DANA-FARBER CANCER INSTITUTE, INC.
DON APPLICATION # DFCI-18060111-HE
ATTACHMENTS

SUBSTANTIAL CAPITAL EXPENDITURE

JULY 19, 2018

BY

DANA-FARBER CANCER INSTITUTE, INC.
450 BROOKLINE AVENUE
BOSTON, MA 02215

DANA-FARBER CANCER INSTITUTE, INC.
APPLICATION # DFCI-18060111-HE

TABLE OF CONTENTS

Attachment/Exhibit

A

Attachment/Exhibit

1

2. Project Description

Dana-Farber Cancer Institute, Inc. ("Applicant"), an acute care hospital offering sub-specialized cancer care services with a primary location at 450 Brookline Avenue, Boston, MA 02215 ("Main Campus") submits this request for a Notice of Determination of Need ("DoN") for a substantial capital expenditure and acquisition of technology for a new hospital satellite facility to be located at 300 Boylston Street, Newton ("Chestnut Hill"), Massachusetts 02467 ("New Hospital Satellite Facility"). The New Hospital Satellite Facility will offer oncology services, which include exam, infusion and imaging services for the diagnosis and treatment of cancer. The project includes substantial renovation of the space, as well as the acquisition of two magnetic resonance imaging ("MRI") units, two computed tomography units ("CT") and one positron emission tomography/computed tomography ("PET/CT") unit ("Proposed Project") in support of examination and infusion therapy services.

The Proposed Project will result in the creation of a New Hospital Satellite Facility on two floors (140,000 square feet) of leased space. The implementation of the Proposed Project will occur in two phases. The initial phase is comprised of the construction of approximately half of the clinical space and will include exam rooms and the installation of infusion chairs to support the following oncology specialties at the new facility: breast, gastrointestinal, genitourinary, gynecologic and thoracic. To provide patients with essential imaging services, during the first phase of the Proposed Project, the Applicant will acquire and install one 1.5T MRI and two CTs. The second phase of the Proposed Project includes the construction of additional exam rooms and the installation of additional infusion therapy chairs. To ensure appropriate imaging capacity is available on-site for patients, the second phase of the Proposed Project includes the installation of one 3T MRI and one PET/CT. At completion, the New Hospital Satellite Facility will have approximately 45 exam rooms and 65 infusion chairs. Additionally, the New Hospital Satellite Facility will offer genetic testing and counseling, survivorship programming, centralized phlebotomy and lab services, palliative care, supportive services (e.g., social workers, financial counselors, resource specialists, etc.), clinical trials and imaging consultations.

Due to the Applicant's aging patient panel, as well as the aging population within the Commonwealth and the increasingly chronic nature of the disease, there is an increasing demand for cancer care services, including demand for the sub-specialized services provided by the Applicant. From fiscal year ("FY") 2015 to 2017, the Applicant experienced a 5% increase in demand for its services at its Main Campus, and significantly higher demand at its community-based sites. This increased demand for cancer care services is impacting the Applicant's Main Campus, which is currently nearing capacity despite the construction and opening of a new hospital building at its Main Campus in 2011. Since the addition of this capacity in 2011, the Applicant has experienced sustained and continued demand for its cancer care services. An analysis of demand data provides that even with efforts to expand capacity through operational changes and operating 7 days/week, the Applicant will be operating at full capacity at its Main Campus within the next two to three years. Accordingly, through the Proposed Project, expanded oncology services at the New Hospital Satellite Facility will allow projected excess volume from the Applicant's Main Campus to be shifted to Chestnut Hill, facilitating shorter wait times for multidisciplinary oncologic exams (medical, surgical and radiation oncology), infusion therapy services, and oncology-related imaging services. This shift of patients to the New Hospital Satellite Facility also will allow the Applicant to make available additional capacity at its Main Campus to continue to meet the growing demand by patients residing near the campus, including underserved populations that more heavily utilize public transportation.

To ensure access to a complete complement of cancer care services for its patients, the Applicant proposes to acquire diagnostic imaging equipment for operation at the New Hospital Satellite Facility. Specific modalities, such as MRI, CT and PET/CT play a critical role in initial cancer diagnosis, staging, treatment planning, and continuous monitoring. These imaging modalities provide oncologists with the information needed to appropriately diagnose and treat cancer. Given the necessity of imaging as a standard evidence-based component of cancer care, it is critical to have these services integrated and co-located with other oncology services.

Overall, the Applicant anticipates that implementation of the Proposed Project will provide needed access to cancer care services, while meaningfully contributing to the Commonwealth's goals of cost containment in healthcare. The Applicant's Clinical Pathways program has achieved high quality outcomes while ensuring the most cost-effective treatments are used for patients.[1] Additionally, timely access to specialized/sub-specialized oncology services may lead to earlier and more appropriate diagnoses and the potential to more quickly initiate cost-effective treatment options. When cancer is detected and treated earlier, care is two to four times less expensive than when it is detected in later stages as reduced and lower-cost interventions are typically utilized to treat earlier stage cancer.[2] This reduced cost of care leads to decreased costs for insurers and patients, ultimately leading to stabilized or reduced total medical expenses.[3] Quality of life for patients also will be improved by the Applicant's provision of complementary integrative therapies and supportive services (such as social work, financial counseling and access to resource specialists) at the New Hospital Satellite Facility, leading to high levels of patient satisfaction. Accordingly, the Proposed Project meets the needs of the Applicant's patient panel, as well as the Commonwealth's goals for high quality outcomes through lower-cost care.

Factor 1: Applicant Patient Panel Need, Public Health Values and Operational Objectives

F1.a.i **Patient Panel:**
Describe your existing Patient Panel, including incidence or prevalence of disease or behavioral risk factors, acuity mix, noted health disparities, geographic breakdown expressed in zip codes or other appropriate measure, demographics including age, gender and sexual identity, race, ethnicity, socioeconomic status and other priority populations relevant to the Applicant's existing patient panel and payer mix.

The Applicant is a not-for-profit, National Cancer Institute ("NCI")-designated Comprehensive Cancer Center and Center for AIDS Research, providing adult and pediatric cancer care services at its Main Campus in Boston and providing adult cancer care services at its hospital satellite facilities in Brighton, Milford, Roxbury (mammography only), and Weymouth, Massachusetts, as well as Londonderry, New Hampshire. The Applicant also operates physician oncology practices in Lawrence, Methuen, and Weymouth, Massachusetts. A principal teaching affiliate of Harvard Medical School, the Applicant provides training for new generations of physicians and scientists, designs programs that promote public health, particularly among high-risk and underserved populations, and disseminates innovative patient therapies and scientific discoveries to its target

[1] David M. Jackman et al., *Cost and Survival Analysis Before and After Implementation of Dana-Farber Clinical Pathways for Patients with Stage IV Non–Small-Cell Lung Cancer*, 13, J. OF ONCOLOGY PRAC., e346, e346-e352 (2017).
[2] *Econ. Impact of Cancer*, AM. CANCER SOC'Y, https://www.cancer.org/cancer/cancer-basics/economic-impact-of-cancer.html (last visited July 9, 2018).
[3] *Id.*

community across the United States and throughout the world. The Applicant conducts community-based programs in cancer prevention, early detection, and control throughout Boston's neighborhoods and the region, as well as maintaining joint programs with other Boston institutions affiliated with Harvard Medical School, including Brigham and Women's Hospital, Boston Children's Hospital, and The Massachusetts General Hospital.

As the only freestanding, NCI-designated Comprehensive Cancer Center in New England, the Applicant maintains a unique role in the continuum of care in the region by providing high-quality, sub-specialized services to patients with cancer. A pioneer in cancer care and research, the Applicant provided care to 88,626 unique patients in FY17. The Applicant also is involved in over 800 clinical trials and is internationally renowned for its blending of research and clinical excellence. Consequently, the Applicant is uniquely positioned to develop and test the next generation of cancer therapies in both the laboratory and clinic settings.

The Applicant is a major provider of cancer care services in the region as demonstrated by the utilization data for the 36-month period covering FY 2015-2017 ("FY15-17"). Attachment 2 provides the demographic profile for the Applicant's patient panel in table form.[4] The volume of patients seeking cancer care services from the Applicant has increased over the combined last three years by over 5% with 84,110 unique patients in FY15, 86,002 unique patients in FY16 and 88,626 unique patients in FY17.[5]

In regard to geographic diversity, the majority of the Applicant's patients are from Massachusetts with 77% (65,147 unique patients) residing in the Commonwealth in FY15, 76% in FY16 (65,379 unique patients) and 76% in FY17 (67,428 unique patients). Additionally, between FY15-FY17, 18-19% of all the Applicant's unique patients resided in New York, Connecticut, Maine, New Hampshire, Rhode Island, or Vermont. The Applicant's remaining patients come from various parts of the country and the world.

Current age demographic data from FY15-17 provide that the majority of the Applicant's patients (88%) are in the 40+ age cohort, with the 19-39 age cohort representing 10% of the patient panel and the 18 and under age cohort representing 3% of the patient panel. Significantly, over this same timeframe, the number of patients within the 65+ age cohort increased nearly 11% (with the 65+ age cohort representing 43% of the Applicant's panel in FY17), while volume for all other age cohorts remained the same (an increase of less than 1%). In regard to gender, the Applicant's patient panel is predominantly female (63%) with 53,661 women receiving treatment in FY15, compared to 30,443 men; 54,053 women to 31,945 men in FY16; and 55,637 women to 32,980 men in FY17. Additionally, the Applicant notes that its public payer mix is approximately 47%, with 40.4% of patients enrolled as Medicare beneficiaries and 6.8% of patients enrolled as MassHealth beneficiaries.

The Applicant's patient panel reflects a mix of races. Data based on patient self-reporting provide that from FY15-FY17, 85.3% of all patients seeking care at the Applicant's Main Campus and satellite hospital facilities identified as White; 4% identified as Black or African American; 3% identified as Asian and 2% identified as Other; approximately 2% identified as Hispanic or Latino;

[4]Data for the Applicant's Main Campus and satellite facilities based on claims data; reports included radiation oncology volume and outpatient volume only at the Main Campus. If more than one zip code was provided for any given medical record number within the space of a year, the most recent zip code was utilized for identifying the geographic origin of the patient. The data source for DFCCC patient data was OncoEMR medical record data.
[5] This total includes patients receiving services via the Applicant's Main Campus, hospital satellite facility locations, and physician practices.

and nearly 3% of patients declined to report race information. It is important to note that the racial composition of the Applicant's patient panel may be understated given the number of patients that identified as Other or declined to report information on race. Similarly, race data for the Applicant's physician practices for FY17 demonstrate analogous findings, with 68% of these patients identifying as White; patients who identified as Black or African American comprised 3% of the patient panel, and patients who identified as Asian comprised nearly 2%. Moreover, 12% of patients identified as Other and 1% declined to report race. Regarding ethnicity, 12% of patients identified as Hispanic or Latino.

Although the aforementioned race and ethnicity data represent all of the Applicant's patients with a visit over the last three fiscal years, these data also include patients who sought a second opinion and/or consultation at the Applicant's Main Campus or hospital satellite facilities, but did not necessarily seek treatment from the Applicant. To provide a more accurate depiction of the Applicant's patient panel that elected to receive treatment, an analysis of cancer registry data was conducted. Cancer registry data reflect patients who have had at least one session of treatment at the Applicant's facilities. For patients residing in Boston, cancer registry data reflect the following race statistics: for 2015, approximately 63% of the Applicant's patients residing in Boston identified as White; 25% identified as Black; 2% identified as Chinese;[6] 1% identified as Other; 8% identified as Unknown; and all other patients represented a combination of other races. In 2016, the data was analogous, 67% of the Applicant's patients residing in Boston identified as White; 22% identified as Black; 2% identified as Chinese; 5% identified as Other; 3% identified as Unknown; and all other patients represented a combination of other races. Finally, for January through September of 2017, 63% of the Applicant's patients identified as White; 26% identified as Black; 2% identified as Chinese; 6% identified as Other; 2% identified as Unknown; and all other patients represented a combination of other races.

Due to the continuum of cancer care provided by the Applicant, many of the Commonwealth's sickest and most acute cancer patients receive treatment at its Main Campus, including a high volume of patients with rare and orphan cancers who require tertiary and quaternary level care. Consequently, Vizient reports that the Applicant's case mix index ("CMI") is higher than any other provider in the state.[7] This is because the Applicant's patient panel is sicker than other providers' panels and tends to need more services. Regarding prevalence of diagnosis, patients seek cancer care services from the Applicant for numerous types of cancer. In FY17, the most frequent primary diagnoses among the patient panel were breast cancer, with 25% of all patients seeking treatment for various forms of breast cancer (22,515 unique patients); hematologic malignancies at 18% (16,017 unique patients); 14% for benign hematology (12,374 unique patients – a 37% increase from FY15 to FY17 for these services); gastrointestinal cancers at 9% (7,748 unique patients); genitourinary-related cancers at 8% (7,270 unique patients); and thoracic cancers at 5% (4,408 unique patients).[8]

---

[6] The Applicant provides services to all races, including all Asian populations. The sub-population of Chinese patients is specifically referenced due to the volume of patients captured in the data.

[7] Vizient (formerly the University HealthSystem Consortium) has developed a database that generates a data-driven dashboard for comparing hospital systems. This solution provides benchmark data to participating hospitals and acts as a consolidator to submit data to the Centers for Medicare and Medicaid Services and other quality agencies. Vizient is leveraged by multiple healthcare systems across the country to understand an organization's CMI. The Applicant utilized Vizient's solutions to understand its inpatient case mix index relative to other Boston hospitals.

[8] Data for the Applicant's Main Campus and satellite facilities based on claims data; reports included radiation oncology volume and outpatient volume only at the Main Campus. If more than one zip code was provided for any

The Applicant also reviewed historical data for its patient panel at its Main Campus, including the number of oncologic exams and infusion therapy services provided over the last three fiscal years. Table 1 below depicts the total examination and infusion therapy visits for the Applicant's Main Campus from FY15-FY17.

Table 1: Historical Volume for Main Campus Oncologic Exams and Infusion Therapy Services[9]

	FY15	FY16	FY17
Main Campus Oncologic Exams	202,418	210,102	219,927
Main Campus Infusion Therapy Visits	93,421	98,489	102,889
Total Per Year	**295,839**	**308,591**	**322,816**

In FY15, 49,581 unique patients received 202,418 oncologic exams and 93,421 infusion therapy visits at the Applicant's Main Campus. In FY16, this number increased to 52,141 unique patients receiving care through 210,102 oncologic exams and 98,489 infusion therapy visits at the Applicant's Main Campus. Finally, in FY17, this number increased for a second consecutive year with 54,498 unique patients receiving care through 219,927 oncologic exams and 102,889 infusion therapy visits at the Applicant's Main Campus. Concurrently, given the increased number of patients seeking care and the availability of new chemotherapy treatments, historical data also show an increase in infusion therapy visits with 19% of unique patients receiving these services in FY15, 20% in FY16 and 21% in FY17, for an overall increase of 2% over the last three fiscal years.

Table 2 depicts the Applicant's historical volume for various imaging modalities:

Table 2: Historical Volume for Radiology Services

Imaging Volume History			
Imaging Service	2015	2016	2017
Main Campus CTs	28,875	30,525	30,343
Main Campus MRIs	6,823	7,144	6,962
Main Campus X-Rays	4,449	4,691	4,467
Main Campus PET/CT	3,981	4,345	3,875
Main Campus SPECT	2,187	2,349	2,697
Main Campus Ultrasound	1,090	1,193	1,294
Main Campus Mammography	7,815	7,636	7,745
Total per Year	**55,220**	**57,882**	**57,383**

Overall historical volume trends show an increase in the demand for imaging services at the Applicant's Main Campus. As demonstrated by these historical volume data, the existing MRI and

given medical record number within the space of a year, the most recent zip code was utilized for identifying the geographic origin of the patient. The data source for DFCCC patient data was OncoEMR medical record data.

[9] Exam volume includes oncology and hematology exams.

CT units at the Main Campus are operating at 90% of capacity, with other modalities showing increased utilization over the last three fiscal years.

F1.a.ii **Need by Patient Panel:**
Provide supporting data to demonstrate the need for the Proposed Project. Such data should demonstrate the disease burden, behavioral risk factors, acuity mix, health disparities, or other objective Patient Panel measures as noted in your response to Question F1.a.i that demonstrates the need that the Proposed Project is attempting to address. If an inequity or disparity is not identified as relating to the Proposed Project, provide information justifying the need. In your description of Need, consider the principles underlying Public Health Value (see instructions) and ensure that Need is addressed in that context as well.

A. Cancer Incidence and Prevalence

The Burden of Cancer in the United States: Incidence and Mortality Trends

Cancer is, "the name provided to a collection of related diseases."[10] Typically, human cells grow and divide continuously based on what the body needs, replacing old or damaged cells.[11] However, when cancer develops, this orderly biological process breaks down, causing abnormal, old and damaged cells to survive along with replicating new cells.[12] In all types of cancer, the body's cells divide without stopping and spread to surrounding areas (tissues). These cancerous cells grow out of control and become invasive.[13] Characterized by the uncontrolled growth and spread of abnormal cells, cancer is a group of diseases that kills hundreds of thousands of Americans annually.[14] In 2016, cancer remained the second leading cause of death in the United States ("US") and the leading cause of death worldwide.[15] NCI estimates that in 2018, 1,735,350 new cases of cancer will be diagnosed in the US and 609,640 people will die from the disease.[16]

The most common cancers (listed in descending order according to estimated new cases in 2018) are breast cancer, lung and bronchus cancer, prostate cancer, colon and rectum cancer, melanoma of the skin, bladder cancer, non-Hodgkin lymphoma, kidney and renal pelvis cancer, endometrial cancer, leukemia, pancreatic cancer, thyroid cancer, and liver cancer.[17] Based on 2011-2015 cases, the cancer incidence rate in the US is 439.2 per 100,000 persons per year.[18] Moreover, cancer mortality is 163.5 deaths per 100,000 persons per year (based on 2011–2015 deaths).[19] Cancer mortality is higher among men than women (196.8 per 100,000 men compared to 139.6 per 100,000 women).[20] When comparing groups based on race/ethnicity and sex, cancer mortality in the US is highest in African American men (239.9 per 100,000) and lowest in

[10] *What is Cancer?*, NAT'L CANCER INST., https://www.cancer.gov/about-cancer/understanding/what-is-cancer (last visited July 9, 2018).
[11] *Id.*
[12] *Id.*
[13] *Id.*
[14] *NCI Dictionary of Cancer Terms*, NAT'L CANCER INST., https://www.cancer.gov/publications/dictionaries/cancer-terms/def/cancer (last visited July 9, 2018).
[15] *Cancer Stat.*, NAT'L CANCER INST., https://www.cancer.gov/about-cancer/understanding/statistics (last visited July 9, 2018).
[16] *Id.*
[17] *Id.*
[18] *Id.*
[19] *Id.*
[20] *Id.*

Asian/Pacific Islander women (88.3 per 100,000).[21] In 2017, an estimated 15,270 children and adolescents ages 0-19 were diagnosed with cancer, and 1,790 died of the disease.[22] Based on 2013-2015 data, at some point during their lifetimes, approximately 38.4% of men and women will be diagnosed with cancer, with the number of new cancer cases per year rising to 23.6 million by 2030.[23] Consequently, estimated national expenditures for cancer care are high, and in 2017 were $147.3 billion in the US.[24]

As stated by NCI, "the best indicator of progress in the fight against cancer is a change in age-adjusted mortality rates."[25] In April 2018, the Surveillance, Epidemiology, and End Results ("SEER") Program's Cancer Statistics Review reported that cancer death rates decreased by: 1) 1.8% per year among men from 2006 to 2015; 2) 1.4% per year among women from 2006 to 2015; and 3) 1.4% per year among children ages 0–19 from 2011 to 2015.[26] [27] "These trends show that progress is being made against the disease, but much work remains. Although rates of smoking, a major cause of cancer, have declined, the US population is aging, and cancer incidence rates increase with age.[28] Obesity, another risk factor for cancer, is also increasing."[29]

Furthermore, "many cancers can be controlled and managed for long periods of time. Many physicians and practitioners consider patients being treated for some types of cancer as living with a chronic condition. However, these patients require ongoing therapy to control their condition, and this treatment now often takes the form of oral drugs that patients can administer themselves – much like people with diabetes or high blood pressure."[30] Consequently, the aging population, as well as the number of individuals living with cancer as a chronic disease increases the demand for cancer care services. Thus, the Applicant will continue to experience increasing demand for its services as the hospital offers an integrated compendium of cancer care services, including sub-specialty care and cutting edge clinical trials.

