BIKE PLANNING FOR EQUITY

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Abstract

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This paper focuses on issues in urban and regional bike planning that contribute towards inequity. This paper offers a study on the definition of equity and studies how equity relates to urban and regional planning particularly in transportation issues. A review of existing literature offers examples of how policy, ordinances, design, infrastructure, and the planning process affect marginalized people. This review revealed that many common elements of bike planning might negatively affect marginalized people. Provided are suggestions on creating more equitable bike planning including GIS methods to study environmental justice, an example of an equitable complete streets ordinance, and general recommendations for improving bike planning. Urban and regional planners may use this thesis to examine their bike planning practices and use the recommendations in this paper to create a more equitable practice. While this paper offers many recommendations, further research is needed on many aspects of improving the bike planning practice including relationships with land use, public safety issues, and bike share equity among many other issues.

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Introduction

Statement of Problem

Many communities are undergoing major changes to their transportation networks. Part of these changing networks is the usage of the bike as a practical means of transit and as a form of recreation. While bike infrastructure is growing in many communities, many systems lack comprehensive bike infrastructure and may be providing an inadequate levels of service. Access to bike infrastructure or biking as a means of transit and recreation may be particularly difficult for marginalized communities. Additionally, many communities are not addressing this equity issue in their bike planning process, do not know of issues that affect equity in the process, or do not know solutions to those issues. In this context, specifically planning for equity is a practical and ethical requirement.

Purpose of Study

This thesis will analyze issues that make biking and bike planning less equitable. It will then provide means of improving the bike planning process to give planners, designers, and policy makers more ideas and information on how to successfully support equitable planning, design, and policy relating to bikes. This will help planners, designers, and policymakers to be more aware of issues that affect people who bike. This thesis will also help communities who do not know of issues that affect equity in the planning process or do not know solutions to those issues by providing concrete steps to improve equity in bike planning. This thesis will also provide example documents and techniques that can be applied to their own communities.

What is Equity?

Understanding what equity means is vital as many people, including planners, have different definitions. Wellman (2015) interviewed several public transit planners and administrators and found that the vast majority of organizations where those professionals work had mentioned social justice recently but the individuals had varying definitions of what social justice meant (2015). Furthermore, equity has different definitions according to different social groups with their own interests and dependent on social and political context including race and class (Brand 2015). If equity is to be supported through planning then the definition of equity and equity planning must be defined.

Equity planning pioneer Norm Krumholz states that equity planning pays "particular attention to the need of poor and vulnerable populations" (Krumolz 1990, 210). He has described equity planning as "You keep your eye on who gets helped and who gets hurt and for the people who usually get hurt, you try to make sure they don't get hurt as bad." (McIntyre 2014). This paper defines equity *broadly* as fairness and equity planning as a process that supports fairness. The definition of fairness is dependent on context with larger social and cultural issues altering what is required for something to be fair and altering many people's definitions of fairness. In the current context of the world there are large scale issues of racism, patriarchy, social exclusion, economic exclusion and exploitation, and other issues which limit people's rights, opportunities, and ability to achieve their potentials. Equitable actions would attempt to alleviate and eventually end these forms of oppression. Equitable actions must also be in awareness of marginalized groups seeking to end the sources of the marginalization while assuring that those marginalized people are given resources to have the same amount of potential, choice, and

agency as non-marginalized groups. This may require a disproportionate amount of resources being spent for marginalized groups compensating for the resource scarcity of marginalized groups (which occurs because they are marginalized). Marginalization, however, is experienced in more areas than physical resources. Giving marginalized people the same level of potential, choice, and agency as non-marginalized groups requires addressing the larger social, cultural, and economic issues that they face. This may be defined as vertical equity which seeks to correct for larger societal issues through policy that benefits marginalized groups (Litman 2017). Supporting potential, choice, and agency inherently requires that planners support the voices of are marginalized allowing these groups to be part of the process eventually enabling them to lead.

Planning for equitable spaces has existed throughout all of human existence. The paradigms of the American equity planning movement began in the 1960s and 1970s in response to racism, disinvestment, and damaging urban "renewal" (Metzger 1996; Schrock 2014). This form of equity planning used the planner's role in the government apparatus to mobilize marginalized communities, advance and implement pro-equity policy, and redistribute resources to marginalized people (Metzger 1996). This, in essence, has to counteract for the fact that "neutral" planning reinforces existing distributions of power and wealth (Krumholz 1990). Planners, therefore, cannot simply operate in mainstream planning practices but must actively engage equity issues in those planning practices.

One of the most significant plans under the modern equity planning style is the *Cleveland Policy Planning Report* which defined equity as expanding choices for people facing housing, employment, and transportation challenges (Metzger 1996). This work was headed by Norm Krumholz in the 1970s (Zapata 2015). From Cleveland and Chicago where this form of planning

started the movement spread to many cities throughout the country (Metzger 1996). Modern

manifestations of equity planning have included racial justice initiatives and equity in climate

action (Zapata 2015). Transportation was one of the major issues addressed by equity planners in

the past and the relationship between transportation and equity continues to be a necessary aspect

of equitable planning. From the equity planning perspective, all people should have access to

transportation that reasonably allows them to comfortably and efficiently travel, even if by

different modes of transportation.

Relationship of Equity and Transportation

Inequality in transportation is typically created through unequal access to participation in the planning process, unequal exposure to localized environmental burdens, and/or unequal distribution of mobility benefits from transportation investments (Golub 2015). The first aspect of transportation inequity, unequal access to participation in the planning process, is a critical issue in planning. Planners may have very few community meetings with limited times meaning that many workers on shift or hourly work schedules cannot attend. Meetings may be located in neighborhoods that are far from where marginalized people are located, they may be in buildings that make some people feel unwelcome, and they may be difficult to access for people with disabilities or limited transportation options. Unequal exposure to burdens and benefits is directly related to location with only different access to transportation, different qualities of transportation, and different socio-cultural experiences of transportation depending on where a user is located. For example, neighborhoods may have very different wait times for buses, different access to routes or route changes, and different experiences of safety while using transit. In all, equity is directly expressed in transportation. Some people have multiple transportation options many of which will be comfortable and convenient while others may have no travel options at all.

In many cases, economic inequity limits someone's ability to simply afford transportation. Transportation is the second highest expense, after housing, for American families and the percentage spent on transportation increases as family income decreases (Wellman 2015). The result of this is that the quintile of individuals with the lowest incomes spend 40 per dollar earned on transportation which is two times higher than individuals with

higher incomes (Wellman 2015). Transportation is only useful if it is readily available and cost is a major barrier with the people with the fewest transportation options having the highest relative cost because of issues of economic marginalization and transportation issues.

Transportation's main purpose is moving people between different locations and locational issues can express inequity in several ways. Firstly, people who are marginalized are less likely to be able to choose where they live or work and are more likely to face challenges at those locations like harassment and crime depending on how they are marginalized. Minorities often have been intentionally isolated and face more localized environmental burdens because of transportation placement (Golub 2015). This leads to safety impacts because of urban confinement, higher rates of walking, lack of recreational space, and high exposure to traffic (Golub 2015). One example is the location of bike infrastructure. Where bike infrastructure does exist, the placement of bike infrastructure in cities is often focused on providing transportation options to a limited set of workers. Bike transportation planning often revolves around taking bike users in and out of the central business district which ignores the trips of users not going to the central business district (Golub 2016). This infrastructure, therefore, does not provide for people who travel from suburb to suburb (Golub 2016). Central business districts employ many people, many of them marginalized, and they allow for recreation and other activities but central business districts only make up a small fraction of where transportation is needed.

The current CBD-focused transit planning methodology mainly provides for travel to work which accounts for only 20% of travel and forces complicated scheduling on people with many commitments (Chapple 2015). This means that many marginalized areas lack bike infrastructure and even if they have the infrastructure it will likely only take them downtown not to jobs in other areas or to schools, grocery stores, and other places where they need to go. Bias,

to some extent, may change what locations gets access to transit with one study showing a lower bus access in non-Caucasian communities all other things being equal though "neighborhoods with a high percentage of residents without cars receive better bus access" which is a standard concern for transit (Wells 2011, 58). Location determines many aspects of the transit experience from what transportation is available and limited transportation limits options on work, social life, and nearly all other aspects of life.

Inequity, social, cultural, and accessibility issues are manifested in transportation. People using the same transportation may have vastly different experiences of that transportation depending on issues such as racism, classism, patriarchy, and ableism. For example, many bike riders in marginalized communities disproportionately face harassment while biking including street harassment and sexual harassment (Golub 2016, 2). This is, of course, not limited to biking but all forms of transportation. There is also racial profiling aimed at bike riders who are people of color (Hoffmann 2016, 2016, 25). In all, transportation must be viewed through a wide context in which infrastructure alone is not the solution.

The Effects of Inequity in Transportation

A lack of transportation profoundly affects nearly all aspects of someone's life. One major issue is that transportation disadvantage limits economic opportunity. The link between transportation and economic opportunity is evident and the lack of options in many areas contributes towards inequity. This issue is not just limited to a spatial mismatch between jobs and low-income and minority workers, though studies suggest this is true, but there are also social issues that limit job access and both issues must be considered and may affect different groups in different ways (Parks 2004). Public transit is not a fix-all solution to poverty (Sanchez

2004) and a body of research shows that vehicle ownership may have a larger impact on employment outcomes for unemployed people (Blumberg 2014). Nevertheless, there is still a strong relationship between living in transit-rich areas and employment retention (Bloomberg 2014). While car usage has many negative effects on cities low-income people may benefit from access to vehicle the most (Blumenberg 2014). In this system, marginalized people are likely to have the fewest travel options, support sprawl through their tax contributions much of which goes to highway construction and maintenance. All community members face many of the negative effects of suburban commuters and their cars such as noise, pollution, and traffic (Thompson 2013) though for people living in the inner city incoming suburban commuters may pollute their neighborhoods then simply leave again for the suburbs. For marginalized people living in the suburbs, the costs of sprawl like car ownership and commute times are also damaging as Université Laval Professor Jean Mercier explains stating that car commutes have negative effects on the environment as well as on public life because the car excludes the driver from public life (2009).

There is an evident, if often ignored, link between a lack of adequate transportation and social exclusion or a lack of social opportunities. People use transportation to reach friends, family, places of worship, and public spaces. This is particularly difficult for forms of transportation dependent on schedules like buses which, while affordable and sustainable, may not be in operation in the evenings or on weekends when non-work related social opportunities are plentiful. Additionally, transportation to social life may be especially difficulty for marginalized people like people with disabilities and women while other challenges can affect families or people living in rural areas (Ricci 2016; Velho 2016). Additionally, many people may believe that public transportation is inaccessible which may reduce their ability to travel

(Lättman 2015). Many communities have used research on inadequate transportation to create policy that attempts to provide transportation and reduce social exclusion (Lucas 2011).

A lack of transportation options means that people may miss necessary medical work. A lack of transportation is well established as a barrier to healthcare, particularly for vulnerable groups (Yang 2006; Syed 2013). For example, when Serena Yang collected research on the topic, researchers found that a lack of transportation is the main reason Latinx parents delay children's medical visits, and was cited by 51% of users (primarily single mothers) of a studied clinic listed transportation as the main barrier to missing appointments with transportation issues cited by multiple studies (Yang 2006). Syed (2013) reviewed studies on the subject and found that the majority of studies on the issue list distance as an issue in health care access and a lack of transportation was a major issue for health care. Syed found that 3.6 million people were not able to attain medical care due to lack of transportation (2013). This issue was found particularly among "older, poorer, less educated, female, and from an ethnic minority group" as well as children, veterans, and elderly persons with the issue pertaining to marginalized groups being supported by multiple studies (Syed 2013, 987). Additionally, a lack of transportation may have negative effects on mental health because of issues of social exclusion. Another major health issue relates to access to food with many people facing transportation disadvantaged living in food deserts and needing transportation to gain access to healthy food. This is particularly problematic for people who cannot use public transportation (if available) because of an impairment (Crabtree 2013).

