The Five Pillars of Economic Development

A STUDY OF A SUSTAINABLE FUTURE FOR WARD 7 AND 8 IN WASHINGTON, D.C.

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Welcome to the Five Pillars Report!

What works in economic development?

Why do some communities thrive while others do not?

Can economic development be influenced to help a community thrive and if so how?

These questions have been at the heart of the economic development debate. In the past, much of this debate was dominated by a concept called the base theory of economic development. It argues that a region's economy will grow when its most important sector or company, its base, thrives. More recently, questions have been raised about this approach. Communities all over the world have argued that any successful economic development strategy must be rooted in a commitment to improve the quality of life (QoL) of a community and its people. A great place to live is also a great place to do business!

This report offers a strategy to implement this new QoL based approach to economic development. It offers a vision of successful development based on the ideas of Deanwood (Ward 7) and Congress Heights (Ward 8) residents who shared their ideas for a successful economic development future and a better Quality of Life by writing a collective story. The story provides an eloquent road map for development east of the Ana-

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costia river. The report also analyses QoL indicators for the eight Wards of Washington DC in five key areas: (1) education, (2) health, (3) environmental quality & recreation, (4) social & cultural amenities, and (5) information & transportation access.

My sincere thanks to the residents of Wards 7 and Ward 8 who participated in the Five Pillars meetings. This report would not have been possible without you! I also owe a debt of gratitude and thanks to the students of the University of the District of Columbia, who served as facilitators, note takers, data collectors, and research assistants. As with every project, some people deserve an extra mention for their countless contributions of counsel, attention to detail, and perseverance: Stephanie Howard, Commissioner Antwan Holmes, and Jimell Sanders provided invaluable counsel; Golnar Ahmadi, Arielle Gerstein, and Rick Hess provided countless hours of research assistance; and our skillful webmaster Michael Kendall made the report come alive; it is available at https://www.fivepillarsdc.org/. My sincere thanks to all of you!

The entire project would not have been possible without the support of the National Institute for Food and Agriculture (NIFA) of the United States Department of Agriculture (USDA). My hope is that this report will contribute to a thriving, sustainable and just future for communities of the District of Columbia and for others around the nation and the world.

Sincerely,

Sabine O'Hara
Dean of CAUSES and Land-grant Programs
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Introduction

What works in economic development? Why do some communities thrive while others do not? Can economic development be influenced to help communities thrive, and if so, how? These questions have been at the heart of the economic development debate for some time. In the past, much of this debate was dominated by a concept called the "base theory" of economic development. It argued that a region's economy will grow if its base sector thrives. The base sector can be an entire sector of the economy, such as tourism in Hawaii or the financial sector in New York City, or it can be a large company that dominates a region's economy, like Boeing in Seattle or Kodak in Rochester, New York.

Base theory assumes that the success of a region's economy is closely tied to the success of its base sector, and that economic policy must therefore focus on building a strong base sector and ensuring that the base sector thrives. This has meant giving incentives to base sector businesses and businesses that complement the base sector. Cities and regions have offered tax breaks, subsidized facilities, paid for amenities and training programs in order to make their base sectors happy.

More recently, questions have been raised about the long-term success of implementations of the base theory approach. For example, an important factor in a region's economic development success is its Quality of Life (QoL). QoL factors can influence how a region is perceived—whether it is considered a good place to live and to do business. High QoL can generate population growth, which stimulates a region's demand for goods from food to furniture and services such as restaurant meals, haircuts, and medical treatments. But there can also be too much of a good thing. Too much growth can place pressure on a region's resources, increase traffic, overburden the water and sewer system, and lead to a decline in reliable services, all of which can negatively impact the region's QoL.

There is another good reason for adopting a broader view of economic development. Base theory placed primary importance on producing goods and services that satisfy *external* demand, but demand that is *internal* to a region can also play an important role in fueling the local economy. Preventing dollars from leaking outside of a region—making it attractive for residents and businesses to spend their money at home—can have economic benefits. And these benefits have a multiplier effect. When additional money is spent in local restaurants, for example, the restaurants will buy more food and hire more wait staff, and the additional hires will in turn spend some of their money. Each dollar spent locally will cycle through the local economy and generate more than a dollar's worth in economic benefits.

In today's post-industrial economy, jobs and production are no longer co-located. A marketing firm located in Washington DC, for example, may have a workforce of designers located in India. The designers are a part of the so-called creative class workforce of educated, innovation-oriented men and women who garner above average wages and can work from where they choose to live.[1] Many link to their jobs via the internet, physically commuting to their company offices only occasionally. The changing landscape of labor requires a new look at economic development strategies. The incentives offered to a company to entice them to locate in Washington DC, for example, may not create many jobs in the DC area, but may instead create more work for software engineers in India.

This report offers a broad view of economic development that moves beyond traditional approaches by drawing attention to the importance of the *context* of economic development. It argues that today's successful economic development strategies should not focus on attracting and building a base sector. Instead, they should focus on the following three tasks: (1) building the economic development capacity of a region; (2) building the quality of life in a region; and (3) building a diverse regional economy to avoid reliance on only one sector or business.

For economic development to be successful, all three tasks must be addressed, and all three require the engagement of local and regional stakeholders. In fact, local stakeholders are indispensable in identifying local capacity assets, defining relevant quality of life factors,

and ensuring that diverse perspectives are brought to bear. This report focuses on one of these three tasks—that of improving quality of life.

This report provides a road map for how these core tasks of successful economic development might play out at the micro level of two neighborhoods in Wards 7 and 8 of Washington DC. At two stakeholder meetings, residents from Deanwood in Ward 7 and Congress Heights in Ward 8 expressed their vision of successful development outcomes around five key Quality of Life categories. It also identifies development assets and gaps in the eight Wards of Washington DC by comparing indicators in the same five QoL categories. These two sets of data—the qualitative data from the stakeholder meetings and the empirical data regarding quality of life indicators—is here presented using a framework developed by the lead author of this report: the Five Pillars model of economic development. This model tracks quality of life indicators in five key categories: (1) education, (2) health, (3) environmental quality & recreation, (4) social & cultural amenities, and (5) information & transportation access.

By tracking indicators and identifying development outcomes in these five categories it becomes possible to identify points for proactive interventions that strengthen a region's overall economic development capacity.[2] The Five Pillars approach does not suggest that a region like the DC metro area can meet all of its needs by building a local economy. Industries like mining, automobile manufacturing, and cash crop agriculture require natural resources, space, and economies of scale that cannot be achieved in every region, and especially not in densely populated metro areas. Yet even in these urban areas, there is plenty of opportunity for decentralized, small-scale production, technology, design, and service-oriented economic activity that is viable.

This report analyzes starting points for development initiatives that will move Wards 7 and 8 toward the vision identified by residents and stakeholders from Deanwood and Congress Heights. The analysis reveals assets and deficits that must be addressed to improve economic development conditions and build capacity in these DC neighborhoods, which have some of the lowest QoL indicators.

Rethinking Economic Development

Communities across the United States have experienced the ebb and flow of policies that seek to lure businesses with various incentives. These policies have had mixed success in producing long-term local economic development. The conclusion to be drawn from this is that additional tools are needed to create sustainable development outcomes for local communities. This section will review the reasons why a broader, more diversified approach to economic development is needed. It also outlines an alternative approach to advancing development solutions that sustain local communities and their residents and organizations, a model we call the Five Pillars of economic development.

Why new economic development models are needed

Standard economic development strategies are based on three fundamental assumptions (see figure 1):

1. Export-oriented businesses that seek to meet demand outside of the region are key
2. Demand inside of the region is less important
3. A strong base sector is key even at the expense of a diversified economy

There is growing consensus that all three assumptions are problematic. First, an exclusive focus on exports that meet demand outside of the region leaves a lot of resources on the table. Keeping money inside a region by making it attractive for individuals and businesses to spend their money at home can benefit the regional economy. The multiplier effect that stems from money cycling through a region's economy further strengthens the impact of regional spending and adds to the benefits of regional demand and supply. The idea of keeping money in the local economy by producing local goods

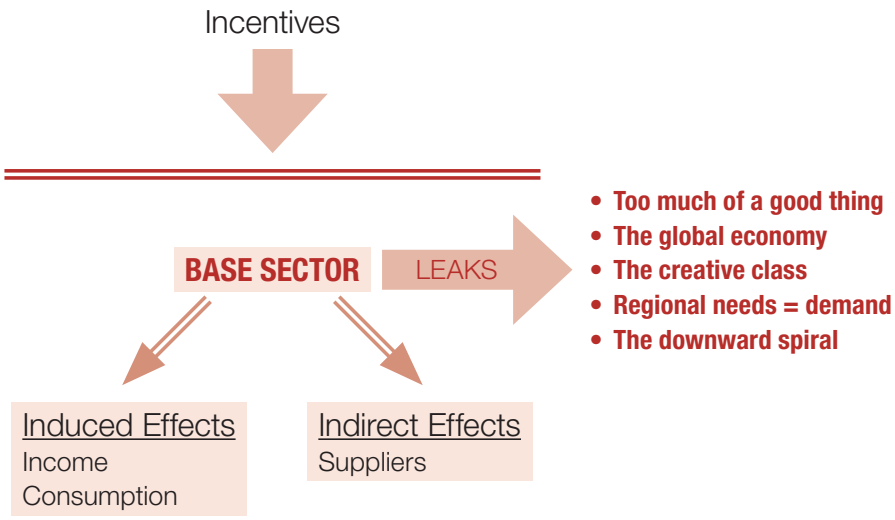

Figure 1 Base theory of economic development

and services in decentralized local business networks has been gaining traction.[3] This strategy has been called leak plugging or re-localizing production.[4] There are two principal ways of implementing this approach. One seeks to attract businesses that can address local needs; the other works to grow businesses that are oriented to meeting internal demand from within the community. Both strategies require a strong base of highly skilled and less skilled workers that can support the success of the local enterprises.

Secondly, the demand side of regional economies has steadily increased in importance. Jobs and production no longer need to be located in close proximity to one another. A qualified workforce can live where it choses. Technology allows the workforce to link into their job sites via the internet. A focus only on stimulating development by stimulating supply may therefore not be a sure recipe for success. For example, a company located in Ward 6 in Washington DC may have a big distribution center on the West Coast; the incentives the company receives to add jobs in Ward 6 may in fact add jobs on the West Coast but not at the facility in DC. The successful workforce that is in high demand in today's economy is well educated, highly skilled, and engaged in the specialized services, design, and innovation markets, and this workforce can choose where to live. Businesses who want to drive innovation must be able to attract men and women from this creative-class workforce. This means that they must be able to offer more than good wages. In fact, attractive amenities and a mission-oriented business culture often outweigh wages in importance. Regions and communities must therefore collaborate with the business community to build strong amenities and improve a region's Quality of Life (QoL) in order to attract these workers and grow the local economy.

Third, as important as a base sector or base company might be, it cannot sustain a region's economy on its own. Instead, a diversified local economy seems to be key to long-term economic stability. Examples abound of regional economies going into downward spirals when their base sectors suffered a decline. Boeing, for example, took the economy of Seattle and the state of Washington into a recession when airplane orders declined in the 1980s; Schenectady, New York, and its metro area in upstate New York suffered from the declining turbine business of General Electric; and southwest Virginia still suffers from the decline of the tobacco industry. A more diversified economy provides alternatives. When employment options in one sector suffer, other sectors may be able to absorb the downturn. A study conducted in

upstate New York, for example, documented the benefits of diversification across a wide range of sectors, from tourism to forest products and agriculture.[5]

So how does a region attract the innovation-oriented businesses and the skilled workforce that drive the new, post-manufacturing economy? In this new economy, successful economic development strategies are intentional about improving those factors that contribute to a high Quality of Life (QoL). This requires that the concept of QoL be operationalized, a process that requires indicators that quantitatively portray key QoL characteristics.

Incentives to attract businesses must go hand in hand with incentives to attract and retain a well-educated workforce, key among which are attractive amenities. Businesses can do their part by offering in-house amenities like attractive fitness centers and break rooms that resemble coffee shops. But businesses cannot provide attractive outdoor activities and social amenities like an active music scene or diverse culinary options. The fostering of these broader context-based amenities that make a region attractive requires commitment from municipalities and regions. Communities can also attract businesses by developing a strong, innovation-ready workforce through a focus on educational opportunities that recognize the need for lifelong learning and the capacity to adapt in a fast-paced changing economy.

A focus on QoL recognizes that economic development does not take place in a vacuum but rather in a social/cultural and environmental/physical context. If these social/cultural and environmental/physical contexts are impaired, economic development cannot succeed either. Sustained regional economic development thus requires the measurement of the QoL factors that impact a region's social, cultural, and environmental quality. While some of these quality measures may be consistent across regions, others may have unique regional characteristics. Low unemployment and strong workforce skills, for example, are universally desirable, while access to water as an attractive recreational option may be a regional asset, one that is influenced by local geography and precipitation patterns. Some QoL factors can be influenced, but others lie outside of community control.

It is thus challenging to collect suitable QoL indicators that are useful across regions. Yet these indicators are indispensable to identifying a region's assets (QoL strengths) and addressing its development barriers (QoLweaknesses). Much has been written about how to measure the QoL of a community. Previous studies have used a wide range of indicators to capture the complex economic, social, and environmental dimensions of a high QoL, including good schools, recreational opportunities, quality medical care, and amenities ranging from restaurants to music venues and theatres.[6] The Five Pillars approach seeks to introduce a common framework that takes account of the interests of many different stakeholders while keeping the number of indicators to a manageable size.

The Five Pillars approach

The concept of the "Five Pillars of Economic Development" offers a practical, consistent, yet adaptable approach to measuring a region's QoL and assessing its leak-plugging potential by tracking key indicators of community needs and assets.[7] The Five Pillars model focuses on those indicators that can be considered *lead* indicators as opposed to *lag* indicators. In other words, it consults indicators that provide a trajectory for the future. For example, if education levels are low, an area is unlikely to have a qualified workforce that can fill skilled, high wage jobs, and businesses consult data about the educational preparedness of a region's workforce when making decisions about whether to expand or locate in the region. Similarly, families consult school performance data and information about health care and recreation to determine where to buy a house; young professionals and senior citizens want to have easy access to amenities like restaurants and retail; and a growing segment of the population want fitness programs and recreational opportunities within easy reach. By tracking these QoL indicators communities can use the strengths and weaknesses they expose as data to drive their economic decisions.

The Five Pillars model suggests five indicator categories that can measure a community's likelihood of long-term economic success: (1) health, (2) education,

(3) environmental quality & recreation, (4) social & cultural amenities, and (5) information & transportation access (see figure 2). These categories cut across a wide range of relevant factors that are of interest to local stakeholders and public, private and non-profit organizations. The Five Pillars categories can therefore facilitate better collaboration and coordination of development efforts between these groups. Public and private sector agencies often collect data on a large number of indicators; this data may be useful but can be overwhelming in its detail. There is also little agreement on which indicators are relevant to different local players like the health department, the education department, or the department of energy. In order to pro-actively drive positive development outcomes, a common set of measures is needed for communities to assess their progress.

In a study of the Roanoke Valley, for example, we identified indicators in the Five Pillars categories and compared the region's performance on those indicators to that of nine other small metro areas.[8] The study identified the Roanoke region's environmental and recreational assets and its education system as strengths with promising development potential. The region's social and cultural amenities emerged as a deficit area. By highlighting its natural beauty and recreational opportunities, the region positioned itself as a QoL destination (Vermont with good weather!). The recognition of the region's strength in outdoor recreation also identified a related area that could be improved: developing the region's amenities with restaurants that use local and seasonal produce, catering to outdoor enthusiasts, and building on the local history.

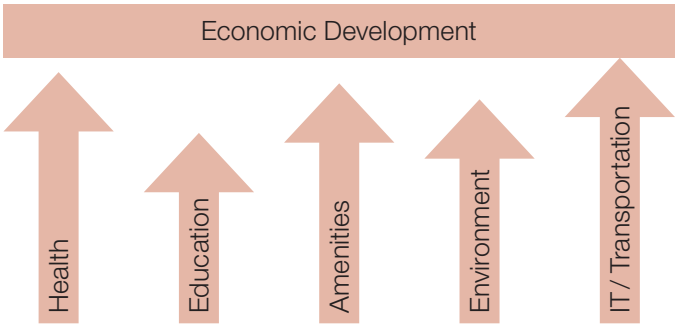

Figure 2: The Five Pillars of Economic Development

A new museum with arts programs and outlets for local artists and musicians became a cornerstone of the efforts to strengthen the local amenities.

Using a similar approach, this report offers a comparison of indicators in the Five Pillars categories across the eight Wards of Washington DC. In selecting which indicators in each of the Five Pillar categories to track, practical and theoretical considerations came into play, including availability, relevance to multiple stakeholders and agencies, and significance to QoL based development.

According to Swain and Hollar,[9] QoL studies usually start from one of four indicator categories. They may start from an economic perspective and expand traditional economic indicator approaches to capture non-economic QoL aspects. They may take the environment as their starting point, arguing that human well-being is influenced not only by economic factors but also environmental factors; these types of studies may include economic, social, and environmental indicators, but they place particular importance on environmental quality measures. A third approach focuses on community health, broadly defined as including economic prosperity, social wellbeing, environmental quality, public safety, and other factors that impact the health of a community. A fourth approach, which has its roots in the benchmarking movement of the 1990s, focuses on indicators that are well suited to influence policies to bring about desired change. These types of studies were typically conducted at larger scales—often at the state rather than regional, community, or neighborhood level.

The Five Pillars approach integrates these four methodological approaches, and adds another, often overlooked, category of QoL-related characteristics: access to information and transportation. Without information and transportation access, it would be difficult for a community to participate in any kind of development progress.

Regardless of the approach, the QoL of a community must incorporate the community's vision for a quality future. Many communities have such a vision, although it may not be explicitly articulated. This opens the door for generalities, lack of accountability, and inertia—to simply

do what has always been done. Indicators are not substitutes for a community's vision for a high QoL future, but they can help make that vision concrete. When combined with a community visioning process, indicators can be an effective way to communicate a common vision, share information, and work toward a common goal. As Swain and Hollar argue, indicators can "…raise consciousness among citizens and decision makers, to reconfigure priorities among issues most deserving of community attention, and to shape the agenda for public consideration of action and allocation of resources" (pg. 797).[10]

Since indicators can play such a critical role in giving direction to a community's development path, the selection of indicators must meet a set of specific criteria. They must be:

1. available relevant to action
2. valid
3. understandable
4. outcome- and asset-oriented
5. pro-active
6. representative

Relevant to action—indicators must measure attributes that can be influenced. Factors such as weather or the proximity to water may be popular and frequently quoted in ratings of "the best places to live," but they are not useful because they cannot be cultivated. These fixed characteristics are better viewed as assets or barriers. Information about characteristics that are changeable, however—the *quality* of an asset, such as a river's water quality or accessibility—are relevant indicators.

Valid—indicators must measure an attribute of the community's QoL that is considered important. If there is widespread disagreement about a particular indicator, then it is probably not useful for bringing about needed change. Similarly, an indicator may receive broad support yet be ambiguous. Take housing prices, for example. Some may consider an increase in housing prices positive, while others may view it as negative. It will be important to determine at the outset which direction is considered valid.

Understandable—indicators must measure an aspect of a community's QoL that most citizens can understand and interpret. This does not mean that the indicators themselves must be constructed simplistically. For instance, measuring the water quality of a river may require the use of scientific data that few residents can understand, but they will easily understand that there is a connection between water quality and their QoL.

Outcome- and asset-oriented—indicators must measure the actual condition of the QoL rather than measuring a characteristic that is assumed to be correlated with the condition. Ideally, indicators will point toward direct actions that can improve the identified condition. This may be easier to communicate when the indicator is expressed in terms of assets rather than deficits.

Representative—indicators must measure important dimensions of determined goals and objectives. Selected indicators that measure a particular QoL aspect must be representative of that specific QoL aspect. All indicators taken together should cover all major dimensions of a community's QoL.

Available—indicators must measure QoL characteristics for which information is readily available. If data must first be collected, or can only be obtained at considerable cost, then the usefulness of the indicator will be limited. For some important indicators, gaps in data availability may trigger targeted action to collect additional data.

The indicators selected for this study of the eight Wards of Washington DC meet these selection criteria. Their selection also took into account the vision of the Ward 7 and 8 residents who contributed to two focus groups. The vision for positive QoL outcomes may vary across communities, and different cities or even neighborhoods will choose different indicators to measure progress toward their vision. For instance, Jacksonville, Florida, collects indicators in nine different categories,[11] while Chicago uses six.[12] Yet there is also considerable consistency across communi-

ties. By providing the structure of the pillar categories and leaving room for specific indicators within each pillar, the Five Pillars approach offers both the consistency needed for proactive comparative policies and the flexibility needed for local effectiveness.