The Burden of Cancer in Massachusetts: Incidence and Mortality Trends

Cancer is the leading cause of death in the Commonwealth, with an age-adjusted death rate of 155.5 per 100,000 persons in 2014.[31] Preliminary cancer incidence rates reported by the Massachusetts Department of Public Health – Massachusetts Cancer Registry from September 2017 provide an age-adjusted overall cancer incidence rate of 459.4 per 100,000 persons (with a 95% confidence limit of 457.2-461.5 per 100,000 persons) for 2011-2015, which is greater than the national incidence rate. The most commonly diagnosed types of cancer in Massachusetts for men during 2011-2015 were prostate cancer, followed by cancers of the bronchus and lung,

---

[21] NAT'L CANCER INST., *supra* note 13.
[22] *Id.*
[23] *Id.*
[24] *Id.*
[25] *Id.*
[26] *SEER Cancer Stat. Rev. (CSR) 1975-2015*, NAT'L CANCER INST., https://seer.cancer.gov/csr/1975_2015/ (last visited July 9, 2018).
[27] Although death rates for many individual cancer types have declined, rates for a few cancers have stabilized or even increased. As the overall cancer death rate has declined, the number of cancer survivors has increased.
[28] *Age and Cancer Risk*, NAT'L CANCER INST., https://www.cancer.gov/about-cancer/causes-prevention/risk/age (last visited July 9, 2018).
[29] NAT'L CANCER INST., *supra* note 13.
[30] *Patient and Caregiver Res.*, NAT'L COMPREHENSIVE CANCER NETWORK, https://www.nccn.org/patients/resources/life_after_cancer/managing.aspx (last visited July 9, 2018).
[31] *Stats of the State of Mass.*, CENTERS FOR DISEASE CONTROL AND PREVENTION, https://www.cdc.gov/nchs/pressroom/states/massachusetts.htm (last visited July 9, 2018).

colon/rectum, and urinary bladder.[32] [33] Among women in Massachusetts, the most commonly diagnosed cancer types were cancers of the breast, bronchus and lung, colon/rectum, and thyroid.[34] From 2009-2013, there were 64,543 deaths from cancer among Massachusetts residents, for an average annual age-adjusted mortality rate of 162.9 deaths per 100,000 persons.[35] From 2010-2014, the number of deaths decreased to 63,671 deaths, with an average of 12,734 deaths annually.[36] Similar to newly diagnosed cases, cancer mortality in Massachusetts decreased from 2009 to 2013 and again from 2010 to 2014.[37] These decreases in overall cancer rates are evidence that treatment services, along with new technology and scientific discoveries are leading to improved outcomes in the Commonwealth. However, cancer remains pervasive, leading to more deaths in Massachusetts than any other disease.[38] Accordingly, through the Proposed Project, the Applicant will provide additional access to cancer care services, with the goal of further reducing cancer death rates.

The Burden of Cancer in Boston: Incidence and Mortality Trends

Cancer also is the leading cause of death in Boston, followed by heart and cerebrovascular disease.[39] Cancer and heart disease remained the top two leading causes of death for all racial/ethnic groups in Boston from 2008-2013.[40] Since 2005, there has been an overall downward trend in cancer mortality within the City of Boston.[41] Lung, prostate, female breast, and colon cancers were the leading types of cancer deaths in Boston from 2010-2015.[42] Moreover, the five leading age-adjusted cancer death types stayed relatively stable from 2008-2012.[43] Death rates increased slightly for all five cancers (lung, prostate, female breast, colon and pancreas) from 2011-2012.[44] Similar to 2013 findings, residents identifying as Black had the highest age-adjusted cancer death rates in the City from 2010-2012, followed by White residents. Asian and Latino residents had the lowest age-adjusted cancer rates during this timeframe.

B. The Aging Population Requires More Access to Cancer Care Services

Due to the Applicant's aging patient panel, as well as the aging population within the Commonwealth and the increasingly chronic nature of the disease, there is an increasing demand for cancer care services, including demand for the sub-specialized services provided by the Applicant. According to the University of Massachusetts' Donahue Institute's ("UMDI") *Long-Term Population Projections for Massachusetts Regions and Municipalities*, statewide population growth is projected to grow a total of 11.8% from 2010 through 2035.[45] An analysis of UMDI's

---

[32] *Id.*
[33] *Cancer Incidence Statewide Reports, 2011-2015*, MASS.GOV., https://www.mass.gov/lists/cancer-incidence-statewide-reports (last visited July 9, 2018).
[34] *Id.*
[35] *Id.*
[36] *Id.*
[37] *Id.*
[38] CENTERS FOR DISEASE CONTROL AND PREVENTION, *supra* note 30.
[39] *Mass. Cancer Stat.*, MASS.GOV., https://www.mass.gov/service-details/massachusetts-cancer-statistics (last visited July 9, 2018).
[40] *Id.*
[41] *Id.*
[42] *Id.*
[43] *Id.*
[44] *Id.*
[45] UNIV. OF MASS. DONAHUE INST., LONG-TERM POPULATION PROJECTIONS FOR MASS. REGIONS AND MUNICIPALITIES 11 (2015), *available at* http://pep.donahue-institute.org/downloads/2015/new/UMDI_LongTermPopulationProjectionsReport_2015%2004%20_29.pdf. The Massachusetts Secretary of the Commonwealth contracted with the University of Massachusetts Donahue Institute

projections shows that the growth of the Commonwealth's population is segmented by age sector, and that within the next 20 years, the bulk of the state's population growth will cluster around residents that are age fifty (50) and older.[46] Moreover, between 2015 and 2035, the Commonwealth's 65+ population is expected to increase at a higher rate compared to all other age cohorts.[47] By 2035, the 65+ age cohort will represent approximately a quarter of the Massachusetts population.[48] As the number of individuals that fall into the 65+ age cohort continues to grow, the demand for cancer care services is expected to increase as well.

According to the NCI, advancing age is the most important risk factor for cancer overall, and for many individual cancer types.[49] Age is a recognized risk factor for cancer development as the normal aging process impacts important biological processes within the body causing proteins and DNA cells to deteriorate and over time mutate, causing the formation and spread of cancer.[50] "Beyond these intrinsic cellular changes, other bodily processes become less effective with age. The body's immune system, for example, becomes less protective and resilient, and is less efficient in detecting and fighting infection and diseases, including cancer."[51]

The most recent statistical data from NCI's SEER program show that the median age of a cancer diagnosis is 66 years.[52] Additionally, 78% of new cancer cases are diagnosed in people aged 55 and older.[53] A similar trend is seen for many common cancer types. For example, the median age at diagnosis is 61 years for breast cancer, 68 years for colorectal cancer, 70 years for lung cancer, and 66 years for prostate cancer.[54] Consequently, NCI reports that the convergence of an overall aging population and a peak cancer incidence among those aged 65-74 will result in a significant increase in the number of people diagnosed with cancer.[55]

With the growing number of individuals within the Commonwealth who will be 65+ in the coming years, as well as the large number of patients within the Applicant's patient panel that are and will be 65+ (currently 43%) in the coming years, there is and will continue to be a critical need for cancer care services in the Commonwealth. The Applicant's proposed expansion of oncology services in Chestnut Hill will allow increased access to a continuum of cancer care in a convenient location, outside of Boston, which is more easily accessible for many cancer patients. The New Hospital Satellite Facility will allow patients in outlying areas greater access to care closer to home, while ensuring the Applicant's ability to continue to provide access for underserved patients that need to travel to the Applicant's Main Campus via public transportation.

(UMDI) to produce population projections by age and sex for all 351 municipalities. Within the past five years, Massachusetts has been experiencing an increase in the population growth rate per year due to high immigration and low domestic outflow, which is expected to slow down in 2030.

[46] *Mass. Population Projections – EXCEL Age/Sex Details*, UNIV. OF MASS. DONAHUE INST. (2015), *available at* http://pep.donahue-institute.org/downloads/2015/Age_Sex_Details_UMDI_V2015.xls.

[47] *Id.* The report uses the cohorts as defined by the U.S. Census Bureau 2010 Census Summary, which are 0-19, 20-39, 40-64, and 65+. Figure 2.5 in the report demonstrates that where the 65+ cohort increases from 2015 to 2035, all other cohorts are predicted to decrease.

[48] *Id.*

[49] NAT'L CANCER INST., *supra* note 27.

[50] *Id.*

[51] *Id.*

[52] *Id.*

[53] *Id.*

[54] *Id.*

[55] NAT'L CANCER INST., *supra* note 27.

C. Increased Demand at the Applicant's Main Campus and the Need to Shift Patient Volume to the New Hospital Satellite Facility

Historical Volume Trends and Projections Provide that the Applicant's Main Campus is Nearing Capacity

Due to the aging population in the Commonwealth, as well as the chronic nature of cancer, the Applicant has experienced continued increases in patient volume. From FY15-17, the Applicant experienced a 5% overall increase in demand for its services, a trend that is projected to continue. This increased demand for cancer care services is impacting the Applicant's existing facilities at its Main Campus, which is currently nearing capacity. An analysis of demand data provides that the Applicant's Main Campus will be at full capacity within the next two to three years. Tables 3, 4 and 5 below provide historical volume trends and projections showing increased utilization at the Applicant's Main Campus and the need to shift patients to the proposed New Hospital Satellite Facility for oncologic exams, infusion therapy and imaging services. This shift of patients to the New Hospital Satellite Facility will allow patients coming from the western suburbs the option to receive cancer care services in a more convenient setting, closer to home. Moreover, this shift will ensure that the Main Campus continues to be able to serve all patients choosing to receive care in Boston, including individuals that reside in Boston's neighborhoods (e.g., Allston, Back Bay, Brighton, Charlestown, Chinatown, Dorchester, Jamaica Plain, Mattapan, Mission Hill, the North End, Roslindale, Roxbury, South Boston, the South End, the West End and West Roxbury), as many of these patients rely on public transportation to get to and from appointments.

Table 3: Oncologic Exam Volume Trends: Historical Data and Projections[56]

Exam Volume Projections	2015	2016	2017	2018P	2019P	2020P	2021P	2022P	2023P
Main Campus Exams per Year	202,418	210,102	219,927	227,137	236,223	228,517	214,254	222,824	193,370
Chestnut Hill Exams per Year						17,154	41,244	42,894	80,320
Total per Year	**202,418**	**210,102**	**219,927**	**227,137**	**236,223**	**245,671**	**255,498**	**265,718**	**273,690**

Table 4: Infusion Therapy Volume Trends: Historical Data and Projections[57]

Infusion Volume Projections	2015	2016	2017	2018P	2019P	2020P	2021P	2022P	2023P
Main Campus Inf Visits per Year	93,421	98,489	102,889	106,277	110,528	107,240	101,013	105,054	91,664
Chestnut Hill Inf Visits per Year						7,709	18,534	19,275	36,395
Total per Year	**93,421**	**98,489**	**102,889**	**106,277**	**110,528**	**114,949**	**119,547**	**124,329**	**128,059**

The projections in Tables 3 and 4 show increasing volume over the next five years with exams and infusion therapy visits both increasing by approximately 4% annually between now and 2023. Since the Applicant's Main Campus is already approaching full capacity at 227,137 exams and 106,277 infusion therapy visits projected for 2018, if additional capacity for these services is not added at the New Hospital Satellite Facility, by 2020, even a modest increase in volume will

[56] The source for historical volume data is DFCI's EPSI charge data via clinical statistics. The projections for the Applicant's Main Campus are derived from DFCI's 2017 Clinical Growth Model. For the New Hospital Satellite Facility, projections are based on historical trends for the noted disease centers that will be available in Chestnut Hill.
[57] The source for historical volume data is DFCI's EPSI charge data via clinical statistics. The projections for the Applicant's Main Campus are derived from DFCI's 2017 Clinical Growth Model. For the New Hospital Satellite Facility, projections are based on historical trends for the noted disease centers that will be available in Chestnut Hill.

exceed the Applicant's Main Campus capacity, increasing wait times for exam and infusion therapy services.

Similarly, demand for imaging services at the Applicant's Main Campus also has been steadily increasing with a number of the modalities operating at 90% to full capacity as outlined by the volume data in Table 5. Through the Proposed Project, the Applicant will acquire imaging modalities to support the provision of cancer care at the New Hospital Satellite Facility. This diagnostic imaging equipment also will allow patients to choose where they obtain their imaging services. For example, if the time to the next available appointment at the Applicant's Main Campus CT is a week to two weeks away, a patient may opt to seek imaging services at the New Hospital Satellite Facility. Accordingly, these newly acquired modalities will support the New Hospital Satellite Facility, while ensuring all patients have timely access to imaging services.

Table 5: Imaging Volume Trends: Historical Data and Projections

Imaging Volume History and Projections									
Imaging Service	2015	2016	2017	2018	2019	2020	2021	2022	2023
Longwood CT	28,875	30,525	30,343	31,670	32,000	32,000	32,000	32,000	32,000
Longwood MRI	6,823	7,144	6,962	6,590	6,853	7,127	7,412	7,709	7,940
Longwood Xray	4,449	4,691	4,467	4,241	4,410	4,587	4,770	4,961	5,110
Longwood PET/CT	3,981	4,345	3,875	5,178	5,385	5,601	5,825	6,058	6,239
Longwood SPECT	2,187	2,349	2,697	2,613	2,718	2,826	2,939	3,057	3,149
Longwood Ultrasound	1,090	1,193	1,294	1,383	1,438	1,496	1,556	1,618	1,666
Longwood Breast Imaging	7,815	7,635	7,745	7,818	8,131	8,456	8,794	9,146	9,420
Chestnut Hill CT per Year						5,943	12,796	14,588	15,986
Chestnut Hill MRI per Year						924	2,297	2,389	2,461
Chestnut Hill PET per Year						0	0	0	826
Chestnut Hill SPECT per Year						0	0	0	1,049
Chestnut Hill Mammography per Year						1,155	2,871	2,986	3,075
Total per Year	**55,220**	**57,882**	**57,383**	**59,492**	**60,935**	**70,114**	**81,260**	**84,511**	**88,921**

Assumptions: *FY18= Volume declined in FY18 from 1/1/18 through 4/30/18 due to the replacement of an MRI, resulting in 5 months without a unit

The Applicant's Main Campus is Nearing Capacity

With increases in patient volume and based on the allocation of exam rooms at the Yawkey Center on the Applicant's Main Campus, the Applicant's staff are consistently scheduling providers to approximately 97% of available rooms each week. The Yawkey Center has 115 exams rooms. The Applicant may schedule up to 1,150 exam room slots per week. Current capacity data provide that the Applicant is scheduling providers to 1,116 of these exam room slots per week and is nearing capacity. Consequently, to address capacity constraints, the Applicant has been over scheduling providers on weeks with higher demand (e.g., a four-day week following a holiday), increasing wait times for patients.

To combat these capacity constraints, the Applicant initiated a number of operational strategies before determining that the New Hospital Satellite Facility is needed. First, the Applicant extended exam hours, having clinicians begin exams at 7:30am and end at 6pm. Second, the Applicant moved to a more efficient system for distributing exam rooms amongst providers that has enabled the hospital to schedule more providers each day. Third, the Applicant leveraged its investment in real-time locating service ("RTLS") technology to improve communication, allowing staff to measure and monitor patient wait times, so resources could be allocated more efficiently. Fourth,

to increase capacity, the Applicant piloted extended hours of operation for exams on Saturdays as infusion therapy appointments are available on Saturdays and Sundays, but this effort was not successful as most patients do not elect to have exam appointments on the weekend. To date, these strategies have allowed the Applicant to gain some limited additional capacity at its Main Campus, but these efforts are not enough to address the growing and projected demand for cancer care services as the population continues to age.

Shifting Patient Volume to a New Hospital Satellite Facility

After implementing the various strategies to address capacity issues, the Applicant sought to understand the impact of shifting patients from the Applicant's Main Campus to a New Hospital Satellite Facility in Chestnut Hill. A review of patient panel data found the following historical trends for the Applicant's patients who live within ten miles of the New Hospital Satellite Facility and receive services from disease centers that will be available at Chestnut Hill:

Table 6: Potential Patients for the New Hospital Satellite Facility

	FY15	FY16	FY17
Unique Patients	12,106	11,164	11,639
Exams	38,732	41,084	43,295
Infusions	17,620	19,724	20,182

More than likely, the majority of these patients will find the New Hospital Satellite Facility in Chestnut Hill a convenient alternative location to obtain care.[58] Consequently, the Applicant projects that there will be a potential shift of approximately 12,000 current or new patients each year to the New Hospital Satellite Facility in Chestnut Hill, which will open additional capacity at the Applicant's Main Campus ensuring prospective or current patients have continued and increased access to expedited cancer care services at both locations.

This increased capacity and expedited access to services at the Applicant's Main Campus may be most beneficial to patients from underserved communities. A review of data for the zip codes[59] within Applicant's community health needs assessment ("CHNA") targeted areas, such as Dorchester, Mattapan, Mission Hill, Roxbury and Jamaica Plain found that approximately 2,500 patients from these areas seek services at the Applicant's Main Campus annually. Frequently, these patients rely on public transportation to get to appointments. Accordingly, the availability of additional capacity at the Applicant's Main Campus, by offering the New Hospital Satellite Facility as an option for patients predominantly residing in the metrowest service area, will ensure these underserved patients also have additional access to expedited care in a convenient location.

[58] Although these patients may find it more convenient to seek care at the New Hospital Satellite Facility in Chestnut Hill, the Applicant knows that patients have choice and may be seen at either the Applicant's Main Campus or at the New Hospital Satellite Facility.

[59] The following zip codes were reviewed for patient data: 02119, 02120, 02121, 02122, 02124, 02125, 02126 and 02130.

Table 7: Patients from the Noted CHNA Zip Codes

	FY15	FY16	FY17
Unique Patients	2,820	2,404	2,465
Exams	7,340	7,857	8,832
Infusions	3,701	4,353	4,540

Through the opening of the New Hospital Satellite Facility, the Proposed Project will provide patients with additional access to expedited cancer care services, allowing them to choose where they will receive their oncology care and ensuring shorter wait times as demand continues to grow. The New Hospital Satellite Facility will offer expanded exam room space for medical, surgical and radiation oncology exams; new infusion chairs for chemotherapy; additional imaging capacity; and access to integrative and supportive therapies. Moreover, the New Hospital Satellite Facility's suburban location will offer additional amenities that are important for cancer patients, such as accessible parking, less traffic and a shorter commute for patients coming from outlying areas (which is a concern for many cancer patients who are quite ill). Additionally, as provided at the Main Campus, the New Hospital Satellite Facility will offer some supportive programming for cancer patients, such as survivorship programming and supportive services (e.g., social work, financial counseling and access to resource specialists).

