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Walkability and Housing: A Comparative Study of Income, Neighborhood Change and Socio-Cultural Dynamics in the San Francisco Bay Area

By

William Warren Riggs

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

City and Regional Planning

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Robert Cervero, Co-chair  
Professor William A. Satariano, Co-chair  
Professor Malo A. Hutson  
Professor Sam Davis

Fall 2011



Walkability and Housing:  
A Comparative Study of Income, Neighborhood Change and Socio-Cultural  
Dynamics in the San Francisco Bay Area

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by

William Warren Riggs





## Abstract

### Walkability and Housing: A Comparative Study of Income, Neighborhood Change and Socio-Cultural Dynamics in the San Francisco Bay Area

by

William Warren Riggs

Doctor of Philosophy in City and Regional Planning

University of California, Berkeley

Professor Robert Cervero, Co-chair  
Professor William Satariano, Co-chair

Planning research has shown correlations between urban sprawl and obesity. Additional work has correlated higher walkability with increased walking behavior and improved population health independent of race, education, income, or lifestyle preferences. Presumably, people with access to a walkable neighborhood might improve their total well-being; however, housing research suggests that walkability is not equitably allocated and that price, sorting, discrimination and individual preferences may pose barriers to walkable neighborhoods as a health resource.

As such, this work evaluates the inclusiveness of walkable neighborhoods in the San Francisco Bay Area, with the primary question of whether or not those with lower income can afford to live in walkable neighborhoods. Based on exploratory analysis and mapping, while the study finds no evidence of a positive association between income and walkable neighborhoods, the analysis does suggest a negative correlation between race and walkability for the most concentrated populations. Specifically, neighborhoods that are more Black, in locations with a higher share of the total regional population, appear correlated with less walkability.

This pattern leads to the hypotheses that affordability and socio-cultural factors may be contributing to Black clustering in less walkable neighborhoods – that there may be barriers for these individuals to live in the most walkable areas and that many of these individuals may be either, 1) moving to less walkable suburban areas, or 2) left in less-walkable urban pockets. Interviews inform these hypotheses, suggesting that walkability may not factor in to housing decisions and that more research is needed to analyze whether or not income is a barrier to accessing a walkable neighborhood.

Given the possibility that barriers exist, policies are suggested to improve streets, increase affordability, influence behavior, and to change the type of housing and financial tools available – with the goal of encouraging inclusiveness, and better ensuring that more individuals have access to walkable neighborhoods and the health benefits associated with walking.



## Dedication

This dissertation is dedicated to my great-grandfather, my grandfather and my father - Dr. William Jefferson Smith, Mr. Earl Warren Riggs and Dr. Glenn Richard Riggs. All three of these men are examples of the fact that I have been blessed with many excellent educational opportunities during my life — due in some part to their legacy. I am the oldest son of an oldest son, the latest in a line of doctors, lawyers, engineers and artists.

Dr. Smith, my great-grandfather, educated himself with a notorious bunch of medical students from the University of Louisville who would rob graves for research cadavers in the late 1800s. Earl, my grandfather, completed a Master's in electrical engineering and designed guidance systems for the Navy after serving in the Air Force during WWII. My father, Glenn, is just the latest in the line of these educated citizens but unlike my great-grandfather and grandfather, he spent his life devoted to the field of education.

My dad made learning a constant theme in our family – not only to my siblings and me but also to countless other students, both young and old. On the first day of school each year he would address parents and students of all ages during the opening assembly in the school auditorium and talk about education being a privilege. Dad would stand on stage in a crisp black suit and red tie and warmly welcome new and returning students with a blessing. “Train up a child in the way he will go, and when he is old he will not depart from it,” he would quote from the book of Proverbs.

This was not something he would just say in front of crowds – he truly believed it and practiced it daily. He was a parent who read and did homework with his children. Hikes outdoors became learning opportunities as we would identify plant and animal species. Dinnertime discussions were on vocabulary, economics, engineering, science, religion, music, art, business or his favorite – real estate. Even in his own dissertated, published in 1993, he encouraged my siblings and I to seek knowledge in order to gain wisdom so that we “might know that the beginning of wisdom is the fear of God.”

Abigail Adams, wife of founding father John Adams once said,

*“Improve your understanding for acquiring useful knowledge and virtue, such as will render you an ornament to society, an honor to your country and a blessing to your parents... and remember you are accountable to your Maker for all your words and actions.”* (McCullough 2001)

This philosophy summarizes how the beliefs of my elders have framed my own work and education. I am truly indebted to them for the gift of life-long learning that has been handed down to me, and hope that I can use it to both honor my country and bless my parents.

Additional dedication to Frederick Riggs, Madigan Riggs, Pearl Sethi, Ajax Sethi-Choudhury and Tristan Sethi-Choudhury that they may live long lives with continued access to walkable places around the world, and to the memory of Mary Jane Gorman, Rosemary Sethi and Rod Fasone who we all hope to walk with again someday.



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## Preface

*August 2009, Monterosso, Cinque Terre, Italy* – After a day of hiking in the hills of Cinque Terre, I settle in to an evening of reading and writing in the village of Monterosso, thinking about my planning work from a different context – from the outside looking in. I have spent the week on a flâneur: walking, thinking and experiencing life in the spirit of such philosophers as Charles Baudelaire, Henry Wadsworth, and Walter Benjamin.

The first thing that comes to mind is a poem my late grandmother Mary Jane used to recite to me. She was born in the hills of rural Eastern Kentucky where recited poetry continues to be an important part of the local culture. It is an area of the United States which, although plagued by abject poverty, still retains a depth of spirit unlike elsewhere in the United States – where walking and the small town are still intertwined in the poor, countryman’s version of Baudelaire’s gentlemanly city stroller. The poem reads:

*There are hermit souls that live withdrawn  
In the place of their self-content;  
There are souls like stars, that dwell apart,  
In a fellowless firmament;  
There are pioneer souls that blaze the paths  
Where highways never ran-  
But let me live by the side of the road  
And be a friend to man.*

*Let me live in a house by the side of the road  
Where the race of men go by-  
The men who are good and the men who are bad,  
As good and as bad as I.  
I would not sit in the scorner's seat  
Nor hurl the cynic's ban-  
Let me live in a house by the side of the road  
And be a friend to man.*

*I see from my house by the side of the road  
By the side of the highway of life,  
The men who press with the ardor of hope,  
The men who are faint with the strife,  
But I turn not away from their smiles and tears,  
Both parts of an infinite plan-  
Let me live in a house by the side of the road  
And be a friend to man.*

*I know there are brook-gladdened meadows ahead,  
And mountains of wearisome height;  
That the road passes on through the long afternoon  
And stretches away to the night.  
And still I rejoice when the travelers rejoice*

*And weep with the strangers that moan,  
Nor live in my house by the side of the road  
Like a man who dwells alone.*

*Let me live in my house by the side of the road,  
Where the race of men go by-  
They are good, they are bad, they are weak, they are strong,  
Wise, foolish - so am I.  
Then why should I sit in the scorner's seat,  
Or hurl the cynic's ban?  
Let me live in my house by the side of the road  
And be a friend to man.*

Authored by American author Sam Walter Foss in 1897, the poem echoes the words from Homer, “He was a friend to man, and lived in a house by the side of the road.” It reminds me how pervasive are the themes of roads, paths, trails, movement and connection, and how they can be traced throughout generations and across cultures. In my life with regard to city planning, I have seen them echoed around the globe in Italy, India, Belize, Kentucky, Minnesota and California. Transportation and human movement for both work and play are global issues – things you can talk to someone about anywhere around the world, by the side of the road or in the halls of national government.

In Cinque Terre a series of walking trails have united coastal trading towns since the days of the Roman Empire. People walk to and fro from town to town, to fulfill not only their economic needs but also social needs for interaction with each other and the outside world. Primary modes of transportation are on foot, horse, bike, or boat, and the street infrastructure respects this. Dense lodging mixed with businesses sprout from the hillsides connected by streets no more than 8 to 10 feet wide in most places. A spine of train lines connects the towns providing quick modern access along the coast.

Cars have changed much of this, just like they have done around the world. Modern traffic jams and pollution now put pressure on streets and infrastructure not designed to handle such capacity, and, more and more, people are less active. This inactivity is leading to a global weight problem. The Organization for Economic Cooperation and Development (<http://www.oecd.org/>) estimates that 35% of Italians were overweight and 10% were obese in 2006, both a rise of 2% since 2000. The US had 33% of the population over age 15 overweight, and 34% obese; however, the percent overweight had declined since 2000, for reasons not identified. My friend Bill who owns a bike tour company in the Chianti wine region of Italy makes observational assessments of this trend. He says that many of his clients are too out of shape to take a moderate 15-mile bike ride through the region, blaming it on poor diet and lack of exercise.

A trip to the beach in Monterosso gave me a glimpse into the global obesity epidemic. Many folks there are soft around the edges and unashamed of it. I sat and watched a small child play soccer; he had a waist girth of someone three times his height. It was a sad but sobering picture of how even Europe is grappling with the same obesity issue that is present in the U.S.

Obviously the invention of the automobile is not all bad and not the only culprit in this weight epidemic. The Italian diet is one notoriously high in carbohydrates and, similar to the US, its population exercises less and less. This combination of diet and exercise is exacerbated by continued urbanization that may not respect access to health resources such as parks, green space and walking facilities. Although many urban spaces are now being cited for their sustainable and livable environments, many suburban locations, such as the immigrant-heavy outskirts of Paris, suffer from a complete lack of resources and progressive planning thought (Gaspard 1995).

As Rebecca Solnit puts it in her book *Wanderlust* (Solnit 2001),

*... In many new places, public space isn't even in the design: what once was public space is design to accommodate the privacy of automobiles; malls replace main streets; streets have no sidewalks; buildings are entered through the garages; city halls have no plazas; and everything has walls bars and dates... where to be the pedestrian is to be under suspicion... At the same time, rural land and the once – inviting peripheries of towns are being swallowed up in car commuter subdivision and otherwise sequestered. (11)*

This changing cultural and physical landscape is further complicated when ‘weighed’ against factors such as genetic predispositions towards disease, cultural acceptance of habits such as binge drinking or smoking, or the seemingly innocuous economic benefits that the auto brings to personal mobility. Autos, specifically, have increased autonomy, productivity, tourism, and ultimately wealth. In Italy it is also safe to say they have provided an opportunity for art with the creation of meticulously designed vehicles such as Maseratis, Lamborghinis, and Ferraris, all originating in the country.

Likewise housing has changed significantly from the 19<sup>th</sup> Century to today. In the United States, the San Francisco Bay Area has seen development in affiliation with a gold rush, two wars and a huge tech boom. In Berkeley, Oakland and Richmond, single-family bungalows that were once connected as streetcar suburbs are now highly auto-reliant. While work is being done to increase bike and pedestrian safety and routes, based just on the experience of my family and friends the affordability of inner-city, dense, walkable locations still appears to be an issue. On the surface it would seem that the housing choice is between walkable and expensive vs. drivable and affordable.

These observations, however simplistic they may seem, begin to frame my research in this study of walkability and housing. Although I focus on land and transportation resources there are many factors that contribute to unhealthy lifestyles that can be found in our everyday lives. For this reason understanding the complex relationship between health and the environment is important: How people make choices to live and how those choices are influenced by a variety of factors that ultimately might dictate health outcomes and how minorities and those without means may not have equitable access to the healthy option of walkable neighborhoods.

These introductory observations also provide a global perspective for the issues I intend to explore in the U.S. They frame the potential biases I have found in my research of walkable neighborhoods, and urban and rural pedestrianism. While I’ve made a concerted effort to be objective in my evaluation of transportation, mobility, transit and auto related travel, I must

admit that I am a walker. Actually, I am a walker and a runner; an activity-seeker in both urban and rural space. I am the type of stroller and wanderer that has been described by Edmund White as one who walks the streets to take note of houses, vendors and boutiques, and aimlessly and lazily becomes a part of the mass of society in an experience that is both pure and useless at the same time. As Baudelaire writes of the flâneur:

*The crowd is his domain, as the air is that of the bird or the sea of the fish. His passion and creed is to wed the crowd. For the perfect flâneur, for the passionate observer, it's an immense pleasure to take up residence in multiplicity, in whatever is seething, moving, evanescent, and infinite: you're not at home but you feel at home everywhere; you see everyone, you're at the center of everything yet you remain hidden from everybody – these are just a few of the minor pleasures of those independent, passionate, impartial minds whom language can only awkwardly define. The observer is a prince who, wearing a disguise, takes pleasure everywhere... The amateur of life enter into the crowd as into an immense reservoir of electricity. (White 2001)*

This puts me in a desirable position that allows me to combine my personal interests with my professional research. It allows me to be fully invested in the topic of walkability, public space-building, art, music and things that inspire human emotions and spirit. I would hope that this also offers me some ability to participate in the creation of beauty in the spaces around me, and that this beauty would in some way shape the lives of others. To that degree I hope this research can contribute something meaningful and facilitate positive change in the urban and not-so-urban environment.

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To my parents who instilled in me both a love for learning and a love for God; my brothers and sisters who are my best friends; the extended Gorman and Riggs family; the Sethi family for adopting me as a son and a brother and therefore a friend; C.M. Scruffy and all his friends for so much help and assistance.

To my son Frederick William Sethi Riggs, a beautiful blessing who came to his parents just in time to see the San Francisco Giants win the 2010 World Series, and had to put up with a somewhat distracted papa for the first 13 months of his life. I look forward to the many hours of walking, running and playing we have in the years to come.

Lastly, a special acknowledgment to my beautiful wife Menka, who loved me, encouraged me and persevered with me through the highs, the lows and everything in-between, while I completed the doctoral program and this dissertation. I love you.

## Chapter 1 - Executive Summary

Planning research has shown correlations between urban sprawl and obesity. Similar work has studied how the built environment has an impact on walking, and has correlated higher walkability with increased walking behavior and improved population health independent of race, education, income, or lifestyle preferences. Presumably, any individual with access to a walkable neighborhood might improve his or her total well-being, however housing research suggests that walkability is not equitably allocated and that price, sorting, discrimination and individual preferences may pose barriers to walkable neighborhoods as a health resource.

The purpose of this dissertation is to explore the individual, household and neighborhood attributes of walkable neighborhoods, assessing whether these locations are accessible to all regardless of socio-economic dynamics. There has been significant analyses of how the built environment impacts walking behavior but the income and market-based mechanisms, as well as demographics and related social equity issues, behind residential choice have not been fully explored (Cervero & Duncan, 2003; Handy, Cao, & Mokhtarian, 2005; Handy, Cao, & Mokhtarian, 2006; Sallis & Glanz, 2006). This is especially important for low income and minority populations who have historically suffered from location-based discrimination and may not have the financial means to ‘choose’ more walkable neighborhoods to live in. Such inequity would create a public health issue since planning research has shown correlations between housing and transportation characteristics, and population health.

Given trends in urban gentrification and chronic disinvestment in inner-city minority neighborhoods (Massey, 2004; Williams & Jackson, 2005) — leading to fewer neighborhood amenities and lower walkability (based on a quantitative walkability benchmarking index) — this study explores patterns of neighborhood walkability and potential sorting into more and less walkable neighborhoods in the San Francisco Bay Area, with the idea that low income individuals (and possibly poor minorities) have less capacity to live in walkable neighborhoods. Key research questions include:

- Who has the ability to live in a walkable neighborhood?
- Does this suggest distributional equity issues?
- Are there barriers to living in or creating a walkable neighborhood?
- Are there other factors (individual, lifestyle, or cultural preferences) that play a role in the selection of walkable neighborhoods?
- If there are barriers, then what are some policies or market-based incentives that could provide greater accessibility to these neighborhoods?

The ultimate goal is to contribute knowledge about *who* has the capacity to live in a walkable neighborhood, hypothesize about why this is taking place, and explore how private individuals, planners, and politicians might help create walkable neighborhoods that are more inclusive.

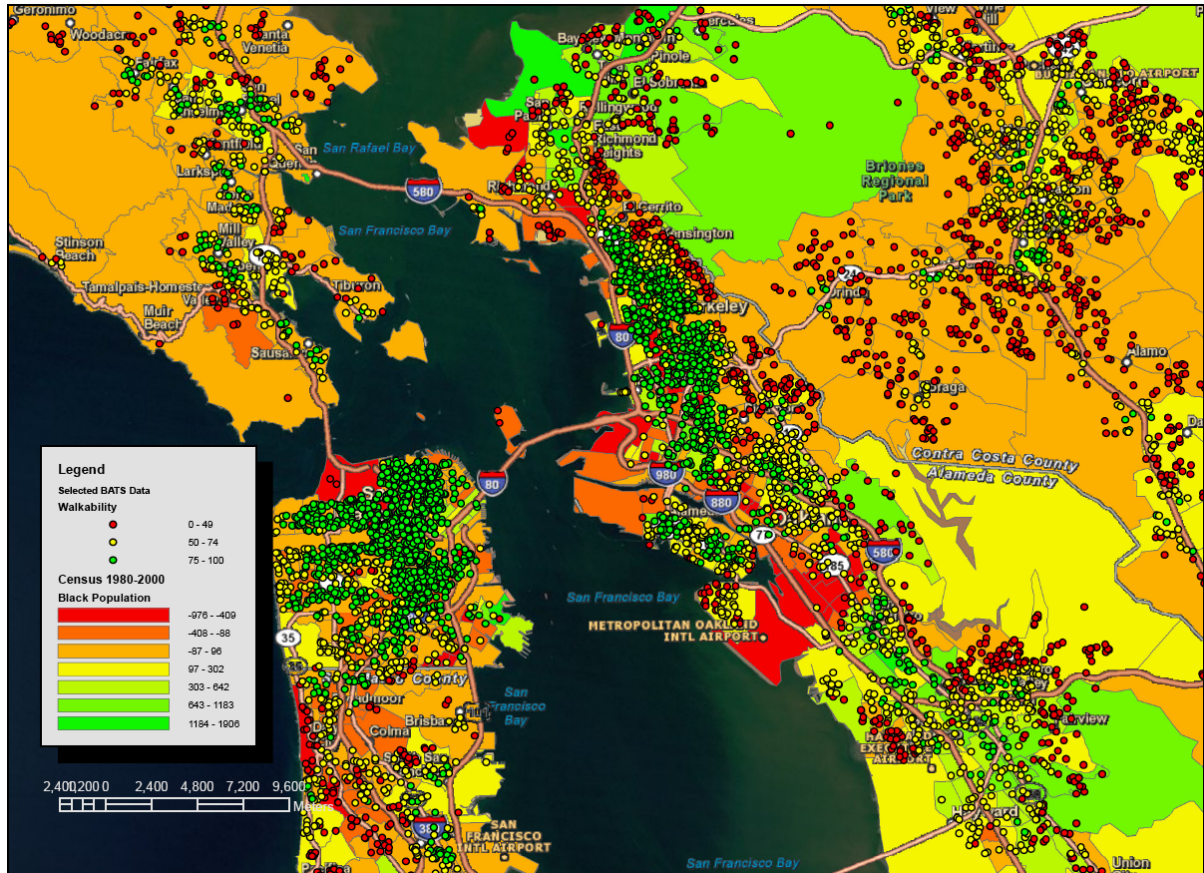


*Chapter 1* through *Chapter 3* provide context around this issue, both outlining the literature as well as the key research issues. This includes a survey of the *Early History of Planning and the Walkable City* and a section on *20<sup>th</sup> Century Development and Housing* that leads to the discussion of *Health and Social Ramifications*. The exploratory framework for this research is also discussed in a section that details walkability and walkable neighborhoods, and makes a distinction between simple suitability for walking (street width, auto speed, urban design amenities, etc.) and walkability for access to stores and services – the latter being the definition used in this study.

After the three introductory chapters, *Chapter 4* describes the research approach. It explains how the suggestive research in this study connects land use and transportation planning around the issues of neighborhood walkability as a health resource. This is important given increasing obesity of the U.S. population and reduced accessibility to walkable spaces in both urban and suburban locations. It discusses the methodology of both quantitative and qualitative techniques used to explore whether walkable neighborhoods are equally distributed by income levels and some of the limitations of the research.

*Chapter 5* presents models that best fit the data set to investigate associations between individual, household and built environment attributes associated with walkable neighborhoods. It goes through a quantitative exercise exploring correlations between theoretically supported variables in the Bay Area Travel Survey (BATS) data set to determine significant factors. It also conducts mapping on neighborhood change using the Census Neighborhood Change Database (NCDB) and evaluates the impact of the spatial concentration of race. The investigation offers the following contributions:

- The assessment suggests that *there is significant variation in those living in walkable areas that are more concentrated by race*, hinting that individuals may be either concentrating in less walkable suburban areas or left in less-walkable urban pockets. Up until this point, previous research has not discussed geographic concentration and racial unevenness. This work contributes by bringing these factors into the discourse on the topic, using a dissimilarity index measuring spatial distribution within the context of walkability.
- The assessment does not provide evidence supporting a connection between income and walkability. This provides an opportunity for future research.
- The assessment also adds to the discussion on the associations between housing value and walkability. Other research has suggested that walkability increases housing value, makes prices more stable and is tied to income, but this work does not provide strong evidence to support that. Walkability *does not appear to be significantly associated with income* in the Bay Area. Furthermore, *it does not appear to be strongly associated with higher housing values in the Bay Area*.



**Figure 1: Walkability in Black Neighborhoods**

*Chapter 6* builds on these observations and informs the quantitative facts through focus groups and interviews. Since associations suggest that the most racially concentrated (or dissimilar) areas may be less walkable, this chapter focuses on potential friction in these areas with an eye to pockets in San Francisco, Oakland and Richmond. Discussions focus on why this racial concentration may be happening and what factors contribute to walkability in situations where individuals may be either moving to less walkable suburbs or left in less-walkable urban pockets (suggesting ghettoization).

Using this framework, the chapter focuses on individual cases and stories about specific neighborhoods that are experiencing change using interviews of both lay individuals and technical experts to tell a story about patterns of walkability. This reveals the following observations:

- Qualitative interviews provide additional insight that minorities appear to be either moving to less walkable suburban areas for more space and amenities that are not available to them in the central city, or left in urban pockets with less walkable amenities. Much of this appears related to two factors: 1) *price / affordability*, and 2) *individual / social / cultural factors*.
- Despite quantitative associations, interviews suggest affordability (price) may be a contributing factor to accessing a walkable neighborhood, and inform the need for more rigorous analysis / study on the topic. There was a *sentiment that many felt 'priced out'* of the most walkable and desirable areas, leading to the ideas that other factors might serve as a proxy for income. Furthermore, *real estate professionals felt that price was a factor* – that price factored in to the ability to live in a walkable neighborhood.
- Finally, certain professionals felt that many developments (even suburban) could support more accessible, walkable resources but were *hampered by restrictive planning / zoning codes, problems with amount and type of housing, and limited financial tools for buyers and developers*. This, again, not only informs the quantitative work in this study by providing impetus for further investigation, but it offers room for immediate policy solutions that can assist in creating more inclusive walkable neighborhoods.

The concepts derived from both quantitative and qualitative work lead to a focus on areas of opportunity for policy makers to improve walkability in areas with high minority concentrations. These include: targeted complete streets investment, increasing supply through density, changing housing typologies, endorsing creative finance tools, increasing relevant types of uses, working to influence and match preferences, and targeting walking behavior. These are discussed in *Chapter 7*, followed by suggestions for future research (including a longitudinal panel study of walkability) in *Chapter 8* and the conclusions in *Chapter 9*.

## Chapter 2 - Purpose and Research Questions

The purpose of this dissertation is to explore the socio-economic dynamics of walkable neighborhoods, with the idea that they are not accessible to everyone. There has been significant analyses of how the built environment has an impact on walking behavior; but the income and market-based mechanisms, as well as demographics and related social equity issues behind residential choice, have not been fully explored (Cervero & Duncan, 2003; Handy, Cao, & Mokhtarian, 2005; Handy, Cao, & Mokhtarian, 2006; Sallis & Glanz, 2006).

While research has shown associations between socio-economic status (SES) and leisure physical activity (Cerin & Leslie, 2008; Gordon-Larsen et al., 2006) aspects of ‘choice’ as they relate to quantitatively walkable communities have not been closely studied. This is especially true for low income and minority populations who have historically suffered from location-based discrimination and may not have the financial means to ‘choose’ more walkable neighborhoods to live in. Such inequity would create a public health issue since planning research has shown correlations between housing and transportation characteristics, and population health.

Given trends in urban gentrification and chronic disinvestment in inner-city minority neighborhoods (Massey, 2004; Williams & Jackson, 2005, which leads to fewer neighborhood amenities and lower walkability (based on a quantitative walkability benchmarking index), this study explores patterns of neighborhood walkability and potential ethnic sorting into more and less walkable neighborhoods in the San Francisco Bay Area, with the idea that low income individuals (and possibly poor minorities) have less capacity to live in walkable neighborhoods.

Therein lies the intellectual merit of this study: to explore potential barriers to living in a walkable neighborhood and explore how the public health intervention of walkability can be equitably distributed as a resource. Key research questions include:

- Who has the ability to choose to live in a walkable community?
- Does this suggest distributional equity issues with walkable neighborhoods as a health resource?
- Are there barriers to entry in walkable communities?
- If there are barriers, then what are some policies or market-based incentives that could provide greater accessibility to these neighborhoods?
- Are there other factors (individual, lifestyle, or cultural preferences) that play a role in the selection of walkable neighborhoods?

The ultimate goal is to contribute the knowledge about *who* has the capacity to live in a walkable neighborhood, hypothesize about why this is taking place, and encourage the idea of inclusiveness as planners and developers work to create more walkable neighborhoods – that walkable neighborhoods need to be inclusive as a public health intervention for all.

## Chapter 3 - Background and Literature Review

To provide background on walking and neighborhood planning this section surveys the literature based on the historical progression of thought from the *Early History of Planning and the Walkable City*, to *20<sup>th</sup> Century Development and Housing* that reframed walking as an activity of leisure rather than transportation. This narrative leads to the discussion of *Health and Social Ramifications*. Finally the exploratory framework for this research is discussed in the section entitled *Walkable Neighborhoods and Walkability vs. Accessibility* that begins to outline gaps in existing literature. This discussion makes a distinction between simple suitability for walking and accessibility to stores and services – the latter being the holistic definition of walkability explored in this study.

### 3.1 Early History of Planning and the Walkable City

Around the turn of the 20th Century many U.S. cities were over-crowded and dirty. They were compactly constructed so walking was the primary mode of transportation but there was little control over building placement, size, quality, or safety. Water and air quality were poor. Garbage and sewage were un-monitored. Diseases such as yellow fever and cholera were rampant. Transportation systems were uncontrolled and walkers were overcome by the combined, “noises from clacking horse hooves, wooden wagon wheels, street railways, and unmuffled industrial machinery (Leavitt, 1996).

Jacob Riis documented this when he published his expose on New York City slums *How the Other Half Lives* (Riis, 1890). His belief, which was common at the time, was that a person’s physical environment determined his or her behavior. He and other early public health advocates such as Charles Booth were quick to find solutions to amend the slum problem (Corburn, 2007). Slum clearance was done to remedy “environmental miasmas” and create “sanitary cities” – giving proper housing and access to open space to individuals so they could be reformed. Tenement laws were formed and appropriate infrastructure systems developed to provide cleaner water, sewers, and appropriate disposal of refuse.

Building codes provided better ventilation and ambient light exposure, and zoning limited noxious uses and noise around residences, all of which supported the 19<sup>th</sup> Century concept of the walkable city for the wealthy. This was written about by those such as Charles Baudelaire, who saw walking as the pastime of the refined gentleman who would engage in social walking and the casual flâneur (White, 2001).

These improvements, along with the initiatives of other early reformers, architects, designers, naturalists, and politicians (such as Ebenezer Howard, Fredrick L. Olmstead Jr., Daniel Burnham, John Muir, and Theodore Roosevelt), enabled more walking in urban and non-urban areas. These individuals were convinced of the existence of connections between city design and human behavior mainly through the preservation and use of green space within the urban environment. Howard designed ‘garden cities’ united by a series of ring roads attached by radial streets that would tie together “the factories, warehouses, dairies, markets, coal yards, timber yards” on the outer rings of the

town; he then placed walkable elegant gardens and public spaces at the center (Howard, 1902).

Olmstead also believed in the walkability of large cities, and that they needed accessibility and well distributed public facilities and parks, “if the health and vigor of the people are to be maintained” (Olmsted, 1911). Yet, despite the attempts to tie physical form (and thereby morality) to health in city design, early planners and architects of the walkable city (such as Olmstead) did not have the enlightenment of scientific knowledge that arose in the progressive era that followed. They believed that environment determined biology, that things such as decomposition, stagnant water, unventilated air, and lack of light caused contagious disease, and that man was corrupt, but that through environmental design and walking in nature this corruption could be cured (Corburn, 2007).

### **3.2 20th Century Development and Housing**

As cities expanded at the start of the 20<sup>th</sup> Century, sanitary reformers tried to change city structure through engineering (Peterson, 1979), taking a more scientific approach than their predecessors. This involved complex sewerage projects to dispose of refuse and the ‘miasmas’ of the time (Melosi, 2000). Both New York City and Boston installed over 100 miles of sewer lines between 1849 and 1873. New York, at the end of the 19<sup>th</sup> Century, had spent \$24 million for subways, bridges, paving, and water supplies (Boyer, 1986).

Yet, at this time the city remained primarily one where transportation was done via walking or horse-and-buggy, designed systematically to reduce disease causation. Based on this premise, the American Public Health Association’s Committee on the Hygiene of Housing issued risk-reducing guidance for neighborhood planning and design (APHA, 1948). Clarence Perry provided design schemes for the ideal ‘neighborhood unit’ that included a single-family array of homes over 160 acres of land and accommodating 5000 to 6000 individuals, navigable via walking or horse-and-buggy (Perry, 1929; Silver, 1985).

Perry assumed that the neighborhood provided organization and homogeneity, writing, “automatically it draws together a group of people of similar living standards and similar economic ability to realize them.” Perry also believed that, “the segregation of a city population along racial, economic, social and vocational lines is a normal process and one which is constantly at work... (and that) the use of a neighborhood formula in suburban building and slum rebuilding schemes (would) promote this grouping process.”

Shortly thereafter, housing construction boosted the economy as it transitioned from military production after World War II (Hall, 1996). This resulted in post-war suburbs. New communities became filled with middle-class suburbanites and troops returning from the war. Expansion occurred outside of the central cities, in places like Levittown – towns largely dependent on private automobiles. Transportation and commute patterns became auto-focused and the functionality of towns changed. They became less focused on walking and environmental exposure for health and more on providing privacy, becoming principally bedroom communities.

This suburban framework spawned more housing developments with large-lot homes and neighbors spread out from each other. While original suburbs were found to have greater neighborhood involvement than their urban counterparts, they were largely filled with middle-to-upper class, homogenous, White populations, which, over generations, created difficulty in social connectedness (Putnam, 2001). Occupants seeking privacy and safety were more isolated and disconnected both physically and emotionally, with the loss of the social capital of traditional non-auto-focused communities.

These “sprawling” developments were designed for automobiles, with little connectivity, thus the ease of moving via walking or cycling to destinations such as schools, stores, and work places was limited (Sallis et al., 2004). Individuals in these areas had greater propensity for obesity (Ewing et al., 2003) and were largely dependent on private automobiles, located away from jobs and transit; having few opportunities for walking and biking has been linked with reduced physical activity and obesity (Cervero & Kockelman, 1997; Frank, Andresen, & Schmid, 2004).

To complicate matters further, many of these healthy activities were unsafe in communities that were built for inactivity, with little connectivity, thus lessening the ease of moving via walking or cycling to destinations such as schools, stores, and work places. Additionally, the residents were statistically more likely to have chronic mental or physical health conditions (Sturm & Cohen, 2004).

Suburban pressures also compounded issues with inner-city urban poverty and blight, with affluent people fleeing the central city. This resulted in the need for ‘urban renewal’ in the 1960’s (Corburn, 2007). Renewal efforts were attempts to cure urban ills and resuscitate the urban slums left underfunded and ailing by homogenous suburban (White) flight. The construction of massive super-block housing severed many minority and immigrant communities.

Many minorities remained unable to find adequate or healthy housing in cities, and could not afford to purchase nicer housing in the suburbs because of predatory lending and insurance practices (Cutler, Glaeser, & Vigdor, 1999). Some studies suggest a housing markup of approximately 7% for Blacks compared to Whites (Kain & Quigley, 1972). Complicating this was a mortgage industry that was pitted against minorities.

One example in Boston indicated that a minority individual in the Boston area faced an 8% higher chance of being denied a home mortgage than a White individual with the same characteristics (Munnell et al., 1996). Thus, the community envisioned by Perry became the foundation for housing segregation; it had been designed to contain relevant services and walkable amenities but also only for people of a certain race or class.

Slowly the concentration of housing continued to move out of the downtown core of the city. While average household size decreased, the average house size increased from 1,500 square feet in 1970 to over 2,200 in 2000. This trend away from the monocentric cities led to developments that sprawled over vast land areas, developments that formed

“edgeless cities” (Lang, 2003) that lacked diversity in land use and provided inadequate housing resources near jobs and transit.

In response, 20th Century planners such as Jane Jacobs juxtaposed urban density on Perry’s neighborhood unit, leading researchers to find new connections between urban density, health, and community (Keating & Krumholz, 2000). Those such as Lynch (Lynch, 1960), Alexander (Alexander, Ishikawa, & Silverstein, 1977), and Jacobs and Appleyard (Jacobs & Appleyard, 1987) worked to frame positivist responses to the physical environment and urban design central to urban rejuvenation with features such as:

- (1) *Livable streets and neighborhoods;*
- (2) *Minimum densities for residential development and intensity of land use;*
- (3) *Integration of activities—living, working, shopping in proximity to each other;*
- (4) *Definition of public spaces in the built environment;*
- (5) *Many and distinct buildings (Schurch, 1999)*

These moves toward ‘smart growth’, traditional neighborhood design, and the ‘New Urbanism’ placed strong emphasis on neo-functionalism with the idea that the built environment could define physical and social relationships, encouraging walking and healthy lifestyles (Rutheiser, 2008).

Despite these movements and other regeneration efforts by planners, housing discrimination and trends of segregation continued. All-black neighborhoods came about during the 1890 to 1940 period as black populations migrated north during the post-WWI period (Cutler, Glaeser, & Vigdor, 1999). These areas consolidated and expanded from 1940 – 1970. They peaked in 1970 as legal barriers to segregation were put in place. Desegregation then occurred from 1970 – 1990, as legal barriers to segregation were removed and White populations began to move into own-race neighborhoods by paying more for housing.

Between the 1970s and 1990s, around 80% of Blacks lived in similar location clusters. Much of this continued discrimination and clustering was related to ‘collective actions’ such as restrictive housing covenants or threats of violence rather than decentralized ‘tipping’ models of segregation, where buyers are willing to ‘tip’ (or pay more) for housing (Cutler, 1999). While subsequent improvements focused on White neighborhood integration they did not attend to black neighborhoods, and so housing segregation for Blacks continued in more concentrated ways than for Hispanic and Asian communities (Ellen, 2008).

While discriminatory policies had been formally abolished, discrimination still existed in practice through: (1) market failures with regard to information / search patterns; (2) blatant housing / lending discrimination through steering; (3) income sorting based on price and rent levels enabled by racial steering from real estate agents; (4) group preferences for certain amenities, social or cultural connection or proximity to resources (Ellen, 2008). Three theories that attempt to explain why this segregation persists for



Blacks include: preference of Whites to live in predominantly White neighborhoods; barriers to entry and discrimination that exist preventing Blacks from entering predominantly White neighborhoods; income and wealth disparities between Whites and Blacks that prevent Blacks from moving into higher priced White neighborhoods (Quillian, 2002). *Given this, many researches have tried to determine the factors that influence housing choice and trends of minority concentration but none have focused specifically on walkability.* For example, hedonic price modeling by Levine and others indicated that the “quality” of bundled residential services impact home prices, just the same as more objective characteristics such as square footage, bedroom / bathroom count, and unit type (Kain & Quigley, 1970). These include many of the factors that make up holistically walkable communities but none that quantify this factor specifically.

Also it is typical for “poor households” to choose low public service levels, and “rich households” to choose high public service levels (De Bartolome & Ross, 2003). Given this experts would say that, “Commute costs increase with income... (and therefore) land prices adjust.” Costs for the “rich” are higher in the suburbs than in the inner city, but these costs are offset by the benefit of a higher public service level on things such as schools in the suburbs. This partially explains why metropolitan land development has resulted in suburbs where the majority of suburban households are “rich” and where the majority of inner city households are “poor.”

Similar research has shown that minority (and specifically) Black households experience lower home ownership rates and corresponding lower capital accumulation than White households (Kain & Quigley, 1972). The research concludes that “supply restrictions” on black housing accounts for the discrepancy between White and Black home ownership rates. These restrictions implicitly limit black household purchases by income – restricting them primarily to undesirable, inner-city areas. Once in these areas, they are many times miss-matched from job locations, something that scholars have identified through linkages between housing discrimination and racially-based policies and joblessness (Cervero, Rood, & Appleyard, 1995, 1999; Farley, 1987; Raphael, 1998; Raphael et al., 2001)

Some studies suggested that Whites prefer large, single-family homes (Bajari & Kahn 2005,) and others that proximity to the workplace and racial homogeneity influence housing choices (Quigley, 1985). Racial homogeneity and an un-integrated environment are seen as desirable by many individuals (regardless of race or income) because of fear of retaliation or hostility – avoiding violence, conflict, questions of culture, neighborhood stereotyping, etc. in favor of established social routines (Farley et al., 1978; Farley, Fielding, & Krysan, 1997; Krysan & Farley, 2001; Meen & Meen, 2003).

### **3.3 Health and Social Ramifications**

The results of suburban trends have been neighborhoods that extend far beyond original central cities, and regardless of the cause segregation issues bring to light the topic of resource and health equity. Many individuals (especially those living in suburban locations) do not have the same level of housing and transportation resources as others. This has in-turn led to new trends of chronic diseases which have arisen despite advances

in city design and medicine that have limited contagious disease (Galea, Freudenberg, & Vlahov, 2005). These man-made diseases are arguably associated with the overdose of the benefits of 20<sup>th</sup> Century advancements, and the problems with poor housing and transportation resources. They include obesity, heart disease, diabetes, depression, osteoporosis, and cancer.

A 2006 study by researchers at the Harvard School of Public Health reports that obesity is responsible for 2.6 million annual deaths worldwide (Ezzati et al., 2006). Recent studies also indicate that 65% of American adults are overweight and 30.5% are considered obese (American Obesity Association, 2007). Rates are expected to double within the next 10 years based on reports from the U.S. Center for Disease Control. Being overweight and obese increases the risks of high blood pressure, high cholesterol, heart disease, stroke, cancer, gall bladder and respiratory disease, joint and bone disease, and many other afflictions including diabetes (Pi-Sunyer, 1993).

The U.S. General Accounting Office (GAO) identifies obesity as an area of specific concern for children between the ages of 6 and 17 (Bascetta, 2005). They report that both the incidences and costs associated with childhood obesity have tripled over the past 30 years, putting the current youth population at risk for long-term obesity and diabetes as adults.

Both recreational and incidental, utilitarian trips, such as those spent walking to school, to friends' houses, the library, the store or the park, all seen as 'active lifestyle' behaviors, have decreased in cities and suburbs alike. Research has shown that although areas of higher density may have more walking for transportation purposes, lower density areas offer more opportunities for leisure walking, making behavior very important (Forsyth et al., 2007). Those who want to live in a location where they can walk for transportation choose locations that support this. Those whose preference is to walk for leisure prioritize housing with more access to leisure opportunities.

While it remains to be proven if greater numbers of adults or children walk in the central cities vs. suburbs, many studies have shown a correlation between activity levels from walking and the built environment. There have been strong associations with inactive lifestyles and the elevated risk of obesity and diabetes, showing that even light-to-moderate activity is associated with substantially reduced risk of developing disease (Hu et al., 2003; Thompson et al., 1999). Other studies have shown increased risk of obesity and related illnesses to be correlated with walkability (Frank, Andresen, & Schmid, 2004; Frank et al., 2005).

