Health Resources in Action
Advancing Public Health and Medical Research

Health Resources in Action (HRiA) is a national non-profit public health and medical research organization, located in Boston, whose mission is to help people live healthier lives and build healthy communities through policy, research, prevention and health promotion.

OASIS ON BALLOU:

Health Impact Assessment Report

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Executive Summary

Codman Square Neighborhood Development Corporation (CSNDC) has proposed the multi-use development of adjacent parcels of land at 100 Ballou Avenue in the Woodrow-Mountain section of Boston's Dorchester Codman Square neighborhood.

The site, *Oasis on Ballou*, is proposed to have the following components:

- A ***Tot Lot*** that would serve as a small, age-appropriate playground serving primarily children of preschool age in the neighborhood
- ***Teaching and Production Gardens*** in which neighbors could learn to garden and that would produce and sell fruits and vegetables to the local community
- A ***Learning and Teaching Kitchen***, within a proposed new building structure, that would mostly serve the function of imparting cooking skills, using primarily products from the associated garden.

CSNDC met with Health Resources in Action (HRiA), a national non-profit public health and medical research organization in Boston, to examine the potential health and equity impacts of the site design, using a Health Impact Assessment (HIA) methodology.

The goals of the Oasis on Ballou HIA are the following:

1. To build capacity among stakeholders (individuals and organizations) to understand and utilize the HIA process
2. To empower the CSNDC and Woodrow Mountain residents ("The Friends") to envision and plan for the redevelopment of the vacant 100 Ballou Avenue site with an explicit consideration of the health impacts of the site

HRiA engaged two groups of stakeholders to assist with conducting the HIA for Oasis on Ballou. These two groups were *The Friends* and *The Advisory Committee*. The Friends, a group of residents from the Woodrow Mountain neighborhood, were actively engaged throughout the HIA process to solicit feedback regarding their interests and concerns for the site and use these to drive the scoping to recommendations phases of the HIA. The Advisory Committee, made up of representatives from local, relevant non-profit and governmental organizations, was convened twice to provide public health expertise and resources in the scoping, assessment and recommendations phases as well.

Based on the interests and concerns of The Friends, as well as the experience and expertise of the Advisory Committee, the scope for this HIA examined the following questions:

- *How will Oasis on Ballou impact the rates of chronic health conditions (e.g., obesity, heart disease and diabetes)?*
- *How will Oasis on Ballou impact levels of mental health (e.g. depression and anxiety)?*
- *How will Oasis on Ballou impact rates of injury (e.g., accidents, poisonings)?*

In order to answer these questions, and make the connections between the site components and the potential health outcomes, a mixed method approach was utilized, including:

1. ***Secondary Data Analysis:*** summary of statistics available on neighborhood demographic characteristics, health behaviors and health outcomes related to the health areas of interest
2. ***Resident Survey:*** an 18-question survey to assess local residents' current behaviors, perceptions and values
3. ***Literature Review:*** examination of peer-reviewed and grey literature for the three site components and the overall site.

Key findings from the HIA included the potential for positive impacts on the level of physical activity, healthy food access and healthy eating, social interaction and social cohesion. Potential negative impacts included exposure to soil toxins, injuries, and crime. Overall, the HIA found that Oasis on Ballou would have significant positive impacts on the health of local residents if designed according to the recommendations and resources presented in the report.

Below is a table summarizing the overall impact of Oasis on Ballou on immediate and intermediate health impacts for each of the site components as well as the development as a whole. The table also summarizes the strength of the data to support these conclusions.

TABLE 1. HIA SUMMARY OF FINDINGS

TOT LOT

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Physical Activity	+	Likely	Children & Caregivers	High
Social Interaction	+/– (children ? (adults)	Likely	Children & Caregivers	High
Perception of Safety	?	Likely	Children, All users, Neighbors	High
Crime	–	Uncertain	Children, All users, Neighbors	High
Sense of Well-being	?	Uncertain	Children & Caregivers	Medium
Social Cohesion	+	Likely	Children & Caregivers	Medium
Exposure to Soil Toxins	–	Likely	Children, potentially Caregivers	High

TEACHING/PRODUCTION GARDEN

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Physical Activity	+	Likely	Participants	High
Social Interaction	+	Likely	Participants, Especially Youth & Elderly	High
Perception of Safety	+	Likely	Participants, Their Families/ Networks, Wider Community	High
Crime	+	Likely	Participants, Their Families/ Networks, Wider Community	High
Sense of Well-being	+	Likely	Participants, Possibly Wider Community	Medium
Social Cohesion	+	Possible	Participants, Possibly Wider Community	Medium
Exposure to Soil Toxins	–	Possible	All Participants, Especially Children	High

LEARNING/TEACHING KITCHEN

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Health Food Access	+	Likely	Participants, Families/Networks, Wider Community	High
Food/Nutrition Skills & Knowledge	+	Likely	Participants, Families/Networks, Wider Community	High
Social Interaction	+	Likely	Participants	High
Healthy Eating	+	Likely	Participants, Families/Networks,	High
Social Cohesion	+	Likely	Participants	High
Sense of Well-being	+	Possible	Participants	Medium

OVERALL SITE IMPACTS

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Physical Activity	+	Likely	Users	High
Social Interaction	+/–	Likely	Users, possibly Neighbors	Medium
Social Cohesion	+	Likely	Users, possibly Neighbors	Medium
Crime	–	Uncertain	Users, Neighbors	Medium
Traffic	–	Uncertain	Users, Neighbors	Medium

DIRECTION:

\+ (Positive Health Impact)
– (Negative Health Impact)
? (Unable to assess)

LIKELIHOOD:

Likely (likely the impact will occur as a result of the project)
Possible (possible that the impact will occur as a result of the project)
Unlikely (unlikely that the impact will occur as a result of the project)
Uncertain (unclear if the impact will occur as a result of the project)

DISTRIBUTION:

Subpopulations affected

STRENGTH OF EVIDENCE:

High (Primary Survey Data, Secondary Data, and Strong Literature Base)
Medium (Strong Literature Base and Primary Survey Data OR Secondary Data)
Low (Weak Literature Base OR Secondary Data)

Based on the impact assessment findings, a set of recommendations was proposed to mitigate the negative health impacts and maximize the positive health impacts of Oasis on Ballou.

Recommendations prioritized by stakeholders include the following:

- Use Active Design principles for the Tot Lot to promote physical activity and social interaction
- Install safe ground cover for the Tot Lot to prevent injuries
- Make raised garden beds to avoid growing food in contaminated soil
- Install vandalism-proof lighting and benches as barriers against potential vandalism
- Install water fountain to provide an alternative to sugary beverage consumption
- Install hand washing stations to avoid ingestion of contaminated soil
- Create signage regarding site hours and proper usage to keep the property safe
- Partner with local gardening and cooking organizations to learn best practices and hold events/programs to promote social interactions
- Hire a local resident as a site manager to perform ongoing maintenance and to ensure proper usage of site and connection to the neighborhood

The findings of this HIA will be presented to CSNDC and other stakeholders involved in the project, as well as external stakeholders who may have an interest in the HIA process or outcomes. CSNDC will use the HIA findings in determining the final site design for Oasis on Ballou and in applying to the City of Boston to procure the currently vacant land at 100 Ballou Avenue.

Several suggested indicators for monitoring the impacts and outcomes of the site include:

- How many residents (adults and children) utilize the site?
- Have gardening and cooking skills/ knowledge changed in the neighborhood?
- Has fruit and vegetable (healthy food) access and consumption changed in the neighborhood?
- Has physical activity in the neighborhood changed?
- Has the level of neighborhood social interaction changed?
- Has the perception of safety in the neighborhood changed?
- Has the incidence of crime in the neighborhood changed?
- Do neighbors believe that the Oasis on Ballou affects their sense of well-being?
- Has traffic volume in the neighborhood changed?

REPORT ORGANIZATION

This report will summarize the process, data and findings that were utilized by HRiA in developing a set of practical recommendations for enhancing the health benefits as well as mitigating any potential hazards associated the three components being contemplated for the Oasis on Ballou. In addition, because of the challenging and inequitable conditions often faced by lower-income neighborhoods of color — such as lack of access to community resources and conditions that promote optimal health, safety and quality of life — the HIA process examined how this project can foster greater neighborhood access to these important social determinants of health.

The report is organized into four major sections.

Section I

Provides an overview of the project, decision-makers and timeline for this HIA process; outlines the screening and scoping phases of this HIA, with a focus on stakeholder and community engagement; describes the research questions that guided HRiA's examination of the project, and includes pathway diagrams to show the connections between the site components and potential health impacts and outcomes; and discusses the assessment methodology used to assess the potential health impacts.

Section II

Provides a description of the health behaviors, perceptions and status of the neighborhood, and characterizes how each of the three project components may impact the neighborhood's health based on the research.

Section III

Proposes recommendations on how to best maximize the benefits and minimize the hazards associated with the project as a whole, as well as with each of the three components.

Section IV

Outlines the plan for the dissemination of the HIA findings; gives suggested considerations for evaluating whether the HIA met its goals; recommends indicators for monitoring the impacts and outcomes over time; and discusses limitations of the HIA.

Appendices

Contain detailed findings referred to in the body of the report, as well as further information and resources that will serve to better inform decision makers on executing the recommendations in the last section.

Section I: Introduction

The Project

The 100 Ballou Avenue project (hereafter referred to as "Oasis on Ballou") is located in South Dorchester, Boston. It is located in a largely residential neighborhood in the Woodrow Mountain section of Boston's Codman Square neighborhood.

OASIS ON BALLOU SITE

The site is currently a vacant lot comprised of 23,000 sq. ft. of land, currently owned by the City of Boston, directly next to the Fairmount Corridor Commuter Rail Line. The Fairmount Corridor Commuter Rail Line currently runs from South Station south through the Boston neighborhoods of Dorchester, Roxbury, Mattapan and terminates in Hyde Park. It consists of approximately 9.2 miles of track. It is the only Commuter Rail Branch that exclusively serves the City of Boston and MBTA's Urban Core. However, there is a currently not a rail stop near Oasis on Ballou.

The CSNDC hopes to purchase the Ballou Avenue land from the City, and requested Health Resources in Action (HRiA) to examine the health impacts of their design for the Oasis on Ballou that would include three key components:

- A ***Tot Lot*** that would serve as a small, age-appropriate playground serving primarily children of preschool age in the neighborhood
- ***Teaching and Production Gardens*** in which neighbors could learn to garden and that would produce and sell fruits and vegetables to the local community
- A ***Learning and Teaching Kitchen***, within a proposed new building structure, that would mostly serve the function of imparting cooking skills, using primarily products from the associated garden.

This HIA examines the potential health and equity impacts of the above site design, given the articulated and inferred needs and desires of the neighborhood, based on both qualitative and quantitative research gathered as part of the HIA process.

POPULATION

This section presents demographic and socioeconomic characteristics for census tract 1002 (the Ballou Avenue neighborhood), South Dorchester, Boston, and Massachusetts for purposes of comparison.

According to the 2005–2009 American Community Survey, South Dorchester had an estimated population of 47,817 residents, comprising 7.6% of Boston's total population (625,304). The census tract within which the Oasis on Ballou resides had a total population of 2,997, which was 6.3% of South Dorchester's population.

RACIAL AND ETHNIC DISTRIBUTION

Table 2 displays the racial and ethnic composition of census tract 1002, South Dorchester, Boston, and Massachusetts. Most of South Dorchester residents self-identified as Black at 44%, which was double the percent of Blacks citywide (22%).

One-third of residents were White (33%) and 11% were Latino. Less than 10% of residents identified as Asian (5%) and mixed race (2%). Within census tract 1002, over three-fourth of residents self-identified as Black (78%) and 15% as Latino. Thus, the neighborhood around Oasis on Ballou is comprised almost entirely by people of color.

TABLE 2. RACIAL/ETHNIC COMPOSITION

	Asian	Black	Latino	Other Race	Two or More Races	White
Massachusetts	5%	6%	10%	2%	2%	76%
Boston	9%	22%	17%	2%	2%	47%
South Dorchester	5%	44%	11%	*	2%	33%
Census Tract 1002	1%	78%	15%	2%	3%	1%

Note: *Other Race includes American Indians/Alaskan Natives, Native Hawaiian/Other Pacific Islanders, and Some Other Races.*

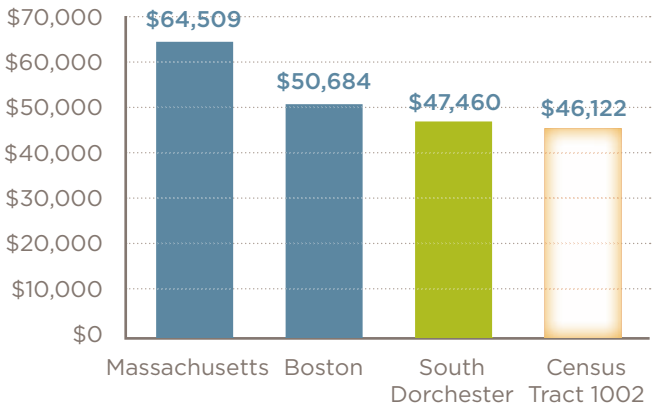
** Insufficient sample size.*

Data Source: *U.S. Department of Commerce, Bureau of the Census, 2005–2009 American Community Survey, as cited by the Health of Boston Report, 2011 and 2006–2010 American Community Survey.*

INCOME AND POVERTY

As illustrated in **Figure 1**, the median annual household income in South Dorchester was $47,460, which was below that of Boston ($50,684) and Massachusetts ($64,509). The median household income in census tract 1002 was slightly less than that of South Dorchester. Relatively speaking, the neighborhood around Oasis on Ballou is by and large lower income.

FIGURE 1. MEDIAN HOUSEHOLD INCOME



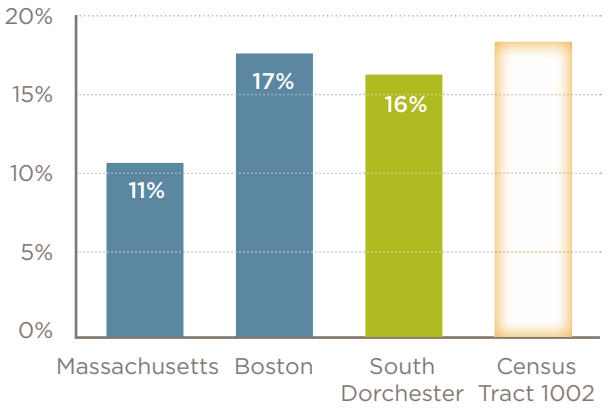
Data Source: *U.S. Department of Commerce, Bureau of the Census, 2005–2009 American Community Survey, as cited by the Health of Boston Report, 2011 and 2006–2010 American Community Survey.*

The percent of South Dorchester residents living below poverty (16%) was similar to that of Boston (17%) but higher than that of Massachusetts. The highest percent of individuals in these 4 comparisons living below poverty (18%) resided in census tract 1002 (**Figure 2**).

EDUCATION

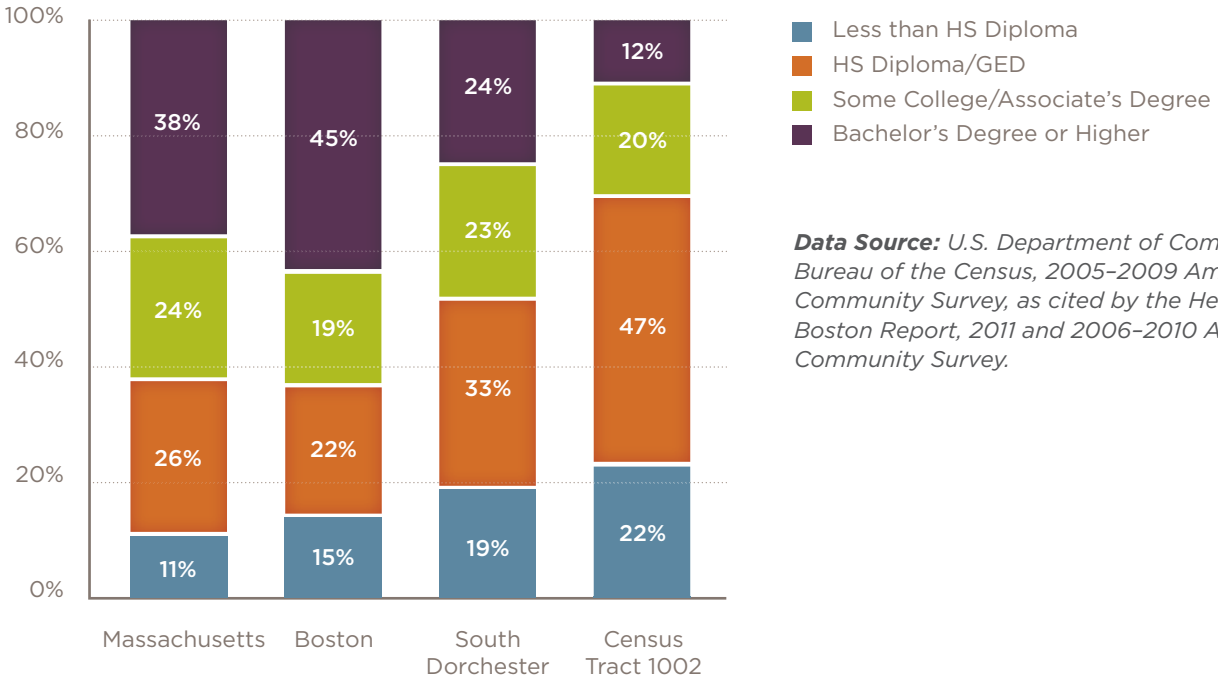
As seen in Figure 3, residents in South Dorchester were twice as likely to have a Bachelor's degree or higher (24%) compared to those in the Ballou Avenue census tract (12%). Additionally, both Boston and Massachusetts had statistically greater proportions of the population that held a Bachelor's Degree or higher degree than in South Dorchester or the Ballou Ave Census Tract.