Engaging local neighborhoods

The Five Pillars approach to economic development depends on local information and local knowledge. While expert knowledge may be useful, it is not sufficient. The knowledge of credentialed experts can even create distortions if it becomes too generalized or too abstracted from local conditions. For example, aggregated socioeconomic data may underestimate the local purchasing power in a community. Local experts are therefore needed to provide details about the local social, cultural, and environmental characteristics, assets, and barriers. Such local knowledge forms the very basis for identifying the indicators that can track the QoL and the desired development outcomes of the community. Without the engagement of local experts, local contexts will be misrepresented, underrepresented, or omitted altogether.[13]

One of the barriers to locals' participation in economic development plans is the specialized language associated with a specific area of expertise. For example, economic development goals use a particular shorthand of growth rates, percentage rates, and target figures. This language, and the framework and viewpoint it encodes, often excludes local participants who have valid and important local knowledge to contribute. When goals are stated in plain language and strategies to move toward the goals are clearly articulated, it becomes easier to communicate a shared vision of successful outcomes and to identify a set of indicators that reflect this vision.

The approach taken in this Five Pillars study is therefore to start with the language of local experts, namely the residents of Wards 7 and 8. Their voices collectively articulated a story of a successful development future for the two Wards. The Five Pillar categories served as a structuring element for the community vision, which was developed in two sets of focus group meetings that were convened to tell the story of this successful development future. This storytelling approach invites a wider range of participants into the process of developing a shared vision. Unlike the numbers that are typically used to measure and benchmark economic development, a story paints a picture in our minds, and most people can see that picture when a story is told.

However, to make the picture that the story paints a reality, we do require numbers. Numbers can help draw a road map to get from where we currently are to the outcome that the story helps us visualize. Numbers can help us learn what blocks the road to making the story come true and what passageways are wide open. Especially useful is the numerical analysis of the area's greatest opportunities and biggest deficits. Since the indicators can express specific aspects of the collective story, they can also serve the critical role of getting a community to work together to take manageable, concrete steps toward the desired outcome, moving toward the collective vision rather than remaining stuck in generalities. The selected indicators of the Five Pillars study can serve to measure the gaps between the vision of a successful development future and the present state. The indicators thus serve as a measurable way to both tell the story and to measure the progress being made toward making the story a reality.

The idea of developing a story written by the community, for the community, in order to capture that community's development future, is not an entirely new one. Examples include a story about the future of the Everglades in 1995[14] and the Five Pillars story of the Roanoke Valley.[15] These kinds of studies can be considered micro-studies, but these studies do not only capture the vision of the specific participants who participated. Like the so-called Q search methodology, the Five Pillars story captures a broader social narrative that is reflected in specific strands of the story that are told by sub-groups of participants (parents, young people, the elderly, businesses, homeowners, renters, etc).[16]

The Five Pillars approach combines this community storytelling with empirical indicators, enabling robust quantitative data to be combined with qualitative analysis.

Taking Account of Where We Are—Five Pillar Data for Washington DC

The following section compares how the eight Wards of Washington DC perform on selected indicators in the Five Pillars categories. The indicators highlight the eight Wards' differences in two key aspects of economic development: economic capacity and quality of life. The indicators in the study reported here were selected to operationalize the Ward 7 and 8 Five Pillars story, developing a common road map toward bringing into reality the narrative themes that appear in these communities' visions of a high QoL future. In some cases, the availability of data for suitable indicators was limited. These challenges will be further discussed in a later section of this report.

In addition to the indicators in the Five Pillars categories, broader context for the Five Pillars indicators is provided via demographic and economic data. However, the demographic data capture past decision outcomes and are not as action-oriented as indicators in the Five Pillars categories. Given the small land area of the study, the business, residential, and retail areas included are densely packed and located in close proximity to each other, which is typically the case with urban studies. But despite their small size, urban neighborhoods have distinct boundaries and characteristics. Figure 3 provides an overview of the geographic area of the eight Wards.

This report relies heavily on Census data, which is available for relatively small, granular geographical areas, for many of its indicators. In the case of DC, each Ward is comprised of several Census tracts, which are typically realigned every ten years with each new Census. In the intervening years, only some of the data is updated. The analysis shows that the geographic areas of Wards 3, 6, 7 and 8 grew slightly following the 2010 Census. However, the boundary adjustments are small, as shown in Figure 4. Unless otherwise indicated, the report uses boundaries established in 2012 following the 2010 Census. Table 1 summarizes the selected demographic and economic indicators as well as the indicators selected in each of the Five Pillar categories. The indicators were selected to be informative and relevant across various areas of interest while remaining a manageable number.

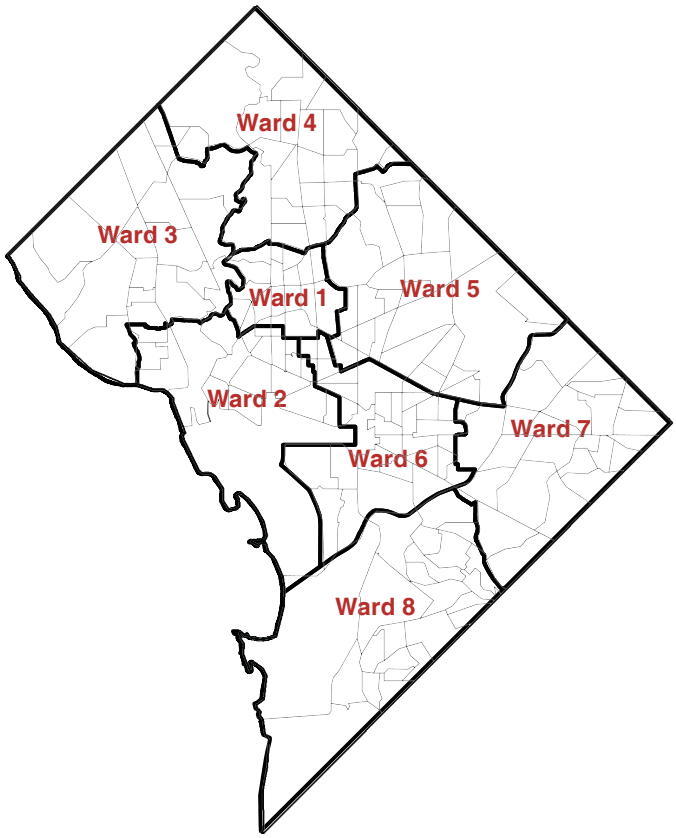

Figure 3: Wards and Census Tract

Background Data

The population of Washington DC is relatively evenly distributed among the city's eight Wards, each of which averages 80,900 residents. Population density, however, varies considerably. Ward 1, the District's downtown area, has the highest density and the smallest geographic area. Wards 3 and 5 have the largest geographic areas and the lowest population densities (see table 2).

Both the 2000 and 2010 Census reported slight population increases across Washington DC, and growth rates since 2010 have averaged 2.2% per year. This trend is consistent with national data that shows a steady trend toward urbanization, a reversal of the steady decline of urban populations in previous decades.

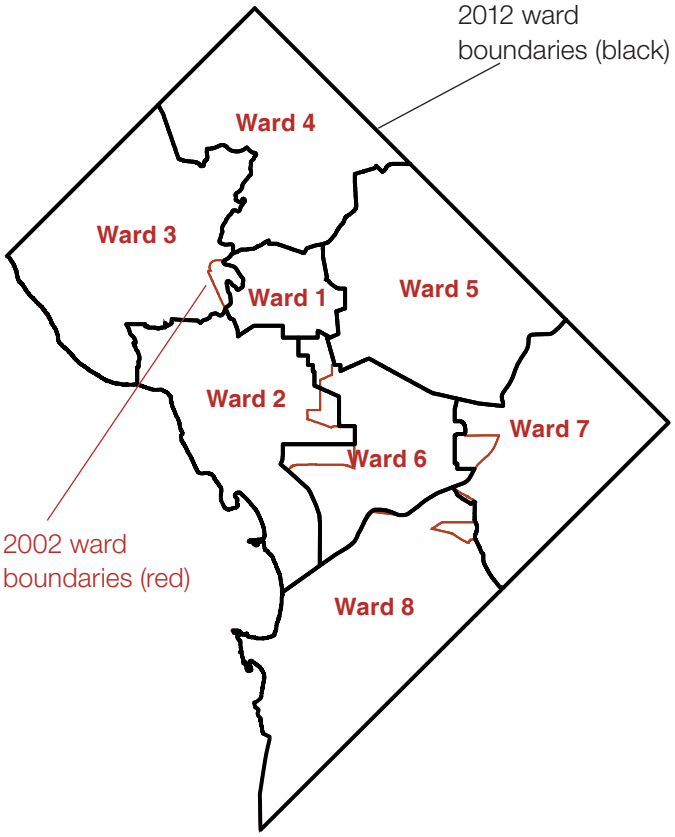

Figure 4: Boundaries of DC Wards 2002 and 2012

Age distribution and racial distribution vary considerably between the eight Wards. The highest percentage of residents over 65 live in Ward 3, while the District's youngest populations live east of the Anacostia River. In Wards 7 and 8, 24% and 30% of the population, respectively, are children under 18 years old. Out of all the Watds Wards 7 and 8 also have the highest percentage of female-headed households.

Wards 7 and 8 have the highest percentage of non-Hispanic black residents, while Wards 2 and 3 have the highest percentage of non-Hispanic whites. The fastest growing demographic was Hispanics, followed by Asians. Hispanic populations also make up the largest percentage of foreign-born residents, comprising 19% and 21% of the populations in Ward 4 and Ward 1, respectively (see table 3).

The economic outlook for the District of Columbia is generally positive. Between 2000 and 2010, median household income increased by almost 20%. In contrast, national median household income decreased slightly during the same time period. Poverty rates in the District of Columbia did not follow the same positive trend, remaining almost constant at slightly over 18%—which is 4% above the national average poverty rate of 14%.[18,19] This is despite a considerable drop in District-wide unemployment between 2000 and 2010, from 12.4% to 6.8%.

Unemployment and income levels vary considerably between the eight Wards. The lowest unemployment rates were recorded in Wards 2 and 3; the highest were in Wards 7 and 8, which had close to five times the unemployment rate of Wards 2 and 3. Household incomes showed similar disparities. Median household income in Wards 2 and 3 was roughly five times that in Wards 7 and 8. Median housing prices have almost doubled since 2000, adding to the financial pressures experienced by low-income households (see table 4).

The rate of homeownership in the District of Columbia is about 20% below the national average. Wards 3 and 4 have the highest rate of home ownership, while Ward 8 has the lowest. The below-average rate of home ownership across DC can be attributed to the relatively large segment of residents who work in transient positions associated with political representation or international diplomacy. This transiency and associated low rates of homeownership assert considerable pressure on rents. Data about subprime loans reflects the economic disparities between the Wards: subprime loans in Wards 5, 7, and 8 were around 15% and below 3% in Wards 2 and 3.

Collectively, the socioeconomic and demographic data shows significant disparities across the eight Wards of the District of Columbia. This confirms that an analysis at the District level is of limited use, for such an aggregated analysis would veil the economic development realities of those Wards that have not benefited from the positive economic trends that are captured in commonly used measures of economic success.

Table 1: Summary of the Five Pillars Indicators

Indicator Category	Indicator Category
Socio-Demographic Background	*Environmental Quality & Recreation*
Surface area	Walking trails miles
Population density	Bike trail miles
# of residents	Community gardens
Population age 65 and above	Permeable surface area
Population age 18 and below	Green roofs
% of residents born outside of the US	LEED certified buildings
Black (non-Hispanic)	Vacant and blighted properties
While (non-Hispanic)	
Hispanic	
Asian	
Household income	
Unemployment rate	
Female headed households	
Home ownership	
Education	*Social & Cultural Amenities*
% of population with four-year or graduate degree	# of full service restaurants
% of population with high-school degree	# of fast food restaurants
8th-grade math comprehension level	# of coffee shops
8th-grade reading comprehension level	# of full service grocery stores
# of preschool programs	# of farmers markets
# of after school programs	
Health	*Information & Transportation Access*
Life expectancy	# of computers
Infant mortality	# of bus and rail lines
Obesity rate	# of people using public transportation
Diabetes rate & diabetes deaths	# of people biking to work
Heart disease deaths	Phones per household
Violent crimes	Cars per household

Education

Educational disparities have long posed a challenge in the District of Columbia. According to the Sustainable DC Plan, "the primary barrier to the employment of District residents in local jobs is the imbalance between the education level attained by District residents and the education level required by local jobs" (pg. 26).[20] Education is thus a leading indicator of economic development, accurately predicting future economic development in a region.

Overall, education indicators show a positive trend across the District of Columbia. Between 2000 and 2010, educational attainment increased, and the percentage of residents without a high school diploma declined in

Table 2: Area and Population Density by Ward[17]

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Total surface area in square miles	2.5	6.4	10.4	8.9	10.2	5.6	8.4	8.7
Population density per mile	33,144	12,132	7,995	9,333	8,044	15,052	8,725	9,326

Table 3: Demographic Information by Ward

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Total population	82,859	77,645	83,152	83,066	82,049	84,290	73,290	81,133
Children under 18	12%	5%	13%	20%	17%	14%	24%	30%
People over 65	2%	6%	13%	3%	2%	3.3%	0.3%	0.2%
Foreign born	22%	21%	19%	23%	11%	9%	3%	3%
Black (non-Hispanic)	33%	10%	5.6%	59%	77%	43%	95%	94%
White (non-Hispanic)	40%	70%	78%	20%	15%	47%	2%	3%
Hispanic	21%	9%	8%	19%	6%	5%	2%	2%
Asian	5%	10%	8%	2%	2%	5%	0.3%	0.5%

every Ward. At the same time, the percentage of residents under 18 decreased, resulting in a decline of school-aged residents by 3% and a decrease in primary and secondary school enrollments. For all Wards except Wards 7 and 8, the rate of college degrees is well above the 28% national average: Wards 1, 2, 3, and 6 have rates above 50%, with Ward 3 having the highest rate (see table 5).

Primary public and charter schools are fairly evenly distributed across the eight Wards of the District. At the post-secondary level, there is one public university, seven private colleges and universities, and a number of institutions offering workforce development and continuing education programs. Despite these overall positive trends and conditions, educational attainment gaps between Wards remain significant. As Figure 5 shows, the percentage of populations without a high school diploma is less than 20% across all Wards, yet it is significantly lower in Wards 2, 3, and 6 than in the Wards east of the Anacostia river. Wards 2 and 3 have high school drop-out rates below the national average, but all other Wards have drop-out rates adove the national average of 7%.[21] This trend must be reversed to ensure that local job seekers can meet the demands of an innovation-driven job market that requires its workforce to have a strong skills base and to know how to learn and re-tool.

Education is closely correlated with income. There is also a robust literature confirming the correlation between higher education success, and pre-existing college experience. Student who are the first in their family to attend college tend to graduate at a lower rate than those with a history of college success among family members and friends. This tends to perpetuate deficits in educational attainment.

One of the unique elements of the Washington DC labor market is its high concentration of government jobs. Many of these jobs are relatively stable, but they often require education levels above a high school diploma or GED. The same applies for innovation and green economy jobs. To bring the eight Wards closer to parity with one

Table 4: Socio-Economic Information by Ward

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Household Income	$113,972	$209,147	$257,224	$123,353	$82,425	$140,853	$56,759	$45,239
Per Person Income	$43,219	$65,876	$76,174	$39,385	$28,704	$53,163	$22,669	$16,941
Unemployment	5.1%	3.8%	3.7%	9.8%	14%	6.2%	19%	22%
Female Headed Households	10%	3.8%	4.2%	19%	22%	11%	33%	39%
Homeownership	34%	35%	52%	59%	47%	42%	38%	20%

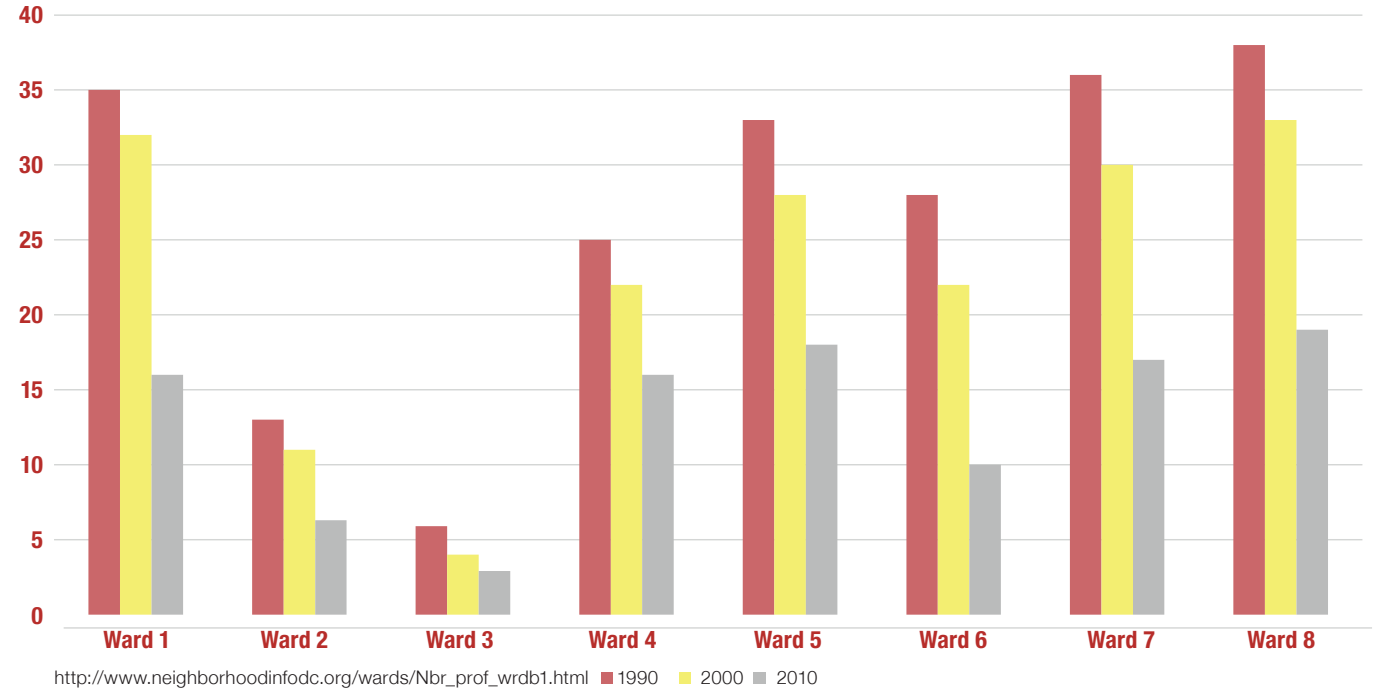

Figure 5: Percent of Population without High School Diploma

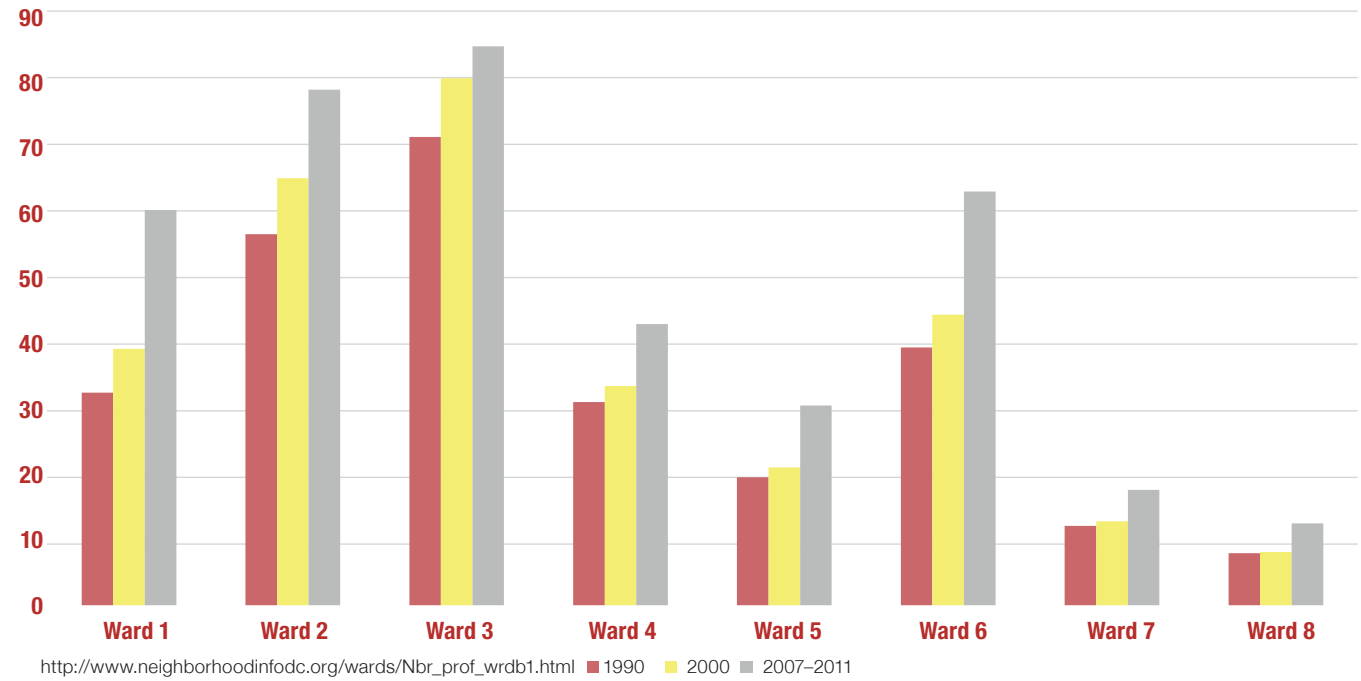

Figure 6: Percent of Persons with College Degree or Higher

another, it will be critically important to address education gaps and to provide education and workforce development programs that meet the needs of an ever-changing innovation economy. As Figure 6 shows, the trend in educational attainment beyond high school is overall positive, yet disparities remain. Lifelong learning is no longer an option, but a requirement.