Such work emphasizes the notion that built environment geometry and the related accessibility to services on foot could have equity implications – that spatial reasoning is necessary when making decisions on local-level services requiring a high degree of proximity to nearby residents (Hewko, Smoyer-Tomic, & Hodgson, 2002), and that the built environment can influence physical activity levels and propensity toward obesity (Ewing, 2005). These factors were confirmed in meta-analysis of 14 studies by Saelens, Sallis and Frank (2003). The analysis reviewed literature on the relationship between

neighborhood design and non-motorized transportation (walking and bicycling). It suggested that the design of communities (and more specifically their density, mixed use, and the type of street network) is associated with an increase in the number of walking trips per week taken by its residents.

And while these studies connecting walking to health may transcend class (affecting large portions of the population regardless of socio-economic status), it is important to emphasize how they are bounded limitations with self-selection and the disproportionate resource choices available for the poor and minorities. Research indicates that self-selection of housing is many times related to income (Nakosteen & Zimmer, 1980) and while the built environment might influence active behaviors these are shaped by neighborhood self-selection (Handy, Cao, & P. L Mokhtarian, 2006) .

This presents a unique challenge to research design – how to successfully deal with self-selection biases based on income, race or other personal preferences. Studies by those such as Oakes and Forsyth (2007) and e Macintyre, Ellaway, and Cummins, 2002 have tried to deal with this first by including race and income information into statistical modeling, and then by using interviews and focus groups to understand other items influencing location choices in walkable neighborhoods.

Other work has observed that since those in the same neighborhood tend to have common characteristics, adding these preference factors (such as household size, education, housing turnover, race, etc.) can improve housing choice models (Ioannides & Zabel, 2008). These studies have had outcomes similar to the previously discussed housing research – that income and individual preference factors form some of the primary determinants of location in a community (walkable or not).

This idea that preference influences choice of walkable locations forms the preliminary theoretical basis (explored more in Chapter 4) and aligns with other work showing that many health problems are focused in areas with high population of minorities, and are tied to social and cultural factors (Galea, Freudenberg, & Vlahov, 2005; Geronimus & Thompson, 2004) with some work showing inequitable concentration of disease for Blacks in the U.S. based on segregation in the built environment (Williams & Jackson, 2005). Compared to the norm, Blacks have higher cancer rates and are more likely to live in polluted, less desirable neighborhoods which can contribute to increased risk of obesity, heart disease, hypertension and higher morbidity.

Given this reality, Rawls might frame such social and economic inequity as a justice issue (Rawls, 1975; Rawls, 1977). When an individual enters into a social contract with society there are certain guarantees of rights to equity of opportunity (Rawls, 1988). In light of inequity, Rawls might argue for redistribution of resources – that the greatest benefit of social welfare should go to individuals who need it most – ensuring that access to walkable housing is not disadvantaging health and that walkable places are inclusive.

### **3.4 Walkable Neighborhoods**

After establishing this base of information on walkable neighborhoods, it is important to understand the dynamics of walking behavior, methods of benchmarking walkability and the idea of accessibility vs. suitability for walking. These definitions establish the basic questions and contributions of this study.

#### **3.4.1 Walking Behavior**

Much research has correlated neighborhood walking with higher density, street intersections, higher land use mix and green / open space access (Frank, Andresen, & Schmid, 2004; Frank et al., 2005). Studies have found that neighborhoods classified as more walkable (using walkability benchmarking tools) have higher levels of incidental walking and also less likelihood of obesity (Frank et al., 2007).

For example, Sallis and Glanz (2006) link reduced obesity to aspects of the built environment such as lack of sidewalks, distance to schools, and busy streets. Taking a different perspective, the work of Handy and colleagues looks at walking behavior and how the built environment has an impact on walking (Handy, Cao, & Mokhtarian, 2005; Handy, Cao, & Mokhtarian, 2006). These studies emphasize the urban design elements of the built environment as important to walking behavior, including safety, quality of path and path context (Southworth, 2005). This involves walking for transportation as well as leisure purposes (Forsyth et al., 2007), and there is a growing theory that walkable neighborhoods have an intrinsic economic value by encouraging economic transactions and social exchanges (Litman, 2003), and bolstering property values (Cortright, 2009).

Further dissecting the factors that enhance or deter walking, exogenous factors such as topography, climate and weather come to light. Research has shown that such factors are more likely to control walking and biking transport behavior than urban design factors (Cervero & Duncan, 2003). Other studies emphasize this, showing that neighborhoods with hillier topography have less walking and lower physical activity (Leslie et al., 2005).

Other complementary work has discussed how climate and topography deter walking, especially among vulnerable populations like the elderly (Li et al., 2005). Topography becomes even more important as people age because of cognition and balance issues (Tranter, Slater, & Vaughan, 1991). A study by Lövdén found that older adults have comparably more trouble with wayfinding, spatial cognition and 'place-finding performance' because of topography (Lövdén et al., 2005; Lövdén et al., 2008).

While there is a recognition that vulnerable populations such as minorities, older adults and children may need the intervention of 'walkable' or 'active-living' communities most (Prohaska et al., 2009), research has shown that certain features of the physical / built environment (such as bulb-outs and the presence of sidewalks) encourage walking, and that these environmental factors are of greater importance to vulnerable populations with reduced capacity (Lawton, 1999). Furthermore, since changes in the environment are likely to impact walking and activity levels based on the characteristics of the individual, built environment features have great influence on vulnerable populations (Clarke & George, 2005).

This brings to light how individual characteristics influence walking behavior. Alfonzo (2005) discusses these by differentiating these individual-level characteristics from quantifiable built environment variables. These are scaled based on a pyramid of needs similar to Maslow's Hierarchy of Needs. As displayed in Figure 2, the hierarchy emphasizes "feasibility" (related to individual characteristics, age, race, health or physical mobility) as a baseline measure for walking behavior. After this come access, safety, and comfort / pleasurability (e.g. benches and presence of trees). This notion underscores the concept that many physical or social factors provide an underlying determinant of walking behavior – set aside from built environment or moderating factors such as the exogenous factors identified by Cervero and Duncan (2003).

Studies have shown walking behavior and activity levels can be tied to individual-level, socio-cultural factors such as race, crime or gender barriers (Jankowski, 1991; Scott et al., 2007). Some studies cite perceived risk and social networks / environment as additional factors contributing to walking and increased physical activity (Cromley & McLafferty, 2002; Wolch, Wilson, & Fehrenbach, 2005), however by controlling for these variables and accommodating compositional variables, the context of the physical / built environment has still been found to be an influencing factor on walking behavior (Diez Roux, 2001; Macintyre, Ellaway, & Cummins, 2002; Oakes 2004).

Other work has looked at specific populations, such as Blacks, and has suggested that they are slightly less likely to engage in walking behavior (Brownson et al., 2000), *but, in general, research has not looked at the quantifiable aspects of the individual or the built environment relating to housing in walkable neighborhood.* There is some research that suggests home age serves as a proxy for walking behavior (presumably for its affiliation with more traditional neighborhood design) more so than race, age or income (Berrigan & Troiano, 2002), suggesting that housing factors need additional research with regard to walking behavior and other individual factors.

The interaction of individual factors with exogenous and built environment factors relates to the issue of self-selection discussed in Section 3.4. These individual level factors (related to age, race, income, etc.) form some of the primary variables that dictate preferences toward or against walking. They relate closely to the theoretical model in Figure 2, which builds on a walking hierarchy of needs first presented and discussed by Alfonzo (2005).

Variables could be associated with each tier of the hierarchy, for example: topography and shade with comfort, crime and street grid density with safety, distance to various resources with accessibility, and physical capacity with feasibility. In the case of Figure 2, a distinction is made between built environment urban form and individual level variables. The idea of 'moderating factors' (e.g. preferences, weather, neighborhood type) is added to represent other attributes that shape walking behavior beyond those variables that are associated with urban form and physical capacity.

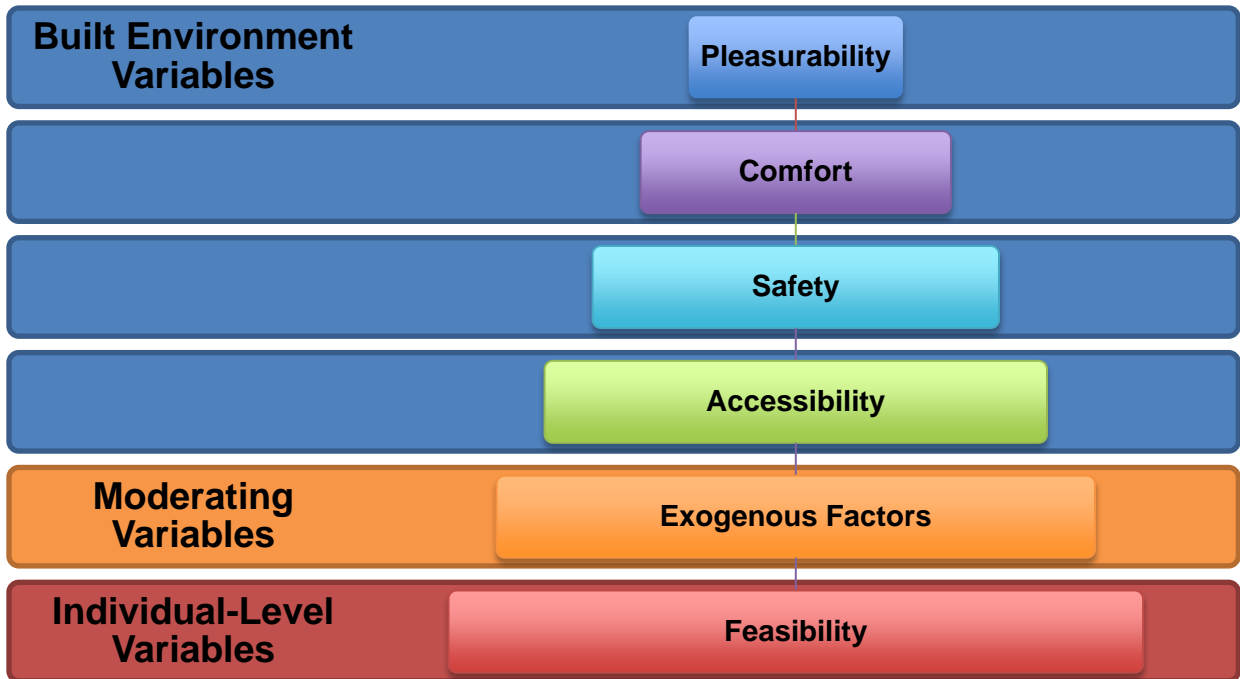


Figure 2: Walking Behavior Hierarchy

### 3.5 Walkability Metrics – Summary Measures

Further unpacking and defining the term ‘walkability,’ it is important to understand how built environment variables have been used to classify the conduciveness of the environment for walking. This is important as there are many variables that influence walking behavior, but a few are consistently cited in the literature. Recent meta-analysis by Ewing and Cervero indicates that street-grid connectivity is likely to be the single strongest determinant of walking behavior (Ewing & Cervero, 2010) among built environment variables. Most other studies identify residential density, street connectivity, land-use mix and FAR. In addition, preliminary results from the Healthy Aging Network (HAN) study indicate walking behavior as more predicted by individual characteristics such as perceived safety or pain from arthritic conditions (Satariano et al., 2010).

While this outcome would be consistent with the model presented in Figure 2, it presents questions about how to best quantify walkability, and furthermore for whom that benchmark might be a reasonable predictor. If those with reduced capacity, such as children or the elderly, are highly influenced by variables other than those planners are assuming for the general population (e.g. density, street grid connectivity, etc.) then it can be assumed that the current methods of measurement are not entirely effective; that increased street connectivity may not be the most relevant variable for this population.

Recognizing this limitation, that walkability benchmarking tools represent only a portion (albeit most) of the population, the three most common methods that have been

established are based on built environment features, population characteristics and proximity measures and include: (1) a method established by Frank, Andresen, and Schmid (2004) using data from the Seattle SMARTRAQ study (hereinafter referred to as SMARTRAQ); (2) an objective GIS method used by Leslie et al (2005), referred to as GIS; and (3) a 'Walkscore' tool that uses virtual online information in a methods similar to Frank (2004).<sup>1</sup> All of these methods used a combination of quantifiable built-environment variables associated with unique geographic locations. They are summarized below and in Table 1.

#### *SMARTRAQ - Frank*

First demonstrated in 2004 using transportation and land use data from the Puget Sound area, Frank's SMARTRAQ walkability index uses standardized 'urban form' variables to establish an objective measure of walkability (Frank, Andresen, & Schmid, 2004). These variables include: (1) net residential density (number of residential units per residential acre based on census block-group); (2) street connectivity (number of intersections/square kilometer); and (3) land-use mix (one-kilometer network-based street buffer). These measures are normalized, weighted and combined using Z-scores [(Z-score of net residential density) + (Z-score of street connectivity) + (Z-score of land-use mix)].

Citing data from studies by Cervero, Ewing, Handy and others, the tool weights destination by six (6), using the mix of land over both the net residential density and intersection density. Variations of this weighting method are given, however, in additional publications by Frank in recent years with the conclusion that a higher weighting for land use variety provides the best fit for walking tools (Frank et al., 2005; Frank et al., 2006). These analyses incorporate other variables, such as floor area ratio, and use different weighting scheme (2 \* street connectivity), in the end confirming the original weighting scheme and discussing wider application of the metric as a quality of life measure (Frank et al., 2009).

#### *GIS - Leslie*

The walkability measurement method by Leslie builds on the method developed by Frank and colleagues but uses a GIS buffer approach alongside urban form variables (Leslie et al., 2007; Cerin et al., 2008). The walkability index is calculated based on dwelling density, intersection density, land use and net retail area (gross retail area/total retail parcel area). Scores for each unique location are summed and normalized, giving a range of possible scores from 4 to 40. The recognized limitations of the tool include the omission of variables such as: presence of parks; condition of walking paths; accessibility

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<sup>1</sup> It is worth mentioning that other benchmarking tools have been developed, but they have either: 1) not been evaluated as thoroughly in peer-reviewed documentation, or 2) were built to test non-quantitative factors (e.g. pleasureability and design). Some of these include: the Irvine-Minnesota Inventory (IMI) and the Systematic Pedestrian and Cycling Environmental Scan (SPACES) which survey qualitative factors such as pleasurable, perceived safety from traffic, and perceived safety from crime, and the Pedestrian Environmental Data Scan (PEDS) and the Workplace Walkability Audit Tool (WWAT) which evaluate elements of sidewalk, road and urban design improvements. More discussion on tools can be found in Chapter 8, Future Research.

to transit; topography and other physical barriers; individual perceptions of the built environment.

*Walkscore - Frontlane*

Walkscore uses a virtual, Google-indexed system to measure the walkability of a geolocation (Lawton, 1999). Developed by Frontlane in partnership with academics including Larry Frank and Reid Ewing, it uses a similar method to SMARTRAQ combining, land use mix, density, and street grid density. Google is used to index adjacent amenities as a proxy for land use mix, density comes from U.S. Census figures, and intersections are counted using an algorithm on a street network. The weighted Z-scores are summed and normalized to 100, yielding a score from 0–100. The methods place the highest priority on land use mix as the leading predictor of walking behavior.

**Table 1: Walkability Measures**

<b>METHOD</b>	<b>DESCRIPTION</b>	<b>VARIABLES</b>	<b>SCALE</b>
<b>SMARTRAQ (Frank)</b>	Environmental variables examined separately to design an index intended to reflect overall walkability of neighborhoods	Based on land-use mix (parcel), residential density (Census), and street connectivity (Census / Tiger)	Urban form measured in two separate ways, within a 1-km grid system for target-area selection purposes and within a 1-km road network-based buffer
<b>GIS (Leslie)</b>	Uses Geographic Information Systems (GIS) to develop walkability index and a series of layers with each layer tied to specific points or addresses	Builds on the SMARTRAQ model using land-use mix, residential density (Census), street connectivity, and net retail area	Urban form measured using GIS buffers at the smallest available spatial unit (usually ¼ mi)
<b>Walkscore (Frontlane)</b>	Environmental variables assessed independently using virtual tool; normalized for simpler user interpretation	Uses SMARTRAC method of land-use mix, residential density (Census), and street connectivity but provides Google index of amenities and street map as proxy for land use and connectivity	Urban form measured using ¼ mile buffer from residential addresses to nearby amenities; normalized score classified from 1-100.



### 3.5.1 Accessibility vs. Suitability

The aforementioned SMARTRAC, GIS and Walkscore methods of measuring walkability could rightly be debated, however each attempts to move the definition of walkability beyond the idea of an area simply being suitable (or pleasurable) for walking to one that is less subjective and more closely akin to the concept of neighborhood accessibility and livability. This is important given the increasing emphasis of funding and program initiatives on ‘livability’ (See information at: <http://www.fhwa.dot.gov/livability/>).

Much of the literature discussed previously focuses on the *suitability* of a place for walking, especially for individuals. Factors influencing suitability include street width, number of lanes, safe speeds, bulb outs, crossing improvements, presence of trees, etc., and are identified in many FHWA pedestrian level-of-service and suitability factors (NCHRP Report 616, 2008). There are also perception issues with safety, such as fear of crime or heavy traffic, that some pedestrian audit tools attempt to uncover. While these are important factors for walking behavior, the work by those such as Frank, Leslie and Ewing would suggest that they are subordinate to the idea of *accessibility* and the importance of destination, land use and population characteristics.

This study uses this concept of accessibility to frame the definition of walkability. The quantitative aspects of this study look at access to goods, services, and various types of land use. It is not dismissive of suitability factors that improve the quality of the environment nor of Southworth’s (2005) emphasis on safety, quality of path and path context (many of these come to light in the qualitative discussions), or the notion that many pedestrian routes may not be tied to streets (Chin et al., 2008), however it focuses primarily on measureable factors that influence trips – including various destinations and street connectivity.

## Chapter 4 - Methodology and Approach

This chapter provides a detailed discussion of the research approach. It explains how the suggestive research in this study connects land use and transportation planning to the issue of neighborhood walkability as a health resource. This is important given the increasing obesity of the U.S. population and reduced accessibility to walkable spaces in both urban and suburban locations. It discusses both quantitative and qualitative methods used to explore whether walkable neighborhoods are equally distributed as a health resource.

### 4.1 Research Problem & Question

Research has found that walkable neighborhoods are correlated with overall health and reduced obesity and higher levels of incidental walking in adults, but it has not focused on whether lower income adults can choose to live in these highly walkable locations. This is of critical importance to populations such as minorities who are traditionally lower income, may not have the means to purchase homes in more walkable neighborhoods, and may be in most need of the intervention of walkability.

The focus of this study is to explore the patterns of neighborhood walkability and evaluate potential sorting into walkable and / or non-walkable neighborhoods by income or other factors. The study first looks at these patterns with cross-sectional data, using simple correlations and GIS mapping. It then uses qualitative focus groups and interviews to compare and contrast neighborhoods to further illustrate these patterns, hypothesize why certain trends exist, and provide insight into improving the quantitative work (e.g. what might be omissions / limitations). Policy suggestions and future research directions are then offered. A conceptual model of this is provided in Figure 3.

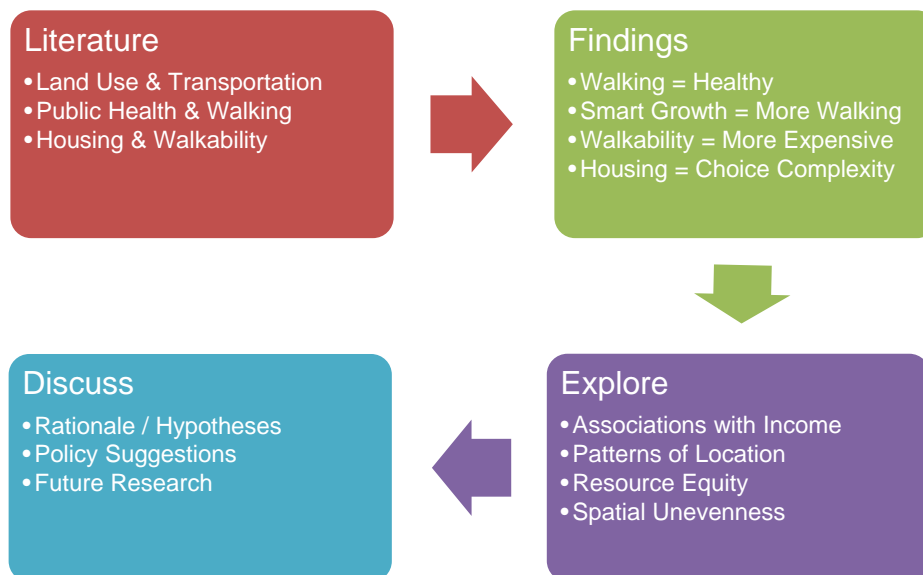


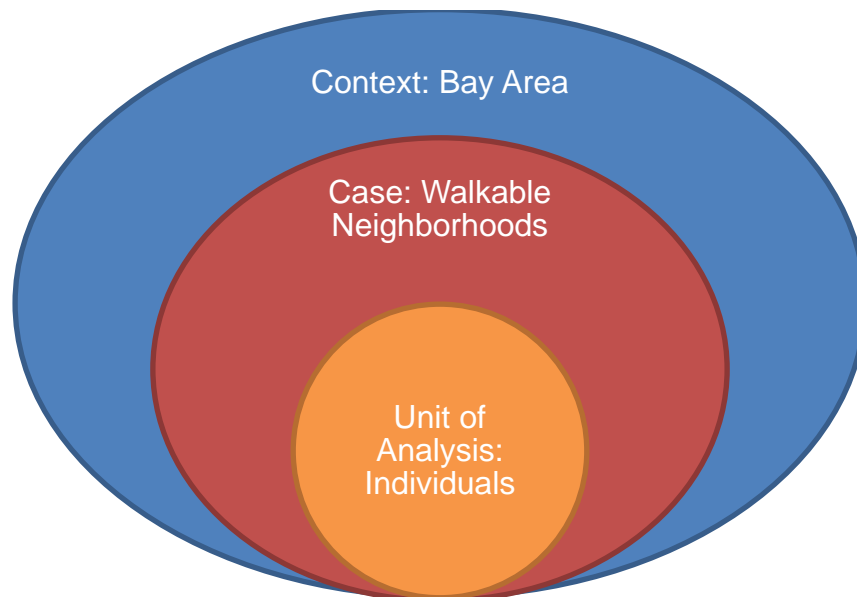
Figure 3: Conceptual Model

Key research questions include:

- Are there barriers (or is there friction) to lower income individuals living in a walkable neighborhood?
- Who has the ability to self-select a healthy community and what are patterns of sorting into walkable neighborhoods?
- What are hypotheses about these trends? What policies or market-based incentives could provide greater accessibility to healthy, livable, walkable housing and neighborhoods?

## 4.2 Methodology

As noted previously, this study is broken up into quantitative and qualitative phases to study the relationship between neighborhood walkability and housing location in the San Francisco, California Bay Area. The Bay Area provides a range of neighborhood types with a large variation in density and walkability across the region – presumably including examples of both more and less walkable neighborhoods. As illustrated in Figure 4, the cases are neighborhoods that have been objectively measured as to their walkability, and the units of analysis are the characteristics of individuals in those neighborhoods. Data is taken from the Bay Area Travel Survey (BATS) in the interior 5 counties of the Bay Area (Alameda, Contra Costa, San Francisco, Marin and San Mateo Counties). This provides many contrasting neighborhoods, from less to more walkable.<sup>2</sup>



**Figure 4: Research Framework**

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<sup>2</sup> This project was originally conceived using the Youth Environment and Nutrition (YEN) data set from UCSF / Kaiser Permanente, however the analysis of that data did not yield significant results. The results from the YEN data are presented for *informational purposes only* in the appendices.

### **4.3 Research Question**

Assuming (1) that there are health advantages to certain types of urban and suburban environments and that (2) people make neighborhood location decisions for a variety of reasons, the core concept of this study is to explore the attributes associated with walkable neighborhoods with the idea that they are not distributed equitably by socio-economic-status. This would imply that individuals are not able to equally sort into more walkable places based on income or other factors (i.e. it would be less likely to find lower income individuals in more walkable neighborhoods, or as income goes up walkability goes up).

If this is true, it could be the result of neighborhoods becoming more or less homogenous, concentrated with individuals with certain attributes. It could suggest that there are distributional equity issues surrounding the even distribution of walkable neighborhoods as a health resource and that some individuals may have barriers to access based on a variety of contributing factors (spatial, financial, racial, social, etc.).

### **4.4 Approach and Limitations**

To conduct this exploration, a mixed methods approach (quantitative and qualitative) is used, modeled after the work done by Macintyre that uses analysis of quantitative data bundled with qualitative comparisons of contrasting neighborhoods. This study is therefore informed by sociologic and anthropologic approaches, which provide some of the rationale for use of interpretive perspectives to balance out quantitative work (Dewalt, Dewalt, and Wayland, 1998; Morland et al., 2002)

With regard to limitations, first, this study is limited in that it does not directly study longitudinal housing or location decisions over time. While the Census Neighborhood Change Database (NCDB) is used to supplement cross-section data, the primary focus is on cross-sectional associations. Such associations cannot be used to directly illustrate selection or longitudinal behavior. They may reveal propensity (whether or not certain populations may be sorting to certain areas) and allude to how underlying preferences (desire for space, schools, being near like people) might be impacting decisions, but they cannot show choice.

As such, this study uses qualitative work to provide balance to the quantitative and to explore potential longitudinal inferences. This interpretive assessment reaches beyond the quantitative assessment to an understanding of the lay interpretation and the socio-cultural forces that can mediate or moderate in apparent correlations. Use of a solely positivist perspective would be limiting in that it might illustrate a causal relationship but not tell the researcher how this relationship came to be. Thus, by blending positivist and interpretive perspectives, this study can build on the limitation of the quantitative data.

This use of interviews and focus groups allows exploration of the cross-sectional traits found in the quantitative. Hypothesizing that the traits would hold on a longitudinal basis, one can develop reasons why they might be occurring and identify opportunities to intervene. These could include opportunities to enable more mixed income, racially

inclusive walkable housing, or policy interventions to correct market failure and population health.

In addition to this limitation of cross-sectional data, it should be recognized that this study does not measure walking behavior – only propensity to walk based on a series of variables (density, street-grid connectivity and land-use mix). It would be wrong to assume that these are the only determinants of walking; however, there is a well-defined body of literature indicating their importance and correlation with behavior. Other factors such as landscaping, sidewalk width, and safety / perceived safety play some part in behavioral decision, but this study argues that they are related more to the suitability of the environment (measured by audit tools) vs. accessibility (which would measure propensity) as discussed in Section 3.1.1.

Lastly, since this study deals with the concept of socio-economic status and income, there are implicit connections to minorities, many of whom are traditionally poor and have lower education. This generalized statement of common knowledge (that minorities are poor and have low income), however, oversimplifies a complex and nuanced issue. There are both non-minorities with low incomes and minorities with high incomes. One of the benefits of the mixed methods approach discussed above is the ability to unearth some of the differences between individuals of any race that might run counter to what is ‘common.’

#### ***4.5 Data Description***

This study uses the 2000 San Francisco Bay Area Travel Survey (BATS). BATS was designed by MORPACE International, Inc. for the Metropolitan Transportation Commission. The survey provides information about mode choice as well as individual user characteristics for more than 15,000 survey respondents throughout the 9-county Bay Region. Home-based data was used for all individual survey respondents within the interior counties of the Bay Area, including Alameda, Contra Costa, San Francisco, Marin and San Mateo Counties (N=8,919). It was combined with data from the U.S. Census and local municipalities to calculate other variables such as walkability and racial unevenness (using a concentration index). These interior Bay Area counties provide a sample of respondents that provide a cross section of areas that are diverse and reflective of many different types of neighborhoods.

A list of variables used can be found in Table 2. Basic descriptives from the database are found in Table 3. On average, the neighborhoods are somewhat walkable (close to 60 on a 0-100 point scale), which was expected given the built environment features of the central Bay Area. Median housing value was over \$410,000 but given the standard deviation it varied over the geographic area. To explore neighborhood composition (whether a neighborhood is a concentrated Black neighborhood) an index of concentration was calculated. This was used to provide information about the most isolated areas and discussed more in the following tables.

**Table 2: Summary of Variables Used**

<i>Category</i>	<i>Variable</i>	<i>Abbrev.</i>	<i>Source</i>	<i>Description</i>
<b>Dependent</b>	<b>Walkability</b>	WALK	Census 2000	Calculated index of Walkability / [ $\sum$ Z-scores (Density, Street Grid Connectivity and Land Use Entropy by CBG)]
<b>Individual</b>	<b>Age (Years)</b>	AGE	BATS	Age of Respondent in Household by in Years
	<b>Age<sup>2</sup></b>	AGE2	(BATS)2	Quadratic Variant of Age to in Years to Account for Variation Over Time-of-Life
	<b>Gender (Male)</b>	GEN	BATS	Gender of Respondent in Household (Male = 1; Female = 0)
	<b>Income (\$)</b>	INC	BATS	Household Income of Respondent in Dollars (\$)
	<b>Ethnicity</b>	ETH	BATS	Ethnicity of Respondent (White=1, Black=2, Asian=3, Latino / Hispanic=4 and Mixed / Other=5)
<b>Housing / Built Environment</b>	<b>Neigh. Age (Years)</b>	NEIGH	Census 2000	Median Housing Age Based on CBG as a Proxy for Neighborhood Age in Years
	<b>Multi-Family (1-0)</b>	MULTFAM	BATS	Housing Type of Respondent (Multi-Family=1 vs. Single=0)
	<b>Housing Value (\$)</b>	MED	Census 2000	Median Assessed Housing Value by CBG in Dollars (\$)
	<b>Owned Housing (1-0)</b>	TENURE	BATS	Housing Tenure of Respondent (Owned=1 vs. Rent=0)
<b>Household / Transport</b>	<b>Household Size</b>	HHSIZE	BATS	Number of Individuals per Household per Respondent
	<b>Number of Workers</b>	WRK	BATS	Number of Workers in Household per Respondent
	<b>Available Vehicles</b>	VEH	BATS	Household Vehicles per Respondent
	<b>Number Licensed</b>	LIC	BATS	Number Licensed in Household per Respondent
<b>Other</b>	<b>Black Neighborhood</b>	BLKNEIGH	NCDB	Calculated Concentration Index of the Black Population ( $C_B > 1$ )

**Table 3: Selected BATS Descriptives**

Descriptives	Entire Population (N=8919)	
	Mean	Std. Deviation
Walkability	59.22	24.66
Age	47.86	14.54
% Income <\$40K	18.5	NA
% White	79.2	NA
% Black	2.8	NA
% Asian	6.6	NA
% Latino / Hispanic	3.4	NA
% Multi-Family	3.89	NA
Housing Value (\$)	410,311.97	201,498.82
Household Size	2.24	1.23
Number of Workers	1.31	0.85
Number Licensed	1.72	0.72
Black Neighborhood	.69	1.08

Again, an index of concentration is used as a demographic measure of distribution between groups over a geographic area. While other measures have been used in the literature to measure concentration [see Lieberman (1980a; 1980b) and Robinson (1980)] in the case of this study a concentration measure similar to a location quotient calculation is used to measure the regional share of the Black population located in a smaller area relative to a larger area.<sup>3</sup> The measure is indicated as a formula below.

$$C_B = \left( \frac{\frac{P_{Bi}}{P_i}}{\frac{P_{Br}}{P_r}} \right)$$

Where:

- $C_B$  = the relative concentration of Black population in the  $i^{\text{th}}$  area (Census Tract)
- $P_{Bi}$  = the Black population of the  $i^{\text{th}}$  area (Census Tract)
- $P_{Br}$  = the Black population for the study area / region (5 Bay Area counties)
- $P_i$  = the total population for the  $i^{\text{th}}$  area (Census Tract)
- $P_r$  = the total population for the study area / region (5 Bay Area counties)

This yields the relative share of subarea  $i$ 's population that is Black, relative to the regional share. If  $C_B = 1$ , then there is an equal share in the area as compared to the region. If  $C_B < 1$ , then the track is less concentrated than the region. If  $C_B > 1$ , then there is a relatively higher concentration of Blacks. The higher the number, the more concentrated the area. For example, in the case of the equation above, if there is an equal share of Blacks for the  $i^{\text{th}}$  area, the value of  $C_B = 1$ , but in more concentrated Black locations,  $C_B$  exceeds 1.

Each zone or subarea has a concentration index that is calculated. The unique geographic values of the concentration calculations (N=872) are then applied to each individual case from the BATS data set (N=8,919; all of which relate to an individual's home location). This yields a single concentration index value for each case, related to the geographic subarea where they live.

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<sup>3</sup> Location quotients were first used by Robert Haig (1926) and are normally applied in economic base analysis.

The range of values for these cases extend from 0 to 7.92, as indicated in the descriptive statistics found in Table 4.

**Table 4: Descriptive Statistics of Concentration Index**

	N	Minimum	Maximum	Mean	Median	Std. Dev.
Concentration	8919	0.00	7.92	0.6986	0.3069	1.0821

These factors enter into the quantitative model last and are regressed after, individual, housing and transportation variables.

More detailed methodological discussion, additional descriptives and cross-tabulations can be found the appendices.

#### **4.6 Walkability**

For the quantitative work ‘walkability’ is the key dependent variable. It is quantifiably defined using the method demonstrated by Frank (2004) as discussed in Section 3.1. Address data from the BATS study is geo-coded, and Z-scores for related built environment data including population density, street grid connectivity and land use mix are tallied to determine a unique walkability index value for each of the individual cases in the data set.

Although Frank makes use of residential density in his method, the method in this study varies by using population density in that all potential residents are potential walkers. This is consistent with work by Leslie and the Frontseat / Walkscore algorithm. A summary of the calculation used on the address information to benchmark or ‘index’ neighborhood walkability can be found below in Table 5.

**Table 5: Walkability Index**

<i>Measure</i>	<i>Definition</i>	<i>Data source</i>
<b>Population density</b>	Z-score of population per square mile	2000 Census
<b>Street grid connectivity</b>	Z-score of the number of intersections per square kilometer	2000 Census (Street centerline file)
<b>Land use mix</b>	Weighted (3) Z-score of the land use entropy per square mile	Parcel-level land use data and Google indexed businesses
Note: Scores are summed and normalized to a 0 to 100 scale; land use weighted per recommendations from Leslie (2003) and Frank (2004).		



The walkability index, using data normalized to a 100-point scale by Frontseat, is mapped in Figure 5. The variables chosen to measure walkability are used because they represent: 1) the most consistent walkability framework based on the data set and established literature; 2) the best available information on the socio-demographics of the study population. The histogram presented in Figure 6 illustrates how the walkability values are distributed normally but somewhat skewed toward higher walkability. The Bay Area as a whole has above average walkability, but a substantial portion of locations fall below this average.

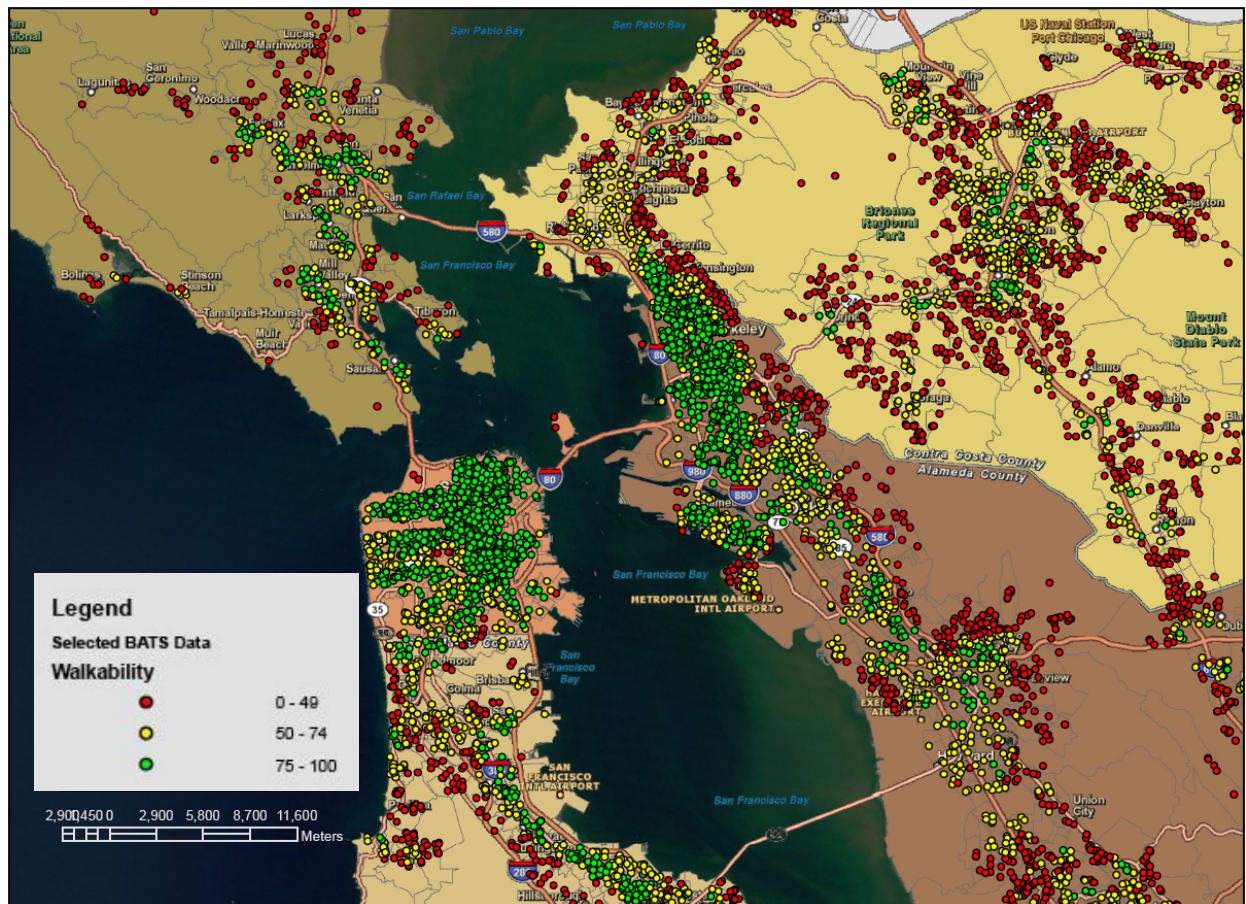


Figure 5: BATS Cases

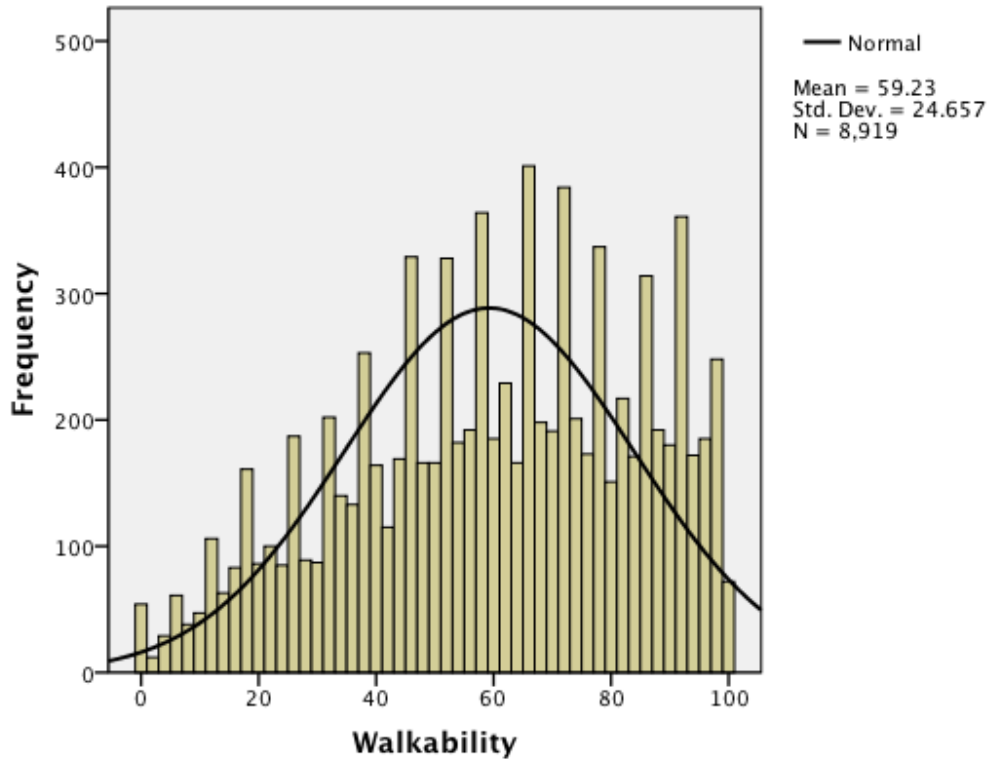


Figure 6: BATS Walkability Histogram

#### 4.7 Quantitative Assessment

As mentioned previously, the quantitative phase of this study evaluates the individual characteristics of those living in a walkable neighborhood on a cross-sectional basis. The purpose of this phase is to explore the question ‘Who?’ – who lives in quantifiably walkable (or non-walkable) neighborhoods in the California, San Francisco Bay Area. The data set is modeled to explore correlations between neighborhood walkability and individual, household and built environment variables for significance. The general framework is shown in Figure 7.