FIGURE 2. PERCENT OF INDIVIDUALS BELOW POVERTY



Data Source: *U.S. Department of Commerce, Bureau of the Census, 2005–2009 American Community Survey, as cited by the Health of Boston Report, 2011 and 2006–2010 American Community Survey.*

FIGURE 3. EDUCATIONAL ATTAINMENT OF ADULTS 25 YEARS AND OLDER BY CITY AND NEIGHBORHOOD, 2005–2009



Data Source: *U.S. Department of Commerce, Bureau of the Census, 2005–2009 American Community Survey, as cited by the Health of Boston Report, 2011 and 2006–2010 American Community Survey.*

Decision-makers and Decision-making process

CSNDC is the decision-making body concerning the design and development of the Ballou Avenue property, and they are a member of the Fairmount Greenway Task Force whose efforts have engaged the community around identifying and planning for the transformation of vacant parcels along the 9-mile Fairmount Commuter Rail Line corridor. Currently the City of Boston owns the land. CSNDC began exploring development of 100 Ballou Avenue in 2009 as part of its Fairmount Greenway community outreach and education work. This led to the 100 Ballou Avenue site being presented to the City of Boston in the list of parcels for inclusion in the Fairmount Greenway project during a meeting with multiple City departments and stakeholders.

The initial proposed use for the space in 2009, identified by neighbors, was for a playground. However, in 2010, this parcel of land was also listed as a proposed demonstration site for an urban agriculture pilot program proposed by the City of Boston. CSNDC staff participated in the community meetings organized by relevant city agencies regarding the urban agriculture pilot program. Residents in the Woodrow-Mountain area expressed significant concerns about the proposed use of this space for urban farming, particularly because it included small animal farming. Neighbors and local stakeholders also raised concerns about how the community would benefit from this land being rented out for urban agriculture purposes.

Given community interest in other uses for the Ballou Avenue site, CSNDC pursued developing a model that incorporated multiple elements reflecting community priorities. The 100 Ballou Avenue parcel was subsequently removed from the list for solely urban agriculture use, and CSNDC employed the services of Sustainability Guild International to develop potential models for the Ballou Avenue site that could yield benefits as raised during community meetings. A report was produced in October 2011 and shared with the City of Boston outlining the current development landscape in Codman Square and presenting four models for consideration. Given the response by the City of Boston, CSNDC agreed to continue work with local neighbors to arrive at a proposal that reflected the right mix of uses and activities for the site. The chosen three-component site design for Oasis on Ballou reflects the interests and concerns of the local neighbors and stakeholders.

Timeline:

In December 2011, HRiA met with CSNDC to discuss the potential use of a HIA for examining the final design chosen for the 100 Ballou Avenue site. The HIA began in the spring of 2012 and was completed on August 31st, 2012. The project was funded by the Massachusetts Department of Public Health through a grant they received from the U.S. Centers for Disease Control and Prevention, and the project was administered by the Metropolitan Area Planning Council.

The Steering Committee of CSNDC, in consultation with the Woodward-Mountain sub-neighborhood residents ("The Friends"), will create the final site specifications after the completion of the HIA report in Fall 2012, and then bid on the Ballou Avenue site in the Fall of 2012 when the City of Boston is supposed to issue a request for proposals for the purchase or lease of this site. If CSNDC's bid for the property is accepted, subsequent development of the project by CSNDC is projected to begin in late 2012 or early 2013, depending on the success of fundraising efforts.

The HIA Process

WHAT IS A HEALTH IMPACT ASSESSMENT (HIA)

At its core, an HIA determines the likely health effects in a community of a proposed action, such as a policy, rule, project, program or other activity. Through a systematic process, HIAs seek to identify and evaluate the potential effects of proposed decisions, and make recommendations about how to enhance the health benefits and minimize potential harmful effects before critical decisions are made. HIAs are unique because they consider a broad definition of health that examines the social, economic, physical and environmental factors (aka the "health determinants") that are most likely to influence health outcomes — especially in vulnerable communities.

In addition, they not only look at the scientific data, but they also seek to engage a wide array of stakeholders in the process of informing the issues of concern as well as the recommendations that emerge from the analysis. The combined use of scientific information and stakeholder input makes for a relevant and informed process.

The process of conducting an HIA consists of six steps:

- *Screening* establishes whether a HIA is needed and how it would be useful.

- *Scoping* identifies the elements that will be examined in the HIA, including the populations that would be affected by a proposal; the health effects to be evaluated; research questions and plans to address them; data and methods to be used and alternatives to be assessed; the team that will conduct the HIA; and critically, the mechanisms for stakeholder participation throughout the process.

- *Assessment* describes the current health status of affected populations, and characterizes how each alternative under consideration would affect their health.

- *Recommendations* suggest actions or changes in the proposal to minimize its negative health effects and maximize its positive health effects.

- *Reporting* communicates findings and recommendations to the full range of stakeholders, including decision-makers, other policymakers and professionals, advocates, the media, and the public.

- *Monitoring* tracks the impact of the HIA recommendations on the decision-making process, as well as whether they impacted health outcomes of the affected populations.

HIAs are gaining traction across the nation and in Massachusetts in particular. It is the only state in the nation where HIAs are required by law as part of a state's transportation planning process ("Massachusetts Transportation Compact"). The Massachusetts Department of Public Health (MDPH) is very invested in promoting the adoption of HIAs by local and regional health departments and community planning organizations, and has grants through the CDC and private philanthropy to conduct more of them. The Boston Foundation (TBF) is also advocating for the use of HIAs through legislation and policy initiatives. Indeed, with the release of TBF's second annual health report card, the Commonwealth earned a "C" grade for its involvement with HIAs (up from a "D" grade in the prior year).

The hope is that, with more successful HIAs conducted such as this one, decision and policy makers that have an impact on community health will see the advantages and "value added" that HIAs can bring to their planning process. In particular, the hope is that community development corporations will demonstrate higher demand for HIAs in neighborhoods across the across the state after learning about the beneficial public health outcomes and community-based partnerships that can be had as a result of the HIA process. CSNDC is a strong, active partner in the Massachusetts Association of Community Development Corporations. Community development corporations, as organizations that support the well-being of their communities through social and economic development, are logical stakeholders for collaborating and conducting HIAs more broadly. The association has over 90 members in Massachusetts. To our knowledge, no CDCs in Massachusetts have engaged in HIA, and thus this project could serve as an example for how to make the connection between community development and health.

THE GOALS OF THIS HIA

The two overarching goals of the Oasis on Ballou HIA are the following:

1. To build capacity among stakeholders (individuals and organizations) to understand and utilize the HIA process; and

2. To empower the CSNDC and Woodrow Mountain residents ("Friends") to envision and plan for the redevelopment of the vacant 100 Ballou Avenue site with an explicit consideration of the health impacts of the site

SCREENING:

Conducting an HIA on this project makes good sense for a number of reasons:

- It has potential for improving the health status of a community that has disproportionately poorer demographic and health indicators than many other parts of the city and the state, as data indicates in Section II of this report. In summary, the vast majority of residents in the Codman Square neighborhood of South Dorchester, Boston are low and moderate income people of color. The neighborhood ranks poorly, compared to state averages, in many social determinants of health including educational status, income, and access to healthy foods and recreation. The population living in the immediate vicinity of 100 Ballou Avenue stands to be disproportionately affected, both positively and negatively, by the development of this site.

- The project components do have potential negative impacts on the community's health including playground, gardening and cooking injuries, exposures to toxins (such as heavy metals and pesticides), and crime. However, the components can also serve to enhance access to healthy foods, physical activity and social interactions that can positively influence the community's health status.

- The CSNDC is a mission-based organization that is highly motivated to make this project as beneficial to the community as possible, yet does not have the capacity to examine the evidence-based health considerations of the project. MDPH has made resources available for HRiA to be able to do this for the CSNDC.

- The CSNDC's decision for the site design has not yet been completed, and they are eager to incorporate the HIA's recommendations into their site designing and specifications process to the extent that they are feasible as well as amenable to the community.

- The CSNDC has already developed mechanisms to meaningfully interact with community stakeholders in the HIA process.

SCOPING

The purpose of the Scoping Phase is to identify affected populations, determine health priorities to be addressed, depict how the project components will potentially affect the health and safety of the affected population, and develop research questions that will help guide the health impact assessment. A plan is also created detailing how the research questions will be investigated, including data sources and methods to be used, and how stakeholders will be involved in the HIA process.

HRiA worked with various stakeholders, as described below, to create ***pathway diagrams*** that graphically show how the project components can influence a variety of factors that can influence community health over the long-term. The *health determinants*[1] within each diagram are arranged according to immediate and intermediate impacts that, in turn, can influence longer-term health outcomes. These pathway diagrams helped HRiA, and stakeholders, to set research priorities and questions, as well as identify the types of data to be collected. The section below details the community engagement process and outcomes of the scoping phase.

[1] *Health determinants are elements within each project component that impact health behaviors. For example, tot lots will encourage social interaction, a health determinant. Lack of plentiful social interaction leads to several poor health outcomes.*

PARTNERS, STAKEHOLDER ENGAGEMENT, AND COMMUNITY ENGAGEMENT

Organizers

This *Codman Square Oasis on Ballou Avenue HIA* is a collaboration between HRiA and the CSNDC. HRiA is a national non-profit public health and medical research organization located in Boston committed to supporting healthy communities through policy, research, promotion and prevention. CSNDC is a *community development corporation*, a broad term referring to not-for-profit organizations providing programs and projects that support community development. CDCs usually serve a geographic location that often focuses on lower-income residents or struggling neighborhoods. They can be involved in a variety of activities including economic development, education, community organizing and real estate development. CSNDC is located in Dorchester, Massachusetts (MA), the largest neighborhood in the City of Boston.

HRiA was requested to conduct a HIA by the CSNDC of their proposed multi-use development of adjacent parcels of land located at 100 Ballou Avenue in the Codman Square neighborhood of Dorchester in December 2011. The HIA opportunity came about by connections facilitated through the Boston Alliance for Community Health and The Boston Foundation.

Key Partners

In addition to HRiA and the CSNDC, whose roles were previously described, there were two primary groups that advised the HIA process:

- ***The Woodward-Mountain sub-neighborhood residents, aka "The Friends" of the project:*** The Friends had an integral role in identifying the Oasis on Ballou project components, identifying their hopes and concerns for the site, helping to shape the research questions and health pathways to be considered through the HIA process, constructing a neighborhood survey, and providing ongoing input as the project moved forward. A more in-depth description of their involvement will be described below, but it should be emphasized that The Friends worked closely with the CSNDC to shape the site components and with HRiA during the Scoping, Assessment and Recommendations portions of the HIA process.

- **The Oasis on Ballou HIA Advisory Committee:** This Committee, made up of representatives from community-based and governmental organizations, was assembled to offer outside public health and planning expertise to assist HRiA as they moved through the "Scoping" and "Assessment" phases of the HIA, as well as to serve as connected resources that could provide ideas and information as the recommendations were being developed. The Advisory Committee met twice with HRiA and CSNDC staff.

Below is a description of the organizations that comprised the Advisory Committee:

» ***Boston Alliance for Community Health:*** BACH is a partnership of Boston neighborhood health coalitions, residents, hospitals, nonprofit organizations, community health centers and government agencies working together to improve health in Boston's neighborhoods. The Alliance is comprised of 10 neighborhood-based coalitions and their main goal is to support neighborhood-level programs and strategies addressing health disparities.

» ***Boston Public Health Commission:*** BPHC, the country's oldest health department, is an independent public agency providing a wide range of health services and programs. It is governed by a seven-member board of health appointed by Mayor Thomas M. Menino. The BPHC is very committed to promoting HIAs in the city.

» ***Massachusetts Department of Public Health:*** MDPH is the state's public health department. They are the funders of this project; they provided the stakeholders with HIA trainings and technical assistance via Human Impact Partners; and, they had representatives from two divisions that served on the Advisory Committee: Division of Prevention and Wellness as well as the Bureau of Environmental Health.

» ***Sportsmen's Tennis and Enrichment Center:*** Founded in 1961 as the first African-American non-profit tennis club in the country, Sportsmen's Tennis & Enrichment Center builds leaders on the court, in the classroom and in the greater community by providing academic, wellness and social development programs alongside recreational and competitive tennis instruction for youth and adults. They also partner with the Massachusetts Department of Public Health in their Mass in Motion initiative to address policy and environmental strategies for reducing the obesity epidemic in the neighborhood.

» ***Metropolitan Area Planning Council:*** Established in 1963, the Metropolitan Area Planning Council (MAPC) is a regional planning agency serving the people who live and work in the 101 cities and towns of Metropolitan Boston. Their mission is promoting smart growth and regional collaboration. They have experience developing transportation-related health impact assessments and are committed to public health. They also administered this project.

» ***The Boston Foundation:*** As Greater Boston's community foundation, The Boston Foundation devotes its resources to building and sustaining a vital, prosperous city and region, where justice and opportunity are extended to everyone. They are a lead organization in the state's prevention coalition, *Healthy People in a Healthy Economy,* and are advocates for the use of HIAs.

Resident Partnership Development and Community Engagement

HRiA, in collaboration with the CSNDC, engaged community residents throughout the process of conducting the Scoping Phase of the HIA.

There were two primary points of engagement:

- *CSNDC* provided a core team of staff that worked with HRiA staff to plan and facilitate meetings with community residents, to provide input on health pathways and research questions, and help plan and execute the resident survey. Core CSNDC staff included the Assistant Director, the Director of Community Organizing and Resident Resources, and a Community Organizer.

- ***The Friends*** met with CSNDC and HRiA staff at numerous meetings to identify their health priorities, questions and concerns, as well as to narrow down the health indicators and research questions to be studied. They were integral to the development of a neighborhood survey as well.

PRIORITIES DEVELOPMENT

HRiA and the CSNDC met with The Friends several times over the course of the HIA process.

In doing so, HRiA found that the top three health concerns of the Friends were:

- Physical Activity
- Healthy Food Access
- Safety

With input from key partners, HRiA developed pathway diagrams that visually depict how these health concerns impact other health determinants that could ultimately help predict the ways in which the project will affect the longer-term health outcomes of the neighborhood.

To research the connections within the pathway diagrams, HRiA identified a list of data indicators for the assessment phase. This list was narrowed through a prioritization process with the CSNDC and The Friends. The Friends had specific concerns about potential vehicle and pedestrian traffic, car accidents, and injuries on the playground. HRiA therefore included many of these issues in its research.

HRiA ultimately developed the following overarching health outcome research questions, based on the stakeholder input:

- *How will Oasis on Ballou impact the rates of chronic conditions (e.g, obesity, heart disease and diabetes)?*
- *How will Oasis on Ballou impact levels of mental health (e.g., depression and anxiety)?*
- *How will Oasis on Ballou impact rates of injury (e.g., accidents, poisonings)?*

Because The Friends wanted to add local perspectives and information to the process, a neighborhood survey was conducted and incorporated into the HIA assessment phase to provide local level baseline data. The survey development and implementation are described later in this section.

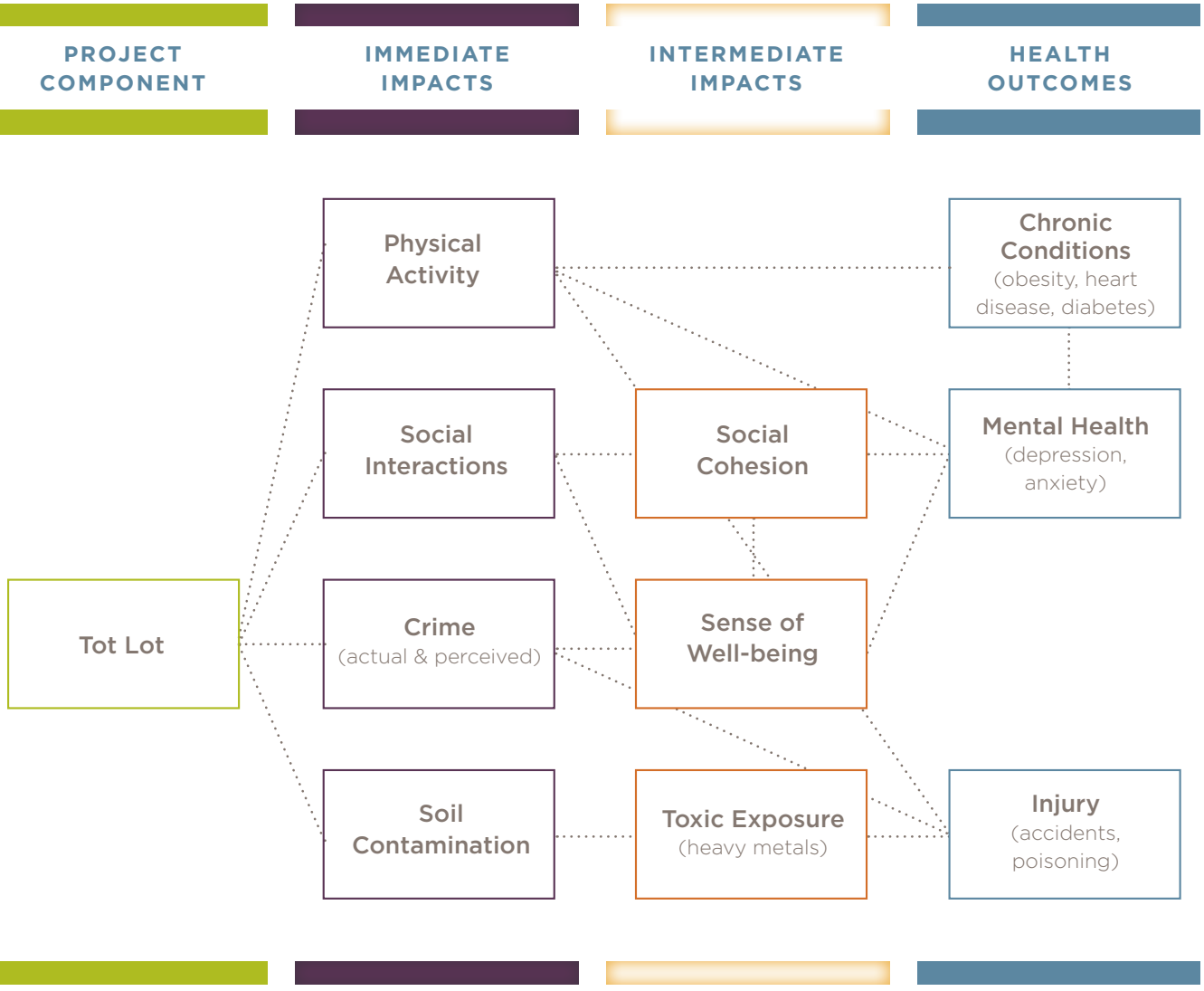
Finally, based on input solicited from The Friends and the Advisory Committee, HRiA finalized the list of recommendations which can be found in **Table 7**.