D. Imaging Services as a Necessary Component of the Cancer Care Continuum

Diagnostic imaging plays a critical role in initial cancer diagnosis, staging, treatment planning, continuous monitoring and the types of palliative therapies used for cancer care. Frequently, specific types of imaging modalities, such as CT, MRI and PET/CT provide oncologists with necessary information to appropriately diagnose and treat a cancer patient, thereby reducing unnecessary treatment, suffering and costs. The importance of imaging as a standard aspect of cancer care makes it critical to have these services integrated and co-located with other oncology services. Integrated oncology services transform care, allowing providers to design an effective care experience around the needs of each patient.[60] Evidence suggests that high quality, integrated cancer care programs improve quality and reduce the cost of healthcare, ultimately improving health outcomes for patients.[61]

The implementation of various imaging modalities at the New Hospital Satellite Facility will allow the Applicant to use on-site radiologists specializing in oncology to review scans. These physicians, whose practice is limited exclusively to cancer and the sub-specialties within cancer, possess a higher level of expertise for interpreting images and providing a sound opinion on cancer staging and treatment planning than general radiologists. Recognizing subtle nuances and differences in images is critical to providing timely and effective cancer care. An inability to provide all of the necessary information about a particular scan can lead to the need for additional reviews by oncologists, as well as additional scans, ultimately leading to increased utilization and therefore, increased costs. Accordingly, recognizing the critical need for integrated oncology services, the Applicant through the Proposed Project, will acquire and implement CT, MRI, PET/CT, SPECT-CT, X-ray, ultrasound, and mammography technology for the New Hospital Satellite Facility. The availability of the full complement of on-site cancer care imaging will ensure that patients have integrated cancer services at one location. Through the Proposed Project, the Applicant also will ensure appropriate review of scans by experienced radiologists specializing in

[60] K. Haire et al., *Integrated Cancer Sys.: A Persp. on Developing an Integrated Sys. for Cancer Services in London*, 5 LONDON J. OF PRIMARY CARE 29, 29-34 (2012).
[61] *Id.*

oncology, which will further quality outcomes through appropriate interpretations for cancer diagnosis, staging and treatment, as well as reduce the cost of care by eliminating unnecessary scans and/or additional review by other radiologists.

A study conducted at the Dana-Farber/Brigham and Women's Cancer Center reviewed the findings of second opinion imaging consultations for breast cancer patients.[62] Typically, patients who are referred to the Applicant or other comprehensive cancer care centers bring clinical data, including scans that require review.[63] An analysis of this second opinion imaging consultation data demonstrates "the significant value that this service has on breast cancer management. Overall, 11.7% of patients who underwent breast surgery had care management changes as a consequence of radiologic imaging review."[64] Key to these findings is the use of expert radiologists who sub-specialize in various forms of oncology imaging. Accordingly, appropriate imaging and the review of scans (second opinions) by expert radiologists impact the care that patients receive, including its efficacy and overall costs.

F1.a.iii **Competition:**

Provide evidence that the Proposed Project will compete on the basis of price, total medical expenses, provider costs, and other recognized measures of health care spending. When responding to this question, please consider Factor 4, Financial Feasibility and Reasonableness of Costs.

Clinical Pathways as a Cost-Effective Tool

The expansion of oncology services, including related imaging services, will not have an adverse effect on competition in the Massachusetts healthcare market based on price, total medical expenses ("TME"), provider costs or other recognized measures of health care spending as the Applicant has made significant efforts to implement cost effective strategies in its delivery of cancer care services. One such strategy is the implementation of clinical pathways. The Applicant's Clinical Pathways program is an integrated, clinical decision-support tool that allows the Applicant to utilize expert, value-based cancer care throughout its facilities by promoting adherence to standardized care pathways based on the most recent research. Use of Clinical Pathways has demonstrated improved value by reducing unnecessary variation in clinical decision-making based on cancer diagnosis, stage, tumor biology, line of therapy, and patient characteristics.

Since 2012, the Applicant has been at the forefront of developing Clinical Pathways for many high volume and commonly diagnosed cancers, offering 31 distinct medical oncology pathways and 30 radiation oncology pathways (each pathway represents hundreds of potential treatment options based on a patient's presentation and disease characteristics). While other clinical pathway programs throughout the country provide four to six effective care treatments, as a single specialty focused provider, the Applicant is able to conduct a robust process, including the latest studies, experience from clinicians and evidence-based findings to develop one defined clinical treatment for each disease group. Each pathway includes access to real-time, evidentiary-based, decision support created by internationally-recognized experts in their individual sub-specialized cancer fields, many of whom practice at the Applicant's facilities.

---

[62] Melissa Anne Mallory et al., *The Influence of Radiology Image Consultation in the Surgical Mgmt. of Breast Cancer Patients*, 22 ANNALS OF SURGICAL ONCOLOGY, 3383, 3383-8 (2015).
[63] *Id.*
[64] *Id.*

The Applicant's Clinical Pathways program standardizes physician decision making, ensuring that patients, including those in the community setting, benefit from the same decision support tools offered at Applicant's Main Campus. This decision support model is especially beneficial for general oncologists in the community who may not treat a large volume of any individual type of cancer, but can leverage the pathways to ensure their clinical practice is consistent with the most up-to-date guidelines for the many different types of cancer that they do treat. The Applicant's Clinical Pathways are updated quarterly and exhibit the highest survival rates and best quality outcomes. The Applicant's clinicians choose the recommended treatment pathway for each disease group 70-80% of the time. When Clinical Pathways' recommendations are not used, a clinician must document the reason why standard pathway protocols are not being utilized. The Applicant's Clinical Pathways' team and the Applicant's disease centers then review the reasons for deviation.

An article in the Journal of Oncology Practice, *Cost and Survival Analysis Before and After Implementation of Dana-Farber Clinical Pathways for Patients with Stage IV Non-Small-Cell Lung Cancer*, details a study conducted at the Applicant's hospital that explored the use of clinical pathways to support clinical decision making and manage resources for patients with late-stage-non-small cell lung cancer ("NSCLC").[65] [66] In this study, researchers created customized lung cancer pathways and partnered with a commercial vendor to develop a web-based platform for real-time decision support and post-treatment data aggregation.[67] The Applicant initiated its pathway for NSCLC in January 2014. At the end of the year, the authors identified 160 patients who had been diagnosed and treated for stage IV NSCLC in 2012 prior to implementation of the pathways and 210 patients who had been diagnosed after pathways were rolled out in 2014.[68] The ambulatory cost of care was calculated for one year from the time of diagnosis.[69] The study findings revealed that the total ambulatory cost of care decreased by more than $15,000 per patient after the implementation of the pathways ($67,050 before pathways versus $52,037 after pathways).[70] Moreover, there was no compromise in clinical outcome, with median overall survival times remaining similar (10.7 months before pathways vs 11.2 months after pathways).[71] Chemotherapy, biologics, and other antineoplastic drugs represented the single largest contributor to savings.[72] This was achieved, in part, by reducing the use of selected high-price regimens that were not associated with significant clinical benefit. Accordingly, the Applicant's Clinical Pathways can provide comparative outcomes, value, and standardization, all of which are crucial in reducing the overall cost of cancer care.[73] By providing clinicians with appropriate decision support tools, providers can develop the highest quality, most cost-effective treatment plan for their patients, ultimately leading to lower cost of care, and thereby maintaining and/or decreasing overall TME.

As oncology care continues to become increasingly complex, with new drugs and therapies being approved for patients on a frequent and ongoing basis, the Applicant believes that providing evidence-based and consensus-driven electronic, clinical decision support is the key to managing unwarranted variation in care, with the goal to improve quality and manage cost. Clinical

---

[65] Jackman., *supra* note 1.
[66] *Id.*
[67] *Id.*
[68] *Id.*
[69] *Id.*
[70] *Id.*
[71] *Id.*
[72] *Id.*
[73] *Id.*

Pathways are constructed and regularly updated based on careful consideration and balancing of each potential treatment's efficacy, toxicity, and costs. When efficacy and toxicity are equal, the more cost-effective treatment is the preferred option for clinicians. Results, such as the conclusion from the study noted above, have indicated that adherence to the Applicant's Clinical Pathways reduces cost without compromising survival. Implemented across large populations, more cost-effective treatments lead to improving care efficiencies, stabilizing and/or reducing provider costs, and thereby leading to sustained or lowered TME.

Potential Impact of Expanded Capacity on Costs

Furthermore, through the Proposed Project, the Applicant seeks to expand capacity for oncology care at its New Hospital Satellite Facility, and thereby open up capacity at its Main Campus. Expanded services will lead to increased access to expedited, appropriate care, potentially leading to earlier treatment for some patients. Treatment of cancer in its initial stages (stage I and II cancers) is much less costly than treating late stage cancer (stage III and IV cancers) and allows for more cost-effective treatment options. Accordingly, when treatment is timely and appropriate, cost efficiencies are created leading to a reduction in overall services and costs.

Studies from the World Health Organization ("WHO") conclude that investing in timely cancer care greatly reduces cancer's financial impact on both the cost of treatment (provider costs and price, as well as insurer and patient coinsurance costs), as well as the loss of productivity by these patients.[74] The overall economic cost of cancer worldwide is approximately $1.16 trillion annually, and in the US direct medical costs alone for cancer care total approximately $50 billion annually.[75] [76] However, timely access to care may lead to treatment that is generally more effective, less complex and less expensive.[77] For example, "studies in high-income countries, such as the US, have shown that treatment for cancer patients that is started in the earlier stages of the disease is two to four times less expensive compared to treating people diagnosed with cancer at more advanced stages."[78] Additionally, research demonstrates that when services are integrated and co-located, patients have seamless access to care, ensuring that these patients obtain necessary services.[79] These actions of starting care earlier with co-located services may lead to improved patient care outcomes and a potential reduction in costs for cancer treatment, ultimately leading to reduced TME.[80]

Moreover, when care is appropriate additional cost savings may be achieved. An incorrect diagnosis can result in initiating the wrong treatment, leading to poor outcomes and greatly increasing the overall cost of care for a patient. In a 2011 study, formal analysis of pathologic material obtained at outside institutions and reviewed at an academic medical center identified frequent serious misdiagnoses at the outside institutions.[81] Among 335 sarcoma cases, the academic medical center diagnosis varied from the outside institution in 24% of cases.[82] In 16%

---

[74] *Early Cancer Diagnosis Saves Lives, Cuts Treatment Costs,* WORLD HEALTH ORG., http://www.who.int/en/news-room/detail/03-02-2017-early-cancer-diagnosis-saves-lives-cuts-treatment-costs (last visited July 9, 2018).
[75] *Id.*
[76] AM. CANCER SOC'Y, *supra* note 2.
[77] *Id.*
[78] *Id.*
[79] Haire, *supra* note 56.
[80] Yang & Johannes Czernin, *Contribution of Imaging to Cancer Care Costs*, 52 J. OF NUCLEAR MED. 86S, 86S-96S (2011).
[81] Chandrajit.P. Raut et al., *High Rates of Histopathologic Discordance in Sarcoma with Implications for Clinical Care,* J. OF ONCOLOGY PRAC. 29, 10065, 10065-10065 (2011).
[82] *Id.*

of these cases, discordance was clinically significant such that the correct diagnosis would have led to a different treatment approach.[83] In this way, when complex diseases like sarcoma are not managed in an appropriate setting with specialized expertise, misdiagnoses and other inefficiencies in care can occur and may result in worse outcomes and an overall higher cost of care. Consequently, when treatment is timely and appropriate it is less expensive, leading to an overall stabilization and/or reduction in TME for these services in the Commonwealth.

Finally, when patients have access to appropriate imaging modalities, clinicians can reduce cancer mortality through better screening and more accurate staging, which can lead to more appropriate therapeutic interventions and the effective monitoring of the efficacy of treatment.[84] As discussed in Section F1.a.ii, a study conducted at the Dana-Farber/Brigham and Women's Cancer Center found that second opinion imaging consultations can lead to significant differences in the treatment and care management of breast cancer patients.[85] "Overall, 11.7% of patients who underwent breast surgery had care management changes as a consequence of a second opinion radiologic imaging review."[86] Central to these findings is the use of expert radiologists who sub-specialize in various forms of oncology imaging. Consequently, appropriate imaging and the review of scans by expert radiologists impact the care that patients receive, including its efficacy and overall costs. Since the Applicant utilizes radiologists with specialties in oncology, more patients will receive appropriate care management from the onset of their diagnosis, leading to a reduction in the amount of care that is provided and ultimately reduced TME.

F1.b.i **Public Health Value /Evidence-Based:**
Provide information on the evidence-base for the Proposed Project. That is, how does the Proposed Project address the Need that Applicant has identified.

A. Applicant's Proposed Expansion of Oncology Services

The Applicant's proposed expansion of oncology services is supported by extensive literature related to evidence-based strategies on effective cancer care. The Proposed Project seeks to develop two floors of a New Hospital Satellite Facility through two phases. The initial phase comprises the construction of exams rooms and the installation of infusion chairs to support the following oncology specialties at the new facility: breast, gastrointestinal, genitourinary, gynecologic and thoracic. Additionally, to support this new space and provide patients with essential imaging services, during the first phase of the Proposed Project, the Applicant will purchase and install a 1.5T MRI, two CT units, one X-ray machine, two ultrasound machines and mammography equipment. The first phase also includes phlebotomy and lab services, palliative care and support services, clinical trials, genetic counseling and testing, as well as imaging consultations. The second phase of the Proposed Project includes the construction of additional exam rooms and the installation of additional infusion therapy chairs. To ensure appropriate imaging is available to complement the additional treatment spaces for this phase of the Proposed Project, the Applicant will install one 3T MRI, one PET/CT and one SPECT-CT. Upon completion, the New Hospital Satellite Facility will have approximately 45 exam rooms and 65 infusion chairs. Consequently, expanded oncology services at the New Hospital Satellite Facility will allow volume from the Applicant's Main Campus to be shifted to Chestnut Hill. This shift will allow oncology patients from the metrowest area to receive care in a more convenient setting with accessible

[83] *Id.*
[84] *Id.*
[85] Mallory, *supra* note 58.
[86] *Id.*

parking, therapeutic services and other amenities at the New Hospital Satellite Facility. Additionally, this shift of patients to the New Hospital Satellite Facility will allow for additional, much needed capacity at the Applicant's Main Campus.

B. Research Supporting the Expansion of Oncologic Exams and Infusion Therapy Services

As stated, cancer is the name provided to a collection of related diseases. NCI defines cancer as a genetic disease – "that is, it is caused by changes to genes that control the way cells function, especially how cells grow and divide. Some genetic changes that cause cancer can be inherited. Genetic changes may also arise during a person's lifetime as a result of errors that occur as cells divide or because of damage to DNA caused by certain environmental exposures. Cancer-causing environmental exposures include substances, such as the chemicals in tobacco smoke, and radiation, such as ultraviolet rays from the sun. Each individual's cancer has a unique combination of genetic changes. As the cancer continues to grow, additional changes will occur. Even within the same tumor, different cells may have different genetic changes. In general, cancer cells have more genetic changes, such as mutations in DNA, than normal cells. Some of these changes may have nothing to do with the cancer; these changes may be the result of the cancer, rather than its cause."[87]

One method of treating cancer is through chemotherapy by infusion, often referred to as "infusion therapy." Chemotherapy treatment uses drugs called cystostatics that seek to stop cancer cells from dividing uncontrollably.[88] Typically, medication is delivered through a needle into a person's arm or via central line. These drugs work in various ways to kill cancerous cells. The majority of these medications attack the DNA within cancer cells, preventing them from dividing and causing them to self-destruct.[89] "Other drugs bind to the DNA and lock the strands of the double-helix in place, preventing them from unwinding to form new copies."[90] Certain chemotherapy drugs originally isolated from fungus organisms trigger the formation of free oxygen radicals, which damage the strands of DNA within the cancer cells.[91] When used in tandem with other treatments, chemotherapy can reduce the size of a tumor (neoadjuvant chemotherapy), destroy cancer cells that remain after surgery or radiation treatment (adjuvant chemotherapy), enhance the ability of other treatment mechanisms and kill cancerous cells that have returned or spread to other parts of the body.[92] The addition of 65 infusion therapy chairs in two phases at the Applicant's New Hospital Satellite Facility will ensure that patients have additional access to chemotherapy treatment as the prevalence of cancer grows with new incidence among the aging population, as well as access to other forms of infusion therapy, such as hydration. Consequently, chemotherapy results in improved quality outcomes for many patients.

---

[87] *Id.*

[88] *How Does Chemotherapy Work?*, PUBMED HEALTH, https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0072611/ (last visited July 9, 2018).

[89] *Chemotherapy Overview*, DANA FARBER CANCER INST., http://www.dana-farber.org/chemotherapy/ (last visited July 9, 2018).

[90] *Id.*

[91] *Chemotherapy by Infusion*, DANA FARBER CANCER INST., http://www.dana-farber.org/chemotherapy/infusion/ (last visited July 9, 2018).

[92] *Chemotherapy to Treat Cancer*, NAT'L CANCER INST., https://www.cancer.gov/about-cancer/treatment/types/chemotherapy (last visited July 9, 2018).

C. Research Supporting the Expansion of Oncology Imaging Services

In all phases of cancer management, multiple biomedical imaging techniques are used to diagnose, stage and treat cancer.[93] Imaging forms an essential part of cancer clinical protocols and is able to furnish morphological, structural, metabolic and functional information.[94] "One of the main pillars of comprehensive cancer care, biomedical imaging, has many advantages including real time monitoring, without tissue destruction, minimal or no invasiveness and can function over wide ranges of time and size scales involved in biological and pathological processes."[95] Consequently, inclusion of imaging in the management of patients with cancer is associated with improvements in survival and/or mortality.[96] There are numerous reasons for utilizing imaging as a tool in cancer care, including: early detection and diagnosis, assistance in determining appropriate treatment recommendations, monitoring a patient's response to therapy, staging and understanding disease progression, and identifying the location of tumors or other cancerous cells for removal. Due to the critical role that imaging has in cancer treatment, the Applicant seeks to provide ready access to these services at its New Hospital Satellite Facility through the acquisition and installation of specific types of imaging modalities, including MRI, CT and PET/CT.