Equity in transportation may include issues of the quality of the transportation infrastructure and its impacts on land use, commute time, and pollution, cost of transportation, distribution of transportation in a community, distribution of tax revenue, impacts on land values,

economic activity, employment locations, and accessibility among other issues (Litman 2017). A more comprehensive list of links between equity and impact can be found in *Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning* by the Victoria Policy Institute. Which impacts on equity are emphasized by planners will impact the plan that is created. Transportation and Equity are intrinsically linked and planners must acknowledge this because transportation cannot be improved without addressing equity and equity cannot be achieved without addressing transportation.

Why Plan for Equity?

Planners must address equity for several reasons the first of which is because it is simply an ethical duty. Planning for equity may help to correct issues in society that devalue people, limit their potential and use them. Additionally, planning is an inherently political process, a process which works within exploitative systems, and planning has often been used for goals that are opposed to equity. Conscious choice to plan for equity may help repair many of the problems that planning itself caused.

Planning is often a political act and the political nature of planning is manifested in several ways. Planning, in many cases, uses public funds for its projects. Planning projects are location based because of the nature of planning meaning that some people benefit more than others. Additionally, planners most involve public participation, projects face political feasibility from officials and groups outside planning, and the planning process takes place under larger political structures. Planners also work with space and their actions may benefit some areas more than others while nearly all planning decisions affecting land, the people on that land, neighbors, neighborhoods and entire communities. Sometimes this is based on political pressure, other times public demand, but planning, at least in most aspects, will always be political.

While planners may think of themselves as supporting communities in many different terms planners are often only supporting part of them. In many cases, planning is linked to oppression. Planners often play a role in this through political means of oppression. In an ethnographic study of New Orleans researcher Brand (2015) found that residents on one wealthy white community were using urban planning to actively maintain their area as white and

wealthy. The City implemented zoning that restricted development to single family homes while arguing that too much public funding was going to other neighborhoods to help people of other races (Brand 2015). This neighborhood leveraged planning and public sector dollars to unequally benefit their neighborhood and its recovery (Brand 2015). Privileged voices within the political neo-liberal state may create inequality through planning, intentionally, and many may see that as "equity" (Brand 2015).

A means of addressing this has been through a conscious form of planning known as equity planning. Equity planning is a movement articulated in one form by Norm Krumholz in the 1970s while Krumholz was working in Cleveland (Zapata 2015). Equity planning became a movement by which planners were activists as Krumholz supporting planning that expanded choice in opportunities for the most marginalized members of a community through policy, administration, and resource allocation (Zapata 2015). Equity planning has taken other forms including supporting marginalized voices (Zapata 2015).

Equity planning has often focused on representing marginalized groups and redistribution while some planners and theorists argue that planning still advances the desires of capital instead of marginalized groups (Brand 2015). Equity planning is therefore complicated by structural issues as well as issues which are not always addressed by the planning process and which may limit planning potential. The definition of equity used in this paper is therefore dependent on the planning context and creating more equitable shared transit through planning may be complicated by the inherent limits of planning in the current world context. Furthermore, it is important to acknowledge that transportation planning, even if perfected, would not fix the larger structural issues and structural issues in planning. How an ideal equitable transportation system would function is hard to qualify and would likely different than how an ideal transportation

system would function if society was equitable. The goal of planners in the current context should be to reasonably maximize transportation options for marginalized people as one aspect of larger structural changes.

The Future of Transportation

Many planners and researchers are attempting to understand what the future of transportation will look like. Transportation is changing rapidly with new means of transit or expansions of existing means. It is impossible to say what the future of transportation will be but many planners are already considering how to plan for the communities of tomorrow. Planners must address the changes that the self-driving car might bring, the growth of on-demand and technological driven taxi services, and the increasing popularity of bike share and car share programs (Shaheen 2010). While these are just some of the changes occurring in transportation they will make a major impact on future communities. Despite changes to transportation networks, biking will likely remain an important form of transportation because it is both a practical means of transport and a common recreational activity. Bike planning must acknowledge changes to transportation planning but continued support for bike infrastructure will continue to be a part of America's necessary infrastructure.

Planning in Biking: Past and Future

Cyclists in the United States are twelve times more likely to die in a traffic crash than people in cars (Goddard 2016, 101). This number controls for urban exposure and socioeconomic status and still Black and Hispanic vulnerable road users are disproportionately represented in US traffic deaths…" with a 23% higher bike death rate for Latinos and 30% higher bike death rate for African Americans compared to their white counterparts (Goddard 2016, 101). In recent years, Indiana has seen unprecedented growth in bike infrastructure to provide safer and higher quality bike infrastructure. These investments have given many people greater access to the things that are important to them as the worlds of biking and bike planning have been brought together to create some of America's best bike networks. However, in America's marginalized communities the experience of biking is far from safe.

One means of studying these marginalized communities is through the framework of environmental justice. Environmental justice, in an urban planning context, studies the locations of positive or detracting attributes in relation to locations of people. Environmental justice particularly examines the locations of marginalized people in comparison to the locations of those attributes. One such examination is the location of transportation infrastructure in which transportation systems may support inequities through many means.

Inequality in transportation is typically created through unequal access to participation in the planning process, unequal exposure to localized environmental burdens, and unequal distribution of mobility benefits from transportation investments (Golub 2015, 40). Much of this is related to location and, therefore, environmental justice. The first aspect, unequal access to

participation in the planning process, puts place at the forefront. Planners may have very few meetings with limited times meaning that many workers on shift or hourly work schedules cannot attend. The location, time, and atmosphere of public meetings (if meetings are held at all) is of key importance to the planning process.

Transit comes in many forms and works best when users have many transportation options. While many Americans can access several modes of transportation people in marginalized communities often have limited incomes and limited access to transportation options. One means of giving more people transportation options is by improving or providing bike infrastructure. Biking is healthy, has almost no negative impact on the environment, and is very affordable with the cost of buying and maintaining a bike cheaper than a car and even cheaper than many monthly bus passes. Biking can provide a means of transportation to work, school, religious experiences, and social life. In short, biking matters especially if it provides one more transportation choice for those with few other choices. Having access to bike infrastructure may be the difference in a user's ability to visit a friend or make it to work on time and being able to bike is dependent on being able to do so safely. This is why the location of infrastructure is important, particularly because individuals are typically dependent on a government agency to build this infrastructure.

While biking's role in transportation and recreation is greatly important biking transcends these roles. Before the car became the dominate mode of transportation the street was a mixed use public space for informal marketplaces and social interaction (Lee 2015, 81). Supporting more bike infrastructure can be part of a larger active transportation system taking more people out of their cars and back onto bikes and the sidewalk. People need to be on sidewalks, trails, and bike lanes because they allow more direct interaction of people with the environment and with

each other. Streets are an ecology of social, political, and economic territorial patterns handled

by a series of negotiations (Mehta 2015). Those engagements and interactions are generally

created by vendors, users, and multiple active uses on the street and create a dynamic

environment (Mehta 2015). Areas where interaction is possible leads to diverse social interaction

and even tolerance (Mehta 2015, 97-100). In order to improve the experience of the street and

create a stronger community one step is getting people out of their cars and bikes are a key part

of that goal.

      While biking matters in a number of ways, it appears some neighborhoods do not matter

in terms of bike and transportation infrastructure placement. Minorities often have been

intentionally isolated, and face more localized environmental burdens because of transportation

placement (Golub 2015, 40-41). This leads to safety impacts because of urban confinement,

higher rates of walking, lack of recreational space, and high exposure to traffic (Golub 2015, 41).

This infrastructure, therefore, does not include people traveling at non-peak times (such as shift

workers) or people who travel from suburb to suburb (Golub 2016, 24). This current transit

planning methodology focuses on travel to work which is forcing complicated scheduling on

people with many commitments (Chapple 2015, 299). This means that many marginalized

communities lack bike infrastructure and even if they have the infrastructure it will likely only

take them downtown not to other jobs, schools, grocery stores, or other places where they need

to go.

      In the circumstance that bike infrastructure is actually built in marginalized communities

it is often not for the benefit of the marginalized residents. Planners may not have been

concerned about the bike safety of marginalized communities in the past but often do care when

gentrification is occurring there (Hoffmann 2016, 82). Bike infrastructure may not cause

gentrification or be a form of gentrification but can be part of a larger gentrification-causing

investment scheme making the infrastructure a means of pushing marginalized residents out, not

providing them with transit options (Hoffmann 2016). Even the advertising description of bike

infrastructure is problematic. Bike infrastructure is often advertised as "green" and used to

recruit talent in a competitive market (vs other cities) as opposed to being for the benefit of

residents (Hoffmann 2015,). In Minneapolis, bike infrastructure went where bike culture already

existed and if not in one of those areas the primary force was economic not resident wellness

(Hoffmann 2015). Bike planning is often built around benefiting users who already have several

transportation and recreation options, not in areas of the most need.

Even in areas with bike infrastructure marginalized people face many challenges. People

who are forced to bike out of necessity tend to use relatively cheap bikes, have little

understanding of how to maintain their bikes, and they tend to use the sidewalk because many

feel it is safer or that they should stay out of the way of cars (Hoffmann 2016, 10). Cars or even

bus passes may be too expensive for low-income workers and while bikes have very little regular

maintenance cost they can be expensive to purchase (Hoffmann 2016, 23). This begins to show

that biking is more than just the bike and the infrastructure. If equity and biking are to be

addressed it must include larger cultural and economic issues.

Many riders in marginalized communities disproportionately face harassment while

biking including street harassment and sexual harassment (Golub 2016, 2). There is also racial

profiling aimed at bike riders who are people of color (Hoffmann 2016, 2016, 25). Bike

infrastructure such as trails and bike lanes cannot address these threats (Golub 2016, 2). These

issues often manifest themselves in ways planners did not predict but has also been intentional in

some communities. One possible example is a proposed law California law. UC Riverside

professors Alfredo Mirande and Raymond L. Williams argue that a proposed California helmet requirement law was directed at latinx cyclists because who typically do not wear helmets, often for economic reasons (Mirande 2016, 136). The helmet requirement law would therefore act as a way to harass and control lower-income cyclists (Mirande 2016, 136). People with undocumented immigrant status are also unlikely to report harassment or other incidents due to fear of deportation and other discrimination (Bernstein 2016, 150). This makes people with undocumented immigrants particularly vulnerable to harassment and other issues. Infrastructure, therefore, does not address other issues in cycling such as the danger faced by undocumented immigrants as they cycle and risk deportation (Bernstein 2016) and many issues relating to other marginalized groups.

This is not only a theoretical issue. It is not only the fear of harassment that planners must be aware of but planners must acknowledge that bike ordinances have been used and currently are being used to harass marginalized cyclists. A National Association of City Transportation Officials (NACTO) report, NACTO collected studies on harassment citing several sources and concluded that,

> A review of court and police records in Dallas found significantly uneven enforcement of the city's helmet law, with 96% of citations outside of downtown being written in neighborhoods of color and 86% in areas with large numbers of households below the poverty line. Similarly, a study in New York City of citations for riding on the sidewalk found that communities where most residents are Black or Latino represented 12 of the 15 neighborhoods with the most citations. In contrast, predominantly white neighborhoods, many of which have large cycling populations, made up 14 of the 15 neighborhoods with the fewest citations. In Florida, the Tampa Bay Times found that 8 out of 10 bike citations in Tampa were given to Black people and concluded that "Tampa police are targeting poor, Black neighborhoods with obscure subsections of a Florida statute… Officers use these minor violations as an excuse to stop, question and search almost anyone on wheels."