Pathways

Based on the pathways mentioned above and shown below, HRiA conducted an assessment of the potential health impacts.

Oasis on Ballou Health Impact Assessment

TOT LOT PATHWAY



Research Questions:

- How will Oasis on Ballou impact the rates of chronic conditions (i.e., obesity, heart disease and diabetes)?
- How will Oasis on Ballou impact levels of mental health (i.e., depression and anxiety)?
- How will Oasis on Ballou impact rates of injury (e.g., accidents, poisonings)?

Oasis on Ballou Health Impact Assessment

GARDEN PATHWAY

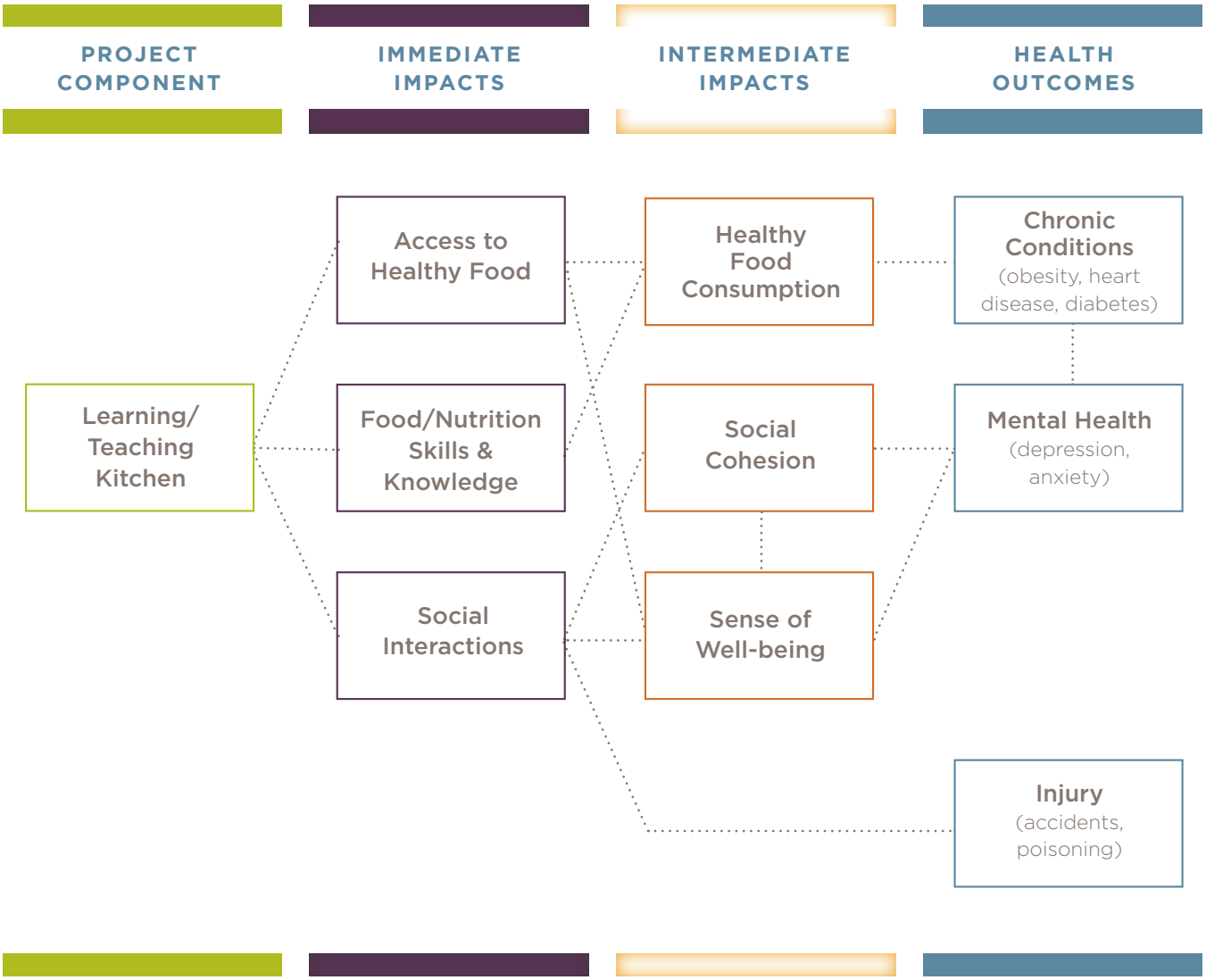
Research Questions:

- How will Oasis on Ballou impact the rates of chronic conditions (i.e., obesity, heart disease and diabetes)?
- How will Oasis on Ballou impact levels of mental health (i.e., depression and anxiety)?
- How will Oasis on Ballou impact rates of injury (e.g., accidents, poisonings)?

1

Oasis on Ballou Health Impact Assessment

LEARNING/TEACHING KITCHEN PATHWAY

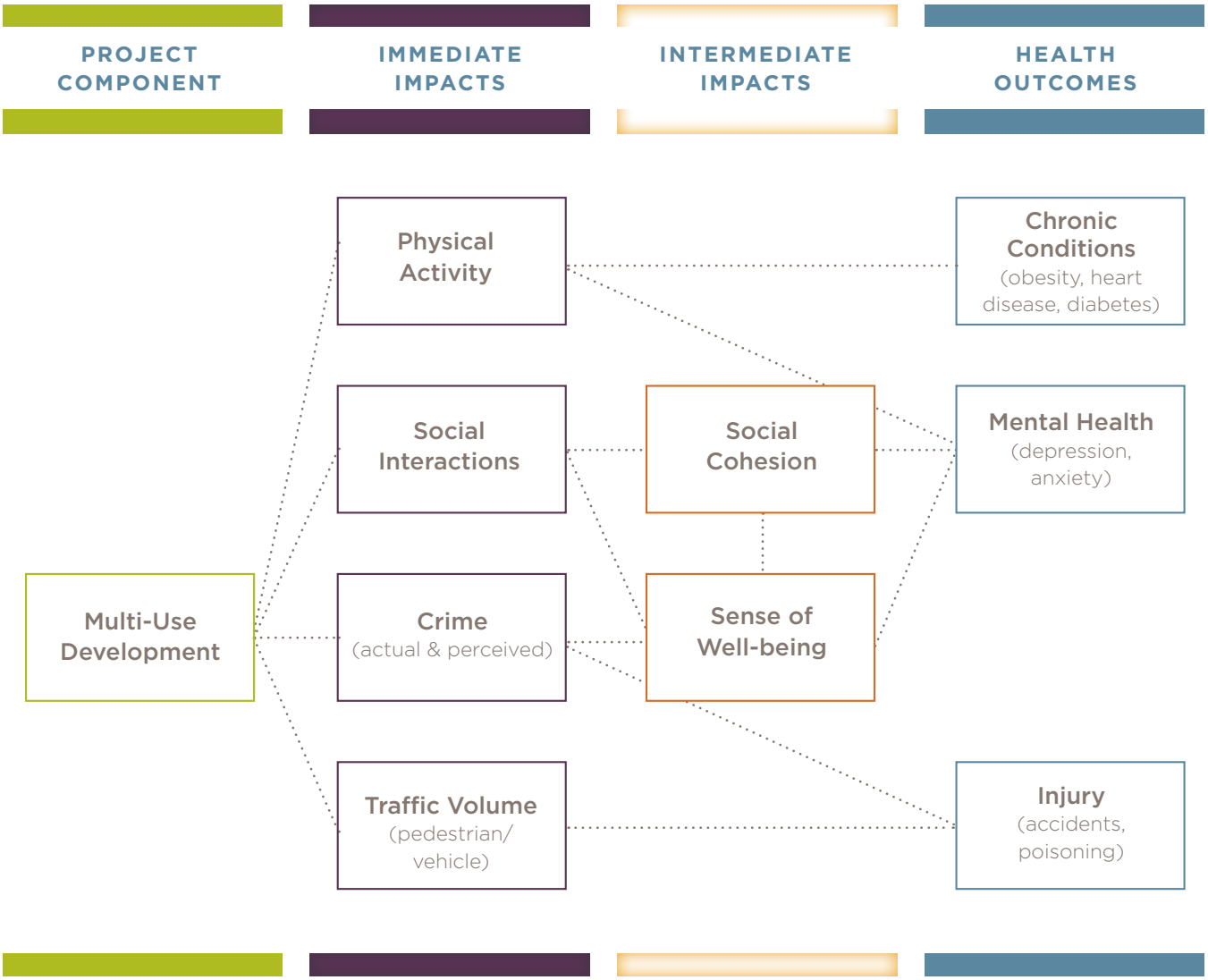


Research Questions:

- How will Oasis on Ballou impact the rates of chronic conditions (i.e., obesity, heart disease and diabetes)?
- How will Oasis on Ballou impact levels of mental health (i.e., depression and anxiety)?
- How will Oasis on Ballou impact rates of injury (e.g., accidents, poisonings)?

Oasis on Ballou Health Impact Assessment

SITE DEVELOPMENT PATHWAY



Research Questions:

- How will Oasis on Ballou impact the rates of chronic conditions (i.e., obesity, heart disease and diabetes)?
- How will Oasis on Ballou impact levels of mental health (i.e., depression and anxiety)?
- How will Oasis on Ballou impact rates of injury (e.g., accidents, poisonings)?

ASSESSMENT METHODS

This HIA utilized mixed research methods, including analysis of secondary data, a survey of local residents, and review of empirical literature. This section describes each of the methods used.

1. ***Secondary Data Analysis:*** summary of statistics available on demographic characteristics, health behaviors and health outcomes related to the health areas of interest

2. ***Resident Survey:*** an 18-question survey to assess local residents' current behaviors, perceptions and values (See Appendix B)

3. ***Literature Review:*** review of peer-reviewed and grey literature for all four pathways

Secondary Data Analysis

To develop a profile of baseline conditions, including of health determinants and outcomes, HRiA reviewed existing data drawn from state and local sources. When available, data measuring immediate impacts (e.g., physical activity) was disaggregated by income, race, gender, age, and/or place. Baseline data were compiled for South Dorchester and for comparison purposes, the City of Boston and Massachusetts. Demographic data is also provided for census tract 1002, where Oasis on Ballou is located. Sources of data included the U.S. Census, MDPH, Boston Public Health Commission, and the Boston Police Department. Data also comprised self-reported responses from telephone surveys (e.g., Boston Behavioral Risk Factor Surveillance Survey (BBRFSS) and Youth Risk Behavior Survey (YRBS), state vital statistics, and reported hospitalizations. Data analyses were generally conducted by the original data source (e.g., U.S. Census, Massachusetts Department of Public Health). Much of the secondary data collected is incorporated into the assessment section of this report. For additional secondary data collected, including health determinants and outcomes, see Appendix C.

Resident Survey

HRiA, in partnership with the CSNDC and The Friends, developed and administered a resident survey to assess behaviors and values of the residents within the immediate vicinity of the development site. The survey tool utilized and adapted questions from existing validated surveys including the BBRFSS and Boston Neighborhood Survey (BNS). (The final version of the resident survey can be found in Appendix B). HRiA also created a survey protocol and trained the core team of the CSNDC in proper data collection methodology. The core team of the CSNDC then trained their survey team comprised of CSNDC employees, AmeriCorps volunteers, and youth of the CSNDC.

A team of nine people comprised of CSNDC employees, AmeriCorps volunteers, and youth of the CSNDC conducted the resident survey multiple weeks in July, 2012. The survey was conducted as a census by going door-to-door within a quarter mile radius of 100 Ballou Avenue, focusing on the north side of the commuter rail tracks. (See Appendix D for a map of the area that was surveyed). The survey team knocked on the doors of 307 residents. Of these, 212 were not home or did not answer the door. Of the remaining 95, **61 residents ultimately participated in the survey**. Thirty-four residents refused to participate. Incentives for participation were not provided. The collected data was entered into a database and analyses primarily examined frequencies.

The demographic characteristics of the survey respondents, as well as the residents of Census Tract 1002, are presented in **Table 3**. More females than males participated in the survey at 61%, though this is comparable to the gender breakdown of the neighborhood. Only those 18 years or older were eligible to participate. Of those who participated in the survey, more than half (53%) were 55 years of age or older, whereas only 12% of participants were ages 18–24 years old.

TABLE 3. CHARACTERISTICS OF RESIDENT SURVEY RESPONDENTS AND CENSUS TRACT 1002

	Resident Survey (n=61) (%)	Census Tract 1002 (%)
Gender		
Male	39	41
Female	61	60
Age		
0–17 years old	0	27
18–24 years old	12	10
25–34 years old	16	14
35–44 years old	20	14
45–54 years old	23	15
55 years old or more	30	20
Educational Level*		
Less than high school diploma	5	22
High school diploma or equivalent (GED)	43	47
Some college or associate's degree	37	20
College graduate or more	15	12
Race/ethnicity *(check all that apply)*		
Black/African American, non-Hispanic	77	78
Hispanic/Latino	10	15
White, non-Hispanic	0	1
Asian or Pacific Islander	0	1
Other	15	2

Note: *Percentages are rounded to the nearest whole number and may not add up to 100. Frequencies were tabulated among all survey respondents. Not all survey respondents answered every question.*

Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012; U.S. Department of Commerce, Bureau of the Census, 2005–2009 American Community Survey, as cited by the Health of Boston Report, 2011 and 2006–2010 American Community Survey.*

** The Educational Levels for Census Tract 1002 are for adults ages 25 and older.*

The neighborhood is younger than the survey respondents, especially given the age restriction for people able to take the survey. Over half (52%) of respondents had some college, an associate's degree, or higher education, which is a more educated group than the 27% of the neighborhood who has some college or more. Most respondents self-identified as Black or African-American at 77%, consistent with the Census demographics of the neighborhood. One-tenth (10%) of respondents self-identified as Hispanic/Latino and 15% identified as other (e.g., Multiracial, Caribbean, or Central American).

Literature Review

HRiA used a structured literature review approach for each pathway. Search terms specific to the immediate and intermediate health impacts as well as the long-term health outcomes were used in PubMed, Medline, JSTOR and Google Scholar. Additionally, HRiA examined reference lists, review articles, and grey literature. Many articles had findings that applied to multiple pathways, and thus the literature is cited in several places.

The literature review sought information that showed direct links between the Oasis on Ballou site components and each long-term health outcome (e.g. the impact of the gardens on the development of chronic diseases), that demonstrated links between the site components and immediate impacts (e.g. the impact of the gardens on physical activity), and that demonstrated links between immediate/intermediate impacts and longer term outcomes (e.g., the impact of gardening on injuries).

Section II: Assessment

This section discusses the heart of the HIA, the assessment, and includes separate sub-sections for each of the three site components as well as a sub-section on the overall site. Each sub-section contains:

- Existing baseline health conditions: primary and secondary data results
- Literature review
- Synthesis of the assessment findings and predictions for impacting the neighborhood's health

The goal of this section is to:

- Describe the baseline health status of the community
- Answer our research questions that can be found in Appendix A, and
- Predict how the project will, both positively and negatively, impact the community's health in order to make useful recommendations on how Oasis on Ballou can become a healthy and safe resource for the community to enjoy.

HEALTH DETERMINANTS

As seen in the pathway diagrams, this HIA focuses on several health determinants — physical activity, access to healthy food/healthy eating, social interaction/social cohesion, perception of safety, crime, sense of well-being/stress, and exposure to soil toxins — that are shown to have links to the health outcomes of interest: chronic health conditions, mental health and injuries.