Data on average math and reading scores is typically based on public school data from tests administered in the 5th and 8th grades. With the exception of Ward 3, DC schools perform at a 40 to 60% level for both subjects and both grades. Ward 3 schools outperform all other Wards with 8th grade scores of 79% for reading and 83% for math, and 5th grade scores of 86% for reading and 82% for math.[22] High school graduation rates range from a low of 52% in Ward 1 to a high of 89% in Ward 3. However, this data is not consistently available and questions have been raised about its reliability.

In her recent letter to Washingtonians, DC Mayor Muriel Bowser writes: "The OSSE investigation revealed poor student attendance, a culture of graduating students despite poor attendance, training and technology failures within DCPS, and pressure to pass students in order to meet or exceed graduation goals. Misapplied policies and a desire to help our most disadvantaged students led to a series of failures we must now overcome."[23]

The poor performance discussed by Mayor Bowser may in part be addressed by supporting more early childhood programs, which form an important basis for the learning experience later in life. These programs can be especially important for children socialized in an environment with low educational attainments. Data indicate that without early childhood intervention programs, existing patterns of educational success are replicated and students are more likely to match their family and neighborhood levels of educational attainment than to exceed them. Wards 3, 4, and 5 have the highest number of nursery schools and pre-schools. Given the high percentage of young children east of the Anacostia River, Ward 7 appears to have a particularly severe shortage of nursery and pre-schools.

Similar disparities exist for afterschool programs. These programs provide benefits to both students and parents: they offer students a safe place to study and engage in co-curricular and extra-curricular activities, and they give working parents peace of mind, knowing that their school-age children are supervised. As the data presented in Table 5 shows, Ward 7 may have a particularly high need for additional afterschool programs, given the high percentage of female-headed single parent households and school-aged populations under 18.

Washington DC has invested considerable resources in its primary and secondary schools. It may be necessary to broaden this educational investment at both ends. DC should ensure that pre-school and early childhood education gives a head start to children most in need, and it should work to improve access to postsecondary, continuing, and workforce education. The desire for a broader definition of education that spans from early childhood to older adults was a prominent theme in the neighborhood focus groups.

Health

Health indicators offer important insights into a community's capacity-building potential. Like education, health can be considered a leading indicator—one that impacts future economic development outcomes. A healthy workforce has fewer sick days and tends to be more productive. Health indicators also provide a correlated measure of social and environmental determinants of

Table 5: Early Childhood Education

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Number of Nursery and Pre-K Schools	16	8	20	26	30	9	15	26
Number of Public School After-School Programs	10	12	12	14	18	8	12	18

health, which are strongly associated with a community's QoL. For example, there is a correlation between food access, healthy eating habits, and positive health outcomes; there is also a correlation between neighborhood safety, walkability, outdoor activities, and health outcomes. Positive social and environmental determinants of health will lead to improved health outcomes of community residents.

The overall trend shows improvements in health outcomes across all eight Wards of the District of Columbia over time. According to the District of Columbia Community Health Needs Assessment, the District saw an overall rejuvenation of its population and an increase in health and fitness oriented lifestyles.[24] However, key health indicators in the eight Wards reveal significant disparities in the social and environmental conditions that determine health.

Life expectancy

Between 1990 and 2010, the average District resident gained almost ten years in life expectancy, from an average of 69 to an average of 78 years. But the life expectancy between Wards is variable, ranging from 70 years in Ward 8 to 86 years in Ward 2. A recently published study of health indicators also confirms that there are persistent disparities in maternal and infant health outcomes, with high infant mortality rates in some Wards. At 7.6 infant deaths per 1000 live births, Washington DC's infant mortality is higher than the national average of 6.1[25] and more than three times the rates of Finland (2.2), Japan (2.3) Sweden (2.4), Portugal (2.5) and many other Asian and European countries.[26] A study conducted in 2010 indicates that mothers aged 30 to 39 account for 55% of all infant deaths in Washington DC, with the leading cause being a lack of prenatal care. A study conducted in the late 1990s showed a successful approach to reducing infant mortality rates. This approach, developed by the Land-grant Division of the University of the District of Columbia, compared three groups of expectant women. The first group was observed; the second group received written materials about prenatal care; and the third group met regularly with a UDC land-grant staff member to discuss prenatal care, nutrition, and healthy lifestyles. The third group showed significantly improved health outcomes for both mothers and infants. Interventions like those implemented in this study could successfully reduce the disparities in infant mortality across Wards. Unfortunately, subsequent budget cuts prevented the model from being broadly implemented.[27]

Food-Related Illnesses

Obesity is a leading indicator of community health, for it is linked to social and environmental health factors and it has health consequences of its own. In its 2010 report, the Behavioral Risk Factor Surveillance System (BRFSS)[29] classifies as "obese" those adults with a Body Mass Index (BMI) of 30 or higher and as "overweight" those adults with a BMI of 25 to 29. The national obesity rate is 36%, and 69% of the U.S. population are either overweight or obese.[30] At 24.5%, obesity rates for the District of Columbia are below the national average, but obesity rates vary widely between Wards. Ward 3 has the lowest rate, with 7.5%; Ward 8 has the highest rate, with 44.5%.

Obesity is closely correlated with other lifestyle related illnesses, including heart disease and diabetes.[31] DC has rates of diabetes higher than the national average: more

Table 6: Key health indicators in the District of Columbia by Ward[28]

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Life expectancy (years)	78	86	85	78	75	77	73	70
Infant deaths	4	3	5	11	10	10	7	10
Diabetes deaths	3	3	4	15	21	12	21	20
Heart disease deaths	8	5	9	16	19	13	17	13

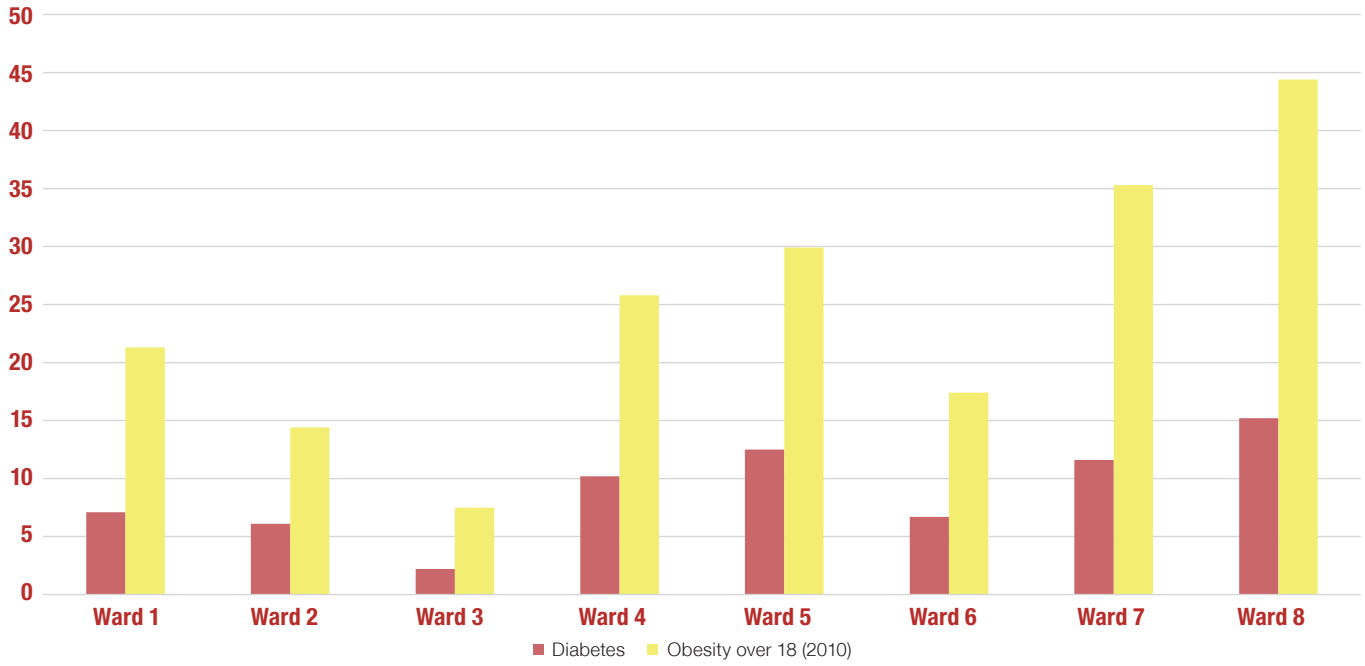

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Figure 7: Percent of Population with Obesity and Diabetes

than 8% of the adult population of the District of Columbia has diabetes, compared to a national average of 6%. Ward 3 has the lowest rate of diabetes, while Ward 8 has the highest (see figure 7). Physical activity is key to curbing obesity rates and related health problems, a correlation that is further examined in the 'Environmental Quality & Recreation' section of this report (see table 7).

Poverty (which often brings with it an unhealthy diet) is a leading cause of poor health, both nationally and in the District of Columbia. The Supplemental Nutrition Assistance Program (SNAP) seeks to mitigate food-related illness by providing food and nutrition assistance to low-income households. The percentage of residents enrolled in SNAP by Ward ranges from less than 15%

Table 7: Correlation between Health Outcomes and Physical Activity

Ward	Obesity Rate	Diabetes Rate	Heart Disease Rate	Physical Activity Rate
8	44.4	15.2	3.6	68.5
7	35.3	11.6	4.8	69.4
5	29.9	12.5	2.4	72.4
4	25.8	10.2	2.2	79.9
1	21.3	7.1	1.5	83.7
6	17.4	6.7	2.9	85.1
2	14.4	6.1	1.2	86.0
3	7.5	2.2	2.0	92.2

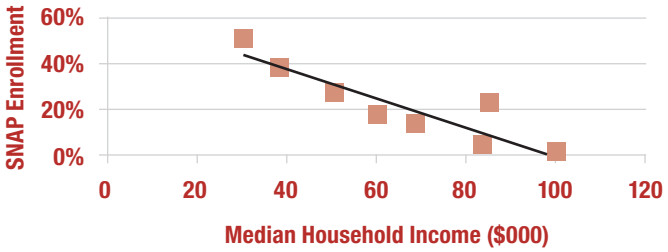

Figure 8: SNAP Enrollment and Income in Washington DC[32]

in Ward 3 to more than 50% in Ward 8 (see figure 8). Enrollment is closely correlated to income levels in the DC Wards.

Asthma and HIV

Asthma, whose primary triggers are allergens and pollutants, is another health condition that is determined by social and environmental factors. Asthma rates are more closely correlated to location than income. The overall asthma rate among DC residents 18 years and older is 10%—above the national average of 8%, which itself is rising.[33] According to the Center for Disease Control and Prevention, only 20 million people had asthma in 2001, compared to 25 million in 2014.[34] In DC the lowest rates are found in Ward 6 with 8% and the highest in Ward 7 with 12%.

According to the Center for Disease Control and Prevention, Washington DC has one of the highest rates of HIV in the United States, with 56 diagnoses per 100,000 of the population. This is almost twice the rate of Georgia (32 per 100,000) and Louisiana (30 per 100,000), which rank number 2 and 3 in diagnosed HIV rates.[35] African American populations are disproportionally affected. Wards 3 and 4 had the lowest number of diagnosed HIV cases; Wards 5 and 8 had the highest rates.

Safety and Violence

Safety is another social determinant of health. Across the District of Columbia, safety trends are positive; both overall crime and violent crime have declined over the past twenty years. Yet differences between Wards remain significant. Violent crime is especially high in low-income neighborhoods, with theft being more common in high-income neighborhoods. Table 8 and Figure 9 summarize the overall trends.

Access to Health Care Services

Positive health outcomes are chiefly associated with prevention rather than treatment. Walking and biking trails, and health care clinics that provide preventive services (such as nutrition counseling, exercise and fitness coaching), are key to achieving positive health outcomes. However, data about preventive services in the DC Wards is limited. For example, the primary care facilities that were built in Ward 7 and 8 with tobacco settlement funds provide important health care services, including access to preventive care, but utilization rates tend to be relatively low and inconsistent.[36]

Data about the number of physicians per Ward can be considered a relevant indicator of access to health care services. Physicians are typically concentrated in proxim-

Table 8: Total Crimes vs. Violent Crime by Ward

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Total crimes per 1000	5491	5377	5336	3706	3640	5269	4168	3997
Violent crimes per 1000	13	9	2	10	13	12	18	19

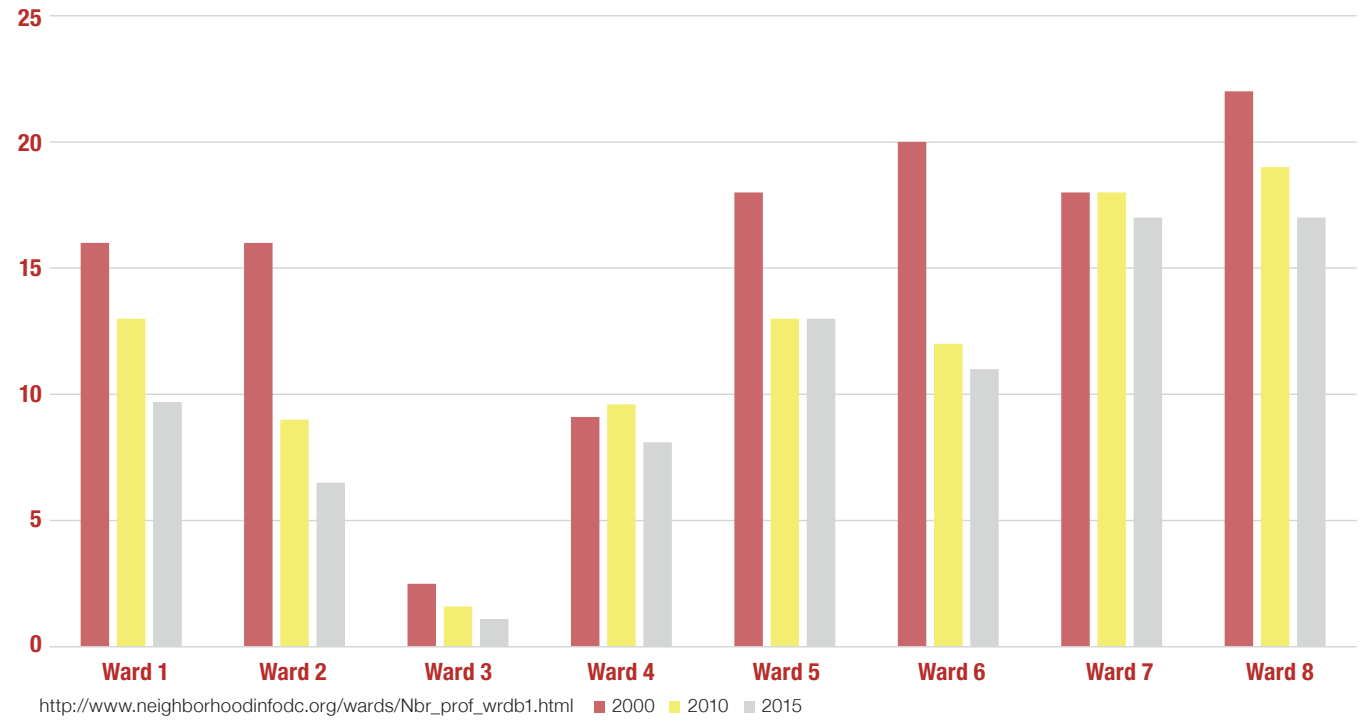

Figure 9: Violent Crime by Ward from 2000 to 2015 per 1000 Residents

ity to hospitals, and predictably, Ward 1 and 3 have the highest concentration of physicians; Wards 2, 5 and 8 have the lowest. A similar pattern emerges with respect to pediatricians.[37] Ward 1 has the highest concentration, while Wards 6 and 7 have the lowest. Given the high concentration of children under 18 in Wards 7 and 8, these Wards can be considered as undeserved with respect to pediatric services.

Environmental Quality and Recreation

Environmental indicators fall into three broad categories: (1) environmental quality, (2) environmental services, and (3) environmental amenities. The first category is typically defined by larger-scale regional or ecosystem boundaries and is difficult to measure at the scale of a neighborhood or Ward. Indicators of air and water quality, for example, are captured at monitoring stations that do not necessarily follow administrative boundaries. Many environmental quality indicators are crucial to residents' long-term health and productivity. Polluted air, water, and soil can cause health problems, particularly in older adults and children, and can therefore make a location less attractive.

Indicators of environmental services can be easily captured at any scale. These indicators include the tree canopy of an area, its permeable surface area, and other relatively scalable measures. Other indicators such as heat absorption, the health and productivity of habitats, and species diversity can also offer valuable information but may be less scalable.

Environmental amenities are especially relevant to human health and wellbeing. Indicators of environmental amenities include the number of parks, gardens, walking paths, biking trails, and other outdoor spaces that connect urban residents to the outdoors. Also included may be common spaces such as public pools and exercise facilities, which cross over from the outdoor environment to the built environment. Such recreational facilities provide residents with the opportunity to exercise and socialize.

Table 9: Air Pollution in Washington DC[38]

Contaminant	Monitoring Station	98th/99th percentile NO_2 & SO_2
Nitrogen dioxide	420 34th Street N.E., Washington DC 20019	48
Nitrogen dioxide	2500 1st Street, N.W., Washington DC 20310	48
Nitrogen dioxide	301 Van Buren Street, N.W. Washington DC 20012	58
Sulfur dioxide	420 34th Street N.E., Washington DC 20019	9
Sulfur dioxide	2500 1st Street, N.W., Washington DC 20310	7

Environmental Quality

In the District of Columbia, air quality is monitored at five stations (see table 9) that track nitrogen and sulfur dioxide concentrations in parts per billion (ppb). Nitrogen dioxide monitoring stations are located in Wards 2, 4, and 7, and sulfur dioxide is monitored in Wards 2 and 7. Concentrations of these pollutants vary over the course of the year and by time of day.

According to the Environmental Protection Agency (EPA), the National Ambient Air Quality Standards for nitrogen dioxide and sulfur dioxide are 53 ppb (annually) and 75 ppb (1-hour value). Data for nitrogen dioxide were in the 98th percentile defined as the 98th percentile of the daily maximum of 1-hour values per year; data for sulfur dioxide were in the 99th percentile defined as the 99th percentile of the daily maximum of 1-hour values in the year. The data summarized in Table 9 indicates that only one measurement, in Ward 4, was over the annual mean established by the EPA for nitrogen dioxide; sulfur dioxide was significantly below the 1-hour standard.

Water quality standards are measured by a range of indicators, including dissolved oxygen and Escherichia coli. According to the Anacostia 2032 Plan for a Fishable and Swimmable Anacostia River, a fishable waterway is one with enough aquatic habitat to support aquatic life, while a swimmable waterway supports long-term recreational or whole-body contact.[39] One important determinant of these water quality standards is E. coli. The District has used a measure called the most probable number (MPN) of bacterial colonies per 100 mL of water. The standard for fishable water is 1,000 MPN/100 ml, and for swimmable water it is 126 MPN/100 ml.[40] As Figure 10 shows, pathogen levels in the Anacostia River are well above these standards.