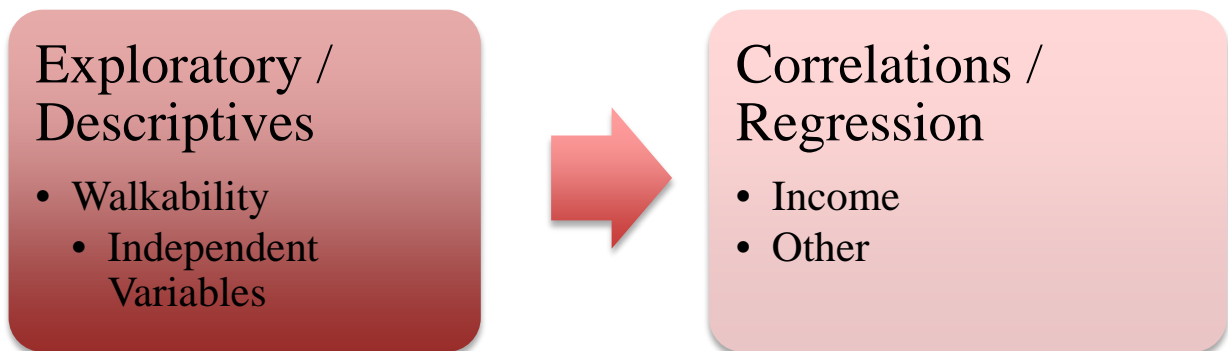


Figure 7: BATS Model

The hierarchy of features of a walkable neighborhood (presented in Figure 2) is used as a basic theoretical model for variable selection and entry. The model draws on 1) built environment factors, 2) moderating factors, and 3) individual factors. These have been shown to be connected with walkable neighborhoods. Since this study evaluates the characteristics of such locations on a cross-sectional basis, it is appropriate to base evaluation on this theory since it is directly linked to this concept of walkability.

It also appropriate to use such a model since it evaluates walkable neighborhoods in the same manner that prospective households weigh desired characteristics and amenities in the “*area orientation*” stage of housing searches (Gibb, 2000). While housing decisions are bounded by available units on the market, they follow many of the same built environment behavioral decision pathways as other utility decisions (Marsh & Gibb, 2009; Von Neumann & Morgenstern, 1947).

The graphic in Figure 8 presents how this framework applies to this study where the dependent variable is neighborhood walkability, e.g. density, land use mix, and street grid connectivity (Frank, 2005). The graphic presents the broad categories consistent with the established theory in Figure 9, and then lays out the related variables used in this study. Again, the variables are used because they best fit the theoretical framework presented in Figure 2, outlining the built environment, moderating and individual variables that guide walkability.

For example, Ioannides and Zabel (2008) discuss the use of price, number of residents, and household size as significant moderating variables in their study of neighborhood selection decisions, but also add individual factors such as age, income and race to the model. They note that due to multi-collinearity they do not include variables such as education (which is highly correlated with income). The same was true for this data set.

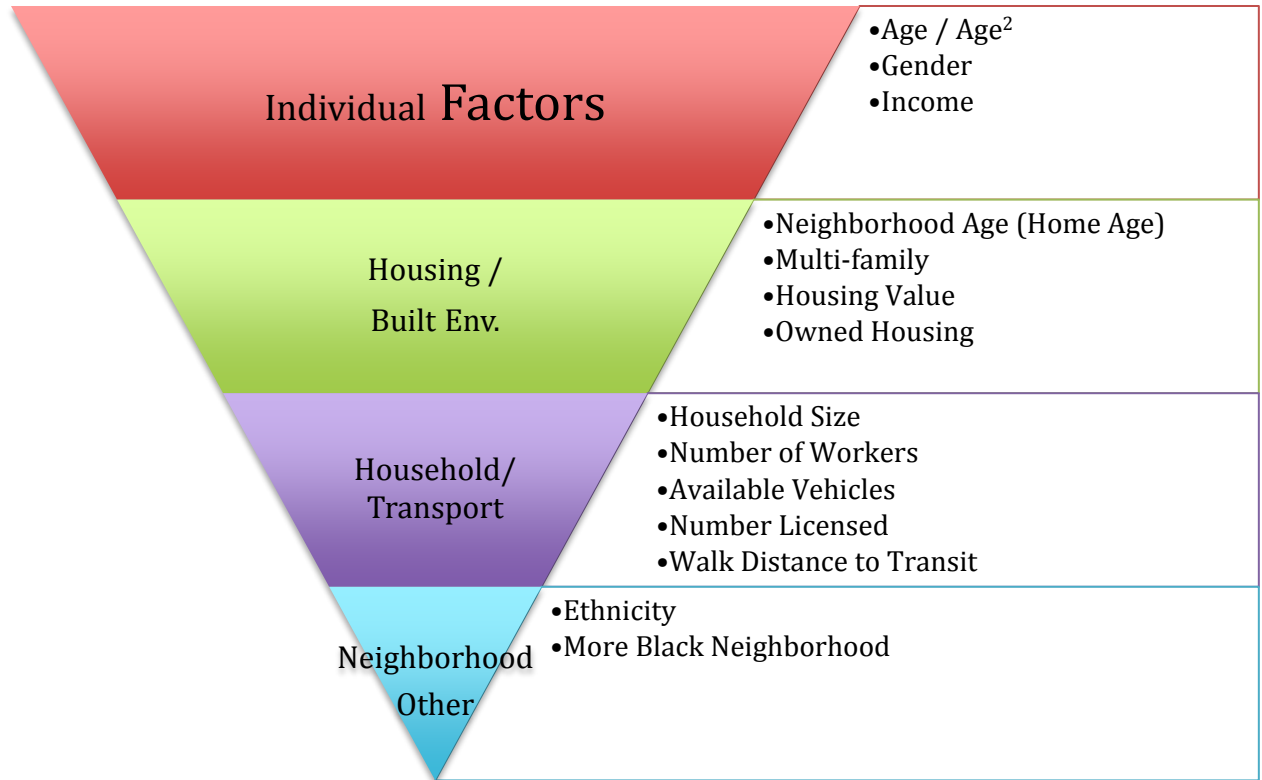


Figure 8: Walkable Neighborhood Variable Entry Framework

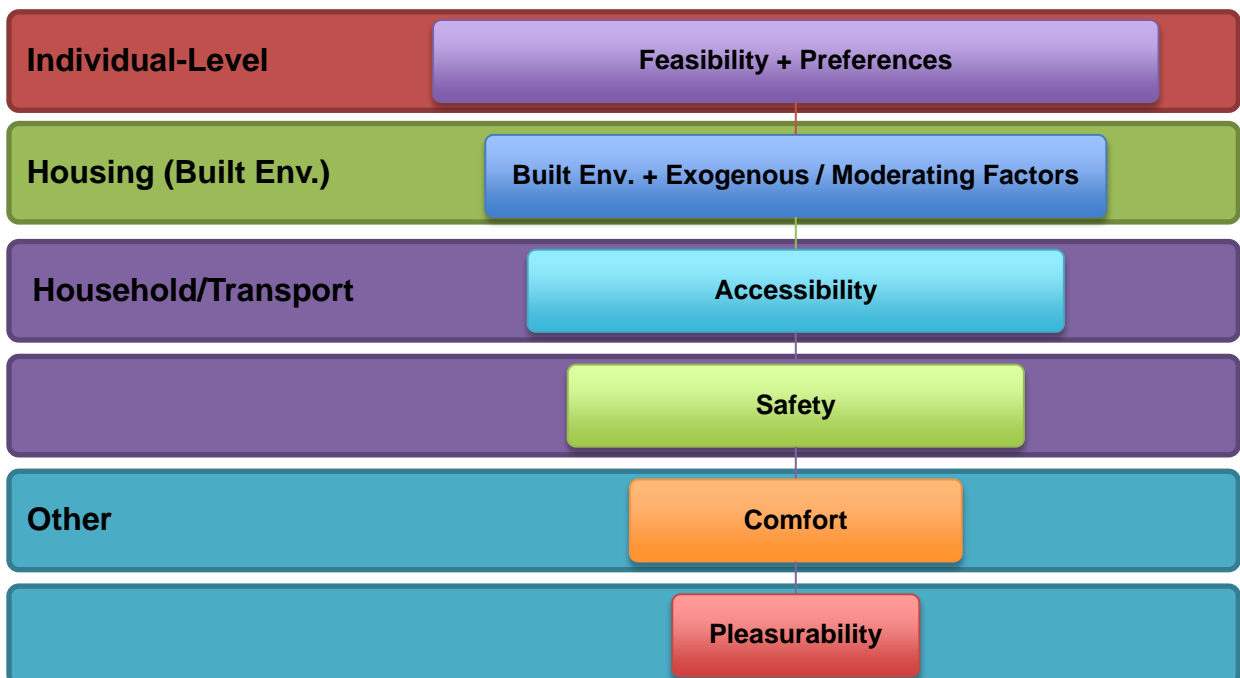


Figure 9: Walkable Neighborhood Theoretical Modeling Framework

With regard to modeling, first simple descriptives and associations are explored. After assessing these, variables are modeled based on their priority in the pyramid, entered by group, moving from a limited model to a full model. With each step the adjusted R-value and F-statistic are compared to judge model improvement. A detailed list of the explanatory variables used for analysis is found in Table 2. The general procedure for entry is outlined in Table 6.

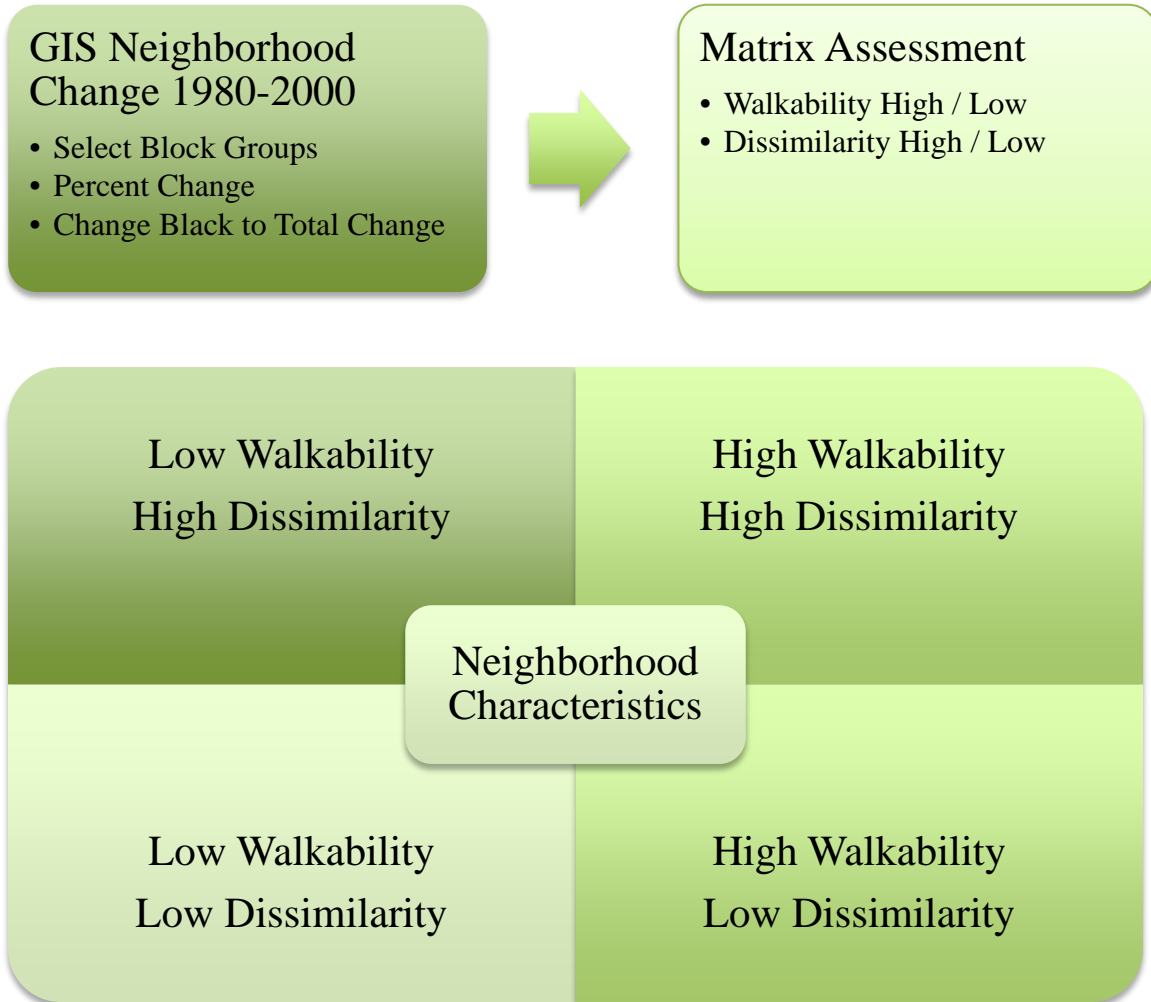
**Table 6: General Modeling Framework**

<b>Step 1</b>	<b>Classify built environment data.</b> <u>Aims:</u> <ul style="list-style-type: none"> <li>• Import GIS data, built environment characteristics and geo-code addresses.</li> <li>• Calculate walkability index (<math>\Sigma</math> z-scores (Density; Street Grid; Land Use).</li> <li>• Export results back to statistical package.</li> </ul>
<b>Step 2</b>	<b>Explore descriptive information and distribution.</b> <u>Aims:</u> <ul style="list-style-type: none"> <li>• Explore normality and evaluate scatterplot distribution of variables.</li> <li>• Confirm assumptions that the sample is representative of the population, appropriately degree of randomness, check for errors.</li> </ul>
<b>Step 3</b>	<b>Explore models using statistical techniques.</b> <u>Aims:</u> <ul style="list-style-type: none"> <li>• Explore using crosstabs and ANOVA.</li> <li>• Explore associations between independent variables and walkability, entering them into the model one-by-one based on race, income and education</li> <li>• Evaluate significance, goodness-of-fit and R-values.</li> <li>• Investigate other variables factors; repeat steps 2-3 if necessary.</li> </ul>
<b>Step 4</b>	<b>Repeat 1-3 as necessary.</b>
<b>Step 5</b>	<b>Triangulate data in Phase 2 with qualitative assessment.</b>

This statistical assessment is done in tandem with analysis using the Census Neighborhood Change Database (NCDB) and an index of concentration to show time-series trends in ethnic concentration (more Black neighborhood, etc.) The NCDB is a data resource that normalizes population data over time as Census tracts change so that population differences can be seen.

A calculated index (used to measure the distribution between groups over a geographic area and evaluate pockets of inequality) is used along with geo-coded BATS walkability data and neighborhood change data from the NCDB to inform and illustrate modeling exercises, showing how walkable and non-walkable tracts are changing. This data is shown in a matrix framework to display the characteristics of specific neighborhoods in a method illustrated in Figure 10.

This neighborhood change exercise provides a segway to targeted interviews in walkable vs. non-walkable environments as located by GIS assessment. These interviews comparatively explore residential preferences, patterns and the potential influencing factors surrounding residential choice for those living in less-walkable places.



**Figure 10: Neighborhood Change Model**

#### **4.8 Qualitative Assessment**

The qualitative portion of this study uses focus groups and interviews with roughly 60 individuals to explore and provide insights into the results of quantitative assessment. The primary focus of this work is to provide data triangulation on why people choose walkable areas and explore the stories behind these residential decisions. For example, the work can gain clarity on whether those living in less walkable places are controlled by variables in the model or for other reasons, and inform the important variables for future quantitative assessment.

The analysis seeks a broader understanding of culture, history, and community from subject-area experts as well as lay individuals. The assessment begins with a ‘thick description’ including historic analysis and a content analysis of the current narrative on housing choice (Geertz, 1973). It is done using content analysis and focused interviews with neighborhood residents and professionals, inquiring what is happening with those

living in walkable vs. non-walkable neighborhoods and how people value various aspects of the entire hedonic bundle of goods for housing resources. The analysis evaluates selected neighborhoods using narrative-story-telling derived from focus groups and individual interviews to explore the history and experience of those living in the study neighborhoods.

Focus groups and interviews were conducted from January to April 2010 and again in March through June 2011. Areas with pockets of less walkability were targeted on foot with a focus on Oakland, Richmond and San Francisco based on GIS mapping exercises. Individuals were recruited using snowball sampling within a two-block GIS radius of the corresponding home-based cases in the BATS data set.

This recruitment involved visiting homes and knocking on doors in these areas, leaving flyers and then asking those who answered to attend focus groups and to invite others. Individuals intercepted on the street were invited, however since neighborhood residents were the primary thrust of the research, these conversations were conditioned based on questions about where individuals resided.

Focus groups involved roughly 30 people; individual interviews (scheduled based on the results of the focus groups and suggestions from other interviewees) involved 43 individuals. Twenty-four local planners, real-estate professionals and business owners identified in interviews or linked to an interest in the neighborhood (such as a real estate listing) were also interviewed.

Questions were developed based on the results from quantitative assessment and from contextual assessment of the neighborhood. Interview structure was loose, so as not to limit the ability of individuals to talk in their own language and avoid researcher bias (Trost et al., 1999). Examples included questions such as:

- How did you first come to live in this neighborhood?
- What factors influenced that decision?
- What factors contributed to this?
- Are there any disadvantages to living in this neighborhood? If so, what are they?
- Did you have assistance in making the decision to locate in a certain neighborhood? If so, from whom?
- Did you feel homes were more or less affordable in this neighborhood vs. others?
- How important was the ability to be physically active for you in your housing decision?

More examples can be found in the appendices. All interviews were recorded, transcribed, and checked for accuracy.

The qualitative narrative uses perspectives and points provided by the interviewees ( ; Marshall & Rossman, 1999; Taylor & Bogdan, 1998) arranged on a thematic basis similar to work done by Song (2005) and Kashef (2008) (e.g. housing affordability, density, street grid / connectivity, land use / zoning / mix of uses, socio-economics, other

factors). While the narrative further develops the findings and themes of quantitative assessment, its' primary purpose is to provide further insight into the rationale for housing choices framed by the significance of the lay perspective) and augmentations that might improve quantitative study. The results provide a natural segway and story line for hypotheses, policy suggestions, discussion and future research suggestions.

It should be noted that while the original intent of this research was to conduct a longitudinal pre-post study with data obtained from developers (using the natural experiment of people making residential choices over time) however it is not currently possible to track BATS respondents longitudinally because a unique individual identifier has not been assigned to survey respondents.



## Chapter 5 - Quantitative Assessment

Chapter 5 explores models that best fit the data set to investigate individual, household, and built environment characteristics of walkable neighborhoods. It uses a series of regression models, exploring the correlation of various features that have been attributed to a walkable neighborhood including: 1) individual factors (including age, race and income), 2) built environment and moderating factors, and 3) other factors related to comfort and pleasurability.

This is done to explore whether there are potential influencing factors surrounding the ability to live in a walkable neighborhood. The theory in using this model (as discussed in greater depth in Chapter 4) is that these factors have been shown to be connected with walkable neighborhoods in a hierarchical fashion – moving from individual attributes to neighborhood attributes.

Staying consistent with this framework, variables are added to the regression model using the same logic. First, individual variables are entered, followed by built environment and then other factors, moving from a limited to full model. An F-statistic is computed for each sequential model to judge incremental improvements as variables are added.

All of the variables used and their descriptions are presented in Table 7. To assess the evenness of racial dispersion between walkable and non-walkable areas over time data on neighborhood change from the Census Neighborhood Change Database (NCDB, 1980-2000) is also used in concert with an index of concentration to measure spatial unevenness.

The resulting models are presented and discussed here, and then explored through interviews in Chapter 6.

**Table 7: Summary of Variables Used**

<i>Category</i>	<i>Variable</i>	<i>Abbrev.</i>	<i>Source</i>	<i>Description</i>
<b>Dependent</b>	<b>Walkability</b>	WALK	Census 2000	Calculated index of Walkability / [ $\sum$ Z-scores (Density, Street Grid Connectivity and Land Use Entropy by CBG)]
<b>Individual</b>	<b>Age (Years)</b>	AGE	BATS	Age of Respondent in Household in Years
	<b>Age<sup>2</sup></b>	AGE2	BATS	Quadratic Variant of Age in Years to Account for Variation Over Time-of-Life
	<b>Gender (Male)</b>	GEN	BATS	Gender of Respondent in Household (Male = 1; Female = 0)
	<b>Income (\$)</b>	INC	BATS	Household Income of Respondent in Dollars (\$)
	<b>Ethnicity</b>	ETH	BATS	Ethnicity of Respondent (White=1, Black=2, Asian=3, Latino / Hispanic=4 and Mixed / Other=5)
<b>Housing / Built Environment</b>	<b>Neigh. Age (Years)</b>	NEIGH	Census 2000	Median Housing Age Based on CBG as a Proxy for Neighborhood Age in Years
	<b>Multi-Family (1-0)</b>	MULTFAM	BATS	Housing Type of Respondent (Multi-Family=1 vs. Single=0)
	<b>Housing Value (\$)</b>	MED	Census 2000	Median Assessed Housing Value by CBG in Dollars (\$)
	<b>Owned Housing (1-0)</b>	TENURE	BATS	Housing Tenure of Respondent (Owned=1 vs. Rent=0)
<b>Household / Transport</b>	<b>Household Size</b>	HHSIZE	BATS	Number of Individuals per Household per Respondent
	<b>Number of Workers</b>	WRK	BATS	Number of Workers in Household per Respondent
	<b>Available Vehicles</b>	VEH	BATS	Household Vehicles per Respondent
	<b>Number Licensed</b>	LIC	BATS	Number Licensed in Household per Respondent
<b>Other</b>	<b>Black Neighborhood</b>	BLKNEIGH	NCDB	Concentration Index of the Black Population ( $C_B > 1$ )

## 5.1 Limited Model

### 5.1.1 Individual Factors

As a first step, using a model of neighborhood walkability measuring the attributes of residents who live in those neighborhoods (N=8,919)<sup>4</sup>, individual variables are entered into a limited model. The model shows that age, gender, and income are negatively correlated with walkable neighborhoods.

**Table 8: BATS Regression – Individual Factors Associated with Neighborhood Walkability**

Model <sup>1</sup>		Entire Population (N=8919)					
		B	Std. Error	Beta	t	Sig.	VIF
	(Constant)	98.898	2.673		37.000	.000	
<i>Individual</i>	Age (Years)	-1.311	.105	-.773	-12.446	.000	35.359
	Age <sup>2</sup>	.010	.001	.612	9.848	.000	35.361
	Gender (Male=1)	-1.152	.517	-.023	-2.228	.026	1.001
	Income (\$)	-.028	.009	-.034	-3.182	.001	1.018
		df	F	Sig.			
	ANOVA	4	97.78	.000 <sup>2</sup>			
	R	.207 <sup>2</sup>					
	R-Square	0.043					
	Adjusted R-Square	0.042					

1. Dependent Variable: Walkability

2. Predictors: (Constant), Household Income, Gender, Age<sup>2</sup>, Age

It is interesting to note the significance of both Age and Age<sup>2</sup>, suggesting a concave curve relationship with regard to age. The change of sign and significance for Age<sup>2</sup> could indicate that older adults are slightly more likely to live in more walkable areas. This could also imply that walkability could be more important as individuals age – a finding consistent with preliminary results from the Healthy Aging Research Network study (Prohaska et al., 2011; Satariano et al., 2010; Weiss, Maantay, & Fahs, 2011).

Gender is also significant (although it loses significance in later models), perhaps indicating that women might feel more safe because of the population density in many more walkable environments or may be influenced by economic, social, or community factors that cause them to prefer walkable environments.

The significance of income in Table 8 suggests that, to a certain extent, as income increases, individuals may be less likely to live in walkable locations. This association would mean that generally those with lower income live in walkable areas – a factor that

<sup>4</sup> It should again be noted that the dependent variable is highly aggregate (a combination of density, land use entropy and street grid mix) but that the independent variables related to individuals are highly disaggregate.

runs contrary to initial thoughts that those with lower income would not have access to walkable neighborhoods.

Note the F-statistic (97.78) to be used to test improvements to the model as variables are added.

### 5.1.2 Housing / Built Environmental

Despite the significant correlation between income and walkability in the limited model, as other variables enter the model (with the addition of housing / built environment factors) income loses its significance, as seen in Table 9, and it becomes clear that the data set cannot provide evidence to illustrate a relationship between income and walkability. Housing characteristics (many of which relate to income), it appears, may do a better job of explaining neighborhood walkability, as is indicated with the overall fit of the model, which increases with a new F-statistic of 288.425, a difference of 190.645. Given the critical value of 9.488 ( $\alpha = .05$ ) and 13.277 ( $\alpha = .01$ ) for 4 degrees of freedom, the model appears to be improve significance at both the 95% and 99% confidence intervals when adding housing factors.

**Table 9: BATS Regression – Built Environment / Housing Factors Associated with Neighborhood Walkability**

Model <sup>1</sup>		Entire Population (N=8919)					
		B	Std. Error	Beta	t	Sig.	VIF
	(Constant)	70.895	2.674		26.517	.000	
<i>Individual</i>	Age (Years)	-.555	.098	-.345	-5.642	.000	37.173
	Age <sup>2</sup>	.003	.001	.222	3.630	.000	36.945
	Gender (Male = 1)	-.718	.470	-.015	-1.528	.127	1.002
	Income (\$)	-.007	.008	-.009	-.845	.398	1.036
<i>Housing Built Env</i>	Neigh. Age (Years)	.627	.018	.358	35.216	.000	1.022
	Multi-Family (1-0)	.020	.005	.039	3.867	.000	1.022
	Housing Value (\$)	.000	.000	-.165	-16.236	.000	1.023
	Owned Housing (1-0)	-7.117	.431	-.180	-16.529	.000	1.171
	Household Size (# in HH)	-2.635	.199	-.142	-13.268	.000	1.129
		df	F	Sig.			
ANOVA		9	288.425	.000 <sup>2</sup>			
R		.512 <sup>2</sup>					
R-Square		0.262					
Adjusted R-Square		0.261					

1. Dependent Variable: Walkability

2. Predictors: (Constant), Median Value, Household Size, Gender, Dwelling Type, Household Income, Median Home Age, Household Tenure, Age<sup>2</sup>, Age

Accordingly, housing attributes (which are related to income) do a better job explaining variation in walkability than income.<sup>5</sup> Although the variable gender loses significance, all of the variables appear to be consistent with what one would expect, with older neighborhoods (presumably closer to the urban core) being associated with more walkability.

Owned housing enters the model as significantly associated but with a negative sign, implying that those who own housing are generally not in more walkable locations. An explanation for this could relate to the traditional spatial structure of urban areas, where the value of land in dense, walkable areas of the urban core makes owned housing more expensive, and renting housing easier than purchasing for most consumers. Conversely, ownership rates tend to be higher in the suburbs, where the same amount (or more) housing may be available for the same price (or less). These areas would tend to be less walkable.

The same concave relationship between Age and Age<sup>2</sup> appears in the model.

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<sup>5</sup> It should be recognized that there is likely some multicollinearity between income and housing values, and while income might ultimately be a better attribute to evaluate, housing is included in the model because of the increasing **insignificance** of income in the model. In this case, and in subsequent models, housing attributes stand in as a proxy for income.

## 5.2 Full Model

Further exploring the variables and attributes in the model, other neighborhood factors are introduced. As indicated in previous tables, when additional attributes of households enter the model, positive associations exist between many variables but not related to income. As such, income, gender, and other insignificant variables are not included in the full model.<sup>6</sup>

The model, shown in Table 10, includes the variables best suited to explain walkability. The variables are used based on the theory discussed in Chapter 4 – that there is a hierarchy of needs for a walkable environment, starting with individual, then housing and built-environment, and ethnic and neighborhood factors. A measure of spatial concentration (or unevenness) is entered during this final phase to explore Black concentration in more or less walkable locations.

As discussed in section 4.5, a concentration index is gauged by comparing the share of Blacks in the  $i^{th}$  area relative to the regional share of the population that is Black, measuring the concentration of a ‘Black Neighborhood.’ Similarly, it can be used to compare concentrations for other ethnic groups.

The concentration index generates a scaled value where numbers greater than 1 represent areas of high concentration. If  $C_B = 1$ , then there is an equal share in the area as compared to the region. If  $C_B < 1$ , then the track is less concentrated (and more dispersed) than the region. If  $C_B > 1$ , then there is a relatively higher concentration. The higher the number, the more concentrated the area.

The formula is presented again below.

$$C_B = \left( \frac{\frac{P_{Bi}}{P_i}}{\frac{P_{Br}}{P_r}} \right)$$

Where:

$C_B$  = the relative concentration of Black population in the  $i^{th}$  area (Census Tract)

$P_{Bi}$  = the Black population of the  $i^{th}$  area (Census Tract)

$P_{Br}$  = the Black population for the study area / region (5 Bay Area counties)

$P_i$  = the total population for the  $i^{th}$  area (Census Tract)

$P_r$  = the total population for the study area / region (5 Bay Area counties)

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<sup>6</sup> This change to include only significant variables limits the ability to compare improvement over some previous models.

**Table 10: Full Model of Factors Associated with Neighborhood Walkability**

Model <sup>1</sup>		Entire Population (N=8919)					
		B	Std. Error	Beta	t	Sig.	VIF
	(Constant)	67.519	2.529		26.699	.000	
<i>Individual</i>	Age (Years)	-.329	.096	-.205	-3.442	.001	39.155
	Age <sup>2</sup>	.002	.001	.120	2.006	.045	39.746
<i>Built Env / Housing</i>	Neighborhood Age (Years)	.583	.017	.332	34.024	.000	1.056
	Multi-Family (1-0)	.016	.005	.031	3.239	.001	1.024
	Median Value (\$)	.000	.000	-.143	-14.435	.000	1.087
	Owned Housing (1-0)	-5.954	.415	-.150	-14.362	.000	1.211
	Household Size (# in HH)	-1.658	.221	-.089	-7.505	.000	1.559
<i>Household /Transport</i>	Number of Workers (#)	1.563	.347	.058	4.498	.000	1.827
	Household Vehicles (#)	-3.893	.299	-.160	-13.002	.000	1.665
	Walk Distance Transit (Feet)	-5.280	.215	-.236	-24.557	.000	1.022
<i>Ethnicity / Neighborhood</i>	Black (1-0)	-2.397	1.402	-.020	-1.709	.087	1.497
	White (1-0)	-1.140	.796	-.020	-1.432	.152	2.261
	Asian (1-0)	3.648	1.170	.038	3.117	.002	1.648
	Latino / Hispanic (1-0)	-.871	1.377	-.007	-.632	.527	1.390
	Black Neighborhood	-2.388	1.107	-.022	-2.156	.031	1.152
		df	F	Sig.			
ANOVA		15	249.771	.000 <sup>2</sup>			
		R	.582 <sup>2</sup>				
		R-Square	.339				
		Adjusted R-Square	.337				

1. Dependent Variable: Walkability

2. Predictors: (Constant), Black Neighborhood, Latino / Hispanic, Asian, Black, White, Walk Distance to Transit, Household Vehicles, Number of Workers, Household Size, Household Tenure (Owned), Housing Value, Dwelling Type (Multi-Family), Neighborhood Age, Income, Gender (Male), Age<sup>2</sup>, Age

As seen in Table 10, similar relationships appear in the full model as compared to more limited models. Again, there is a concave curve relationship with regard to age (which could indicate that older adults are more likely to live in more walkable locations) and housing attributes maintain their importance in explaining variation in walkability.

When variables that influence travel, like vehicle ownership levels and proximity transit enter the model with individual factors, they improve the predictive capability over the limited model based on the improved F-statistic, which improves by 151.991.78 when 11 degrees of freedom are added [critical values of roughly 19 (  $\alpha = .05$ ) and 21 (  $\alpha = .01$ )].

The most notable finding is that, controlling for factors like housing attributes, proximity to transit and access to a car, Blacks tend to live in less walkable neighborhoods. Furthermore, when Blacks live in a neighborhood that is predominantly Black, neighborhood walkability declines even more.<sup>7</sup> Among ethnic groups, only Asians tend to live in more walkable neighborhoods.

While one might speculate that this Black concentration in less walkable areas could be arising from a lack of affordability and continued discriminatory practices in the real estate industry, more study would be needed to see if this pattern held across a larger geographic area or in locations other than the Bay Area. The full model, however, hints that *there is something about Black concentration that is associated with less walkable environments* and that these empirical findings are worth further exploration using geographic assessment and qualitative methods.

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<sup>7</sup> It is when Blacks are in areas with high concentration of other Blacks, that walkability declines.



### 5.3 Geographic Assessment

A geographic assessment that factors into neighborhood change helps underscore the significant negative association between neighborhoods that are more Black and have less walkability, illustrating the concentration of Blacks over time. As is seen in Figures 11 through 13, the areas of highest racial concentration (those that are more Black, indicated in red and orange) have had an increasing Black population over time – thus, while racial dispersion may have been improving on the whole, racial concentrations may be in certain locations.

Figure 11 shows this pocketed concentration using data from the Census Neighborhood Change Database (NCDB). Figure 12 follows it with population change from 1980 to 2000. As can be seen in the graphics, 3 general areas of interest emerge, including *San Francisco, Oakland* and *Richmond*. Figure 13 underscores this concept, adding less walkable areas (in blue) layered over the proportion of the population that is Black. The analysis again highlights locations with less walkability that have a high concentration of Blacks in San Francisco, Oakland, and Richmond.

Adding to this exploration of neighborhoods that are ‘more Black’ and more or less walkable, a matrix displays the various characteristics that begin to emerge. These are shown in Table 11. As the table indicates, the less walkable and highly concentrated areas appear to have older individuals, with more cars and licensed individuals (perhaps because more driving is required), who live in single family homes and are increasingly Black.

This would support the idea of pocketed clustering and provides an interesting framework for discussion and evaluation of the locations with low walkability and high concentration, identified in the clusters in Figure 11 and 13 (as well as additional graphics in the appendices showing these clusters alongside population trends). These areas appear to be less walkable but also somewhat segregated.<sup>8</sup>

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<sup>8</sup> It should be noted (especially in the case of Figure 13) that while the areas east of the identified clusters in San Francisco, Oakland, and Richmond, appear to have a high proportion of Blacks; they are larger and less populated. This causes them to appear ‘clustered’ as a result of the spatial classification of Census blocks. The areas identified within the urban core, however, suggest a trend of unevenness in availability of walkable areas for minorities. This is thereby explored in greater depth in the qualitative assessment in Chapter 6.