Healthy eating and physical activity, seen as immediate and intermediate impacts of Oasis on Ballou, are two of the most important behaviors for good health. These behaviors are associated with decreases in many chronic conditions, including obesity, diabetes, cardiovascular disease, osteoporosis, and cancer. They have also been shown to improve mental health and mood, as well as prevent injury.[1, 2]

Social interaction, two or more people interfacing, and the potential **social cohesion** (connectedness, trust, bonding, collaboration) that may result, are important determinants of health, specifically related to mental health in the community.[3] Social interaction and social cohesion are shown to buffer the stresses of everyday life — higher levels of social interaction among the community leads to feelings of trust and social support that improve mental health.[4] Communities that provide supportive places for social interactions can be empowering, helping to sustain the community's viability and residents' personal health.[5]

A growing body of public health research suggests that **perceptions of neighborhood safety and crime** are linked to health outcomes, specifically mental health, as well as predictors of whether people will utilize a place or engage in an activity.[6] When people perceive a place or an activity to be unsafe, this causes increased stress, which can lead to anxiety.[7]

Perception of safety and crime are also determinants of **sense of well-being and stress**, another key health determinant examined in this HIA. Sense of well-being or the absence of stress is a key determinant of mental health. Stress is an important factor in mental health because it can both initiate and worsen symptoms and lead to relapses. If stress decreases, sense of well-being increases and symptoms of poor mental health decrease.[8]

HEALTH OUTCOME BASELINE DATA

While the scope of this HIA focused on immediate health impacts, longer-term health outcomes were also examined to develop a profile of baseline conditions. Specific health outcomes of interest included obesity, diabetes, heart disease (chronic diseases), mental health, and injuries. Much of this data could not be gathered for the Ballou Avenue area, but only for the larger South Dorchester neighborhood.

According to the BBRFSS, more than one in four adults in South Dorchester were obese (28%), which was greater than the Boston average (22%) and one-third (33%) of Boston high school students were overweight or obese. BBRFSS data also indicate that 7% of South Dorchester's adult population reported having diabetes, which was slightly higher than the citywide level (6%); nearly 5% of Boston public high school students reported having diabetes. The rate of heart disease hospitalizations in South Dorchester (22.1 per 1,000 adult population) was slightly above that of Boston as a whole (19.4 per 1,000). Regarding mental health, 9% of Boston adults reported feeling sad, blue, or depressed and 10% reported experiencing poor mental health for more than two weeks during the past month. Most unintentional injury-related emergency department visits were due to "other" unintentional injuries (339.5 per 10,000 population) as opposed to falls (241.1 per 10,000) or motor vehicle/traffic accidents (163.3 per 10,000).

The mortality rate due to injury in Boston was 43.8 deaths per 100,000 population. Additionally, 1.2% of young children in South Dorchester screened for elevated blood levels tested positively (defined as 10 micrograms per deciliter or higher), which was slightly higher than the citywide rate (<1.0%). This data is not available for older children and adults. However, the CDC recently lowered the threshold for what is considered to be safe levels of blood lead content in children (from 10 µg/dL to 5 µg/dL), and thus more children in South Dorchester presumably have elevated blood lead levels than are reported in current public health data. Health outcome data is presented in further detail in Appendix C.

ASSESSMENT — A SYNTHESIS OF FINDINGS

This section represents a synthesis of the primary survey and secondary data and literature review to help HRiA make predictions about how the three project components may influence the community's health –both positively and negatively. This section is split into four sub-sections, corresponding to the three different site components of Oasis on Ballou — tot lot, teaching/production garden, and learning/teaching kitchen — as well as a sub-section on the overall site. Each sub-section discusses the evidence linking the site components to immediate and intermediate health impacts and longer-term health outcomes. At the end of this section, there is a table summarizing all of these assessment findings.

TOT LOT

The first component of the Oasis on Ballou is the tot lot, which is proposed to consist of approximately 5,000 square feet of Oasis on Ballou. This area will include an approximately 1,500 square foot play area for small children as well as landscaped paths and seating areas for other children and adults. Play equipment has not been determined yet.

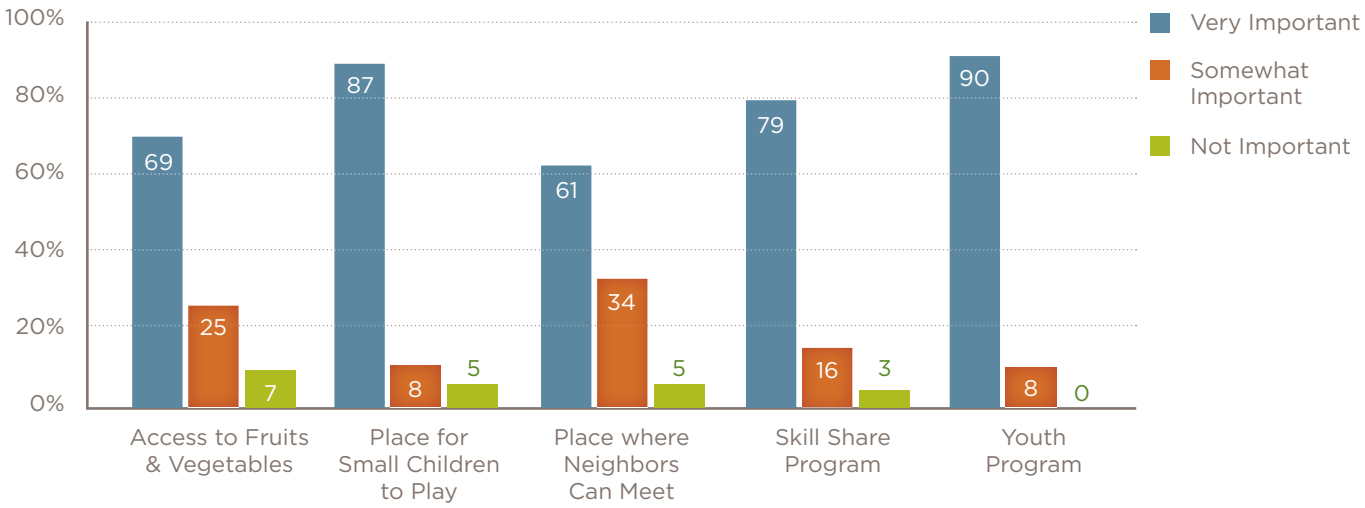
As seen in the tot lot pathway diagram, the tot lot is predicted to have impacts on chronic diseases, mental health, and injuries through the health determinants of physical activity, social interaction, perception of safety, crime, sense of well-being, social cohesion, and exposure to soil toxins. The evidence supporting these connections is presented below.

Physical Activity

One of the primary health determinants of the tot lot is physical activity. Physical activity in children is important because it reduces the incidence of chronic conditions and poor mental health status that may develop in childhood or later in life. There is currently no data that exists on the extent of physical activity of young children in Boston. However, according to **Figure** 4, the resident survey indicated that 87% of respondents value a place for small children to play.

Respondents were asked to report the importance of having a development such as Oasis on Ballou in their neighborhood. The majority of respondents report that it is very important to have a development such as Oasis on Ballou in their neighborhood to address their needs.

FIGURE 4. NEIGHBORHOOD IMPORTANCE OF OASIS ON BALLOU



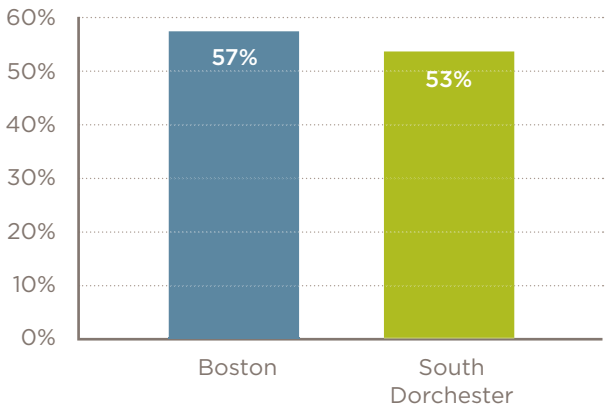
Note *Respondents were allowed to choose more than one answer so total percent may not equal 100. Frequencies were tabulated among all survey respondents. Not all survey respondents answered every question.*

Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012.*

Additionally, there are no playgrounds within a quarter mile and very few (<5) within 1 mile of Oasis on Ballou. Thus, it is predicted that neighborhood residents would likely take their children to play at the Tot Lot at Oasis on Ballou. Research has shown that children who live closer to play spaces are more likely to be active than children who do not. In fact, 42% of children get most of their exercise on a playground, either at school recess or in their neighborhood.[9] Several studies have shown the connection between the existence of playgrounds and physical activity in youth.[10, 11, 12] A national study by the RAND Corporation looked at the correlation between physical activity in adolescent girls and proximity to parks and schools. Researchers found that girls who live close to parks participate in more physical activity than those who live farther away.[13] Neighborhood physical environments, such as playgrounds, and perceived safety, influence adults' readiness to encourage children's physical activity. Adults in neighborhoods with more physical order (greenery, playgrounds) were twice as likely to allow children to use local playgrounds.[14]

Additionally, according to the BBRFSS, 53% of South Dorchester adults engage in regular physical activity, which is slightly less than the Boston overall (**Figure 5**). For adults, regular physical activity is defined as vigorous activity for 20 minutes per day on 3 or more days a week or moderate activity for 30 minutes per day on 5 or more days a week.

FIGURE 5. PERCENT OF ADULTS WHO ENGAGE IN REGULAR PHYSICAL ACTIVITY BY NEIGHBORHOOD, 2008 AND 2010 COMBINED

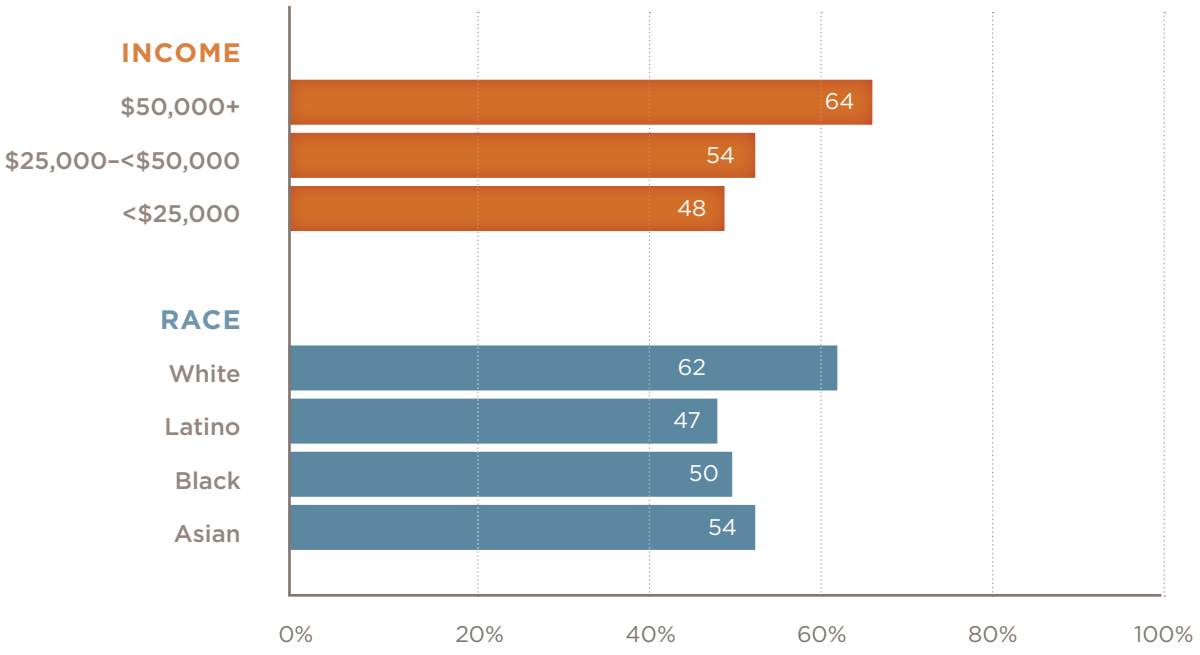


Data Source: *Boston Behavioral Risk Factor Survey 2010, Boston Behavioral Risk Factor Surveillance System (BBRFSS), Boston Public Health Commission, as cited in the Health of Boston Report, 2011.*

Data on the percent of Boston adults who engage in regular physical activity were stratified by race/ethnicity and income. As illustrated in **Figure 6**, White adults were more likely to report engaging in regular physical activity (62%) than Latino (47%) and Black (50%) adults. Additionally, as income increases so too does the percent of adults reporting regular physical activity. Data stratified by income and race/ethnicity are not available by neighborhood.

Of residents surveyed, 74% reported engaging in vigorous physical activities such as running, aerobics, or heavy yard work, during a usual week in the past month. The median number of days respondents spent engaging in such activities was 3 days for a median of 30 minutes. Ninety-two percent (92 %) engaged in moderate physical activities such as brisk walking, bicycling, vacuuming, or gardening, during a usual week in the past month. The median number of days respondents spent engaging in such activities was 4 days for a median of 30 minutes. The survey respondents' median number of minutes per week of vigorous physical activity (90 minutes per week) was greater than the nationally recommended amount (60 minutes per week). The survey respondents' median number of minutes per week for moderate physical activity (120 minutes per week) was less than the nationally recommended amount (150 minutes per week).

FIGURE 6. PERCENT OF ADULTS WHO ENGAGE IN REGULAR PHYSICAL ACTIVITY BY SELECTED DEMOGRAPHICS IN BOSTON, 2008 AND 2010 COMBINED



Data Source: *Boston Behavioral Risk Factor Survey 2010, Boston Behavioral Risk Factor Surveillance System (BBRFSS), Boston Public Health Commission, as cited in the Health of Boston Report, 2011.*

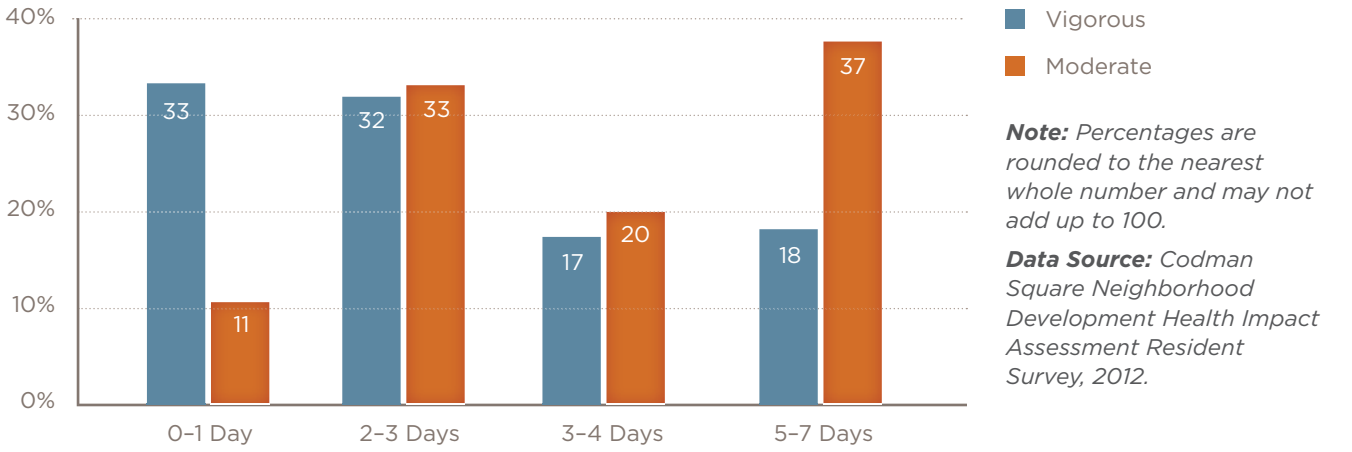
In a study by Voss and Sandercock, youth were more likely to be physically active if they perceived their parents to be active. There was an especially strong association in girls. Because many of the adults in South Dorchester, as well as the vast majority of neighborhood survey respondents (**Figure** 7), engage in regular moderate physical activity, it is likely that the Tot Lot will be utilized — especially by families who already value physical activity.

Given the prediction that adults are likely to take their children to play on the tot lot, the effect of adult exercise on children's exercise, as well as the literature stating that children get a significant amount of their physical activity on playgrounds, it is predicted that physical activity among young children will increase as a result of the tot lot.

Social Interaction and Social Cohesion

The tot lot represents a place for not only young children but also adults to interact. Data from the resident survey showed that 61% of neighborhood residents value a place for neighbors to interact (**Figure 4**). Additionally, literature has shown that social interaction of youth increases on the playground. A report by The Trust for Public Land stated that outdoor "play also teaches children how to interact and cooperate with others, laying foundations for success in school and the working world."[16] A study by Knowles et al. showed that social interaction on playgrounds resulted in both positive impacts (social support/skills/cohesion) and negative impacts (bullying).[17] In addition, a study by Boulton found that those children who engaged in the most cooperative play time showed more social cohesion than those who did not engage in cooperative play time.[18]

FIGURE 7. VIGOROUS AND MODERATE PHYSICAL ACTIVITY AMONG BALLOU AVENUE AREA RESIDENTS, 2012



Note: *Percentages are rounded to the nearest whole number and may not add up to 100.*

Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012.*

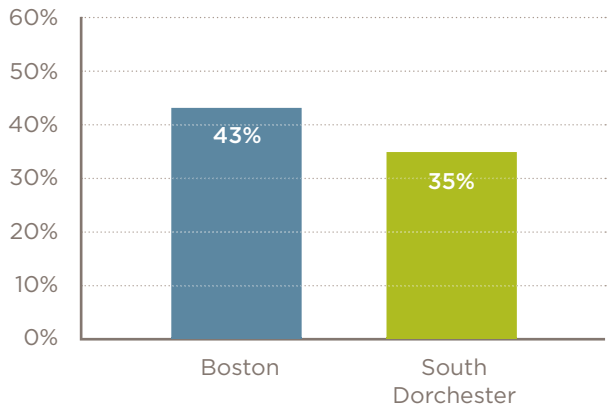
Literature on playgrounds and their influence on adult interaction is scarce. One study by Bennet et al. found that parents with low accessibility (e.g. not walkable distance) to playgrounds were more likely to interact socially with their neighbors than parents with high accessibility.[19] Though, this finding may be because people without access to playgrounds are out in their private yards interacting with other neighbors. The Bennet study finding is counter-intuitive, and must be considered in light of the resident survey that indicated that parents would likely use and walk to the tot lot and the overall site of Oasis on Ballou, which offers other spaces for adults to interact.