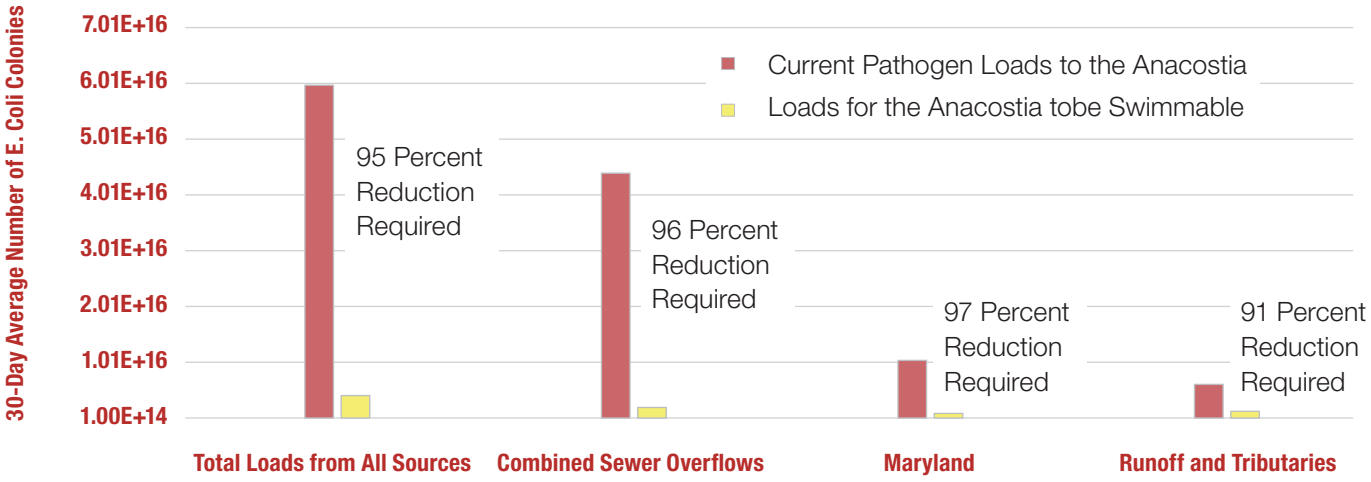

Figure 10: Average and Maximum Pathogen Loads for the Anacostia River[41]

Table 10: Per Capita Water Usage

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
100s of ft^3 (CCF)	230	217	292	301	267	251	308	285
Gallons	172,040	162,316	218,416	225,148	199,716	187,748	230,384	213,180

Dissolved oxygen, or the amount of gaseous oxygen dissolved in water, is another measure of water quality. It measures a water body's ability to sustain aquatic life. For a healthy aquatic environment, a body of water should have a daily level of dissolved oxygen of 2.0 milligrams per liter (mg/L) throughout the year and a daily average of 5.0 mg/L of dissolved oxygen during the spawning season between March and June. Dissolved oxygen levels of less than 2.0 mg/L may cause fish mortality, and dissolved oxygen levels of less than 5 mg/L impair fish growth and reproduction. Dissolved oxygen levels for DC waterways fall below 5 mg/L an average of 93 days of the year,[42] and according to site-specific monitoring results, all of the DC waterways are impaired.[43] Contaminants from urban runoff and storm water comprise the majority of sources of the impairment. To improve these indicators of environmental health, DC must mitigate its water quality issues.

Tap water used in DC (see table 10) is chemically treated to meet drinking water standards. However, lead contamination remains a chief concern. According to the 2016 Drinking Water Quality Report, 3 out of 213 drinking water samples from DC contained lead levels above EPA standards.[44] The elevated levels are due primarily to corrosion of household plumbing systems and natural deposits.

Environmental Services

One of the challenges in obtaining water use data for the District of Columbia is the city's aging water infrastructure. Old pipe systems tend to have leaks that may lose considerable amounts of fresh water between the distribution source and water users. Data from the United States Geological Survey suggests that residential water usage is fairly evenly distributed among users. At 125 gallons per person per day, water consumption in the District of Columbia is considerably higher than the national average of 90 gallons per person per day.45 To reduce overall water use and water discharge, the District Department of Energy and the Environment gives storm water credits to building owners who capture and/or absorb storm water runoff. The Department also provides rain barrels to homeowners through the RiverSmart Homes initiative. These barrels collect storm water runoff that may be used for lawn maintenance and other gardening applications.

Pervious surfaces can help to manage water run off and reduce pressure on aging storm water infrastructure, while impervious surfaces (like rooftops, paved driveways, roads, sidewalks, and parking lots), which do not absorb water, add to the runoff water entering sewer systems and rivers. According to the New Hampshire Estuary Project, "impairment to streams often occurs when more than 10% of the land within a watershed is covered with impervious surfaces… especially when impervious surfaces are located adjacent to water bodies."[46] The percentage of impervious surface area varies depending on the level of urbanization. All Wards except Ward 6 have more than 10% impervious surface area; Ward 1 has the highest, with 36% (see table 11).

Table 11: Environment & Recreation

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Impervious surface area	36%	27%	20%	19%	24%	6%	20%	20%
Parks	32	33	57	82	67	33	31	31
Bike paths in miles	11	19	6	8	7	17	4	0.3
Walking trails in miles	1.4	17	8	4	4	7	6	11

Urban parks and community gardens add permeable surfaces to the urban scape. DC has a high percentage of green space overall; it is considered a green city, ranking number eight on the Siemens Green City Index of U.S. and Canadian cities.[47] The DC Department of Parks and Recreation (DPR) lists the many small parks scattered throughout DC in its record of urban parks. Wards 3, 4, and 5 have a larger number of parks per 1,000 residents. Despite the high prevalence of parks in Ward 5 an analysis of their accessibility by census tract shows that neighborhood in Ward 5 have comparatively limited park access. Census tracts in Ward 1, the most densely developed Ward in the District, have a remarkably high degree of accessibility to small neighborhoods parks. Wards 3 and 6 show the best accessibility overall (see figure 11).

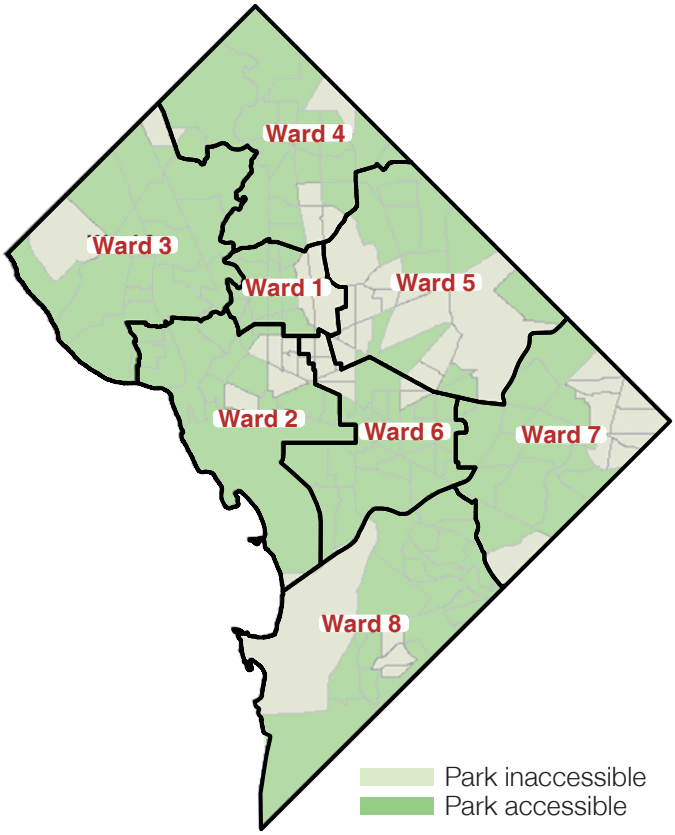

Figure 11: Park Accessibility within ½ Mile[48]

Since the record of parks does not take their size into account, the information is of limited use in determining how much pervious surface DC's parks add to the city's water runoff management.

Environmental Amenities

Like parks, community gardens give residents additional opportunities for outdoor activity and exercise; they also offer access to fresh, unprocessed food. According to DPR, community gardens comprise approximately one-fifth (1/5) of the total acreage used for gardening in Washington DC.[49] Models for community gardens differ widely. Some operate on public land, some on private land, and some have taken over vacant land, vigilante style. Some are operated by non-profit organizations, others by a neighborhood committee. Typically, residents sign up for a plot in the community garden and grow food or horticulture plants for their own use. While it is difficult to capture data for the constantly changing landscape of community gardens, Wards 3 and 7 have the greatest access to community gardens while Wards 5 and 8 have the least. The College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES) of the University of the District of Columbia operates community gardens free of charge at its Urban Food Hubs sites in Wards 3, 5, 7 and 8.

While not all biking and walking trails add to the District's permeable surface area, these trail systems add to healthier lifestyle options and to opportunities for outdoor activity in the city. The availability of biking and walking trails is an indicator that residents and businesses often consult when making location decisions. The better a community's access to outdoor recreation and to non-automobile modes of transportation, the more attractive it is to the green and creative economy workforce. In DC, the downtown corridor in Ward 2 has the highest number of bike lane miles, followed by Ward 6. Walking trails (which do not include sidewalks, only official walking and hiking trails) vary across Wards: in Ward 2, the trails consist almost entirely of the urban trail system at the National Mall, while trails in Ward 8 include the Bolling Air Force Base Waterfront trail, the Suitland Parkway Trail, and the Anacostia River Trail.

In addition to outdoor spaces, recreation and community centers also offer access to exercise and fitness activities, such as gyms, basketball courts, baseball fields, and tennis courts. In total, DC has 67 public recreation facilities. Wards 5 and 7 have the largest number of indoor and outdoor recreation spaces (14), while Ward 2 has the lowest number.

The number of vacant properties in a location provides an indicator of both available land and of potential barriers to revitalization. Vacant properties can pose a safety concern as some may be littered with construction debris and other may serve as hidden gathering spaces; yet they are also an opportunity for new land-uses that can improve health, wellness and access to amenities. A recent initiative by DC Mayor Bowser called "Vacant to Vibrant" seeks to identify alternative uses for unutilized buildings and lots to revitalize neighborhoods where vacant areas pose a deterrent to development and threat to safety.[50] Ward 3 has the lowest vacancy rate at 8% and Ward 8 has the highest rate at 18%. The District average of 10% is below the national average of 13% vacancy (see figure 12).[51]

According to an annual survey conducted by Green Roofs for Healthy Cities (GRHC), Washington, DC, has the largest number of green roofs per square foot of any metro region.[53] Ward 2 has the highest density of green roofs at almost twice that of Ward 5, which has the second-highest concentration.

LEED (Leadership in Energy and Environmental Design) is the most widely used green building certification system in the United States. Certifications vary for residential and commercial buildings and extend to both new construction and renovations. The LEED system awards Silver, Gold, and Platinum level certifications depending on the number of green environmentally friendly features a building has that can earn it 'green points'. According to a 2011 report by the U.S. Green Building Council (USGBC), Washington, DC, is leading the way in the number of LEED Certified buildings per capita.[55] Distribution of LEED-certified buildings across the eight Wards varies, ranging from a high of 39% in Ward 2 to less than 1% in Ward 7 (see figure 13).

While environmental disparities in air and water quality, green spaces, green housing, property vacancy, etc. exist, the indicators overall reveal a strong environmental record. This positions the District and its 8 Wards well to play a leadership role in sustainable urban development and the green job market as job seekers and businesses alike gravitate to cities with high quality environmental services and amenities.

Social and Cultural Amenities

Indicators in the Social and Cultural Amenities category index a community's vitality and public engagement. These indicators play an increasingly important role in

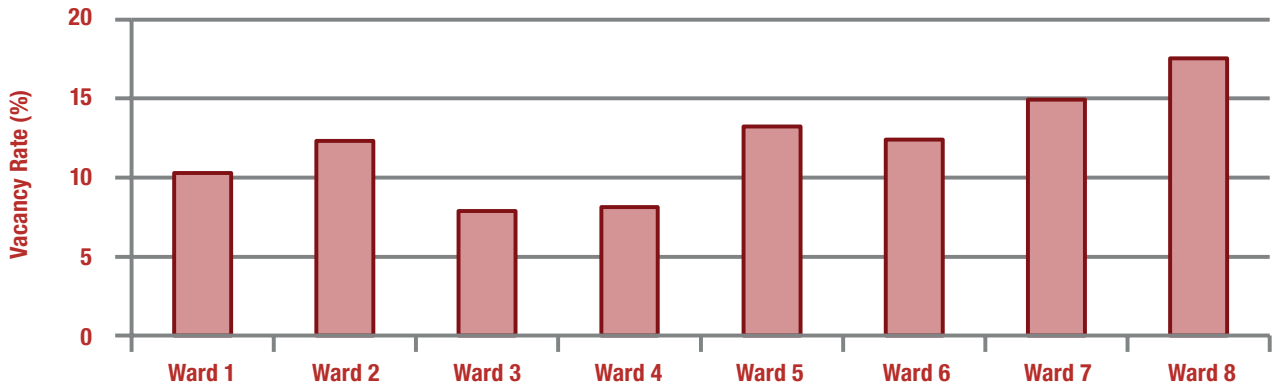

Figure 12: Vacant Properties by Ward[52]

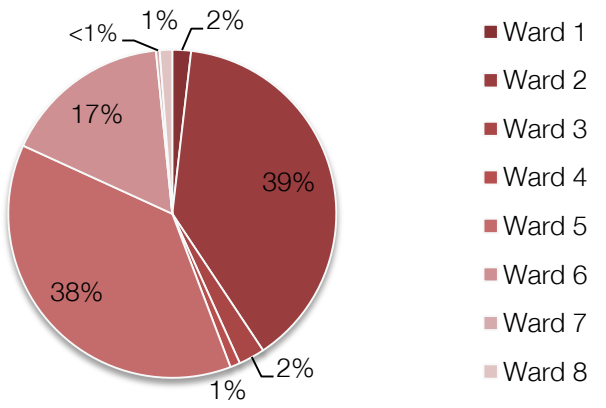

Figure 13: LEED Certified Buildings by Ward[54]

location decisions for residents and businesses. A prominent example is Amazon's recent search for a second corporate headquarters. Social and cultural amenities (as well as indicators from the other categories: education, health, environment and recreation, and public transportation choices) featured prominently in the criteria Amazon weighed to make its location decision.

Social and cultural amenities include such indicators as restaurants, retail, grocery stores, and coffee shops; performance spaces and movie theatres; and indicators of public engagement, such as voter participation and charitable giving.

Collecting data on social and cultural amenities at the level of the Ward may have mixed relevance at first blush. Residents are often willing to travel to particular amenities and some amenities require a certain density and purchasing power to be economically viable: cultural heritage sites, theatres, and upscale eating establishments may be destinations that draw customers from a wider geographic area. Other amenities, however, like coffee shops, grocery stores, some eating establishments and retail must be available close to home in virtually every neighborhood.

Ward 2 is home to the majority of restaurants and retail businesses in the District of Columbia. It can be considered a destination, and its establishments are frequented not only by residents of Ward 2 or of DC more broadly, but also by tourists. To develop strong amenities that draw purchasing power from beyond the region, economic development plans should consider access, attractiveness, and uniqueness. But some of these social and cultural amenities, while geographically accessible, may be economically inaccessible to some. The highest concentration of higher priced restaurants can be found in Ward 2, followed by Wards 1 and 3. Only 6% of higher-priced DC restaurants are located in Ward 7 and 3% in Ward 8. Fast-food restaurants are more evenly distributed across the District of Columbia. Even so, the highest concentration can be found in Ward 2 and the lowest concentration in Wards 7 and 8. Since there are almost no higher end restaurants in these Wards, residents have few options for eating out.

Public social spaces are important amenities. Coffee shops, for example, are more than places to buy food and drink, for they offer residents a communal space in which they can socialize and meet their neighbors. Studies indicate a high preference for having a coffee shop close to the place of residence and the place of work.[56] Ward 2 has the highest concentration of coffee shops—three times as many as the second highest, Ward 1 (see figure 14). Public libraries are another important public space in which to socialize. They also provide access to online resources, computers, and print materials, as well as meeting rooms. Public libraries are relatively evenly distributed across the eight Wards of Washington DC. In contrast, movie theaters are clustered in Wards 2, 3, and 4, with additional theatres in surrounding suburban service areas such as Alexandria and Bethesda.

Food access plays a special role within the amenities category of indicators. Full-service grocery stores are the primary access point to fresh food. Eight of the Census tracts in the District of Columbia are considered food deserts; the United States Department of Agriculture (USDA) defines food deserts as "urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food."[57] Figure 15 shows the number of grocery stores per 1000 residents. Ward 3 has the highest accessibility to full service grocery stores, Ward 7 has the lowest (see also table 12).

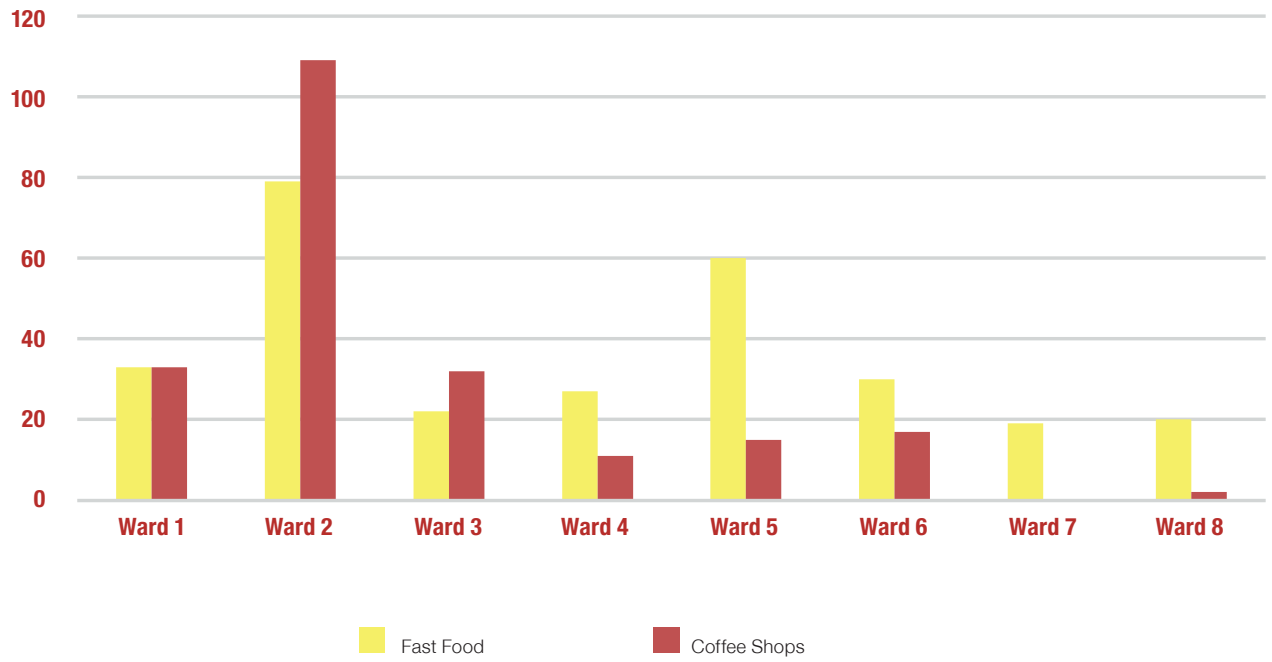

Figure 14: Fast Food Restaurants and Coffee Shops by Ward

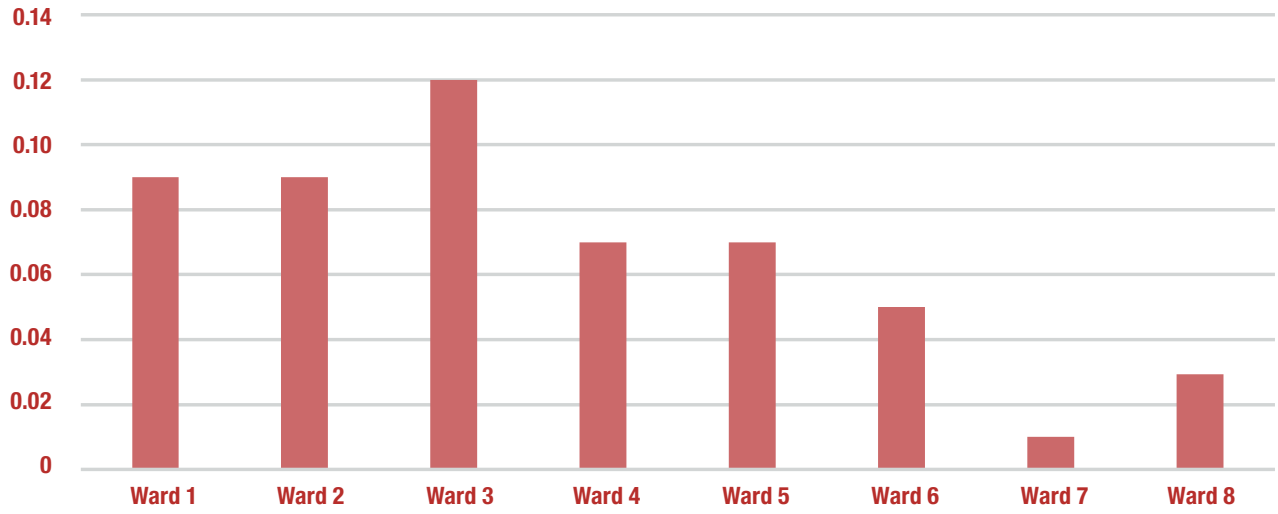

Figure 15: Full Service Grocery Stores per 1000 of the Population

Table 12: Indicators of Amenities

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Full-service groceries	7	7	9	5	5	4	2	2
Full-service restaurant	364	777	304	104	167	144	26	43

Figures 16 and 17 show the correlation between access to a full-service grocery store and income (Figure 16) and obesity (Figure 17). As the figures indicate, the higher the income level in a Census tract, the higher the density of full service grocery stores, and the higher the access to full service grocery stores, the lower the obesity rate. Figure 18 ranks the District's Census tracts by food accessibility. A Census tract is ranked as food-accessible if it has a grocery store within one mile of its center. According to this definition, 15% of DC Census tracts do not qualify as food accessible. Residents in these Census tracts shop at local convenience stores or travel to a full service grocery by car, taxi, or public transportation.