MRI

MRI is a technology that uses a magnetic field and pulses of radio waves to generate detailed images of organs, tissues, and structures inside the body. During an MRI, a patient is placed at the center of an extremely strong magnetic field and tissue information is obtained by measuring how atoms respond to pulses of radiofrequency energy sent from a scanner. MRI images provide anatomical, and in some cases functional, information that can be used to help diagnose, evaluate, plan for, monitor, and guide treatment for a variety of conditions, including cancer. MR images are valuable in that they are obtained without using any ionizing radiation, so patients are not exposed to the harmful effects that are associated with X-ray, CT and PET imaging. MRIs come in different magnetic strengths, known as Teslas ("T"), commonly 1.5T and 3T.[97] The strength of the magnet in an MRI machine directly affects the quality of the images that the machine is able to produce. However, additional factors are important to consider in determining which MRI strength is appropriate for a patient, such as type of cancer.[98]

MRI plays a vital role in cancer diagnosis, staging, treatment planning and determining the efficacy of treatment.[99] MRI's superior soft tissue resolution allows clinicians to distinguish between normal and diseased tissue to precisely pinpoint and monitor treatment of cancerous tumors and metastases within certain parts of the body.[100] MRI provides information on the

---

[93] Leonard Fass, *Imaging and Cancer: A Review*, 2 MOLECULAR ONCOLOGY 115, 115–152 (2008).
[94] *Id.*
[95] *Id.*
[96] *Id.*; Miles, K., *Can Imaging Help Improve the Survival of Cancer Patients?*, 11 CANCER IMAGING S86, S86–S92 (2011).
[97] *Why Choose 3 Tesla Magnetom Treo?*, 3T IMAGING, http://www.3timaging.com/why-3-tesla-mri-ct-xray-mri-imaging-center-morton-grove-riverside-chicago-illinois.htm (last visited July 9, 2018)..
[98] Sarah Thompson, *1.5T versus 3T MRI*, SCANMED (Apr. 27, 2017), https://www.scanmed.com/single-post/2017/04/27/15T-versus-3T-MRI.
[99] *MRI for Cancer*, AM. CANCER SOC'Y, https://www.cancer.org/treatment/understanding-your-diagnosis/tests/mri-for-cancer.html (last visited July 9, 2018).
[100] Jinjing Lu et al., *Cancer Diagnosis and Treatment Guidance: Role of MRI and MRI Probes in the Era of Molecular Imaging*, 14 CURRENT PHARM. BIOTECH. 714, 714-22 (2013); AM. CANCER SOC'Y, *supra* note 97.

characteristics of a tumor, including location, size, and type of tissue.[101] MRI scans are considered the best modality for diagnosing brain and spinal cord tumors as these scans offer three dimensional images.[102]

Most clinical MRIs today operate at 1.5T or 3T.[103] Though the 1.5T magnet is not as strong as a 3T, it is often preferred and more effective when used in cancer patients who have a surgical implant or artificial joint.[104] Implants that are determined to be safe for use in a MRI scanner can cause an error, or artifact, on the produced image; as the strength of the magnet is increased the more pronounced the image artifacts become.[105] Additionally, since not all body parts consist of the same types of tissue, certain organs are better imaged with lower strength magnets.[106] Another benefit to the 1.5T scanner is the reduced specific absorption rate ("SAR"), which is the estimated rate of energy absorbed by the volume of tissue when the radio waves are deposited into the body.[107] The SAR increases with the strength of the magnet, and can cause the body to heat up.[108] While there are no long-term effects of SAR, it is more likely to occur in a 3T scanner.[109]

The 3T MRI scanner uses a stronger magnet which precipitates a greater signal from the tissues in the body, resulting in a higher quality image compared to a 1.5T scanner.[110] The 3T scanner is preferred by physicians for certain scans, such as the prostate (given its small size), and is instrumental in identifying additional malignancies in breast cancer patients.[111] Doubling the signal strength of the scanner allows for faster scan times. Moreover, the increase in spatial resolution within a 3T MRI improves visualization of anatomical detail, which can lead to better tumor characterization.[112] Better characterization of tumors may lead to a decrease in the number of unnecessary biopsies.[113] This modality is also more sensitive than mammography and sonography in detecting breast cancer and characterizing small lesions, and as such, is the standard of care for detecting breast cancer.[114]

CT

Physicians utilize CT technology to obtain detailed three-dimensional images of organs, bones, and tissue to identify, stage, and monitor tumors and the presence of cancer.[115] Frequently, CT scans are the modality used for initial evaluation of metastases and the determination of a

---

[101] *Tests for Soft Tissue Sarcomas,* AM. CANCER SOC'Y, https://www.cancer.org/cancer/soft-tissue-sarcoma/detection-diagnosis-staging/how-diagnosed.html (last visited July 9, 2018).
[102] *Tests for Brain and Spinal Cord Tumors in Adults,* AM. CANCER SOC'Y, https://www.cancer.org/cancer/brain-spinal-cord-tumors-adults/detection-diagnosis-staging/how-diagnosed.html (last visited July 9, 2018).
[103] Beth W. Orenstein, *4T, 7T, 8T, and Beyond – High-Field MR Research Seeks a Closer Look Inside the Human Body,* 10 RADIOLOGY TODAY 16, 16 (2009).
[104] Thompson, *supra* note 94.
[105] *Id.*
[106] *Id.*
[107] *Id.*
[108] *Id.*
[109] *Id.*
[110] William A. Faulkner, *1.5T Versus 3T,* MEDTRONIC (2015), http://www.medtronic.com/mrisurescan-us/pdf/UC201405147a_EN_1_5T_Versus_3T_MRI.pdf.
[111] *Id.*; Reni S. Butler et al., *3.0 Tesla vs 1.5 Tesla Breast Magnetic Resonance Imaging in Newly Diagnosed Breast Cancer Patients,* 5 WORLD J. OF RADIOLOGY 285, 292 (2013).
[112] Jurgen T. Futterer et al., *3T MRI of prostate cancer,* APPLIED RADIOLOGY J. OF PRACTICAL MED. IMAGING AND MGMT. (Feb. 12, 2009), http://appliedradiology.com/articles/3t-mri-of-prostate-cancer.
[113] Rebecca Rakow-Penner et al., *Breast MRI at 3T,* APPLIED RADIOLOGY J. OF PRACTICAL MED. IMAGING AND MGMT. (Mar. 8, 2009), http://appliedradiology.com/articles/breast-mri-at-3t.
[114] Haitham Elsamaloty et al., *Increasing Accuracy of Detection of Breast Cancer with 3-T MRI,* 192 AM. J. OF ROENTGENOLOGY WOMEN'S IMAGING 1142, 1142-1148 (2009).
[115] *Id.*

patient's prognosis, as this modality is a lower-cost option (than a PET/CT) that provides precise clinical information.[116] This modality takes x-rays and layers a series of cross-sectional pictures, or slices, that provide the physician with a complete view of an abnormality or tumor.[117] CT scans are used to detect abnormal growths, diagnose tumors, stage cancers, identify where to perform a biopsy, guide local treatments, help plan surgery, determine the efficacy of treatment, and detect the recurrence of a tumor.[118] CT scans and other imaging modalities also are used to monitor the overall health of patients and to detect comorbidities.[119]

PET/CT

PET/CT utilizes dual-modality imaging from both PET and CT technology that are performed at the same time on the same unit.[120] These scanners combine information about the body's anatomy and metabolic function to provide a more detailed image of cancerous tissue than either a stand-alone PET or CT can provide. The result is a highly detailed image that can pinpoint the anatomic location of abnormal metabolic activity.[121] The combination of these two technologies leads to more precise information and more accurate diagnoses.[122] PET/CT scans also reduce the number of additional imaging procedures a patient may need.[123]

PET uses noninvasive molecular imaging technology to provide images at the cellular and molecular level via detection of radiotracers injected into a patient's bloodstream.[124] PET allows physicians to see how the body is functioning and measure the chemical and biological processes of its organs.[125] PET's molecular imaging technology may detect biochemical changes in the body that indicate the onset of a disease before symptoms, abnormalities, or anatomical changes can be seen with other imaging technology.[126] PET is often used to diagnose cancer as cancer cells multiply much faster and are more metabolically active than normal cells.[127] The radiotracer injected into a patient accumulates in areas of the body where high chemical activity or metabolism is occurring, allowing physicians to determine how well organs and tissues are working to detect abnormalities.[128] As described above, while PET provides information on a molecular level, a CT scan provides detail on an anatomical and structural level.[129]

---

[116] *Id.*
[117] *Computed Tomography (CT) Scan,* AM. SOC'Y OF CLINICAL ONCOLOGY, https://www.cancer.net/navigating-cancer-care/diagnosing-cancer/tests-and-procedures/computed-tomography-ct-scan (last visited July 9, 2018).
[118] *Id.*
[119] *Lung Metastases Imaging,* MEDSCAPE, https://emedicine.medscape.com/article/358090-overview (last visited July 9, 2018).
[120] *Id.*
[121] *Positron Emission Tomography – Computed Tomography (PET/CT),* RADIOLOGYINFO.ORG, https://www.radiologyinfo.org/en/info.cfm?pg=pet (last visited July 9, 2018).
[122] *Id.*
[123] *Id.*
[124] *What is PET?,* SOC'Y OF NUCLEAR MED. AND MOLECULAR IMAGING, (2016), http://snmmi.files.cms-plus.com/FileDownloads/Patients/FactSheets/What%20is%20PET%202016.pdf.
[125] *Id.*
[126] *Id.*
[127] *Id.*
[128] *Id.*
[129] *Computed Tomography (CT) Scans and Cancer,* NAT'L CANCER INST., https://www.cancer.gov/about-cancer/diagnosis-staging/ct-scans-fact-sheet (last visited July 9, 2018).

PET/CT scanners allow doctors to identify the appropriate location for a biopsy, determine the efficacy of cancer treatment and assist in planning for radiation therapy.[130] When combined, PET/CT technology produces greater detail with a higher level of accuracy, as well as convenience for the patient who only has to undergo one scan.[131] This combined modality is more accurate in detecting and staging cancer, given the detailed images.[132] Widely used in cancer diagnosis and treatment, the PET/CT scan's sensitivity and specificity can provide invaluable information on the extent of a tumor, as well as target localization, and is the most widely used radiology modality in oncology.[133]

F.1.b.ii **Public Health Value/Outcome-Oriented:**
Describe the impact of the Proposed Project and how the Applicant will assess such impact. Provide projections demonstrating how the Proposed Project will improve health outcomes, quality of life, or health equity. Only measures that can be tracked and reported over time should be utilized.

A. Improving Health Outcomes and Quality of Life through the Expansion of Oncology Services

The Applicant anticipates that the Proposed Project will provide its patients with improved health outcomes, better quality of life and additional access to high quality oncology services by offering access to cancer care services at its New Hospital Satellite Facility. To meet increasing demand and ensure the highest quality care to all patients, through the Proposed Project, the Applicant will provide expanded access to medical, surgical and radiation oncology exams; infusion therapy; and imaging services. Additionally, the Applicant will offer a full spectrum of complementary and supportive services at the New Hospital Satellite Facility aimed at improving quality of life and ensuring higher quality outcomes. Although the Applicant is still determining the specific services that will be available at the New Hospital Satellite Facility, current complementary and supportive services offered at the Applicant's Main Campus, include:

- *Adult Survivorship Program:* Patients diagnosed with cancer are living longer than ever before thanks to remarkable research and treatment advances, many of which have been pioneered by the Applicant. The Applicant's Adult Survivorship Program offers the expertise and support needed to help manage the physical and emotional issues related to surviving cancer. The Applicant's dedicated team provides a comprehensive array of recommendations and services to help survivors and their caretakers understand the long-term effects of past treatments and navigate their future care, including: education and support services (social work, financial counseling and resource specialists), sub-specialty programs to manage a range of common health effects related to cancer treatment and physical health consultation to assist survivors in safe, effective and regular physical activity.

- *Leonard P. Zakim Center for Integrative Therapies and Healthy Living:* The Applicant's Zakim Center is dedicated to enhancing the quality of life for cancer patients and their

[130] *Positron Emission Tomography and Computed Tomography(PET-CT) Scans,* AM. SOC'Y OF CLINICAL ONCOLOGY, https://www.cancer.net/navigating-cancer-care/diagnosing-cancer/1tests-and-procedures/positron-emission-tomography-and-computed-tomography-pet-ct-scans (last visited July 9, 2018).
[131] RADIOLOGYINFO.ORG, *supra* note 119.
[132] Heiko Schoder & Mithat Gonen, *Screening for Cancer with PET and PET/CT: Potential and Limitations,* 48 J. OF NUCLEAR MED. 4S, 12S (2007).
[133] Jun Li & Ying Xiao, *Application of FDG-PET/CT in Radiation Oncology,* 3 FRONTIERS IN ONCOLOGY 1, 1-6 (2013).

families by incorporating complementary therapies, such as exercise, into traditional cancer care. Through clinical services, education, and group programs led by physicians, therapists, nurses, and other health care professionals, the Center empowers patients to be active participants in their treatment plans. This integrative cancer care can help patients feel better by reducing the pain, stress, and anxiety caused by cancer and its treatment. For example, exercising, even at a moderate level, lowers the odds of cancer recurrence.[134] The most consistent and largest number of studies analyzing the links between exercise and cancer recurrence and overall survival have been reported for patients with breast and colorectal cancer, though increasingly other cancer types are also being studied to determine the potential benefit from exercise.[135][136]

- *Supportive Services:* The Applicant also offers an array of supportive services to cancer patients and their families, including: linkages to social workers, bereavement support, disability services, one-on-one support services, financial assistance, linkages to patient navigators and resource specialists, as well as many other programs.

These complementary and supportive services, coupled with each patient's overall comprehensive cancer treatment, often lead to improved health outcomes and a better quality of life. For those services that are not offered at the New Hospital Satellite Facility, patients may seek services at the Applicant's Main Campus.

Moreover, the New Hospital Satellite Facility is fully accessible from all main highways and is located in a convenient location for those patients who cannot or do not want to travel to Boston for exams, infusion therapy or imaging services. Providing patients with the opportunity to receive oncology services close to home will result in patient satisfaction and reduce unnecessary stress and anxiety for patients and their families. The proposed site was chosen given its amenities (a vast amount of convenient parking, in an area with food, gas and other conveniences).

The Proposed Project also will allow patients to receive co-located imaging services, which is essential to providing comprehensive oncology services. Most cancer patients require some form of imaging on a consistent basis to continually monitor their disease. By including imaging services at the New Hospital Satellite Facility, patients will have seamless access to these services (similar to the Applicant's Main Campus), allowing them to obtain all necessary services at one location and providing clinicians with timely information necessary to update infusion therapy protocols and/or treatment plans. Ultimately, this convenient access to imaging services will create care efficiencies, provide patients with increased access to expedited care and ensure patients receive the necessary imaging that is needed to provide high quality cancer care. The inclusion of diagnostic imaging modalities at the New Hospital Satellite Facility also will reduce the burden on patients who would otherwise have to travel to multiple locations to receive services, which is important for an ailing patient population that may need assistance getting to and from appointments.

---

[134] JC Brown et al., *Randomized Trial of a Clinic-Based Weight Loss Intervention in Cancer Survivors*, 2 J. OF CANCER SURVIVORSHIP: RES. AND PRAC. 186, 186-95 (2007).
[135] *Id.*
[136] Justin C. Brown & Jennifer A. Ligibel, *The Role of Physical Activity in Oncology Care*, 2017 JNCI MONOGRAPHS lgx017, (2017).

B. Ensuring Health Equity to the Applicant's Patients

As a leading center for cancer prevention, treatment, and discovery, the Applicant is committed to providing the best possible care for patients with cancer and seeking tomorrow's cures through research. Central to this mission is the Applicant's dedication to meet the health needs of high-risk and medically underserved populations in the region. The Applicant recognizes the profound burden that cancer has on residents in Boston and its surrounding neighborhoods, especially among communities of color. The Applicant's efforts to lessen this burden include a broad range of public health programs designed to reduce cancer incidence and mortality, support community development, and ensure every patient receives equitable and culturally appropriate care.

In many ways, the Applicant's involvement in the community is a direct extension of its work in the lab and the clinic. The Applicant's experience in treating patients and educating them about their disease, combined with research into cancer biology and prevention, inform the programs it has launched in the Greater Boston area and reflect its longstanding commitment to addressing these important issues. These initiatives include public awareness efforts about cancer risk; screening programs for early detection of certain cancers; and projects to increase access to cancer care and clinical research to people across Boston and the region.

The Applicant is making significant progress in curbing youth access to tobacco, providing breast cancer screenings, increasing vaccination rates for human papillomavirus ("HPV"), educating residents about sun safety, and more. The impact of these programs is greatly strengthened by embedding these initiatives and services in the fabric of the communities that the Applicant serves and through comprehensive partnerships with community-based organizations who share the goal of reducing cancer-related disparities in Boston and across the state.

Although specific strategies to address health equities are more fully discussed in Section F.1.b.iii, one such program that works specifically to reduce cancer disparities and promote health equity in the community is the Applicant's Community Care Equity Program ("CCEP"). CCEP was established in January 2012 to serve as a bridge between research and outreach efforts addressing cancer disparities at the Applicant's facilities. The CCEP aims to broaden access to vulnerable patient populations and join community partners in the quest for equitable care across the spectrum of cancer-related disease. To this end, the role of the CCEP is to 1) improve local outcomes via clinical access to the spectrum of preventive medicine, treatment, and access to clinical trials for medically underserved populations; 2) unite disparities-related research across the Applicant's facilities; 3) initiate and facilitate research in cancer disparities; and 4) support established outreach and educational programs. By directly involving and encouraging patient-centered collaborations between oncologists and primary care clinicians, the Applicant is establishing trust and a high level of comfort that reflects a commitment to treatment equity.

C. Assessing the Impact of the Proposed Project

To assess the impact of the Proposed Project, the Applicant will extend to the New Hospital Satellite Facility, the following quality metrics and reporting schematic, as well as metric projections for quality indicators that will measure patient satisfaction, access and quality of care. The measures are discussed below:

1. **Satisfaction – Patient Satisfaction:** Patients who are satisfied with care are more likely to seek additional treatment when necessary and tend to have better quality outcomes.

The Applicant will review patient satisfaction levels with oncology services at the New Hospital Satellite Facility via Press Ganey Scores.

Measure: To ensure a service-excellence approach, patient satisfaction surveys will be distributed to all patients at the New Hospital Satellite Facility with specific questions addressing (a) care coordination among doctors and caregivers; (b) satisfaction with care services; and (c) the likelihood of recommending services.

Projections[137]**:** Baseline[136]: 91% Year 1: 85%; Year 2: 87%; and Year 3: 90%

Monitoring: Any category receiving a less than exceptional rating (satisfactory level) will be evaluated and policy changes instituted as deemed appropriate. This data will be evaluated on a quarterly basis by the Applicant's performance improvement and quality staff.

2. **Access Measure – Time to New Patient Appointment:** With expanded access to cancer care services at the New Hospital Satellite Facility, the Applicant will review how quickly exam and infusion services are provided.

   Measure: The number of days that a new patient waits to be seen for cancer care services at the Applicant's Main Campus or the New Hospital Satellite Facility.

   Projections: Baseline: 8 days;[139] Year 1: 6 days; Year 2: 5 days; and Year 3: 5 days

   Monitoring: These data will be evaluated on a quarterly basis by the Applicant's Data Analytics team.

3. **Access Measure – Time to the Next Imaging Appointment:** The Applicant will review the number of business days to the third available appointment for each imaging modality at the Applicant's Main Campus and the New Hospital Satellite Facility.

   Measure: The number of business days to the third available appointment for each imaging modality.

   Projections: Baseline: 3 days or less; Year 1: 3 days or less; Year 2: 3 days or less; and Year 3: 3 days or less.

   Monitoring: These data will be evaluated on a quarterly basis by the Applicant's performance improvement and quality staff.

4. **Quality Measure – Falls with Injury:** The rate of falls experienced by patients within the clinical areas of the New Hospital Satellite Facility.

---

[137] The percentage for the baseline and projections are the average percentage score based on the three noted questions in the measure.

[136] The baseline percentage is for the Applicant's Main Campus and higher than the other projected years, as satisfaction for the New Hospital Satellite will begin to be measured in Year 1 (post-construction) and a ramp-up period is necessary to achieve the baseline of approximately 90% satisfied.