(Equitable Bike Share 2016)

Many of the issues that marginalized cyclists face are a result of insufficient planners and biking advocacy groups. Bike advocacy is in many places dominated by white men (Hoffmann 2016). However, in the U.S. the greatest share of bicycle commuters is in the Census's lowest income bracket, Latinos have the highest bike commuting rates, and the number of African Americans riding bikes has increased at a much faster rate than their white counterparts (Golub 2016). There is a disconnect between who attends bike meetings, who makes up the bike planning profession community, and who actually uses bike infrastructure. This means that marginalized communities and the greatest share of bike users are often left out of the planning process. While it certainly is possible for these advocates and cyclists to plan for people not like them, the lack of diversity must be acknowledged. The lack of diversity is the fault of planners and advocacy groups who use inadequate outreach but is also affected by larger issues.

Bikes are seen by some bike advocates as superior to cars because they are a form of transit that does not rely on oil but this does not resonate with people for whom cars are a status symbol or a necessity (Hoffman 2016). In high-income areas bikes can be seen as alternative transport, sport, or leisure, while in lower income areas it can be seen as a marker of poverty (Hoffmann 2016). This may make bike advocacy ineffective for some people (Hoffmann 2016) and challenging this issue is difficult because it a cultural issue. Additionally, bike training and other bike offerings may also be ineffective for some people such as explaining how to wear a helmet while also wearing a headscarf or training that is separated by gender (Hoffmann 2016). Many of these issues are affected by the way in which data on biking in a city is collected. Bike counts and quantitative methods often do not take into account the diversity of bike users which involves a range of lived cycling experiences altered by aspects such as race, class, and gender (Golub 2016, 3).

Discrimination in biking comes from more than simply the public sector but also in the private sector such as bike share programs. In North America Bike share's most common use is commuting to work/school with many stating that it is more convenient than owning a personal bike and eliminates the fear of personal bike theft (Fishman 2013, 157). Bike share and transit support each other and in many cases users will use both systems (Fishman 2013, 157). However, access to bike share systems may be limited by structural issues (lack of stations), financial issues (cost to use), and information and cultural issues (cultural barriers) (Hannig 2016, 205). Barriers include lack of internet access to sign up, lack of information, and language barriers (Hannig 2016, 206). Bike share often supports one kind of bike and have locations that support a limited number of users disenfranchising many groups including women, families, and people cycling in groups (Hannig 2016, 212). Women have been shown to be particularly disenfranchised in bike share systems because of risk of harassment, assault, beauty standards, and family responsibilities and bike shares rarely have bikes for children or trailers (Hannig 2016, 212).

Research suggests bike share users are more likely to be white, young, educated, urban men than a city's general population (Fishman 2013, 158). However, in a London study people in sections of the city that were most deprived also had the fewest docking stations but made 0.85 more trips per month that people in the least deprived areas (Ogilvie 2012). Bike infrastructure and balancing cost and convenience have been cited as means of reducing barriers for marginalized people but this may leave out the voices from marginalized communities if they are not included in the planning process (Hannig 2016, 207). Planning without input from marginalized groups will place the values and ideas of planners and (un-marginalized) advocates

into plans. These values and ideas will include biases and a lack of understanding of the needs of the marginalized communities (Hannig 2016, 207).

This has been experienced very directly in areas such as North Minneapolis. North Minneapolis is a lower income racially diverse area which did not initially get bike shares stations when the system was created in Minneapolis (Hoffmann 2016, 121-23). Furthermore, local north-side businesses were often left out of maps on the stations at the start of the program (Hoffmann 2016, 121-123). Later, when the stations were built they were funded only through grants (Hoffmann 2016, 124). Despite fears that the people in north Minneapolis would simply steal all the bikes, no bikes were stolen (Hoffmann 2016, 124).

The public and private sectors are marred by discrimination the problem does not just lie with them. In many ways this discrimination has become subconscious with underlying issues affecting how nearly all people treat cyclists, and cyclists with particular characteristics. In a study, Goddard (2016) found that drivers do not treat all road users equally with drivers using different yield behavior based on race, apparent disability, or age of pedestrians. For example, drivers gave larger passing distances to female and unhelmeted cyclists (Goddard 2016, 102). Goddard's data shows that drivers make conscious or subconscious decisions about visible road users dependent on social constructions (2016). The biases present in the public and private sectors are built into American culture, an issue that planning alone cannot solve.

This literature establishes that transportation including biking is an economic, cultural, and social issue. Marginalized people and the people in marginalized communities, therefore, face major hurdles when it comes to all aspects of transportation. While discrimination is present

in all forms of bike and transportation planning there are many people and communities working towards better transportation for all including those in marginalized communities.

The bike movement is a social movement to "gain access to road, space, policies, and investments to support the use of bicycles for transportation" (Golub 2016, 21). This means that advocacy must include more than simply addressing one form of discrimination in transportation. Promoting cycling should "entail identifying and expanding the social networks and cultural attitudes that support the practice" (Lugo 2016, 180). For example, bike organizations need to reach out to undocumented communities, if they are not already, and may do so by working with individuals active in the latinx immigrant community (Bernstein 2016). Systematic discriminatory issues must be addressed at every level if bike planning is to be successful and there are many communities making steps towards a more equitable bike system and bike culture.

Minneapolis has in many ways provided a pro-equity example in its bike planning. Minneapolis has reorganized its bike advisory committee to appoint people from different wards resulting in a more diverse membership with women being around half of the group and people-of-color being around one third of the group (Hoffmann 2016, 21). Nice Ride, a non-for-profit bike share, later came out with a system of providing bikes, helmets, and locks, and earn up to $200 towards a bike (Hoffman 2016). Users could keep the bike if they rode them at least twice a week, tracked their use, and came to meetings planned around some other community events (Hoffmann 2016). Minneapolis also has a program to address the high cost of purchasing a bike. Community bike shops or labor-for-bike options or long term bike loans with a program known as Cycles for Change (Hoffmann 2016, 23).

While significant progress has been made in some areas not all of the U.S. is seeing this kind of bike advocacy. Planners cannot address all of the issues of transportation discrimination in strictly planning work. Furthermore, planners must be aware of the complexities of urban design and transportation planning. For example, low-income workers often work in places and industries that require car use. Limiting parking may force those industries out of an area thus increasing environmental cost and furthering inequality (Chapple 2015). Additionally, low-income jobs are often dispersed over a whole region and therefore low income people may depend on cars more heavily to reach their jobs and also other goods and services (Chapple 2015). This can be seen directly in many communities in which "big box" stores are major employers. Many of these workers are low income but the form of most "big box" stores places the store in sprawl and makes it difficult and expensive to connect the store to its workers via bike transit. While this is a land use and urban design issues, it further demonstrates that equitable transportation planning is connected to other aspects of planning (Mercier 2009). Complete streets with bike infrastructure may make driving more expensive or time consuming which limits low-income workers but they may also eliminate the need for workers to drive at all reducing their transportation costs considerably. It is a complicated issue that requires planners to address the needs of all people while still supporting sustainable development.

Complete streets like those with bike lanes can help bring more businesses close to home. In a Smart Growth America study, all six if the cities studied that had data on the subject showed that the number of businesses increased after complete street infrastructure was built (Smart Growth America 2015, 20). Smart Growth America notes that while complete streets are not alone responsible for these gains, positive economic trends along most of the studied complete street corridors suggests that complete streets make more desirable places to locate a business

(Smart Growth America 2015, 20). Complete streets are not a perfect solution. Complete streets

can cause private investment, affluent people to move to an area, and then this causes

displacement and anti-displacement strategies are needed to combat this (Goodling 2015, 184).

Some of these strategies are the inclusion of community benefit agreements, community

controlled housing, and workforce development (Goodling 2015, 190). However, many of these

issues require political support and African Americans in low-income neighborhoods likely have

less political power to pressure local government for quality bike infrastructure (Hoffman 2016,

14). Creating change is, therefore, complicated by many external issues to the neighborhood and

to planners as well as structural issues with all forms of planning.

Making Biking Work Better

Complete Streets

Complete streets is a term that refers to making streets safe and accessible for all users. Complete streets policies have rapidly become popular with more than 1100 complete street policies existing in the United States (Complete Streets Development 2015). Complete streets may vary in form but commonly include elements such as sidewalks for pedestrians, bike lanes, and safely sized car lanes. Complete streets are vital to promoting equity because, while all people use streets, marginalized people are more likely to walk or bike and a lack of infrastructure affects their safety directly.

Complete street policies come in many different forms. Some complete street policies take the form of city ordinances while others may be internal department policies. No matter the form of the policy, they have the potential to affect the implementation of complete streets. Despite the different forms of policy, the ordinances usually have similar structures. Many follow the format recommended by Smart Growth America which supports complete streets and provides guidelines to help support their creation. Smart Growth America also provides documentation on equity linking the benefits of complete streets to benefits for marginalized people.

Common complete street elements include visions and policy statements, current conditions, application of the ordinance, exemptions, jurisdiction, design, contact, performance measures, and implementation. In order to maximize the ability for complete street policies to support equity some wording should be specific and contribute towards equity specifically.

The vision and policy section typically includes lists of people that should be considered in the ordinance and whose infrastructure will be part of the complete streets such as cyclists and the elderly. The groups included in this should be comprehensive as later exemptions will allow infrastructure to meet demand. Wording may include that they should be built for users of all ability levels, users of all incomes, users of all races, and users in other marginalized groups. In the vision or application section, a city could state that The City must ensure that complete streets reflect the needs of users of all incomes, races, neighborhoods, and languages while supporting access to job centers for all users, schools for all students, and public places. This line has multiple benefits ensuring, again, that marginalized people are considered while invoking environmental justice through supporting users in different neighborhoods. It also places emphasis on income, race, and language meaning those aspects cannot be ignored during design, funding, construction, operation, and maintenance stages of any project, policy, or plan affecting the public right of way.

Complete street policies typically have exemptions. This section typically allows designers not to accommodate certain users in certain situations. For example, if the cost is excessively disproportionate to need or if there are severe topographic restraints. A limitation not commonly found is an exemption for a circumstance in which the same funds will be used to support complete streets in an area of greater need. Adding this exemption is important to support equity goals and make them possible through the ordinance. This exemption could be used in the case of a wealthy area with many travel and recreational options is going to face construction or maintenance in which the complete streets policy would be applied. This area would benefit from more complete streets but there are likely other areas of a city with fewer travel and recreational options. The funds that would have gone to making the improvements to

the wealthier area could be applied to the area with more need. This allows the city or government agency to save funding and apply it where it is needed most instead of being forced to spend on areas that need it must less. Implementation sections may include a means by which the public can judge the equity of the system (though the public should be involved throughout the writing process).

The effectiveness of complete street policies is debated as, in many cases, they simply enshrine in law what is already being practiced by planners, engineers, and designers. However, in many communities having these requirements may make a major difference in transportation particularly the most vulnerable users. Even in communities where complete streets are being implemented, a complete street policy ensures that good policy is enacted even if government or department leadership shifts. Complete streets are an important aspect of transportation, complete street policies can support these efforts, and these simple additions to complete street policies can allow them to have an even larger impact.

It is important to note that complete streets are not a perfect solution. Industrial uses which may employ low-income people are more likely to expand than other uses and need room to do so (Chapple 2015, 292). The loss or movement of trucking and industrial uses further from the core hurts the overall economy and low-income workers (Chapple 2015, 297-98). As the size of stores grow so does their market area meaning people are more reliant on cars (Chapple 2015, 300). Complete streets may make driving more expensive or time consuming which limits low-income workers. Planners cannot simply support complete streets and assume it will be making commuting easier to for all low-income and other marginalized people. Complete streets are necessary for equity, safety, and enjoyment of the city but they must be combined with economic and land use decisions to support density and affordability. Planners should work with

stakeholders to write and pass complete street policies which may require a political, not simply

planning, process. The means by which complete streets are passed are diverse (Heinrich 2011;

Dotson 2014: Dunham, 2011) so planners must acknowledge and work with their individual

communities to support and pass strong policies. Complete streets are a long term and often

political process but are a necessary part of equitable cities.