Farmers markets have emerged as an alternative to fresh food access. According to a 2014 report, 44 farmers markets were operating in the District of Columbia, and a recent report ranks Washington DC as number 1 in

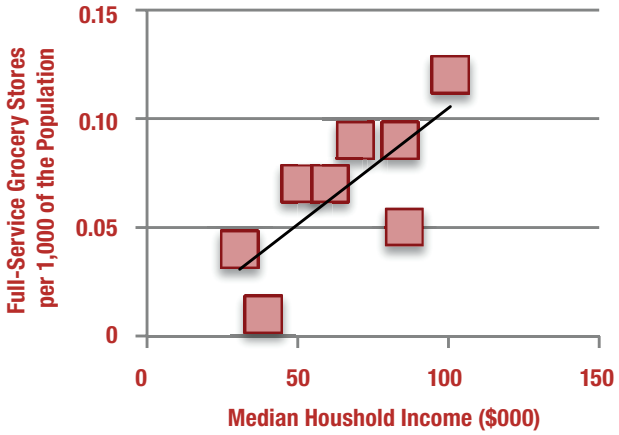

Figure 16: Income and Food Access

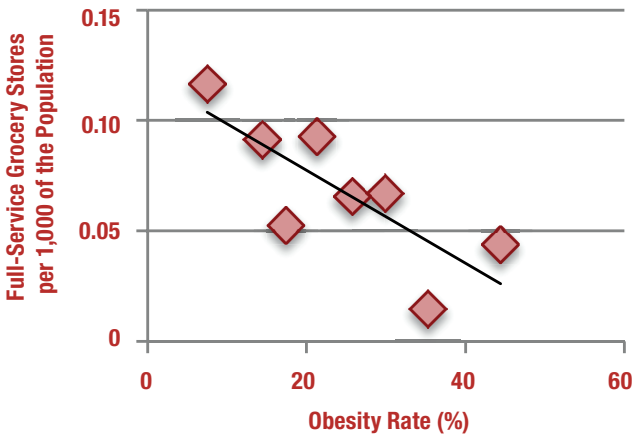

Figure 17: Obesity and Food Access

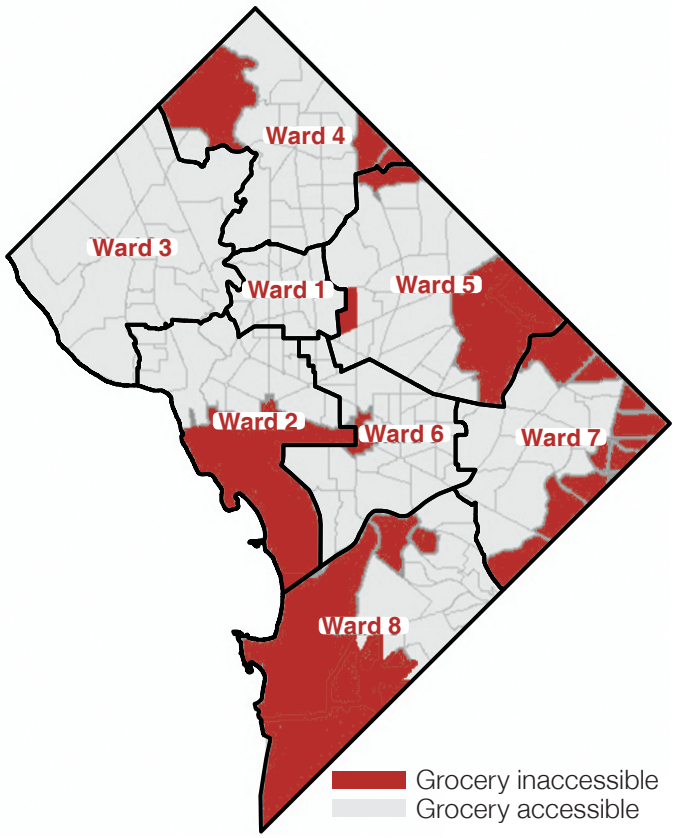

Figure 18: Accessibility of full-service grocery stores[58]

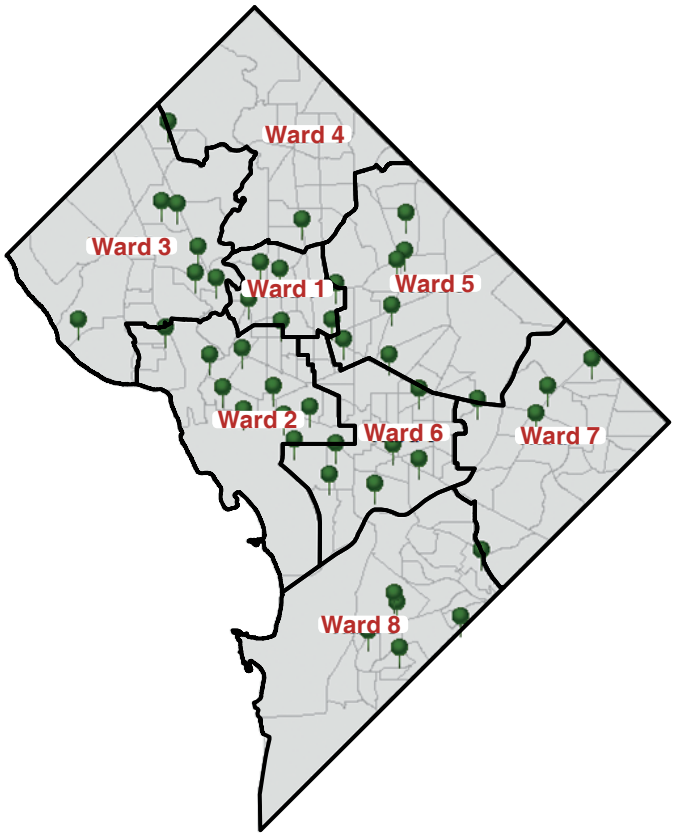

Figure 19: Farmers Markets in DC

farmers markets in the United States.[59] There are also nine mobile markets that deliver food to areas that lack food access.[60] Many of these markets accept assistance vouchers like food stamps and WIC coupons. The largest number of farmers markets is concentrated in Wards 1, 2, and 6. Ward 4 has the lowest concentration (see figure 19).

Developing a composite indicator of the social and cultural amenities of the District of Columbia is challenging. Such an indicator would need to assess the relative importance of the individual indicators used to measure the District's social and cultural amenities. Figure 20 provides a visual image of the location of amenities without prioritizing them. It simply records the locations of the different types of amenities using latitude and longitudinal coordinates.

Figure 21 provides a similar measure of accessibility by displaying the distance from the center of each Census tract of each of the amenities, including restaurants, grocery stores, coffee shops, movie theaters, music venues, museums, and libraries. Accessibility is defined as a one-mile distance (about a 20 minute walk) from the center of the census tract. Depending on the distance of the amenities from the center, each census tract was ranked as inaccessible, very low, low, medium, or high accessibility. Wards 1 and 3 were found to be highly accessible overall and contained no inaccessible census tracts; Wards 2, 4, 5 and 6 were found to have a mixed record with some accessible and some inaccessible areas; amenities in Wards 7 and 8 were found to be almost completely inaccessible.

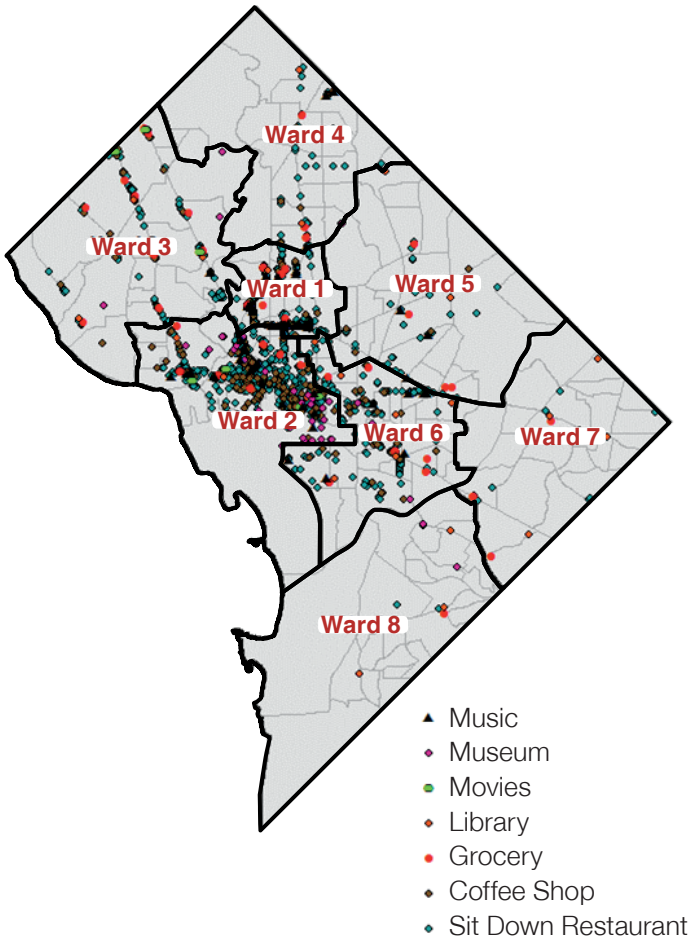

Figure 20: Amenities in DC

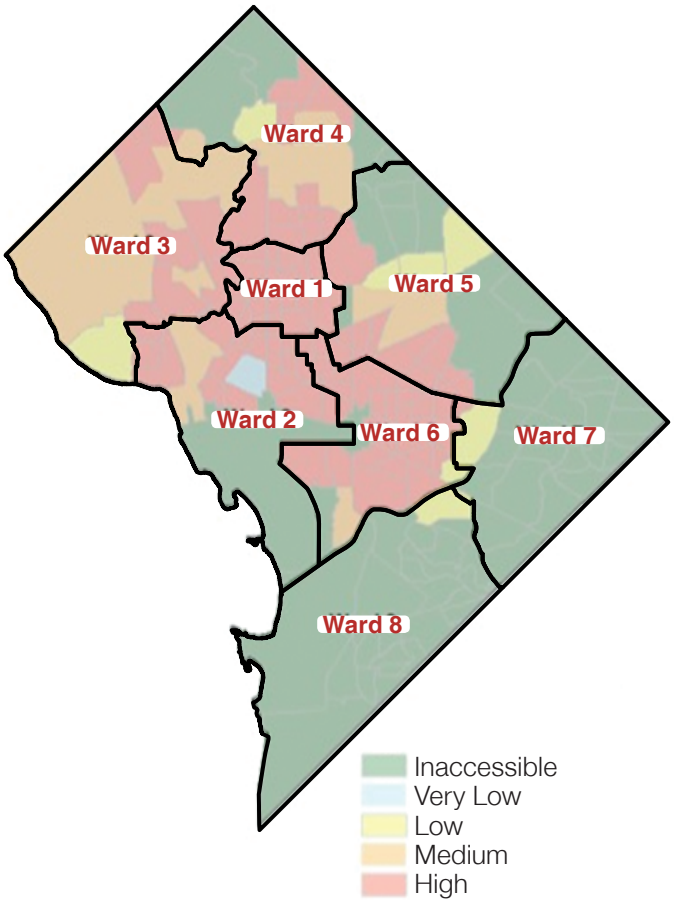

Figure 21: Access to Amenities

Another useful measure of social and cultural amenities is residents' civic engagement. Without it, local venues and businesses may not have the support they need to succeed. Even purchasing power for businesses outside the immediate local area is strengthened by a strong internal base of highly engaged local residents. One indicator of engagement is charitable giving. While the lack of data makes it impossible to distinguish between local giving and giving beyond the locality, general giving patterns can be useful for assessing a community's level of civic engagement. Ward 3, the Ward with the highest median household income, also has the highest total level of charitable giving, with approximately $69 million dollars in 2012. However, when charitable giving is calculated relative to household income, Ward 7 has the highest percentage of charitable giving, and Ward 3 has the lowest. Figure 22 shows the correlation between income and charitable giving.

These findings are consistent with national studies, which suggest that "…lower-income people were more generous, charitable, trusting and helpful to others than were those with more wealth. They were more attuned to the needs of others and more committed generally to the values of egalitarianism."[61] This may bode well for a strong base of civic engagement that can drive local economic development objectives in some of the neighborhoods east of the Anacostia River.

The analysis of indicators of social and cultural amenities confirms the disparities found in other indicator categories. The Wards west of the Anacostia River, especially Wards 1, 2 and 3, are well resourced with amenities that support social networks and a high quality of life, while the Wards east of the river have limited access to social and cultural amenities. This impacts the QoL in these neighborhoods and also reduces their potential as destination points. Addressing these deficits will be a critical factor in developing successful pathways for economic development for these communities.

Information & Transportation Access

Transportation is another key factor in economic development, for the availability and quality of transportation impacts access to services and amenities.

Figure 22: Charitable Giving by Income Level

Car ownership is rather low in Washington DC and continues to decline. It ranges from 52% in Ward 8 to 78% in Ward 3.[62] The decline in car ownership is consistent with data from other cities, which indicates that a growing percentage of urban populations want to use a car but not own one. Only 34% of District residents travel to work alone in a car, truck, or van—the lowest percentage of any metro area in the United States.[63]

Like many cities, the District of Columbia supports a variety of transportation options beyond private vehicle ownership: car and bike sharing programs, bus service, Metrorail, and, increasingly, biking and walking paths. As the population continues to grow, these alternatives to privately owned vehicles need to continue to expand to keep up with growing demand: too many cars on the roads create congestion, long commuting times, pollution, and risks to pedestrians and bikers.

Lower-income Wards report a slightly higher percentage of public transit ridership than higher-income Wards: 28% of residents in Ward 2 and 45% in Ward 1 report taking public transportation to work. Buses are generally less expensive than Metrorail, but tend to take longer because of their exposure to traffic congestion. Like most cities, Washington DC has the highest density of bus routes in the downtown area where a larger number of transfer stations are located. Commuting times to downtown from neighborhoods in the northeast and the southeast of the city tend to be longer than from those located in northwest DC. Figure 23 summarizes the distribution of major bus stops across the eight DC Wards.

An average 3% of District residents regularly bike to work, with the highest percentage of bikers in Wards 2 and 6 (see table 13). Biking reduces private vehicle transportation, and biking and walking have health benefits. Access to bike lanes and sidewalks is thus an indicator of QoL related to both transportation and health, for they offer residents the opportunity to engage in more physical activity. The fast growing research area of Low Impact Development explores how to foster biking and walking, studying the best practices in traffic calming and in designing walk-able neighborhoods that facilitate social connections, healthy lifestyles, and neighborhood safety.

The District of Columbia is well on its way to being recognized as a model of progressive transportation despite the challenges with its metro-rail system. According to *Walk Score*,[64] the District ranked fourth among U.S. cities scored in the publication's transit-friendly categories. This ranking takes not only the number of transit options into account but also the accessibility of public transportation to residents in the cities and metro areas examined. No U.S. city scored in the top category of "rider paradise" and only New York City, San Francisco and Boston scored in the second highest category of "excellent transit". The District of Columbia was ranked in the third category of "good transit". Given the District's relatively small geographic area, much progress could be made in improving this pillar.[65] As cities and metro areas continue to grow, the design of a transportation system that is convenient, affordable, and environmentally friendly will be of paramount importance. In 2015, CAUSES hosted an international exhibit entitled Post Oil Cities. The exhibit, curated by the German government, offered a glimpse into the transportation future of ten cities from six continents and emphasized the role of transportation as an explicit partner in achieving QoL objectives including accessibility and sustainability.[66]

Access to technology is crucial to success in today's Information and Communication Technology (ICT) driven world, but this access is challenging to measure. In urban communities, cell phone access is ubiquitous, and almost every resident has access to a device that provides Internet access. But even as the ongoing development

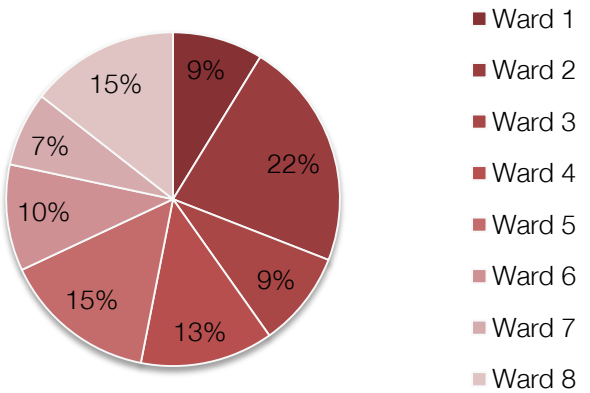

Figure 23: Major Bus Stops by Ward[67]

Table 13: Bus Service and Bike Use by Ward

	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8
Bus lines	17	43	18	25	29	20	14	28
% Biking to work	5%	3%	2%	1%	2%	4%	0.2%	0.1%

of apps continues to level the playing field of ICT access consistent access to high-speed internet and more extensive ICT services remains limited in some areas and for some groups.

Technology is changing fast, and it has become challenging to measure ICT indicators, especially at the granular level of a neighborhood or Ward. In 2000, for example, cable access was considered a good indicator of ICT access, but less than twenty years later, it has become near impossible to determine ICT access by consulting cable subscription rates, due to competition among cable companies, access via handheld devices, and internet and computer access through public libraries, community centers, and some food venues. The number of traditional phone service subscribers is also in decline, with a growing numbers of users relying solely on mobile devices. All of the DC Wards reported a 94% or higher rate of phone access (defined as the percentage of households with at least one working phone).[68]

Access to technology does not necessarily equate to the ability to use that technology. While no conclusive data is available, limited ICT literacy and lack of ICT skills may well be a determinant of educational and career success, for ICT skills are increasingly expected in schools and at the workplace. Figure 25 shows the correlation between internet use and educational attainment in the United States. No information is available at the level of the Wards or the Census tracts.