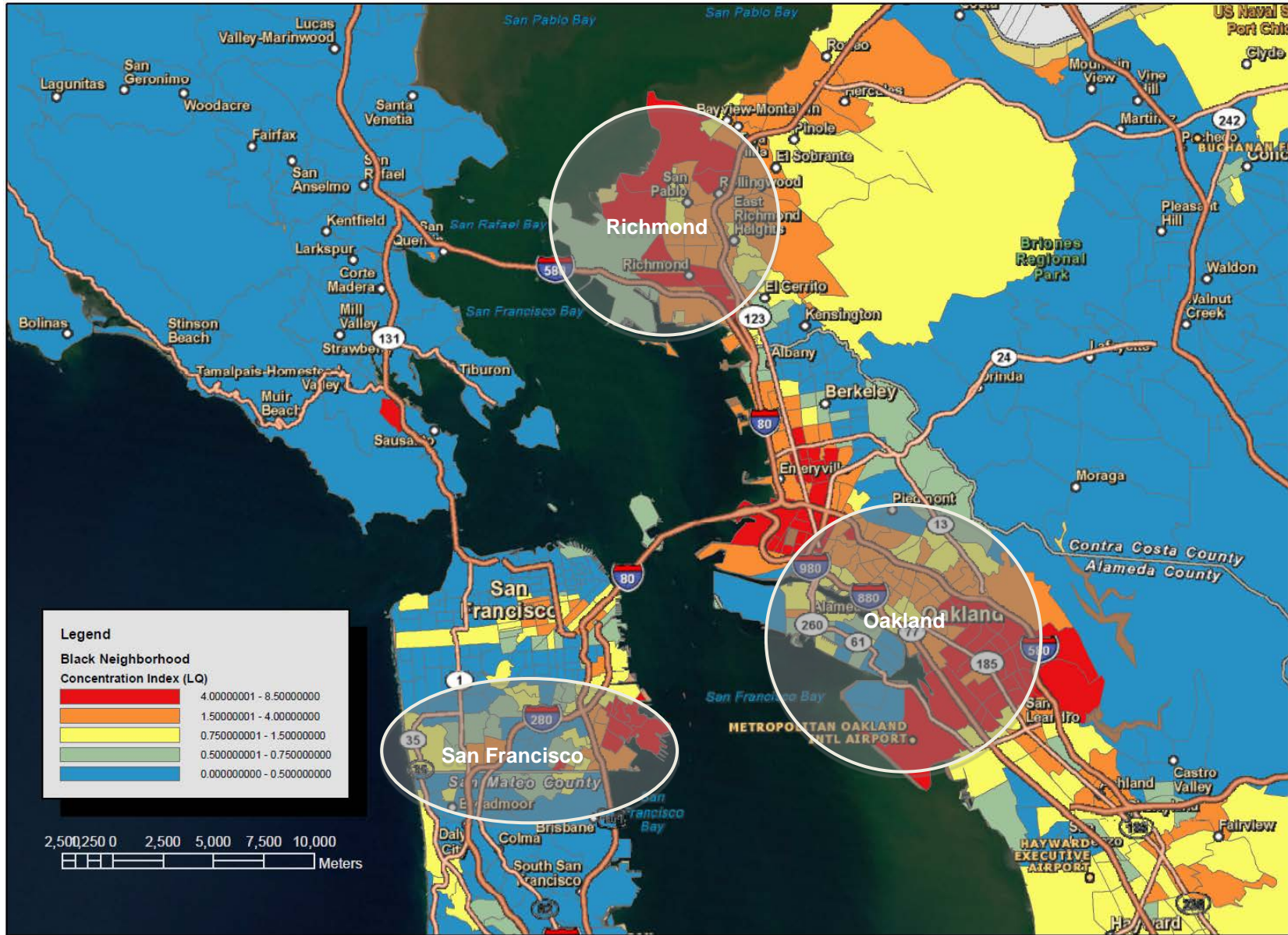


Figure 11: Black Neighborhood Concentration Index 2000



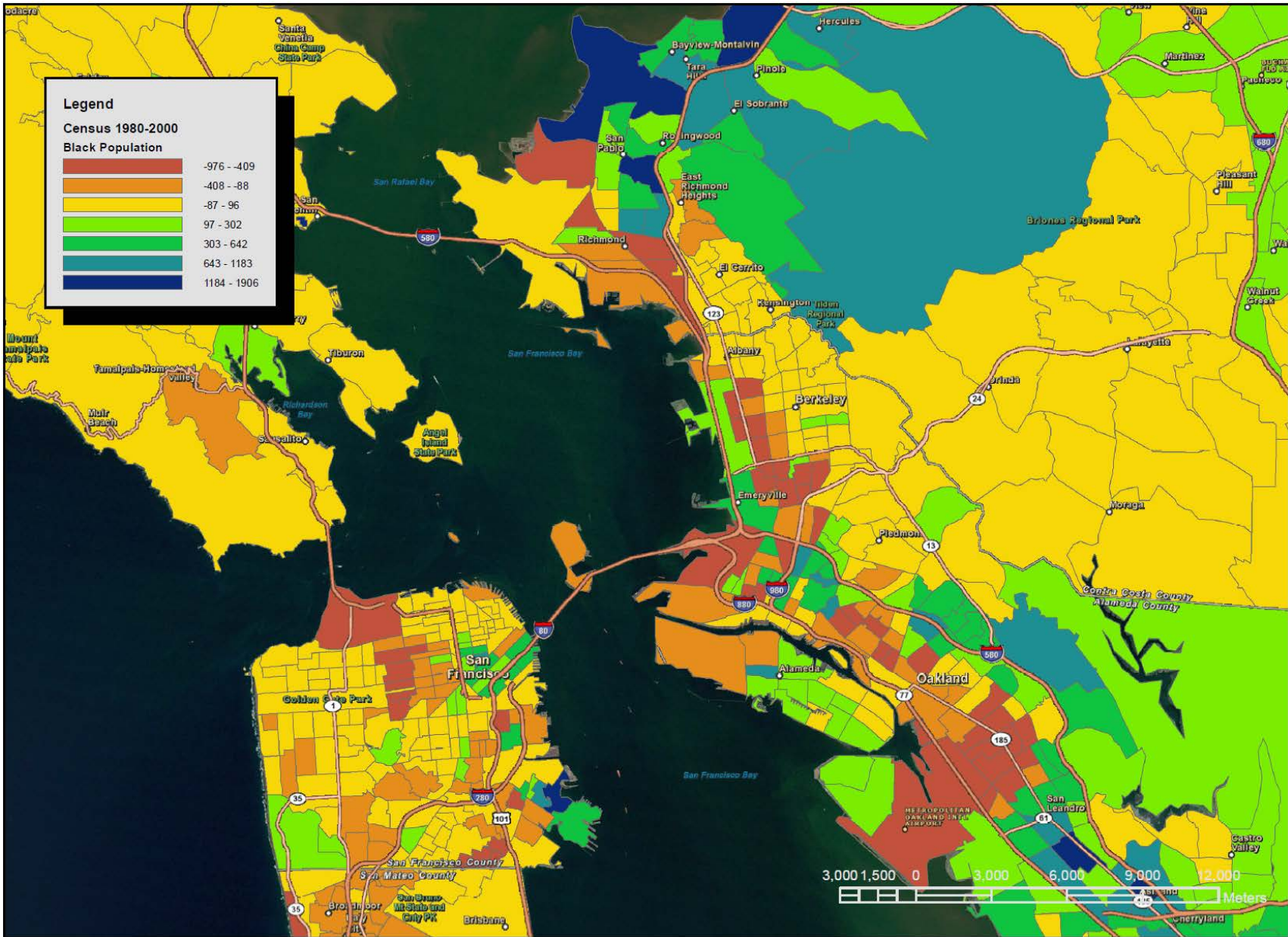


Figure 12: Neighborhoods Becoming More Black 1980-2000



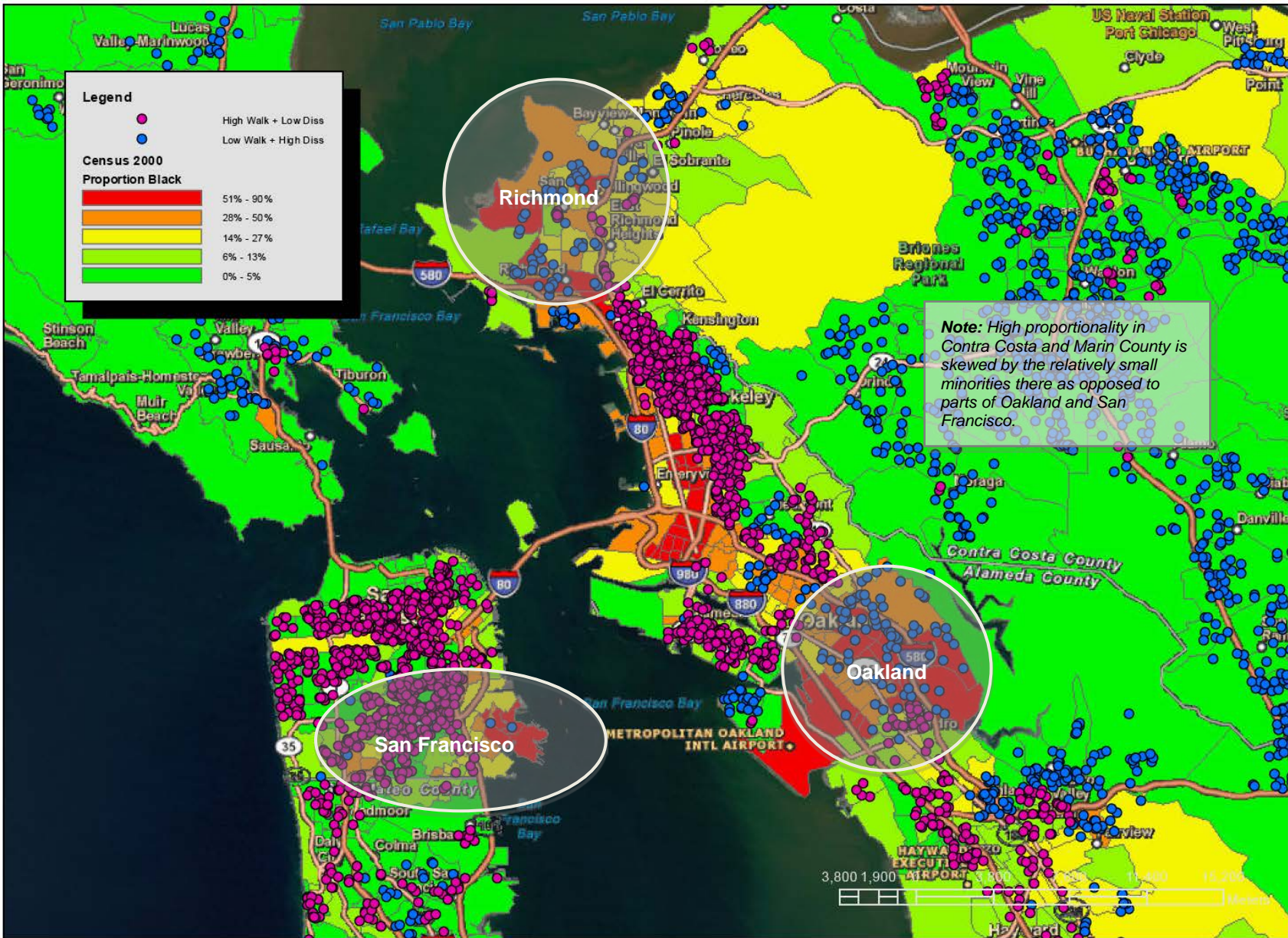


Figure 13: Low Walkability in More Black Neighborhoods 2000

**Table 11: Matrix of Walkability and Concentration of Blacks**

	<b>Quadrant 1: Low Walk / High Concentration</b>	<b>Quadrant 2: High Walk / High Concentration</b>
	N = 2496	N = 1890
	<b>Mean</b>	<b>Mean</b>
Average Age	50.28	46.83
Household Size	2.51	2.00
Housing Value	\$421,484.01	\$421,740.53
% Single-Family	81.4%	46.8%
% Multi-Family / Other	18.5%	53.0%
% Rent	14.9%	45.8%
Number of Workers	1.34	1.23
Number Licensed	1.87	1.57
Household Vehicles	3.05	1.53
Percent Change Black Population 1990-2000	35%	20%
Average Proportion Black	22%	9%
	<b>Quadrant 3: Low Walk / Low Concentration</b>	<b>Quadrant 4: High Walk / Low Concentration</b>
	N = 1811	N = 2580
	<b>Mean</b>	<b>Mean</b>
Average Age	49.25	45.30
Household Size	2.45	2.02
Average Median Value	\$380,545.55	\$412,025.78
% Single-Family	78.3%	47.7%
% Multi-Family / Other	21.5%	52.2%
% Rent	20.1%	48.1%
Number of Workers	1.39	1.29
Number Licensed	1.85	1.60
Household Vehicles	2.03	1.47
Percent Change Black Population 1990-2000	26%	-0.06%
Average Proportion Black	12%	6%

## 5.4 Summary and Contributions

Based on the exploration in this study, there seems to be some type of relationship between neighborhoods that are less walkable and more racially concentrated. There does not appear to be a significant correlation between lower income and the ability to live in a walkable neighborhood. Other significant relationships seem to point to a connection with housing characteristics that could be associated with income (and that possibly reflect individual needs and preferences).<sup>9</sup> In sum, this empirical exploration of walkable neighborhoods offers the following contributions:

- Up until this point, previous research has not discussed geographic concentration and racial unevenness. This work contributes by bringing these factors into the discourse on the topic, using a measure of racial concentration within the context of walkability. The model output suggests that *there is significant variation in those living in walkable areas that are more concentrated for Blacks and that these clustered Black areas are usually less walkable*. It is possible that these individuals may be either 1) concentrating in less walkable suburban areas, or, 2) left in less-walkable urban pockets.
- The assessment does not support a connection between income and walkable neighborhoods. This suggests the need for future research.
- The assessment also adds to the discussion on the relationship between housing value and walkability. Other research has suggested that walkability increases housing value, makes prices more stable, and is tied to income, but this work does not find a strong correlation to support that. *Walkability does not appear to be significantly associated with income in the Bay Area. Furthermore, it does not appear to be strongly associated with higher housing values in the Bay Area.*
- The significance of both Age and Age<sup>2</sup> indicates a possibility that older adults are slightly more likely to live in walkable locations and may find neighborhood walkability more important – a finding that would be consistent with other studies but also worthy of additional investigation.

The key finding on minority concentration provides an opportunity for *further exploration into why minorities appear to be clustered in less walkable locations*.

The empirical data would seem to indicate that there are pockets of minorities in less walkable locations, raising questions about access to walkability among this population subset. Hedonic price models might suggest that with higher incomes people purchase more housing product, which has traditionally been in larger-parcel, suburban areas regardless of ethnicity. However, again, the correlation of specific minority populations could indicate that certain populations are stuck in place, have moved to less walkable suburban areas, or that ethnic enclaves have developed in areas suffering from lack of services or urban disinvestment.

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<sup>9</sup> For example, as households become larger and more established, perhaps with changing family needs (more room for kids, better schools, more access to public open spaces), they may gravitate to less-walkable living environments.

While the limitations of the data set preclude making conclusive statements about these issues, a profile of those in more or less walkable neighborhoods can be developed, and the reasons people choose housing over time can be explored more through qualitative inquiry.

## Chapter 6 - Qualitative Assessment

This section builds on the quantitative exploration through qualitative focus groups and interviews. Since data analysis suggests that Blacks living in more concentrated areas are more likely to be living in less walkable locations, this chapter focuses on two questions stemming from this exploration: 1) *why do Blacks appear to be concentrated in less walkable locations*, and, 2) *why do individuals select walkable neighborhoods*. In the case of Black clustering two themes are explored: that minorities are either moving to less walkable suburbs or that they are left in less-walkable urban pockets (suggesting ghettoization).

Given this lens, this chapter first introduces some basic housing trends in Oakland, Richmond, and San Francisco. This includes observations of 1) financial factors, 2) policies, 3) housing types, and 4) individual preferences. Using this framework, the chapter then focuses on stories about specific neighborhoods that are experiencing change and dealing with the two aforementioned questions, focusing on historical context and interviews, and focus groups conducted in these areas. These discussions, with both lay individuals and technical experts, are used to tell a story about patterns of walkability, and how affordability and socio-cultural factors may be causing minorities to be sorted into less walkable areas. The discussions also lead to follow-up discussion in Chapter 7 about what policies might be used to improve walkability and increase opportunity in clustered areas that are less walkable.

### 6.1 Introduction

Many recent media publications show that the concentration of the Black population has risen in less desirable suburban and urban areas. Some report a rise of more than 60% since 2000 in areas on the outside of inner cities, which are presumably less walkable (Tavernise & Gebeloff, 2010). Assessment of the 2010 Census also seems to indicate this, showing that minorities may be concentrating in less walkable areas outside “...of declining cities ... in search of better opportunities” (Tavernise & Gebeloff, 2011). Maps such as Figure 13 would seem to confirm this idea, showing ‘more Black’ locations, and that there are concentrated areas in ‘inner-suburb’ locations, such as East Oakland and Richmond, in addition to more urban parts of San Francisco.

Minority concentration in these less walkable areas is consistent with the findings of the quantitative analysis and reinforces the question, “Why is this occurring?” The possible influences are recognizably complex. Some might say that this trend is purely life cycle based and related to filtering / sorting [“Baby boomers are coming of empty-nest retirement age, and at the same time their children are buying their first homes, and neither group wants large lots in remote places where little is going on” (Keates, 2010) ], yet this is likely an oversimplification.

A quick academic database search illustrates that (in addition to the mortgage issues leading to the housing crisis of the ‘Great Recession’ of 2008-2009) financial factors, policy issues, housing diversity, and personal preferences play a part in how people make housing decisions, just as much or more than walkability factors into that choice. The



lack of ability to control for these factors is a shortcoming of both the quantitative and qualitative work in this study, however the qualitative discourse presented here is intended to explore these concepts, potentially address shortcomings, and enhance the subsequent policy solutions.

The graphic comparing black concentration and the neighborhood walkability of Bay Area Travel Survey respondents (Figure 14) show that some of the areas that seem to have the highest minority concentration (specifically Blacks) appear to be primarily in somewhat less walkable inner suburbs and depressed areas of existing inner cities. These include areas of Oakland, Richmond, and San Francisco.

The qualitative work in this study provides an opportunity for more focused assessment on this key question of minority concentration in less walkable areas by using focus groups and individual interviews with residents, civil servants, and real estate professionals. But given the complexity of the issue a robust background is necessary, touching on key topics using recent literature, periodicals, and news reports, and outlining the historical development of the focus areas with high concentrations of minorities.

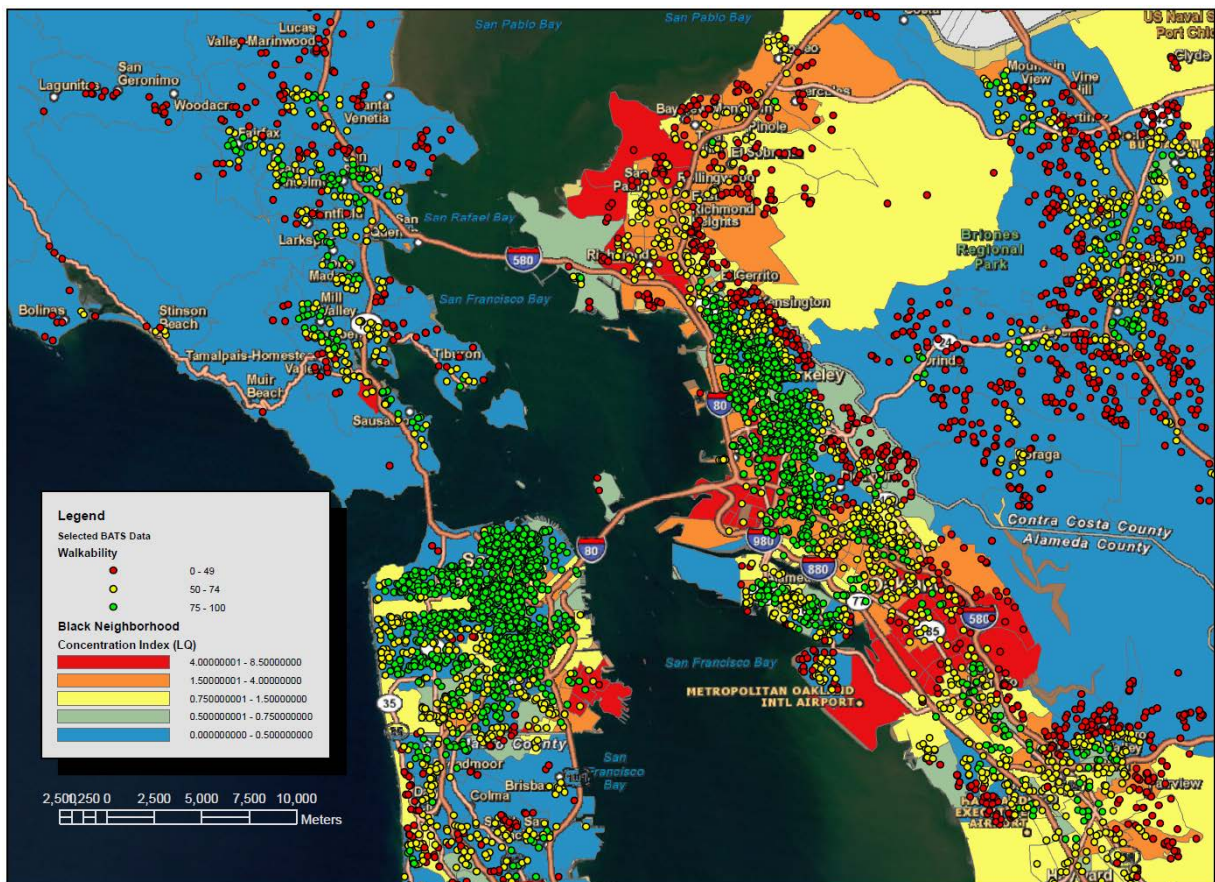


Figure 14: Black Neighborhood Concentration and Walkability

## **6.2 Trends in Housing**

### **6.2.1 Financial**

To provide context for qualitative discussion, it is worth reviewing some of the factors that can guide housing decisions. The most clearly identified factors in the literature that relate to minorities are financial ones such as price and affordability (Robert Wood Johnson Foundation, 2011). With rising house prices people may be put off buying and choose to rent. With rising rental prices people are driven the opposite way towards a purchase. Budgeting problems, house value fluctuations, inflation, rent increases, shifting tenant protection laws/policies, and building condemnations can add to fears, indecision or frustration, all contributing to individual decisions. This concept is critical to the observation that lower income individuals may not always have access to the most walkable locations.

The financial pressure of housing exists both for those who own and those who rent. The very low interest rates and easy access to finance in recent years drove home ownership up rapidly, whereas rents were left stable due to a glut of new housing stock (Burt, 2005). The median home price in the U.S. rose 16% according to the National Association of Realtors. Rents, by comparison, grew just 1.2%. In San Francisco alone median home prices jumped 24% between 2003 and 2005 while rents dropped 7%.

Conversely, in 2011 many reports indicate that rents are now rising while the cost to own remains low due to historically low mortgage rates, yet the price burden of ownership is higher when given the added burden of repairs. Oakland was notorious for enforcing building code infractions for dilapidation and blight in the early 2000s, often against those least able to address code or maintenance issues (Nieves, 2002). Their City Attorney spoke of raises on fines for non-compliant buildings as, "a very self-conscious effort at social engineering to get us on the train of economic revival."

### **6.2.2 Policy**

This regulation on dilapidated buildings leads to a focus on policy. In the Bay Area price has many times been a function of development controls and policy. For example, some areas around Silicon Valley tried to block new housing developments during the technology dot-com boom of 2000 and in response workers migrated outward (Fulton & Shigley, 2002).

While this does not directly relate to minorities, the result was an increase in house sharing or very long commutes, especially among younger and low-income workers, something similar to what happened in WWII Oakland and Richmond shipyards (see Section 6.6). As a result, many workers found themselves commuting in reverse – they could live more cheaply in the San Francisco and travel to their jobs in the Silicon Valley.

The indirect effects ultimately did impact lower income, inner-city residents and minorities. Many proposed that office and housing development be limited and landlords be forced to make a portion of their property available for affordable housing and low rent space for lower income minorities and non-commercial organizations (Campbell,

2000). There were worries about gentrification and that minorities, in addition to artists, bakers, butchers and all the traditional working class residents, would be ‘forced’ to move.

Policy also played a part in shaping choice in places such as Oakland, which had many deteriorated buildings and spaces ripe for redevelopment, and which Mayor Jerry Brown once described as vehicles for "diminished expectations" (Nieves, 2000). During the late 1990’s and early 2000s, Brown pushed for redevelopment of 10,000 units of housing and development of building sites that were abandoned. Certain locations were littered with vacant lots and half-finished buildings with no funding to complete them.

Yet pro-development policy is not the only factor involved in creating a trend of lower-income exodus from center cities. The environmental process and density restrictions have also limited or slowed the amount of growth and had an echo effect on government revenues generated from building permits and property taxes.

As *The Guardian* described the problem of the Bay Area using the City of Vallejo as an example of ‘Bankruptsville, USA’ (Clark, 2008):

*For years, taxes and fees rolled in as developers speckled the city's scorched hills with immaculate estates. The sub-prime mortgage crisis in the United States was a jolt. Homes in many estates lie empty because their owners could not afford loan repayments and, with lots of vacant homes, construction has halted.... With prices in some areas falling 50%, savvy residents have had their homes revalued and are paying much lower rates.*

This has created a difficult situation for many local governments – how to encourage development (and therefore generate revenue) in a down economy, but also to be sensitive to lower income and minority flight.

### **6.2.3 Supply and Preferences**

These development and gentrification issues are closely related to the supply and type of housing. Experts claim that tens of thousands of new properties are needed to accommodate millions of new inhabitants in the Bay Area by 2050, creating a dramatic shortage (Weber, 2010). The influx of technology money in the Bay Area has had a dramatic impact on affordability and has also affected the type and amount of development. Some claim that with all the planned future development there is a lack of housing diversity – that the number of units and their type do not match job and population growth in central cities / the urban core. Each year, 10,000 new jobs are created in places like San Francisco, but only 1,000 new housing units are produced annually.

Traditional home options (such as the suburban single-family home) have dominated the U.S. housing market for decades, and as such there had been few options for other housing models (Ravo, 1993). This creates isolated “warehouses for people and their stuff.” And despite the notion that other products exist (tenancy-in-common, co-housing,

micro-units, etc.) they are very rarely explored to expand housing diversity and meet housing needs in U.S. communities.

Deficiencies in the number of walkable neighborhoods may also be tied to how the building industry responds to market preferences (living space requirements, proximity to neighborhood amenities, design of a suitable walking environment). For example, according to *National Association of Realtors* 30% of condo buyers are single women, who want to live in a more dense, walkable environment (Urban Land Institute, 2010).

Similarly, first time buyers looking for a cheap entry to the market and the elderly seeking to downsize desire walkability, no longer wanting the hassle of a large family home may also prefer smaller units or condos based on finances and lessened space needs (Fogarty 2004). [These kind of units also tend to attract demographics like single parents, divorcees, low paid workers and older residents on small pensions.]

Although there is little information available about minority preferences for the types of units usually associated with walkable neighborhoods, some recent literature specifically identifies that communities with a large share of minorities and lower income residents have less of a walking-supportive environment (Cutts et al., 2009; Lovasi et al., 2009). Given this, it is likely that many minorities living in less-walkable locations might live in more walkable condominiums in walkable neighborhoods locations if the choice were available.

Yet regardless of race, when it comes down to how walkability influences choice (by itself or in tandem with other factors), while there are studies that show that walkability increases housing values (See Chapter 2), there is only anecdotal evidence showing how much (or if) walkability factors into housing decisions. Many realtors certainly call walkability “a major amenity” and Dr. Larry Frank (2011), a researcher from the University of British Columbia, agrees that it is significant, saying:

*...the desirability of certain neighborhoods is a function of changing demographics and the reinvigoration of the core areas. There is no question of a large unmet demand for walkable neighborhoods. This comes with its own problems – feeding speculation and price increases in central cities.*

Yet experts do not guide consumer choices and the interviews in this survey seem to diminish how much minority consumers seem to value walkability as a resource in their choice of housing. This is an important discussion point and is explored more in Section 6.5 and 6.6, however before doing this, it is important to understand the historical development context of areas with high minority concentration in walkable and less walkable areas, including San Francisco, Oakland, and Richmond.

### **6.3 Historical Context**

Oakland, Richmond and San Francisco have somewhat different walkable environments, but were developed in much the same way. All three had areas that were originally developed to provide housing for workers, immigrants, and the military. From the early

1900's to the 1950's real estate developers used a model that included public infrastructure investment to transform rural districts into suburban neighborhoods, and to provide housing for military service members and workers affiliated with war efforts during the period (Loeb, 2001).

### 6.3.1 Richmond and Oakland

As inner suburbs, Oakland and Richmond developed based on a need to accommodate workers and immigrants especially around the time of World War II. Early in the 20<sup>th</sup> Century, some East Bay communities provided summer respite to affluent San Franciscans who wanted to get away from the coastal fog and were economic juggernauts. Oakland's booming downtown and Key System represented this trend of pre-recession leisure in the United States. The East Bay was the terminus for the Santa Fe and Southern Pacific Rail lines representing a hotbed of both White and blue-collar employment (Johnson, 1991). This prosperity put pressure on the housing market and created shortages.

The World Wars exasperated this and transformed these locations into minority concentrated industrial boomtowns – the focus of ship building and increased immigrant population. As Johnson puts it:

*Both cities ... experienced some of the greatest population gains on the West Coast-over twenty percent for Oakland between 1940 and 1944 and nearly four hundred percent for the smaller town of Richmond. Both cities hosted major shipyard operations, including the Kaiser and Permanente corporations in Richmond and Moore Dry-dock in Oakland, as well as a variety of other defense contractors and major military supply centers.*

Up to 60% of the population in these areas became migrant base during the war and post-war era, and many of these migrants were southern Blacks.

**Table 12: Increase in Black Population 1940-1944**

City	Black Population		% increase over 1940	% of total population	
	1944	1940		1944	1940
San Francisco					
Bay Area	64,680	19,759	227.3	3.5	1.4
Oakland	21,770	8,462	157.3	6.3	2.8
Richmond	5,673	270	2,001.1	6.1	1.1

Figures for the San Francisco Bay area include the Oakland and Richmond totals. While there are no available statistics on black migration for the war period, census authorities determined that black residents made up approximately 11 percent of the total population gain in California defense centers. Comparable statistics in the East Bay were generally higher. In Oakland, for example, blacks accounted for nearly a third of Oakland's population increase between 1940 and 1944. Source: Commonwealth Club of California, *The Population of California* (San Francisco, 1946).

**Source: Johnson, 1991**

As can be seen in Table 12, the Black population in Richmond increased over 2000% from 1940-1944 creating 'shipyard ghettos' and geographically separating newcomers from older residents (Brown, 1973). This was coupled with housing shortages with residents "sleeping nightly on outdoor benches in public parks, in chairs at all night restaurants, in theatres, in halls of rooming houses, in automobiles, even in City Hall corridors" (Johnson, 1991).

Blacks concentrated themselves in less walkable and connected areas in west Oakland and east Richmond that were affordable, and were, as Johnson says:

*Barred from inland areas by resistant white residents, black migrants flooded into multiracial lowland neighborhoods. As black migrants moved into these areas, white ethnic residents became a relatively smaller and less visible part of the community. In west Oakland, for example, the percentage of blacks in the total population increased from twenty-four percent in 1940 to sixty-seven percent by 1950.*

*... (these) black prewar residents often resented the intrusion of southern migrants into their neighborhoods. One long-time East Bay resident felt that the area had changed for the worse during the war. Her neighborhood, she said, "used to be like a big family. Everybody seemed to get along nicely together because I think everybody owned something... and we had pride in what we owned." The newcomers, she said, "just didn't understand... [and] they didn't have a pride like we had in our little city." This view suggests the importance of home ownership among prewar blacks and reveals a sense of class distinction between old-timers and newcomers that persists to this day.*

This influx of newcomers bundled with discriminatory practices led to massive construction projects by the Federal Housing Authority of close to 30,000 housing units, which was followed in subsequent years by conventional and leased affordable housing programs. [In 1967 the City of Oakland was one of the first communities to participate in the federal leased housing program (Melkonian & Whitman, 1968).] At the same time, many Whites fled both Oakland and Richmond to new neighborhood communities and developing suburbs over the East Bay hills (Spencer, 2005).

Cities like Oakland and Richmond have since struggled with blight and urban disinvestment, with areas that were less walkable and had a high minority concentration seeing little public funding. Much of the housing constructed as a part of wartime investment had been described as 'poorly planned' with little thought to utilities and infrastructure (Lotchin, 1993).

In the 1990s and 2000s Oakland experienced a small "renaissance" with development of new state buildings, and a City Center project by Shorenstein Co. in the more walkable downtown (Howard, 2006). This was complimented by Mayor Jerry Brown's aforementioned 10K housing initiative and redevelopment of historic assets like the Fox

Theater. However, many minorities continued to be located in less walkable areas. Richmond did not see such an economic rise but according to the City's 2008 General Plan they anticipated such growth.

There have been continued complaints of gentrification and of neighborhood polarization, with blue collar, working class, minorities completely segregated from the urban white-collar residents (Diaz, 2011). In other locations, such as Paris, this has formed deep cultural divides in the community (Gaspard, 2005). Immigrants have formed concentrations in suburban locations that have become the new slums; having issues with crime and frequent rioting many times based on workforce issues. Housing does not connect to jobs. Concentrations of service sector employees are unable to live in the city and poorly served by transit, yet these employees are too poor to own a car. This forms what has generally been called 'slumburbia' (Egan, 2010; Holt, 2010; Quastel, 2009; Schafran, 2009).

Similar suburban service-class ethnoburbs have formed in New Jersey and Los Angeles (Li, 1998; Li, 2009) and relate to the idea of the suburban American dream and the cultural theme of "possessive individualism" that is "romanticized" (Archer, 2009). But while some may desire the traditional suburban American experience, the desire may be dissonant with the reality of the experience in these locations.

### **6.3.2 San Francisco**

In other locations, including San Francisco, the concentrated minority population developed in walkable areas like the Ingleside district. There were many features that made the environment more walkable including street art, high-visibility cross-walks and pedestrian bulb-outs, especially in the Ingleside / Ocean Avenue neighborhood to the east of Interstate 280, as depicted currently in Figures 15 and 16.





**Figure 15: Ingleside Walking Environment**



**Figure 16: Street Art at Ingleside Presbyterian, San Francisco**

This is not surprising given that the area developed around the idea of providing middle-class, worker housing around transit. Developers Baldwin and Howell began developing the area after the 1906 earthquake using portions of a 4500-acre ranch sold by the heirs of



Adolf Sutro. Little public infrastructure originally existed in the rural district. A toll road (modern-day Portola Drive) that connected Twin Peaks and Mt. Davidson existed as the area's main connective artery. The extension of public transit from downtown San Francisco to west of Twin Peaks became critical to the success of new residential developments such as Westwood Highlands (as it did with Oakland's Key System).

These new developments did not sell well until MUNI transit was extended to West of Twin Peaks. The new transit reduced a trip from downtown to the new neighborhoods from one hour to twenty minutes. Transit made the neighborhood viable in that minority and first-generation-immigrant residents could easily commute to downtown San Francisco, and local roadways promoted interconnectivity for pedestrian trips. While the physical traits of these city extensions were somewhat less walkable than their downtown counterparts (including curvilinear street grids that followed the topography, and lots that were larger and more single-family-home oriented<sup>10</sup> than what was normally found in other parts of the city) they were served by a commercial district along Ocean Avenue within walking distance of the development. This is shown in its current context in Figure 17.



**Figure 17: Ocean Ave. Commercial Area, Looking West**

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<sup>10</sup> Looking at the San Francisco area in present day context, the two extremes of housing development are the ornate Victorian homes of the late 19th Century and early 20th Century, and the post-WWII tract-housing that inspired the photography of Ansel Adams and the music of Malvina Reynolds ("Little boxes made of ticky tacky"). Westwood Highlands and most of the West of Twin Peaks area developments would fall in the middle between the Victorian and tract-housing extremes.

Despite a framework that was receptive to minorities, Baldwin & Howell embedded discriminatory practice in their methods. They used price restrictions to concentrate socio-economic groups in the new neighborhoods (Loeb, 2001). This was based on their experience in working to bolster the aesthetic and socioeconomic “standards” in the adjacent Westwood Highlands neighborhood. The new sub-divisions were divided into “price areas.” Price was related to the distance from the streetcar and from the Ocean Avenue shopping district. This in turn made housing affordability a challenge for working class (and minority) families, and concentrated those who could afford less in the less walkable areas of an urban environment.

This ‘worker housing’ was also complimented by public housing projects to the east near the port and maritime facilities in less connected areas on the Bay to the East. Barracks from WWII were reused and became areas concentrated with poorer Black populations.

#### **6.4 Neighborhood Change**

This historic background on walkable neighborhoods with minority concentrations should be viewed within the context of changes within recent years. U.S. Census data shows a trend of Blacks moving from central cities to the suburbs for more affordable homes, leaving more walkable locations like San Francisco in record numbers. Blacks accounted for 6.5% of the San Francisco population in 2005, down from a high of 13.4% in 1970. This was the steepest decline of any major U.S. city, according to the U.S. Census Bureau (as cited in Farrell, 2009).

What are some reasons for this phenomenon? Some experts say that while poorer Blacks occupy public housing, Black mobility relates to the middle class who are cashing out and those who have children, who are:

*Vanishing from the social and cultural fabric, priced out and marginalized by the urban redevelopment policies of the past half century... (fleeing) to northern California cities such as Stockton or Antioch... (and killing) the life and spirit of the (urban) community (Farrell, 2009).*

A 2009 task force by then San Francisco Mayor Gavin Newsom found that, “very-low-income households made up more than two-thirds of the black population” in San Francisco – up from roughly one-half in 1990.” The assessment claimed that middle class black families have moved across the San Francisco Bay to Oakland and other cities in the eastern Bay Area, something supported by the decrease in the population of children in the central city. From 1990 to 2000, San Francisco lost 45% of its black children. From 2000 to 2004, an additional 15% left the city, bringing the total population for African American children to fewer than 10,000 for the first time in decades (Pomfret, 2006).

With regard to those cashing out, as stated in a San Francisco State University publication (2005), an “increase in economic status has enabled many African-American homeowners to sell their houses and take the profits to the suburbs.” Middle-class individuals (Black or White) are drawn to the suburbs based on push and pull factors.

This supports the idea that more affluent minorities have residential mobility out of the central city, which is not bad in itself, but it suggests that many of these people (both lower incomes and Black) may be concentrating in less walkable inner or outer suburbs.

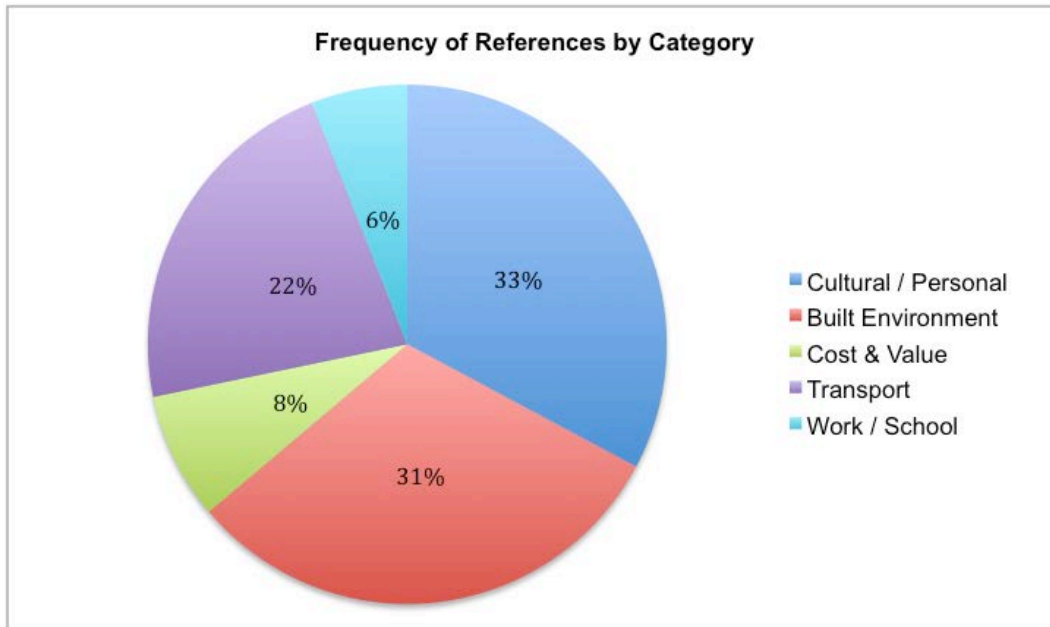
Pull factors could include better schools or more green space; push factors could involve less crime. In focus groups and interviews conducted<sup>11</sup> in Oakland, Richmond and San Francisco many talk about the desire for more “space” and “a yard.” They talk about getting a larger house in the suburbs than they could get in an area more accessible and suitable for walking in the central city, implying a trade-off between certain housing styles and neighborhood walkability. Walkability is almost never mentioned as a primary motivation or desired factor.

Specifically, in pockets of low walkability and high segregation, walkability does not emerge as an important factor in residential choices when looking at a sampling of the top keywords used during interviews. Price and the amount of space are of primary importance. Cultural and social factors are also seen in Figure 18. Many individuals spent more time talking about social places like barbershops and manicure salons than they did price, even if they mentioned price first and if these locations were located 20 miles away in the central city (the case for many Richmond residents). These discussions included mentions of people, relationships, community, and church, and may imply that while cost / price may be the underlying factor, many minorities in concentrated areas value socio-cultural factors more than walkability.

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<sup>11</sup> Focus groups involved roughly 30 people; individual interviews (scheduled based on the results of the focus groups and suggestion from other discussions) involved 43 individuals. Local planners, real-estate professionals, and business owners identified in interviews or linked to an interest in the neighborhood (such as a real estate listing) were also interviewed. Based on the number of flyers distributed, the response rate was approximately 35%. Participants were predominantly minorities including Black, Latino, Asian, and East Asian. The largest share was black, which was expected given the identified concentration in the neighborhoods.

Participants were recruited by visiting homes within 2 blocks of the selected points identified in the quantitative data set, inviting residents and leaving flyers with the invitation to invite other residents. This recruitment involved visiting homes and knocking on doors in these areas, leaving flyers and then asking those who answered to attend focus groups and to invite others. Individuals intercepted on the street were invited, however since neighborhood residents were the primary thrust of the research, these conversations were conditioned based on questions about where the individuals resided.



**Figure 18: Interview Verbal References by Category**

Table 13 summarizes many of the reasons stated for minority clustering in less walkable neighborhoods. Most appear to relate to affordability or socio-cultural preferences and not walkability. If this is the case, then neighborhoods in locations like Oakland and Richmond may have pockets of concentrated minorities in less walkable environments based on price – where individuals who would otherwise choose to live in a walkable environment are unable to do so. As the table illustrates, walkability was never a primary motivator or really valued, something that may warrant specific behavioral policy intervention.

**Table 13: Snapshot of Reasons Described for Housing Choice**

<b>Reasons Cited by Minorities Concentration in Less Walkable Areas</b>	
<b>AFFORDABILITY / PRICE RELATED</b>	
•	Lower price / was more affordable
•	Desire to be in a larger home / more space
•	Being 'forced out' of walkable areas or 'stuck in' or staying in less walkable areas
•	Staying in place as locations become less walkable
<b>INDIVIDUAL / SOCIAL / CULTURAL PREFERENCES</b>	
•	Desire for less crime and a safer environment
•	Space for kids and schools
•	Perception of less walkable places as the American dream (to own a car and not walk as a source of pride)
•	Tendency to stay near their family or friends, especially for recent immigrants
•	Looking for diversity or a multicultural environment

These preferences, combined with the legacy of historic discriminatory practices, creates a situation where social and racial barriers are magnified as parts of central cities are abandoned, with minorities unable to afford or choosing not to live in the walkable city and driven out to more car-dependent suburban locations; those that do remain are forced

into areas that are less walkable. It would also be consistent with the history of housing policy for the past fifty years or more.

