracted rankings for the most polluted MSAs for short-term particle pollution, year-round particle pollution, and ozone from the American Lung Association's report, "State of the Air, 2007." Their rankings were based upon air quality available from the U.S. Environmental Protection Agency's Air Quality System (AQS) database. Results were averaged over the 2003-2005 time period.[83]

Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) is the world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors among adults in the United States yearly since 1984. All fifty states participate. All data describing adult physical activity levels and prevalence of health conditions were extracted from the 2005 BRFSS survey at the level of the Indianapolis (and peer) Metropolitan Statistical Area.

Youth Risk Behavior Surveillance System (YRBSS)

The YRBSS was developed in 1990 to monitor priority health risk behaviors that contribute markedly to the leading causes of death, disability, and social problems among youth and adults in the United States. The YRBSS includes national, state, and local school-based surveys of representative samples of 9th through 12th grade students. These surveys are conducted every two years. All data describing youth activity levels and prevalence of health conditions were extracted from the 2004 YRBSS survey at the level of the *state* of Indiana. Data are not released at the county or MSA level due to an inadequate statistical sample.

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