Updating Bike Ordinances and Laws

Bike ordinances are common documents with diverse rules affecting biking and exist at

both state and local levels. Many of these ordinances include bike helmet laws which require

some or all bike users to wear helmets. This issue is complicated by several factors including the

actual effect on safety, harassment, and even immigration. Bike ordinances may be rarely

enforced but it is still important to ensure that they are used to benefit the community including

all members of the community.

Bike ordinances often include requirements for bike registration which is highly

problematic as undocumented people may feel uncomfortable or be unable to register their bikes.

As mentioned earlier, bike helmet laws can be used to target and harass undocumented

immigrants, minorities, and other groups. Additionally, researchers have not yet determined if

requiring bike helmets actually make people who bike safer (Bateman 2014). Bike helmet laws

may reduce the number of cyclists therefore reducing motorists understanding of biking and

increasing risk (Bateman 2014). In a study of people not using bike share in Melbourne

Australia, 61% of respondents stated their primary reason for not riding was having to wear a

helmet (Fishman 2014). When Melbourne passed a mandatory bike helmet law, bike ridership

decrease almost 50% (Robinson 2006). However, other evidence suggests that biking helmet

laws do make people who bike safer (Bateman 2014). Younger cyclists likely need to be required

to use bike helmets but for other users the costs must be considered and provisions made to

ensure that they do not result in harassment. The overall conclusion of bike ordinances is that

less is more. Limiting overtly dangerous bike usage is important but must be limited in scope so

as to not discourage biking and actual decrease safety. Lastly, human rights must be protected by

bike ordinances not decreased by them. The League of American cyclists among other

organizations offer guidance on laws and ordinances concerning biking.

Changing Public Participation and Organization

A major aspect of bike participation and organization is bike advocacy groups. These

groups may be larger advocacy groups advising a city or producing documents that a city may

use. Advocacy groups may also be local groups which may work directly with the city. These

groups can provide direct feedback about cycling in a community and can bring in diverse

experiences that locals planners may not know about.

In order to better ensure that the diverse set of experiences possible actually becomes part

of a local bike advocacy group there are many steps a city can take. A city can require that users

from all of the city's neighborhoods be appointed to the bike advisory committee increasing the

number of experiences of the city that can work within the advocacy group. A city can also

specifically reach out to groups often left out of the bike planning process. This could include

simple actions such as speaking to organizations that represent or work with marginalized people

and working with them to invite and involve marginalized people's voices in planning. It also

includes inclusive planning techniques that provide for the needs of low-income people, workers,

undocumented people, women (including specifically single mothers), people of all races, people

with disabilities, and people who speak languages other than English. Individual public participation plans may differ but must specifically include provisions for marginalized individuals.

Cities can also reach out to non-for-profits and other groups. Communication between these groups will allow the city to know more about cycling in the city. It may also provide the city with more opportunities to promote cycling. Non-for-profits or even for-profits can help organize bike events and bike promotion events helping people learn to ride safely or simply enjoy biking more. Lastly, cities should all create comprehensive public participation plans. These plans should then be actively followed and engaged to support input on plans, the planning process, and implementation.

Programs can be established to provide free or low-cost helmets increasing safety through volunteer use. Indianapolis' bike share system has a special program for low-income community members. Some programs loan out bikes in exchange for a certain amount of volunteering or labor. Other programs simply loan bikes out to those who need them. Some groups provide maintenance or teach bike owners how to maintain their bikes. Non-for-profits can also help organize biking lessons, bike safety lessons, and riding events which may make people feel more comfortable about biking.

Incorporating Environmental Justice

Applying environmental justice principles can help communities understand the equity implications of the community's research. Studying environmental justice may take many forms. Environmental justice can be used to examine impacts on marginalized communities both positive and negative. While this should be both qualitative and quantitative using a GIS is one

means of understanding impacts. The Indianapolis MPO used GIS to prioritize its bike

construction (Indianapolis Metropolitan Planning Organization. 2015). Another means of using

GIS to study environmental justice would be by mapping environmental justice areas and

combining it with existing or proposed bike infrastructure.

Case Study of Kokomo

The U.S. Census's American Fact Finder estimate that the City of Kokomo has a population of approximately 58,064 people (2015). Kokomo has a significant elderly population with 26.1% of the population aged 65 or older. Kokomo also has a significant population below the poverty level at 21.3%. Poverty is more predominate in some marginalized communities with 45.6% of Kokomo's significant African American population living in poverty. Though a small percentage of Kokomo, 74.6% of the Native Hawaiian and Other Pacific Islander lives in poverty. Single mother households have a 39.8% poverty rate. 24.8% of Kokomo residents with disabilities face poverty. These issues are experienced by residents and can be viewed spatially by planners with concentrations of marginalized people living in certain sections of the city with many challenges experienced in public space (sidewalks and roads for example).

Many people in Kokomo may face transportation challenges. 2,709 households or 10.7% of households lack access to a vehicle. Many households 10,304 or 40% have access to only one vehicle. A bus or "trolley" system was created in 2010 and currently operates five lines operating Monday through Friday 6:30 am to 7pm. The trolley is free, a major asset towards equity, but limited operation times means other means of affordable transit are still necessary. The City has several miles of existing bike transportation networks include two major trails, the Walk of Excellence Trail and the Industrial Heritage Trail. A map of existing bike infrastructure can be found in the appendix.

Methodology

The data used for this analysis was derived from the American Community Survey (ACS) 2015 five year estimates data set from the U.S. Census. The ACS is conducted every year to provide up to date information about the social and economic needs of the country. ACS data is in one year, three year, and five year estimates. The five year estimates set was chosen as it provides the largest sample size, includes data for all areas, and information can be found at the block group level which is the smallest geographic division used by the census.

Using this data, population groups were identified and located at the block group level. Data was gathered for each block group within the city, for either individuals or households, depending on the indicator. From there, the total number of persons/households was divided by the city average. Any block group that meets or exceeds the city average for that population group, is considered an environmental justice sensitive tract for that group. This data for each block group was then applied to each parcel within that block group. Five indicators of potential disadvantage were used for this study. Any block group can contain between zero and five indicators of potential disadvantage.

The five attributes that were considered to be indicators of potential disadvantage were chosen because people with these attributes make up a significant percentage of Kokomo's population, these groups face structural marginalization, they may face unique planning related issues, and are likely to be more heavily impacted by planning decisions because of structural marginalization. In this study we, therefore, collected data on people of color (including Hispanics), single mother households, elderly households consisting only of people 65+ in age, households with incomes below the poverty level, and carless households. Since poverty is

defined at the family level and not the household level, the poverty status of the household is

determined by the poverty status of the householder. Households are classified as poor when the

total income of the householder's family is below the appropriate poverty threshold.

It is important to acknowledge that this means of defining people who are potentially

marginalized is incomplete and overly broad. These are simply indicators of potential

disadvantage providing broad contextual information to help improve community engagement

strategies and to broadly understand the equity of existing and future transportation

infrastructure.

Establishing population and household numbers here is the first step in mapping environmental

justice areas.

Table 1

Kokomo Population	58,054
Number of households	27,589

Source for Tables: US Census American Fact Finder (2014)
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

The number of people or households depending on data for marginalized groups is

displayed here. In Kokomo, these are some of the largest groups who have characteristics that

may make them marginalized in wider culture. Groups that are likely to be marginalized may

vary from one community to another. For Kokomo, there are significant groups of people who

are people of color, single mothers, elderly, have poverty level incomes, or lack cars.

Table 2

Indicator of Potential Disadvantage	Number	Percentage of Kokomo
People of Color	10,419 people	17%
Single Mother Households	2,528 households	8%
Elderly Households	3,851 households	13%
Poverty Level Income Households	5,195 households	20%
Carless Households	2,623 households	9%

Example of a single issue mapped using enviromental justice mapping. The following map

shows areas of poverty in Kokomo, IN. The map in the top right shows areas that have an above

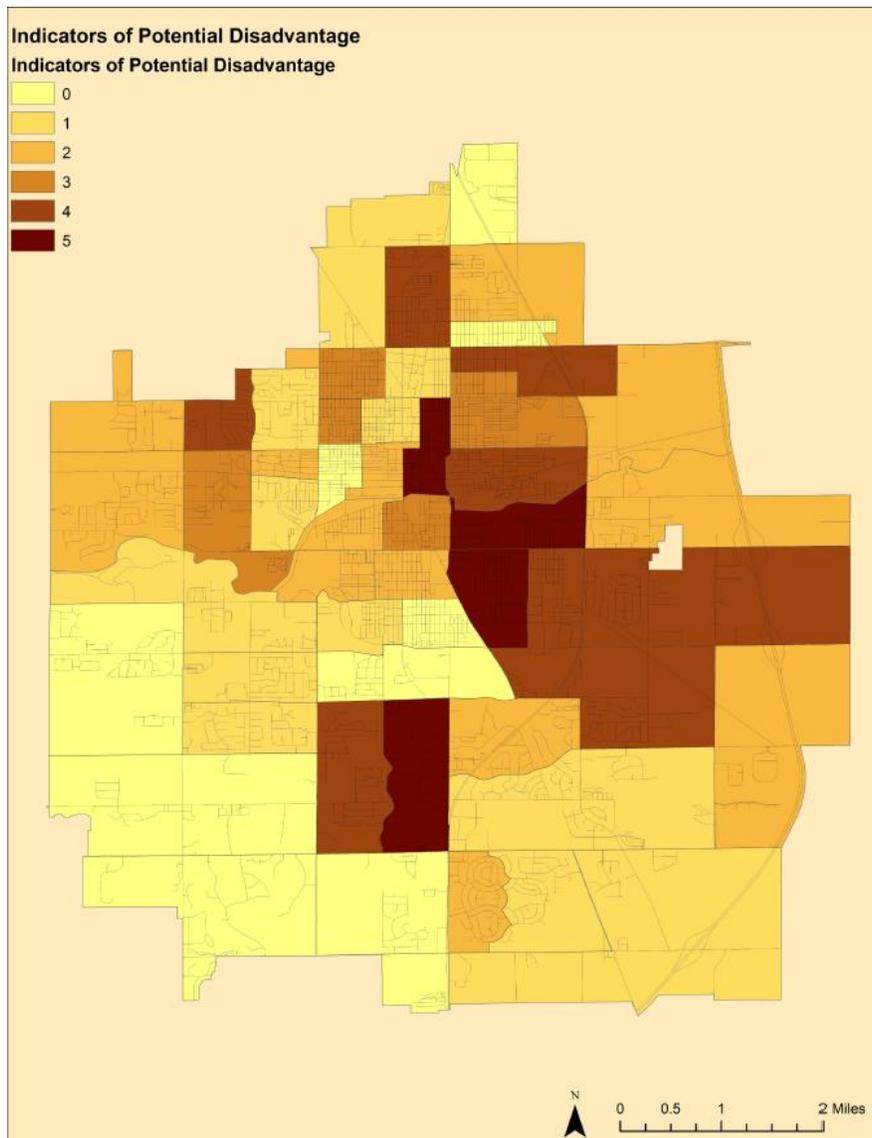average number of people living in poverty.