Discrimination still exists and may shape choice. The Fair Housing Council of Washington found that Blacks are discriminated against approximately 40% of the time when they attempt to buy or rent a home, or apply for a mortgage loan (Squires & Friedman, 2001). The George Washington University's Survey Research Center surveys show that fewer than 20% of Whites compared with 33% of Blacks were denied their first choice when they moved into their current home. Moreover, more than 25% of Blacks reported that they or someone they knew experienced discrimination in their efforts to find housing or a mortgage during the past three years.

In San Francisco, the absence of middle-class Blacks has left the impression to some such as Rev. J. Edgar Boyd of Bethel African Methodist Episcopal Church that they "are not stakeholders in the community" (Farrell, 2009). Some focused pockets of change including parts of south eastern San Francisco, east Oakland, and north Richmond are indicated in the maps in Figures 20 and 21, depicting changes in the proportion of Black population – where some locations have grown to be over 60% Black.

The maps produced from Census Neighborhood Change Database (NCDB) data (found in Figures 19 and 20 and in the appendices) are meant to illustrate this trend. Figure 20 pinpoints three focus areas in San Francisco, Oakland and Richmond with an increasing proportion of Blacks. As was argued in Chapter 5, many of these areas of high Black concentration are less walkable areas. A summary of focus groups and interviews targeting locations that are more walkable (like San Francisco) and those that are less walkable (like locations in Oakland and Richmond) follows these graphics. The discussion focuses on reasons why individual might be concentrating in these areas.



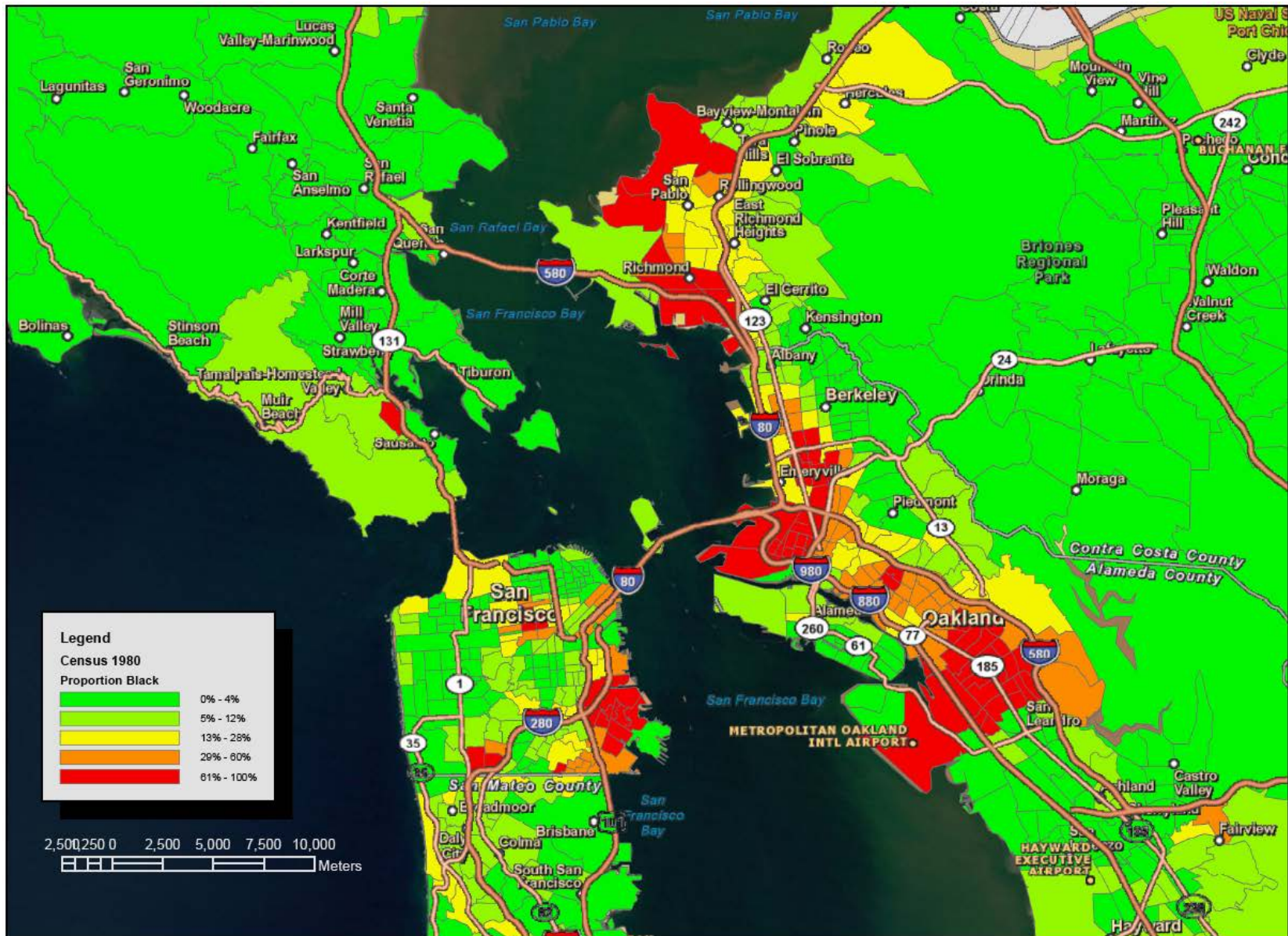
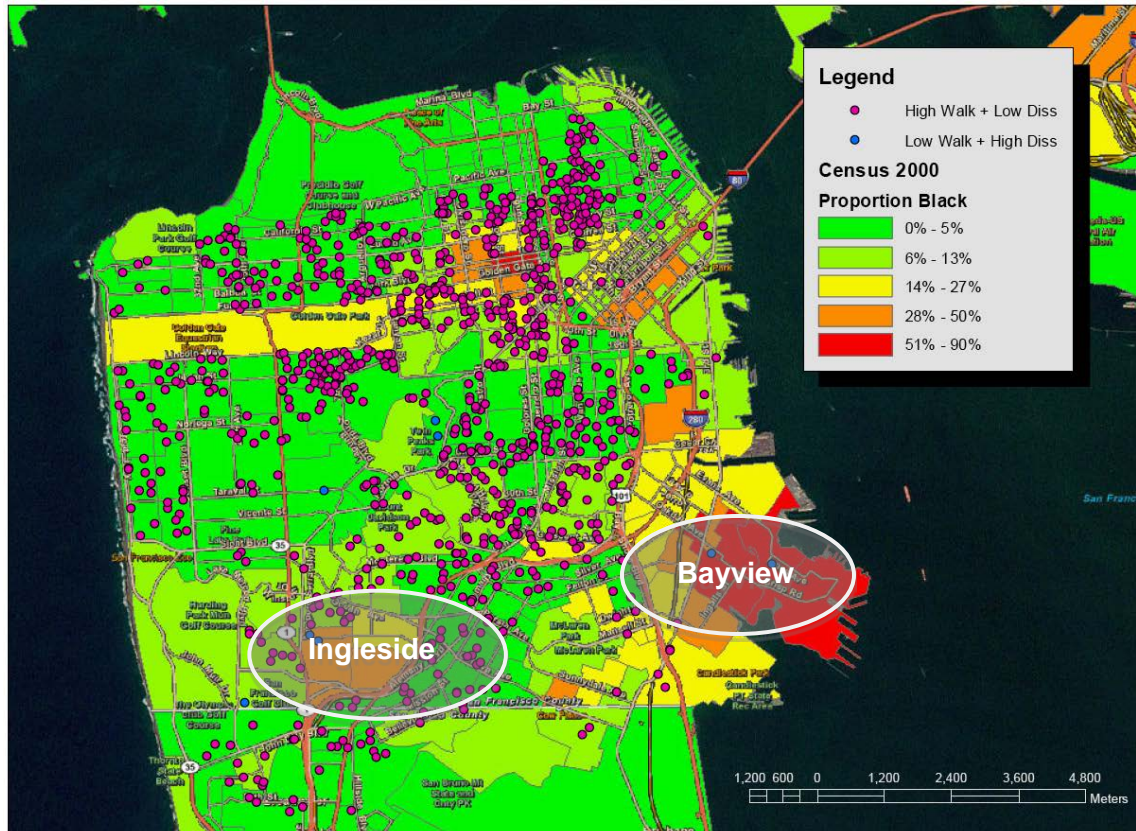


Figure 19: Proportion Black 1980





## 6.5 Minorities Concentrated in More Walkable Areas



**Figure 21: More Black Neighborhoods with Less Walkability in San Francisco**

As seen in Figure 21, San Francisco’s Ingleside and Bayview have a higher concentration of Blacks and BATS respondents living in more walkable areas (see blue dots). While Bayview is less walkable than Ingleside (and has a higher concentration of Blacks) both neighborhoods are in locations that have dense population, many land uses, and have highly connected streets. Yet, while minorities have concentrated in these areas (and despite pockets of affordable public housing) many individuals expressed pressure from increased prices and were facing (or had faced) decisions to relocate based on price.

In 2011, residents described Ingleside and Bayview as being filled with minorities in the past. One neighbor described the southern portion of San Francisco as “almost a (entirely) black community in the 1960s” where “people could afford homes and raise family.” He claimed this was based on the collective culture, price, and preferences such as proximity to the ocean.

Another resident, who characterized his current neighbors as primarily Asian, spoke about how his ‘people’ (his friends) were ‘forced’ to move out to Brentwood, Suisun City, and Vallejo primarily because of the cost of living. In order to emphasize how expensive it was to live in San Francisco, he noted that his house that cost \$30,000 to \$50,000 years ago now costs \$600,000 to \$800,000. He stated that he had stayed in the neighborhood because he loved the cool weather, proximity to the beach, and his church, and that the majority of Blacks had stayed for similar



reasons, but that this number was dwindling. He claimed that the Black community, specifically, could not afford the neighborhood saying:

*San Francisco is expensive to live in, especially if you want to own a house... My kids are grown and gone (because of the price). When I came it was easy to buy a house, but that has changed. It's not half as expensive (now) as it was two years ago but it is still not achievable for most normal folks (to buy a house).*

Other former residents of the neighborhood who were visiting confirmed that they had moved away because of housing affordability, “cashing out” for other locations with presumably less access to walkable amenities. Some expressed that they had lived in the neighborhood for generations, walking everywhere, but then chose to relocate elsewhere because the community is unaffordable to minorities.

This choice is driven by things like “more space”, living near like-minded individuals, desire for a yard, the idea of / or pride in owning a car, and a single-family home. Many of those interviewed loved the ideas that kids could “walk to school” and that you could “walk to church” or to the barbershop but these were not significant enough to keep them from purchasing further out; they could always drive in for these activities.

Another black individual said that in addition to lower prices and less crime, that living in a more suburban location and owning a house and car was associated with status, saying:

*...the American dream is definitely to own a car, not to walk... there is some level of pride or accomplishment with owning a car.*

Once this happens, a minority male described how the trend continues based on individual desires to live near like people and the concentration effect is compounded.

*“... (they) tend to stay near their family or friends, especially in the case of recent immigration. Usually a city is too large and full of many new obstacles; language, cultural, economic, etc. and families will select areas near family and good friends. the culture lends itself to spending lots of time with family and you see many extended families living within the same block (if not the same house!) as their relatives.”*

That said, as one very eloquent mixed-race interviewee described, this trend of migration is not limited to the suburbs. It also happens when individuals move to concentrated areas in the urban core that have not had investment (in streets, sidewalks, lights, parks, etc.) like Bayview. These are places that have very ‘crappy development rules.’ She felt that minorities tended:

*... to have lower income jobs, forcing them to live in lower income housing in also a lower income neighborhood. Few city dollars are allocated to these areas for maintaining streets, sidewalks, parks and playgrounds. Furthermore, higher crime rates in these neighborhoods (due to financial disparities, lower education, opportunities, etc.) dissuade people from wanting to be outdoors at all – especially parents w/ kids. Business such as restaurants, grocery stores, coffee shops, boutique shops (that thrive on*

walkability) also do not locate in these areas because inhabitants don't have the disposable income to support a local business. Also, as gas prices increase and U.S. cities start to face the inevitable reality that seems so obvious when you look at European nations that, it is expensive to live in the suburbs and transportation costs actually aren't completely inelastic, more people move from the suburbs into the city, raising the prices of inner city living and also displacing lower income neighborhoods into less convenient areas of town.

### **6.5.1 How the Minority Concentration Has Changed in a Walkable Neighborhood**

As the neighborhood has become less Black, many of the cultural institutions patronized by friends and family, as well as social ties, have remained. Some talk at length about how these existing relationships have been maintained (irrespective of distance) and the fact that many people are choosing to live elsewhere. This includes local churches (such as Ingleside Presbyterian) and other socio-cultural services such as nail salons and barber shops. People will travel across town for church, veterinarians, and manicurist, with some saying that they did not “care about traffic. We don't care about anything; we are just going.”

One individual felt that since the neighborhood had been primarily Black, that Blacks were the main individuals being forced out. Another community member described this in terms of ‘community loss’ – how it was not the same as it was 50 or 60 years ago because many friends had moved.

*Back in the 1950s it was integrated; it was everybody. It wasn't like Black, White, this, that or the other. Every class (at the local school) had Asian, Black and White. It was very diversified. It was fun. It was clean.*

Yet despite this change the membership at the local church has maintained constant despite the fact that many members now live far away. As the pastor's wife puts it,

*We have what we call a commuter congregation because most of the people live somewhere other than here. We have very few people in the neighborhood... Pacifica... Vallejo... Suisun City... Concord... Marin County... Vacaville... San Bruno.*

This culture change (and the value of community / culture) was sometimes expressed with reservation and with racial/ethnic overtones. Individuals felt that they were being targeted by gentrification, affluence and redevelopment. They expressed latent anger that they were not able to live in the neighborhood where they had grown up (many times in the walkable urban core). They made references to how other races now dominated what they had once considered their own social enclave – ethnic groups they felt took advantage of social services and housing occupancy rules to provide housing for their friends and family. While these opinions represented some bias, they also reflected the passion of the individuals. They would say things such as:

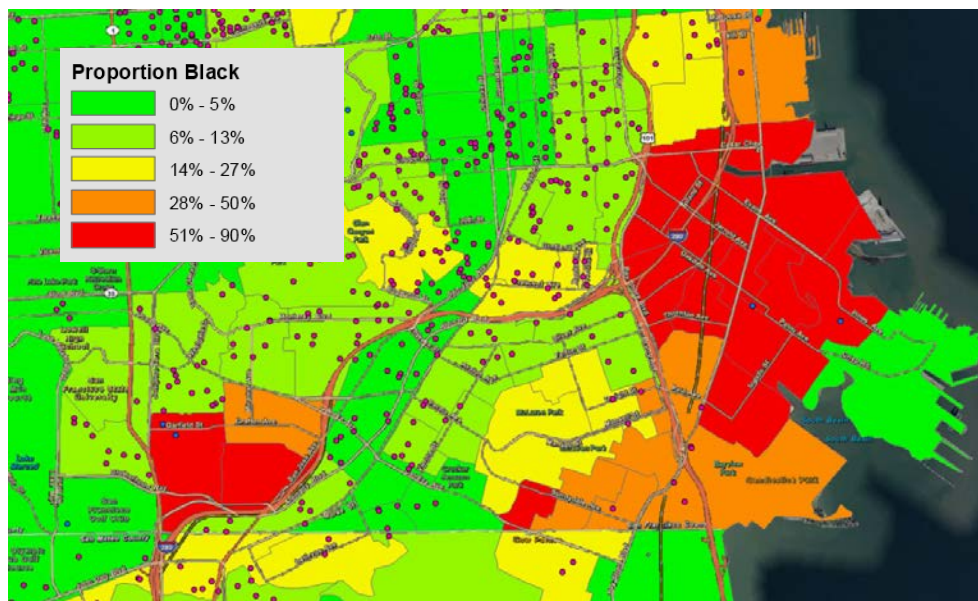
*Many Chinese are coming from communist China and used to paying nothing. Everything is free, you don't pay anything; no gratuity. So it is part of the mentality... In the neighborhoods, when the houses go up for sale, you will see one Asian family wants*

*to buy that house and they buy in cash (and) put all their money together.. (or) get a loan under the table... and they buy a house and everybody lives in there... and they do that until they own every house on the block... blacks (won't do that) ... we're too proud.*

This view of being forced out was compounded by a rise in race-related crimes, reported in the *San Francisco Chronicle* during the spring of 2010. There were numerous reports of Black-on-Asian crime. Given claims that the neighborhoods were becoming less diverse and more homogenous, this gives air to the topic of urban balkanization, and the formation of ethnoburbs. This has been the trend in many European cities, with cultural enclaves forming on the fringes of the urban core. (Gentrification occurs in poor urban neighborhoods. They get improved through some private investment and people liking the housing stock. Then those same people are displaced and they move to the new slum – the less walkable, ex-urban, suburban neighborhood.)

Suggestions that individuals were “forced out” or that they were “forced” to make a residential decision to leave a more walkable neighborhood represents an extreme opinion, but when comparing a map of Black concentration from 1980 (Figure 22) to that of 2000 (Figure 21) there does appear to be somewhat of a trend of reductions in the concentration of the Black population in a walkable area. Figure 22 illustrates (in red) substantially more Blacks living east of Interstate 280 in 1980 vs. the number indicated in 2000 (Figure 21).

Since there is no data set in the Bay Area that tracks survey respondents over time, there is no way to determine where these people have relocated to other than to talk to individuals in the community and ask them why they relocated and what their new neighborhood is like. However, interviews with minorities concentrated in less Oakland and Richmond, interviews suggest these individuals are moving to less walkable inner and outer suburbs because of price and as opposed to San Francisco which is more walkable.



**Figure 22: More Black Neighborhoods with Less Walkability in 1980**



## 6.6 Minorities Concentrated in Less Walkable Areas

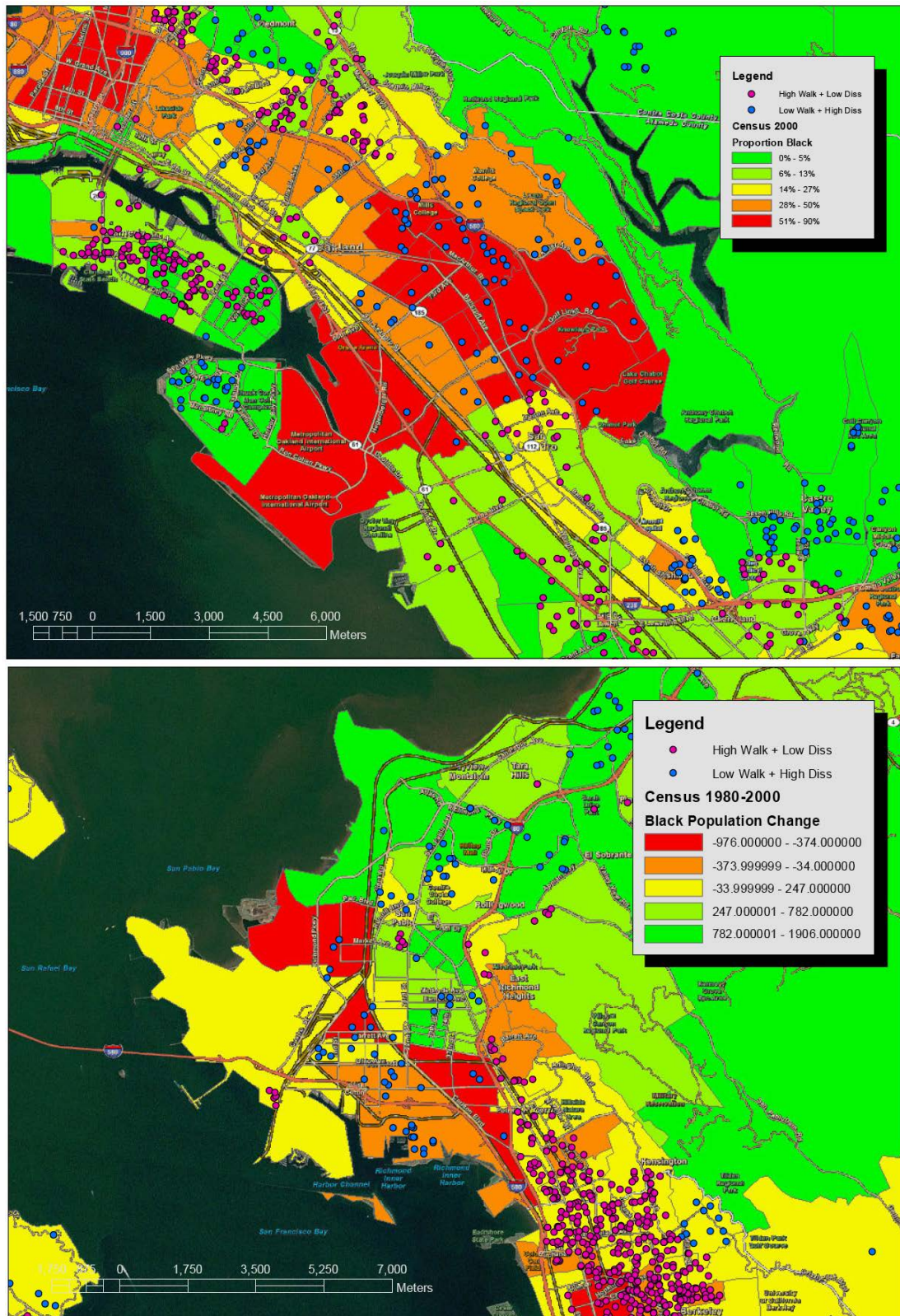


Figure 23: More Black Neighborhoods with Less Walkability in Oakland and Richmond

As seen in Figure 23, Oakland and Richmond have pockets with an increasing population of concentrated minorities. The inner suburbs of Oakland and Richmond have drawn-in individuals moving to and concentrating in less walkable areas that are experiencing disinvestment, and in inquiring why, many individuals in Oakland and Richmond express frustration and dissonance with the traditional American ideal.<sup>12</sup>

Minorities living in concentrated locations such as Oakland talked about why they lived in a less walkable area in a manner that was dismissive of price – as if they were resigned to the harsh reality that they may have had no choice at all – saying:

- *We moved here because... (It's) just the best, cheapest place we could find.*
- *I feel like it's overpriced and you get very little for what you pay for.*
- *It was not necessarily affordable for us.*
- *We looked down there but the homes were too expensive for us.*

A few young minorities said having children shaped their residential decision, saying things like:

- *We had a daughter; we moved because of that.*
- *We were interested in the schools.*

In Richmond, while almost all said they looked for diversity or a multicultural environment in housing, most said they had not wanted to move to there and only did:

- *Because we had to.*

Of the over 40 people interviewed, only one person said that staying close to friends ('buddies') was a primary motivator in their housing. The overwhelming majority felt price was the primary factor – that they might have selected otherwise if they had the choice. Many felt the concentrated areas that they ended up in were less diverse than they had been before, but that there was little reason to stay in more walkable urban neighborhoods because more suburban areas were "cheaper."

This is consistent with discussions with Blacks in more walkable areas and was reflected by interviewees who would say things such as:

- *I wish I could afford more to live in the city but what I have works.*

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<sup>12</sup> As one planner interviewed described, those in inner and lower income suburbs may experience "dissonant utopias" that are contradictory to historically romanticized view of the American suburban experience.

- *My housing choice had tradeoffs and here (in a less walkable location) I could get more for less; have a garden and some land.*
- *If money were no object... (we would live in a different place).*

### **6.6.1 Why Minorities Are Clustering Less Walkable Neighborhoods**

Among other factors, the Blacks interviewed talked about a “need for space” and “yard”. They spoke about being able to buy more than they could get elsewhere in terms of square feet. This implied that walkability in such locations was less (if at all) important than space (square footage) and that, from a health-resource standpoint, the most walkable neighborhood was not available in locations where people had the financial ability to move. One woman said:

*We went to look to buy a house. Well, little, raggedy, 2-bedroom, 1-bath, I-wouldn't-live-in-it kind of houses, were like \$600,000 or \$700,000 dollars. And I thought, you people are crazy! And so we moved to where we live now in Richmond up by Hilltop Mall. And we have a nice big house with a yard and a garden...*

Since locational clustering in less walkable locations was based on other factors (e.g. price, home size, yard, family needs, schools, etc.), it is conceivable that their move did not always reflect the best health result.

One minority resident talked about dissonance in transportation, housing, and school connections but how autos made up the differences in trade-off between locating in a less walkable neighborhood and for a more highly connected, walkable one. Another reinforced the experience, saying that they could get a bigger house in Richmond (even though the walkability in this location was poor) but that he could drive to get everything – to get goods and services they had previously walked to get. He or she would say that at least you could drive to areas that were “a little greener” or “a little easier for kids to walk to school” or that, The transportation maybe could be a little better for the school kids.”

In East Oakland, at a location that is highly connected and might be considered walkable if it had more amenities or local services, one individual noted, “a surprising amount of traffic.” He observed that it was hard to get to services because services were spread out in pockets. This created ‘deserts’ that were connected by the street grid network but lacked amenities serving housing. He said there was definitely a racial difference in the people living there – especially when compared to locations “like Temescal in Oakland, with amenities” that people of any race could walk or bike to. But that there was usually a high price associated with places like Temescal, so Blacks usually could not afford it.

In sum, while none cited walkability as a primary reason for locating to a more walkable area, individuals in less walkable areas usually said affordability was the main reason for being there. Some would talk about living near relatives despite being in pocketed areas with few accessible resources and higher crime that were generally blighted. As is indicated in Table 14, minorities concentrated in less walkable areas would talk not about being able to walk to the store but about having more square footage, space for a second car or a yard to garden.

**Table 14: Attributes of Those Living in More vs. Less Walkable Neighborhood**

Minorities Clustered in More Walkable Attributes	Minorities Clustered in Less Walkable Attributes
<ul style="list-style-type: none"> <li>• Older</li> <li>• Smaller household usually without children</li> <li>• Lower income (Unless owning single-family unit)</li> <li>• Renters (Unless owning single-family unit)</li> <li>• Live in older neighborhood</li> <li>• More likely to walk</li> <li>• Closer to Transit</li> <li>• Expressed need for pedestrian amenities (trees, shade, crosswalks, bulb-outs, etc.)</li> <li>• Desire for proximity to amenities</li> <li>• Socio-cultural institutions close to home</li> <li>• Decreasing Black concentration; increasing Asian and Latino</li> </ul>	<ul style="list-style-type: none"> <li>• Younger to middle age</li> <li>• Larger household usually with children</li> <li>• Higher income</li> <li>• Owners</li> <li>• Live in more recent developed neighborhood</li> <li>• More likely to drive</li> <li>• Farther from Transit</li> <li>• Tolerate wider streets; less pedestrian amenities (trees, shade, crosswalks, bulb-outs, etc.)</li> <li>• Desire for space / yard / garden</li> <li>• Socio-cultural institutions require driving</li> <li>• Increasing Black concentration</li> </ul>

## 6.7 Practitioners Perspective

To both confirm and investigate potential causes of minority clustering in less (vs. more) walkable areas, professionals were consulted for their opinions.<sup>13</sup> A summary of their perspectives also confirmed the idea of suburban relocation of those with lower income and minorities, and pocketed gentrification / ghettoization. Every real estate professional or planner agreed that walkability was desirable (as was living in the dense urban core), but that this was becoming less achievable for many minorities and those with less money / lending capacity.

### 6.7.1 Affordability Issues

Most real estate professionals felt that the cache of urban walkability was driving gentrification and increases in housing price, one simply saying, “a neighborhood ‘works better’ (but costs more) if you can walk in it.” Some claimed that this was tied to retirees increasingly wanting to move to the urban core where they would not be as auto reliant. One agent unable to live in ‘the City’ complained that price was the ultimate driver for clustering, saying:

*I would love to live in the city and be able to walk and bike everywhere... but it's too expensive... The City is awesome, I love it. It's just too expensive.*

A planner echoed their feelings about price and connected this to clustering when she said:

*I believe that walkability increases property values significantly. This would keep out groups that tend to have lower incomes like minorities.*

<sup>13</sup> In addition to the interviews and focus groups previously discussed, 24 planners, real-estate professionals and business owners identified in interviews, linked to an interest in the neighborhood (such as a real estate listing), and those having specific experience and/or expertise in developing walkable neighborhoods were interviewed.

A real estate broker who deals with property transactions across the Bay Area added general context to this and why people pay more for walkability saying:

*Of course it factors in to real estate decisions. I wouldn't say it is the top deciding factor but it does weigh heavily on younger and older buyers. In many cases I'd say these buyers are more affluent so price and price per square foot is no object; and we know that here in the Bay Area, many times you pay a premium for the hip urban homes. So they are getting a little less home? No matter. I think they see the city as an extension of their home.*

The realtor went on to talk about how he has seen fewer transactions lately as a result of the 'great recession' and how very few of these have been middle or lower income individuals. He didn't think it was a race issue but more a class issue, or 'people who have money.' He attributed part of the slowdown to not only changing rules of the banking industry but also the *continued lack of available units* in the most desirable (and walkable) locations.

His assertion that one would pay a premium for walkability is consistent with a recent analysis of 94,000 real estate transactions in 15 major markets showing walkability as directly linked to higher home values (Cortright, 2009). A one-point increase in walkability index was associated with \$700 to \$3,000 increased housing value. As one professional put it:

*Even in a turbulent economy, we know that walkability adds value to residential property just as additional square footage, bedrooms, bathrooms and other amenities do. It's clear that consumers assign a tangible value to the convenience factor of living in more walkable places with access to a variety of destinations.*

Another added to this quote saying that while price may be dictating location decisions some areas are become less and less walkable with:

*.. fewer places to walk to other than liquor stores and in some cases the streetscape has not been invested in. There aren't good sidewalks, crossings, etc. and that is coupled with the crime associated with generational poverty.*

Although some claimed that they had not seen conclusive data on this issue, most planners agreed that affordability in walkable neighborhoods and disinvestment in locations that would otherwise be walkable were 'emerging if not already an issue(s).' As one Bay Area planner alluded, cost and distance are two primary issues:

*If you could afford to design a walkable life for yourself (and to) map out wherever the nail salon should go, the grocery store go, and where your neighbors and friends be... it might not be too different from the suburbs, it just wouldn't be so far away... and this stuff would really need to be two hundred yards away or five hundred yards away (to encourage walking). It can't be any more than that or it's not just somewhere to dash down to (in order to) get your milk. It can't be like walking a mile to the grocery store.*



Similarly, others were forgiving to early suburbs and development tracts which they felt turned out well. Houses were small and close together, and as one developer interviewed said, they:

*...were actually quite congenial places as opposed to the current, mass-produced, late dinosaur stage suburban tract model.*

Most connected issues with the affordability of the walkable community with three key factors: 1) restrictive zoning and planning codes, 2) problems with housing models and delivery, and 3) limited financial tools for buyers and developers.

When talking about zoning, one academic focused on restrictive building codes as the single most onerous factor in the affordability of walkable urban housing units. In his opinion, the number of units was far too low and zoning code far too restrictive to encourage more units and therefore impact the housing market. One example cited was the limitations of use on Single-Room Occupancy zoned units in many cities. He noted that while this posed a challenge to unit creation, some creative developers in San Francisco and New York were using the concept of the 'micro-unit' condominiums to overcome this and work around zoning restrictions.

Another planner related the issue of codes to the topic of density, saying:

*The single biggest difference (around the world) that you see everywhere is density. Even in small towns out in green fields the housing is all five stories high and all in apartment blocks with mixed-use below... (Even in) the absolute cookie cutter standard of good housing... is this basic density assumption – which means there's almost always some transit and always something to walk to. And so you get the bars on the street with the cafes, but you also get the grocery stores and smaller retail. There are big grocery stores, but there are just a lot more small stores because they serve the (dense) apartment building that they're located in.*

On the topic of providing dense affordable housing, a project manager for the U.S. Department of Housing and Urban Development said:

*True federal public housing has not and is not being built... you have people using various tax credits but this provides a housing type that doesn't meet the true need.*

He went on to explain that many "grants" are used more as "loans" to secure more financing so that affordability is only a small component of the project.

This exasperates the housing balance being provided, for example creating unit types / mixes that do not match the market or imbalances in rental vs. owned opportunities in urban environments. 'Design thinking' is a factor but not with regard to the neighborhood fabric. The primary focus is on green building technology not on site-related or walkability issues. As the HUD project manager described, the federal government:

*Has more interest on the energy performance than it does on where you eat or what you can walk to.*

A board member for the Bay Area's Bridge Housing confirmed this, stating that since federal projects develop slowly the organization has worked to find other creative ways to build affordable housing. They have tried to execute many projects that turned out not to be financially viable because of the expense of development – “just assembling parcels as an affordable housing project does not always work even if the parcel or block is donated.”

In the board member's opinion, the resulting complications in finance are changing the role of the organization from one of an affordable housing corporation to one of a true profit based housing developer. In the past, Bridge has “sold off” parcels that were part of affordable projects to companies and had them build on the property with dead restrictions. Now they are operating as both a developer and a holding corporation – controlling project finances, assembly, and delivery and then managing the resource over time.

### **6.7.2 Social and Cultural Issues**

This model creates trust and “institutional investment in community over the long term” – something that can be closely allied with culture (another factor pointed out by many planners). Many cited location of public housing in areas with increasing disinvestment where there is a “lower tax base” and no money for “investment in street trees” and amenities that might improve the walkable environment.

In these locations that might have otherwise been walkable:

*...only the minimum amount of expenses are allowed... No design aspects were utilized to blend the complex into the surrounding neighborhood. Sidewalks, landscapes, streets, and entrances were designed only as part of the complex; not to extend into the neighborhood and connect the complex with existing surroundings. Also, the surrounding area was not considered a reflection of the complex; so connected parcels of land were planned and zoned as separate, isolated, units. The stigma of the complex caused adjacent land owners to sell and relocate; re-zone and build a "money generating" building, and relocate; or abandon their property, and relocate. Once the built environment of the adjacent property becomes a "wall" around the complex; then connections to other parcels, only a block or two away, are lost.*

On the topic of social and cultural factors, one developer described how in his view social investment plays a large part in location clustering in a walkable area, especially for Blacks, Latinos and recent immigrants where there may be emphases on ‘ethnic pride’ or ‘identity’.

*...minorities tend to stay near their family or friends, (and) the American dream is definitely to own a car, not to walk...so perhaps there is some level of pride or accomplishment with owning a car and not walking.*

Another planner explained social factors influencing walkable neighborhood clustering as “complex” saying:

*It's not just physical, it's also social. What is the existing walking, pedestrian infrastructure to the degree that a person can easily make the decision to walk... (but)*

*then there's the social aspect. This woman in southeast San Diego who lives in a Latino neighborhood... said the neighborhood is controlled by gangs. She literally said, 'If I have to go to the grocery store, which is only two blocks away, I'll drive my car.'... The social conditions are such that she fears for her safety, so she's not going to walk two blocks.*

Yet crime and safety are only a portion of socio-cultural factors that drive walking decisions. Some would argue that the U.S. has a cultural, behavioral resistance to walking while in Europe there are strong cultural and historic roots. In another interview, a planner described her experience in Spain and how culture framed the value of walking / walkable neighborhoods – again the city being an extension of the home.

*(In Spain) there is a cultural practice to go out for a walk in the evening – and to go out to dinner or else just to go to the square and walk around. Madrid is one of the most crowded cities for pedestrians I've ever seen; outside of maybe a busy Saturday night in Greenwich Village. It's just that everybody is out walking. So, that's just one basic thing – you have people... (Another thing) is how Spanish people want to be together whereas American people want to have their privacy rather than to actually LIVE in the city. So you have an essential question of do people even want to be walking near other people...is there a cultural reference for that?*

## 6.8 Summary and Contributions

This notion of a cultural reference is an important concluding factor, especially in the way it informs and provides insights into the behavioral aspects of policy solutions to reduce clustering in less walkable areas and provide access to more walkable neighborhoods. These will be discussed in the next chapter framing hypotheses for trends and potential solutions / policies to address these issues. In sum, the qualitative assessments led to the following contributions:

- Qualitative interviews provide additional insight that minorities appear to be either moving to less walkable suburban areas for more space and amenities that are not available to them in the central city (most of which was based on *price or affordability and public disinvestment*), or left in urban pockets with less walkable amenities (which related to *individual / social / cultural factors*). This was especially apparent with the reasons stated by Blacks for leaving central cities and staying put within the central city.
- Despite quantitative associations, interviews suggest price may be a primary underlying factor in minority clustering in less walkable neighborhoods, and inform the need for more rigorous analysis on this topic. There was a *sentiment that many felt 'priced out'* of the most walkable and desirable areas; that perhaps other factors (such as price and availability of many walkable amenities) served as a proxy for income. Furthermore, *real estate professionals felt that price was a factor* – that it did factor in to housing decisions, especially for those with more financial means.
- Interviews suggest social and cultural factors play a part in clustering, especially for certain ethnic groups with strong family ties, those that place higher value on education and lower crime, pride and perceived association with the traditional view of the American dream.
- Finally, certain professionals felt that many developments (even suburban ones) could support more accessible walkable resources but were hampered by restrictive planning codes, affordable housing issues and limited financial tools for buyers and developers. This, again, not only informs the quantitative work in this study by providing impetus for further investigation, it also offers room for immediate *policy solutions that could assist in creating more inclusive walkable neighborhoods*.

These policy concepts offer potential lessons for policy makers looking to create more walkable communities and will be discussed in the policy recommendations to follow.

## Chapter 7 - Policy Recommendations

This chapter provides hypotheses and related policy suggestions about the two key concepts explored and developed in Chapters 5 and 6: that Blacks are becoming more concentrated in less walkable areas – either moving to less walkable areas outside of the urban core or staying in less-walkable urban pockets that have suffered from lack of investment (pocketed, minority-focused, underserved and not-walkable areas).

This issue of unevenness poses a policy and public health issue in that concentrated minorities may have pocketed barriers in access to walkable neighborhoods – some of the same individuals who may have the most need for walkability as a health resource. Environmental triggers (relating to life issues such as driving, health, job concerns, financial, family situations, etc.) may have more impact on minorities, thus increasing the importance of walkability and access to goods and services on foot. And, as more funding goes into U.S. federal government ‘livability’ initiatives this becomes important.

Two hypotheses are presented to address why minorities are clustering. These relate to 1) *price and affordability*, and 2) *disinvestment and socio-cultural factors that do not preference walking*. To address these issues, policy opportunities are offered along the lines of the three factors identified by planners, practitioners and subject area experts during the interview process. They include: targeted complete streets investment; increasing supply through density; changing housing typologies; endorsing creative finance tools; increasing relevant types of uses; working to influence and match preferences; and targeting walking behavior. These pave the way for the suggestions for future research and conclusions in Chapters 8 and 9.

### 7.1 Hypothesis 1 – Price and Affordability

To address affordability issues that could be influencing minority concentration in less walkable areas, policy makers might consider the following factors (outlined in the sections that follow) to increase the ability of minorities to live in walkable areas: *targeted complete streets investment; increasing supply; changing housing types; and, endorsing creative finance tools*. The first policy of targeting complete streets investments directly addresses those places where minorities are already clustered in less walkable locations. Those that follow provide strategies that might decant or prevent further minority clustering in less walkable areas from a supply side.

#### 7.1.1 Related Policy 1: Targeted Complete Streets Investment

As the primary policy to address minority clustering in less walkable locations a targeted complete streets policy is encouraged. While many cities across the U.S. have adopted policies to encourage safer and more bike and pedestrian friendly streets, few if any have targeted these improvements toward minority dominated or low-income areas. Many times these areas, like East and West Oakland and Bayview in San Francisco, have the least amount of public investment and have suffered from increasing isolation and disinvestment.

The continuing effects of the Great Recession and housing crisis of 2008-2009 may compound this disinvestment. In a speech in October 2011, Berkeley professor Robert Reich cited the biggest problem in U.S. cities as the lessening spatial / geographic interdependence of people.

He argued that technology and globalization has created the ability to overlook and disinvest in things like housing and streetscape improvements. This has been combined with a clustered ‘negative wealth effect’ with increasing concentrations of job loss, under-employment and poverty. This causes places to become overlooked because others are not dependent on them, easing the possibility of disinvestment and problematic ‘social instability’.