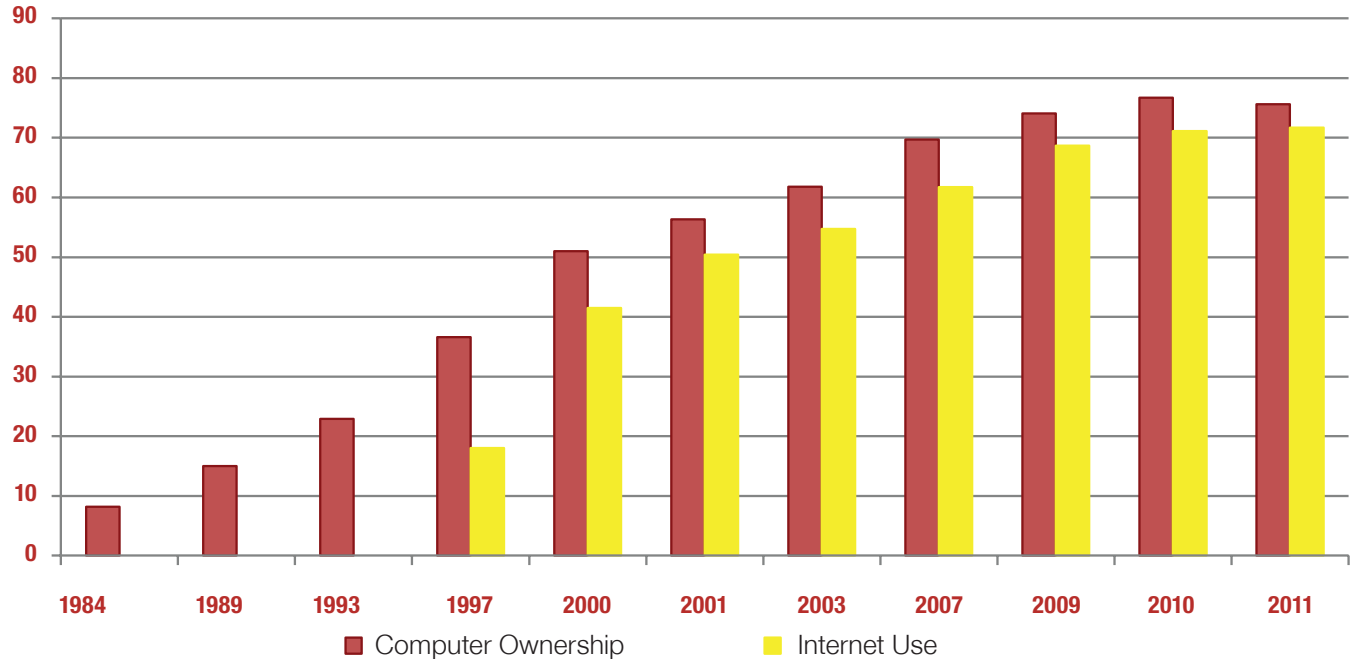

Figure 24: Percentage of DC Households Owning a Computer and Using the Internet

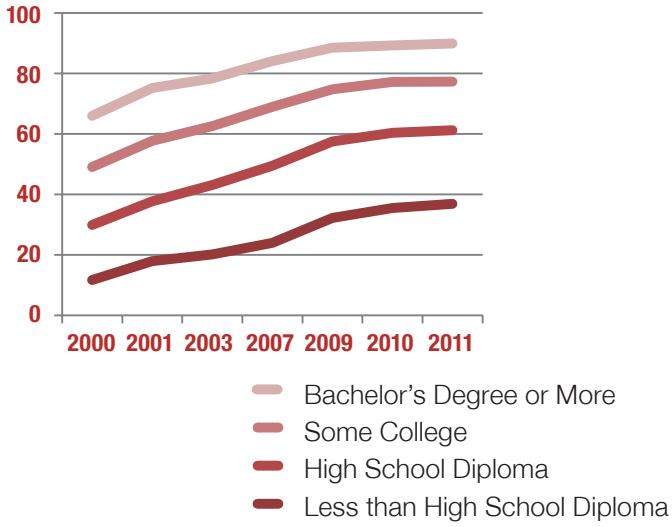

Figure 25: Internet Use by Educational Attainment

Five Pillars Composite Measure

To provide an overall evaluation of each Ward's QoL (and thus identify areas in need of improvement to ensure more equitable economic development opportunities), a composite of indicators comprising each of the Five Pillar categories was calculated. The composite is unweighted, treating indicators in each of the Five Pillar areas the same. Further considerations might change this approach, assigning greater or lesser value to various indicators in each of the Five Pillar categories.

Using equal weight for each indicator, Wards 2 and 3 have the majority of high scores in all but one of the Five Pillar categories: both Wards rank low in the environmental quality & recreation category, in which Ward 6 earns the highest score. Ward 7 has the lowest composite score in three categories: health, social & cultural amenities, and information technology & transportation. Ward 8 has the lowest score in two categories: education and environmental quality & recreation (see table 14).

The composite scores correlate moderately well to the results of a satisfaction survey reported in the DC Community Health Needs Assessment.[69] Wards 2 and 3 reported the highest levels of resident satisfaction, followed by Ward 6; Ward 5 ranked lowest in the satisfaction survey, and Ward 7 the second lowest (see figure 26).

Table 14: Highest and Lowest Composite Scores

Pillar	Highest Composite Score	Lowest Composite Score
Health	Ward 3	Ward 7
Education	Ward 3	Ward 8
Social & Cultural Amenities	Ward 2	Ward 7
Environmental Quality & Recreation	Ward 6	Ward 8
Information & Transportation	Ward 2	Ward 7

Differences between the objective (empirical data) indicators that were collected for the Five Pillars study and the subjective indicators of residents' stated satisfaction level are not unusual. Research indicates only a weak correlation between subjective and objective factors (for example, between material wealth and happiness). Biases are easily introduced into objective data by insufficient information, limited representation, and unchallenged perceptions associated with tradition and culture.[70] It is for these reasons that reliance on objective data alone is not sufficient to provide guidance for development decisions.

A Community-Based Vision of Successful Development Outcomes

Central to the Five Pillars approach to economic development is the engagement of the local community. The vision of a successful development future must be their vision. To that end, two focus groups were conducted to provide input for a collective story that would express their vision of a sustainable development future for their local community. Stories can be widely shared; they can also invite broad dialogue from a wide range of stakeholders, including those who do not commonly participate in development and planning decisions and those who are less practiced at interpreting quantitative indicators.

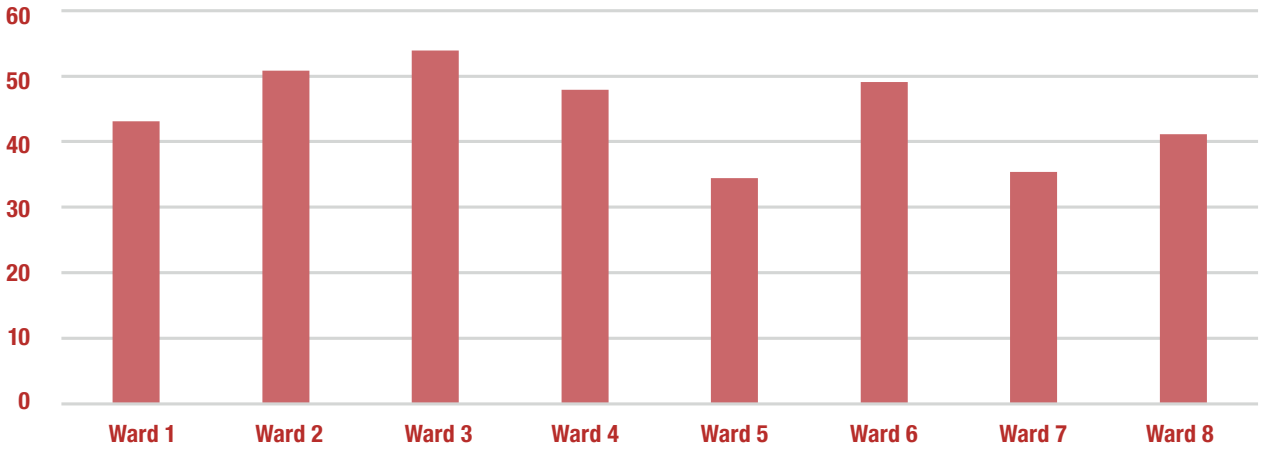

Figure 26: Percentage of the Population Very Satisfied with Life

The Focus Group Process

The vision of a successful development future must be the vision of the local community. In the focus groups in Wards 7 and 8 it was expressed by writing a collective story. Stories can be widely shared; they can also invite broad dialogue from a wide range of stakeholders, including those who do not commonly participate in development and planning decisions and those who are less practiced at interpreting quantitative indicators.

The two focus groups were held at Houston Elementary School in Ward 7 and the Petey Greene Community Center in Ward 8. Participants were randomly selected through a community outreach effort that included churches, schools, businesses, community centers, neighborhood associations, libraries, neighborhood associations, and door-to-door solicitations. The goal of this broad-based approach was to get representation from a range of perspectives as well as a wide age spectrum of residents and stakeholders from the Deanwood neighborhood in Ward 7 and the Congress Heights neighborhood in Ward 8.

A resident of the Deanwood neighborhood, who was also a graduate of the University of the District of Columbia, spearheaded the outreach effort to recruit focus group participants. Other UDC students and land-grant staff members assisted by distributing flyers door-to-door, visiting schools, churches, libraries, and local businesses, and making random phone calls to invite participation in the two focus groups.

Outreach materials included information about the goals of the focus groups, the nature of the Five Pillars approach to community development, and the date, time, and location of the focus group meetings. Participants were informed of the time commitment involved; they were also told that breakfast and lunch would be served and that they would receive a $20.00 metro card to compensate them for their time.

Fourteen students and staff members were trained as focus group facilitators and recorders. Each of the two focus group meetings started with a brief overview of the Five Pillars approach to development. Focus group participants were then assigned to smaller discussion groups to share their visions for the future of their neighborhood with respect to each of the Five Pillars—education, health, social & cultural amenities, environmental quality & recreation, and access to information & transportation. The question posed to each group was ‘what do you want your neighborhood to look like in 2030 with respect to education, health, social & cultural amenities, environmental quality & recreation, information & transportation access?’ The small group discussions were timed so that every participant could speak to each of the five categories. Facilitators and recorders ensured that the small

discussion groups stayed on topic and that all participants had the opportunity to speak.

The resulting story was based on the recorded contributions of the participants from both focus groups using a qualitative content analysis approach. Contributions that were mentioned repeatedly and found strong resonance with participants were included in the story. While some of the specific characteristics of the two neighborhoods were evident in the focus group contributions, many others cut across both locations, capturing larger, less location-specific themes. This is similar to the composition of collective stories captured in other narrative approaches, such as Q-searches. In a Q-search conducted in upstate New York, for example, focus group participants were asked to rank statements about the environment according to how much they agreed with each one.[71] Some recurring themes that appeared in the collective story reflected larger regional or societal narrative strands.

A total of 76 focus group participants from Deanwood and Congress Heights participated in the process. Participation from Deanwood was somewhat stronger than that from Congress Heights. Participants were asked to provide basic demographic information using census track compatible categories for age, education, and ethnicity. They also received a written statement confirming that no identifying characteristics would be used in any subsequent communication or publication to ensure privacy.

Males and females were almost equally represented, with a slightly higher representation of female participants. Age groups ranged from 15 to 19 years old to more than 65 years old, with the majority of participants falling into the 35 to 54 year-old age brackets. Participants' formal education also ranged widely; some had no high school diploma and some had postgraduate education. Several participants reported being unemployed, some were retired, and some were attending school, but the majority reported being employed full time. Some participants also identified themselves as being associated with a local business or non-profit organization or with local government.

Records of the focus group participants' vision for their neighborhood in the Five Pillar areas formed the basis for the story. The records showed considerable overlap between the two neighborhoods, which shared several common themes about the kind of economic development that residents of both neighborhoods wanted to see. Key themes included:

- The desire to develop small businesses especially around food, health, and entertainment
- The desire to participate in the new innovation economy through focused education and training
- Green technology as the cornerstone of neighborhood revitalization and opportunity
- Cultural heritage as a development asset that must be preserved and developed

Like the focus group conversations, each chapter of the story is structured by the Five Pillars categories. In the fall of 2016, all focus group participants were contacted and invited to a joint meeting at DC Scholars on East Capital Street to read a draft of the collective Five Pillars story that had emerged from the focus group conversations. Focus group participants from both Ward 7 and Ward 8 attended the feedback meeting, although attendance was small overall. The meeting started with a reading of the initial draft of the story, which was based on the vision for their neighborhoods in the year 2030 shared by the focus group participants.

Meeting participants provided useful comments on the story draft, confirming where it had captured the focus group discussion well, and indicating where it needed additional detail or adjustments. The main thrust of the feedback was that the story needed further detail, especially as it related to the "characters" in the story. Participants did not want the story to use a third person narrative; they wanted it to include real people who reflected key demographics of Wards 7 and 8.

Following the discussion of the story, some of the data collected in the Five Pillar categories was shared. Meeting participants also discussed a few examples of how the data might be used to track progress toward implementing the 2030 economic development vision captured

in the collective Deanwood and Congress Heights Five Pillars story. Meeting participants also wanted guidance on additional data and project management strategies that might be used to implement specific aspects of the Five Pillars story rather than simply tracking the overall progress of the five Pillars areas.

Due to the small size of the feedback meeting, additional participants from the two initial focus groups were contacted randomly in the fall of 2016 to provide further input and ensure that the story reflected the shared vision of focus group participants. What follows is the revised story that takes into account the feedback provided by all participants. Excerpts from this story, as well as a summary of the indicator data collected, were also shared in two public community meetings held in November and December of 2017 at Petey Green Community Center and the Deanwood Recreation Center.

Telling the story of a sustainable economic development future

The year is 2030. The Deanwood and Congress Heights neighborhoods of Washington, D.C. are thriving communities that are sought after by residents and visitors alike. The neighborhood demographics represent a spectrum of young to middle-aged singles, families, and people of retirement age and a diverse mix of races, ethnicities, and cultures that give the area its vibrancy. Both neighborhoods have benefitted from the trend toward urbanization that resulted in the continued growth of the DC metro region, but they also benefitted from deliberate strategies that made home ownership and rents affordable: housing co-ops, land trusts, and rent subsidies.

The newly forged connection between the two historical neighborhoods of Deanwood and Congress Height created a more robust demand for a range of services. In addition, the local demand from neighborhood residents is supplemented by a steady stream of visitors from the DC metro area and from across the nation and the world. Job growth has occurred largely around key initiatives like hospitality, health and wellness, green infrastructure, alternative energy, and the proud history of the Chocolate City.

Education

Ashley's household is one of the 33% of Deanwood households headed by a single woman. Her daughter Tia attends middle school. Education is a major focus for Ashley and mothers like her. A comprehensive re-visioning process that was launched in 2020 redefined education as more than K-12 schooling; Ashley and her neighbors understand that education encompasses a comprehensive top-quality system that offers access points to residents from pre-school age to post-retirement age. Multiple high quality schools from pre-K through 12th grade are located within walking distance from Ashley's house or are easily accessible through publicly funded transportation. A voucher system offered through DDOT provides free transportation to the District's public university system, including the Community College, the Flagship University, and the Law School.

Deanwood and Congress Heights parents have a choice between high-quality public schools, public charter schools, and private schools. School options for the younger students, pre-K through 8th grade, include nontraditional programs like Montessori schools and bi-lingual immersion schools, including schools with less frequently spoken language programs. The neighborhood secondary schools have developed a strong network of special talent schools, such as the Duke Ellington School of Performing Arts and vocational training options focused on the trades and special skills associated with the green economy. Technical certifications are available in fields such as HVAC, IT and data processing, alternative energy, landscaping, green infrastructure, green building maintenance and other fields that have shaped the urban landscape of Washington DC. The early connection between the secondary school systems and the District's public university system has changed the relationship between neighborhood schools and post secondary education, and 70% of all students attending neighborhood schools are college bound from the time they enter middle school. All students have a firm understanding of the importance of continuing education and life-long learning.

Dedicated school counselors are well aware of the available educational options and are skilled at matching high school students with appropriate post secondary options

and business development opportunities. The 17% graduation rate of 2014 has risen to 80 percent. This is due not only to the more robust curriculum and its strong dual academic and green-economy oriented vocational focus, but also to a strong extra-curricular system of education and support for the whole family. Access to educational and support services extends from preschool to post-retirement age.

A particular strong suit of the neighborhood schools is their parental education classes that offer hands-on training on healthy age-appropriate nutrition, cooking, exercise and fitness, child development, healthy TV and gaming habits, accountability and respect; it also focuses on new skills development to enable residents to adapt to the ever changing new economy. Ashley is all too aware that she will have to keep learning if she wants to model the importance of learning for her young daughter. The parental education classes are available to residents with school-aged children at no cost and are offered twice a week during afternoon and early evening hours, as well as most Saturdays.

Skills development classes are offered at a nominal cost and cover a wide range of topics: study habits, health, creating a healthful living environment, reducing clutter, interpersonal skills, customer service, and time management, as well as hard skills like environmental literacy and risk management. Residents cherish these sessions not only for their educational value but for the networking opportunities they offer. As one participant aptly stated, "It takes a village to raise a child and to succeed in life, and this is our village".

Extra-curricular opportunities for middle and high-school students are strong and varied. They consist of a blend of academic and practical hands-on activities focused on skills development and physical and emotional health. Every student has the opportunity to develop future-oriented professional skills, including learning languages like Mandarin Chinese, Arabic and Russian, and vocational skills in green building science, low-impact development, food science, and culinary arts. These co-curricular classes incorporate a strong focus on reading comprehension and quantitative skills and effectively link these basic skills to applied topics. As a result, the low reading and math test scores (20th–40th percentile against national averages) have vastly improved.

Health

Community health and wellness played an important role in the revitalization of the Deanwood and Congress Heights neighborhoods. Key was a shift in focus from treatment to prevention through a network of community health clinics, urgent care facilities, and wellness facilities that are easily accessible to local residents. A primary care facility offers convenient access to the health records of patients of all ages to ease the coordination of prevention and care. Key services that are readily available and easily accessible to local residents include mental health services, drug counseling, prenatal care, child wellness care, and geriatric care—services offered by dieticians, respiratory and exercise scientists, nurses, midwives, and other prevention-focused health professionals. Chronic care management for respiratory illness, nutrition related illness, and mental health are central to the prevention focus of the community health facilities offering a high level of quality care for residents of all ages.

Ashley's neighbor Phyllis is a frequent client at one of the community-based wellness facilities in Ward 7. Phyllis is in her 70s and has lived in the neighborhood most of her life. She has become active in the community garden on East Capitol Street and at Houston Elementary School. It keeps her young, she says, but most importantly it has helped her get off her diabetes pills. An entire network of community gardens provides access to gardening spaces for neighborhood residents to grow some of their food, which has proven to increase the consumption of fresh fruits and vegetables. Phyllis was even trained to teach a monthly gardening workshop to her neighbors.

High-quality locally grown food is a cornerstone of the health and wellness efforts of Deanwood and Congress Heights. Several community gardens were added to the two original hubs at East Capitol Street and Livingston Ave. A local food co-op that coordinates the supply of locally grown produce with area restaurants and grocery stores also coordinates a 200 member strong Commu-

nity Supported Agriculture (CSA) program that prepares weekly deliveries of fresh food for local residents. The co-op also offers employment opportunities for local residents.

The approach of serving local needs through local businesses and non-profits has successfully lowered the unemployment rate in Wards 7 and 8, a rate that once was the highest in the District of Columbia. Two multipurpose wellness facilities are strategically located to provide maximum access to local residents. One of the facilities includes a swimming pool, and both include basketball courts, weightlifting facilities, and space for aerobics classes, yoga, dance and other forms of exercise. The neighborhood schools, too, offer access to their fitness facilities for children and young people during after-school hours. Activities include sports that have not previously been easily accessible to local residents, including swimming and fencing—sports that offer one of the highest scholarship potentials for college-bound students. Cooking classes and nutrition education classes offered at the wellness facilities and at the Urban Food Hubs also assist in reducing food-related illnesses like diabetes, obesity, and hypertension.

Two well-equipped neighborhood parks and a network of running and biking trails are well integrated into the fabric of the Deanwood and Congress Heights neighborhoods. The parks include playgrounds made out of natural materials, fruit trees, raised bed gardens to grow vegetables, and a small pond. The parks have become outdoor community centers, offering intergenerational activities and meeting spaces for families with young children and for the elderly. Free health education events are available every Saturday both at the wellness facilities and, during the warmer months, at the neighborhood parks. And several busy farmers markets offer fresh food options as well as recipe sheets and information about healthy age-appropriate meals. The high rates of obesity and diabetes, which once stood at 44% and 15%, respectively, have successfully been lowered, thanks to these multipronged prevention efforts.

The commitment to fitness, healthy food options, and outdoor activities also provided a basis for viable business development. The afterschool fitness activities, exercise classes for the elderly, and weekend classes about healthy lifestyles are offered by local providers and non-profits. Two of these non-profits operate the two wellness facilities and sub-contract with other providers to offer programs focused on physical health, emotional health, and wellness. The two original UDC Urban Food Hubs at East Capitol Street and Livingston Avenue have long been turned into successful business incubators that have spawned other food-related enterprises, including a local salsa and condiment business; a business that delivers smoothies, jellies, and fresh juices to local restaurants; and a vegan catering business. These local food businesses accept food stamps and WIC coupons and have forged close working relationships with local health providers to ensure a strong focus on prevention through healthy eating, exercise, and wellness.

Environmental Quality and Recreation

There cannot be a healthy community without a healthy environment. Water quality, air quality and soil quality are key in achieving and maintaining strong health outcomes and lowering public health risks.