Map 1
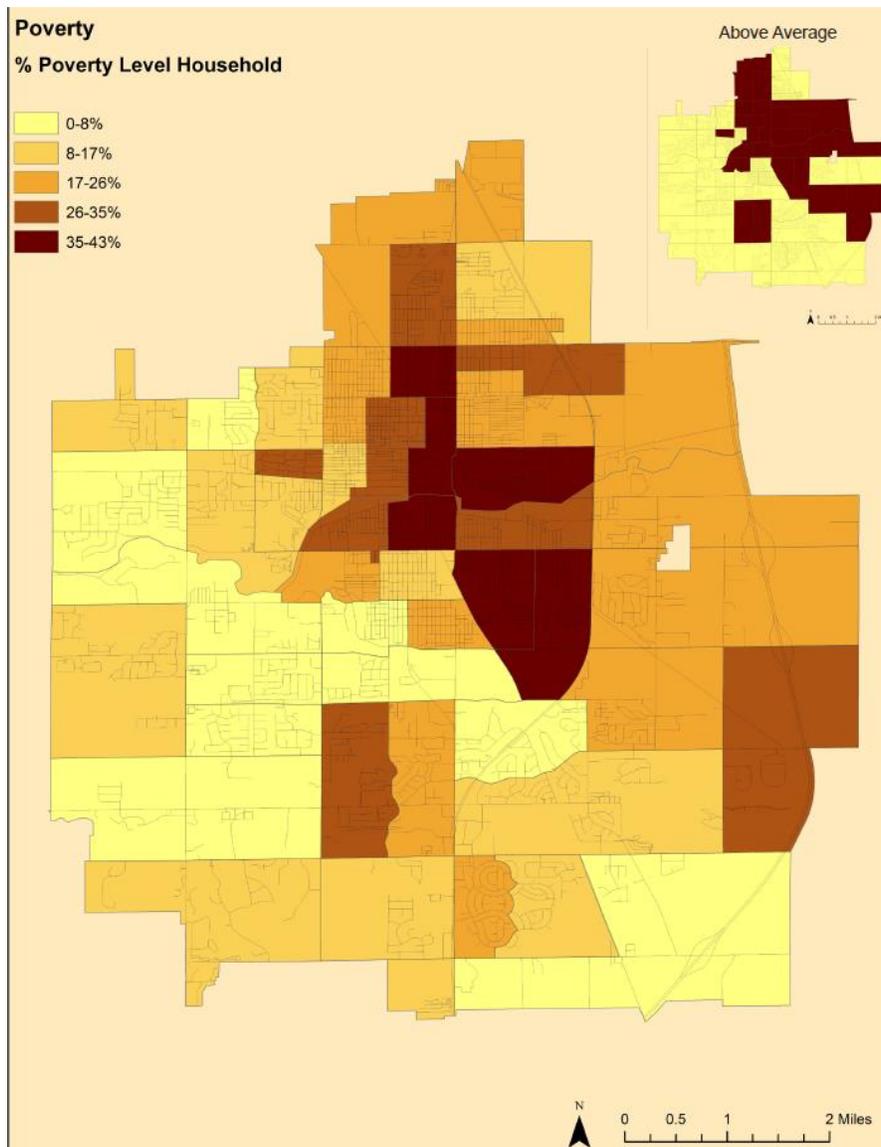
Source: American Fact Finder by the U.S. Census, US Census TIGER/Line Shapefiles, Indiana
Map by the Indiana Geological Survey

City of Kokomo, IN. Mapped by the number of potential indicators of disadvantage per block

group. Each indicator (for example, poverty) is added to the map if it has an above average

number of people with that indicator. These are layered so areas with most indictors of potential

disadvantage can be viewed.

Map 2

Source: American Fact Finder by the U.S. Census, US Census Tiger/Line Shapefiles, Indiana
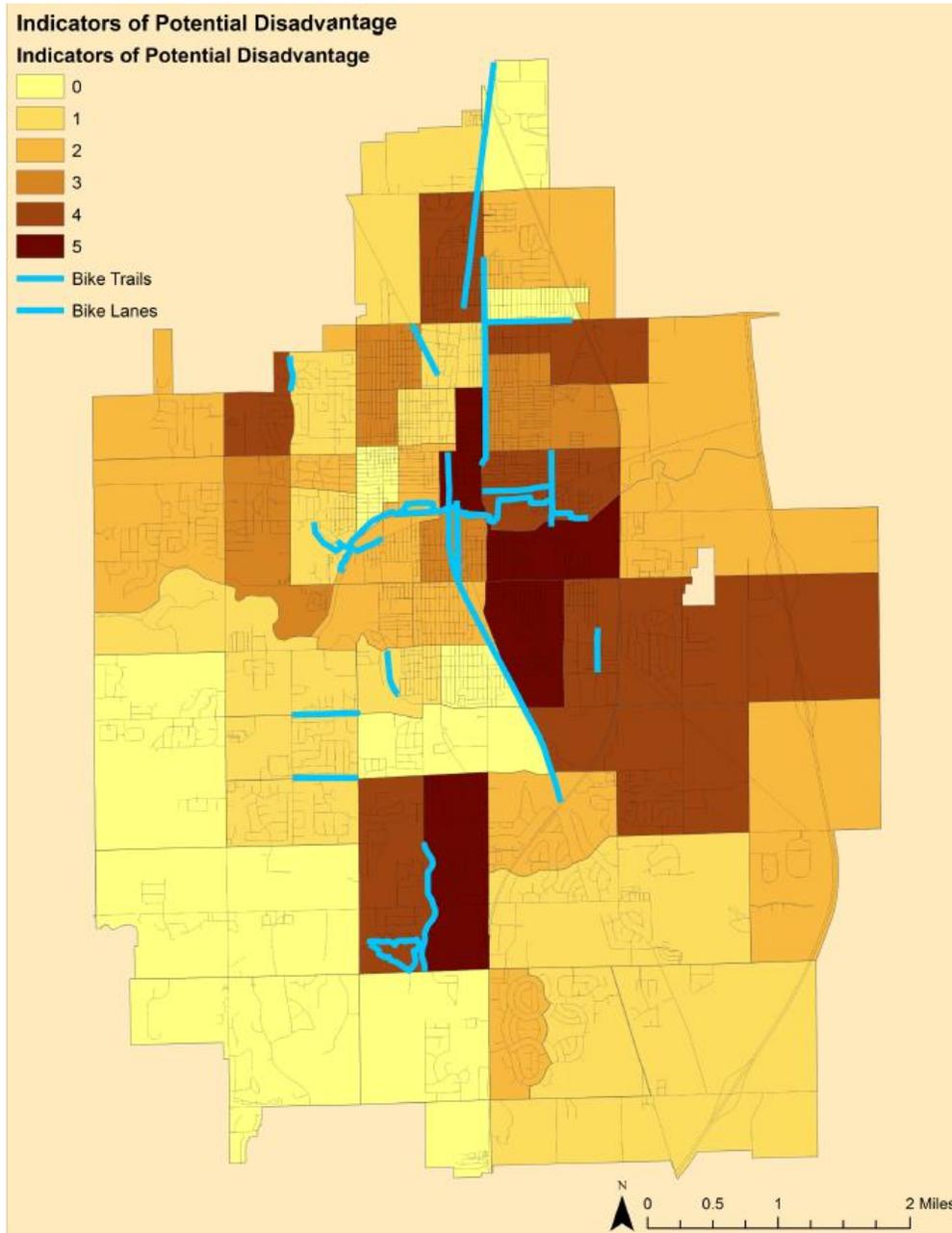
Map by Indiana Geological Survey

The block group data once combined with data on the location of bike infrastructure can provide

percentages of the total block groups in your city with and without infrastructure.

Table 3

	Number of block groups	Number of Block Groups with Infrastructure	Number of Block Groups without Infrastructure	Percent Block Groups with Infrastructure	Percent Block Groups without Infrastructure
Total Block Groups	51	28	23	55%	45%
People of Color	17	12	5	71%	29%
Single Mothers	20	12	8	60%	40%
Elderly	23	13	10	57%	43%
Poverty	24	11	13	46%	54%
Carless	21	11	10	52%	48%

The indicators of potential disadvantage map (map 3) showing where bike infrastructure is
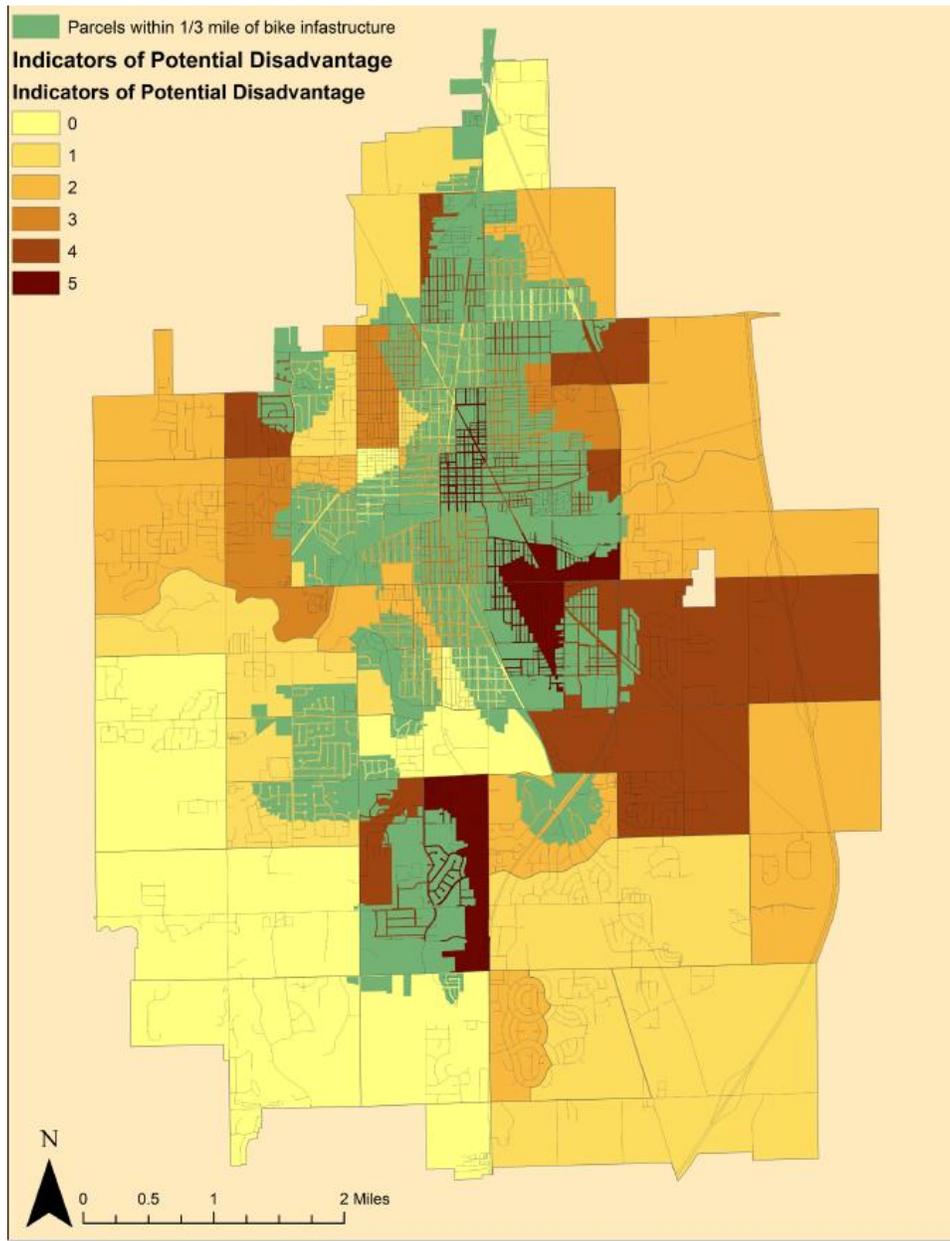
located.