This notion of modernization created a larger number of concentrated problem areas may relate to the sentiments expressed in previous chapters, and focused streetscape investment may be one way to increase the walkability (and ultimately livability) of less walkable areas with a larger regional share of the minority population. Recognizably such investment might increase housing value, price and lead to some gentrification, however bundled appropriately with increased affordable housing supply (possibly using some tools suggested in Policy 2 and 3) these negatives can be mitigated.

Recommended improvements might include many of the characteristics mentioned by interviewees as being not present in less walkable environments with concentrated minorities. These include:

- Sidewalk bulb-outs and safety refuges reducing crossing distances / street widths
- Installing crosswalks and road markings for pedestrians
- Providing trees, benches, shelters and art

It is recognized that to some extent this policy directly focuses on minorities who are ‘stuck in’ or saying in place, in less walkable locations, but does not address the issue for those clustered in more suburban locations, nor does it take into account the idea of destination or ‘places to walk to.’ Policies connected to these factors can be found in Section 7.2, however (given the large share of minorities who live in dense urban areas) it should be underscored that a policy to invest in urban streets might have more impact on neighborhoods of concentrated minorities than a policy that focused on more suburban areas

### **7.1.2 Related Policy 2: Increasing Supply through Density**

As one planner interviewed for this study said, the single most consistent variable to increased minority access to walkable areas and housing opportunity around the world is density which leads to more affordability, saying:

*The single biggest difference (around the world) that you see everywhere is density. Even in small towns out in green fields the housing is all five stories high and all in apartment blocks with mixed-use below... (Even in) the absolute cookie cutter standard of good housing... is this basic density assumption – which means there’s almost always some transit and always something to walk to. You get the bars on the street with the cafes ... grocery stores and smaller retail.*

This idea of encouraging density and destination forms a catalyst for two suggested policy interventions in a ‘central city strategy’ that would break down barriers for minorities and allow for them to sort into walkable places. Specifically, the capitalizing on vacant land / space and

providing more options to live in a walkable environment there could allow for greater access and sorting into walkable locations for every person, regardless of race.

Local governments in the Bay Area (and elsewhere) could increase the availability of housing for minorities by making wider use of land-to-improvements ratios to target development sites and opportunities. This method of comparing relative property improvements to land improvements can identify underdeveloped properties as well as vacant parcels, however it many times is only used in areas to assess the impact of taxation or housing policy (Schaaf, 1969). Using it up front could open up possibilities to increase housing supply (and therefore affordability) and redevelop urban spaces more quickly and uniformly.

As an example, the City of Santa Cruz, CA in 2002 commissioned a detailed development study using land-to-improvement ratios for its post-industrial west side. The study examined land use patterns and development opportunities “as an incentive to attract new development” (Bay Area Economics, 2002). The City planned to “explore an expedited permitting process, infrastructure needs, and marketing efforts to further promote economic development in the Westside District.” As seen in Figure 24, the ratio identified potential underutilized parcel that could be turned into development areas.

# Santa Cruz Westside Redevelopment Area

## Land Utilization

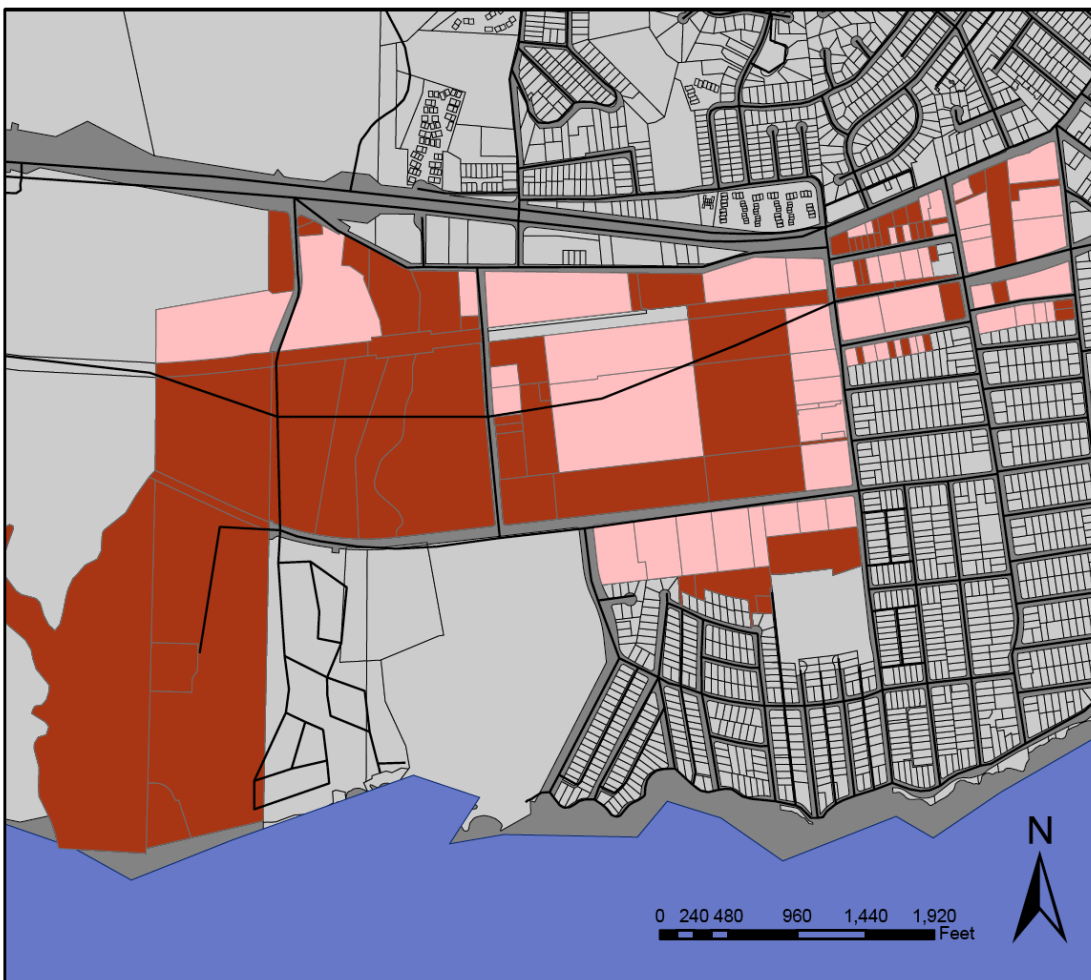
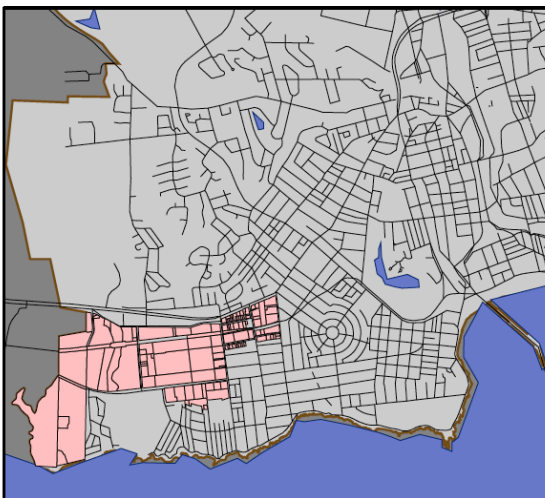
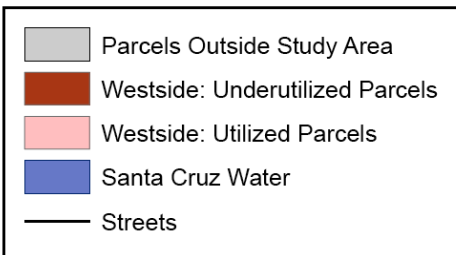


Figure 24: Santa Cruz Land-to-Improvements Ratio



While some of the Santa Cruz parcels were former industrial properties and vacant parcels, others were things like large surface parking lots or driveways. These are the kind of opportunity sites that one interviewee cited as big opportunities for increasing the supply of walkable housing and creating new (and more equitable) places, saying:

*(In Europe) they are creating a lot of new spaces (by developing on vacant parcels and former parking in urban areas). I think the biggest opportunities are that they're undergrounding all sorts of things (including) parking. In Madrid, Barcelona and Torino, they're taking rail yard space and putting train tracks underground, or capping the top of what had been a train canyon right through the middle of the city and creating a new boulevard on top of it with a pedestrian mall. That's where they're getting all of these beautiful new pieces of the city.*

While the idea of undergrounding infrastructure (as the interviewee alluded) might counteract the goal of affordability, the principle of creative identification of vacant or underutilized land holds promise. Cities can and should increase supply so that minorities and low and middle-income individuals can have the opportunity to stay in or sort in to dense, urban, walkable neighborhoods. For example, in one of the case study neighborhoods of Ingleside in San Francisco, a parcel utilization analysis could identify priority parcels for new affordable housing construction increasing the distributional equity of this walkable urban place, and keeping more minorities and lower-income populations from leaving the area. As seen in Figure 25, there are clear supply opportunities – the most glaring being the huge parking lot at San Francisco City College. Use of this parcel as an “opportunity site” for housing could provide a number of new affordable units to serve existing and future residents of the area.

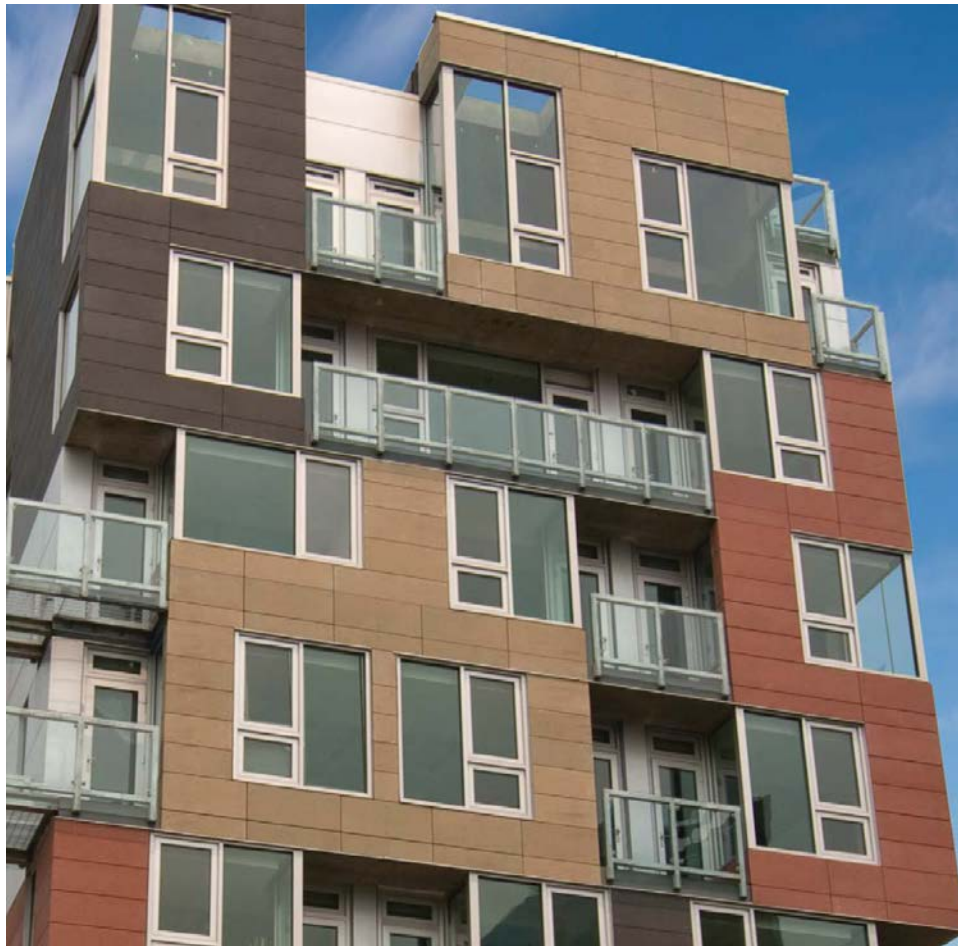


Figure 25: Ingleside Priority Affordable Development Sites

Source: City of San Francisco, Planning Department

### 7.1.3 Related Policy 3: Changing Housing Types

Using this land identification tool as a basis, policies can be aligned to support the maximum use of these parcels, building different types of units in walkable areas and encouraging more affordable units to meet the needs of minorities. Techniques to do this include relaxation of rules for setbacks and open space requirements in order to increase lot coverage. In many locations the number of units is hampered as a result of these requirements, but some examples of efficiency and single-room occupancy (SRO) zoning provide case studies in site maximization.



**Figure 26: Cubix SF Exterior**

Recent developments in San Francisco have tried to use SRO zoning. In 2008 a San Francisco design and development firm put 98 condominiums onto a 6,600 SF site in the City's South of Market area, as seen in Figure 26. The intent was to provide affordable buying opportunities to many different populations, including the elderly (Dineen, 2008). Popular in Europe, these "micro units" rely on a reduction in the rigidity of planning codes and have yet to become a significant feature in the U.S. urban landscape. However, given that other comparable, small-unit projects in the Bay Area have sold out, some think they could be important tools in addressing housing shortages.

As Gabriel Metcalf, executive director of the San Francisco Planning and Urban Research Association (SPUR), said:

*Micro units should be part of the broader housing strategy for the city... They are not for everyone, but they have a role for some people. If you look at the housing stock of San Francisco, there are tens of thousands of multi-family flats and Victorians occupied by unrelated adults in roommate situations. Many of those people would love the chance to own a small place of their own where they do not have to live with roommates.*

Testing this in a development pro forma (Table 21 in the appendices) reveals that the policy could not only be used to incentivize development through identification and prioritization of smaller and underutilized parcels, but it could also increase density and profitability for developers. For example, if a 1/8 acre size is developed compared to a 1/4 site, smaller unit sizes are needed to keep the number of units high enough to be profitable.

With relaxed density and permitting requirements the smaller unit sizes could conceivably increase developer margins from likely unviable developer margin of 10% to 23% based on projected revenues. Given this increased profitability, more private developers may be willing to assume the risk of developing smaller parcels and more money can be spent on public realm improvements and design factors that can enhance the suitability of the environment for walking (as discussed in section 7.1.1).<sup>14</sup>

Policies that ease development controls on these kinds of units could increase the type and amount of affordable housing to encourage more inclusive areas that are walkable; non-profits and development corporations could facilitate their implementation. Many communities around the world use below market rate (BMR) policies to ensure that urban locations remain affordable, but these require that for-profit developers set aside a percentage of units in for-profit endeavors as affordable. Many times the units that are least desirable and not as well-thought out end up as the affordable ones and are not the right size to meet the need – the ultimate result is inferior housing units.

Developing affordable housing as projects on their own offers a better method to deliver the type and amount of product the market demands, and use of SRO zoning could assist in this. For example, San Francisco Bay Area Bridge Housing (<http://www.bridgehousing.com/>) has been able to provide over 13,000 affordable units for more than 35,000 individuals in California, units that may have otherwise not been financially viable if attempted by a private developer, yet, Bridge faces the same challenges in bringing the product to market that limit private developers.

Just because someone takes a parcel or block and gives it to a non-profit housing developer, it does not make a project viable. Non-profits face similar obstacles to private developers,

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<sup>14</sup> Note that while this policy may also be beneficial to non-profit developers, assuming that State and Federal grants remain available, the policy may not be as critical. According to non-profit developers interviewed as a part of this study, only a 2-3% margin is needed to break even on a project and sustain the viability of the organization. This usefulness of the policy could increase if the tradition grant and tax credit structure of many affordable housing projects is compromised due to Federal and State budget cuts being discussed in 2011. This could increase the importance of using a market-based approach to provide affordable housing units in walkable locations.

including project financing, environmental review and planning approvals. As one individual put it:

*Everybody thinks the way we're going to provide more housing is to make it cheaper to build, and that's impossible. If you go... and buy a 2x4 to put in the wall, it costs the same whether I plan to put it in a luxury condo or in (affordable) housing ... The construction costs are a relatively minor component of a project's total, not nearly as important as the cost of financing, the cost of land, the soft costs and the political costs.*

A member of the Bridge's board said that this complication is changing the role of the affordable corporation to the role of housing developer, citing the forthcoming McArthur Transit Village project. In the past Bridge had "sold off" affordable projects to companies and had them develop a project there on the property with dead restrictions. Now they are operating as both developers and holding corporations – allowing them to control finances, project assembly, delivery, and building sustainment over time.

This practice makes the costs an easier burden, but if some of the process were streamlined and only limited environmental reviews were required, use of new smaller SRO-like footprints on more dense lots could facilitate the creation more affordable units. As seen in Table 22, just by use of the SRO zoning technique developers could support 20% BMR housing and still achieve an appropriate profit margin, and as mentioned in the footnote on the previous page, non-profit developers may only need a margin of 3%.

One item that might facilitate this streamlining could be to codify counter-level (non-commission level) approvals for all projects that meet baseline environmental standards and use an independent design standard / rating framework that supports features that improve neighborhood walkability such as LEED-ND [Leadership in Energy and Environmental Design – Neighborhood Design] (Ewing, Kreutzer, & Frank, 2006). By eliminating fees and expediting the environmental approvals for projects that use this tool, developers might have the incentive to invest in design elements that improve the suitability for walking.

As seen tested in Table 23, although profit margins would be tight, such a policy could help in meeting sustainability goals while at the same time increasing the amount of walkable neighborhoods available to those minorities and others who might need them in the urban core – so they might choose not to move out of central cities. The viability of such a project might improve if tax credits, soft loans, and grants were used in a non-profit scenario.

Use of a system such as LEED might help to reinforce better standards of design that would make developments more walkable moving beyond the idea of multi-family, high-rise 'housing' to that of 'homes' along a walkable streetscape (Davis, 1997); to the:

*...aggregation of a single element into a larger pattern ... (in) "group form" ... (like) Italian Hill towns, Greek fishing villages, or pueblos...*



Developments such as Napa Pipe in Napa (Figure 27), which plans not only to provide affordable housing but to design it alongside streets built to encourage walking, biking, including a large walking trail within a ¼ mile of all residences to encourage walking, offers an example of how the LEED system might improve walkability. If cities could begin to shape development in this way through local planning codes it could help bring more affordable healthy, walkable homes to the market.



**Figure 27: Napa Pipe LEED-ND Development**

Source: Keith Rogal, <http://www.ahomefornapans.com/>

#### **7.1.4 Related Policy 4: Endorsing Creative Financing Tools**

In addition to policy on housing, policy that addresses individual buyer finance might provide tools for minority and other buyers who are disadvantaged to purchase in more walkable locations. One widely discussed but largely underutilized technique of doing this could be Location Efficient Mortgages (LEMs, <http://www.locationefficiency.com/>) or transportation credit mortgages (TCMs) which, “allow lenders to credit reduced transportation costs to household income, or use a relaxed loan-to-income ratio in setting the terms of mortgages, typically based on how close the home is to public transit...” (Chatman, 2007).

Many studies indicate that location efficient mortgages can not only increase urban mobility and transportation choice (which assumes TOD location), but they can also address price issues in markets where there are problems with affordability (Cervero & Duncan, 2003). While Chatman and Voorhoeve (2010) display skepticism that changes should be made to such frameworks, they can help address latent supply (plus reduce auto use and decrease sprawl) even if they do not address all of their social goals.

Additional tools could be provided by many community-based, financial institutions willing to explore creative loan options such as graduated scale / payment mortgages (recently emphasized by the Obama Administrations' Making Home Affordable program). There are many small savings establishments popping up all over the internet that seek to revitalize and change the thinking about the banking industry (Lieber, 2010). These new lenders are completely non-traditional, offering things like free coffee and music. Many are community-based and have a strong presence online. They have names like:

- CircleBank: <https://www.circlebank.com/>
- PerkStreet: <http://perkstreet.com/>
- SmartyPig: <http://www.smartypig.com/>
- Kasasa: <https://www.kasasa.com/>
- BankSimple: <https://www.banksimple.net/> (a professed response to ING Direct: <http://home.ingdirect.com/>)
- Green Dot: <https://www.greendotonline.com/> (offers saving linked to bank accounts and to keep costs down recently acquired a bank)
- Mint: <http://www.mint.com/> (not a bank but provides consolidated money management and conduits to various smaller banks and lenders)

They could serve disadvantaged customers who may be otherwise unable to afford to stay in walkable neighborhoods and offer LEMs. Traditionally, larger home lenders have been involved with LEM, but not these internet-based savings and loans. However, given the degree of freedom these new lenders have in their reward plans, the idea of offering easily accessible transit-tied or graduated payment mortgages would hardly be a stretch. Moves to reframe Fanny Mae and Freddy Mac could accommodate these formats, and also alleviate some fears about smaller banks making bad loans (Cho, 2010).

By staunchly advocating for and partnering in development of these financing techniques policy makers could embrace a highly attractive financing scenario in the complex mortgage situation of 2008-2010, increasing buyer purchasing power while decreasing default risk both for banks and consumers. Buyers of all races would have more money to spend on walkable housing as a commodity because of savings diverted from fuel and related items. Multi-car families could shed additional vehicles. And hopefully, the end result would be more disadvantaged individuals living in walkable neighborhoods, boosting community health.

An additional policy intervention in the financial realm might be to codify higher visibility of the total ownership costs for both housing and transportation, and require better methods of showing prospective buyers costs (and have them understand that they will be accountable for them). What if citizens were required to sign a disclosure about the actual costs of living in a suburban vs. urban location? What if a display of this information was included in a buyer's disclosure packet? It might allow for some greater level of accountability in things like the difference in running infrastructure out to suburban / fringe neighborhoods as opposed to the neighborhoods that are already served.

And since walkability is not the only factor influencing a housing decision, what if individuals were required to understand the increased costs of owning a car, including the cost of mileage

related to a home purchase in a non-walkable vs. walkable area? Many of those interviewed as a part of this study valued “space” without consideration of driving, being somewhat dismissive of the value of walkability in their housing purchase. What if they were required to gauge not only the cost of square feet but also the full cost of ownership including walkability – similar of the idea to Life Cycle and Total Ownership Costing? What if it were required education? As one individual commented,

*I have long thought that we need some classes in high school and even early college that talk about financial management, costs of home ownership and transportation, retirement and such – people do not know this stuff and their parents do not teach them.*

Resources could be provided to enhance buyer knowledge such as the ‘snapshot’ rent vs. own analysis or the hypothetical cash-flow analysis developed in Table 15. Combined with the kind of market comparative suggested above, prospective buyers would be empowered with residential information not only about the environment they are buying in to but about what it would cost them as compared to their monthly income and the equity they would gain over a series of years of owning. Integrating this with residential disclosures could not only help educate people on the value of walkability but also help prevent the faulty lending practices and lack of financial responsibility that was a problem with the lending crisis of 2008-2010.

**Table 15: Example Rent vs. Own Analysis**

<b>Rent vs. Own Analysis</b>							
		<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>TOTAL</b>
<b>Own</b>							
	Payment	48,000	48,000	48,000	48,000	42,000	234,000
	MID (Tax Refunded)	-8,000	-8,000	-8,000	-6,000	-8,000	-38,000
	Prop Tax Deduction (Refunded)	-2,000	-2,000	-2,000	-2,000	-2,000	-10,000
	Principal Paid	-9,600	-9,600	-9,600	-9,600	-9,600	-48,000
	Equity Gain (Loss)	8,100	7,425	7,425	7,425	7,425	37,800
	Misc Ownership Costs	1,000	1,000	1,000	1,000	1,000	5,000
	Subtotal / Costs	37,500	36,825	36,825	38,825	30,825	180,800
<b>Rent</b>							
	Payment	33,600	33,600	33,600	33,600	33,600	168,000
	MID (Tax Owed)	8,000	8,000	8,000	6,000	8,000	38,000
	Prop Tax Deduction (Tax Owed)	2,000	2,000	2,000	2,000	2,000	10,000
	Principal Paid	0	0	0	0	0	0
	Equity Gain	0	0	0	0	0	0
	Misc Ownership Costs (not incurred)	-1,000	-1,000	-1,000	-1,000	-1,000	-5,000
	Subtotal / Costs	42,600	42,600	42,600	40,600	42,600	211,000
	<b>Net +/- ownership vs. rental</b>	<b>5,100</b>	<b>5,775</b>	<b>5,775</b>	<b>1,775</b>	<b>11,775</b>	<b>30,200</b>
	<b>Cumulative</b>		<b>10,875</b>	<b>16,650</b>	<b>18,425</b>	<b>30,200</b>	<b>60,400</b>

## **7.2 Hypothesis 2 – Socio-Cultural Factors**

This notion of socio-cultural factors influencing preferences, and that many minorities may not value walkability in their residential choice, forms not only a discourse on resource accessibility but also one on how policies designed especially to target concentrated minorities who may not be inclined to live in a walkable area and need it most. As Talen has argued, populations that are most disadvantaged may need guidance toward walkable areas. This calls for a "Newer Urbanism" that embraces equality of access that goes beyond traditional development, planner-language, and attempts at social engineering (Talen, 1999; Talen, 2002) and actively reaches out to address the socio-cultural needs of minorities.

Policies that are aligned with this goal of creating greater access and walkability in areas with pocketed minority concentrations include: 1) *increasing relevant types of uses*; 2) *working to influence and match preferences*; and 3) *targeting walking behavior*. Again, the streetscape investment and financial tools suggested in the previous sections also apply in this case, however, these targeted policies might best address the socio-cultural factors contributing to minority clustering in less-walkable areas.



### 7.2.1 Related Policy 1: Increasing Relevant Types of Uses

A policy about encouraging more interactive uses in less walkable areas could be described in lay terms as creating ‘places to walk to.’ This was one of the characteristics described by minorities concentrated in less walkable areas – be they more urban or suburban – and certain types of uses were mentioned more than others. Many of those interviewed in areas with concentrated minorities identified local uses like barbershops, salons, manicurists, dry-cleaners, drug stores, grocery stores, and churches as primary destinations. If policies could be implemented to increase and infuse less walkable areas with these types of uses it could benefit those concentrated in less walkable areas.

One specific way this could be done is to encourage pop-up businesses by loosening planning and zoning codes (some of which have helped shape a segregated and non-walkable environment, especially in more suburban environments). As one interviewee put it:

*I think that’s the problem with a lot of the cul-de-sacs. They’re great for walking if you want to walk for long stretches for leisure, but if you’re walking for utilitarian purposes, for example kids are walking to school, they are not necessarily the best. If they had set aside pedestrian routes directly to the school, had safe street crossings and had (routes) that maybe cut across lots, that would have made sense. But the way that neighborhood was laid out, you don’t have space between houses to do that.*

This creates dissonance in life, work and play connections, and in the transportation, housing and school connections (Marthinsen, 2010). Loosening planning and zoning restrictions for businesses would diversify these locations and reduce dissonance – especially in less walkable location with limited variation in the type of uses.

The idea for loose zoning for pop-up or informal business has parallels around the world. As one individual remembered about spending some time in a middle-class neighborhood in Leon, Nicaragua:

*You had these things that they called poparillas, or octopus stores. That was the joke because the person would just stand in a little window of their house and reach for everything ‘like an octopus.’ They would sell a couple of light bulbs, some matches, some cokes, and cheese and bread; kind of like a 7-11, just out of their closet. They would have one window that opened to the street, and a sales person manned the window just for the block.*

But how could this be achieved in less walkable areas? The same person had additional thoughts about how more local businesses (like beauty shops and convenience stores) might create more destinations and places to walk to:

*If you could afford to design a walkable life for yourself, map out wherever the nail salon should go, where does the grocery store go, where would your neighbors and your friends be... it might not be too different from the suburbs – you just wouldn’t be so far from people. You would need to walk; need to go pick up milk and beer on the corner; and this stuff would really need to be two hundred yards away or five hundred yards*

*away. It can't be any more than that or it's just not somewhere to dash down to get your milk. It can't be like walking a mile to the grocery store.*

*So, the distances in the suburbs just mean that some of those houses have to become stores. (Geometrically) it's a very interesting question because in some suburbs, that is what's happening. People are cooking tacos out of their garage and selling them for a buck, and doing nails in the basement – all unregulated business activity in the suburbs.*

*But it again gets to land use policy, because those aren't permitted uses and there are underground businesses. And the question is - what would it take to permit those businesses? All of the inspectors are going to freak out – you're going to have nail polish solvent in somebody's garage and no ventilation, so there's no way you're going to get that approved. But you could take the opposite approach that it's lost business revenue for the city. So the building inspectors might freak out, but your economic development people might be saying “yeah, go for it, we love small businesses here”.*

New flexible zoning codes would complement street size and connectivity, and enable things like the corner grocery store – the American versions of *poparillas*. “Flex Zoning” could adjust and enable these small businesses through things such as providing for one commercial conversion of a single-family home per ¼ mile in a residential area. This might be very effective in retrofitting the suburbs – allowing for corner stores in places that planners might never fathom, or small, walkable businesses serving minority communities run out of a garage in a suburban cul-de-sac.

The idea of ‘land banking’, which could end up being one positive outcome of the Great Recession and housing crisis of 2008-2009, could be equally transformative in making less walkable neighborhoods more transactional and walkable. The concept involves using a quasi-governmental ‘land bank’ to assume responsibility for foreclosed on homes if they will agree to assist in demolitions, and has been effective in some of the areas hardest hit by foreclosures (Saito, 2011). This process provides vacant land / opportunity sites for varied public-serving land uses, parks and community facilities that can facilitate more inclusive and walkable environments (not to mention bolstering home values).

These frameworks to increase the types of uses might open the door for more walkable community-benefiting facilities like parks and greenways, focused in areas of clustered minority population. Many urban locations such as San Francisco's Bayview and parts of Oakland have existing assets to work with. Applying for grants or pursuing private corporate partners (Pristin, 2011) to reinvest and revitalize these assets would ensure that neighborhoods are improving while retaining local residents. They might incentivize individuals to tear down backyard fences and create playing fields and footpaths similar to what has been done in many cohousing developments – not only increasing the accessibility of walkable resources but the probably of walking behavior to those that need it most (Corti, Donovan, & Holman, 1996; Giles-Corti et al., 2005; Whyte, 1988).

### **7.2.2 Related Policy 2: Influencing Preferences**

As a parallel policy, planners can encourage design standards that work to influence many of the consumer / cultural preferences that may influence minorities to cluster in less walkable

locations. As many of the interviewees expressed, many minorities have a direct association between amount of space, driving and affluence. This was especially the case for new immigrants who may have wanted to “own a car” or live the “American dream.” Good design standards can help to influence alternative preferences toward smaller housing and one-small-car (or even car-free) lifestyles.

For example, as mentioned previously, recent projects in San Francisco have taken advantage of efficiency / single room limitations to create independent living units. These units require new thinking in terms of design – using ambient light from wrap around windows, high ceilings and individual balconies to add to the perceived spaciousness of small units (350 SF at largest) – ultimately increasing the number of units put to market by reducing zoning restrictions.



**Figure 28: SF Cubix Interior**

The appeal of this to minorities is that it provides high-quality items associated with the American dream alongside a high-density framework that can assist in breaking down language, social, or economic barriers. Once again referencing the idea of group form as it relates to Italian hill towns, making design flexible can help it better match preferences – organic groups of buildings designed as a unit but with individual components (Maki, 1970).

Applying design components that make individual units unique and that respond to cultural preferences could help shape housing in less walkable and minority-clustered areas. Affordable housing and other projects should be shaped in a way that the architectural language does the following:

- Provides units with individual architectural identities and independence while being a part of the whole, with independent addresses, front doors, balconies, etc. relating to the traditional American value of independence related to the single-family home.
- Balances repetition with architectural variation, including repeated elements such as structural frames, bathrooms, kitchens, cabinets, etc. but making statements with things like entries and windows where they are most visible, and matching preferences toward individualism.
- Offers private space immediately adjacent to the public areas, with transitional space in between, and a semi-public space like a central courtyard that's controllable and viewable that can facilitate minority preferences toward multi-family, multi-generational and multi-cultural lifestyles.
- Provides large spaces (such as combined kitchen-living areas), high ceilings and lots of light to make smaller units look larger matching preferences toward larger spaces.
- Provides reduced parking that can be unbundling from unit costs, offering the ability for those who want to own a car that capability, but tempering that desire by reducing the number of spaces available and offering financial incentives for non-vehicle owners.

Some of these features are exemplified in UC Berkeley's University Village, Albany (UVA) student housing which provides affordable housing for multinational students with families.<sup>15</sup> As depicted in the photos that follow, the development works both to establish individual housing unit identity and to make distinction between the private, semi-private and public spaces appealing to American residential desires toward single-family living.

While these design elements might help shape preference, it is recognized that they could have unintended consequences such as raising prices, however these elements are likely not a huge financial burden to projects; on the contrary some (such as reduced parking) bring about savings. Many involve no increase in expense, just a change in design thinking. Furthermore, research on communities that have included elements to improve walkability shows the premium to be no more than 3% – something that the pro-formas for previous policies have indicated was bearable even by non-profit developers (Ewing, Kreutzer, & Frank, 2006). Given this, it is more likely that design changes that attempt to influence preferences might begin to shape consumer demand than they would impact the price of housing. They might shift the development paradigm to bring more affordable and walkable homes to the market.

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<sup>15</sup> Unfortunately there are also bad examples of this type of development, which have many of these same place-making amenities, but are in the wrong location. Peter Calthorpe was accused of this when his firm proposed 400 'green' units in a suburban location outside of Sacramento, as have many of his New Urbanist colleagues who have encouraged on exurban greenfields such as Seaside (FL) and Mountain House (CA). While these developments seek to embrace the architecture of European town ascribed by Maki and others, critics argue that some are done out of context and in the wrong location – making 'place' where place should not be.



**Figure 29: UVA – Delineation of Public Space**



**Figure 30: UVA – Variation of Units**





**Figure 31: UVA – Semi-private Entrances and Individual Mailboxes**

### **7.2.3 Related Policy 3: Targeting Walking Behavior**

Given that healthy habits and lifestyles are large part of also encouraging walking, behavioral programs should not be omitted from any discussion about increasing the evenness of walkable neighborhoods – especially for clustered minority communities. There are many ways that health and land use organizations can work to foster more healthy lifestyles and environments. They include both policy and programs, but before they can be discussed, demystification about design should be done.

Over the past 10 years, as many have tried to connect built environment factors to public health issues, a ‘Field of Dreams’ mentality has developed – if you build it they will come. Many academics have argued that by doing urban beautification, creating dense, mixed use communities, and promoting walkable environments that behavior would change. But this is not the case, as many opponents of environmental determinism have argued. Simply having a walkable resource does not automatically change choice and behavior. It does not make physical exertion easier or get someone out the door to exercise.

Many policy makers have embraced the design-heavy trend with the approach that it doesn’t matter whether or not it changes health behavior because of the beautification, economic development, or sustainability benefits of such improvements, but this is careless use of public resources directed at a specific health issue. They would do well to read literature by those such as Forsyth and look at many successful CDC programs.

Forsythe emphasizes that a dense, smart growth community is not simply a button to push followed by a healthy outcome. She notes that while areas of higher density may have more

travel walking, lower density areas offer more opportunities for leisure walking (Forsyth et al., 2007). In summary, she states that while density may provide transit benefits and be more efficient for “infrastructure, housing affordability, energy efficiency and possibly vibrant street life... (it does) not appear to be the silver bullet for a public health campaign aiming to increase physical activity and/or mitigate the rise of obesity in the U.S.”

This emphasizes the importance of a lifestyle choice to integrate vigorous exercise, not just for daily commute or common tasks, but that non-incident exercise and recreation also matter. While many might argue that urban density is correlative with close job proximity and resource accessibility, thus resulting in more time for leisure exercise, she would say that this does not automatically lead to healthy people. The use of gains in leisure time from reduced commute times and trips can shift, with reduced trips being filled by additional ones. The behavioral tendency to engage in regular physical exercise must still be present, such as using time gained from reduced commute (time and trips) to engage in socialization or vigorous exercise – not to simply turn on the television. Even if less time is spent in cars in dense environments, as Forsyth illustrates, if one has to drive an hour out of the city to run in the park, one wonders whether they are more or less likely to exercise than those who live in the suburbs with close access.

With the research of Forsythe in hand, policy makers could temper trends toward creating ‘instant’ dense, smart growth, new urbanist, or Leadership in Energy and Environment Design (LEED) communities. Adequate research has not been done to conclusively say that these places provide a net increase in community health (Ewing, Kreutzer, & Frank, 2006). And, as this study has suggested, there are still many families who may not have the capacity or not be choosing such walkable areas.

In many cases community-based programs and educational interventions might be more cost effective and appropriate. According to Cerin and Leslie (2008) these may be:

*... programs aimed at enhancing social networks supportive of physical activity (and) community-based social support interventions involving the recruitment of neighborhood residents into voluntary groups (e.g., neighborhood walking groups), whereby members provide companionship and encouragement for attaining self-selected activity goals.*

Best practice examples in community partnering come from Seattle, WA and Richmond, CA, where planners have seen dramatic success when communities come together to work for healthy outcomes. The Robert Wood Johnson Foundations’ Active by Design program has supported noteworthy, community-based health programs in cities such as Boulder, CO, Portland, OR, Cambridge, MA, Olympia, WA, and Lexington, KY that have worked to establish healthy habits in local residents (Robert Wood Johnson Foundation, 2006). Many of these programs involve a multidisciplinary approach and have engaged the research, planning, design, and development fields for solutions (Lavizzo-Mourey & McGinnis, 2003).

The program in Lexington, KY, for example, was angled toward getting youth ages 9-14 to conduct their preferred physical activities on a regular basis. It was part of the national VERB program<sup>16</sup> which has used social marketing and media to successfully increase awareness and

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<sup>16</sup> The name being derived from the word “verb” as a word bent on action with the tag line “It’s what you do.”

subsequently impact youth, as well as adult physical activity levels (Wong et al., 2004). While one of the program's primary assumptions was that a 'place' for activity exists, the focus was not about creating space or place but about creating a lifestyle behavior – "to win or gain a greater market share of time tweens spend on sedentary activities."

Much of the research analyzing this and other programs supports this hypothesis – that by creating healthy lifestyles and habits at an early age, later-life activity levels can be increased, a factor that could be viewed independently of location. The VERB program has been found to increase awareness 74%, which was attributed to significant activity increases, especially in the 9 to 10 year old female population (Huhman et al., 2005). In Lexington specifically, the national program found a local in-road in the "Tweens Nutrition and Fitness Coalition" which "created physical activity action outlets" to enable a better platform for the national marketing campaign. Similar community-based efforts have been related to food access and encouraging healthy food consumption for children.

While the reality for increasing the funding of such programs is negligible, the chance to funnel current funding streams to existing programs could provide an engine to encourage the youth and the elderly to live more healthy and active lifestyles. Additional policies could be easily implemented at a low cost to provide institutional support to such programs. These include those relating to school lunch programs, California environmental review, and regional and state-level Blueprint Planning.



## Chapter 8 - Future Research

Given the limitations of this study as a cross-sectional work rather than a longitudinal study of preferences toward walkability, focused research is needed as a follow-up to this study. This research involves four key areas that might best support and add scientific validity to this study. These areas include: (1) a longitudinal panel study of housing choice, income and walkability documenting actual location decisions; (2) complimentary longitudinal work on walking behavior; (3) research on suburban behavior and preferences; and (4) assessments of metrics and benchmarking techniques.

*First*, a longitudinal analysis on move choice and walkability is needed a follow-up to this study. The original intent of this work was to enlist private developers to share data from those purchasing in walkable and non-walkable developments. Address data of prior residences would have been obtained from those moving to the new environments. With the real estate crisis of 2008-2010, the developer went bankrupt and this concept lost viability, however such longitudinal work is needed to understand preferences toward walkability and how interventions toward minorities should be directed.

Longitudinal analysis on housing choice and walkability is the natural next step for this study. A panel survey should be completed for new developments, documenting socio-demographics and preference questions, along with information about previous residences. This work should factor in the significant factors in this study (Age, Age<sup>2</sup>, Median Home Age, Multi-Family, Owned, Housing Value, Number of Workers, Household Vehicles, etc.) as well as additional questions about income, preferences, control for crime / schools, and the local policy context for the best picture of how available walkable housing is accessible to all (regardless of income or ethnicity). It should also evaluate the degree to which lower income individuals may be having less ability to live in walkable places, if this is becoming harder over time, and what type of walkable units are needed to meet housing needs / preferences in the future.