Recognizing the substantial costs associated with environmental hazards, the District of Columbia has invested considerably in improving the environmental health of Wards 7 and 8. Public sector investments along with a comprehensive education campaign have lowered residential water usage, which once was higher than that of other Wards in the District. Water-saving showerheads, faucets and toilets were installed free of charge. Corroded plumbing and water lines were repaired and replaced, and water contamination issues that had plagued many communities with older infrastructure were successfully mitigated. The kind of comments shared at the 2015 focus group meetings, like "…most of the time I have to boil water to ensure it is safe to drink," are a thing of the past.

Novel aeration techniques implemented in collaboration with the Water Resources Research Institute of the University of the District of Columbia have improved the water quality and aquatic health of the Anacostia

River. Strict monitoring of the total maximum daily loads (TMDLS) reduced pollution levels and improved the health of the River ecosystem. Green roofs have been installed in most of the buildings along the main corridors of Wards 7 and 8, and two Living Machine water filtration plants are integrated into the two public parks in Deanwood and Congress heights. The green roofs and the water filtration systems helped spawn a number of green businesses. The well-trained green infrastructure workforce of the District, which maintains green roofs, green walls, rain gardens, small-scale water filtration, and other green infrastructure options, is largely headquartered in Wards 7 and 8.

Air quality standards too have improved, and comments like "…sometimes it's difficult to breathe outside—I cough a lot and sneeze—it just contributes to a general feeling of unwellness" are quite rare. Nitrogen dioxide levels that once ranked in the 98th percentile of the daily maximum 1-hour values have been lowered to below average levels. Key to achieving these tremendous results was the closure of the coal burning power plants in the DC Metro region. These power plants have been replaced by neighborhood-scale power plants that utilize a mix of solar, geothermal, and wind energy to generate power for clusters of approximately 50 households.

Kevin has been at the forefront of these efforts from the beginning. He is now in his 50s and lives in Congress Heights. He coordinates neighborhood-based energy efficiency and environmental quality efforts east of the river. A centerpiece of these efforts is the network of neighborhood-scale alternative energy plants that dot Ward 7 and 8. Four of these household clusters also share a so-called blue house or Living Machine in addition to the neighborhood-scale energy facilities. These small-scale water filtration systems follow cutting edge standards, using plant systems and sediment materials arranged in linked cylinders as filtration devises. The filtered water is then reused for irrigation and other uses.

Two newly launched Urban Food Hubs form the heart of two low-income public housing complexes. At the center of each of the Food Hubs is a large hydroponics greenhouse. One Hub specializes in food production for local restaurants and grows a wide variety of vegetables, including popular crops like tomatoes, peppers, lettuce, basil, collards and kale and also lesser-known ethnic crops like garden eggs, kiteli, and West African herbs, which are popular with restaurants specializing in African and Caribbean cuisine. The second Hub specializes in horticulture plants used on green roofs, green walls, and in rain gardens. The Ward 8 Food Hub includes a commercial kitchen that serves as training facility and business incubator for food related businesses. Each of the greenhouses is surrounded by raised bed gardens, trellises, and small seating areas that create aesthetically pleasing and peaceful outdoor respite places where neighbors can meet and congregate.

The Urban Food Hubs and neighborhood parks are connected by walking and biking paths that are bordered by shade trees, fruit trees, and berry bushes. These green pathways form a web of green spaces that mitigate heat island effects, add oxygen, and reduce nitrogen dioxide and sulfur dioxide contaminants. This Green Pathways initiative has put Washington DC on the map, and the city has been recognized as an innovator and leader in improving health and wellness in urban neighborhoods by using the space between buildings and public spaces as intentional corridors of environmental and human health and wellness.

Social & Cultural Amenities

At the very center of the transformation of the Deanwood and Congress Height neighborhoods are two museums—the Museum of African American History and the Innovation Museum. The Museum of African American History features the rich history of the area, dating back before the Civil War, when neighborhoods east of the Anacostia river were home to a growing number of freed slaves who worked as skilled craftsmen, hack drivers, businessmen and laborers. The museum links this rich history to today's successful local performers, sports icons, writers and business owners. The Museum is linked to the Congress Heights public library and is a vibrant meeting place for active learning and exploring for all ages.

The second museum features African American inventors, scientists, and entrepreneurs. It connects the rich history of African American inventors to the cutting edge energy generation facilities, water filtration systems, and Urban Food Hubs located in Wards 7 and 8. The museum offers many hands-on exhibits that invite children and adults to learn by doing. It is also connected to one of the neighborhood's business incubators and features weekend workshops where visitors can conduct science experiments and learn from the inside out how the neighborhood's innovative green technologies work and what benefits they create in terms of water savings, reduced energy consumption, and reduced heat island effects, to name a few.

The museums are an integral part of a network of museums, called the Heritage Trail, that takes visitors on a tour of DC's African American heritage, which is a key feature of the city's Cultural Tourism DC network. The Trail includes more than 200 significant and historic sites rich in black history—from churches to schools to famous residences and businesses. It includes the Smithsonian Institution's Anacostia Community Museum, the Frederick Douglass National Historic Site, the birthplace of Duke Ellington, and the music legend's U Street Corridor, where he played with jazz greats like Cab Calloway, Pearl Bailey and Jelly Roll Morton; it also includes landmarks like the Lincoln Theatre, the Howard Theatre, the African American Civil War Memorial and the Thurgood Marshall Center for Justice and Heritage, which is the home of the first African American YMCA.

Tevon is the curator for both museums. His skill and dedication have made both museums a vibrant part of present-day southeast DC. Presentations by entrepreneurs and business workshops are an integral part of the programming the museums offer. The unique contributions of the neighborhood-based Museum of African American History and the Innovation Museum is that they link the rich local history of the Deanwood and Congress Heights neighborhoods to modern-day green technology with innovation focused events that breathe contemporary life into the Heritage Trail, which brings visitors from every corner of the country and the world to the Wards east of the river.

By combining their efforts, the once-separate Deanwood and Congress Heights neighborhoods have attracted a viable base of purchasing power from within and from outside of the immediate local area. The well-planned balance between single-family homes and apartment buildings has preserved a strong basis for local home ownership with 15% of housing being single-family homes and 50% apartments for low to moderate income households. Local residents form a strong basis of local demand that combines comfortably with the inflow of visitors. The neighborhoods take pride in serving the entire demographic spectrum, from children and young adults to senior citizens and from African Americans to Africans, Hispanics, Caucasians, and Asians.

Around the two museums, niche grocery stores, coffee shops, and funky, trendy fusion-style restaurants have sprung up. There are popular hangouts and gathering places serving distinct demographics including families with young children, young adults, West Africans, music lovers, and health enthusiasts, to name just a few. By focusing on distinct anchors, such as the neighborhood park, with its Living Machine, its alternative energy facility, the Innovation Museum, and the African American History Museum, the neighborhoods east of the river have created a unique character that is at the same time contemporary, green, health conscious, and mindful of its rich heritage. This successful fusion now serves as a model for the DC Metro area, and the nation as a whole.

Information & Transportation Access

The local business incubators and the library have significantly increased the neighborhoods' access to information technology. Cell phones have evolved into hand-held connectivity devices that provide password-protected access to everything from library holdings to energy and water use data from the neighborhood-based Living Machine to the green energy generation facilities. Passwords to the green data are distributed free of charge to neighborhood residents. Visitors can access some of the information for a small fee. They can also get connected to self-directed museums tours, event videos, green infrastructure data, and market information.

A local futures market allows the network of small urban food producers to post their expected produce harvest, and local consumers, restaurants, grocery stores, and value-added businesses can place their local produce orders on the same website. The neighborhood coffee shops and parks also provide connectivity, and school-children act as citizen scientists, collecting and analyzing data as part of their regular school assignments. Since the neighborhood has leapfrogged other areas in terms of its connectivity and IT access, communication-intensive businesses love to locate in close proximity to the two business incubators to benefit from the available technologies and communications networks they support. The incubators and green technology parks are also attractive locations for new green technology businesses that are looking for a place to start up within a vibrant area that is relatively affordable.

Weekly training sessions at the library, the business incubators, and several of the area schools address a variety of topics, including software and hardware skills and specific technology and data management needs, at no cost to residents. There are also a few tech-free zones in neighborhood restaurants, parks and designated areas within the two museums. These tech-free zones facilitate conversation and person-to-person interaction. In an age where eye contact and personal attention have almost become a lost art, the Deanwood and Congress Heights neighborhoods have earned a stellar reputation as places where customer service and civic mindedness are thriving, and where children and young adults are developing much sought after soft skills that make them successful throughout their lives and professional careers.

Public transportation is another strength of the community. The neighborhoods are readily accessible by metro and bus. Two additional bus lines have added accessibility for residents and visitors. Especially useful was the addition of a bus line that links attractions east of the Anacostia River to northwest DC, Alexandria, Arlington, and other destinations in northern Virginia. The increased visitor traffic that these added public transportation lines have brought to southeast DC have added purchasing power that supports the health, wellness, and green infrastructure focus that has shaped the vibrant DC neighborhoods east of the river.

Implementing the Vision

Several opportunities emerge from the Five Pillars study. First, the indicators collected in each of the Five Pillar categories can facilitate pro-active, deliberate strategies to improve those areas where disparities and deficits exist. This kind of targeted collaboration will not only improve overall QoL outcomes but will also create a spirit of cooperation and teamwork. The selected indicators are outcome-oriented, pro-active, manageable, and diverse in scope. They are therefore well suited to facilitate collaboration across a wide range of responsibilities, including health, education, environmental quality, and public transportation, and across a wide range of stakeholders, including residents, businesses, the public sector, and non-profit organizations.

The website listing the Five Pillars indicators for the eight Wards of Washington DC can serve as a starting point for much needed public discourse about shared outcomes and shared strategies that will move the indicators in the right direction. In developing such shared strategies, priority must be given to current demographics. It is all too easy to improve some of the indicators through gentrification rather than through deliberate strategies that ensure strong community participation and capacity-building from within those neighborhoods that show low QoL outcomes.

The second strategy relates to the collective story and the vision it paints about the future. The story can itself form the basis for identifying specific initiatives that bring about the articulate collective vision it captures. What follows is a brief discussion of at least one initiative in each of the Five Pillars categories that is taken directly from the Five Pillars story and that may be considered low-hanging fruit. The story is rife with viable community-based development ideas, and it can be analyzed in further detail in collaboration with local stakeholders, especially in the Ward 7 and 8 neighborhoods.

Further opportunities to develop concrete initiatives should be based on the use of the indicators, with a specific focus on closing persistent gaps across the eight Wards.

Shorter-term action items

Education

A frequently mentioned need in the area of education is parenting classes. This was a prominent theme of the focus groups and the resulting Five Pillars story. At a community meeting held by UDC President Ronald Mason on the University's *Equity Imperative*, a strategic plan that seeks to create pathways to the middle class for District residents, meeting participants also mentioned the need for a high-performing education system that focuses not only on high-performing schools but on the educational needs of parents and caregivers so that they can support the educational success of their children and young adults.[72] A starting point can be a parenting certification comprised of classes that teach time management, good study habits, healthy eating, writing proficiency, and other proven elements of learning outcomes success.

The proposed parenting certificate is distinctly different from other continuing education and workforce certificates currently offered in the District of Columbia. Time management skills, emotional intelligence skills, and life skills are recurring themes that these much-needed classes must address. Information about available classes can become an integral part of pre-natal care and child wellness services. The classes can be viewed as a prevention measure that reduces future health and human services expenditures. Effective coordination between Education, Health, Human Services, and Social Services can supply the needed funding for the classes with the anticipation that ongoing expenditures can be effectively reduced over time as parents and caregivers have better skills and knowledge. The successful pre-natal care classes offered in the 1980s through the land-grant programs of the University of the District of Columbia can serve as an effective model for delivering the proposed parent and caregiver classes.

Health

There is a strong and growing consensus that effective health initiatives must focus on preventing illness rather than on treatment alone. This requires better access to wellness care, primary care facilities, family practitioners, nutrition educators, and exercise coaches, all of which who can improve residents' lifestyles and wellness and help manage chronic health conditions. Effective training and incentives for businesses and non-profits in the wellness-care and prevention arena can improve access to services while also creating jobs. Incubator programs for wellness-related enterprises such as exercise clinics, fitness facilities, walking and biking clubs, and nutrition coaching are important aspects of a strategy focused on preventing illness and strengthening health and wellness.

Evidence suggests that while starting wellness clinics and nutrition counseling may be a step in the right direction, it may not be sufficient. For example, two state-of-the-art primary care facilities in Ward 8, Unity and Community of Hope have been well received but not as well attended. Both clinics were started using tobacco settlement money that the District of Columbia received in the late 1990s. In a recent report, Community of Hope CEO Kelly Sweeney McShane stated that the settlement money was transformative and dramatically improved health care access: "The city, I think, used the settlement money very wisely, and has created a bunch of really beautiful health care centers in new locations to expand access." McShane further pointed out that many residents "…haven't accessed care as much, they have way more medications—lots of people living in poverty have lives that are a little more chaotic, it's a little more expensive to get places…that all contributes to not accessing primary care. And then you wait longer and longer and get sicker and sicker."[73]

This points to the many socio-economic determinants of health that may stand in the way of preventive care utilization even as access to care improves. An important component of implementing an effective wellness focus may be a training program for local health paraprofessionals. The program, patterned after the Expanded Food and Nutrition Education Program (EFNEP) that is administered by the UDC Center for Nutrition, Diet and Health and

funded by the United States Department of Agriculture, would train paraprofessionals to serve as trainers for their neighbors and fellow community members, teaching healthy eating habits, age-appropriate diets, and how to shop for healthy food on a budget. These paraprofessional education and training efforts can effectively improve local health outcomes and create jobs for the paraprofessionals. Initiatives in a broader range of service areas beyond nutrition education might be funded by the Department of Health and Human Services and complemented by training programs funded through the District Department of Employment Services and the Department of Small Business Development.

Environmental Quality & Recreation

The Five Pillars story of a thriving future for Ward 7 and 8 offers especially compelling ideas in the category of Environmental Quality & Recreation. One such idea is the establishment of neighborhood-based energy generation and water filtration plants. The promise of economies of scale in the neighborhood-based green economy space is considerable; the neighborhood may constitute the sweet spot in green business development, for it is situated between individual household size systems and larger scale systems that by necessity increase the distance between producers and consumers. The neighborhood-scale enterprises described in the Five Pillars story can allow the District of Columbia to become a leader in neighborhood-based green businesses development.

The Division of Metabolic and Endocrine Drug Products (DMEDP) and the Department of Employment Services (DOES) may be considered as the lead agencies to establish the necessary investment capital and workforce training to develop the neighborhood-scale energy generation and water filtration companies that the Five Pillars story envisions. Models for these types of neighborhood-scale enterprise exist in Europe, where policies support small-scale energy generation by compensating net energy producers for the kilowatt-hours they feed into the grid. Similar policies can compensate for the water security services provided by neighborhood-scale water filtration facilities.

Existing policies in the District of Columbia offer a lot to build on. For example, the innovative storm water credit program offers incentives to those who make water absorption and retention services available to those in need of water retention.[74] For example, a church or school that installs green infrastructure enhancements, like a rain garden on its parking lot to reduce storm water runoff, can sell its excess storm water absorption credits to a business that intends to build an office building and cannot meet the storm water retention space requirements.

Pooling households to invest as a neighborhood in a collective energy generation or water capture and filtration facility can enable larger clusters of households to get off the grid, thus contributing to urban resiliency. Neighborhood-scale facilities can also expand the alternative energy sources currently in use. For example, solar installations that generate energy at the household level are increasingly popular in the District of Columbia, thanks to policies that incentivize increases in local energy generation from alternative sources. Larger clusters have the potential to also increase the viability of other sources like geothermal energy and bio-digesters.

A potentially limiting factor that must be addressed is the energy grid in the District of Columbia. As more households or household clusters generate alternative energy, the grid must be strengthened to balance temporary surplus periods with temporary deficit periods. Energy storage remains a challenge, but neighborhood-scale facilities can facilitate the development of more efficient storage options.

Even more challenging than the energy grid is the water grid. It too is in need of upgrading—not only in Washington DC, but in many urban communities that have outgrown their storm water infrastructure. This is true especially for communities along the highly populated corridor along the US East Coast. The problem is not only with storm-water management but also with meeting residential demand for water. Potable water may be generated through Living Machine and blue house facilities,[75] and water-capture and filtration facilities may be permitted to distribute irrigation and cooling water, which would substantially reduce the demand for potable water overall.

Indeed, only a fraction of the overall water use of households requires that water be of drinking quality, and the need for potable water use may be even lower for production facilities. These interventions through recirculating systems would reduce strain on the aging water grid.

Any level of off-the-grid energy generation and water filtration and reuse will improve the resilience of the District of Columbia and its urban neighborhoods. The Five Pillars story paints a compelling vision of this important aspect of urban resilience through neighborhood-scale facilities. Further analysis will be needed to determine whether policies and innovative financing to support the proposed cooperatively owned neighborhood-scale energy and water processing facilities can viably be created in the short to medium term.

Social & Cultural Amenities

Initiatives in the social & cultural amenities category may find common ground with initiatives to improve health outcomes and green tech outcomes. A recurring theme in both categories is a thriving local food economy, which has the potential to improve food access, eating habits, and job opportunities.[76] This type of food economy would require incentives in the form of startup funds, land access, and tax incentives to support local food production and value-added businesses in the District of Columbia.[77] These incentive strategies may interlock with interventions in other areas such as health and technology, for urban agriculture can do more than provide fresh produce for a local food economy. It can also reduce storm water run-off by increasing absorptive vegetation and permeable surfaces; it can improve public health by expanding access to fresh high-quality produce and changing eating habits; it can create jobs and strengthen local supply chains; and it can improve urban sustainability and resilience.

Local food systems can buffer urban areas against the impact of food access crises resulting from natural and human-made disasters. This is one of the undervalued benefits of urban agriculture, one that is not captured in the market value of businesses engaged in urban food production and food processing. This added value must be expressed deliberately through policies that set explicit goals for local food security, support local food enterprises, and incentivize green infrastructure objectives. Such a multi-pronged resilience policy recognizes the many positive externalities of a robust local food system that typically go unvalued or undervalued.[78]

A successful local food economy will therefore require the support of the right policy signals. Without the right incentives, it is not likely that local food production enterprises will be able to successfully address the needs of local low-income consumers. Producing local food for local consumers is not the same as producing local food for maximum revenue generation. Calculations for the urban hydroponic and aquaponic systems pioneered by the UDC College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES) indicate that the difference between producing high revenue crops and producing crops for a neighborhood farmers market or a CAS can be as high as $80,000 per year for a production space of less than 4000 square feet. The reason for the difference is that the vegetables that are popular in local markets, such as tomatoes, peppers, kale, and collard greens, generate lower revenue than crops such as micro-greens, eatable flowers and herbs that are produced for high-end and niche markets. The wider variety of crops needed for local consumer markets also limits efficiency gains from specialization and thus creates higher production costs than a specialized production facility producing specialty herbs, micro-greens, and ethnic crops. Business incentives that compensate urban growers who are committed to a local production model will be an important step toward making urban food production commercially viable.[79]

Another model to incentivize a local food economy is a tiered taxation system. The system might, for example, have a low tax rate (or no taxes at all) for farmers in the Washington DC metro area and a fifty-mile radius beyond; higher taxes for growers outside the immediate DC area; and a higher still tax rate for food retailers who do not grow food themselves nor source from local producers. These kinds of incentive systems can be implemented relatively easily in the short to medium term. Regrettably,

many urban food policies are stuck in the belief that urban agriculture is limited primarily to the non-profit sector and has limited commercial viability. What is needed is the political will to support a local food economy that goes beyond the concept of urban food production as a domain of the non-profit sector and supports a vibrant private sector food economy.

Information & Transportation Access

One of the more immediate needs emerging from the Five Pillars story is the need to establish an easily accessible communication tool that will widely disseminate information about the visionary initiatives the Five Pillars story identifies. Sharing the story at the local and regional level is the basis for inviting collaboration and support.

A number of the initiatives envisioned in the Five Pillars story will not be sustainable at the micro-level of a neighborhood or a Ward. For example, some of the proposed social and cultural amenities, such as the Deanwood Museum of African American History and the Congress Heights Innovation Museum, will depend on interest, support and purchasing power from beyond the two Wards. Washington DC and its downtown area are already a tourism destination. This offers opportunities to broaden historical and educational opportunities and to push them into DC neighborhoods outside of the main tourism corridor. To expand and decentralize attractions will, however, require a coordinated development and communication strategy. The African American History museum that opened its doors in 2016 has been sold out ever since. This indicates that there is a strong interest in the historical and educational topics suggested by the focus group participants, and this interest can be captured in the Social and Cultural Amenities pillar of the Five Pillars story. A starting point to implementing this vision may be an expanded route of the circulator bus to include neighborhoods and destinations in Wards 7 and 8 that are of historical significance. The availability of this expanded route can be communicated online and through social media, as well as through printed informational materials that can be made available at hotels and ticketing services.