Map 3

Source: American Fact Finder by the U.S. Census, US Census TIGER/Line Shapefiles, Indiana

Map by Indiana Geological Survey

The indicators of potential disadvantage map was spatial joined to a layer of parcels. The

following map (map 4) shows how many parcels are within 1/3 a mile of bike infrastructure.

Map 4

Source: American Fact Finder by the U.S. Census, US Census TIGER/Line Shapefiles, Indiana

Map by Indiana Geological Survey

For further analysis, it is possible to spatial join parcels with the block groups. First, it is best to

have based number for the numbers of parcels in the City. Any parcel within ⅓ of mile was

considered with bike infrastructure but this distance might change in different communities.

Table 4

Total Parcels with Bike Infrastructure	12,391	44%
Total Parcels without Bike Infrastructure	15,843	56%
Total Parcels	28,234	100%
Source: US Census American Fact Finder		

Applying the same logic as with the block groups you can determine how many parcels in blocks

groups that are potentially disadvantaged have access to bike infrastructure.

Table 5

	Total Number of Parcels	With Infrastructure	Without Infrastructure	Percent With	Percent without
Parcels in People of color BG	10,655	5,019	5,636	47%	53%
Parcels in Single Mothers BG	12,998	7,324	5,674	56%	44%
Parcels in Elderly BG	13,569	7,689	5,880	57%	43%
Parcels in Poverty BG	11,875	4,452	7,423	37%	63%

Parcels in Carless BG	11,655	5,221	6,434	45%	55%
Total Parcels	28,234	12,391	15,843	44%	56%

This method also helps determine total number of parcels in block groups with indicators of potential disadvantage.

Table 6

Total Parcels in a block group with any indicator of potential disadvantage.	23,603
Parcels Meet all Categories (scores of 5)	9,817
Parcels in block groups without any indicators of potential disadvantage	4,631

Summary of findings from GIS Analysis

This study found that there are many areas of concentrated potential disadvantage within the City of Kokomo. 44% of total parcels had easy access to bike infrastructure while only 37% households in poverty had access. All other marginalized group categories had higher access to bike infrastructure to the total. While this is an important indicator of environmental justice work it is important to remember that marginalized groups may have less access to other means of transportation meaning that even households with bike access may face transportation challenged as bike infrastructure may be their only means of transportation. Additionally, it does not acknowledge social or cultural issues that may limit use of bike infrastructure or other transportation such as harassment.

This method can examine the service provided by existing infrastructure and the likely impacts of proposed infrastructure. While GIS is a strong quantitative means of studying environmental justice, this method alone will not provide a full picture. In additional to using quantitative methods planners must be actively engaging marginalized people and resource poor neighborhoods to understanding if they would like bike infrastructure or another kind of investment and work with locals to examine how to build infrastructure that serves their needs best. This falls back on public participation and the planning process though this mapping technique can help establish areas where more public outreach is needed and examine best outreach practices (for example high Spanish speaking populations may need translation, high elderly populations may lack transportation to meetings). This GIS analysis is a tool to understand where plans and programs should be targeted.

This is simply one means of measuring equity in bike infrastructure. For another example, see *Equity of Access to Bicycle Infrastructure GIS methods for investigating the equity of access to bike infrastructure by the League of American Bicyclists* (Prelog 2015). If communities do not have access to a GIS software they may use EJ Screen, a free map generator created by the Environmental Protection Agency. EJ Screen can map environmental justice categories such as poverty and race which a community can compare to its bike infrastructure plans and use to help improve public participation.

Changing Infrastructure and Implementation

There are many simple strategies to improve the planning, implementation, and actual infrastructure for bikes. One of the ways that bike planning can be improved is by changing how planners gather data. Often, planners rely on quantitative data to make judgments on the

effectiveness of bike infrastructure and its use. This quantitative data is useful but must be combined with qualitative data gathering. Qualitative data collection involves speaking with users and direct observation. This allows for a much more personal account of bike need or the biking experience than what bike count devices alone could create.

Bike share systems are rapidly growing throughout the United States and the world. These systems have helped to put more bike users on the road providing infrastructure, a mass of users, and the actual bikes to many who did not have access before. Some bike share programs provide low-income users with scholarships to make using the bike share system more affordable. Additionally, bike shares systems may make biking more popular increasing the number of bikers and therefore making biking safer.

While bike shares have many potential benefits towards equity there are still many issues that limit its effectiveness. The lack of bikes for all kinds users makes it harder for families to use bike share and a lack of wagons or other bike accessories limits its use for trips to places like the grocery store. Including a range of bikes and bike accessory can make bike share systems more accessible. Families and grocery shoppers also need bike share stations close to where they live and their destinations. Placing bike share stations near schools, grocery stores, and in diverse neighborhoods will increase their effectiveness. Officials at Indianapolis's bike share system have stated that it is one of the main ways for low-income residents to get around downtown with "25 percent of trips ended at one of two docking stations located next to a grocery store" (Rodd 2016). Planners should also examine areas where marginalized people may work which may be very different from the central business districts where bike share systems are usuallythe most comprehensive. This may be factories in suburban areas or even big-box retailers which often are major employers in smaller cities. Lastly, it is important to acknowledge that many

people in marginalized communities would use bikes to primarily for recreation these users are less able to afford the continuous costs of the bike share system. Additionally, infrastructure improvements like lighting may make biking safer but many marginalized people would still face substantial risks biking.

Bike share systems have potential to provide many opportunities to marginalized people. Bike share systems, however, are not a perfect solution. Long-term, it will be cheaper to buy an individually owned bike instead of consistently paying for access to the bike share system. Many communities work with non-for-profits to achieve this goal. Bike share systems may also be profitable with many tourists and recreational users taking part. Bike share systems may be a part of a larger bike network and with this larger system they can make contributions towards equity but their role and impacts must be carefully considered.

Bike users, particularly those that are part of marginalized communities face many forms of harassment. There is no simple solution to this issue that planners alone can handle. This is an area in which, again, public participation will be vital. In order to address the needs of people who are unsafe when biking (and who are likely unsafe using any means of transit) planners must understand the marginalized transportation experience. To understand this experience and find solutions planners must engage with community, particularly the marginalized.

Conclusion

While complete streets, better infrastructure, and all planning efforts may play a key role in creating a more equitable transportation network they are not a perfect solution. Biking promotes accessibility only when an individual has the "propensity" to cycle and when land use and urban forms allow cycling to be a meaningful means of transport (Martens 2016, 87). Policy, land use, urban design, and the needs of the community must all be considered and this is where theory and planning practice must all work together. If planners must shape the future form of marginalized communities they must do so with members of that community not simply for that community. People living in marginalized communities understand those communities the best and planners can use their unique skills to address local issues. Infrastructure and changes to urban form are needed but they are not enough when used alone. Only when planners combine professional work with community empowerment can they actually address issues in marginalized communities. Equity planner Norm Krumholz acknowledges this fact stating: "planners cannot single handedly change the landscape and political economy of our cities. We should not ask planners to do what only broader social movements can accomplish" (Krumholz 1990, 210). This is, however, not an excuse not to try or to contribute. Planners can play a role in shaping their communities and they must do so as professional planners and as members of the community.

Transportation is how people get to the things that are important to them. Planners must focus on the home, the workplace, and third places but have to connect all of those important places with transportation. While many planners are working towards this goal some are

forgetting about marginalized communities and the people in them. Bike infrastructure is not a

perfect solution but in many communities it can be life changing.

References

American Fact Finder. U.S. Census Bureau, n.d. Web.

Bateman-House, A. (2014). Bikes, Helmets, and Public Health: Decision-Making When Goods Collide. *American Journal of Public Health, 104*(6), 986-992

Bernstein, J. (2016). No Choice but to Bike: Undocumented and bike-dependent in rust belt America. In A. Golub (Ed.), Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

Blumenberg, E., & Pierce, G. (2014). A Driving Factor in Mobility? Transportation's Role in Connecting Subsidized Housing and Employment Outcomes in the Moving to Opportunity (MTO) Program. Journal of the American Planning Association, 80(1), 52-66.

Brand, A. L. (2015). The Politics of Defining and Building Equity in the Twenty-First Century. Journal of Planning Education and Research, 35(3), 249-264. doi:10.1177/0739456x15585001

Chapple, K. (2015). Incomplete streets, complete regions: In search of an equitable scale. In S. Zavestoski & J. Agyeman (Eds.), Incomplete streets: Processes, practices and possibilities. London: Routledge, Taylor & Francis Group.

Crabtree, J. L., & Mushi-Brunt, C. (2013). Public Transportation to Obtain Food: An Overlooked Instrumental Activity of Daily Living. OTJR: Occupation, Participation and Health, 33(4), 209-217

Delbosc, A., & Currie, G. (2011). The spatial context of transport disadvantage, social exclusion and well-being. Journal of Transport Geography, 19(6), 1130-1137.

Dodson, E. A., Langston, M., Cardick, L. C., Johnson, N., Clayton, P., & Brownson, R. C. (2014). "Everyone Should Be Able to Choose How They Get Around": How Topeka, Kansas, Passed a Complete Streets Resolution. Preventing Chronic Disease, 11, E25. http://doi.org/10.5888/pcd11.130292

Dunham, M. (2011) Where the Shoe Leather Meets the Road: Learning From Experience in Crafting a Complete Streets Ordinance, Planning & Environmental Law, 63:8, 3-8, DOI: 10.1080/15480755.2011.604226

Equity of Access to Bike Infrastructure GIS methods for investigating the equity of access to bike infrastructure (Rep.). (2015, September). Retrieved http://bikeleague.org/sites/default/files/bike_equity_index_final_2.pdf

Equitable bike share means building better places for people to ride (Rep.). (2016, July). Retrieved

http://nacto.org/wpcontent/uploads/2016/07/NACTO_Equitable_Bikeshare_Means_Bike_Lanes.pdf

Fishman, Elliot, et al. (2014) "Barriers to bikesharing: an analysis from Melbourne and Brisbane." Journal of Transport Geography. Accessed via: http://dx.doi.org/10.1016/j.jtrangeo.2014.08.005

Fishman, E., Washington, S., & Haworth, N. (2013). Bike Share: A Synthesis of the Literature Transport Reviews, 33(2), 148-165.

Goddard, T. (2016). Theorizing Bicycle Justice Using Social Psychology: Examining the Intersection of Mode and Race with the Conceptual Model of Roadway Interactions. In A. Golub (Ed.), Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

Golub, A. (2016). Is the right to bicycle a civil right? Synergies and tensions between the transportation justice movement and planning for bicycling. In A. Golub (Ed.), Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

Golub, A. (2016). Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

Golub, A. (2015). Moving beyond Fordism: "Complete streets" and the changing political economy of urban transportation. In S. Zavestoski & J. Agyeman (Eds.), Incomplete streets: Processes, practices and possibilities. London: Routledge, Taylor & Francis Group.

Goodling, E., & Herrington, C. (2015). Reversing complete streets disparities: Portland's community watershed stewardship program. In S. Zavestoski & J. Agyeman (Eds.), Incomplete streets: Processes, practices and possibilities. London: Routledge, Taylor & Francis Group.

Hannig, J. (2016). Community Disengagement: The Greatest Barrier to Equitable Bike Share. In A. Golub (Ed.), Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

Heinrich, K. M., Aki, N. N., Hansen-Smith, H., Fenton, M., & Maddock, J. (2011). A Comprehensive Multi-Level Approach for Passing Safe Routes to School and Complete Streets Policies in Hawaii. Journal Of Physical Activity & Health, 8S135-S140.

Hoffmann, M. L. (2016). Bike Lanes Are While Lanes. Lincoln and London: University of Nebraska Press.