An additional recommendation for Bay Area policy-makers would be to integrate move-related questions into the next Bay Area Travel Survey conducted by MTC, and provide unique identifiers for survey respondents so information could be tracked over time. (This is currently done in the Puget Sound area and has been used for modeling, but is not currently done in the Bay Area.)

*Second*, research in the form of a longitudinal study of walking behavior is needed. Researchers can say that living near and having access to environments that include walking trails, bike routes, and green space give people access to exercise. Data also tells us that use is more prevalent when these areas are safe. Research also finds that community-gathering places encourage more human interaction, a basic building block for mental health, and that people who exercise more are healthier and less susceptible to chronic health or mental issues.

As a continuance of this, research must continue to evaluate the importance of social factors (and health stressors), and how walkable environment might mitigate these factors. How do the preferences and stress-levels of those in a walkable neighborhood change over time? Could living in a walkable environment augment preference to where, if one was involuntarily placed

in such a place, they would naturally gravitate there again on their own volition? And what of aging, this study suggests that the importance of a walkable neighborhood might increase with age, but would this inference hold on longitude basis or at a wider scale?

*Third*, research is needed to study the costs and benefits of living in suburbia. This could include study of suburban preference as well as walking behavior. Do increases in leisure exercise supplant the incidental exercise otherwise gained in a more walkable environment? Some might say that early development tracts turned out well. Houses were small and close together, and as one developer interviewed said, they "were actually quite congenial places." Are lessons to be learned from this type of suburban development vs. the current, mass-produced "late dinosaur stage" suburban tract model and the Great Recession of 2008-2009? Can these lessons be applied to places such as Detroit or Cleveland, which form the heart of a growing 'shrinking cities' dialogue?

*Fourth*, given the limitations of the walkability tool used in this study, metrics, benchmarking techniques, rating tools and measurement indices need study. For the most part, this study has assumed walkability using a series of quantitative metrics of *accessibility* to benchmark one location against another. While this was a well-stated assumption, there are many different ways to classify and many characteristics that play in to walking behavior decision. Despite significant efforts to define the most important variables for walking (Ewing & Cervero, 2010), many other (confounding) items are hard to qualify and measure.

As an example, very few metrics exist which factor in type, quality and presence of sidewalks, yet the quality or *suitability* of the infrastructure relates directly to the decision to walk in a walkable neighborhood. Conversely many cite crime and safety as strong determinants of walking behavior but they are only a small portion of *socio-cultural factors* that drive walking behavior and decisions. Some would argue that the U.S. has cultural resistance to walking while in Europe there are strong cultural and historical roots. In an interview, one planner described this historic precedent by offering an example of a European city he had lived in recently:

*One of the historical architectural traits was porticos, or beautiful covered sidewalks. They were designed because the king wanted to be able to walk from one part of the castle and go strolling without getting wet. So he had this giant covered sidewalk built and that became the general style of any nice building on the boulevard. And so there were eleven miles of walkable, covered sidewalks in the historical part of town.*

*They are about twenty feet wide and pretty, with shopping storefronts, and restaurants. And it forms a city that is based on walking; with flea markets and cafés in these porticos. So, even though the whole rest of the city might not be like that you have this cultural history tied to walking.*

These kind of socio-cultural factors warrant testing alongside suitability factors as walkability metrics become used on a wider basis for research.

## Chapter 9 - Conclusion

The exploration in this study finds that there may be an issue with concentrated minorities living in less walkable locations. The results suggest that there may be barriers to living in the most walkable neighborhoods and that the most isolated areas (those that are more Black and less White) may be less walkable. Key contributions include the following observations:

- This work brings the topic of geographic concentration and racial unevenness into the discourse, using an index of concentration within the context of walkability. The model output suggests that *there is significant variation in those living in walkable areas and that those that more concentrated by race (Black) are associated with less walkability.*
- The assessment does not support a connection between income and walkability. It does, however, add to the discussion on the associations between housing value and walkability. Other research has suggested that walkability increases housing value, makes prices more stable and is tied to income, but the associations in this work do not strongly support that. In the Bay Area, walkability does not appear to be strongly associated with higher housing values.

Additionally:

- Qualitative interviews suggest that minorities appear to be either moving to less walkable suburban areas for more space and amenities that are not available to them in the central city, or left in urban pockets with less walkable amenities, and that this could possibly be occurring because of 1) *affordability* and 2) *socio-cultural factors*.
- Interviews suggest that minorities may not value walkability in their housing preferences, but that affordability is an issue, in that many felt 'priced out' of the most walkable and desirable areas. In contrast, and real estate professionals felt that price was related to walkability, and that walkability factored into housing decisions, especially for those with higher income.

In sum, based on the exploration in this study, it appears that there may be unevenness in allocation of walkable resources and potential barriers for minorities to live in a walkable neighborhood.

These results do not come without shortcomings. The study is limited in that it does not directly study longitudinal housing or location decisions over time. It also does not measure walking behavior – only propensity to walk based on a series of variables (density, street-grid connectivity and land-use mix). However, if the associations identified above were to hold, they yield opportunities for policy makers.

Policies have been suggested to improve the streetscape, create more supply, change the type of housing, endorse more creative financial tools and influence individual preferences / behavior. Additionally opportunities to correct suburban landscapes have been identified – something of critical importance given the current 'shrinking cities' dialogue in many post-industrial and

foreclosure-ridden suburban areas that are becoming increasingly clustered with minorities. The tools proposed are not all pejorative and include items such as:

- 1) Use of a land-to-improvements ratio to identify underutilized parcels and prioritize more dense development of walkable housing units
- 2) Using single-room-occupancy (SRO) housing units and more flexible zoning to create more walkable housing and more walkable locations
- 3) Financial tools such as location efficient mortgages and land banking

Hopefully, by working on these focus areas, planners and policy makers can better promote walkable neighborhoods, working to resolve potential geographic unevenness in walkability that might contribute to inaccessibility, and to encourage the idea of inclusiveness as planners and developers work to create more walkable neighborhoods.

The idea of unevenness provides direct impetus for additional research. As a critical next step a *focused, longitudinal study of walkable neighborhoods and housing choice is recommended*. This would involve implementation of the panel surveys in new developments – documenting the attributes and preferences associated with actual housing choices including price and income. Such research could build on the policy recommendations outlined in this study, so that walkable neighborhoods can be inclusive as a public health intervention for all.

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## Epilogue – A Concluding Flâneur

*July 2011, Berkeley, California, USA* – As I embark on one final stroll in my dissertation writing-refining-writing process, I find my mind wandering as I make my way around the town of Berkeley, CA. The act of walking is so pivotal to human development. I think about my soon-to-be born son and how he will learn to lift himself, crawl on all fours, begin crawling, then walking in bipedal locomotion just like humans have done for millennium. It is a natural instinct. Humans are the most efficient at locomotion of all animals,— covering more distance per step than even larger mammals like horses (McDougall 2009).

I pick up my pace to catch a BART train; past Picante Mexican Restaurant, the Tokyo Fish Market, the Oak Barrel Wine and Brewing, Acme Bread Baking and Cafe Fanny. I think as I walk – the notion of the flâneur as thinking and experiencing. In an earlier time, my dress would have been important. In the 1800s people would wear their Sunday best for long leisure strolls through the City; but by my judgment casual flexibility is best — khaki's and a collar shirt — comfortable yet presentable. I know that to go on a true flâneur I need to be prepared for anything, dressed to go to the nicest place; but today I'm feeling more purposeful. I'd like to at least make it across the Bay, and truthfully, I am not rambling as aimlessly as I would like. At some point I would like to make it to my case study neighborhood in Ingleside.

Arriving at the train station I am greeted by a sea of parking. American transit providers have a unique way of facilitating driving to stations; just provide a ton of parking. I've heard Dr. Robert Cervero talk many times about case studies that parallel this – about how if we were to replace the parking with mixed-use housing, ridership would probably increase and how in the San Francisco Bay Area park-and-ride facilities have kept building square footage low near stations (Cervero and J. Landis 1997).

This keeps people commuting into primary employment areas like San Francisco and living on the fringes. It also requires mobility, which is not something afforded to everyone equally. Studies have shown the power of auto ownership in getting to employment (Cervero, Rood, and B. Appleyard 1995). It is a tool in bridging the gap between jobs and housing. Transit can help mitigate the lack of auto ownership and related spatial mobility disadvantages. This is an important social equity factor that is too-oft overlooked.

The train comes and I rouse myself from my thoughts. I board in an un-orderly way — disrespectful of the idea of lining up to get on the train — grab a window seat, and plunge back into a daydream. I could get off in downtown Oakland and see some of the 10,000 housing units Jerry Brown tried to build during his terms as Mayor of the city. Conversely I could jump off in downtown San Francisco, be surrounded by buildings, and ramble through the heart of financial district pretending to be in a place like New York. I would come on Belden Place and grab a bite or find myself in North Beach where beat poets used to pontificate about nothing. But who am I kidding, it is not New York; no one lives there.

If I waited a little longer and went to my old neighborhood, the Mission, I'd get more of a multicultural experience. The Mission is the heart of Latino culture in San Francisco – the best place to practice your Spanish and the best place to grab a burrito. However, in the time that I lived in the area I have seen it change significantly from gentrification. White urban

professionals moved into the area and it became hip. New restaurants, wine bars, and boutique shops have filled up storefronts catering to these folks.

I've heard it said that San Francisco is the most overeducated city in the U.S. but this area wreaks of way too many college degrees – lots of floating-of and flirting-with big ideas. You just wonder how many of them get implemented. I find it a bit funny to be observing this as a future PhD.

I've thought a lot about the concept of the idea economy recently – of talent and the creative class yielding economic growth. When I read authors like Richard Florida talking about growing the creative class (in essence stealing these people from other locations) something feels a bit odd (Florida 2005). It seems that this leaves out the working class and the poor, and creates a paradigm in which the creative class is served by the non-creatives. Yet the non-creatives I know are the people who make the world go round. They are the “salt of the earth” and critical to our societal fabric – the type of people I interviewed in the Ingleside, in Oakland and Richmond.

As I step off the train, I am reminded of my results – that many are no longer able to live in the areas that they work, and that perhaps an area once built as a transit-supported-community for immigrant workers does not serve the minority immigrant population like it used to. It strikes me that this not a unique problem – not confined to the U.S. I saw similar issues last year in Italy. Despite the walkability of many European central cities and the walkable hill towns in the Cinque Terre area, there are issues with sprawl and obesity – perhaps the same unevenness I observed in the Bay Area. I saw job and housing issues impacting daily life decisions – things that are ultimately tied to health and rises in chronic disease. But unlike here, I also saw an ability to build densely, and explore new housing within old frameworks.

I am reminded of the idea of the hill town as a model for walkable affordable housing and think ‘We have similar issues, but different context.’ I cross over a freeway counting many more cars than I do pedestrians. ‘Tough to walk, let alone live here’, I think. Such a beautiful and diverse area but so much work to do; there is so much work to do.



# BATS Additional Statistics

Table 16: BATS Descriptive Statistics

Descriptive		Entire Population (N=8919)		Alameda County (3002)	
		Mean	Std. Deviation	Mean	Std. Deviation
	Walkability	59.22	24.66	62.06	21.76
	Age	47.86	14.54	46.91	14.56
	Median Value	410,311.97	201,498.82	340259.19	145064.36
	Dwelling Type	3.89	43.82	3.89	44.51
	Household Size	2.24	1.23	2.29	1.25
	Number of Workers	1.31	0.85	1.34	0.85
	Number Licensed	1.72	0.72	1.74	0.75
	Black Concentration 00	14%	12%	0.00	0.00
	Increase in Concentration 80-00	0.37	0.48	0.32	0.47
Descriptives		Contra Costa (2230)		Marin (638)	
		Mean	Std. Deviation	Mean	Std. Deviation
	Walkability	44.99	21.44	51.15	24.55
	Age	49.93	14.44	51.47	14.12
	Median Value	314667.31	165807.19	523794.51	196759.70
	Dwelling Type	3.01	36.56	6.46	68.14
	Household Size	2.45	1.30	2.13	1.10
	Number of Workers	1.31	0.89	1.19	0.80
	Number Licensed	1.82	0.71	1.68	0.64
	Black Concentration 00	0.00	0.00	0.00	0.00
	Increase in Concentration 80-00	0.49	0.50	0.33	0.47
Descriptives		San Francisco (1326)		San Mateo (1581)	
		Mean	Std. Deviation	Mean	Std. Deviation
	Walkability	86.32	12.07	54.44	22.29
	Age	44.07	14.19	48.47	14.25
	Median Value	545880.84	209293.73	518736.94	199498.43
	Dwelling Type	4.30	38.70	3.76	43.40
	Household Size	1.79	1.00	2.29	1.21
	Number of Workers	1.24	0.75	1.36	0.86
	Number Licensed	1.49	0.69	1.77	0.71
	Black Concentration 00	0.00	0.00	0.00	0.00
	Increase in Concentration 80-00	0.37	0.48	0.30	0.46

**Table 17: Age Frequencies**

<b>N</b>	<i>Valid</i>	8777
	<i>Missing</i>	142
<b>Mean</b>		47.86
<b>Median</b>		47.00
<b>Skewness</b>		.332
<b>Std. Error of Skewness</b>		.026
<b>Percentiles</b>	10	29.00
	20	34.00
	25	37.00
	30	39.00
	40	43.00
	50	47.00
	60	51.00
	70	55.00
	75	57.00
	80	60.00
	90	69.00

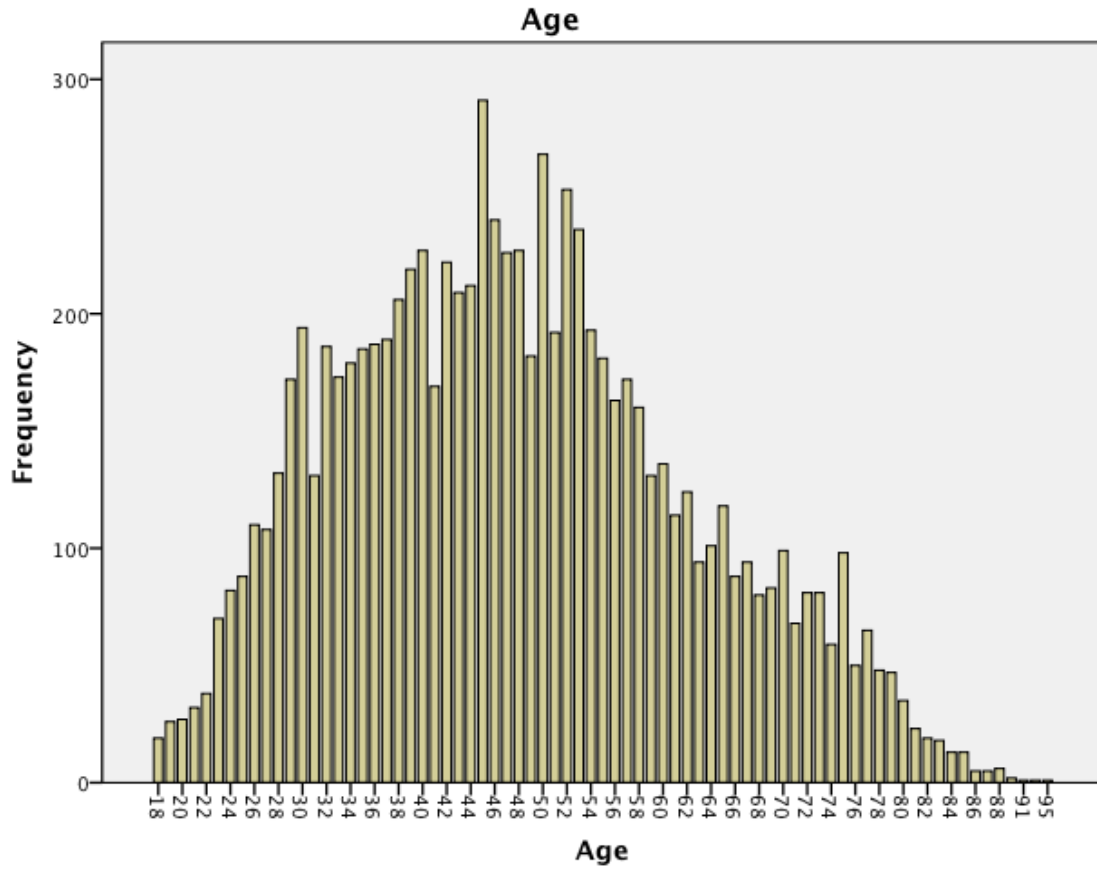
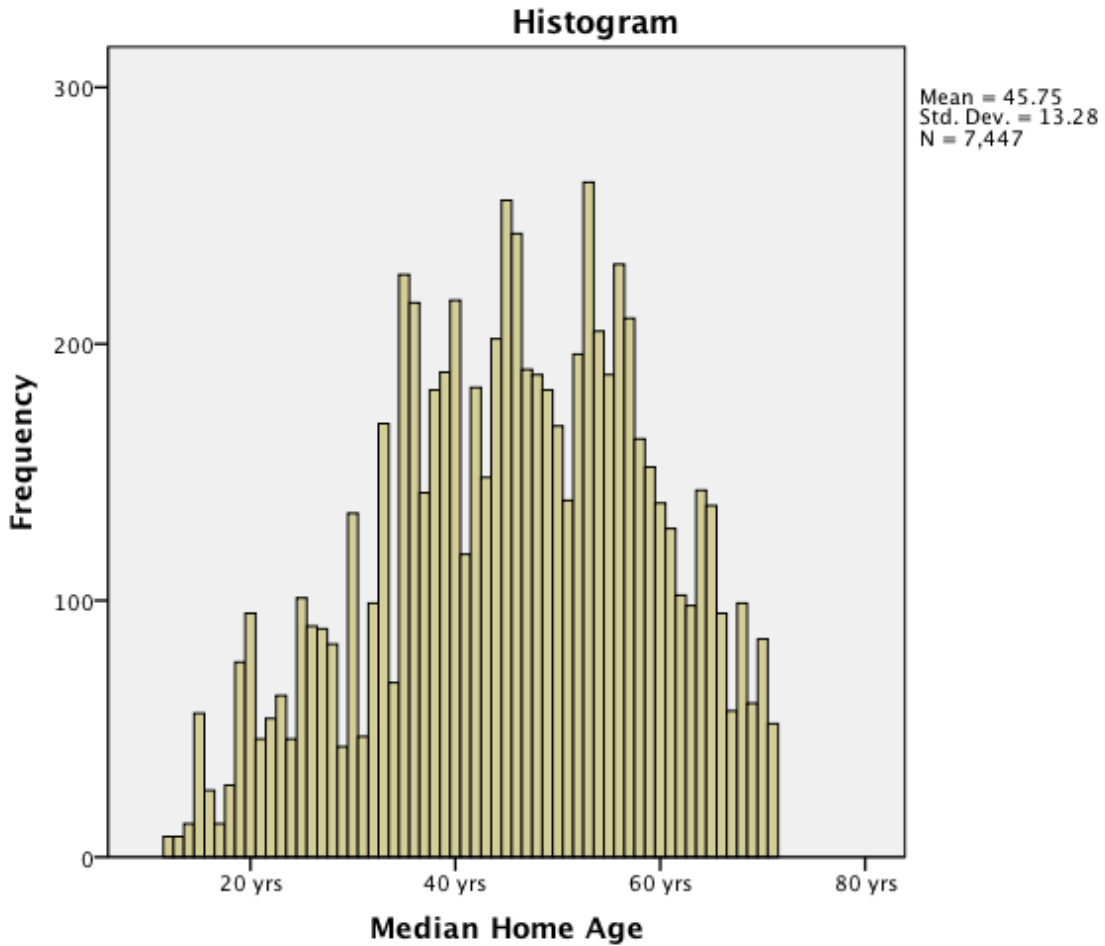


Figure 32: Histogram of Age

**Table 18: BATS Cross-tabulation Income and Ethnicity**

		Ethnicity					Total
		White	Black	Hispanic / Latino	Asian	Other	
<b>Income 40K and Above</b>	Count	5376	192	230	450	536	6784
	% within Income	79.2%	2.8%	3.4%	6.6%	7.9%	100.0%
	% within Ethnicity	77.6%	58.9%	74.0%	80.8%	67.1%	76.1%
	% of Total	60.3%	2.2%	2.6%	5.0%	6.0%	76.1%
<b>Below 40K</b>	Count	1194	126	70	90	173	1653
	% within Income	72.2%	7.6%	4.2%	5.4%	10.5%	100.0%
	% within Ethnicity	17.2%	38.7%	22.5%	16.2%	21.7%	18.5%
	% of Total	13.4%	1.4%	.8%	1.0%	1.9%	18.5%
<b>Total</b>	Count	6926	326	311	557	799	8919
	% within Income	77.7%	3.7%	3.5%	6.2%	9.0%	100.0%
	% within Ethnicity	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	77.7%	3.7%	3.5%	6.2%	9.0%	100.0%



**Figure 33: Median Home Age**

**Table 19: BATS Regression - Built Env. / Housing Detail**

Model <sup>1</sup>		Entire Population (N=8919)					
		B	Std. Error	Beta	t	Sig.	VIF
	(Constant)	65.378	2.553		25.604	.000	
<i>Individual</i>	Age	-.542	.099	-.337	-5.483	.000	37.278
	Age <sup>2</sup>	.003	.001	.219	3.564	.000	37.120
<i>Built Env Housing</i>	Median Home Age	.633	.018	.361	35.433	.000	1.020
	Dwelling Type	.021	.005	.040	3.969	.000	1.021
	Household Tenure	-7.502	.428	-.189	-17.513	.000	1.150
	Household Size >=3	-5.810	.532	-.117	-10.912	.000	1.128
	Median Value	.000	.000	-.166	-16.373	.000	1.014
		<b>df</b>	<b>F</b>	<b>Sig.</b>			
ANOVA		7	395.544	.000 <sup>2</sup>			
		<b>R</b>	.506 <sup>2</sup>				
		<b>R-Square</b>	0.256				
		<b>Adjusted R-Square</b>	0.255				

1. Dependent Variable: Walkability

2. Predictors: ((Constant), Median Value, Household Size, Dwelling Type, Median Home Age, Household Tenure, Age2, Age)

**Table 20: Additional BATS Regression by County**

	Alameda (N=3002)			Contra Costa (N=2230)		
	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	96.798	2.353	0.000	80.840	2.915	0.000
Age	-0.145	0.028	0.000	-0.070	0.036	0.049
Gender	0.068	0.725	0.925	0.741	0.832	0.373
Income	0.874	0.278	0.002	-0.141	0.291	0.627
Household Income	-0.024	0.015	0.114	0.001	0.018	0.969
Ethnicity	-0.002	0.001	0.131	0.002	0.001	0.253
Median Value	0.000	0.000	0.000	0.000	0.000	0.000
Dwelling Type	0.012	0.008	0.140	0.026	0.011	0.023
Household Size	-1.757	0.404	0.000	-2.167	0.438	0.000
Household Tenure	-5.800	0.662	0.000	-6.825	0.881	0.000
Number of Workers	-0.048	0.601	0.937	0.207	0.642	0.747
Number Licensed	-1.750	0.779	0.025	-1.396	0.894	0.118
Number of Vehicles Available to Household	0.122	0.018	0.000	0.050	0.031	0.109
Black Concentration 00	655.128	377.025	0.082	-809.344	395.074	0.041
Concentration High / Low	-6.575	1.028	0.000	1.320	1.141	0.247
Increase in Concentration 80-00	-5.411	0.810	0.000	-0.981	0.834	0.240
R				0.432		
R-Square				0.186		
Adjusted R-Square				0.182		
	Marin (N=638)			San Francisco (N=1326)		
	B	Std. Error	Sig.	B	Std. Error	Sig.
(Constant)	64.230	7.524	0.000	91.174	2.085	0.000
Age	-0.177	0.082	0.031	-0.103	0.025	0.000
Gender	-1.531	1.860	0.411	-1.889	0.609	0.002
Income	0.663	0.614	0.281	-0.340	0.223	0.128
Household Income	-0.034	0.037	0.358	0.010	0.013	0.424
Ethnicity	-0.003	0.003	0.265	0.000	0.001	0.924
Median Value	0.000	0.000	0.091	0.000	0.000	0.000
Dwelling Type	0.017	0.014	0.211	0.003	0.008	0.708
Household Size	-0.763	1.174	0.516	-1.480	0.457	0.001
Household Tenure	-6.408	1.690	0.000	-1.536	0.596	0.010
Number of Workers	-0.128	1.594	0.936	-0.441	0.571	0.440
Number Licensed	-3.686	2.183	0.092	-0.183	0.736	0.803
Number of Vehicles Available to Household	0.150	0.068	0.028	0.042	0.009	0.000
Black Concentration 00	1409.394	2307.623	0.542	-988.317	478.934	0.039
Concentration High / Low	12.385	3.273	0.000	3.078	0.896	0.001
Increase in Concentration 80-00	1.565	2.007	0.436	3.222	0.633	0.000
R				0.371		
R-Square				0.138		
Adjusted R-Square				0.117		

	San Mateo (N=1581)		
	B	Std. Error	Sig.
(Constant)	96.795	3.286	0.000
Age	-0.156	0.042	0.000
Gender	-0.423	1.014	0.677
Income	0.775	0.373	0.038
Household Income	-0.031	0.022	0.156
Ethnicity	0.002	0.002	0.230
Median Value	0.000	0.000	0.000
Dwelling Type	0.014	0.012	0.258
Household Size	-1.174	0.593	0.048
Household Tenure	-6.179	0.870	0.000
Number of Workers	1.527	0.839	0.069
Number Licensed	-1.625	1.133	0.152
Number of Vehicles Available to Household	0.072	0.041	0.080
Black Concentration 00	-	1196.248	0.010
Concentration High / Low	3071.946		
Increase in Concentration 80-00	-0.373	1.584	0.814
	-7.534	1.103	0.000
R			0.460
R-Square			0.211
Adjusted R-Square			0.204







# Development Analysis Pro Formas

Table 21: Test Pro Forma Vacant Land Analysis and Density Increase

	Existing Standard	Test Policy	Difference
<b>Site Area and Zoning</b>			
A. Lot Size in Square Feet (a)	20,000	10,000	Smaller Lots Identified & Developed
B. Lot Acreage	0.46	0.23	.23 Acres
C. Average Lot Coverage (Above Ground and At-Grade)	80%	100%	Density Increase
<b>Development Program</b>			
D. Building Platform	Low Rise Podium	Low Rise Podium	
E. Maximum Height in Feet (a)	48	60	15 Feet
F. Maximum Total Floors	4	5	1 Floor
G. Building Efficiency	80%	80%	More Efficient Design
H. Total Built Potential in Square Feet [ (A*C)*F*G ]	51,200	40,000	(11200)
I. Average Unit Size in Square Feet (b)	1,000	500	(500)
J. Maximum Units (H/I)	51	80	29
K. Units per Floor (J/F)	13	16	3
L. BMR Percentage Onsite	15%	15%	0
M. Number of BMR Units e (K*L)	8	12	4
N. Number of Market Rate Units (J-M)	44	68	24
<b>Revenue</b>			
O. Market Rate Sales Price Per Unit (c)	\$500,000	\$300,000	(\$200,000)
P. Market Rate Sales Price Per Net Square Foot	\$500	\$600	\$100
Q. Base Price of BMR Units (d)	\$150,000	\$90,000	(\$60,000)
R. Total Sales Revenue	\$22,912,000	\$21,480,000	(\$1,432,000)
S. Sales Expense @ 4%	4%	4%	\$0
T. Net Revenue	\$21,995,520	\$20,620,800	(\$1,374,720)
T.1. Per Unit	\$429,600	\$257,760	(\$171,840)
T.2. Per NSF	\$430	\$516	\$86
<b>Land and Building Costs</b>			
U. Unimproved Land Cost Value (e)	\$2,291,200	\$2,148,000	(\$143,200)
V. Hard Construction Costs (e)	\$16,000,000	\$12,500,000	(\$3,500,000)
W. Permits and Fees	\$6,000	\$3,000	Reduced
X. BMR / Inclusionary In-Lieu Fee (f)	\$0	\$0	\$0
Y. Construction Financing @ \$30 / SF	\$1,536,000	\$1,200,000	(\$336,000)
Z. Total Building Costs	\$19,833,200	\$15,851,000	(\$3,982,200)
Z.1. Per Unit	\$387,367	\$198,138	(\$189,230)
Y.2. Per NSF	\$387	\$396	\$9
<b>Residual Land Value</b>			
AA. Developer Margin	10%	23%	13%
BB. Return on Net Sales	\$2,162,320	\$4,769,800	\$2,607,480
BB.1. Per Unit	\$42,233	\$59,623	\$17,390
BB.2. Per NSF	\$42	\$119	\$77
CC. Land Value Per Lot SF	\$1,100	\$2,062	\$962
DD. Per Acre of Land	\$47,906,243	\$89,824,205	\$41,917,962

- a. Uses 1/4 for test; assumes LIR allows for smaller lot development; assumes some form of parking inclusion and a minimum of 12ft needed per floor
- b. Standard average unit size is 1000 SF (925 sf rounded) per recent development proposals in San Francisco (Seifel 2008); micro unit size based on development platform by Hauser Architects (2008)
- c. Market rate sales prices based on Market Assessment by Marcus Millichap 2011; price viewed as conservative to be applied across jurisdiction and provide the most reserved assessment of profitability
- d. BMR prices based assumed to be roughly 30% of market price per SPUR documentation (Seifel 2008)
- e. Land value estimated at 10% of project by SPUR ([http://www.spur.org/publications/library/article/cost\\_build\\_and\\_buy\\_housing\\_san\\_francisco](http://www.spur.org/publications/library/article/cost_build_and_buy_housing_san_francisco)); construction cost estimated at \$200/GSF and contingent on type of construction
- f. In-Lieu fee \$0, as development is meeting housing requirements with onsite production.

**Table 22: Test Pro Forma, Increased BMR**

	Existing Standard	Test Policy	Difference
<b>Site Area and Zoning</b>			
A. Lot Size in Square Feet (a)	20,000	10,000	
B. Lot Acreage	0.46	0.23	
C. Average Lot Coverage (Above Ground and At-Grade)	80%	100%	
<b>Development Program</b>			
D. Building Platform	Low Rise Podium	Low Rise Podium	
E. Maximum Height in Feet (a)	48	60	
F. Maximum Total Floors	4	5	
G. Building Efficiency	80%	80%	
H. Total Built Potential in Square Feet [ (A*C)*F*G ]	51,200	40,000	
I. Average Unit Size in Square Feet (b)	1,000	500	
J. Maximum Units (H/I)	51	80	
K. Units per Floor (J/F)	13	16	
L. BMR Percentage Onsite	15%	20%	Increased BMR
M. Number of BMR Units e (K*L)	8	16	
N. Number of Market Rate Units (J-M)	44	64	
<b>Revenue</b>			
O. Market Rate Sales Price Per Unit (c)	\$500,000	\$300,000	(\$200,000)
P. Market Rate Sales Price Per Net Square Foot	\$500	\$600	\$100
Q. Base Price of BMR Units (d)	\$150,000	\$90,000	(\$60,000)
R. Total Sales Revenue	\$22,912,000	\$20,640,000	(\$2,272,000)
S. Sales Expense @ 4%	4%	4%	\$0
T. Net Revenue	\$21,995,520	\$19,814,400	(\$2,181,120)
T.1. Per Unit	\$429,600	\$247,680	(\$181,920)
T.2. Per NSF	\$430	\$495	\$66
<b>Land and Building Costs</b>			
U. Unimproved Land Cost Value (e)	\$2,291,200	\$2,064,000	(\$227,200)
V. Hard Construction Costs (e)	\$16,000,000	\$12,500,000	(\$3,500,000)
W. Permits and Fees	\$6,000	\$3,000	Reduced
X. BMR / Inclusionary In-Lieu Fee (f)	\$0	\$0	\$0
Y. Construction Financing @ \$30 / SF	\$1,536,000	\$1,200,000	(\$336,000)
Z. Total Building Costs	\$19,833,200	\$15,767,000	(\$4,066,200)
Z.1. Per Unit	\$387,367	\$197,088	(\$190,280)
Y.2. Per NSF	\$387	\$394	\$7
<b>Residual Land Value</b>			
AA. Developer Margin	10%	20%	11%
BB. Return on Net Sales	\$2,162,320	\$4,047,400	\$1,885,080
BB.1. Per Unit	\$42,233	\$50,593	\$8,360
BB.2. Per NSF	\$42	\$101	\$59
CC. Land Value Per Lot SF	\$1,100	\$1,981	\$882
DD. Per Acre of Land	\$47,906,243	\$86,311,526	\$38,405,284

- a. Uses 1/4 for test; assumes LIR allows for smaller lot development; assumes some form of parking inclusion and a minimum of 12ft needed per floor
- b. Standard average unit size is 1000 SF (925 sf rounded) per recent development proposals in San Francisco (Seifel 2008); micro unit size based on development platform by Hauser Architects (2008)
- c. Market rate sales prices based on Market Assessment by Marcus Millichap 2011; price viewed as conservative to be applied across jurisdiction and provide the most reserved assessment of profitability
- d. BMR prices based assumed to be roughly 30% of market price per SPUR documentation (Seifel 2008)
- e. Land value estimated at 10% of project by SPUR  
([http://www.spur.org/publications/library/article/cost\\_build\\_and\\_buy\\_housing\\_san\\_francisco](http://www.spur.org/publications/library/article/cost_build_and_buy_housing_san_francisco)); construction cost estimated at \$200/GSF and contingent on type of construction
- f. In-Lieu fee \$0, as development is meeting housing requirements with onsite production.

**Table 23: Test Pro Forma, LEED / Design Premium**

	Existing Standard	Test Policy	Difference
<b>Site Area and Zoning</b>			
A. Lot Size in Square Feet (a)	20,000	20,000	
B. Lot Acreage	0.46	0.46	
C. Average Lot Coverage (Above Ground and At-Grade)	80%	80%	
<b>Development Program</b>			
D. Building Platform	Low Rise Podium	Low Rise Podium	
E. Maximum Height in Feet (a)	48	48	
F. Maximum Total Floors	4	4	
G. Building Efficiency	80%	80%	
H. Total Built Potential in Square Feet [ (A*C)*F*G ]	51,200	51,200	
I. Average Unit Size in Square Feet (b)	1,000	1,000	
J. Maximum Units (H/I)	51	51	
K. Units per Floor (J/F)	13	13	
L. BMR Percentage Onsite	15%	15%	
M. Number of BMR Units e (K*L)	8	8	
N. Number of Market Rate Units (J-M)	44	44	
<b>Revenue</b>			
O. Market Rate Sales Price Per Unit (c)	\$500,000	\$500,000	
P. Market Rate Sales Price Per Net Square Foot	\$500	\$500	
Q. Base Price of BMR Units (d)	\$150,000	\$150,000	
R. Total Sales Revenue	\$22,912,000	\$22,912,000	
S. Sales Expense @ 4%	4%	4%	
T. Net Revenue	\$21,995,520	\$21,995,520	
T.1. Per Unit	\$429,600	\$429,600	
T.2. Per NSF	\$430	\$430	
<b>Land and Building Costs</b>			
U. Unimproved Land Cost Value (e)	\$2,291,200	\$2,291,200	
V. Hard Construction Costs (e)	\$16,000,000	\$15,520,000	Expedited Env.
W. Permits and Fees	\$6,000	\$1,000	Reduced Fees
X. LEED / DESIGN PREMIUM (f)	\$0	\$465,600	\$465,600
Y. Construction Financing @ \$30 / SF	\$1,536,000	\$1,536,000	
Z. Total Building Costs	\$19,833,200	\$19,813,800	(\$19,400)
Z.1. Per Unit	\$387,367	\$386,988	(\$379)
Y.2. Per NSF	\$387	\$387	(\$0)
<b>Residual Land Value</b>			
AA. Developer Margin	10%	10%	0%
BB. Return on Net Sales	\$2,162,320	\$2,181,720	\$19,400
BB.1. Per Unit	\$42,233	\$42,612	\$379
BB.2. Per NSF	\$42	\$43	\$0
CC. Land Value Per Lot SF	\$1,100	\$1,100	
DD. Per Acre of Land	\$47,906,243	\$47,906,243	

a. Uses 1/4 for test; assumes LIR allows for smaller lot development; assumes some form of parking inclusion and a minimum of 12ft needed per floor

- b. Standard average unit size is 1000 SF (925 sf rounded) per recent development proposals in San Francisco (Seifel 2008); micro unit size based on development platform by Hauser Architects (2008)
- c. Market rate sales prices based on Market Assessment by Marcus Millichap 2011; price viewed as conservative to be applied across jurisdiction and provide the most reserved assessment of profitability
- d. BMR prices based assumed to be roughly 30% of market price per SPUR documentation (Seifel 2008)
- e. Land value estimated at 10% of project by SPUR  
([http://www.spur.org/publications/library/article/cost\\_build\\_and\\_buy\\_housing\\_san\\_francisco](http://www.spur.org/publications/library/article/cost_build_and_buy_housing_san_francisco)); construction cost estimated at \$200/GSF and contingent on type of construction
- f. Assumed 3% design / LEED premium

## Concentration Index Methodology

In this study an index of concentration is used as a demographic measure of distribution between groups over a geographic area. While other measures have been used in the literature to measure concentration [see Lieberman (1980a; 1980b) and Robinson (1980)], in the case of this study a concentration measure similar to a location quotient calculation is used to measure the regional share of the population located in a smaller area.<sup>17</sup> The measure is indicated as a formula below.

$$C_B = \left( \frac{\frac{P_{Bi}}{P_i}}{\frac{P_{Br}}{P_r}} \right)$$

Where:

$C_B$  = the relative concentration of Black population in the  $i^{\text{th}}$  area (Census Tract)

$P_{Bi}$  = the Black population of the  $i^{\text{th}}$  area (Census Tract)

$P_{Br}$  = the Black population for the study area / region (5 Bay Area counties)

$P_i$  = the total population for the  $i^{\text{th}}$  area (Census Tract)

$P_r$  = the total population for the study area / region (5 Bay Area counties)

Each zone or subarea has a concentration index that is calculated. The unique geographic values of the concentration calculations (N=872) are then applied to each individual case from the BATS data set (N=8,919; all of which relate to an individual's home location). This yields a single concentration index value for each case, related to the geographic subarea where they live.

---

<sup>17</sup> Location quotients were first used by Robert Haig (1926) and are normally applied in economic base analysis.



## Index Computation for Subareas

Figure 37 represents the excel calculation for the concentration index of each geographic subarea (Census Tract) within the entire 5-county study area – a total of 872 Tracts. The calculation is shown in column J. It is followed by 2 example calculations.