As this brief analysis shows, the collective Five Pillars story offers viable local development opportunities for Washington DC. To implement these opportunities will require deliberate collaborative efforts from residents and organizations across public, private and civic society. Tracking progress towards selecting and implementing the priority initiatives outlined in the collective Five Pillars story exceeds the scope of the Five Pillars indicators alone. Specific project management measures and targets will have to be identified for each initiative that is prioritized for implementation.

However, the implementation of the story-based initiatives will itself advance some of the indicators collected in each of the Five Pillar categories. Moreover, collecting and reporting the Five Pillars indicators is itself an important initiative, for it can form an effective starting point for a collective vision of community-based development that is practical, manageable, action-oriented, and committed to closing persistent development gaps.

Connecting DC Initiatives

Washington DC has seen many worthwhile studies and plans to improve the city's QoL and address the disparities among its Wards. Recent publications include the DC Health Equity Plan, which studied health disparities,[80] and the Resilient DC Plan, which outlines DC's plans to address impending climate change impacts.[81] Other studies have focused on addressing affordable housing needs, such as the One City Action Plan, which addresses persistent disparities,[82] and the Sustainable DC Plan, which is now in its second iteration[83] (Sustainable DC 2014, 2015, 2016, 2017).

The DC Health Equity Plan identifies social and structural determinants of health and concludes that only 20 percent of health outcomes are attributable to clinical factors while 80 percent are caused by non-clinical factors. The key factors highlighted in the report are similar to the categories included in the Five Pillars study, including education, employment, income, housing, transportation, food, the outdoor environment, and safety. Dr. LaQuandra Nesbitt, Director of the DC Department of Health,

writes:. “Health inequities are neither natural nor inevitable. Opportunities for health are driven by a broad spectrum of societal, structural and institutional laws, policies and practices . . . We must engage multiple sectors and community partners to generate collective impact which is essential to improving the health of all District residents, including achieving health equity, as we work to become the healthiest city in America.” (pg.4)[84]

The recently published Resilient DC Plan outlines proactive ways to prepare Washington DC for the impending climate change impacts that are expected to pose considerable burdens for the city and its infrastructure. Risks may stem from the Potomac and Anacostia Rivers rising, up to three feet over their current levels; from heat emergencies, which are predicted to occur twice as frequently as they do in 2018; from so called “hundred-year” storms hitting every 20 years; and from increased social tensions that are the result of persistent disparities as the costs of disasters are not distributed equally but are born primarily by those who can least afford them. The specific areas addressed by the Resilient DC Plan are similar to the Five Pillars categories: strategies for inclusive economic and population growth that alleviates disparities; initiatives to improve health and safety outcomes for all DC neighborhoods; strategies to uphold DC’s commitments to the Paris Climate Accord and to make DC a national leader in climate adaptation efforts; and strategies for implementing the safe and effective use of technology that is captured in the phrase “smart cities.”

The One City Action Plan identified strategies to alleviate disparities between the DC Wards in order to make Washington DC a better place to live, “regardless of race, religion, ethnicity, sexual orientation, gender identity, ward or neighborhood”[85] (DC One City Action Plan 2012, pg.4). The Plan focuses on three primary areas that are well aligned with the Five Pillars study and the indicators it proposes: (1) Economics, (2) Educational and Workforce development, and (3) Quality of Life. Several of the objectives of the One City Action Plan can be assessed using the indicators collected for the Five Pillars study. This study can therefore be viewed as a pro-active approach to identifying lead indicators that set the stage for successful economic development, education, and quality of life outcomes, with a lower spread in the indicators showing progress toward the One City Action Plan goals.

The Sustainable DC Plan is a comprehensive action plan that seeks to make Washington DC the greenest, healthiest and most livable city in the United States by 2032. Like the Five Pillars report, the Sustainable DC Plan is committed to citizen engagement; its goals are rooted in the aspirations that DC residents have for their city and its diverse neighborhoods. The Plan identified 11 solutions categories, 31 goals and targets, and 143 actions. The actions can be tracked using many of the same indicators proposed by the Five Pillars study. In addition to including participation from residents, Sustainable DC has also made efforts to collaborate with organizations across DC and to set actionable targets across DC agencies. However, these longitudinal efforts will be challenging, given the large number of goals, targets and actions the Plan identifies.

The tables in the Appendix to this report summarize the Sustainable DC goals and the One City Action Plan and shows how they align with the Five Pillars study and its proposed categories and indicators. While there is considerable overlap between the studies, there are also distinct differences. All three studies focus on quality of life objectives, yet the Five Pillars study views these objectives through the lens of community-based economic development and takes a more targeted view of assets and barriers to economic development. It also is the only report that offers an analysis at the level of the eight Wards of Washington DC.

These examples illustrate the many worthwhile efforts to identify measures that track progress toward identified goals, be they improved resilience, better health, or greater equity across the District of Columbia. Regrettably, there are too many of these worthwhile efforts, too many goals and objectives, too many indicators, and too little coordination. This can be overwhelming, undermine accountability, and stifle progress.

To ensure that progress is not impeded, a manageable number of indicators must be identified. These indicators should be able to be tracked longitudinally, should engage agencies across the broad spectrum of government,

and should advance sustainable locally based development. The Five Pillars model offers such a coordinated approach. While some of the indicators within the Five Pillars categories may have to be modified using input from residents, DC agencies, and private and non-profit sector stakeholders, the Five Pillars study offers a useful starting point for the longitudinal assessment, coordination, and accountability needed to make interventions as deliberate, proactive, and successful as possible.

Closing information gaps

The Five Pillars study identifies meaningful indicators at the level of the DC Wards in all of the Five Pillars categories. These categories are well aligned with the goals and objectives of a number of other DC-wide studies that seek to improve the quality of life of DC residents and particularly to close the gap between those who have abundant access to quality services and living conditions and those who do not.

This study also engaged local residents and other stakeholders from two neighborhoods in Wards 7 and 8 in new ways. Rather than engaging residents as participants in a study or planning process, the Five Pillars study engaged them as local experts and asked them to share their vision for local development opportunities through a storytelling approach. This approach places explicit value on the considerable local expertise present in the Ward 7 and 8 neighborhoods and engaged these local experts in writing the Five Pillars story. Engagement that poses questions about citizens' vision for the future of their neighborhood in an open-ended yet structured way is critically important. As the Five Pillars story shows, the creativity and vision captured in the story is impressive and offers many viable pathways for improved QoL outcomes, including better health, educational preparedness, and sustainability. These outcomes, and the stakeholder engagement that identified them, has the potential to move economic development in the Wards east of the river in the right direction.

As the Five Pillars analysis shows, there are significant disparities between the eight Wards of Washington DC in all of the Five Pillars categories. Disparities are especially pronounced in the area of social and cultural amenities, environmental quality and recreation, and health. Some of the social and cultural amenities indicators are especially lacking in Wards 6, 7, and 8, with the bulk of the amenities clustered in the downtown areas. This pattern is not unusual; most metro areas have a dense cluster of amenities in their immediate downtown area and the density of services increasingly declines as the distance from the urban core increases. In DC, this pattern is rather pronounced, and the less central Wards have a lower density of services than any residential neighborhood in a metropolitan area would expect to have, including in grocery stores, coffee shops, and food access.

It is clear that significant disparities also exist in the Environmental Quality & Recreation indicators, although indicators in this category show the most serious data gaps at the Ward level, with available indicators in this category skewed toward recreation rather than environmental quality–related indicators. To some extent, this is not surprising, for environmental quality data generally does not follow jurisdictional boundaries and tends to be collected at a larger scale. Water and air pollution data, for example, follow airflow patterns, watersheds, and aquifers that cross administrative boundaries. These data are therefore difficult to disaggregate to capture Ward-level information. Better data at the Ward level would be useful, especially data related to water quality, pervious surfaces, and green cover. Collecting this kind of disaggregated water quality data would require getting individual households and neighborhoods involved, since water quality is influenced not only by the water distribution system at the water utility level but also by the quality of pipes and appliances in each household. Improvements in granularity of data collection are much needed to track progress toward the goals articulated in the Five Pillars story.

Availability of health data ranks in the middle of the Five Pillars categories overall. Indicators in this category are generally available, but it is sometimes difficult to compare them accurately, for definitions vary across studies and across the organizations that collect and report data. The

available data indicate significant disparities in preventable diseases, such as food-related illnesses (obesity, diabetes, hypertension, etc.). Shockingly high disparities also exist in the area of infant mortality. The critical importance of prevention and wellness care to reduce infant mortality rates is well documented, and prevention of food-related illnesses is also crucial to improving the population's overall health and quality of life. However, better data is needed at the Ward level to track the availability, accessibility, and utilization of prevention and wellness oriented services.

Despite considerable disparities in education across the eight Wards, education is relatively strong compared to other metro areas. Overall, the District has a highly educated workforce, which is an asset in today's post-industrial economy. Yet there is still a long way to go to close the educational disparity gaps, especially in the areas of achievement in post secondary education and college completion rates. In addition, better data and more consistent definitions of performance indicators are needed to reliably track truancy rates, reading scores, and other useful educational indicators—indicators that provide meaningful longitudinal information that can be used to create interventions that address achievement gaps. However, data for these indicators are not readily available, and information about continuing education, workforce development, and life-skills oriented education programs is not consistently collected or categorized.

The District of Columbia ranks high in the information technology and transportation category. The city can be considered public transit–friendly, despite the challenges with the District's metro rail system and the need for additional bus routes that reduce commuting times from neighborhoods in the northeast and southeast of the city. However, better data about both transit and Information Technology is needed at the Ward level. Most indicators in this Pillar are available only at the District level. Recent publications shed light on the persistent disparities in IT access across the eight Wards of the District, but tracking long-term progress will require better and consistent data collection efforts.[86]

Data availability limitations

Several data gaps remain. Data at the level of the DC Wards is not consistently available for all indicator categories. It is easier to obtain data at the District level, but some of the data collected in the various DC studies is rather specialized. In many cases, the Five Pillars study used Census track or zip code level data to calculate needed Ward-level data. ome of the data collected was based on the Census long form; others were based on the five-year American Community Survey. The fact that Census tract boundaries changed during the time frame analyzed in this study adds slight distortions. Similarly, various District agencies use different boundaries for their data collection efforts, posing additional challenges to a longitudinal analysis of data. For example, the Census Bureau uses 2012 Ward boundaries for all data collected after 2011, but most DC agencies still use 2002 boundaries.

Despite these challenges, the data analysis at the Ward level provides meaningful and robust information. To further facilitate the use of shared data and common indicators, the Five Pillars study is available at no cost and plans are underway to identify strategies to disseminate the study in the neighborhoods where the information was generated. Since the indicators collected for the study are based on the more granular level of the eight Wards rather than the District of Columbia as a whole, this study is well positioned to track trends in the long run and to assess whether existing gaps are being narrowed or exacerbated. This should make the Five Pillars study a useful tool to complement other sustainable development and QoL focused efforts in the District of Columbia.

While efforts must be made to address these data gaps (particularly in the areas of Environmental Quality & Recreation and Information & Transportation), the Five Pillars indicators were not designed to work toward implementation on their own; they must be combined with project-specific data and benchmarks to track progress toward realizing the vision of the Five Pillars story.

The Five Pillars indicators can, however, serve as an overarching District-wide tool to drive progress toward better

QoL outcomes and more robust development assets for all eight Wards. Further discussions to create consensus about which indicators should be included in each Five Pillars category will be an important next step to refine the selected indicators. These discussions should also assess missing indicators or indicators that are collected in an inconsistent manner. A manageable number of indicators can then be selected to guide progress toward shared QoL based development outcomes. The common indicators can then be used to identify trends and to coordinate the District's development efforts in a consistent and dependable manner.

Conclusions

The Five Pillars of Economic Development study offers a novel approach to economic development that is based on the premise that sustained and sustainable economic development grows out of the assets—both material and social—of local communities and regions. These development assets are expressed in the Five Pillars of Economic Development: education, health, environmental quality & recreation, social & cultural amenities, and information & transportation access.

All Five Pillars can be viewed as qualitative yet measurable outcomes that are associated with a high quality of life and a high capacity for economic development. The Five Pillars model does not focus on reactive economic development indicators like income per capita and unemployment; instead, it tracks proactive indicators that are critical in bringing about positive economic outcomes: improved health, educational achievement, desirable social & cultural amenities, environmental quality & recreation, and information & transportation access. These indicators drive strong and sustainable economic development rather than simply measuring outcomes post hoc. These types of proactive measures are especially important in the post-industrial economy of smart, green, design-, and creativity-based products and services, where QoL factors play an increasingly important role in successful economic development.

The Five Pillars study proposes a total of 31 indicators in the five relevant categories plus an additional 14 indicators that provide background information and define a baseline with which to compare the indicators' changes over time.

In the second, qualitative component of the study, two communities in Ward 7 and 8 that have suffered from persistent economic disparities in the Five Pillars categories were invited to participate in focus groups, where they developed a collective pro-active vision for the economic future of their neighborhoods. The vision that focus group participants in these two Wards painted of the future development in their neighborhoods is nothing short of impressive. The story and its Five Pillar components are articulate, compelling, well informed, creative and achievable. Key themes of the story developed by the focus group participants include education efforts focused on parents and life-long learners; a strong local food economy; a wellness economy focused on prevention rather than treatment; a green economy focused on neighborhood-scale alternative energy generation, water treatment, and management facilities; two engagement-oriented museums focused on African American history and innovation; and a transportation and information sector focused on broad access options (including IT options) that advance health outcomes through prevention.

The identified Five Pillars indicators are well aligned with this Five Pillars story and can track progress toward the implementation of the story elements and toward improved development outcomes overall. Yet some important indicator data is unavailable at the level of the DC Wards. The selected indicators must therefore be considered a starting point intended to spark further discussion about a comprehensive yet manageable set of Five Pillars indicators for the various Wards and even neighborhoods in Washington DC.

Of course, it would be unrealistic to expect a set of indicators that is manageable in size to address all aspects of implementing the story elements and initiatives detailed in the compelling Five Pillars story inspired by Ward 7 and 8 residents. Specific initiatives must be prioritized, and implementation for each of the story aspects will require a commitment to a specific project. For example, if the neighborhood-based energy generation facility is chosen as the first priority, planners must carefully select specific

project management–oriented indicators to track the successful implementation of the energy generation facility project, including technology, training, and distribution needs, supply lines, permits, policies and more.

This report is a starting point, but a promising one. Its promise is first and foremost anchored in the creativity and vision of the residents in Wards 7 and 8 who formed the core of the Five Pillars focus groups. These residents are tremendous local assets. Secondly, the model offers a promising—and much needed—starting point for selecting shared indicators that are suitable to coordinate and pro-actively direct the many worthwhile development efforts under way in public and private sector organizations across Washington DC.

While the Five Pillars and the indicators within each of the pillars leave room for the selection of project-specific indicators for each specific effort, its real strength lies in its creation of a shared vision and direction and a shared set of measurements to track progress. Without a manageable, action-oriented, outcomes-focused set of longitudinal indicators, it would be challenging to gain the momentum, collaboration, and accountability necessary to make Washington DC the green, equitable, and livable city it aspires to be.

Appendix A

Table 15 in this appendix summarizes the Sustainable DC goals and their alignment with the Five Pillars goals. While there is considerable overlap between the two approaches, there are also distinct differences. Both studies focus on quality of life objectives, yet the Five Pillars study views these objectives through the lens of community based economic development and takes a more targeted view of assets and barriers to economic development.

Table 16 summarizes the goals and objectives of the One City Action Plan. It too indicates considerable alignment with the Five Pillars categories and the indicators that describe them. This plan is especially committed to alleviating disparities across the Quality of Life– and Economic Development–focused objectives of the District of Columbia.

Table 15: Sustainability DC Targets

Sustainable DC Categories and Goals	Targets	Five Pillars
Jobs & the Economy Goals		
Grow and diversify DC's business sector for sustained economic prosperity	Triple the number of small businesses	✓
Expand the number and range of jobs; ensure access to jobs through training	Cut citywide unemployment by 50% and increase the number of green jobs 5-fold	✓
Health & Wellness Goals		
Inspire healthy active lifestyles for all residents	Cut the citywide obesity rate by 50%	✓
Create healthy environments conducive to healthy living	Require all new housing projects to meet 'healthy by design' standards	
Equity & Diversity Goals		
Ensure that all school-age children are educated in sustainability and prepared for a changing green economy	Teach at least 50% of children about sustainability concepts	✓
Ensure transparency in DC's sustainability agenda	Expose 100% of DC residents to sustainability events and initiatives	
Climate & Environment Goals		
Minimize the generation of green house gas emissions	Reduce greenhouse gas emissions by 50%	✓
Advance physical adaptation and human preparedness to increase DC's resilience to future climate change	Require all new buildings and infrastructure projects to assess climate change impacts	
Built Environment Goals		
Increase urban density to accommodate future population growth within DC's urban areas	Increase the DC population by 250,000 new residents	
Develop active and vibrant neighborhoods to create new economic opportunity and a high quality of life	Provide a variety of amenities and services within a 20-min walk of all residents	✓
Improve the sustainability performance of existing buildings	Retrofit 100% of commercial and multi-family buildings to achieve net-zero energy	

Sustainable DC Categories and Goals	Targets	Five Pillars
Ensure the highest standards of green building design	Meet net-zero energy for new construction	
Energy Goals		
Improve the efficiency of energy use to reduce energy consumption	Cut citywide energy use by 50%	
Increase the proportion of energy sourced from clean and renewable sources	Increase the use of renewable energy to make up 50% of DC's energy supply	✓
Modernize energy infrastructure for improved efficiency and reliability	Reduce annual power outages to between 0 and 2 events of less thank 100 min/yr.	✓
Food Goals		
Increase agricultural land uses within the District	Increase agricultural land by 20 acres	✓
Ensure universal access to secure, nutritious and affordable food sources	Ensure 75% of residents live within ¼ mile of a community garden, market or store	✓
Develop the food industry into a strong and viable sector	Grow or obtain 25% of food within100 miles	✓
Nature Goals		
Protect and restore wetlands, waterways and aquatic ecosystems	Increase acreage of wetlands long the Anacostia and Potomac by 50%	✓
Protect and expand tree cover and green landscapes, creating a District-wide ecosystem	Cover 40% of DC with a healthy tree canopy	✓
Enhance access to parks and open spaces for all residents	Provide parks or natural space within a 10-min walk of all residents	✓
Transportation Goals		
Improve connectivity and accessibility through efficient, integrated, and affordable transit systems	Increase use of public transport to 50% of all commuter trips	✓
Expand provision of safe, secure infrastructure for cyclists and pedestrians	Increase biking and walking to 25% of all commuter trips	✓
Reduce traffic congestion to improve mobility	Reduce commuter trips by car by 25%	✓
Improve air quality along major transportation routes	Eliminate "unhealthy" air quality index days	
Waste Goals		
Reduce the volume of waste generated and disposed	Reduce total waste by 15%	
Reuse materials to capture their economic value	Reduce construction waste by 20%	
Increase the citywide recycling rate	Reach a total waste diversion rate (recycling, composting etc.) by 80%	
Water Goals		
Improve the quality of waterways to meet standards suitable for fishing and swimming	Make 100% of DC waterways fishable and swimmable	✓
Relieve pressure on storm water infrastructure and reduce long-term flood risk	Use 75% of landscape to capture rainwater for filtration and reuse	✓
Reduce demand for portable water and increase rainwater reuse	Decrease total water use by 40%	✓

Table 16: Once City Action Plan Targets

DC One City Action Plan	Indicators	Five Pillars
Economic Goal & Strategies		
Grow and diversify the District's economy by improving existing economic sectors, attracting new and innovative enterprises, building new opportunities in neighborhoods, and becoming the most sustainable city in the world	Increase the number of jobs	✓
	Diversify the economy	✓
	Reduce the unemployment rate	✓
	Increase the use of renewable energy	
Education & Workforce Development Goal & Strategies		
Educate and prepare the workforce for the New Economy by starting early with our infants and toddlers, improving the education system, and aligning residents' job skills with new job openings	Increase percentage of children entering Kindergarten learning readiness prepared	
	Set quality standards of childcare and child development programs	
	Improve DCPS four-year graduation rates	✓
	Increase young adult employment rates	✓
	Increase % of college degrees and industry certifications among DC youth	✓
Quality of Life Goal and Strategies		
Improve the quality of life for all by increasing the safety of our neighborhoods, improving the health of our residents, providing more affordable housing options, and strengthening overall government accountability.	Increase the DC population	
	Reduce homicide rates	✓
	Reduce infant mortality rates	✓
	Increase health care coverage for the uninsured	✓
	Reduce obesity rates	✓

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