Hoffmann, M. (2015). Recruiting people like you: Socioeconomic sustainability in Minneapolis's bicycle infrastructure. In S. Zavestoski & J. Agyeman (Eds.), Incomplete streets: Processes, practices and possibilities. London: Routledge, Taylor & Francis Group.

Indiana Map. Indiana Geological Survey, n.d. Web.

Indianapolis Metropolitan Planning Organization. (2015). *2015 Central Indiana Regional Bikeways Plan*. Indianapolis, IN.

Lee, D. J. (2015). The unbearable weight of irresponsibility and the lightness of tumbleweeds: Cumulative irresponsibility in neoliberal streetscapes. In S. Zavestoski & J. Agyeman (Eds.), Incomplete streets: Processes, practices and possibilities. London: Routledge, Taylor & Francis Group.

Lattman, K., Friman, M., & Olsson, L. E. (2016). Perceived Accessibility of Public Transport as a Potential Indicator of Social Inclusion. Social Inclusion, 4(3), 36.

Litman, T. (2017). Evaluating Transportation Equity Guidance for Incorporating Distributional Impacts in Transportation Planning. Victoria Policy Institute

Lucas, K., & Currie, G. (2011). Developing socially inclusive transportation policy: Transferring the United Kingdom policy approach to the State of Victoria? Transportation, 39(1), 151-173

Lugo, A. E. (2016). Decentering Whiteness in Organized Bicycling: Notes from Inside. In A. Golub (Ed.), Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

McIntyre, M. K. (2014, September 25). Planning legend Norm Krumholz's tenure on the Cleveland City Planning Commission ends, involuntarily: Michael K. McIntyre's Tipoff. Retrieved from http://www.cleveland.com/tipoff/index.ssf/2014/09/planning_legend_norm_krumholzs.html

Martens, K., Piatkowski, D., Krizek, K., & Luckey, K. (2016). Advancing discussions of cycling interventions based on social justice. In A. Golub (Ed.), Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

Mirande, A., & Williams, R. (2016). Rascuache Cycling Justice. In A. Golub (Ed.), Bicycle justice and urban transformation: Biking for all? London: Routledge Taylor & Francis Group.

Mehta, V. (2015). The Street as Ecology. In S. Zavestoski & J. Agyeman (Eds.), Incomplete streets: Processes, practices and possibilities. London: Routledge, Taylor & Francis Group.

Mercier, J. (2009). Equity, Social Justice, and Sustainable Urban Transportation in the Twenty-First Century. Administrative Theory & Praxis (M.E. Sharpe), 31(2), 145-163. doi:10.2753/ATP1084-1806310201

Metzger, J. T. (1996). The Theory and Practice of Equity Planning: An Annotated Bibliography.Journal of Planning Literature, 11(1), 112-126. doi:10.1177/088541229601100106

Ogilvie, F., & Goodman, A. (2012). Inequities in usage of a public bicycle sharing scheme: Socio-demographic predictors of uptake and usage of the London (UK) cycle hire scheme. Preventive Medicine, 55(1), 40–45

Parks, V. (2004). Access to Work: The Effects of Spatial and Social Accessibility on Unemployment for Native-Born Black and Immigrant Women in Los Angeles. Economic Geography, 80(2), 141-172.

Prelog, Racheal. Equity of Access to Bicycle Infrastructure GIS Methods for Investigating the Equity of Access to Bike Infrastructure. Rep. League of American Cyclists, Sept. 2015. Web.

Ricci, M., Parkhurst, G., & Jain, J. (2016). Transport Policy and Social Inclusion. Social Inclusion, 4(3), 1. doi:10.17645/si.v4i3.668

Schrock, G. (2014). Connecting People and Place Prosperity: Workforce Development and Urban Planning in Scholarship and Practice. Journal of Planning Literature, 29(3), 257-271. doi:10.1177/0885412214538834

Shaheen, S., Guzman, S., & Zhang, H. (2010). Bikesharing in Europe, the Americas, and Asia. Transportation Research Record: Journal of the Transportation Research Board, 2143, 159–167.

Smart Growth America. (2015). Complete Streets Policy Development. Retrieved from https://smartgrowthamerica.org/program/national-complete-streets-coalition/policy-development/

Smart Growth America. (2015). Safer Streets, Stronger Economies Complete Streets project outcomes from across the country (Rep.). Washington DC: Smart Growth America.

Syed, S. T., Gerber, B. S., & Sharp, L. K. (2013). Traveling Towards Disease: Transportation Barriers to Health Care Access. Journal of Community Health, 38(5), 976-993.

"TIGER/Line® Shapefiles." US Census Bureau Geography. US Census, n.d. Web.

Thompson, D. (2013, October). Suburban Sprawl, Exposing Hidden Costs, Identifying Innovations (Rep.). Retrieved http://thecostofsprawl.com/report/SP_SuburbanSprawl_Oct2013_opt.pdf

Velho, R., Holloway, C., Symonds, A., & Balmer, B. (2016). The Effect of Transport Accessibility on the Social Inclusion of Wheelchair Users: A Mixed Method Analysis. Social Inclusion, 4(3), 24. doi:10.17645/si.v4i3.484

Wellman, G. C. (2015) The Social Justice (of) movement: How Public Transportation administrators define social justice. Public Administration Quarterly, 39(1), 117-146.

Wells, K., & Thill, J. (2011). Do Transit-Dependent Neighborhoods Receive Inferior Bus Access? A Neighborhood Analysis in Four U.s. Cities. Journal of Urban Affairs, 34(1), 43-63.

Yang, S., Zarr, R. L., Kass-Hout, T. A., Kourosh, A., & Kelly, N. R. (2006). Transportation Barriers to Accessing Health Care for Urban Children. Journal of Health Care for the Poor and Underserved, 17(4), 928-943

Zapata, M. A., & Bates, L. K. (2015). Equity Planning Revisited. Journal of Planning Education and Research, 35(3), 245-248. doi:10.1177/0739456x15589967

Appendix

Example Complete Streets Policy Written for the City of Kokomo, IN – Annotated

Vision and Policy Commitment:

The City of Kokomo will support complete streets which are defined as streets in which all users are safe and supported. The Complete Streets Policy is meant to act as a commitment to support the construction of complete streets in Kokomo. All work by the City of Kokomo involving the planning, policy, or design of the public right of way must consider and attempt to provide safety to all users including people using cars, people walking, people biking, people using wheelchairs, people who have disabilities, people using transit, freight haulers, people using horse-based transit, and emergency vehicles. (*This may change in different communities as horse based-transit is specific to Kokomo in which there is a significant number of people using horse and carriages for transportation*). The City must consider and provide safety to all users of all ages, from children to seniors, and build for users of all ability levels, users of all incomes, users of all races, and users in other marginalized groups (*This is purposefully generally to be inclusive though specific groups which are often ignored by planners get mentioned by name*). The City must also consider adjacent land uses, and the environment. The City's commitment to these complete streets must be part of the entire planning, policy, or design process from the earliest stages to end and including design, funding, construction, operation, and maintenance stages. The commitment to complete streets must include considerations for creating a

comprehensive network of safe and efficient travel options for all users. By following this commitment, the City of Kokomo can create and support complete streets.

Current Conditions

Various departments make decisions which will affect complete streets through policies, plans, or designs. The City of Kokomo often supports complete streets already through the work of various departments though the City lacks a comprehensive commitment to complete streets. This Complete Streets Policy will better ensure that all users are accommodated and that the best street designs are implemented. A lasting commitment from the City of Kokomo, with incremental change, will support complete streets in the future.

Application of Complete Streets on Projects and Phasing:

This policy applies to the entire planning, policy, or design process from the earliest stages of the process to the end. This may include the design, funding, construction, operation, and maintenance stages of any project, policy, or plan affecting the public right of way. The City must enact this commitment for all new construction, reconstruction, retrofits, resurfacing, rehabilitation, repair, or maintenance in the public right of way (*some policies are more specific about the form of maintenance, the need to make specific mention will dependent on your exception section*). Existing infrastructure or projects currently underway that are part of the public right of way are exempt from this policy until it is subject to new construction, reconstruction, retrofits, resurfacing, rehabilitation, repair, or maintenance. The City must consider and attempt to create a comprehensive network of complete streets safely connecting users and uses across the City. The City must ensure that complete streets reflect the needs of users of all incomes, races, neighborhoods, and languages while supporting access to job centers

for all users, schools for all students, and public places. (*This, again, is general for the city as a whole but includes specific groups often excluded from the planning process. An important aspect is language ensuring the speakers of less represented languages can still reasonably be part of the planning process and use complete streets*).

Exemptions:

The only exemptions from following the complete streets policy in new construction, reconstruction, retrofits, resurfacing, rehabilitation, repair, or maintenance is if circumstances would make following the complete streets policy impractical. Impractical is defined as a situation in which,

- The cost of accommodating the Complete Streets Policy is excessively disproportionate to the need or probable use of all users

- Accommodation is not necessary because the public right of way prohibits certain users

- There is an absence of current and future need

- There are severe topographic constraints

- The same funds will be used to support complete streets in an area of greater need (*this allows planners to avoid spending funds on areas which already have many transportation and recreation options to instead use those funds elsewhere where there are fewer transportation and recreation options*)

Additional exemption related considerations,

- Transit accommodations are not required where there is no existing or planning transit service

- The City does not have to implement this plan for ordinary maintenance (maintenance that does not change geometry or operations such as mowing) or if maintenance is emergency maintenance.

All exemptions must be approved by unanimous agreement and signatures of the Director of Kokomo Howard County Governmental Coordinating Council and Head of the City of Kokomo Engineering and Traffic Department. Attached must be a documented reason for the exemption.

Jurisdiction:

The Complete Streets Policy applies directly to all work involving the public right of way worked on by the City of Kokomo or receiving funds by the City of Kokomo. The Complete Streets policy must also be supported by policies and designs used by departments. When possible the City should support complete streets with other levels of government, with neighboring jurisdictions, and with private developments.

Design:

The City of Kokomo will follow design practices which best supports complete streets. Documents meant to guide this design include the ADA Plan, Alternative Transportation Plan, and other documents. Additionally, the City should, to the greatest extent possible, meet the most current editions of and follow:

- American Association of State Highway Transportation Officials (AASHTO)
- Policy on Geometric Design of Highways and Streets, Guide for Planning, Designing, and Operating Pedestrian Facilities, and Guide for the Development of Bicycle Facilities;
- Institute of Transportation Engineers (ITE) Designing Walkable Urban Thoroughfares: A Context Sensitive Approach;

- National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide;
- U.S. Access Board Public Right-of-Way Accessibility Guidelines
- Highway Capacity Manual and Highway Safety Manual; and the Manual on Uniform Traffic Control Devices."
- Safe Routes to School Improves the Built Environment.
- The Right to Transportation: Moving to Equity
- Planning Complete Streets for an Aging America
- FHA Office of Civil Rights
- Public Right-of-Way Accessibility Guidelines

Context:

In the planning and implementation of the Complete Streets Policy the City must consider local context. This policy acknowledges the uniqueness of certain places and the diverse needs of urban, suburban, and rural communities and the City will work together with local stakeholders to ensure that quality of place and ecological health are supported.

Performance Measures:

The City should consistently monitor its own success concerning the construction of complete streets infrastructure and infrastructure which contributes to complete streets. This includes but is not limited to bike lanes, bike routes, sidewalks, road conditions, and transit access. The City should also monitor its own success concerning the use of the City's streets and transit and should monitor any difficulties that users have as well as ways in which transportation options can be improved. In addition to monitoring its own success, the City should respond to user feedback to improve streets for all users and must determine success by the rate of use and safety of use. The City should measure its performance every time that decisions are being made that could contribute to complete streets infrastructure and infrastructure which contributes to

complete streets. Additionally, the City must evaluate if its complete streets infrastructure is supporting the needs of people with low incomes, people who are transit dependent, women with children, people of color, and other marginalized groups. (*There are several means of evaluating performance some external and some internal. No matter what performance measures you choose it is important to include diverse and marginalized voices*)

Implementation:

1. City departments should consider restructuring or revising existing plans to best support complete streets as City departments will actively support complete streets in all future plans.