[139] While patients have the option to be seen for their first appointment as soon as the next day, the number of days a patient may wait for their first appointment is driven by several factors. These factors include, patient preference for a specific date/time, provider or location; health insurance referrals and authorizations; and, patient choice to delay in order to collect appropriate medical records to inform a care plan decision.

Measure: The numerator is the number of outpatient falls with injury at the New Hospital Satellite Facility divided by the denominator, which is the number of outpatient encounters (patient appointments). Please note, patients may have more than one appointment per day.

Projections: Baseline[140]: 0.0315 falls with injury per visit encounters; Year 1: 0.032 falls with injury per visit encounters; Year 2: 0.032 falls with injury per visit encounters; and Year 3: 0.032 falls with injury per visit encounters.

Monitoring: These data will be evaluated on a quarterly basis by the Applicant's performance improvement and quality staff.

5. **Quality Measure – Extravasation Rate of Chemotherapy:** Extravasation refers to the inadvertent infiltration of chemotherapy into the subcutaneous or subdermal tissues surrounding the intravenous or intra-arterial administration site. The Applicant will track this rate at the New Hospital Satellite Facility.

   Measure: This measure tracks in the numerator the number of extravasations divided by the denominator, the number of qualifying drug administrations (vesicant, irritant with vesicant potential/properties administered intravenously). The established national benchmark for ambulatory adult extravasation rates is <0.09%. Applicant comparative baseline rates have ranged from 0.0% to 0.08% for the past 8 quarterly reporting periods.

   Projections: Baseline: 0.06%; Year 1: 0.06%; Year 2: 0.06%; and Year 3: 0.06%.

   Monitoring: These data will be evaluated on a quarterly basis by the Applicant's nursing quality improvement staff.

F1.b.iii **Public Health Value/Health Equity-Focused:**

For Proposed Projects addressing health inequities identified within the Applicant's description of the Proposed Project's need-base, please justify how the Proposed Project will reduce the health inequity, including the operational components (e.g. culturally competent staffing). For Proposed Projects not specifically addressing a health disparity or inequity, please provide information about specific actions the Applicant is and will take to ensure equal access to the health benefits created by the Proposed Project and how these actions will promote health equity.

To ensure health equity for all populations, including those deemed underserved, the Proposed Project will not negatively affect accessibility of the Applicant's services for poor, medically indigent, and/or Medicaid eligible individuals. The Applicant does not discriminate based on ability to pay or payer source and this practice will continue following implementation of the Proposed Project. As further detailed throughout this narrative, the Proposed Project will increase access to high quality oncology services for all patients by decompressing the Applicant's Main Campus to allow more patients access to services.

[140] Baseline data is the average of the 2016 and 2017 fall rate for the Applicant's Main Campus.

The Applicant offers a comprehensive array of supportive resources and services, including patient navigators, resource specialists, social workers, clinical nurse navigators, among others to help address cultural, language, transportation and other barriers for patients. Through one program, the Applicant offers patient navigation services for high risk patients. Studies have found that cancer patient navigation programs result in increased access to and utilization of cancer care for poor and underserved individuals.[141] A patient navigator is an individual trained to help identify and resolve real and perceived barriers to care, enabling cancer patients to adhere to care recommendations, thereby improving their cancer outcomes.[142] Patient navigators are tasked with identifying high-risk patients, conducting outreach to minority groups, and assisting patients in accessing the Applicant's cancer care and supportive services. Research shows that patients who face the greatest barriers in accessing care are at risk for foregoing diagnostic testing and/or treatment until later stages of cancer without the involvement of a navigator to provide support, encouragement and linkages to resources to facilitate completion of treatment, making this a critical resource for patients. The Applicant provides bilingual (in English and Spanish) patient navigation services to those patients in need within the gynecology and breast programs, with patients self-referring, as well as physician and clinical staff referring patients to these services. The navigator talks with a patient's health care provider(s) to obtain answers to any questions the patient may have about his or her care, obtains necessary information for a patient regarding procedures and treatment, arranges for tests or other appointments, and connects the patient with services to address social determinant of health issues, such as food insecurity, housing needs, transportation, etc. Patients who speak other languages (beyond English and Spanish) are connected with the Applicant's interpreter services program. In addition, the Applicant is involved in a citywide effort through the Boston Breast Cancer Equity Coalition to evaluate and develop best practices for patient navigation services in an effort to reduce disparities in breast cancer mortality between Black and White women in the City of Boston.

In addition to navigation services, the Applicant provides linkages to its adult social work program, resource specialists, financial counseling assistance program, as well as interpreter services. Social workers provide assistance on a number of issues, such as dealing with depression and anxiety, concerns about drug and alcohol use, coping with advanced cancer, and finding supportive local resources. Resource specialists assist patients in obtaining local transportation, short-term accommodations during treatment, and other special needs (such as, fuel and food pantry assistance). Financial counselors aid patients who are unable to pay for care in submitting applications for assistance. All of these supportive services will available at the New Hospital Satellite Facility in Chestnut Hill.

In regard to interpreter services, the Applicant has adopted the Culturally and Linguistically Appropriate Service ("CLAS") standards (specifically the Communication and Language Assistance Standards) set forth by the U.S. Department of Health and Human Services Office of Minority Health. The Applicant provides effective, understandable, and respectful care with an understanding of patients' cultural health beliefs and practices and preferred languages. Accordingly, the Applicant provides medical interpreters at no charge to patients and families who speak a language other than English. The Applicant's medical interpreters are trained professionals who speak a patient's language, share a patient's culture, have knowledge of medical terminology, and support a patient and their care team. Through all of these efforts, the Applicant ensures that all patients have access to high quality oncology services. These services will be extended to the New Hospital Satellite Facility.

---

[141] Kathryn L. Braun et al., *Cancer Patient Navigator Tasks across the Cancer Care Continuum*, 23 J. OF HEALTH CARE FOR THE POOR AND UNDESERVED 398, 398-413 (2012).
[142] *Id.*

F1.b.iv Provide additional information to demonstrate that the Proposed Project will result in improved health outcomes and quality of life of the Applicant's existing Patient Panel, while providing reasonable assurances of health equity.

The Applicant provides a continuum of cancer care, including risk assessment, primary prevention, screening, detection, diagnosis, treatment, survivorship and end-of-life care. Each of these services includes multiple steps and the inclusion of a number of providers and departments, which can improve care outcomes.[143] The complexity is magnified by various types of cancer, challenging patients, families, providers, and medical care organizations which must coordinate care between health-care sectors and across the cancer continuum.[144] To ensure that patients are receiving necessary oncology services, the Applicant has developed programming around appropriate transitions of care and accessibility of all programs to all patients. Through the Proposed Project, the Applicant will continue to facilitate expedited access to fully integrated, co-located cancer care services, assisting patients and families in navigating the complex clinical system and providing essential supportive services that positively impact overall health outcomes and patient experience.

F1.c Provide evidence that the Proposed Project will operate efficiently and effectively by furthering and improving continuity and coordination of care for the Applicant's Patient Panel, including, how the Proposed Project will create or ensure appropriate linkages to patients' primary care services.

To ensure continuity of care, improved health outcomes and enhanced quality of life, through the Proposed Project, the Applicant's staff will continue existing formal processes for linking cancer patients with referring physicians (often primary care physicians) and other specialists for follow-up care, as well as patient navigation/social work/resource specialty support to ensure patients have access to resources around social determinant of health needs. The Applicant provides care coordination services in numerous ways. First, as discussed in Section F.1.b.iii, the Applicant has an array of supportive services that coordinate care, such as a patient navigator and resource specialists. Second, the Applicant utilizes a comprehensive electronic health record ("EHR") system, Epic, across all of its hospital facilities to coordinate care. This technology will be used by all clinicians and other support staff at the New Hospital Satellite Facility to ensure continuity of care. Through Epic, the Applicant's EHR system, clinical staff provide necessary information to patients' referring physicians (including primary care physicians) through shared clinical note functionality. Depending on the type of cancer, some physicians also follow-up through email and phone to connect to referring providers and local care providers if applicable.

F1.d Provide evidence of consultation, both prior to and after the Filing Date, with all Government Agencies with relevant licensure, certification, or other regulatory oversight of the Applicant or the Proposed Project.

A broad range of input is valuable in the planning of a DoN project to obtain various perspectives on the Proposed Project. Consequently, the Applicant carried out consultations with individuals at various regulatory agencies regarding the Proposed Project. The following individuals are some of those consulted regarding this Project:

[143] Jane Zapka et al., *Multilevel Factors Affecting Quality: Examples from the Cancer Care Continuum*, 2012 JNCI MONOGRAPHS 11, 11-19 (2012).
[144] *Id.*

- Department of Public Health: Nora Mann, Director, Determination of Need Program; Rebecca Rodman, Deputy General Counsel; Ben Wood, Director, Office of Community Health Planning and Engagement; Anita Christie RN MHA CPHQ, Director, Office of Clinical Preventive Services; Torey McNamara, Assistant Director, Policy and Regulatory Affairs and Jennifer Barrelle, Chief of Staff to the Commissioner of Public Health.

F1.e.i **Process for Determining Need/Evidence of Community Engagement:**
For assistance in responding to this portion of the Application, Applicant is encouraged to review *Community Engagement Standards for Community Health Planning Guideline.* With respect to the existing Patient Panel, please describe the process through which Applicant determined the need for the Proposed Project.

Due to current space constraints at its Main Campus, the Applicant's leadership and clinical staff participated in on-going internal discussions around the most effective way to address capacity issues. Following these discussions, the Applicant reviewed various alternatives to ensure appropriate access by all current and prospective patients to the Applicant's cancer care services. Through this process, leadership determined the Proposed Project was the superior method for addressing capacity constraints and continued growth, and a plan was formulated to expand oncology services, including imaging services at the New Hospital Satellite Facility. In contemplation of this expansion, the Applicant's leadership sought to define its community broadly and engage patients, family members, local residents and resident groups that may be impacted by the Proposed Project to obtain feedback and answer questions. These groups were engaged through various initiatives.

First, to ensure appropriate patient and family engagement, Applicant staff presented the Proposed Project to the Applicant's Adult Patient and Family Advisory Council ("PFAC"). This is one of two PFACs at the hospital (there is a separate Pediatric PFAC) comprised of patients, family and staff members that seek to ensure the Applicant provides patient- and family-centered care with a commitment to dignity and respect, information sharing, participation and collaboration. The combined mission of both PFACs is: (1) to help disseminate information and implement services that affect the Applicant's patients and their families; (2) to support patients and their families becoming informed advocates for their own care; (3) to offer a patient and family voice; (4) to initiate ideas for policies, programs, projects, and services within the patient care environment; and (5) to provide ongoing opportunities to hear the voices, experiences, and perspectives of patients and their families. Accordingly, leadership and staff sought to inform the PFAC about the planned expansion and obtain feedback about the Proposed Project.

On March 6, 2018, the Applicant's Director of Analytics, in collaboration with the PFAC Co-Chairs, presented to the PFAC on the expansion of oncology services at the New Hospital Satellite Facility. The presentation provided background and context, a high-level timeline for progression, as well as a brain storming and discussion session. All feedback from PFAC members was positive, with thoughtful contributions around the types of integrative and supportive therapies that might be provided at the New Hospital Satellite Facility.

Second, in an effort to engage community members and neighbors, the Applicant held two community information sessions for the public. These meetings were publicized in patient areas at the Applicant's Main Campus and on its web site, as well as at various community locations

within the Chestnut Hill area. On March 8, 2018, the Applicant held a community meeting at its Main Campus. Although not widely attended (two community members were present, as well as staff members), a presentation on the expansion of oncology services was provided and feedback was sought. Additionally, on March 15, 2018, the Applicant conducted a second community meeting at 300 Boylston Street, Newton, Massachusetts – the site of the New Hospital Satellite Facility. At this meeting, three neighbors attended, with staff providing a presentation on the expansion of oncology services, including imaging. All feedback was positive with enthusiasm for the building becoming health and wellness focused.

Third, in an effort to receive additional feedback on the Proposed Project from various constituencies, the Applicant developed a designated email for the Proposed Project. This email address is posted on the Applicant's web site and checked by staff for potential questions and feedback on the Proposed Project on a regular basis. To date, one email from a staff member has been received and answered. However, no external emails have been received with questions, concerns or feedback. Through all of the aforementioned efforts, the Applicant has sought to engage the community and receive feedback on the Proposed Project.

F1.e.ii **Please provide evidence of sound Community Engagement and consultation throughout the development of the Proposed Project. A successful Applicant will, at a minimum, describe the process whereby the "Public Health Value" of the Proposed Project was considered, and will describe the Community Engagement process as it occurred and is occurring currently in, at least, the following contexts: Identification of Patient Panel Need; Design/selection of DoN Project in response to "Patient Panel" need; and Linking the Proposed Project to "Public Health Value".**

To ensure sound community engagement throughout the development of the Proposed Project, the Applicant took the following actions:

- Presentation to the Applicant's PFAC by the Applicant's Director of Analytics and both PFAC Co-Chairs on March 6, 2018.
- Community information session at the Applicant's Main Campus from 5:30pm - 6:30pm on March 8, 2018. A sign in sheet from this meeting is available from the Applicant upon request as it contains personal contact information for attendees, including name, address, email and phone number.
- Community information session at the Applicant's proposed New Satellite Facility from 6:00pm - 7:00pm on March 15, 2018. A sign in sheet from this meeting is available from the Applicant upon request as it contains personal contact information for attendees, including name, address, email and phone number.

For detailed information on these activities, see Attachment 3.

For transparency and to educate the community regarding the public health value of the Proposed Project, the Applicant developed a presentation to provide at the aforementioned community information sessions. This presentation documents the components of the Proposed Project and the patient panel need that the Proposed Project will meet, as well as the impact of the Proposed Project, including its public health value. Please see Attachment 3b for a copy of the presentation.

Factor 2: **Health Priorities Addresses the impact of the Proposed Project on health more broadly (that is, beyond the Patient Panel) requiring that the Applicant**

demonstrate that the Proposed Project will meaningfully contribute to the Commonwealth's goals for cost containment, improved public health outcomes, and delivery system transformation.

F2.a. **Cost Containment:**
Using objective data, please describe, for each new or expanded service, how the Proposed Project will meaningfully contribute to the Commonwealth's goals for cost containment.

The Applicant has undertaken efforts to reduce costs and continue to improve quality, safety and value in the delivery of cancer care and this work with continue with the addition of the New Hospital Satellite Facility. In recent years, the Applicant has launched initiatives to better coordinate care, reduce unnecessary utilization of high-cost services and reduce variability in the treatment of cancer. Examples of this work are discussed, in Section F.1.a.iii, and include a study conducted at the Applicant's Main Campus by Jackman et al. that explored the use of clinical pathways to support clinical decision making and manage resources for patients with late-stage non-small cell lung cancer.[145] The study findings revealed that the total ambulatory cost of care decreased by more than $15,000 per patient after the implementation of the clinical pathways ($67,050 before pathways versus $52,037 after pathways).[146] Moreover, outcomes were not compromised, with median overall survival times remaining similar (10.7 months before pathways vs 11.2 months after pathways).[147] Chemotherapy, biologics, and other antineoplastic drugs represented the single largest contributor to savings.[148] This was achieved, in part, by reducing the use of selected high-price regimens that were not associated with significant clinical benefit. Accordingly, the Applicant's Clinical Pathways can provide comparative outcomes, value, and standardization, all of which are crucial in reducing the overall cost of cancer care.[149] By providing decision support tools, providers can ensure they are providing the highest quality care, as well as the most-cost effective treatment, thereby meeting the goals of cost containment for the Commonwealth.

Additionally, Section F.1.a.iii discusses a second study that reviewed second opinion consultations for breast cancer patients and the impact of these consultations on treatment and care management.[150] The study found that 11.7% of patients who underwent breast surgery had care management changes as a consequence of a second opinion radiologic imaging review.[151] Key to these findings is the use of expert radiologists who sub-specialize in various forms of oncology imaging.[152] Consequently, appropriate imaging and the review of scans by expert radiologists impact the care that patients receive, including its efficacy and overall costs. By providing patients with access to expert radiologists that specialize in oncology consultations, the Applicant will provide patients with appropriate diagnoses, ultimately leading to a reduction in care through avoided costly and unnecessary treatment, leading to reduced overall costs and meeting the Commonwealth's goals of cost containment.

---

[145] *Id.*
[146] *Id.*
[147] *Id.*
[148] *Id.*
[149] *Id.*
[150] Mallory, *supra* note 58.
[151] *Id.*
[152] *Id.*

F2.b. **Public Health Outcomes:**
Describe, as relevant, for each new or expanded service, how the Proposed Project will improve public health outcomes.

The Proposed Project will ensure access to oncology services as the Commonwealth's population continues to age. Access to detection and treatment are the greatest tools in stabilizing and continuing the downward trend in cancer incidence and death rates in Massachusetts. Given that age is one of the largest risk factors for developing cancer and that a large number of individuals within the Applicant's patient panel are in the 65+ age cohort, as well as an aging population within the Commonwealth, public health experts have been warning that the US cancer infrastructure, such as freestanding cancer centers, must ready itself for a dramatic increase in cancer incidence rates.[153] The most effective way to ensure improved public health outcomes and stabilize cancer incidence is through early detection, appropriate expert care, identifying secondary cancers and providing survivorship services. Through the Applicant's Proposed Project, detection, examination and imaging services will allow clinicians to provide patients with the continuum of cancer care in a timely manner, ultimately leading to stabilized and improved public health outcomes. Furthermore, given that the Applicant specializes in providing oncology services, it is uniquely positioned to provide robust clinical, integrative therapy and supportive service resources to patients, ensuring patient-centered, whole person care. This holistic care will lead to improved health outcomes for patients, and ultimately improved incidence and death rates for patients in the Commonwealth.

F2.c. **Delivery System Transformation:**
Because the integration of social services and community-based expertise is central to goal of delivery system transformation, discuss how the needs of their patient panel have been assessed and linkages to social services organizations have been created and how the social determinants of health have been incorporated into care planning.

The Applicant is strongly committed to integrating social services and community-based expertise in facilitating delivery system transformation. As part of this work, the Applicant participates in outreach activities aimed at the reduction of cancer incidence, morbidity and mortality, conducts community-based research, and supports community-based programs. The Applicant's community outreach mission, which was formally adopted by Applicant's Board of Trustees in 1995 and seeks to: (1) ensure that patients from diverse backgrounds receive equitable cancer care and treatment, including but not limited to, education about the importance of clinical trials participation; (2) establish quantifiable, evidence-based and sustainable programs in cancer prevention focusing on at-risk, underserved and diverse populations; and (3) provide expertise in cancer care to city and state health departments, community-based agencies, and healthcare providers.

In addition, the Applicant partners with a wide variety of community-based organizations and social service agencies that provide resources to their patients and partner on cancer control programming. These partnerships and collaborations with local organizations, such as community health centers, governmental agencies, and support networks enable the Applicant's programs to reach racially and ethnically diverse groups, and those for whom socioeconomic circumstances, financial obstacles, or cultural barriers may have stood in the way of learning about cancer risk or seeking treatment and screening services. Some of these partnerships, include:

[153] R. Yancik, *Population Aging and Cancer: A Cross-National Concern,* 6 CANCER J. 437, 437-441 (2005).

- **Massachusetts Department of Public Health ("MDPH"):** Through ongoing partnerships with MDPH's Chronic Disease Prevention and Control Unit, programs in colorectal, prostate, skin and women's cancers have been established with MDPH and other community agencies across the Commonwealth.