Given the primary survey data as well as the literature regarding access to play space, it is predicted that it is likely that social interaction among youth will result from the tot lot at Oasis on Ballou. Additionally, as a result of social interaction, it is likely that the tot lot will increase social cohesion among youth in the area. Social interaction among adults as a result of the tot lot is uncertain.

Perceived Safety and Crime

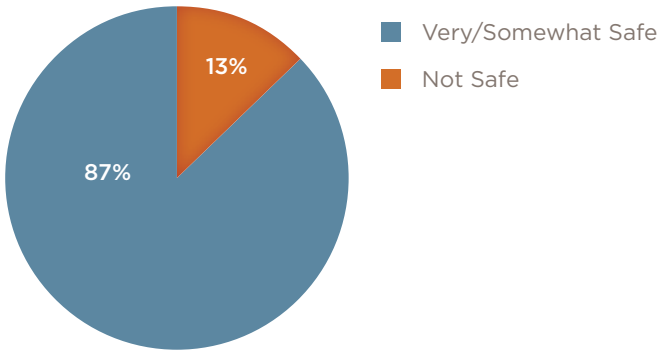
Evidence is mixed as to the impacts of the tot lot on residents' perceptions of safety and crime. As seen in **Figure 8**, only 35% of South Dorchester adults feel their neighborhood is safe, according to the Boston Neighborhood Survey. However, when asked the same question, 87% of residents near the Ballou Avenue site perceive their neighborhood to be somewhat or very safe (**Figure 9**).

FIGURE 8. PERCENT OF ADULTS WHO THINK THEIR NEIGHBORHOOD IS SAFE BY NEIGHBORHOOD, 2008



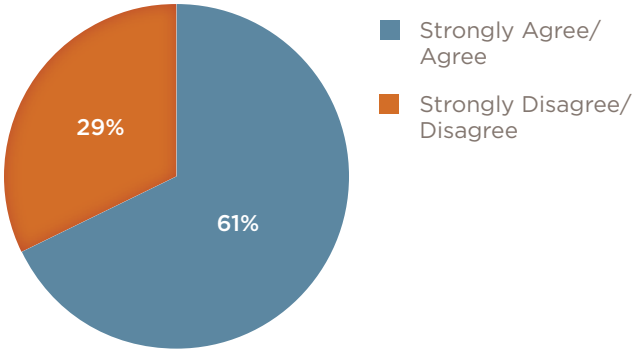
Data Source: *Boston Neighborhood Survey, 2008; Harvard Youth Prevention Center through cooperative agreement with the Center for Disease Control and Prevention, as cited in the Health of Boston Report, 2011.*

FIGURE 9. PERCEIVED NEIGHBORHOOD SAFETY AMONG BALLOU AVENUE AREA RESIDENTS, 2012



Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012.*

FIGURE 10. TRUST IN NEIGHBORS AMONG BALLOU AVENUE AREA RESIDENTS, 2012



Note: *Frequencies were tabulated among all survey respondents. Not all survey respondents answered every question.*

Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012.*

Additionally, sixty-one percent (61%) of resident survey respondents strongly agreed/agreed that they can trust people in their neighborhood (**Figure 10**).

Literature indicates both positive and negative impacts of the tot lot on perceptions of safety and crime. According to Wilcox, playgrounds increase the perceived risk of crime.[20, 21] Also, Crew makes the general statement that urban parks in general share a common reputation for "encouraging lurkers and attracting drug dealers."[22] Crew's study is not specific to playgrounds but does provide a local example (development of the Boston Southwest Corridor) on how park development impacts both perceived risk of crime and actual crime. This study demonstrated that in the design stage of the development project would-be abutters expressed concern about increased crime. *In evaluating the site years later, though, there was no increase in actual crime.* However, Kuo and Sullivan found that residents living in "greener, developed" surroundings reported lower levels of fear, fewer incivilities, and less aggressive and violent behavior. The greener a building's surroundings were, the fewer crimes were reported.[23] This held true for both property crimes and violent crimes.

Though local residents feel safe, police statistics indicate that there is a high level of crime in the area. Codman Square is part of two police districts, B–3 and C–11, which account for 30% of violent crime, 18% of property crime, and 23% of vandalism in all of Boston. **Table 4,** on the next page, illustrates the total number of offenses for the City of Boston and select districts as reported by the Boston Police Department in 2008.

Given this mixed evidence about perception of safety and actual crime, as well as the literature, it is uncertain whether the tot lot will increase or decrease perception of safety and actual crime in the area.

TABLE 4. NUMBER OF TOTAL OFFENSES KNOWN TO LAW ENFORCEMENT BY CITY AND DISTRICT, 2008

Geographic Location	Violent Crime*	Property Crime*	Drug Violations	Vandalism
Boston	6,607	22,274	5,820	7,955
Dorchester (C–11)	1,121	2,515	715	1,058
Mattapan & Points of Dorchester (B–3)	833	1,439	792	750

** Violent crime includes: murder and non-negligent manslaughter; forcible rape; robbery; and aggravated assault.*

***Property crime includes: burglary; larceny-theft; motor vehicle theft; and arson.*

***Note:** The neighborhood of South Dorchester falls into Districts B–3 and C–11.*

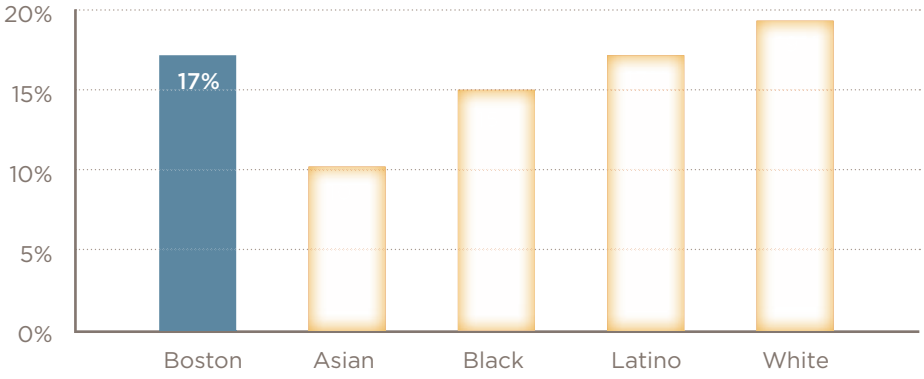
***Data Source:** 2008 Crime Summary Report, the Boston Police Department, Office Research and Development, Office of Police Commissioner, 2008.*

Sense of well-being (stress)

The tot lot has the potential to impact residents' sense of well-being in both positive and negative ways as a result of physical activity, social interaction and perceived safety and crime. As seen in **Figure 11**, 17% of Boston adults reported feeling worried, tense or anxious according to the BBRFSS.

This data is not available for youth in Boston. **Figure 11** presents the percent of adults in Boston (17%) who reported feeling worried, tense, or anxious for fifteen or more days in the past month. When stratified by race, Asians were least likely report this level of stress (10%), whereas Whites (19%) were most likely.

FIGURE 11. PERCENT OF ADULTS WHO REPORTED FEELING WORRIED, TENSE, OR ANXIOUS 15+ DAYS OF PAST MONTH BY RACE/ETHNICITY IN BOSTON, 2010



***Note:** Data is not available by neighborhood.*

***Data Source:** Boston Behavioral Risk Factor Survey 2010, Boston Behavioral Risk Factor Surveillance System (BBRFSS), Boston Public Health Commission, as cited in The Boston Health Report, 2011.*

Literature suggests that physical activity plays a role in decreasing stress among youth.[24] Also due to physical activity, youth experience more immediate effects including a feeling of well-being, improved self-esteem, and increased discipline.[25]

Thus, it is predicted that stress will be reduced as a result of predicted increased physical activity at the tot lot. Social interaction is also a pathway through which well-being and stress are affected. For youth, these effects are both positive, due to increased social support/skills, and negative, due to potential bullying.[26]

The tot lot's effect on sense of well-being and stress among adults is uncertain, due to the dearth of evidence about their social interaction at the tot lot. Similarly, based on literature regarding perception of safety and crime, the tot lot's effects on sense of well-being are uncertain due to evidence supporting both positive and negative impacts.

Exposure to Soil Toxins

According to the Boston Public Health Commission's Department of Environmental Health, 1.2% of young children in South Dorchester have elevated blood lead levels (**Table 5**). However, the CDC recently lowered the threshold for safe levels of blood lead content in children (from 10 µg/dL to 5 µg/dL), and thus presumably more children in South Dorchester have elevated blood lead levels than are reported in current public health data.[27]

Lead is a heavy metal that children are particularly sensitive to, potentially causing developmental and learning problems. Soil is an important pathway of human lead exposure. *Based on data from soil testing done at Oasis on Ballou, there are elevated levels of several heavy metals, including lead, and other substances* (see Appendix E). According to the organization *Lead Free Kids*, "Just a few particles of dust from lead-based paint are enough to poison a child. And the effects could last a lifetime."[28] According to Mielke and Reagen, the greatest lead concentration is in the top one to two inches of the soil, where children often play.

TABLE 5. PERCENT OF CHILDREN WITH ELEVATED BLOOD LEAD LEVELS BY AGE AND NEIGHBORHOOD, 2010

Geographic Location	Percent
Boston	<1.0%
South Dorchester	1.2%
Age (years)	
<1	<1.0%
1	<1.0%
2	1.2%
3	<1.0%
4	1.3%
5	1.1%

Data Source: *Boston Public Health Commission Office of Environmental Health, as cited in The Health of Boston Report, 2011.*

It is unclear whether there will be exposed soil at the tot lot, but any soil should be assumed to contain heavy metals. If so, children will likely be exposed to lead and other toxins from playing in the soil unless protective actions are taken.

Chronic Diseases

In general, literature supports associations between increased childhood physical activity and decreases in the chronic conditions of obesity, diabetes and heart disease.[30] Physical activity opportunities on the tot lot have the potential to decrease chronic diseases among young children. However, these health outcomes are distal given the small scale of Oasis on Ballou, and thus predictions are not made about whether chronic diseases will be mitigated by this project. There is also literature showing a bi-directional relationship between chronic disease and mental health, with each reinforcing the other both positively and negatively.[31, 32] In other words, good mental health status is correlated with decreased rates of chronic diseases (including obesity) and vice versa. Also, poor mental health status increases rates of chronic diseases and obesity and vice versa. The tot lot's effects on mental health are described below.

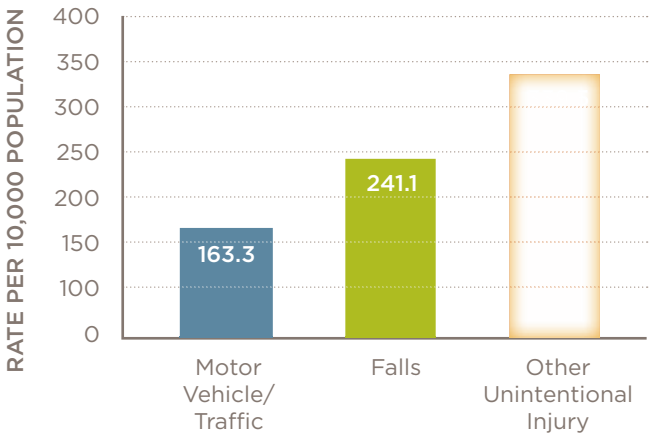
Mental Health

Through the pathways of physical activity, social interaction and perception of safety and crime, the tot lot has the potential to impact mental health. The links between the immediate and intermediate impacts are more robust than long-term mental health impacts, so predictions are not made here. Literature shows that physical activity has beneficial effects for reduced depression.[33] One study found a positive association between being in nature/playing outside and mental health among school-aged children.[34] In general, literature supports the idea that developed green space is an important contributor to mental health with social interaction and social cohesion being a pathway to improved mental health.[35] Lower stress and more social connections are also associated with better mental health.[36]

Injuries

Figure 12 illustrates citywide unintentional injury-related emergency department (ED) visit rates per 10,000 population. Unintentional injury includes events such as falls, accidental poisonings, motor vehicle crashes, pedestrians injured by motor vehicles, or a mass casualty event. Most ED visits (339.5 per 10,000 population) were due to other unintentional injuries (which include those that are the result of accidents and include, for example, those relating to fire, machinery, boating, explosives, electrical current, medical and surgical care, and unspecified accidents) as opposed to falls (241.1 per 10,000) or motor vehicle/traffic accidents (163.3 per 10,000).

FIGURE 12. RATE OF UNINTENTIONAL INJURY-RELATED EMERGENCY DEPARTMENTS VISITS PER 10,000 POPULATION IN BOSTON, 2007



**Rates standardized to US Census count of Boston's total population in 2007, as cited in the Health of Boston Report, 2009.*

Note: *Data is not available by neighborhood*

Data Source: *Emergency Department Visit Data Base, Massachusetts Division of Health Care Finance and Policy, as cited in the Health of Boston Report, 2009.*

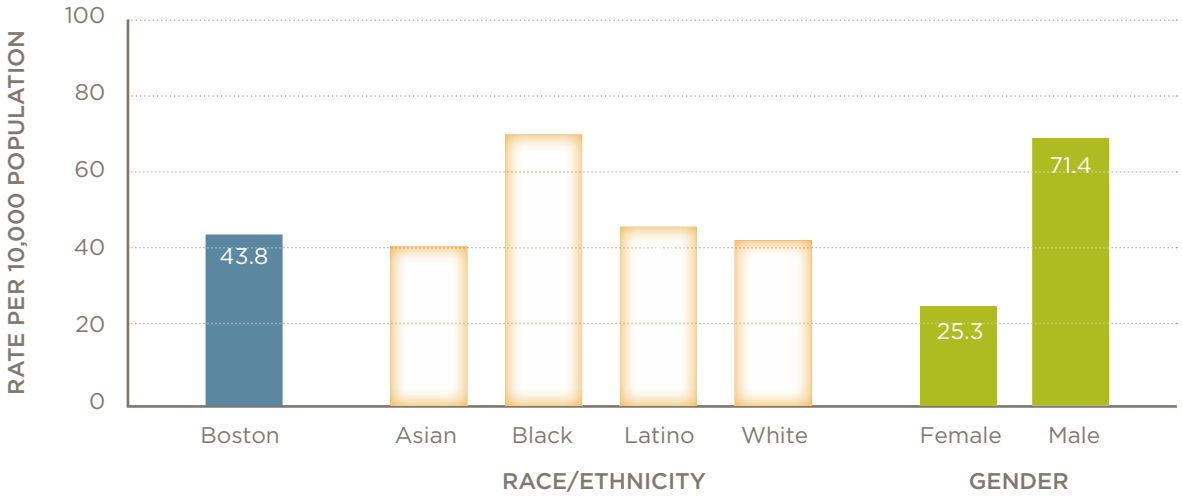
Chronic Diseases

Unintentional injuries are the leading cause of death in children.[37] Playgrounds are a major source of injuries for children. There are 200,000 emergency department visits per year in the US due to playground injuries, one-third of which are serious injuries, such as fractures and concussions.[38] According to research by Cradock et al., playgrounds in lower income areas may be less safe and less geographically accessible to the local population, especially youth of color.[39]

In **Figure 13**, mortality due to injury includes five categories: (1) homicides; (2) suicides; (3) motor-vehicle-related injuries; (4) other unintentional injuries; and (5) undetermined injuries for which it was not determined on the death certificate whether the injury was intentional. In 2008, the mortality rate due to injury in Boston was 43.8 deaths per 100,000 population. The mortality rate was almost twice as high among Black residents of Boston (72.4 per 100,000 population) than for any other racial or ethnic group. This is significant given that the vast majority of the population around Oasis on Ballou is Black (**Figure 13**).

Given the likelihood of children using the tot lot, as discussed in the physical activity section, it is predicted that there will be injuries incurred at the tot lot. It should be noted, however, that Oasis on Ballou will contain a tot lot with smaller, age-appropriate equipment. Thus, injuries should be less likely and less severe than would normally be seen on a traditional playground.

FIGURE 13. MORTALITY RATE PER 100,000 POPULATION DUE TO INJURY BY SELECTED DEMOGRAPHICS IN BOSTON, 2008



Note: *Data is not available by neighborhood.*

Data Source: *Boston Resident Deaths, Massachusetts Department of Public Health.*

TEACHING/PRODUCTION GARDEN

The second component of Oasis on Ballou is the teaching/production garden. The teaching garden will be composed of approximately 1,500 square feet of land and the production garden will be approximately 5,000 square feet. The production garden is not a typical community garden where individuals have plots of land, but rather one large production garden to grow fruits and vegetables for the community.

As seen in the gardens pathway diagram, the garden is predicted to have impacts on chronic diseases, mental health, and injuries through the determinants of physical activity, social interaction, healthy food access, healthy eating, social cohesion, sense of well-being, and exposure to soil toxins. The evidence supporting these connections is presented below.

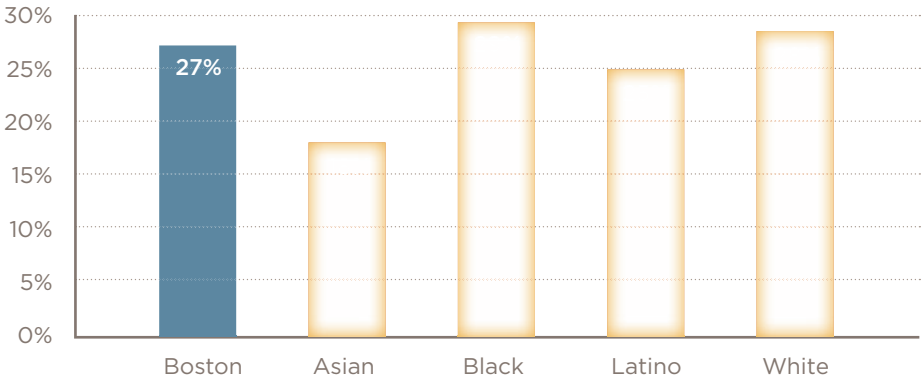
Physical Activity

Gardening is widely recognized and recommended as a form of physical activity.[40, 41] The YRBS indicates that only 27% of Boston public high school students engage in regular physical activity.