Figure 36: Concentration Computation for Subareas

	A	B	C	E	G	I	J	K	L
1	AreaName	GEO2000	TOTAL00	NONWHT00	BLACK00	ISO	CONCLQ		
2	06001CA, Alameda County	06001400100	2464	492	145	0.000020	0.5616		
3	06001CA, Alameda County	06001400200	1944	293	67	0.000005	0.3289		
4	06001CA, Alameda County	06001400300	4878	1392	793	0.000298	1.5515		
5	06001CA, Alameda County	06001400400	3659	1137	696	0.000306	1.8154		
6	06001CA, Alameda County	06001400500	3415	1992	1567	0.001664	4.3793		
866	06081CA, San Mateo County	06081613300	2607	301	42	0.000002	0.1538		
867	06081CA, San Mateo County	06081613400	3392	185	11	0.000000	0.0310		
868	06081CA, San Mateo County	06081613501	5072	1422	408	0.000076	0.7677		
869	06081CA, San Mateo County	06081613502	5412	469	31	0.000000	0.0547		
870	06081CA, San Mateo County	06081613600	5777	641	64	0.000002	0.1057		
871	06081CA, San Mateo County	06081613700	7968	1452	56	0.000001	0.0671		
872	06081CA, San Mateo County	06081613800	4783	552	57	0.000002	0.1137		
873			4123740.00	1698248.00	432077.00				
874									
875									
876									

## Example Calculations:

GEO ID: 06001400500

$$(P_B / P_i) / (P_{Br} / P_r)$$

$$(1567 / 3415) / (432077 / 4123740) = 4.4 \text{ (Relatively More Concentrated)}$$

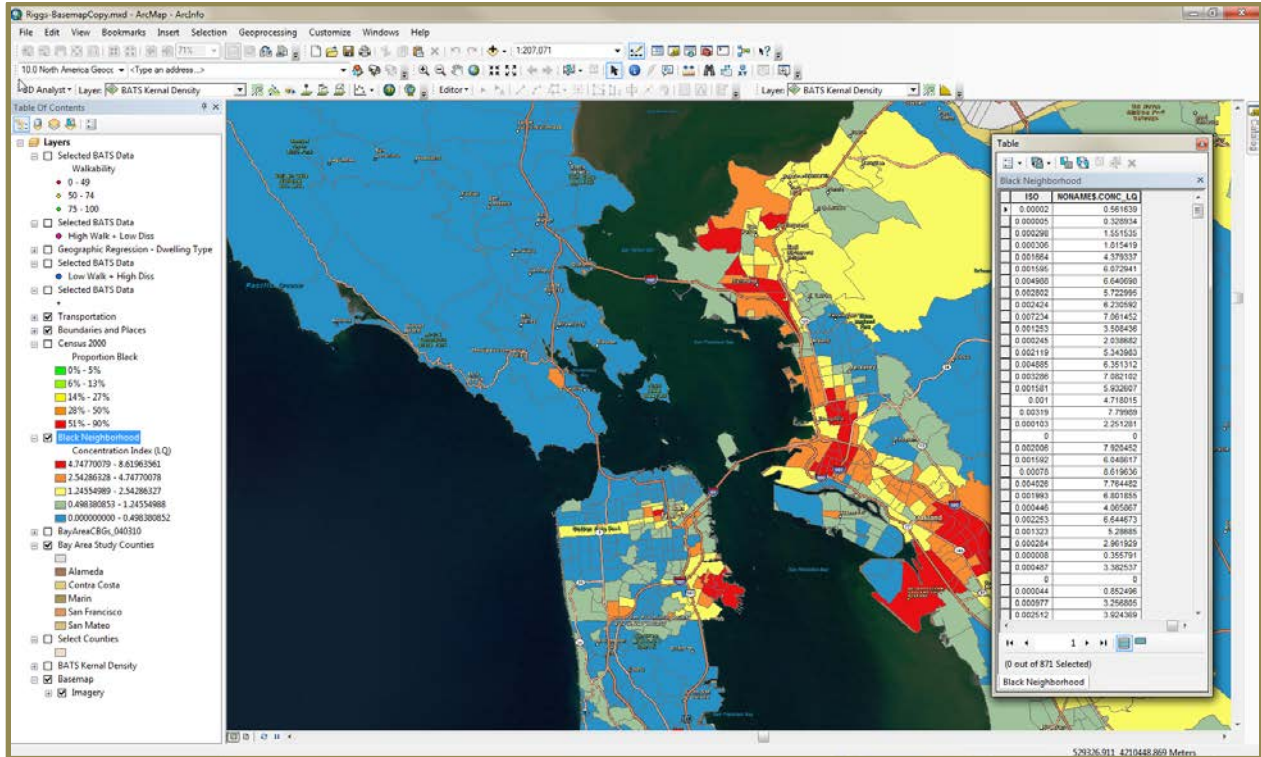
GEO ID: 06081613800

$$(P_B / P_i) / (P_{Br} / P_r)$$

$$(57 / 4783) / (432077 / 4123740) = 0.1 \text{ (Relatively Less Concentrated)}$$

These are then mapped in preparation for case matching with the BATS data. The screenshot below represents the GIS mapping. The values in the region as a whole range from a low of 0 to a high of 8.6

**Figure 37: GIS Screenshot of Concentration Mapping**



**Table 24: Descriptive Statistics for Concentration Index of All Subareas**

	N	Minimum	Maximum	Mean	Median	Std. Dev.
Concentration Index (LQ)	872	.000000	8.6196	1.0937	.3964	1.5904

## Case Matching:

After calculating these values for all of the subareas within the study area, an Excel value-lookup (VLOOKUP) command is used to match the value of each tract to the corresponding individuals / cases in the BATS data set (N=8,919) – the  $C_{Bi}$  value for each tract  $i$  the person lives in. This is represented in Figure 39.

Figure 38: Matching Concentration Index for BATS Cases

The screenshot shows an Excel spreadsheet with a VLOOKUP function being used to match a concentration index value from a table in the 'ISO-CALC' worksheet. The function arguments dialog box is open, showing the following details:

- Lookup\_value:** 0.219940 = "6075035400"
- Table\_array:** ISO-CALC!\$1:\$1048576 = {...}
- Col\_index\_num:** 9 = 9
- Range\_lookup:** = logical

The formula result is 0.219940375. The dialog box also includes a description of the VLOOKUP function and a 'Help on this function' link.

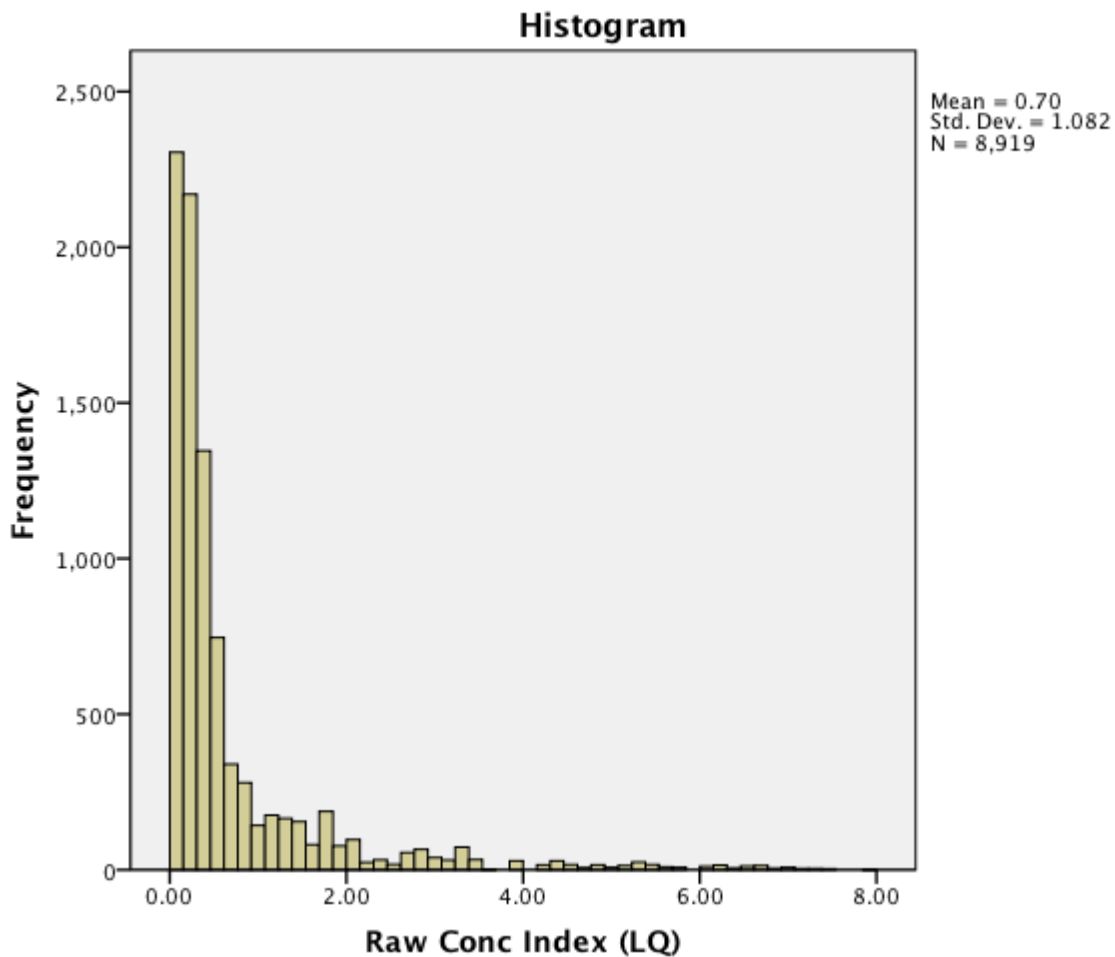
Row	Column A	Column B	Column C	Column D
1	147	6075035400	0.219940	
2	150	6075030202	0.3214	
3	151	6081611400	0.2329	
4	201	6081603400	0.2842	
5	220	6013334004	0.4312	
6	221	6001441100	0.3069	
7	238	6001421500	0.1712	
8	248	6013359102	1.6138	
9	250	6001400100	0.5616	
10	254	6013336101	0.9130	
11	258	6041121200	0.2074	
12	262	6013311000	1.8078	
13	325	6013389100	0.4984	
14	328	6081613200	0.0199	
15	341	6001436200	1.3356	
16	347	6001425100	2.0497	
17	355	6013308002	1.5274	
18	363	6081606900	0.2405	
19	369	6001400500	4.3793	
20	370	6001423902	0.5007	
21	371	6001420200	0.3862	0.386173
22	392	6075025600	0.3212	0.321200
23	398	6001442600	0.2267	0.226659
24	407	6013304000	0.2526	0.252589
25	424	6001440309	0.7353	0.735306
26	428	6075012800	0.0635	0.063491
27	432	6013329000	0.3394	0.339355

The range of concentration index values for the BATS cases extend from 0 to 7.92 as indicated in the descriptive statistics for the index found in Table 25 and the histogram in Figure 40.

**Table 25: Descriptive Statistics of Concentration Index Assigned to BATS Cases**

	N	Minimum	Maximum	Mean	Median	Std. Dev.
Black Neighborhood Concentration Index	8919	0.00	7.92	0.6986	0.3069	1.0821
Valid N (listwise)	8919					

**Figure 39: Histogram of Concentration Index Assigned to BATS Cases**



## **Regression Analysis**

After these preliminary data prep, these concentration index values are imported into a statistical package and recoded to analyze cases representing more concentrated areas  $C_B > 1$ .

The 'Black Neighborhood' concentration values are then regressed with other selected covariates in the walkability model, entering the model last after, individual, housing and transportation variables.

## **Representation Concentration in the Modeling Results**

In the regression modeling the negative coefficient of the 'Black Neighborhood' concentration suggests that a high black concentration is associated with lower walkability and that blacks on the whole may be clustered in less walkable areas. It also suggests that as the concentration of Blacks goes up, the walkability goes down.

## **Policy Importance of the Analyses**

From a policy standpoint the implication is that low walkability is not evenly distributed throughout the population, and that concentrated Black populations may experience the lowest walkability.

If this result were to hold, it would mean that areas of concentrated minorities, such as Black neighborhoods with historically documented health disadvantages, may not be the most walkable environments, and that there may be unevenness in the distribution of walkability as a health resource. It suggests the need for streetscape, housing and behavioral interventions that might increase the amount and location of walkable areas to meet the needs of minorities concentrated in less walkable areas.

## **Additional Research: Social and Transportation Networks**

One additional concept for future research arose as a result of this study however it did not fit in to the overall theme of the document. This topic, evaluation of the interaction of social networks and transportation networks, arose in the course of the interview process. Many patterns that were described illustrated transportation networks not related to existing transportation infrastructure, travel mode, the physical landscape or geography. Social factors dictated many trips.

One example was salons where people received manicures. Of those going for manicures mode was dictated by distance; many people forced out of the walkable neighborhood could no longer walk to their manicurists so that continued to drive back to the neighborhood for this service from places far away. Church services, barbershops and hair salons came up in similar conversations.

This notion of relationships in a transportation network is interesting because it contradicts rational behavior. Individuals who have moved to Albany, Richmond, Suisun City, Vallejo, Benicia, Brentwood (places far from the urban core and along the interstate highway corridor) return to their old neighborhood, often many miles away, on a regular basis and almost always via auto. In essence people are exported without supporting services or cultural ties. Many return back to their old neighborhood two-to-three times a week for day-to-day life services (churches, barbershops, manicurists, not groceries per se, but that could be part of their trip). These are services that might be provided closer to their homes. They will drive from home to do things like get their nails done, get haircuts, attend church, and to meet friends – people making irrational travel decisions based on relationships.

This notion of social networks abutted against transportation networks provides an interesting point of discussion. Very little work has been done on this subject. For example a metasearch using Google Scholar and other research tools around relationship and transport keywords ('social network AND travel', 'transportation AND relationships', 'transportation AND friendships', 'social networks AND driving', 'modeling social networks') yield research focused mainly on the impact of technology on transportation networks, not on how relationships impact regional trip choice. You can have people relocating to suburbia but what if the suburbia has no cultural identity for the person who is moving there and there is no creation of cultural identity? What do relocation decisions mean to transportation networks when established relationships have greater pull than new ones?

As our lives become ever more based on social works and relationship-based trips this has dramatic implications for how we do transportation planning and modeling. For example, traditional modeling focuses on jobs and housing and how to connect the two, not weighting the draw of one land use over another or accounting for multiple destination or linked trips. More sophisticated modeling techniques use land use activities and their draw as well as accounting for some level of variability in linked trips (<http://www.vtpi.org/tm/tm125.htm>) – but what about relationships?

Some would say the social sciences have failed to examine how social life presupposes both the actual and the imagined movement of peoples from place to place, person to person, event to

event. Activity-based modeling would assume that a transactional use, like a salon, may not have a regional pull, but what if modeling a cross-section of individual relationships could be done. At minimum an activity-based model might reflect a greater level of socio-cultural gravitation. The idea that a barbershop can have a reasonable regional draw seems beyond logic but what if the assumption of models was that people make rational or self-serving choices but that they were as Dan Ariely said 'predictably irrational' (Ariely 2008). The idea that even a manicurist or small church can have a massive, regional draw challenges the foundation of existing modeling techniques but what if a discrete choice model was based on a relationship diagram – trip planning might change dramatically.

Growing technology tools and pedestrian-oriented simulation tools (MassMotion; SIMWALK; VISSIM) could provide the individual perspectives needed in order balance models with the socio-cultural. These socio-cultural models provide a counter-point to the jobs-house models developed in many discussions around spatial mismatch between jobs and housing.



## Youth Environment and Nutrition (YEN) Data Set

This study began with cursory assessment of the “Youth, Environment, and Nutrition” (YEN) data set, using cross-sectional t-tests of difference-of-means and linear regressions to test the significance of association between individual characteristics and residential home-based walkability (using the summed z-scores method outlined in the body of this study).

The “Youth, Environment, and Nutrition” (YEN) study was funded by the California Breast Cancer Research Program as an auxiliary study to the “Cohort study of Young Girls’ Nutrition, Environment, and Transitions” (CYGNET) study run under the Kaiser Division of Research. The study evaluated cancer risk and built environment characteristics over time (N=430).

Since the data set contained few variables to control for spuriousness and yielded no interpretable results that could reliably be used for this study, it was used solely to formulate questions and thinking for subsequent analysis with BATS. The results *illustrate the limitations of the data set* in doing built environment research, however, some of the original mapping and analysis are included in this section.

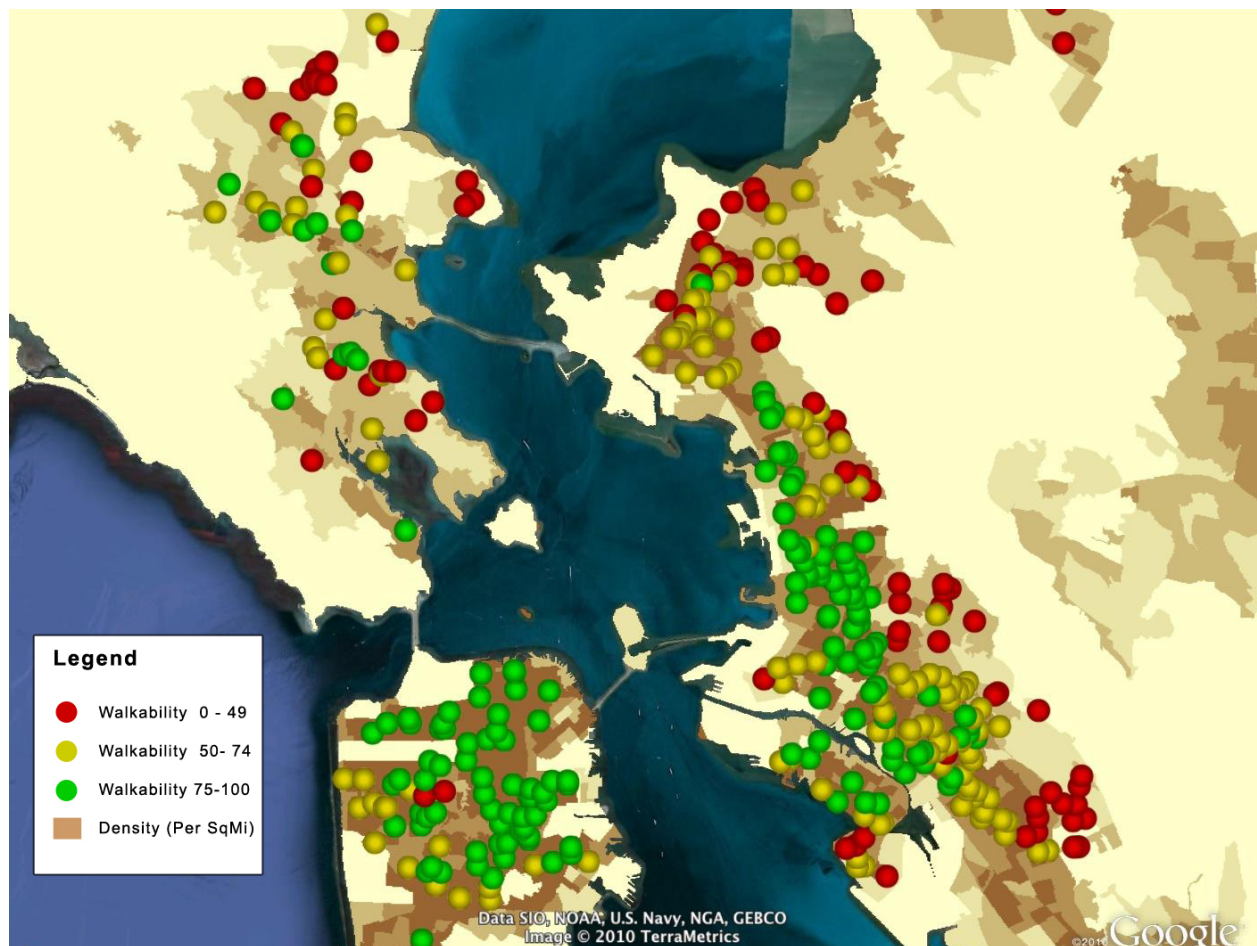
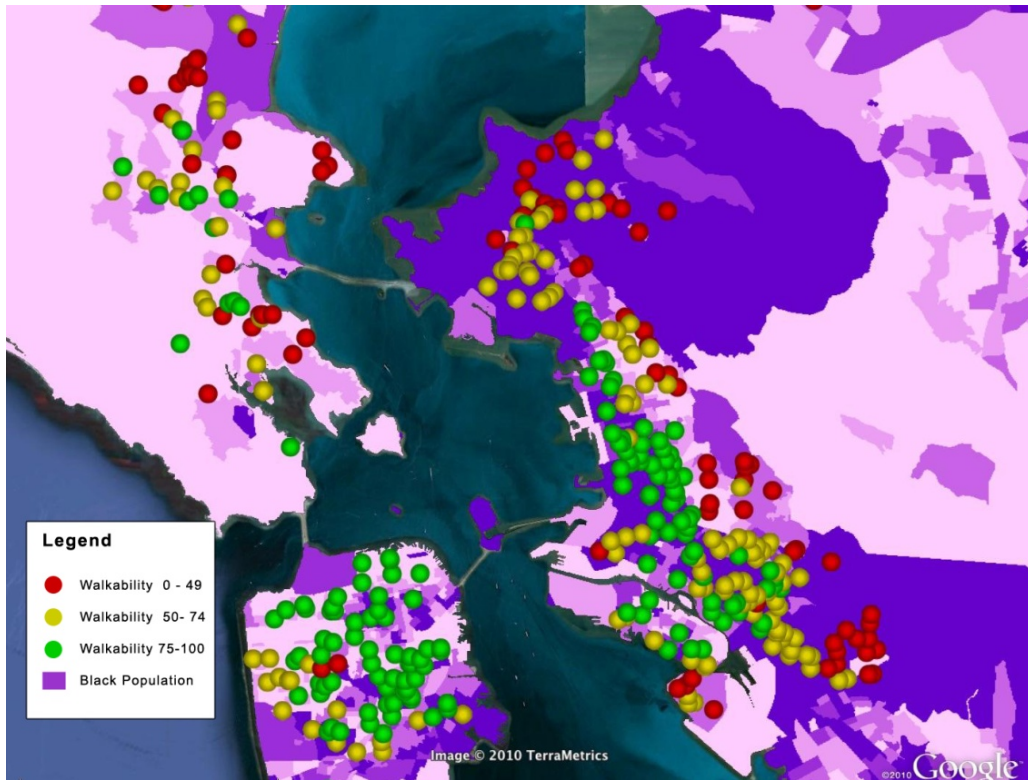
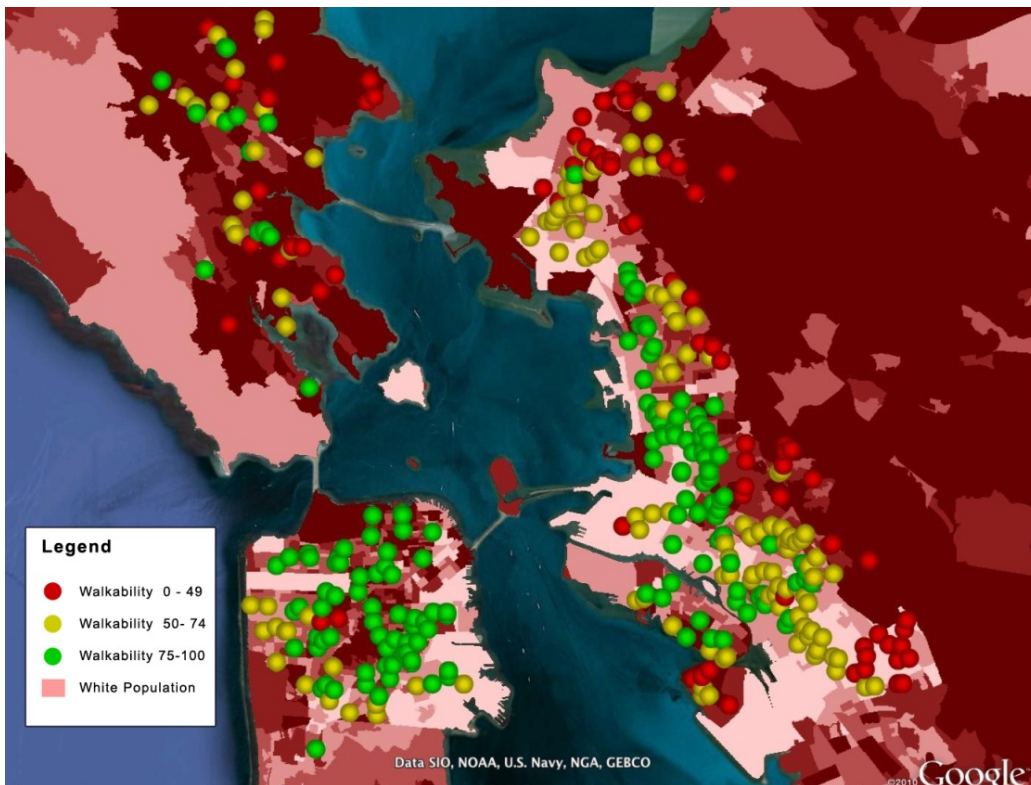


Figure 40: Walkability of YEN Cases (N=430)





**Figure 41: YEN Walkability and Black**



**Figure 42: YEN Walkability and White**

**Table 26: YEN Data Associations**

Model <sup>1</sup>	Entire Population (N=439)			Oakland (N=125)		
	B	Std. Error	Sig.	B	Std. Error	Sig.
<b>(Constant)</b>	60.406	11.349	0.000	39.913	18.734	0.035
<b>Income Less than 25K</b>	6.182	5.231	0.238	3.010	7.294	0.681
<b>Income 75K or Higher <sup>2</sup></b>	-3.684	3.514	0.295	-3.243 <sup>2</sup>	6.127	0.598
<b>Poor (&lt;50K) <sup>3</sup></b>	7.976	4.011	0.047	3.344	6.025	0.580
<b>Hispanic</b>	-5.612	4.629	0.226	-14.265	7.782	0.069
<b>Race Black <sup>4</sup></b>	-8.159	3.822	0.033	-18.697	6.253	0.003
<b>Race Asian</b>	8.043	5.311	0.131	-6.361	15.876	0.689
<b>Race Mixed / Other</b>	1.276	4.062	0.754	2.945	6.886	0.670
<b>Bachelor Degree or Higher <sup>2</sup></b>	-0.774	3.075	0.801	-8.106 <sup>2</sup>	5.454	0.140
<b>R-Square</b>	0.048			0.152		

1. Dependent Variable: Walkability

2. Negative correlation (although not significant) for both income and higher education (below); consistent with traditional suburban design and expectations based on links between education & income. Hedonic price models would suggest that with higher income people purchase more house which has traditionally been in larger-parcel, suburban areas.

3. Significant positive correlation increased walkability and being poor; consistent with traditional urban neighborhoods and higher levels of walkability and accessibility for the urban poor.

4. Significant negative correlation for Blacks and neighborhood walkability; raises questions about access to walkability among this population subset (also less significant correlation for Hispanics). Of the poor Blacks appear less likely to live in walkable areas. This might be explained by: 1) preferences toward / moves to suburban locations; or 2) urban disinvestment in otherwise walkable locations (decreased land use mix could mean neighborhood is walkable but there is nowhere to walk to, or walk to safely). Oakland data (N=125) appears to underscore this hypothesis with higher levels of significance for this traditionally gridded but resource-limited and high crime area.

# Human Subjects Documentation

The study has complied with human subjects rules and regulations per the UC Berkeley IRB (<http://cphs.berkeley.edu:7006/>) and assigned CPHS Protocol #2009-3-50. The data used in quantitative study stems from other research efforts with consent of the participants and is exempt from regulation, however to ensure anonymity addresses were rounded to the nearest hundred of each block prior to delivery to the researcher. For qualitative work, the most stringent data privacy measures have been used. All names have been changed unless specific consent was requested. Tapes have only been reviewed in a secure location and discussions kept confidential. All of this increases the trust and openness within interviews and focus groups, and in-turn the validity of the study.

Record of human subjects training and approval follow.

## CITI Collaborative Institutional Training Initiative

### Human Research Curriculum Completion Report

Printed on Friday, December 5, 2008

**Learner:** William Riggs (username: williamwriggs)

**Institution:** University of California, Berkeley

**Contact Information** Department: City and Regional Planning

Phone: 5106421176

Email: billyriggs@berkeley.edu

**Group 2:** Social and Behavioral Research Investigators and Key Personnel

#### Stage 1. Basic Course Passed on 12/05/08 (Ref # 2345552)

Required Modules	Date Completed	Score
Introduction	12/04/08	no quiz
History and Ethical Principles - SBR	12/04/08	5/7 (71%)
Defining Research with Human Subjects - SBR	12/04/08	5/5 (100%)
The Regulations and The Social and Behavioral Sciences - SBR	12/04/08	5/5 (100%)
Assessing Risk in Social and Behavioral Sciences - SBR	12/04/08	4/5 (80%)
Informed Consent - SBR	12/04/08	4/4 (100%)
Privacy and Confidentiality - SBR	12/05/08	4/4 (100%)
Research with Prisoners - SBR	12/05/08	4/4 (100%)
Research with Children - SBR	12/05/08	5/5 (100%)
Research in Public Elementary and Secondary Schools - SBR	12/05/08	3/4 (75%)
International Research - SBR	12/05/08	4/4 (100%)
Internet Research - SBR	12/05/08	4/5 (80%)
Group Harms: Research With Culturally or Medically Vulnerable Groups	12/05/08	3/3 (100%)
Workers as Research Subjects-A Vulnerable Population	12/05/08	4/4 (100%)
Hot Topics	12/05/08	no quiz
Conflicts of Interest in Research Involving Human Subjects	12/05/08	1/2 (50%)
University of California, Berkeley	12/05/08	no quiz

**For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.**

Paul Braunschweiger Ph.D.  
Professor, University of Miami  
Director Office of Research Education  
CITI Course Coordinator



**OFFICE FOR THE PROTECTION OF HUMAN SUBJECTS**  
University of California, Berkeley  
2150 Shattuck Avenue, Suite 313  
Berkeley, CA 94704 -5940

(510) 642-7461  
Fax: (510) 643-6272  
Website: <http://cphs.berkeley.edu>  
FWA#00006252

April 28, 2009

WILLIAM RIGGS ([billyriggs@berkeley.edu](mailto:billyriggs@berkeley.edu))  
City and Regional Planning  
228 Wurster Hall # 1800 MC# 1850  
Berkeley, CA 94720

RE: **CPHS Protocol #2009-3-50**  
"The Choice of Healthy Neighborhoods: Are Objectively Walkable Neighborhoods Equitable Based on SES and Why are they Chosen?" - Graduate Research- City and Regional Planning

Dear Mr. Riggs:

Thank you for the statement and request for exemption that you submitted to the Committee for the above-referenced project. Your submission has been reviewed and granted exemption, as it satisfies the Committee's requirements under category #2 of the federal regulations. Accordingly, the project is exempt from full Committee review provided that there are no changes in the use of human subjects.

Please note that although your research has been deemed exempt from full committee and subcommittee review, you still have a responsibility to protect your subjects, and the research should be conducted in accordance with the principles of the Belmont Report. Download the Belmont Report at this link:  
<http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.htm>.

If you have any questions about this matter, please contact the OPHS staff at: telephone 642-7461; fax 643-6272; email [ophs@berkeley.edu](mailto:ophs@berkeley.edu).

Sincerely,

A handwritten signature in black ink that reads "Rebecca Armstrong".

Rebecca Armstrong, D.V.M, Ph.D  
Director, Office for the Protection of Human Subjects

RA: ck

Cc: Robert Cervero ([robertc@berkeley.edu](mailto:robertc@berkeley.edu))  
Graduate Division ([degrees@berkeley.edu](mailto:degrees@berkeley.edu)) - SID # 18879029

# Recruitment and Consent Forms

UNIVERSITY OF CALIFORNIA, BERKELEY

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SANTA BARBARA • SANTA CRUZ

CITY & REGIONAL PLANNING, 228 WURSTER HALL #1850

BERKELEY, CALIFORNIA 94720-1850

6 April 2010

Neighborhood Resident,

My name is Billy Riggs and I am currently conducting research for my doctoral dissertation at the University of California at Berkeley, studying healthy neighborhoods and why people choose them.

Based on characteristics such as block length and street width, your neighborhood has been selected for analysis through a series of focus groups. I would very much appreciate the opportunity to talk with you others in the community about what factors make the neighborhood health and why you chose to live here.

I hope to learn something about how the ability to walk and be physically active in neighborhoods like yours influences housing choice, and how lifestyle preferences might influence these decisions. About 100 people will take part in this study in neighborhoods both similar and different than yours throughout the Bay Area.

I will hold an even **Tuesday, April 13, 2010, 6:30-8:30pm at the Ingleside Community Center (Ingleside Presbyterian, 1345 Ocean Avenue, San Francisco)**. Food will be available, and I would love for you to attend and talk about the reasons why you live here. I estimate I would need 1-2 hours of your time, and would ask that you allow me to audiotape the session for transcription purposes only. A consent form will need to be signed at the onset of the meeting and I can provide this to you in advance if you would like to review it beforehand. There are no foreseeable risks to you from participating in this research, nor are there direct benefits that you should anticipate. After the focus group I may contact you to see if we can set up an appointment to talk in more detail at a time and place that is convenient for you.

Your participation is voluntary, and you may opt-out of the of the focus group or interview at any time. The files, notes and transcripts of the interview will be confidential and your identity will either be concealed or I will get your permission before attributing comments or quotes to you in any reports, publications, or scientific meetings.

Please mark you calendar to attend (**April 13, 6:30pm, Ingleside Community Center**). In the meantime, feel free to contact me at any time with questions or concerns you have about this dissertation research to my email [billyriggs@berkeley.edu](mailto:billyriggs@berkeley.edu), or my cell phone 510-205-5944. If you have any questions about your rights or treatment as a participant in this research project, please contact the University of California at Berkeley's Committee for Protection of Human Subjects at (+1) 510-642-7461, or e-mail [cphs@berkeley.edu](mailto:cphs@berkeley.edu).

Sincerely,

Billy Riggs  
Lead Investigator  
City and Regional Planning  
228 Wurster Hall #1800  
Berkeley, CA 94720-1850



CITY & REGIONAL PLANNING, 228 WURSTER HALL #1850

BERKELEY, CALIFORNIA 94720-1850

## REMINDER

Hope you will be able to attend the focus group to talk about walking and physical activity and how that relates to where you live on:

**Tuesday, April 13, 2010, 6:30-8:30pm**

**Ingleside Community Center, Ingleside Presbyterian, 1345 Ocean Avenue, SF**

Light food will be available, and I look forward to talking with you

Billy Riggs, Primary Investigator

[billyriggs@berkeley.edu](mailto:billyriggs@berkeley.edu)

510-205-5944





**CONSENT TO PARTICIPATE IN RESEARCH**  
*The Choice of Healthy Neighborhoods*

**Introduction**

My name is Billy Riggs and I am a PhD researcher at the University of California, Berkeley, working with my faculty advisor, Professor Robert Cervero in the School/Department of City and Regional Planning. I am planning to conduct a research study, which I invite you to take part in. You are being invited to participate in this study because your neighborhood was studied as a part of the recent analysis on the city design and health by UCSF (in coordination with Kaiser Permanente and the National Institute of Health).

**Purpose**

The purpose of this study is to study how the ability to walk and be physically active in communities influences housing choice, and how lifestyle preferences might influence these decisions. About 100 people will take part in this study in neighborhoods both similar and different than yours throughout the Bay Area.

**Procedures**

If you agree to be in this study, you may be asked to:

1. Fill out a short questionnaire asking for biographical information. You will be asked to indicate whether you would be willing to answer any follow-up questions that may result from the study.
2. After filling out the questionnaire, you will be asked take part in either 1) a focus group discussion at a local community center or 2) a individual interview at your workplace or home. Both will be led by myself or an affiliated study member.
  - a. For the focus group, you and the other group members will be asked to react to a series of questions about your activity levels and how the ability to be physically active may have influenced your residential choice. By consenting to participate you agree to allow me to audiotape the discussion and take photos of the event, which is expected to last no more than 2 hours. The taping is to accurately record the information you provide, and will be used for transcription purposes only. Photos will only be taken for illustrative purposes to articulate the procedure that I have gone through to complete my research. If you feel uncomfortable at any time during the focus group, or wish not to continue, you can stop at any time.
  - b. Individual interviews will involve one-on-one discussion of similar questions to those posed in the focus groups. With your permission, I will audiotape and take notes during the interview, which should take no more than 2 hours. The taping is to accurately record the information you provide, and will be used for transcription purposes only. If you choose not to be audiotaped, I will take notes instead. If you agree to being audiotaped but feel uncomfortable at any time during the interview, I can turn off the tape recorder at your request. Or if you don't wish to continue, you can stop the interview at any time. I expect to conduct only one interview; however, follow-ups may be needed for added clarification. If so, I will contact you by mail/phone to request this.
3. In each case no attempt will be made to deceive or hold back information from you as a discussant or interviewee, and at the end the of the study and opportunity for questions about the research will

be available where I can explain more about what we are studying and hope to learn from this research.

### **Benefits**

There is no direct benefit to you anticipated from participating in this study. However, it is hoped that the information gained from the study will help local planning officials and policy makers to have better ideas about preferences for physical activity and active living in housing design.

### **Risks/Discomforts**

There are no foreseen risks as a result of the study. It is possible that some of the focus group or individual questions may make you uncomfortable or upset. You are free to decline to answer any questions you do not wish to or to leave the group at any time. Similarly you are under no obligation to complete the study and can choose to leave at any time. As with all research, there is a chance that confidentiality could be compromised; however, we will take taking precautions to minimize this risk. (See below for more detail.)

### **Confidentiality**

Your study data will be handled as confidentially as possible with the exception of certain information that we must report for legal or ethical reasons, such as child abuse, elder abuse, or intent to hurt yourself or others. If results of this study are published or presented, individual names and other personally identifiable information will not be used, unless specific permission is received from the individual respondent. Data will be kept by the researcher or the faculty advisors. Digital files of all files, audio recordings and photos will kept on a secure server using digital encryption and passwords. Furthermore any hard copies of the data will be kept in a locked file cabinet, accessible only by the research team.

**Retaining research records:** When the research is completed, I may save the tapes and transcripts for use in future research done by myself or others. While I will use audio only for transcription of original study data, I may want to use some of the photographs in public presentations related to the research. There is a Media Records Release Form attached that outlines several possible uses and asks for your specific consent to use these items in each way. If you agree to allow these items to be used after this research study is over, please read, initial, and sign the Media Records Release Form in addition to this consent form. I will not use any photographs, recordings, or other identifiable information about you in any future presentation without your consent. The same measures described above will be taken to protect confidentiality of all of this study data.

### **Compensation**

You will not be paid for taking part in this study.

### **Treatment and compensation for injury**

If you are injured as a result of being in this study, treatment will be available. The costs of this treatment may be covered by the University of California, depending on a number of factors. For further information about this, you may contact the office of UC Berkeley's Committee for Protection of Human Subjects at: University of California, Berkeley, 2150 Shattuck Avenue, Suite 313, Berkeley, CA 94704-5940; 510-642-7461; or [subjects@berkeley.edu](mailto:subjects@berkeley.edu).

### **Rights**

**Participation in research is completely voluntary.** You have the right to decline to participate or to withdraw at any point in this study without penalty or loss of benefits to which you are otherwise entitled.

### **Questions**

If you have any questions or concerns about this study, you may contact Billy Riggs at [billy@berkeley.edu](mailto:billy@berkeley.edu). If you have any questions or concerns about your rights and treatment as a research subject, you may contact the office of UC Berkeley's Committee for the Protection of Human Subjects, at 510-642-7461 or [subjects@berkeley.edu](mailto:subjects@berkeley.edu).





## Interview Guide

### *Example Questions for Focus Groups:*

- Can you tell me about yourself and your background?
- How did you first come to live in this neighborhood?
- What factors influenced that decision?
- Has living in this neighborhood influenced physical or mental health?
- What factors contributed to this?
- Are there any disadvantages to living in this neighborhood?
- If so, what are they?
- Did you have assistance in making the decision to locate in a certain neighborhood?
- If so from whom?
- How do you feel about physical activity in your neighborhood?
- How easy is it to walk in your community?
- Are there examples about how safe it is to walk here?
- How close are you to your place of employment?
- Did you feel homes were more or less affordable in this neighborhood vs. others?
- How important was the ability to be physically active for you in your housing decision? What type of physical activity do you engage in? Walking?
- As a follow-up to this focus group I intend to conduct individual interviews; who do you think I should interview?

### *Example Questions for Individual Interviews*

- Can you tell me about your current position as (*role*)? [*i.e.*, roles and responsibilities]
- Length as (*role*)?
- About your professional background and education?
- What is a healthy neighborhood? (*city name*)?
- What are some examples or project in this community? Others?
- Could you characterize what you see as the overall purpose or mission of your role in facilitating the creation of health neighborhood?
- What problems are the projects trying to address?
- Have you been to (name study) community? What do you think of the outcome; public health treatment?
- What do you attribute to the successes of walkable communities?
- What specific role does your organization play? (get examples)
- What are the benefits to the city?
- How about some of the challenges faced? Have there been some things that did not work well and had to be changed?
- Are there obstacles you are still working to overcome?
- Are there ways to facilitate creation more walkable/healthy neighborhoods?
- What might be ways to retro-fit older non-walkable neighborhoods?
- What organizations or structures have contributed to past projects or processes that made it successful?

- What might be included to improve (probe for examples and good quotes)?
- Who are some of the key players in these projects? Whom else do you think I should interview?