- **Massachusetts Comprehensive Cancer Prevention and Control Network ("MCCPCN"):** The Applicant continues its leadership role as a member of the MCCPCN and has continued to identify cancer control priorities and opportunities for greatest impact in addressing cancer incidence, morbidity, mortality and survivorship.

- **Boston Public Health Commission ("BPHC"):** The Applicant works closely with the BPHC to implement and sustain initiatives that address the need for cancer prevention education, screening services, and survivorship education. BPHC also plays a key leadership role in the Applicant's Community Benefits External Advisory Committee and as the co-convener of the Boston Breast Cancer Equity Coalition. Additionally, the Applicant served on the steering committee of the Let's Get Healthy, Boston! project, a three-year partnership initiative between the BPHC and the Boston Alliance for Community Health aimed at creating healthier environments for Boston-area residents. This project ended in September 2017.

- **Boston Breast Cancer Equity Coalition:** Launched in 2014, this cross-sector coalition seeks to eliminate the differences in breast cancer care and outcomes by promoting equity and excellence in care among women of all racial/ethnic groups in the City of Boston.

- **Boston Alliance for Community Health ("BACH"):** As a steering committee member of BACH, the Applicant continues to work alongside fellow health care institutions, neighborhood coalitions and community development corporations to address the racial and ethnic disparities in health that exist in Boston and throughout the region.

- **Madison Park Development Corporation ("MPDC"):** The Applicant has a longstanding history of collaboration with MPDC and continues to partner with MPDC to implement mutually agreed upon community health improvement strategies, including providing health and wellness programming for MPDC residents.

- **Massachusetts Coalition for HPV and Related Cancer Awareness:** The Applicant continues to serve on the steering committee of the Massachusetts Coalition for HPV and Related Cancer Awareness, with the goal of increasing HPV knowledge and vaccination rates in order to reach the Healthy People 2020 goal of 80% vaccination among eligible youth regardless of race/ethnicity or socioeconomic status.

- **Boston Public Schools Health and Wellness Department:** The Applicant partners with Boston Public Schools to provide education about HPV and cancer prevention to youth, parents, and clinical staff.

- **Tobacco Free Mass Coalition:** As a member of the Tobacco Free Mass Coalition, the Applicant supports the development of policies that aim to reduce youth access to tobacco, prevent nicotine addiction, and increase tobacco control funding.

- **Dana-Farber Cancer Institute – Center for Community-Based Research ("CCBR"):** CCBR conducts cancer prevention research with the goal of developing effective intervention strategies to reduce the risk of cancer. CCBR works extensively with neighborhood health centers, low-income housing, faith-based organizations, health departments and community-based organizations.

- **Dana-Farber/Harvard Cancer Center ("DF/HCC"):** The Applicant and the DF/HCC continue to collaborate and develop programming in a variety of areas aimed at reducing the unequal burden of cancer in partnership with the Faith-based Cancer Disparities Network and other community-based organizations. Early in its history, the consortium created the Initiative to Eliminate Cancer Disparities ("IECD") to maximize the acceptance and desirability of cancer research in communities that have traditionally experienced significant disparities in cancer care. The DF/HCC IECD is also the convener of the Patient Navigator Network ("PNN").

- **Prostate Health Education Network ("PHEN"):** The Applicant and PHEN partner on education, outreach and advocacy efforts and together sustain a prostate cancer support group for men of color that meets monthly at DFCI.

- **The Conference of Boston Teaching Hospitals ("COBTH"):** The Applicant is an active member of COBTH, a coalition of thirteen Boston-area teaching hospitals who collaborate on community outreach and planning activities. Through the shared efforts of the COBTH Community Benefits Committee, a series of neighborhood-level meetings and focus groups were held as part of the Applicant's 2016-2019 Community Health Needs Assessment ("CHNA") process. The Applicant also has been an active participant in the planning process to develop a joint citywide CHNA and Community Health Improvement Plan for 2019.

Further, a social determinants of health perspective guides the evaluation of health needs of the Applicant's local community and patient panel, which is strongly reflected in the Applicant's CHNA Report and Implementation Plan. Through this lens, it is critical to look beyond proximal, individual-level factors in accounting for a community's health problems and towards upstream factors such as housing, education, employment status, racial/ethnic disparities, and neighborhood-level resources that critically impact population health. To this end, the Applicant's CHNA examines how these larger social and economic factors are associated with good and ill health, specifically across the cancer continuum, and identifies key areas for intervention.

The realities reflected by the Applicant's CHNA, which include challenges related to broader upstream socioeconomic issues that go beyond cancer, such as community violence, substance use, and opioid addiction, high rates of unemployment, lack of affordable housing, behavioral and mental health issues, and inadequate availability of nutritious food, highlight the profound burden of cancer experienced by residents in the Applicant's surrounding neighborhoods. The Applicant recognizes that efforts to reduce the cancer burden must go beyond cancer care and treatment, and as such the Applicant continues its unwavering commitment to reducing the cancer burden and promoting survivorship programming. Consequently, the Applicant remains committed to educating the community and raising awareness about the importance of cancer prevention, outreach, screening, early detection, clinical trials and survivorship.

As previously discussed in Section F.1.b.iii, the Applicant has a vast array of programs to address the needs of its patient panel and ensure appropriate linkages to social services. First, through its

patient navigation and adult social work programs, the Applicant provides a comprehensive and streamlined continuum of care for patients and families to address the social determinants of health that might prevent a patient from completing treatment. Patient navigation and social work services provide patients with timely, compassionate support and connect patients to essential resources, including transportation and interpreter services, during treatment. Consequently, the Applicant has created a patient navigation database for tracking patient data to maximize the team approach to care and ensure patients have the resources they need. Second, the Applicant provides patients with linkages to resource specialists who address patients' social determinant of health needs. Resource Specialists are focused primarily on alleviating the financial burden that cancer places on individuals and their family by securing concrete supportive assistance, including short-term lodging/housing accommodation, such as the Hope Lodge operated by the American Cancer Society and financial supports from foundations and other local resources. Additionally, Pharmacy Resource Specialists assist with the frequently high co-pays for cancer-related medications. Providing patients with these services ensures patients have reduced barriers to care through the provision of necessary support and tools to complete their treatment regiments, thereby reducing unnecessary readmissions and visits. Finally, to ensure equal access to care, the Applicant provides financial counselors who help enroll patients in insurance and other assistance programs. Accordingly, any patient in need of supportive programming is provided with these services and may self-refer to these resources.

Factor 5: Relative Merit

F5.a.i **Describe the process of analysis and the conclusion that the Proposed Project, on balance, is superior to alternative and substitute methods for meeting the existing Patient Panel needs as those have been identified by the Applicant pursuant to 105 CMR 100.210(A)(1). When conducting this evaluation and articulating the relative merit determination, Applicant shall take into account, at a minimum, the quality, efficiency, and capital and operating costs of the Proposed Project relative to potential alternatives or substitutes, including alternative evidence-based strategies and public health interventions.**

Proposal: To expand oncology services to the New Hospital Satellite Facility, allowing the Applicant to meet the growing demand for sub-specialized cancer care services. This proposed expansion will allow patients to receive expedited cancer care services at both the New Hospital Satellite Facility and the Applicant's Main Campus and reduce anticipated wait times for appointments, thereby improving quality outcomes, as well as patient satisfaction.

Quality: The Proposed Project is a superior alternative for providing high quality oncology services as patients that receive timely cancer care have better quality outcomes and higher rates of satisfaction. Reducing wait times to initial or follow-up oncology appointments allows for a more rapid diagnosis and commencement of treatment. When cancer is found in its early stages and initial treatment begins earlier, quality outcomes are improved. Additionally, expedited care allows for faster monitoring to determine the efficacy of a specific treatment. Expedited care also reduces the amount of anxiety and stress that cancer patients feel when awaiting test results or initial diagnosis.

Providing integrated, co-located imaging services for oncology patients also improves quality and satisfaction levels. The provision of co-located imaging services at the New Hospital Satellite

Facility will reduce the number of times a patient may have to come to the Applicant's facilities, thereby reducing unnecessary travel, leading to greater levels of patient satisfaction. Additionally, timely imaging that coincides with patient examinations provides clinical staff with necessary information to change treatment plans or may provide additional treatment options that may be discussed at an appointment. The New Hospital Satellite Facility also is an alternative care site for those patients who would rather not travel to Boston to receive services. Moreover, by offering expanded access at the New Hospital Satellite Facility, the Applicant will be able to accommodate more patients at its Main Campus as patients choose to seek care at the most convenient location.

Efficiency: The Proposed Project will allow for the creation of care efficiencies for many patients. Those individuals living closer to the New Hospital Satellite Facility will have to travel less and may receive exam, infusion therapy, imaging, survivorship and supportive programming closer to home. In addition, capacity will be decompressed at the Applicant's Main Campus allowing the Applicant to ensure its continued ability to provide access to urban patients. When care is expedited, and diagnosis and treatment occur in the early stages of cancer, frequently less imaging is required, and more cost-efficient procedures may be available as treatment options for patients.

Capital Expense: The Proposed Project represents the superior alternative for capital expenses, as construction at an offsite, suburban location is substantially lower in cost than the construction of a new facility in the Longwood Medical Area of Boston.

Operating Costs: Operating costs for the New Hospital Satellite Facility are also lower than the Applicant's existing operating costs at its Main Campus as space, utilities and other overhead expenses are less in a suburban area.

List alternative options for the Proposed Project:

Option 1

Alternative Proposal: Sustain current operations and do not expand oncology services.

Alternative Quality: Currently, the Applicant's main building for oncology services, the Yawkey Building, is nearing capacity and will be at 100% of capacity within the next few years. This alternative does not allow the Applicant to address anticipated increased utilization, nor does it allow the Applicant to develop a strategy for future growth to ensure that all patients have access to high quality cancer care services, including the aging population in the Commonwealth.

Alternative Efficiency: No additional care or financial efficiencies may be created through this alternative.

Alternative Capital Expenses: Although this alternative has no associated capital costs, there are other costs to the Applicant, such as longer wait times for patients and decreased patient and provider satisfaction.

Alternative Operating Costs: There are no operating efficiencies that are created through this alternative.

Option 2

Alternative Proposal: Expansion of oncology services, including exam, infusion therapy and imaging services at the Applicant's Main Campus.

Alternative Quality: Currently, this option is not feasible as there is no available space at the Applicant's Main Campus, nor in the surrounding neighborhoods to construct additional floors for expanded oncology services in a cost-effective manner. The Yawkey Building on the Applicant's Main Campus will be at capacity in the next few years, and thus, an alternative plan to acquire more space is necessary to provide patients with continued timely access to high quality care. Accordingly, given space constraints, this option is not feasible.

Alternative Efficiency: No additional care efficiencies may be achieved through this alternative. Additionally, patient satisfaction may decrease as travel time and the ability to find parking would be hindered by construction in an already congested medical area. To build additional capacity, the Applicant implemented potential strategies, such as expanding the hours of operation and changing its exam room operations. However, these efforts only mildly improved capacity. Consequently, this is not a long-term solution to meet demand.

Alternative Capital Expenses: The cost of constructing a similar size facility as the New Hospital Satellite Facility in the Longwood Medical Area would be substantially more than the proposed suburban location.

Alternative Operating Costs: No operating efficiencies can be achieved through this alternative, as an expansion at the Applicant's Main Campus would have traffic and parking implications, as well as higher administrative operating costs, such as space and utility costs.

Attachment/Exhibit

2

DFCI/DFCCC Patient Origin

	FY15			FY16			FY17		
	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC	TOTAL DFCI
MA	50,236	14,911	65,147	50,520	14,859	65,379	53,811	13,617	67,428
NH	4,603	1,118	5,721	4,772	1,177	5,949	4,804	1,250	6,054
Outside NE/NY	3,142	68	3,210	3,537	57	3,594	3,707	46	3,753
RI	2,562	10	2,572	2,798	12	2,810	2,879	7	2,886
ME	2,157	27	2,184	2,342	20	2,362	2,451	14	2,465
NY	1,984	3	1,987	2,248	3	2,251	2,363	3	2,366
CT	2,028	1	2,029	2,160	1	2,161	2,198	1	2,199
Blank/Invalid	724	20	744	861	23	884	813	10	823
VT	514	2	516	610	2	612	651	1	652
Grand Total	**67,950**	**16,160**	**84,110**	**69,848**	**16,154**	**86,002**	**73,677**	**14,949**	**88,626**

Notes:
LMA/SAT = Longwood Medical Area (Main Campus) + Satellite Locations
DFCCC = Dana-Farber Community Cancern Care (Physician Practices)

DFCI/DFCCC Patient Sex

	FY15			FY16			FY17		
	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC	TOTAL DFCI
Female	43,105	10,556	53,661	43,583	10,470	54,053	45,938	9,699	55,637
Male	24,843	5,600	30,443	26,261	5,684	31,945	27,733	5,247	32,980
Other/Unknown	2	4	6	4		4	6	3	9
Grand Total	**67,950**	**16,160**	**84,110**	**69,848**	**16,154**	**86,002**	**73,677**	**14,949**	**88,626**

DFCI/DFCCC Patient Age

	FY15			FY16			FY17		
	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC	TOTAL DFCI
0-18	2,251	55	2,306	2,385	51	2,436	2,382	34	2,416
19-39	6,400	1,678	8,078	6,675	1,809	8,484	6,949	1,614	8,563
40-64	32,972	6,483	39,455	32,726	6,447	39,173	33,681	5,959	39,640
65+	26,312	7,944	34,256	28,061	7,847	35,908	30,664	7,342	38,006
Unknown	15		15	1		1	1		1
Grand Total	**67,950**	**16,160**	**84,110**	**69,848**	**16,154**	**86,002**	**73,677**	**14,949**	**88,626**

DFCI/DFCCC Disease Center / Primary Diagnosis

	FY15			FY16			FY17	
	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC	TOTAL DFCI	LMA/SAT	DFCCC
Breast	19,551	2,372	21,923	18,967	2,824	21,791	19,853	2,662
Cutaneous	926	107	1,033	1,025	160	1,185	1,182	153
Gastrointestinal	5,918	721	6,639	6,534	968	7,502	6,818	930
Genitourinary	5,840	413	6,253	6,223	606	6,829	6,712	558
Gynecologic	3,825	157	3,982	3,720	217	3,937	3,913	200
Head & Neck	2,605	164	2,769	2,763	215	2,978	2,738	209
Hematologic Malignancies	13,254	1,335	14,589	13,878	1,589	15,467	14,497	1,520
Hematology Benign	4,872	4,121	8,993	5,363	6,756	12,119	5,768	6,606
Melanoma	1,551	-	1,551	1,578	-	1,578	1,752	-
Neuro-Oncology	2,123	11	2,134	2,326	27	2,353	2,471	23
Bone, Cartilage & Soft Tissue	2,429	18	2,447	2,367	39	2,406	2,401	30
Secondary Malignancies	281	16	297	189	37	226	180	30
Thoracic	3,650	368	4,018	3,827	601	4,428	3,881	527
Other	1,125	505	1,630	1,088	808	1,896	1,511	768
No Primary Diagnosis Listed		5,852	5,852		1,307	1,307		733
Grand Total	**67,950**	**16,160**	**84,110**	**69,848**	**16,154**	**86,002**	**73,677**	**14,949**

TOTAL DFCI
22,515
1,335
7,748
7,270
4,113
2,947
16,017
12,374
1,752
2,494
2,431
210
4,408
2,279
733
88,626

DFCCC

DFCCC	FY15	FY16	FY17	Grand Total
White	11,667	11,720	10,807	17,738
Other	1,564	1,847	2,270	2,995
(blank)	2,091	1,698	885	3,607
Black or African American	441	469	408	745
Asian	295	317	299	497
Patient Declined	56	66	247	300
American Indian or Alaska Native	18	11	12	28
Black or African American,Other	1	3	5	6
American Indian or Alaska Native,Wh	7	5	4	7
White,Other		1	3	4
Native Hawaiian or Other Pacific Islar	7	8	3	10
Asian,Other	2	2	2	2
Patient Declined,White	2	2	1	2
American Indian or Alaska Native,Bla	1	1	1	1
Native Hawaiian or Other Pacific Islar	4	3	1	4
American Indian or Alaska Native,Asi	1	1	1	1
Other,White	1			1
Black or African American,White	1			1
Asian,White	1			1
Grand Total	**16,160**	**16,154**	**14,949**	**25,950**

LMA / Satellites

Race/Ethnicity	FY15	FY16	FY17
Asian	1,766	1,841	2,162
Black	3,112	2,958	3,053
Hispanic	2,435	1,467	1,321
Other	991	1,506	1,730
Unknown	2,527	2,183	2,079
White	57,119	59,893	63,332
Grand Total	67,950	69,848	73,677

DFCCC	FY15	FY16	FY17	Grand Total
Not Hispanic or Latino	12,404	12,357	11,241	18,645
Hispanic or Latino	1,651	1,996	2,260	3,212
(blank)	1,856	1,439	931	3,334
Patient Declined	249	362	517	760
Grand Total	**16,160**	**16,154**	**14,949**	**25,950**

Attachment/Exhibit

3

Attachment/Exhibit

A

DANA-FARBER
CANCER INSTITUTE

Dana-Farber Cancer Institute – Chestnut Hill Expansion Context, Update, and Discussion

PFAC Meeting
March 6, 2018

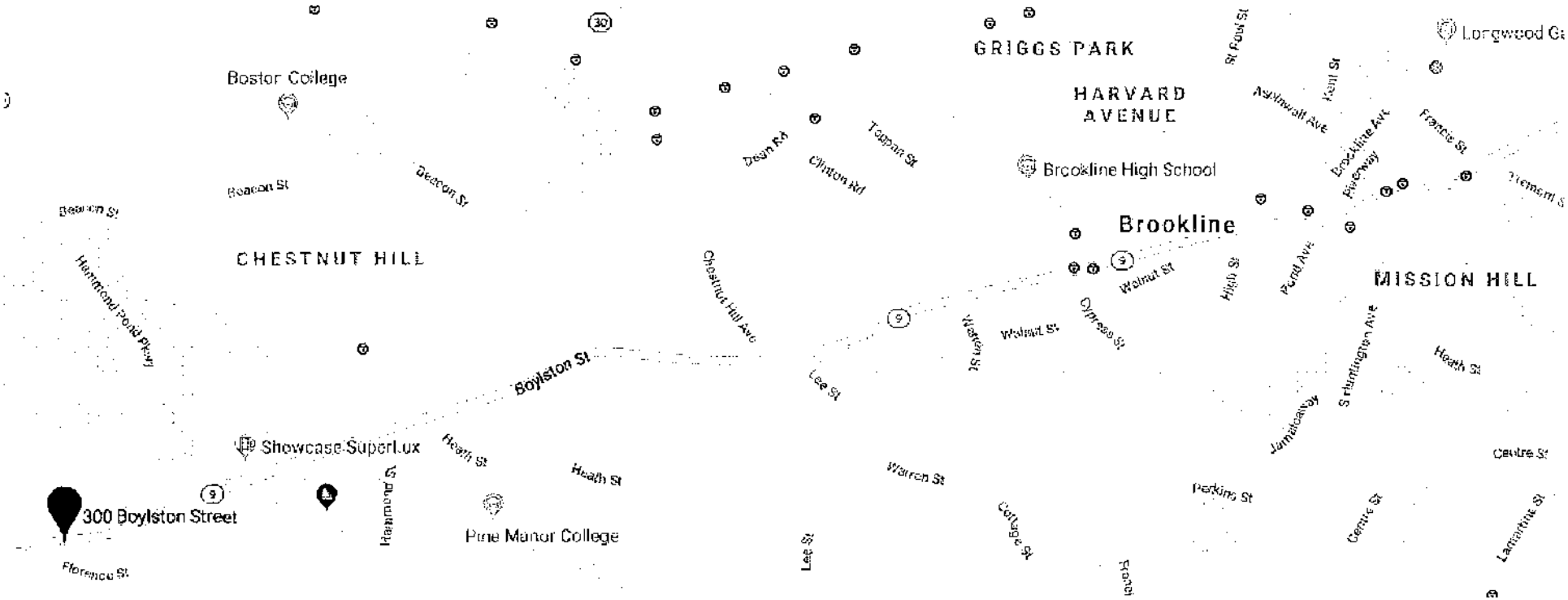
Ryan Leib, DFCI Director of Analytics
Gabby Spear, PFAC Co-Chair
Gina Paglucia, PFAC Co-Chair

Chestnut Hill Expansion Discussion Agenda

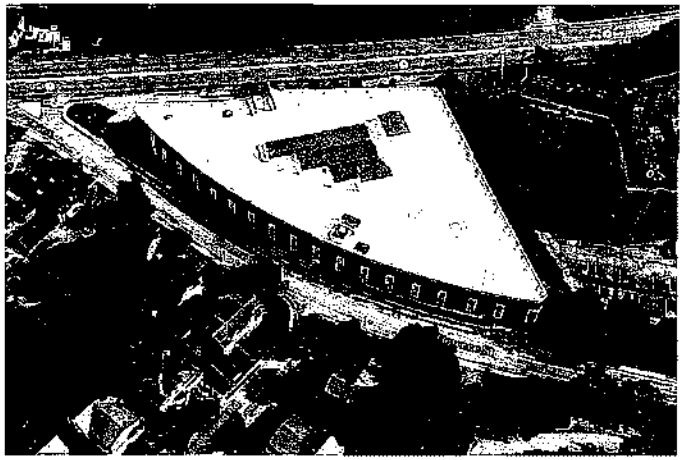
- Background and Context
- Update and High Level Timeline
- Brainstorm and Discussion

What Exactly Is the Chestnut Hill Project?