As seen in **Figure 14**, Black (29%), White (28%), and Latino (25%) students were more likely to engage in regular physical activity than Asian (18%) students.

According to the BBRFSS, 53% of South Dorchester adults engage in regular physical activity (**Figure 5**). These numbers are higher for adults living near Oasis on Ballou. Indeed, 92% of adult residents who participated in the survey indicated that they engage in weekly moderate physical activity, which includes gardening (**Figure** 7).

FIGURE 14. PUBLIC HIGH SCHOOL STUDENTS WHO ENGAGE IN REGULAR PHYSICAL ACTIVITY BY RACE/ETHNICITY IN BOSTON, 2009



Note: *Data is not available by neighborhood.*

Data Source: *Youth Risk Behavior Survey 2009, Youth Risk Behavioral Surveillance System (YRBS), Centers for Disease Control and Prevention, as cited in The Health of Boston Report, 2011.*

Past research suggests community gardens are associated with physical activity. In addition to the physical activity associated with gardening, another potential form of physical activity comes from gardeners' decision to walk to the garden.[42, 43] One qualitative study noted that the exercise and activity was particularly essential for the elderly participants in community gardening. Non-gardeners might be influenced as well, as people are generally more likely to engage in physical activity if they live near greenery.[44]

Given the existing level of physical activity among local residents, their desire to build a garden at Oasis on Ballou, as well as the literature, it is likely that low to moderate physical activity will increase as a result of the teaching and production gardens.

Social Interaction

Formal and informal social interactions are an inherent part of community gardening.[45] One of the purposes of building the gardens at Oasis on Ballou is to create a place where neighbors can come together and to learn gardening skills. This is reinforced by the resident survey, which reported that 61% of respondents value a place where neighbors can meet (**Figure** 4).

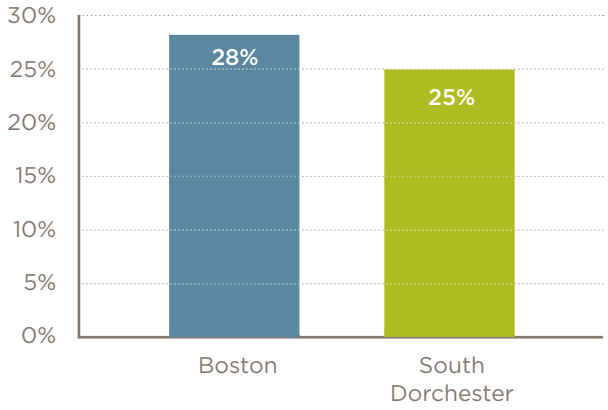
Literature supports the link between the gardens and social interaction. Research by Armstrong on community gardens in New York concluded that increased participation in gardening led to a higher level of social interaction among the community, which led to feelings of trust and social support.[46] Armstrong's research included a survey of community gardens in upstate New York: Community organizing, facilitated through community gardens in low-income neighborhoods, showed that these neighborhoods were four times as likely as non low-income areas to lead to other issues in the neighborhood being addressed.[47]

Considering the local residents' desire for a place to gather, as well as the literature evidence, it is predicted that social interaction will increase as a result of the gardens at Oasis on Ballou.

Healthy Food Access and Healthy Eating

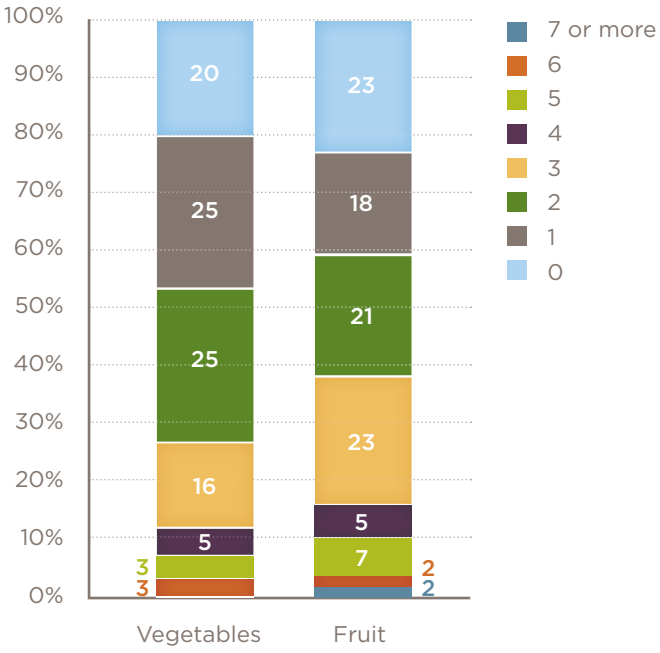
The gardens have the potential to impact healthy food access and healthy eating among gardening participants and the community of Codman Square. There are numerous food retailers in the neighborhood, but many lack a variety of fresh, healthy fruits and vegetables.[48] The resident survey indicated that 69% of local residents value a place in the neighborhood to access fresh fruits and vegetables (**Figure** 4). Several studies suggest gardens provide increased access to food and better nutrition.[49, 50]

FIGURE 15. PERCENT OF ADULTS WHO CONSUME RECOMMENDED DAILY FRUITS AND VEGETABLES BY NEIGHBORHOOD, 2008



Data Source: *Boston Behavioral Risk Factor Survey, 2008, Boston Behavioral Risk Factor Surveillance System (BBRFSS), Boston Public Health Commission, as cited in the Health of Boston Report, 2010.*

FIGURE 16. DAILY SERVINGS OF FRUITS AND VEGETABLES AMONG BALLOU AVENUE AREA RESIDENTS, 2012



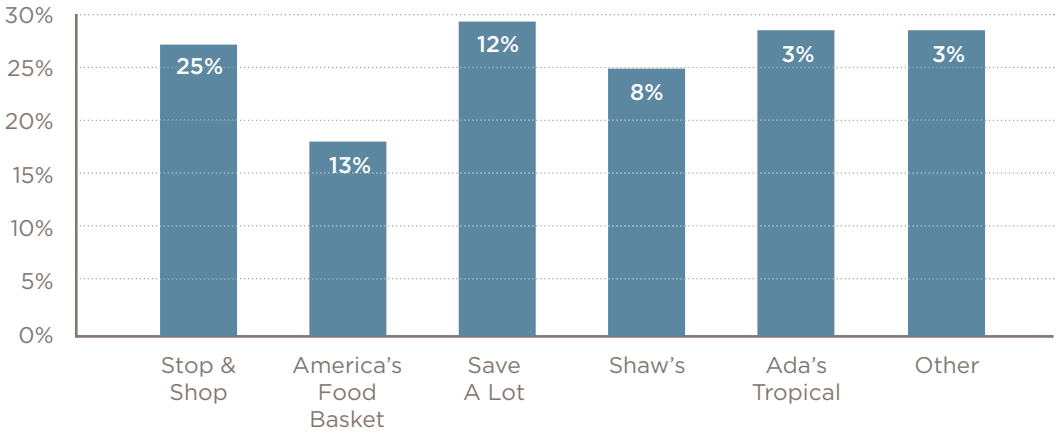
Note: *Percentages are rounded to the nearest whole number and may not add up to 100.*

Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012.*

According to the BBRFSS and YRBS respectively, only 25% of adults in South Dorchester (**Figure 15**) and 18% of Boston public high school students consume the daily recommended amount of fruits and vegetables. These percentages are lower than Boston overall.

As seen in **Figure 16**, 39% of respondents had 3 or more servings of fruits the day prior to the survey and 27% had 3 or more servings of vegetables (**Figure 16**). According to **www.choosemyplate.gov**, adults should consume between 1 ½ and 2 cups of fruits and between 2 and 3 cups of vegetables daily depending on age, gender, and physical activity. Though the percentage of people consuming the recommended daily amounts of fruits and vegetables was even higher in the area immediately around Oasis on Ballou than South Dorchester, the levels are still not optimal.

FIGURE 17. SOURCE OF PRODUCE PURCHASED BY BALLOU AVENUE AREA RESIDENTS, 2012



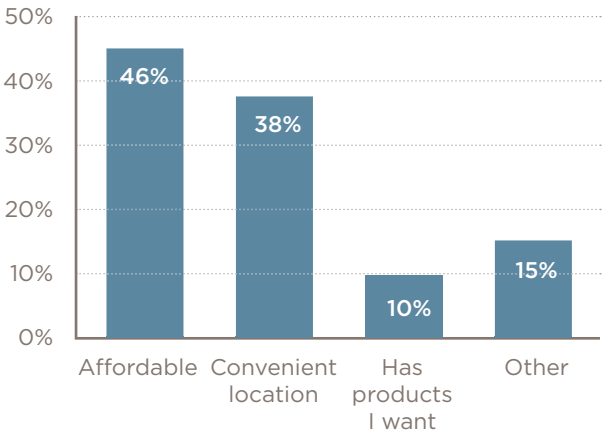
Note: *: Frequencies were tabulated among all survey respondents. Not all survey respondents answered every question.*

Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012.*

Most of the resident survey respondents shop for fruits and vegetables at large grocery stores, which are largely outside of the immediate neighborhood. As seen in **Figure 17**, the top grocery stores include Stop N' Shop at 25%, America's Food Basket at 13%, Save A Lot at 12%, and Shaw's at 8%, the closest of which is 1.5 miles away from Oasis on Ballou.

The resident survey shows (**Figure 17**) that residents have to travel outside the neighborhood to access fresh fruits and vegetables (77%), and **Figure 18** shows that they value affordability (46%) convenience (38%) in purchasing produce. Produce grown at Oasis on Ballou may provide this convenience for neighborhood residents. As seen in the data, there is a low percentage of people engaging in healthy eating, but there is high interest in accessing local fruit and vegetables.

FIGURE 18. REASONS FOR PURCHASING PRODUCE AT A PARTICULAR STORE AMONG BALLOU AVENUE AREA RESIDENTS, 2012



Note: *Respondents were allowed to choose more than one answer so total percent may not equal 100.*

Data Source: *Codman Square Neighborhood Development Health Impact Assessment Resident Survey, 2012.*

Research suggests urban gardeners have healthier diets than non-gardeners. Literature supports the link between community gardens and access to and consumption of fresh fruits and vegetables among gardening participants, their families, and wider community networks. A study by Armstrong suggests a higher consumption of fruits and vegetables in community gardeners and in the community involved with gardening.[51] In Flint, Michigan, a study by Alaimo et al. showed that adults with a household member who participated in a community garden consumed fruits and vegetables 1.4 more times per day than those who did not participate, and they were 3.5 times more likely to consume fruits and vegetables at least 5 times daily.[52]

Similar dietary changes have been seen among youth gardeners. LA Sprouts, a 12-week, after-school gardening, nutrition, and cooking program, worked with Latino 4th and 5th grade students (59% overweight). Compared to subjects in the control group, participants had increased preference for vegetables overall, increased preferences for three target fruits and vegetables, and improved perceptions that "vegetables from the garden taste better than vegetables from the store." Amongst overweight youth, LA Sprouts participants had a 16% greater increase in their preference for vegetables compared with control subjects.[53]

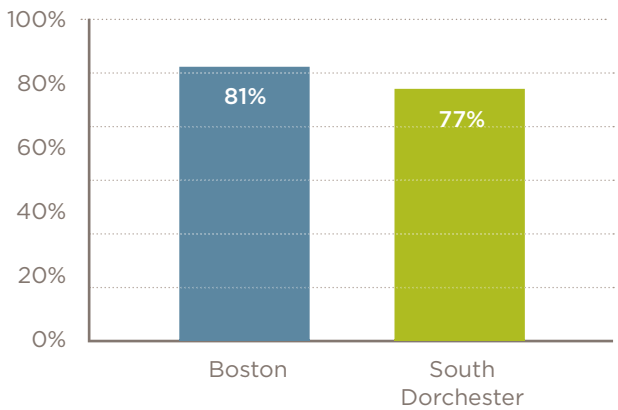
Given the low current local levels of fruit and vegetable consumption, the high value placed on locally grown fruits and vegetables and convenience, and the body of literature, it is predicted that the teaching and production gardens at Oasis on Ballou will likely increase access to and consumption of fruits and vegetables.

Social Cohesion

The inherent social interaction involved in the teaching and demonstration gardens is predicted to likely increase social cohesion among participants.

The percent of residents who feel that their neighbors are reliable served as a measure of social cohesion. According to **Figure 19**, over three-fourths (77%) of South Dorchester adults reported that they felt they could rely on their neighbors in 2007, which was slightly below that of Boston (81%).

FIGURE 19. PERCENT OF BOSTONIANS WHO FEEL THEY CAN RELY ON THEIR NEIGHBORS, 2007



Data Source: *Boston Public Health Commission, as cited by the Boston Indicators Project.*

A major benefit of community gardens that emerged from studies by Zoellner included increasing community cohesion.[54] Also, residents who participate in gardening activities report higher levels of attachment to their neighborhood, which is associated with higher levels of collective efficacy, defined as "mutual trust among neighbors combined with willingness to intervene on behalf of the common good".[55, 56] Involving youth in gardening, as planned by the CSNDC, is likely to have many positive social effects. In a qualitative study by Alaimo et al, it was found that community gardens promoted developmental assets for involved youth through opportunities for constructive activities, contributions to the community, relationship and interpersonal skill development, informal social control, exploring cognitive and behavioral competence.[57]

Given the social interaction likely in Oasis on Ballou gardens, as well as the literature regarding increased community cohesion due to gardens, it is predicted that social cohesion will likely increase among gardening participants.

Sense of Well-being (stress)

The gardens have the potential to impact residents' sense of well-being as a result of physical activity and social interaction opportunities. As seen in **Figure 11**, 17% of Boston adults reported feeling worried, tense or anxious. This data is not available for youth in Boston.

As mentioned in the assessment of the tot lot, literature suggests that physical activity — in this case associated with gardening — plays a role in decreasing stress among youth.[58] Also due to physical activity, youth experience more immediate effects including a feeling of well-being, improved self-esteem, and increased discipline.[59] Social interaction is also a pathway through which well-being and stress are affected. For youth, these effects are positive in the garden, due to increased social support/skills.[60]

There is also evidence in the literature that community gardens reduce stress directly,[61] and benefit social and psychological well-being of gardeners and local residents,[62] as well as increase social capital through the development of social ties. Research by Van and Custers demonstrated that the act of gardening by community gardeners seems to reduce stress and restore positive mood more effectively than other activities such as reading. This is likely associated with moderate physical activity, and/or with the restorative effects of nature.[63] Also, studies have noted that local crime is reduced by the extent to which city gardens and parks are frequented,[64] though the evidence is mixed. There is reason to believe that by reducing crime or the perception of crime, community gardens can reduce stress. Further, a study by Lambert in 2002 shows that exposure to outdoor sunshine raises levels of serotonin in the brain, which is a natural mood-lifting chemical. And vitamin D deficiency, which is made via the skin with exposure to sunshine, is associated with depression, especially in overweight subjects.[65]

Given the literature regarding reduction of stress related to physical activity and being outside, as well as literature about social interaction through gardening, it is predicted that stress will be reduced as a result of the gardens.

Exposure to Toxins

It has long been known that urban soils, including in Boston, often contain high levels of contaminants. The contaminants can pose a significant health risk to the urban population, especially for those who participate in gardening activities or consume contaminated produce, as well as vulnerable populations such as children and the elderly.[67] As discussed in relation to the tot lot, 1.2% of children 0 to 5 years old in South Dorchester have elevated blood lead levels (**Table 5**), based on outdated measures of lead poisoning in children. The likelihood, with the new measures, is that higher numbers of young children in South Dorchester have unsafe blood lead levels.

Based on data from soil testing done at Oasis on Ballou, there are elevated levels of several heavy metals, including lead (Pb), and other substances (see Appendix E) in sections of the site. Additionally, in a study by Preer et al., analyses of soil and vegetables from gardens in metropolitan Boston indicated the existence of elevated Pb and Cadmium (Cd) contents in some gardens. Elevated Pb content has been found in leafy vegetables grown near heavy traffic and in leafy and root vegetables from gardens with high soil Pb content.[68] This is especially of concern given that Oasis on Ballou is directly alongside the Fairmont Indigo commuter rail line.

Most people are concerned with elevated toxins in vegetables and fruits grown in contaminated soil, but the additional risk from inhalation and incidental ingestion of dusts and dirt have likely been underestimated. With increased and extended exposure through gardening activities, the risk is even higher.[69] In a study by Hough et al, it was found that most of the hazard was attributable to dietary exposure with soil ingestion and dust inhalation being relevant for highly exposed infants and persons. The largest contributors to health hazards were lead (Pb – 40% of hazard index) and cadium (Cd – 30% of hazard index).[70] Predicting exposure to potentially toxic metals from consumption of food is complicated – soil properties and the physiological properties of the plant influence plant uptake. Additionally, it is not known whether soil from the site will be used in the garden in any manner.

Given the known presence of lead and other contaminants in the soil, it is possible that there will be heavy metal toxic exposures among the garden participants and local population. If the site is developed as is, without remediation, exposure is very likely. Recommendations are suggested in the following section to appropriately mitigate the likely exposure that would be caused by working in the gardens and consuming produce grown in the gardens.