2. The City will review existing measures, guidelines, and policies to see if they can better support complete streets.

3. The City will actively seek funding for complete streets implementation.

4. Design guidelines, plans, and other documents should be updated to support the implementation of complete streets.

5. Develop and institute better ways to measure performance and collect data on how well the streets are serving all users.

GIS Methodology

The following methodology is for communities using Esri's ArcMap 10.4.1. Communities with earlier versions of ArcMap may need to adapt the methodology. Similar results are possible using other GIS software. If a community lacks any GIS software or experience the EPA has published environmental justice mapping via EJ Screen. https://www.epa.gov/ejscreen This easy to use displays environmental and demographic data. Simply launch the map and either generate

reports by location or add maps and select EJ screen maps then demographics or select more demographics.

Download Data for ArcMap

1. Go to US Census TigerLine Shapefiles https://www.census.gov/geo/maps-data/data/tiger-line.html

2. Under the 2015 tab (or whatever year your Census data will be) click download then web interface

3. Select the year of your Census data then download block groups. Select your state, download the data, and extract the data.

4. Block groups are the only required shapefile though you may want to download states, roads, places (cities), counties, and other data.

Downloading Census Data

5. Go to The United States Census Bureau American Fact Finder and then go to advanced search

6. Under geographies selected block group, the smallest geographic area for which data is available then select your state and county

7. Click on the result and add the selection

8. Choose which environmental justice groups you want to study. Common choices include race, poverty levels, and carless households. Other common choices include, Hispanic populations, limited English populations, elderly populations, single mothers, and persons with physical disabilities. Your goal should be to examine groups in your own community who may be potentially disadvantaged or marginalized.

9. Find your groups under the topics tab or search for them

10. Click the box to the left of your dataset to check it then click download

11. A zip file will be downloaded with on excel sheet including metadata (information about the data) and another excel sheet (usually ending with _with_ann) which will contain the data.

Formatting Data

12. First format the data. You need to keep Geo.ID and Geo.id2 but not Geo.display.label which may be deleted.

13. You need to have only one row of headers so you may move the GEO.ID and GEO.id2 to row 2 and then delete row one. Alternatively, you may also move the headers or the data (e.g. estimate total) to row one and delete row two.

14. Headers cannot contain spaces or special characters or periods but may contain underscores. (Example, GEOID, GEOID2, Poverty_households are acceptable headers.

Analyzing Data

15. Find the number of people or households that fall under your environmental justice category. (e.g. add up all of the people of color in one column). Label this column.

16. Determine the percentage per block group by dividing the estimate total by the number of people or households that meet your environmental justice category. Label this column. At this point you will have total population or household column, a column of the total number of people or households that meet your category, and a percentage column. You will likely want to delete all other columns so your data is more manageable.

17. You may also want a column that displays any block group that has a higher than average number of people or households that meet your environmental justice category. To do this, use the IF function in excel. Use the average function to find the average percent of people or households that meet your category. (=IF(cell in % column > cell with average, 1, 0). For example, =IF(E2 > E271, 1, 0). Putting a $ before the letter and cell number will maintain the function at this cell. Drag this function to until all block groups are assigned a 1 or a 0. Any block group with a 1 has a higher than average number of people or households that meet your environmental justice category.

18. Continue this process for all of your chosen environmental justice categories including them all in on sheet.

19. Once you have all your categories create a column and add the environmental justice category columns (either a 1 or a 0). This will layer your categories so you can determine an area that has several potentially marginalized group. For every 1, there is a higher than average number of people who are potentially marginalized so the higher the number the higher the concentration of potentially disadvantaged or marginalized people.

Saving Data to Add to ArcMap

20. Make GEOID column and GEOID2 columns as text by going to the data tab in excel, clicking text to column, choose delaminated and click next, check the tab box, change column data format from general to text, click finish. Repeat for GEOID2.

21. Your document is current a CSV file, save it as an Excel 97-2003 Workbook.

22. Your Data is ready to join to a block group shape file in ArcMap.

Adding Data to ArcMap

23. Create a new map and connect to the folder where your shape file data is stored then add the shape files.

24. You may clip your data to your county or City (clip tool or click on your county then right click on your layer, right-click and extract the data. You may clip the block groups to your county by clicking on Geoprocessing, then clip with the block groups as your input and your county as the clip feature.

25. Join your census data with your block groups by right clicking on the layer, clicking joins and relates, choose the table to join that is your census data, select GEOID for field one and GEOID2 for field three.

26. Change the display by right clicking, clicking properties, clicking symbology, clicking quantities, and making the value your environmental justice category or the column that is the addition of all the environmental justice categories (the column where you added the 1s and 0s). You can repeat this for all of your categories to see where the percentage of those groups is highest.

Final Steps

27. You can copy and paste your layer then change the symbology until all of your categories can be displayed.

28. You may overlay plans or infrastructure such as bus lines or a bike network or use this to indicator areas where investment or community participation is needed.

29. You can select by location, add a field in the attribute table, and add a 1 or other signifier to every block group that has bike infrastructure within its boundary. This would allow for more complex analysis.

30. Ensure that shape files exist for your data. If not, export each layer and save as a shape file.

Vanderburgh County

Vanderburgh county has 9% of homes as carless, 17% of households in poverty, is made up of 18% people of color. 42% of the block groups with the most potential disadvantage contain bike infrastructure.
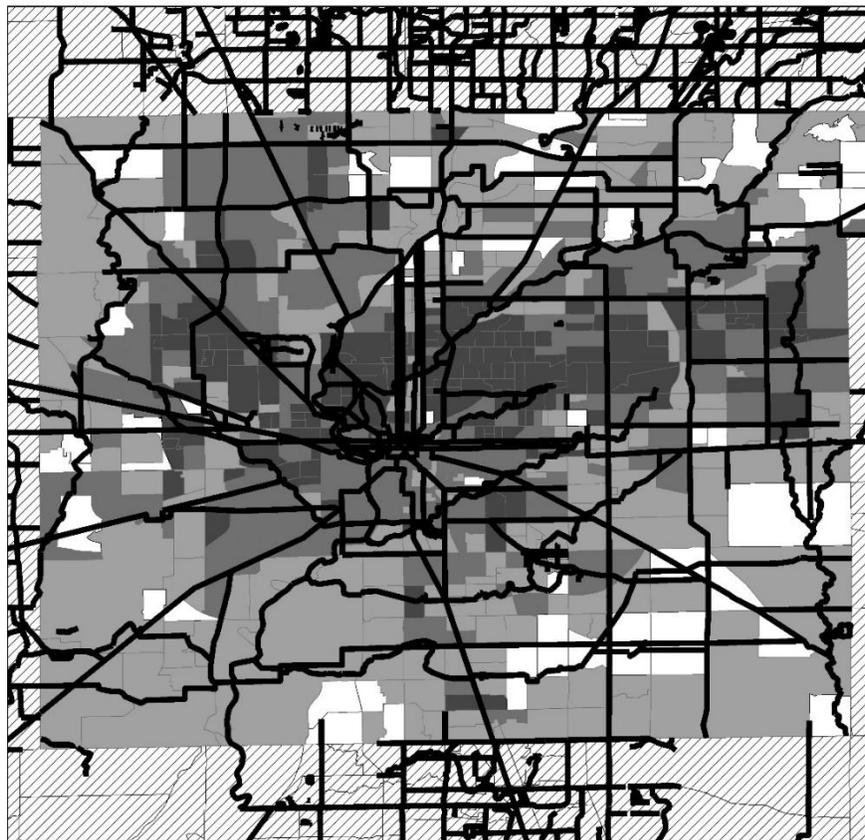
Map 6
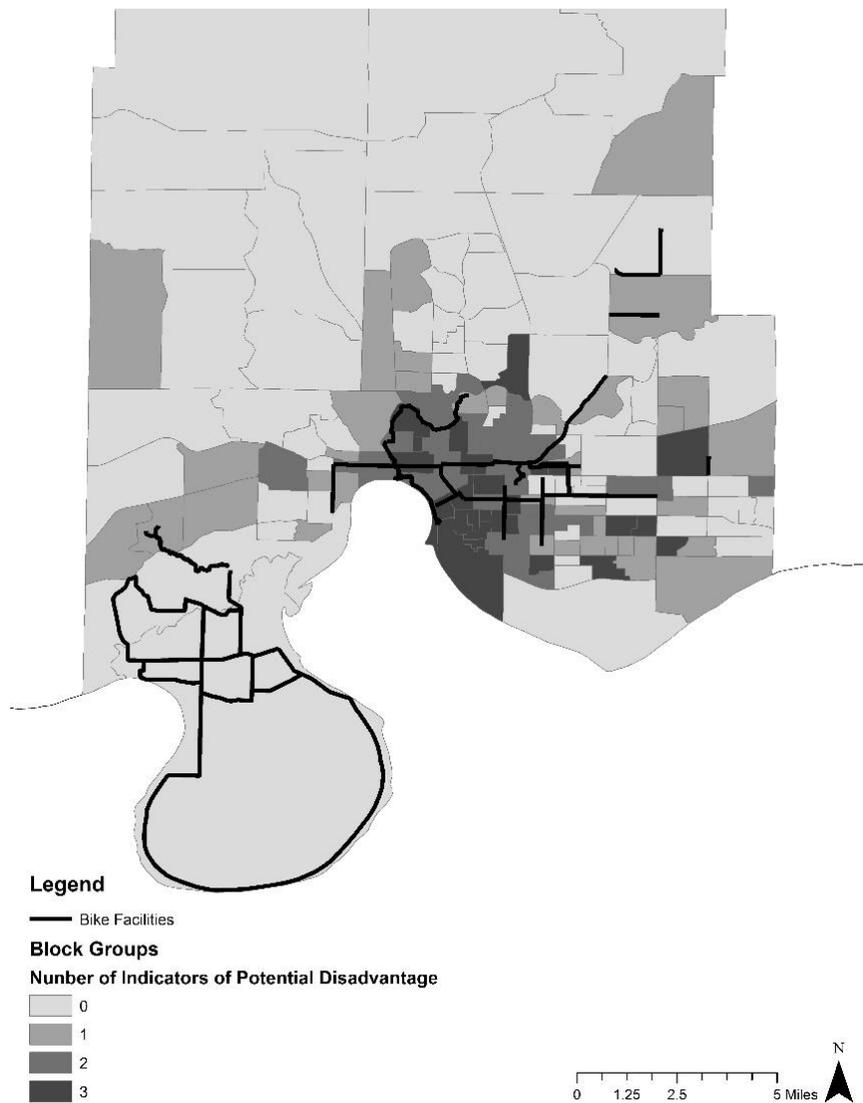
Sources: American Fact Finder by the U.S. Census, US Census TIGER/Line Shapefiles, Evansville Metro Planning Organization shapefiles

Marion County

Marion County has 11% of homes as carless, 21% of households in poverty, is made up of 40%

people of color. The following map shows existing and proposed bike networks.
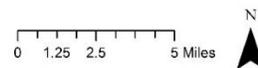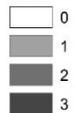
Map 7

Legend

— Existing and Future Bike Network

Marion County Block Groups

Number of Indicators of Potential Disadvantage

- 0
- 1
- 2
- 3

0   1.25   2.5   5 Miles

N

Sources: American Fact Finder by the U.S. Census, US Census TIGER/Line shapefiles
Indianapolis Metropolitan Planning Organization shapefiles