- Major expansion of clinical space from YCCC
  - "Yawkey 15 & 16"
- Located at old Atrium Mall on Route 9 in Chestnut Hill, MA
- Long-term lease, roughly half of the building
- Targeted opening Winter 2019 – Early 2020



Current Location of the Chestnut Hill Expansion



Which Disease Centers Will Be Located in Chestnut Hill?

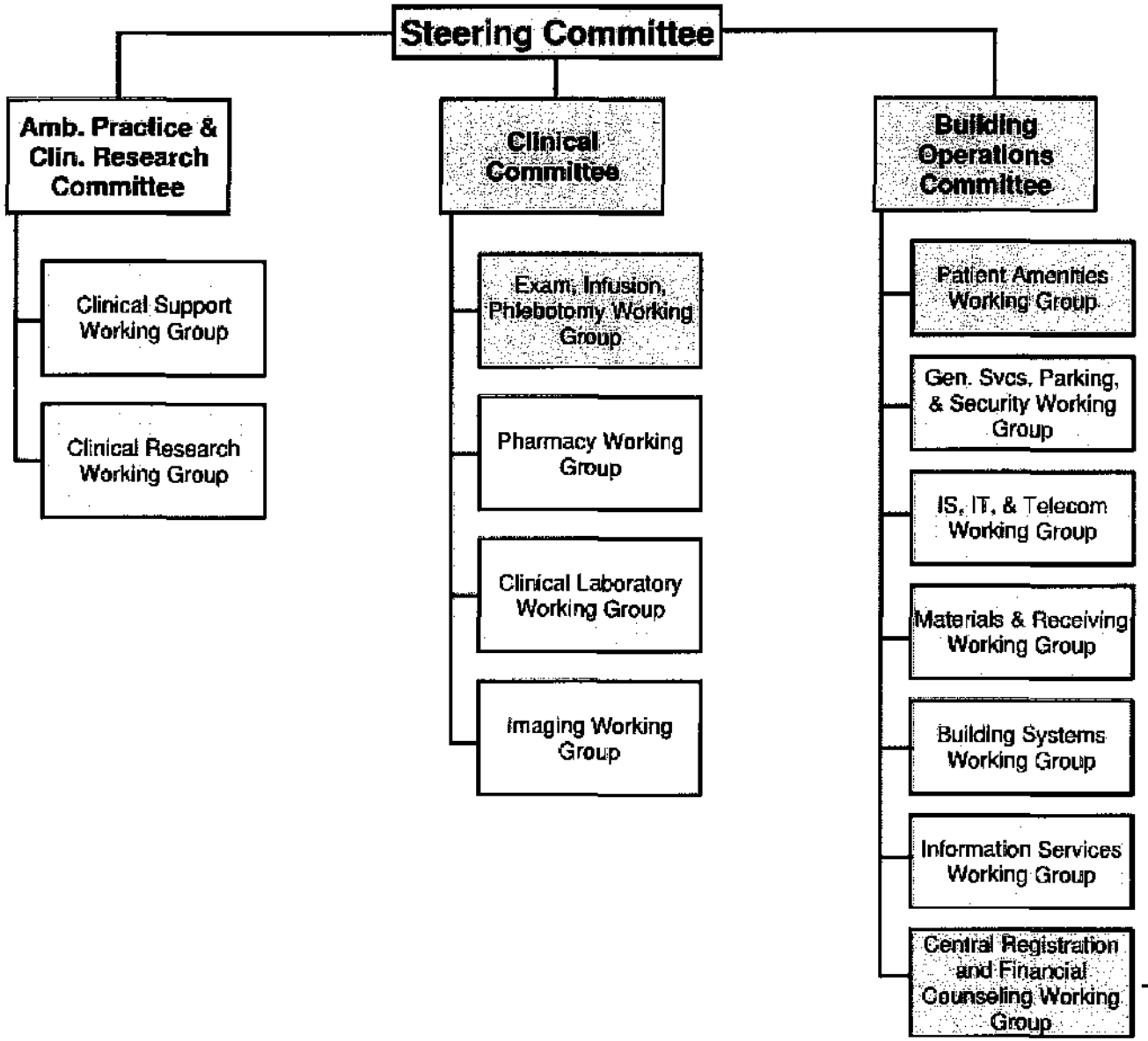
Portions of Disease Centers anticipated to move to Chestnut Hill during Phase I:

- Breast Oncology
- Gastrointestinal Oncology
- Genetics
- Genitourinary Oncology
- Gynecology Oncology
- Multi-D Exam (Surg/Imaging/Rad Onc)
- Survivorship
- Thoracic Oncology
- Palliative Care

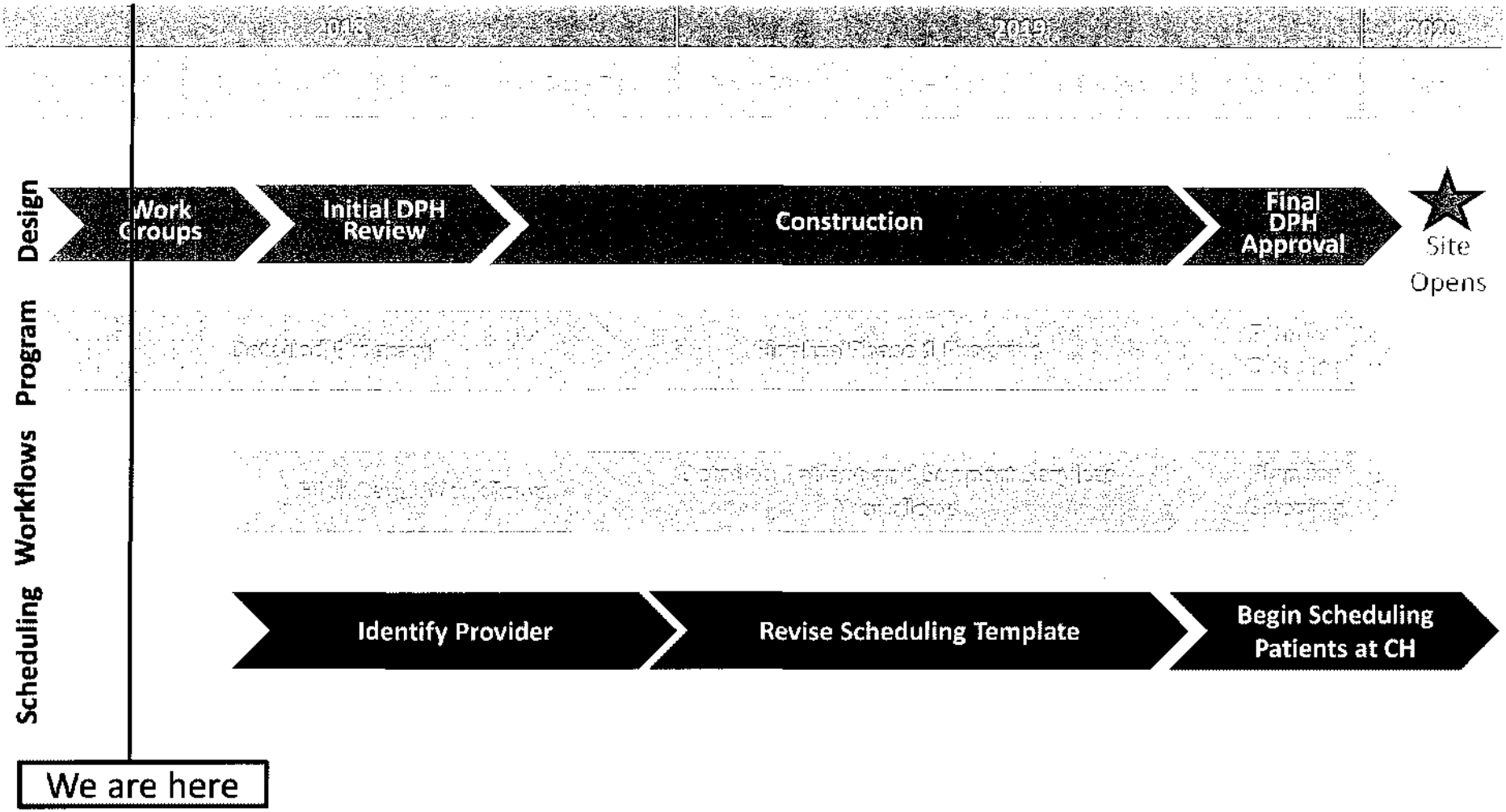
What Are Some of the Key Areas of Design and Development?

- Lobby & Registration
- Patient & Family Support
- Exam & Infusion Clinic
  - Approx. 45 exam, 60 inf.
- Central & Retail Pharmacy
- Lab Services
- Clinical Laboratory
- Minor Procedure
- Imaging
- Office & Conference
- Clinical Research (dry lab)

The Green Boxes Represent Areas Where PFAC Will Be Represented



Current High Level Timeline



To get started....

- What features work well at Yawkey?
- What would you like to change about Yawkey?
- What is Yawkey missing?
- What design (physical plant and facilities) considerations are important for patients and families?
- What features (services and amenities) would enhance and improve the patient and family experience?

Your Feedback Is Important

We welcome your feedback!

Please email ChestnutHill@dfci.harvard.edu
with any questions or suggestions

Attachment/Exhibit

B

Community Engagement Presentation
March 15, 2018

Welcome

- Welcome
- Dana-Farber Cancer Institute Overview
- Current Status
- Proposed Project
- Next Steps

The mission of Dana-Farber Cancer Institute is to provide expert, compassionate care to children and adults with cancer while advancing the understanding, diagnosis, treatment, cure, and prevention of cancer and related diseases.

- Dana-Farber cares for adults and children challenged with cancer, blood disorders, and related diseases
- Our world-renowned specialists provide comprehensive and personalized care for each patient and support for their families
- We offer specialized treatment centers staffed by teams of experts who work closely together to offer patients the latest therapies and strategies, including access to innovative clinical trials
- In 2016, we provided:
  - **160,703** infusion treatments
  - **259,838** outpatient MD visits
  - **752** clinical trials
- We are the only hospital ranked in the top four nationally by *U.S. News and World Report* in both adult and pediatric cancer care

Current Status

Yawkey Center for Cancer Care

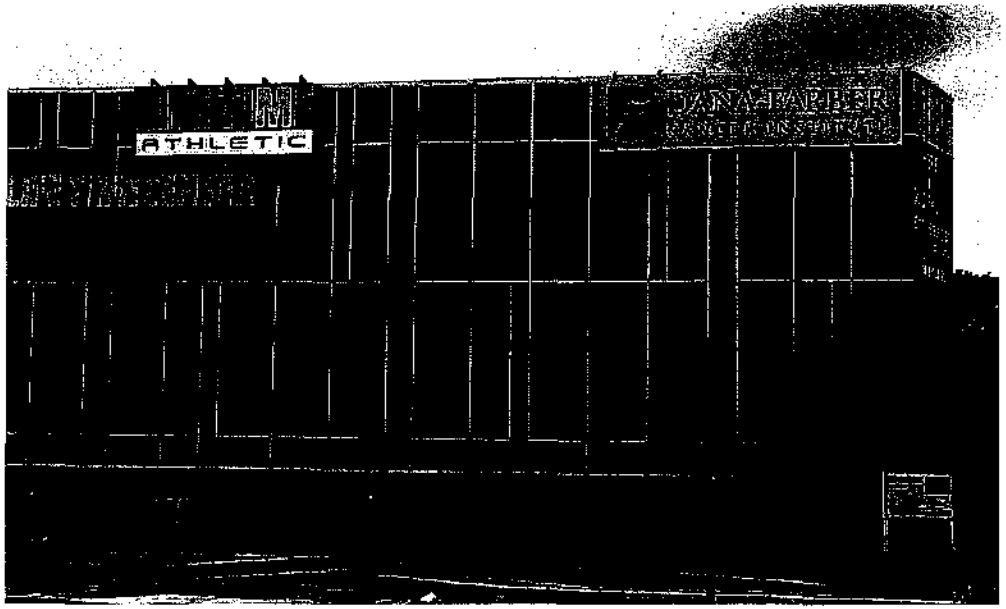
2011:

- We moved into the Yawkey Center for Cancer Care
- In the Yawkey Center, we are able to provide patients with state-of-the-art oncology care

2018:

- We are already nearing capacity
- We need additional space for <u>patient care</u>

Proposed Project



- We are opening a new site a few miles from our home in Longwood
- We have leased 140,000 square feet in Chestnut Hill (300 Boylston St/the old Atrium mall)
- Our new site will provide our patients an option for care in an easily accessible area with ample parking and amenities
- We will offer cancer services including clinical trials, exams, infusions, and supportive services
- We aim to open our site at Chestnut Hill in 2020

Questions?

We want your feedback. Please fill out a feedback form, or go to our website and let us know your thoughts at ChestnutHill@dfci.harvard.edu

For parking tickets: *Please write "CH" or "Chestnut Hill" on the back of your parking ticket so that the cashier will know not to charge you upon exiting.*


DANA-FARBER
CANCER INSTITUTE

Attachment/Exhibit

C

CHESTNUT HILL
NFORMATION SESSION

Join Dana-Farber staff, patients, and neighbors for a presentation on our new site at Chestnut Hill

Thursday, March 8
5:30-6:30pm
Yawkey 306
Parking available in the Yawkey Center

For questions, contact ChestnutHill@dfci.harvard.edu

CHESTNUT HILL

SESION de INFORMACION

Le invitamos a participar junto al personal del Dana-Farber, pacientes y vecinos a una presentación sobre nuestra nueva sede en Chestnut Hill

Jueves 8 de marzo:
5:30-6:30pm
Edificio Yawkey, Sala 306
Estacionamiento disponible en el Edificio Yawkey

Si tiene preguntas, envíe un correo electrónico a
ChestnutHill@dfci.harvard.edu

CHESTNUT HILL
NFORMATION SESSION

Join Dana-Farber staff, patients, and neighbors for a presentation on our new site at Chestnut Hill

Thursday, March 15
6:00-7:00pm
Life Time Center, 3rd floor –
300 Boylston St, Newton, MA
Parking available on site