Chronic Diseases

Through the pathways of physical activity and healthy food access, the gardens at Oasis on Ballou have the potential to impact the development of chronic diseases, though these health outcomes are distal given the small scale of Oasis on Ballou. Thus, predictions are not made about the potential health impacts, in this regard, on the local population.

The literature is scarce supporting distal changes in chronic disease outcomes as a result of community gardens. However, the aforementioned study by Yeudall on the LA Sprouts program did result in several shorter-term health outcomes. LA Sprouts participants had increased dietary fiber intake and decreased diastolic blood pressure.

Amongst overweight youth, participants had a significant change in dietary fiber intake, reduction in body mass index, and less weight gain compared to those in the control group.[71]

Research by Armstrong suggests that increased consumption of fruits and vegetables might lower the consumption of sweetened foods and beverages, which has known links to obesity, diabetes and other chronic diseases.[72] A study by He et al. concluded that women with higher consumption of fruits and vegetables had a 28% lower risk of major weight gain.[73] There is also strong evidence that a diet rich in fruits and vegetables significantly lowers blood pressure and improves lipid profile, both of which are risk factors for cardiovascular disease[74, 75] Finally, higher consumption of fruits and vegetables has been shown to lower all-cause mortality from diabetes.[76]

As noted above regarding the tot lot, there is also literature showing a bi-directional relationship between chronic disease and mental health, with each reinforcing the other both positively and negatively. [77, 78] The gardens' effects on mental health are described below.

Mental Health

Through the pathways of physical activity and social interaction, the gardens have the potential to improve mental health status of the community. The links between the immediate and intermediate health impacts of the garden are more robust, as discussed above, and thus predictions about long-term mental health impacts are not made here. Literature shows that physical activity, which will likely increase due to the garden, has beneficial effects for reduced depression.[79] A study by Flom et al. found a positive association between being in nature/playing outside and mental health among school-aged children, which may apply to youth gardening as well.[80] In general, literature supports the idea that green space is an important contributor to mental health with social interaction and social cohesion being a pathway to improved mental health.[81] Lower stress and more social connections are also associated with better mental health.[82]

Injuries

Injuries in the context of the gardens include accidents and poisonings (see discussion above in *exposure to toxins* section). Gardening is associated with some risk of injury. Common gardening tasks, such as digging, planting, weeding, mulching and raking can cause stress and strain on muscles and joints, primarily in the shoulders, back, neck and knees. **Figure 12** illustrates citywide unintentional injury-related emergency department (ED) visit rates per 10,000 population. Unintentional injury includes events such as falls, accidental poisonings, motor vehicle crashes, pedestrians injured by motor vehicles, or a mass casualty event. Unintentional injury-related emergency room visits for all people in Boston from non-fall-related causes is 339.5/100,000. It is not known how many of these were sustained while gardening.

A study by Powell et al. estimated that men garden more than women, and older people garden more than younger people. Projecting from a national survey, the authors estimated that about 70% of the US population engages in gardening, and about 1.6% of gardeners get injured in a 30-day period, equating to 2.1 million people. Young people suffered more gardening injuries than older people.[83] According to the Consumer Product Safety Commission, emergency rooms in the United States treat more than 400,000 outdoor garden-tool-related injuries each year. Additionally, the American Society for Surgery of the Hand (ASSH) has issued warnings that caution gardeners about hand-related injuries.[84]

Given the prevalence of gardening and gardening injuries nationwide, as well as the anticipated use of the gardens at Oasis on Ballou, it is predicted that gardening injuries on the site are possible.

LEARNING/TEACHING KITCHEN

The third and final component of Oasis on Ballou is the learning/teaching kitchen. This component of Oasis on Ballou is proposed to be contained in a 2,000 square foot building that will include a demonstration kitchen, several classrooms, and an eating area.

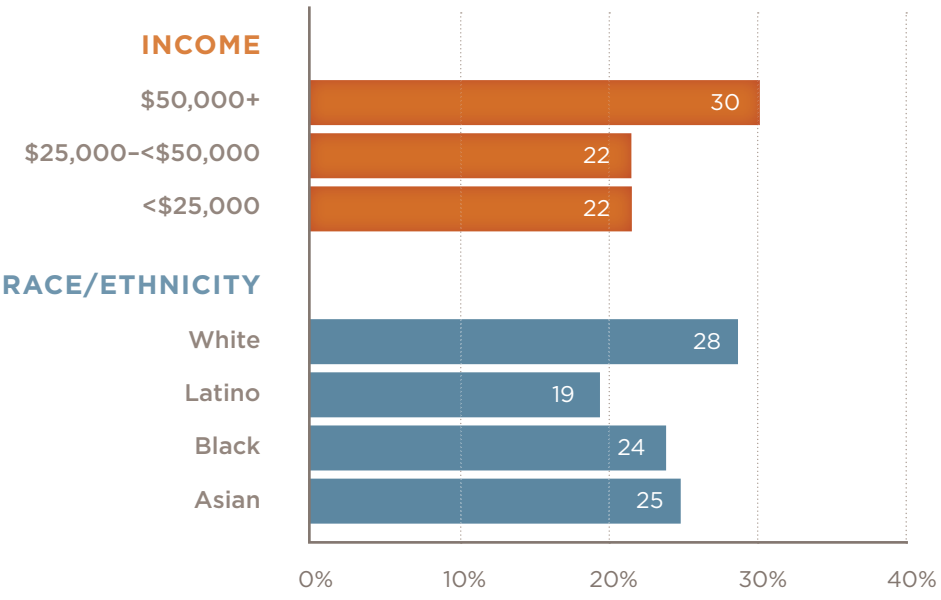
As seen in the learning/teaching kitchen pathway diagram, the learning/teaching kitchen is predicted to have impacts on chronic diseases, mental health, and injuries through the determinants of healthy food access, social interaction, food/nutrition skills and knowledge, healthy eating, social cohesion, and sense of well-being. The evidence supporting these connections is presented below.

Healthy Food Access and Healthy Eating

There are numerous food retailers in the neighborhood, but many lack a variety of fresh, healthy fruits and vegetables.[85] The resident survey indicated that 69% of local residents value a place in the neighborhood to access fresh fruits and vegetables (**Figure 4**). Also, as discussed with regards to the gardens, the BBRFSS and YRBS respectively indicate that only 25% of adults in South Dorchester and 18% of Boston public high school students consume the daily recommended amount of fruits and vegetables (**Figure 15**).

When stratified by income, as seen in **Figure 20**, Boston adults with an annual income of $50,000 or higher were more likely to report consuming the recommended daily amount of fruits and vegetables (30%) compared to adults in lower income brackets. By race and ethnicity, Whites were more likely to meet the recommended servings of fruits and vegetables (28%) as compared to Latinos (19%), Blacks (24%), and Asians (25%).

FIGURE 20. ADULTS WHO CONSUME RECOMMENDED DAILY FRUITS AND VEGETABLES BY SELECTED DEMOGRAPHICS IN BOSTON, 2010



Note: *Data is not available by neighborhood.*

Data Source: *Boston Behavioral Risk Factor Survey 2010, Boston Behavioral Risk Factor Surveillance System (BBRFSS), Boston Public Health Commission, as cited in The Boston Health Report, 2011.*

The resident survey indicated that the percentage of people consuming the recommended amounts of fruits (38%) and vegetables (28%) was higher in the area immediately around Oasis on Ballou, but certainly less than optimal (**Figure 16**). Also important to note is that people of color, who primarily comprise the neighborhood around Oasis on Ballou, have even lower rates of healthy eating. For more local baseline data, see healthy food access and healthy eating section related to the gardens.

Iacovou et al conducted a systematic review of the literature on community kitchens, which found that they may be an effective strategy to improve participants' nutritional intake.[86] The ways in which participation in a community kitchen impacts healthy food access and healthy eating are many and varied. Several studies reported that participants purchased[87] and ate[88, 89] a greater variety of fruits and vegetables. In a study by Fano et al, participants reported that they consumed more fruits and vegetables (an increase from 29% to 47%) after joining a community kitchen program.[90]

LA Sprouts, the after-school program that incorporated a gardening, nutrition, and cooking program, showed that participants had increased preference for vegetables overall, increased preferences for three target fruits and vegetables, and improved perceptions of the taste of vegetables. Amongst overweight youth, LA Sprouts participants had a 16% greater increase in their preference for vegetables compared with control subjects.[91]

Given the dearth of local produce retailers, the resident interest in accessing local fruits and vegetables, current levels of healthy eating, as well as the literature on the benefits of community kitchens on improved nutritional intake, it is predicted that healthy food access and healthy eating will increase as a result of the learning/teaching kitchen.

Food/Nutrition Skills and Knowledge

Community kitchens are frequently implemented alongside gardens, as are the plans for Oasis on Ballou, to take advantage of the produce grown for learning/teaching, consumption, and retail. As seen in **Figure 4**, a large majority of residents (79%) who completed the survey stated that they value a program where people can share and learn new skills. A study by Engler-Stringer and Berenbaum showed that participants in a community kitchen were more excited about learning and cooking with new foods and enjoyed cooking and eating more.[92] Additionally, Fano reported that 81% of participants learned to feed their families healthier food.[93] The benefits seen were also passed to the families of participants, thus impacting a wider population than only those who were able to participate directly in the kitchen. According to Crawford and Kalina, a community kitchen program enhanced the ability of participants to provide themselves and their families with nutritious foods.[94]

Given the strong literature regarding obtaining and sharing cooking/nutrition skills, and the local interest in sharing and learning new skills, it is predicted that the learning/teaching kitchen will likely increase healthy food/nutrition skills and knowledge.

Social Interaction and Social Cohesion

Similar to the gardens, social interaction and social cohesion are inherent to use of the learning/teaching kitchen. As seen in **Figure 19**, 77% of adults in South Dorchester feel they can rely on their neighbors. Though, only 61% of resident survey respondents agree or strongly agree that they can trust their neighbors (**Figure 10**). According to Yeudall et al, "food and shared experiences," such as in a community kitchen, can serve as a "starting point for understanding" and bringing people out of isolation. This can also serve as a starting point for discussions of broader issues affecting the community.[95] The residents around Oasis on Ballou value a place where neighbors can meet and a program where people can share and learn new skills (**Figure 4**). Literature supports these connections, as well. A variety of studies using mixed methods found positive impacts of community kitchens on social interaction, as well as social and emotional support. Three studies showed that participants of community kitchens had increased social interaction and decreased social isolation.[96, 97, 98] A study by Fano et al, indicated that 75% of participants experienced increased social interaction and support.[99] Two additional studies indicated that participants built friendships and received social and emotional support.[100, 101]

Given the inherent interactions in a community kitchen, the residents' desire to interact and learn, and the literature, it is predicted that social interaction and social cohesion are likely to increase as a result of the learning/teaching kitchen.

Sense of Well-being (Stress)

Through the pathways of healthy food access and social cohesion, it is possible that participants in the learning/teaching kitchen will have improved sense of well-being. As seen in **Figure 11**, 17% of Boston adults reported feeling worried, tense or anxious 15 or more days in the past month. Several studies found that participants in community kitchens experienced decreased stress as a result of decreased psychological distress associated with food insecurity [102] and enhanced coping skills.[103]

Chronic Diseases

Through the pathways of healthy eating and sense of well-being (decreased stress), the learning/teaching kitchen has the potential to positively impact chronic disease outcomes. In general, fruit and vegetable consumption, seen as an intermediate impact of the learning/teaching kitchen, is associated with decreases in many chronic diseases, including diabetes, cardiovascular disease, asthma, osteoporosis, and cancer. These behaviors, and many of the afore-mentioned diseases, also have links with obesity. Research by Armstrong suggests that increased consumption of fruits and vegetables might lower the consumption of sweetened foods and beverages, which has known links to obesity, diabetes and other chronic diseases.[104] A study by He et al concluded that women with higher consumption of fruits and vegetables had a 28% lower risk of major weight gain.[105] There is also strong evidence that a diet rich in fruits and vegetables significantly lowers blood pressure and improves lipid profile, both of which are risk factors for cardiovascular disease.[106, 107] Finally, higher consumption of fruits and vegetables has been shown to lower all-cause mortality from diabetes.[108]

The community kitchen's impact on mental health is described below.

Mental Health

Through the pathways of access to healthy foods and social interactions, the learning/teaching kitchen has the potential to impact mental health outcomes. The decreased stress due to healthy food access may improve participants' mental health. Social cohesion, and the coping skills gained by some participants, may also contribute to improved mental health. Finally, there is a bi-directional relationship between chronic disease and mental health, with each reinforcing the other both positively and negatively, as noted above in regards to chronic disease impacts of the learning/teaching kitchen.[109, 110]

Injuries

Kitchen injuries, such as burns and cuts, are common, though evidence is scarce to demonstrate the extent of the problem.[111] As mentioned previously, unintentional injury-related emergency room visits for all people in Boston from non-fall-related causes is 339.5/100,000 (**Figure 12**). Cooking caused 44% of reported home fires in the US in 2010, accounting for 40% of home fire injuries.[112] Cooking-related injuries are a common problem worldwide, resulting in more pediatric burns than any other cause.[113] **Because kitchen injuries are fairly common, it is possible that they will be sustained in the use of the learning/teaching kitchen at Oasis on Ballou.**

OVERALL SITE

While each individual site component of Oasis on Ballou has associated health impacts as described above, the overall development of the vacant lot has several health implications as well. Physical activity, social interaction and social cohesion, crime, and traffic are all health determinants that will potentially be impacted by the development of Oasis on Ballou as a whole, regardless of the specific site components.

Physical Activity

Greater physical activity is likely among youth who use Oasis on Ballou. According to several studies, adults in neighborhoods with more physical order (greenery, playgrounds) were twice as likely to allow children to use local playgrounds.[114, 115, 116] Also, a RAND Corporation study found that Los Angeles residents who live near parks visit them and exercise more often than people who live greater distances from green spaces.[117] Additionally, 79% of resident survey respondents stated that they would walk to the site. These data indicate that regardless of the components of the site, people will engage in increased physical activity commuting to and using Oasis on Ballou.

Social Interaction and Social Cohesion

As noted throughout the assessment of Oasis on Ballou site components, local residents value a place for neighbors to meet. Past research has shown that community development leads to increased social interaction of residents.[118] Oasis on Ballou has numerous spaces and ways for neighbors to interact, which will likely result in greater social cohesion.

Traffic

Given that a new site will be developed in an entirely residential area, and the influx of people this may cause, there is the potential for increased traffic and consequent motor vehicle related injuries. A map of motor vehicle crashes for this area can be seen in Appendix F. However, 79% of survey respondents said they plan to walk to the site, so it is unclear if vehicular traffic will increase significantly enough to impact motor vehicle-related injuries or quality of life in the neighborhood. Also, given that existing crashes in the neighborhood have not occurred directly around the site, there is a low risk of increased pedestrian injuries due to motor vehicle-pedestrian collisions.

Crime

According to a study by Baum et al, perceived levels of safety within neighborhoods are an important potential *outcome* that can result from neighborhood-based social capital, and they are often intricately linked.[119] There is also anecdotal evidence that because vacant urban lots are associated with dumping, loitering, and crime — and because development of green space decreases disorder, increases "eyes on the street," as well as collective efficacy — that community green spaces do have the potential to *decrease* crime or perceptions of crime.[120] Community gardens and parks, when used as intended, have demonstrated a lowered rate of violent and non-violent crimes in the community. Community spaces such as these increase the number of people vigilant to activity in the space, as well as provide a safe space in which people can interact as a community.[121, 122] A longitudinal, case-controlled study in Philadelphia showed that vacant lot greening was associated with consistent reductions in gun assaults, consistent reductions in vandalism, and associated with residents' reporting less stress and more exercise.[123]

As discussed in relation to the tot lot, although local residents feel safe (**Figure 9**), police statistics indicate that there is a high level of crime in the area. Codman Square is part of two police districts, B–3 and C–11, which account for 30% of violent crime, 18% of property crime, and 23% of vandalism in all of Boston (**Table 4**). The evidence is mixed as to whether Oasis on Ballou will impact crime positively or negatively, though we predict that perception of crime and actual crime will possibly be reduced. The evidence must be considered as a whole, and crime related to different site components should be considered as part of the larger development of Oasis on Ballou.

Impact Analysis Summary of Findings

Based on the known community interests and issues, the survey results, secondary data and literature, the most signifi cant and likely positive impacts to the community are improved physical activity, healthy food access and healthy eating, safety, social interaction and social cohesion. The most signifi cant and likely negative impacts include exposure to soil toxins, injuries, and crime. Overall, the HIA found that Oasis on Ballou would have signifi cant positive impacts on the health of local residents if designed according to the recommendations and resources presented in the report.

Below is a table summarizing the overall impact of Oasis on Ballou on immediate and intermediate health determinants for each of the site components as well as the site as a whole. The table also summarizes the strength of the data to support these conclusions.

TABLE 6. HIA SUMMARY OF FINDINGS

TOT LOT

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Physical Activity	+	Likely	Children & Caregivers	High
Social Interaction	+/– (children ? (adults)	Likely	Children & Caregivers	High
Perception of Safety	?	Likely	Children, All users, Neighbors	High
Crime	–	Uncertain	Children, All users, Neighbors	High
Sense of Well-being	?	Uncertain	Children & Caregivers	Medium
Social Cohesion	+	Likely	Children & Caregivers	Medium
Exposure to Soil Toxins	–	Likely	Children, potentially Caregivers	High

TEACHING/PRODUCTION GARDEN

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Physical Activity	+	Likely	Participants	High
Social Interaction	+	Likely	Participants, Especially Youth & Elderly	High
Perception of Safety	+	Likely	Participants, Their Families/ Networks, Wider Community	High
Crime	+	Likely	Participants, Their Families/ Networks, Wider Community	High
Sense of Well-being	+	Likely	Participants, Possibly Wider Community	Medium
Social Cohesion	+	Possible	Participants, Possibly Wider Community	Medium
Exposure to Soil Toxins	–	Possible	All Participants, Especially Children	High

LEARNING/TEACHING KITCHEN

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Health Food Access	+	Likely	Participants, Families/Networks, Wider Community	High
Food/Nutrition Skills & Knowledge	+	Likely	Participants, Families/Networks, Wider Community	High
Social Interaction	+	Likely	Participants	High
Healthy Eating	+	Likely	Participants, Families/Networks,	High
Social Cohesion	+	Likely	Participants	High
Sense of Well-being	+	Possible	Participants	Medium

OVERALL SITE

Health Determinant	Direction	Likelihood	Distribution	Strength of Evidence
Physical Activity	+	Likely	Users	High
Social Interaction	+/–	Likely	Users, possibly Neighbors	Medium
Social Cohesion	+	Likely	Users, possibly Neighbors	Medium
Crime	–	Uncertain	Users, Neighbors	Medium
Traffic	–	Uncertain	Users, Neighbors	Medium

DIRECTION:

\+ (Positive Health Impact)
– (Negative Health Impact)
? (Unable to assess)

LIKELIHOOD:

Likely (likely the impact will occur as a result of the project)
Possible (possible that the impact will occur as a result of the project)
Unlikely (unlikely that the impact will occur as a result of the project)
Uncertain (unclear if the impact will occur as a result of the project)

DISTRIBUTION:

Subpopulations affected

STRENGTH OF EVIDENCE:

High (Primary Survey Data, Secondary Data, and Strong Literature Base)
Medium (Strong Literature Base and Primary Survey Data OR Secondary Data)
Low (Weak Literature Base OR Secondary Data)

Based on the above findings, a set of recommendations is proposed to mitigate the negative health impacts and maximize the positive health impacts of Oasis on Ballou. The next section will discuss recommendations for each site component, as well as for the overall site.

Section III: Recommendations

This section describes our recommendations to improve the potential health outcomes resulting from Oasis on Ballou, both for mitigation of negative impacts and promotion of positive impacts.

A first set of recommendations were compiled based on those that were suggested or inferred by the assessment summary. They were enhanced with further recommendations that were offered by HRiA staff familiar with the public health field.

These recommendations were then presented to the Oasis on Ballou Health Impact Assessment Advisory Committee, a grouping of public health experts who were familiar with the issues and the neighborhood, to provide feedback on the following:

1. Were the draft recommendations accurate and appropriate with regards to the public health field, and this project in particular?

2. Were there any other recommendations or resources that should be offered based on the Advisory Committee's knowledge and experience?

After meeting with the Advisory Committee, HRiA convened again with the Friends in order to give The Friends the final word regarding the recommendations.

The Friends were asked to give feedback on the following:

1. Were the draft recommendations realistic in the context of the neighborhood?

2. Were the draft recommendations feasible for CSNDC and The Friends?

3. Were The Friends' concerns addressed?

4. Would collaborating with other groups for the use of the site enhance or crowd out the residents?

The Friends endorsed most of the recommendations and agreed that they were realistic and feasible. However, they cited that a speed bump on the street, which was one of the initial recommendations, would not be feasible given previous failed attempts to have the city install one. They approved of having a crosswalk. The Friends did not think that the recommendation of partnering with outside groups for use of the site, such as local daycares and schools, would present challenges to the community, especially if there was a site manager to schedule and manage the groups.

The final list of recommendation can be found following in **Table** 7. The recommendations table below is organized by the three site components of Oasis on Ballou.

There are also recommendations regarding the site as a whole. For each component, we list the health determinant, whether it should be promoted or mitigated, and corresponding recommendations.

TABLE 7. RECOMMENDATIONS

TOT LOT

HealthDeterminant	Promote/Mitigate	Recommendation
Physical Activity	Promote	• Encourage "Active Design" tot lot with multiple activity spaces, such as painting a world map and hopscotch lines on the ground, opportunities to strengthen both upper and lower body as well as promote balance and aerobics. See NYC Active Design Guidelines *Appendix G + *For design ideas visit www. playcore.com & other Tot Lots in Boston.*
Social Interaction	Promote	• Plant shade trees alongside the Tot Lot. Contact Grow Boston Greener for grants. *Appendix H • Vandalism-proof benches and tables • Play equipment that encourages two or more users simultaneously • Meet American Society for Testing and Materials standards for accessibility • Outreach to local preschools and daycares to schedule daytime use *Appendix I
Soil Exposure	Mitigate	• Cover ground with safe, shock-absorbing material such as poured in place rubber, recycled rubber tile, or wood products. • Create hand-washing station next to Tot Lot • Signage on site about washing hands after playing
Injuries	Mitigate	• Cover ground with safe, shock-absorbing material such as poured in place rubber, recycled rubber tile, or wood shavings. • Age-appropriate, low to ground play equipment (0–5 years) • Signage that children must be accompanied by an adult
Crime	Mitigate	• Well lit spaces, proper lighting that includes extended hours and mesh over lights to prevent damage and vandalism • Signage about ages of use for Tot Lot (0–5 years) • Signage about hours of operation for Tot Lot (dawn –dusk) • Visible, front placement of Tot Lot

TEACHING / PRODUCTION GARDENS

HealthDeterminant	Promote/Mitigate	Recommendation
Healthy Food Access	Promote	• Survey neighborhood residents about fruit & vegetable preferences to plant in gardens • Develop a distribution network among local food retailers. Contact BNAN, TFP, and ReVision Farms *Appendices J and K • Contact BPHC regarding corner stores and the use of SNAP/EBT & Bounty Bucks; pursue grants to supply local, small food retailers (such as corner stores) with technical assistance and refrigeration units for stocking garden produce *Appendices H and K
Social Interaction	Promote	• Contact local schools, youth groups, ABCD centers, and senior centers to engage participants *Appendix L • Build garden for maximum accessibility — including for those of different heights, with compromised balance, or in need of wheel chairs. Contact BNAN and TFP regarding ADA accessibility requirements and suggestions *Appendix K
Soil Contamination	Mitigate	• Use standard techniques for mitigation of soil contamination + *Raised beds using chemical-free bed planks/dividers — see TFP Raised Bed Manual *Appendix M* + *Contact ReVision Farm and BNAN *Appendix K* • See BNAN Tips to Protect Against Soil Exposure *Appendices N and O • Water spouts for garden should also be also available for washing hands
Injuries	Mitigate	• Signage and teaching regarding safe gardening techniques, as described by the American Physical Therapy Association *Appendix P • Shock-absorbing material for garden paths *Appendix K • Build gardening beds at multiple levels/heights, and include paths, that meet ADA requirements. Contact BNAN *Appendix K
Pests	Mitigate	• Pest control options- see TFP Urban Agriculture Manual and BNAN Pest Control Tips *Appendix Q + Rotation, barrier, row cover, and organic techniques • Organic/safer pesticides — see Resource Guide for Organic Insect and Disease Management *Appendix K • Insect traps • Crop selection • Biological controls, such as predator insects and beneficial microorganisms

LEARNING / TEACHING KITCHEN

HealthDeterminant	Promote/Mitigate	Recommendation
Physical Activity	Promote	• Use open eating space for other community activities, such as yoga or zumba
Food/Nutrition Skills & Knowledge	Promote	• Partner with Cooking Matters, or other nutrition/cooking organizations, to offer programming *Appendix K • Provide free healthy recipes; organize community healthy cookbook project
Social Interaction	Promote	• Focus programming on families, such as community meals and classes
Injuries	Mitigate	• Design kitchen to comply with codes and standards to reduce injuries, food contamination and fires. Use expertise of Boston Inspectional Services. *Appendix K • Signage and teaching regarding hand washing, safe food preparation, and safe kitchen procedures *Appendix R

OVERALL SITE

HealthDeterminant	Promote/Mitigate	Recommendation
All	Promote	• Hire a local resident as site manager to perform ongoing maintenance and to ensure proper usage of the site
Physical Activity	Promote	• Signage around the neighborhood directing people to the site • Signage on site about calories burned while engaging in different activities
Social Interaction	Promote	• Host community and cultural events on site
Chronic Disease Prevention	Promote	• Place at least one water fountain on site • Use "green", low toxic building materials to prevent indoor air quality problems
Crime	Mitigate	• Proper vandal proof lighting, including mesh over lights to prevent breakage • Graffiti resistant materials *Appendix S • Proper maintenance and oversight by site/garden manager • Neighborhood watch
Traffic	Mitigate	• Conduct walkability audit with Walk Boston *Appendix K • Traffic-calming measures, such as a lined cross walk, signs to slow down (10–15 mi/hour) — see HRiA's Community Traffic Calming Policy and Practice Brief (Due out in Spring 2013) and NYC Active Design Guidelines *Appendix G

***ADA** = American with Disabilities Act*
***BNAN** = Boston Natural Areas Network*
***BPHC** = Boston Public Health Commission*
***TFP** = The Food Project*
** = an appendix*

Section IV: Reporting, Evaluation and Monitoring

REPORTING

This report will be presented to the CSNDC to support their application to the City of Boston Department of Neighborhood Development for the procurement of the 100 Ballou Avenue site, and will hopefully inform their decisions on how to develop the site to support the health of the neighborhood. This report was also provided to the MDPH Division of Prevention and Wellness and the Metropolitan Area Planning Commission as part of the grant requirements for this project. Other intended forms of dissemination include a presentation at the annual MDPH Ounce of Prevention Conference and a presentation to the Massachusetts Association of Community Development Corporations. Additional avenues for disseminating this HIA will be discussed among MDPH, HRiA and CSNDC.

EVALUATION

HRiA will consider the following evaluation questions for this HIA:

- What resources were used by HRiA and CSNDC to complete this HIA?
- To what extent was the community involved and engaged in this HIA process?
- What were the successes and challenges of this HIA process?
- Did CSNDC find the HIA process valuable?

**The process evaluation will be completed within three months of the submission of this HIA report, and will be made available on the HRiA website.*

MONITORING

HRiA has developed the following two questions to monitor the impact of this HIA report:

- How did this HIA influence the decision making of the CSDNC?
- What aspects of the recommendations were included in CSNDC's proposal to the City of Boston for the procurement of land and development of Oasis on Ballou?

Tracking the impact of the Oasis on Ballou on health determinants and health outcomes — One way that the health determinants and outcomes of this HIA could be monitored is through proposed regular surveying of local residents by CSNDC using the Resident Survey developed by HRiA. The current version of the survey (found in Appendix B) contains validated health behavior and health status questions, as well as questions regarding resident values and perceptions of the neighborhood. The survey can be adapted to address future needs and concerns of the CSNDC as progress is made on the development and implementation of the Oasis on Ballou site and programming. Over time, the survey can indicate whether predicted improvements on the social determinants of health, relative to the site, were achieved. In addition, complementary data can be compiled from sources that already collect several monitoring indicators of interest. For example, actual crime data is collected by Boston Police Department. Similarly, traffic data is collected by MAPC.

We recommend that the CSNDC monitor the following indicators over time — questions in italics denote those indicators that are contained in the resident survey:

- How many residents (adults and children) utilize the site?
- Have gardening and cooking skills/knowledge changed in the neighborhood?
- Has fruit and vegetable (healthy food) access changed in the neighborhood?
  - » *Where do you get most of your fruits and vegetables?*
- Has fruit and vegetable consumption in the neighborhood changed?
  - » *How many servings of fruit did you eat or drink yesterday?*
  - » *How many servings of vegetables did you eat or drink yesterday?*
- Has physical activity in the neighborhood changed?
  - » *During a usual week in the past month, how many days did you do vigorous physical activity? For how many minutes each day?*
  - » *During a usual week in the past month, how many days did you do moderate physical activity? For how many minutes each day?*
- Has the level of neighborhood social interaction changed?
- Has the perception of safety in the neighborhood changed?
  - » *Overall, how safe do you consider your neighborhood to be?*
- Has the incidence of crime in the neighborhood changed?
- Do neighbors believe that the Oasis on Ballou affects their sense of well-being?
- Has traffic volume in the neighborhood changed?

Limitations

There were several limitation regarding the process of this HIA. First, the limited time restricted the scope of the HIA in terms of which and how many health determinants could be examined. Second, as with all research efforts, there are several limitations related to the data collection that should be acknowledged. A number of secondary data sources were drawn upon for quantitative data in creating this report. It should be noted that for several indicators, current neighborhood level data were not available. Instead, larger geographic neighborhood statistics (e.g. South Dorchester or Boston) were used. Further, due to the collection of data from multiple sources, data presented in this report cover a variety of time periods. Therefore, figures and tables may not be directly comparable with each other. Additionally, because of small sample sizes or because geographic information was not noted, many of the secondary sources are not able to provide data that are specific by neighborhood. When this is the case, Boston city-wide data are presented in the report.

Additionally, self-reported survey data (e.g., BBRFSS and YRBS) should be interpreted with caution as respondents may over- or underreport behaviors and illnesses based on fear of social stigma or misunderstanding the question being asked.

Respondents may also be prone to recall bias — that is, they may attempt to answer accurately but remember incorrectly. Despite these limitations, these self-report surveys benefit from large sample sizes and repeated administrations, enabling comparison over time.

There are several limitations related to this resident survey that should be acknowledged. First, this was a convenience sample, not a scientific sampling of the neighborhood; therefore findings are not representative of all residents. Additionally, the data from the survey is self-reported and should be interpreted with caution as respondents may over- or underreport behaviors based on fear of social stigma or misunderstanding the question being asked. Finally, respondents may also be prone to recall bias — that is, they may attempt to answer accurately but remember incorrectly.

Finally, it should be noted that a limitation of the literature review was that some of the search terminology was different from the exact site components of Oasis on Ballou. For example, search terms for the research on the tot lot included playground, which is somewhat different from a tot lot and may have resulted in literature that was not entirely applicable to the tot lot of Oasis on Ballou. This limitation applied to the literature searches related to all three components. "Community garden" was used for searches related to the teaching and production gardens, because there is limited literature regarding teaching and production gardens. Similarly, the term "community kitchen," a common term for the kitchen component of Oasis on Ballou, was used to find literature related to the learning/teaching kitchen. There are differences between what the search terms describe and the site components intended to be developed at Oasis on Ballou. However, it is believed that much of the evidence provided in the literature was still relevant to this HIA, and thus was included in the assessment.

Conclusions

Health Resources in Action was pleased to conduct this Health Impact Assessment for the Codman Square Neighborhood Development Corporation and its key stakeholders, The Friends. HRiA has concluded, based on the research, that the Oasis on Ballou project has the potential for increasing opportunities for physical activity, access to healthy foods, healthy eating, social interaction and social cohesion of neighborhood residents. These are all important factors for supporting community health. However, the project can also present some potential negative health and safety impacts including exposure to soil toxins, injuries, and possibly vandalism. However, if the development adopts many of the recommendations offered in this report to promote these potential benefits and mitigate these potential hazards, HRiA predicts that the proposed Oasis on Ballou project will be an important asset and resource to a neighborhood that experiences significant challenges to its health and well-being.

Section V: List of Appendices

Following are multiple appendices which provide more detailed information contained in this report, as well as resources that will help the CSNDC successfully implement the recommendations for maximizing the health and safety of the users of Oasis on Ballou.

APPENDIX A.

Oasis on Ballou Health Impact Assessment Research Questions

APPENDIX B.

Codman Square Neighborhood Development Health Impact Assessment Resident Survey

APPENDIX C.

Additional Secondary Baseline Data

APPENDIX D.

Codman Square Neighborhood Development Health Impact Assessment Resident Survey Map

APPENDIX E.

Soil Analysis Report

APPENDIX F.

Codman Square Vehicle Crashes Map

APPENDIX G.

Active Design Guidelines
http://www.nyc.gov/html/ddc/html/design/active_design.shtml

APPENDIX H.

List of Potential Funding Resources

APPENDIX I.

Daycares within One Quarter Mile of Oasis on Ballou

APPENDIX J.

List of Possible Partners for Produce Distribution

APPENDIX K.

List of Organizations Pertaining to Recommendations

APPENDIX L.

List of Possible Partners for Teaching/ Production Gardens

APPENDIX M.

The Food Project Raised Bed Manual
http://thefoodproject.org/sites/default/files/DIY-bag-manual-2012_2.pdf

APPENDIX N.

BNAN Tips to Protect Against Soil Contaminant Exposure (English and Vietnamese)
http://www.bostonnatural.org/PDFs/cgGTips_2010GoodGardPractVietnameseEnglish.pdf

APPENDIX O.

BNAN Tips to Protect Against Soil Contaminant Exposure (Spanish)
http://www.bostonnatural.org/PDFs/cgGTips_2008GoodGardPractSPANISH.pdf

APPENDIX P.

APTA Gardening Safety Tips
http://www.moveforwardpt.com/Resources/Detail.aspx?cid=19c9688e-6022-4204-9591-9a1cf27f0c67

APPENDIX Q.

BNAN Pest Control Tips – What's Buggin' You?
http://www.bostonnatural.org/PDFs/cgGTipsbuggingyou.pdf

APPENDIX R.

Model for Reducing Kitchen Injuries
http://docs.schoolnutrition.org/meetingsandevents/anc2011/presentations/Tuesday/830-930/Model%20for%20Reducing%20Kitchen%20Injuries-D.Schweitzer.pdf

APPENDIX S.

Urban Institute Guide to Preventing Vandalism
http://www.urban.org/UploadedPDF/1001192_preventing_vandalism.pdf

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