For questions, contact ChestnutHill@dfci.harvard.edu

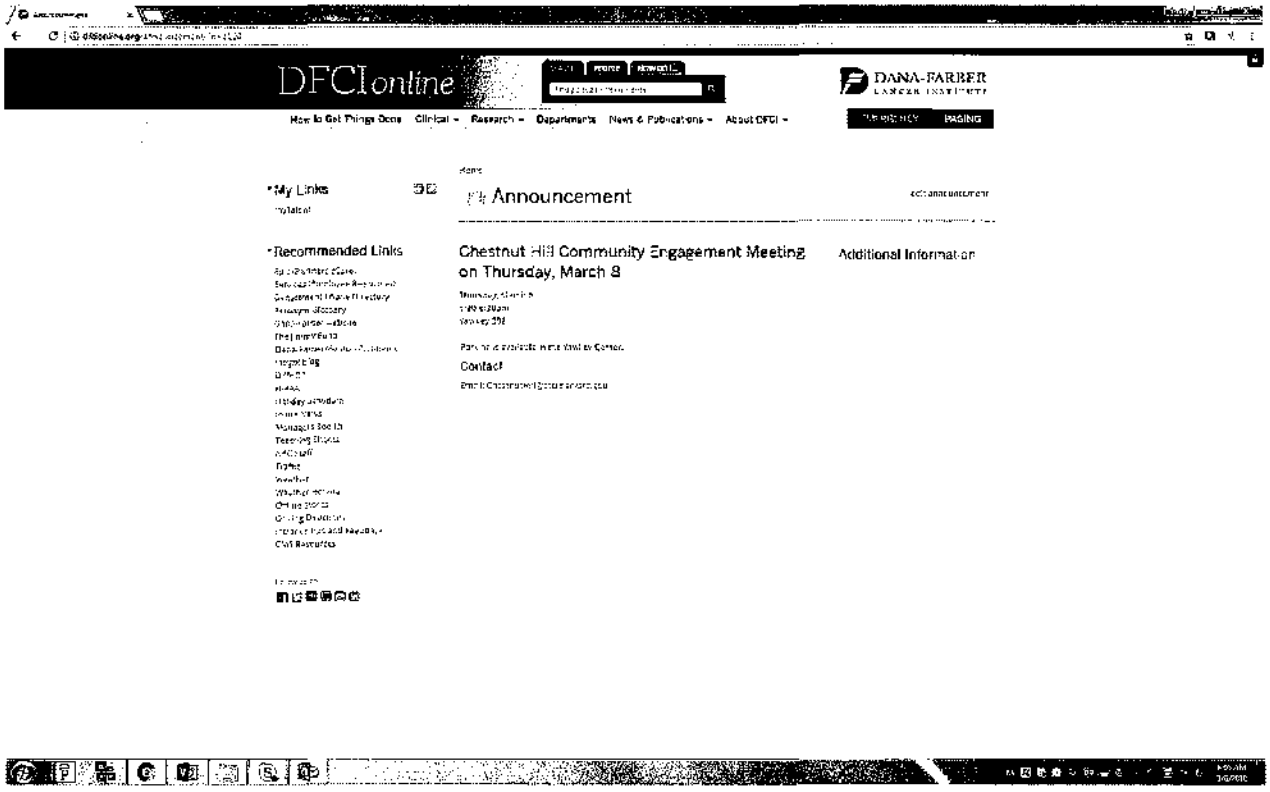
CHESTNUT HILL

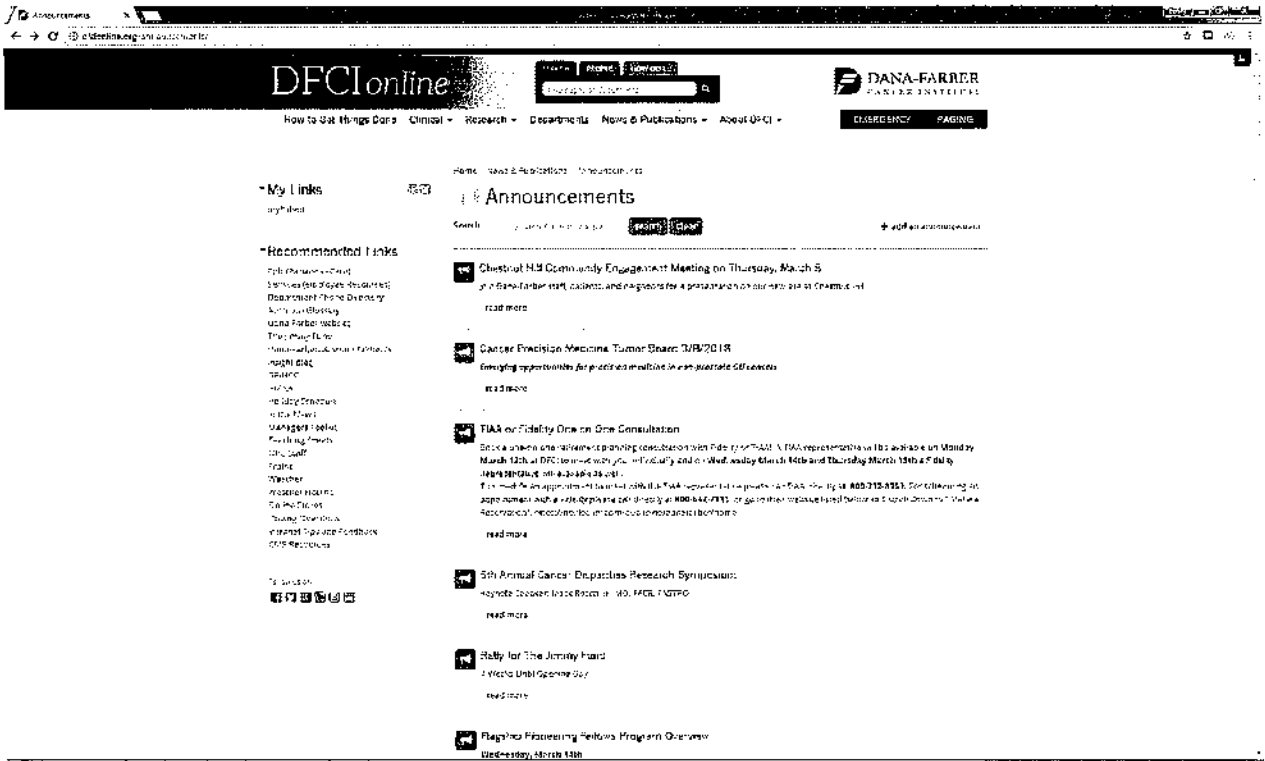
SESION de INFORMACION

Le invitamos a participar junto al personal del Dana-Farber, pacientes y vecinos a una presentación sobre nuestra nueva sede en Chestnut Hill

Jueves 15 de marzo:
6:00-7:00pm
Life Time Center
300 Boylston St, piso 3, Newton, MA
Estacionamiento disponible

Si tiene preguntas, envíe un correo electrónico a
ChestnutHill@dfci.harvard.edu


DFCIonline
DANA-FARBER
How to Get Things Done
Clinical
Research
Departments
News & Publications
About DFCI
EMERGENCY
PAGING
My Links
Recommended Links
Announcement
Chestnut Hill Community Engagement Meeting on Thursday, March 8
Additional Information
Contact


DFCIonline
DANA-FARBER
How to Get Things Done
Clinical
Research
Departments
News & Publications
About DFCI
EMERGENCY
PAGING
My Links
Recommended Links
Announcements
Chestnut Hill Community Engagement Meeting on Thursday, March 8
read more
Cancer Precision Medicine Tumor Board: 03/8/2018
read more
TIAA or Fidelity One on One Consultation
read more
5th Annual Cancer Disparities Research Symposium
read more
Rally for The Jimmy Fund
read more
Flaptree Pioneering Fellows Program Overview
Wednesday, March 14th


DFCIonline
DANA-FARBER
How to Get Things Done
Clinical
Research
Departments
News & Publications
About DFCI
EMERGENCY
PAGING
Tools
Search
Popular Links
My Team Spaces
My Links
Recommended Links
What's New
Tuesday, March 6
Announcements
Chestnut Hill Community Engagement Meeting on Thursday, March 8
TIAA or Fidelity One on One Consultation
New Art Acquisitions and Hidden Treasures
Booking Notice: Mayer - Lab Vacuum Shutdown - 3-10-2018 between 5 am and 7 am
Upcoming Events
Highlight
for the Jimmy Fund
Opening Day at Fenway is one month from today!

Attachment/Exhibit

D

DANA-FARBER
CANCER INSTITUTE

Name _____

Address_____

Please circle the following:

Staff Patient Neighbor Other

Please describe any experience or suggestions you have relating to the new site at Chestnut Hill?

_____

_____

_____

Please provide your email address so we can continue to communicate with you in the future:

_____

Attachment/Exhibit

4

Attachment/Exhibit

A

[redacted]

Dana-Farber Cancer Institute

2016 Community Health Needs Assessment

FINAL REPORT

September 22, 2016

DANA-FARBER
CANCER INSTITUTE

Health Resources in Action
Advancing Public Health and Medical Research

Table of Contents

EXECUTIVE SUMMARY

Background

Dana-Farber Cancer Institute (DFCI) is one of the world's leading cancer treatment and research centers. In addition to providing expert clinical care, DFCI is committed to educating the community and raising awareness about the importance of cancer prevention, outreach, screening, early detection, and clinical trials. To this end, DFCI's Community Benefits Office provides education and outreach across Boston and beyond, offers support services and resources, and conducts a broad scope of research and evidence-based interventions through its collaborative work in local neighborhoods as well as through its national and international public and professional education initiatives. The mission of DFCI's community benefits and outreach activities contributes to the larger goal of advancing the diagnosis, care, treatment, cure, and prevention of cancer and related diseases. The DFCI Community Benefits Internal Committee, the Trustee Community Programs Committee, and the Dana-Farber/Harvard Cancer Center (DF/HCC) Community Engagement Committees all provide input and guidance to DFCI's Community Benefits initiatives and programming.

To ensure that DFCI's outreach activities and programs are meeting the health needs in the community, the DFCI Community Benefits Office retained Health Resources in Action (HRiA), a non-profit public health consultancy organization in Boston, to undertake a comprehensive community assessment effort. The 2016 community health needs assessment (CHNA) builds off of previous efforts to gain a greater understanding of the health issues facing Boston residents and its specific communities of Dorchester, Roxbury, Mission Hill, Jamaica Plain, and Mattapan, how those needs are currently being addressed, and where there are opportunities to address these needs in the future. In addition to identifying broad health issues facing residents, the 2016 CHNA delves deeper into behaviors and health outcomes across the cancer continuum of care, exploring behaviors and health outcomes around prevention, screening, treatment/health care utilization, and survivorship. This effort not only complies with the IRS and Massachusetts Attorney General's mandates for conducting community health needs assessments, but aligns with DFCI's approach of utilizing data to inform the development of its initiatives and strengthening of collaborative partnerships.

Methods

This CHNA aims to identify the health-related needs and strengths of DFCI's priority communities through a social determinants of health framework, which defines health in the broadest sense and recognizes numerous factors at multiple levels— from lifestyle behaviors (e.g., healthy eating and active living) to clinical care (e.g., access to medical services) to social and economic factors (e.g., poverty) to the physical environment (e.g., air quality)—which have an impact on the community's health. Existing social, economic, and health data were drawn from national, state, county, and local sources, such as the National Cancer Institute, the U.S. Census, U.S. Bureau of Labor Statistics, Massachusetts Department of Public Health, Boston Public Health Commission, and the Boston Police Department. Over 60 individuals, representing healthcare providers, community stakeholders, and residents were engaged in focus groups and interviews to gauge their perceptions of the community, priority health concerns, and identify services or resources that are most needed to address these concerns.

Health Equity

In addition to considering the social determinants of health, it is critical to understand how these characteristics disproportionately affect vulnerable populations. Health equity is defined as all people having the opportunity to "attain their full health potential" and entails focused societal efforts to address avoidable inequalities by

equalizing conditions for health for all groups, especially for those who have experienced socioeconomic disadvantages or historical injustices. When examining the larger social and economic context of the population (e.g., upstream factors such as housing, employment status, racial or ethnic discrimination, the built environment, and neighborhood-level resources), a robust assessment should capture the disparities and inequities that exist for traditionally underserved groups. Thus, a health equity lens guided the CHNA process to ensure data comprised a range of social and economic indicators and were presented for specific population groups. Understanding factors that contribute to health patterns for these populations can facilitate the identification of data-informed and evidence-based strategies to provide all residents with the opportunity to live a healthy life.

Findings

The following provides a brief overview of key findings that emerged from this assessment:

Community Social and Economic Context

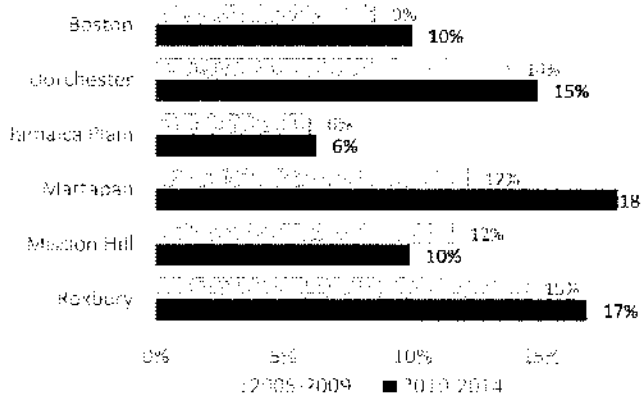
- ***Demographic Characteristics:*** The approximately 17 neighborhoods had approximately 639,594 residents as of 2014. Two of Boston's most populated neighborhoods are DFCI's priority neighborhoods—Dorchester with 122,598 residents, followed by Roxbury with 49,028. The median age of Boston residents was 31 years, compared to the state median of 39 years. Quantitative data indicate that the largest segment of Boston's population was between the ages of 20 and 54 years, making up 59% of the population.

> *"I love how diverse my neighborhood is; there are so many cultures to learn about."*
> *-Focus group participant*

- ***Demographic Diversity***. Participants engaged in the assessment described their communities as *"very diverse"*, mentioning wide racial, linguistic, and cultural diversity. As seen in the quantitative data, there is substantial variation in the racial and ethnic diversity by DFCI priority neighborhood, with nearly three-quarters of Mattapan residents and half of Roxbury residents identifying as Black or African American. Among DFCI priority neighborhoods, Roxbury and Jamaica Plain have the largest Hispanic populations with 29% and 24% respectively, while Mission Hill and Dorchester have the largest Asian populations among the priority neighborhoods with 14% and 10% respectively.
- ***Income and Poverty.*** With poverty reported as a concern across all focus groups and interviews, participants indicated that poverty was the root cause of stress in their lives, reporting challenges meeting basic needs, such as food and shelter, and difficulty balancing multiple low-wage jobs. The median incomes of DFCI's priority communities are generally much lower than Boston overall, with Roxbury at a median income of $25,254, Mission Hill at $35,020, and Mattapan at $42,206, compared to the city average of $55,448.
- ***Employment.*** There has been an overall downward trend in unemployment rates in the city of Boston, from 12.9% in 2010 to 8.3% in 2014. Yet underemployment, the stagnation of wages, and insufficient benefits were reported by focus group and interview participants as major barriers to economic mobility and a factor of negative health outcomes.

- ***Education***. Census data show high educational attainment among Boston's adult residents aged 25 years and older, with 45% having earned a college degree or more. Among DFCI's priority neighborhoods, Jamaica Plain has a high percentage of residents with a college degree (63%). Other neighborhoods such as Mattapan and Roxbury have lower proportions of residents who have completed college, but do have one quarter of residents with some college education or an associate's degree. However, nearly one-quarter of residents in Roxbury, Mattapan, and Dorchester have not completed high school.
- ***Housing***. Similar to the 2013 CHNA, focus group participants and key informants overwhelmingly expressed concern about housing in Boston being unavailable or unaffordable. As residents spoke about the middle class being squeezed out of the city, they attributed housing costs to being one of the main contributors to this trend.

Percent Unemployed, Ages 16+, by City and Neighborhoods, 2005-2009 and 2010-2014



DATA SOURCE: U.S. Census Bureau, 5 Year American Community Survey, 2005-2009 and 2010-2014
DATA ANALYSIS: Boston Redevelopment Authority, as reported in ACS 2005-2009 Estimate by Neighborhood and Boston, 2011; and Boston in Context- Neighborhoods, 2016

- ***Crime and Safety***. While overall counts of crimes and specific violent crimes such as assault and robbery were slightly lower in Boston in 2015 compared to 2014, DFCI priority neighborhoods of Mattapan and Roxbury experienced three times the rate of violent crime as the city overall.

Cancer Prevention: Perceptions and Surveillance Data

- ***Perceptions of Cancer Prevention***. When CHNA participants were asked about their perceptions of cancer prevention, they were most likely to discuss the relationship between lifestyle behaviors and cancer prevention and how the social determinants of health are critical factors. However, several residents also mentioned environmental hazards related to cancer as well as how they viewed mental health and cancer. The following section describes these findings in more detail.
- ***Smoking Behaviors.*** Overall, Boston adult smoking rates have remained steady over time while youth smoking rates have declined. Among DFCI priority neighborhoods, nearly one-quarter of residents in North Dorchester and Roxbury indicated that they were current smokers.
- ***Alcohol Misuse.*** Alcohol was discussed among focus group participants more in relation to substance abuse being a concern in their community and a negative coping mechanism for stress, and less as a risk factor for cancer. Binge drinking rates tend to hover around 20-21% among DFCI's priority neighborhoods. When looking at data by different demographic groups, 32% of males and 33% of white residents indicated that they have engaged in binge drinking, the highest rates among all groups.
- ***Obesity.*** Across all focus group and interviews, obesity was identified as a major health concern for residents, and surveillance data indicate that more than one in five Boston adult residents is considered obese. Nearly 4 in 10 Mattapan residents and 3 in 10 Roxbury residents are considered obese. Figure 21 shows the variation by neighborhood over the last several years, with every neighborhood and Boston overall seeing a slight uptick since 2010.
- ***Physical Activity and Health Eating.*** Compared to 2013, participants in the 2016 CHNA focused more on what they saw as an important link between healthy diet, physical activity, and

cancer risk; surveillance data indicate that many Boston residents are meeting recommended guidelines in this area. Since 2006, nearly 6 in 10 adults in Boston reported meeting CDC guidelines for aerobic physical activity, defined as 150 minutes in the past week, which is above the state (55%) and national (49%) average.

Data on fruit and vegetable consumption indicate that 75% of Boston residents reported that they had have one or more servings of vegetables daily and 62% have one or more servings of fruits.

Cancer Screening: Perceptions and Surveillance Data

- ***Perceptions of Cancer Screening.*** While cancer screening was deemed important by focus group participants and residents served by key informant interviewees, they cited a number of challenges including confusing screening guidelines, uncertainty about insurance coverage, discomfort, opportunity, cost of time and money for lengthier screening tests, and gender-based negative perceptions. A recurring theme in many discussions was confusion of what the cancer screening guidelines currently were and which tests pertained to which individuals.

> *"I think people avoid getting screened because they're scared of the results."*
> *-Focus group participant*

- ***Breast Cancer Screening.*** Screening rates for breast cancer are high in Boston, overall as well as in many populations of color. As screening guidelines differ depending on the recommending agency, many analyses examine mammography rates among women 50-74 years old rather than 40+ years old. Among women 50-74 years old only, data indicate that 90% of Boston women reported having received a mammogram, higher than the 84% seen in Massachusetts overall for this age group.
- ***Cervical Cancer Screening.*** Cervical cancer screening rates are generally high across Boston and in DFCI's priority neighborhoods, although much lower among Asian women in Boston. Among women 21-65 years old in Boston, 87% reported receiving a pap test to screen for cervical cancer in the past three years.
- ***Prostate Cancer Screening.*** The proportion of men in Boston who have ever had a Prostate Specific Antigen (PSA) blood test or who have had a PSA test in the past year is lower than the proportion of men in Massachusetts overall. Among adult men 40 years old and over in Boston, 56% reported ever having had a PSA blood test, whereas 39% reported having the test done within the past year. Compared to Boston, a higher percentage of men in Massachusetts overall reported ever having a PSA blood test (64%) and having had the test within the past year (48%).
- ***Colorectal Cancer Screening.*** Focus group participants indicated that longer screening tests such as colonoscopies have greater challenges for many residents, which is validated in the quantitative data that indicate that only 65% of Boston residents ages 50-75 years old have had a colonoscopy or sigmoidoscopy in the past five years.

Health Care Utilization, Cancer Incidence, and Mortality: Perceptions and Surveillance Data

Overall Perceptions of Cancer

- ***Cancer as a Community Concern.*** Among participants without direct experience with cancer or among key informants not working with cancer patients directly, cancer was not described as a pressing community health concern unless prompted. Mental health,

substance abuse, diabetes, and community violence were named as top health concerns in the community when participants were asked unprompted.

- ***Level of Concern around Cancer***. Similar to the 2013 CHNA findings, focus group participants without any direct experience with cancer expressed a tremendous amount of fear associated with cancer and the high risk of death from the disease. They recognized that people survived the condition, but they indicated that they were incredibly fearful of a cancer diagnosis for them or a family member.
- **Cultural Norms and Beliefs.** When discussing how they viewed cancer, both key informant interviewees and focus group participants acknowledged that there are many cultural beliefs that shape their perceptions. As one interviewee said, "There are different cultural approaches to care that need to be taken into consideration such as religion, language, and social norms." Many of these beliefs and norms are rooted not only in culture but by gender. Given that certain cancer-related issues focus on the reproductive system, comfort levels vary by culture on how patients discuss these issues with their providers.
- ***Perceptions of the Local Health Care System.*** *Overall, participants reported positive perceptions about health services in the city of Boston, citing ample medical services, hospitals, and community centers in the city.* Focus group participants recognized the multitude of services and health care institutions in the city and noted that this is a world-class city with regards to quality of care both in primary and specialty care.

Barriers and Challenges to Accessing Health Care Services

- ***Insurance Borriers and Cost-Related Barriers.*** While interviewees and focus group participants generally stated that it seemed that most community members have access to health insurance, there was much confusion about the details of coverage, deductibles, which providers were covered, and the co-pays required. These themes were slightly different than in the 2013 CHNA, where lack of insurance was a prominent issue. In 2016, the conversations focused more on uncertainty of what insurance actually covered.

> *"Navigating the health care system is daunting when you have cancer."* -*Focus group participant*

- ***Navigating a Complex Health System.*** A common theme among assessment participants was the difficulty navigating the complex health system, especially when dealing with a chronic disease. Residents described confusion around insurance coverage as well as being overwhelmed by the number of appointments they needed to make and steps that had to be taken. These issues were especially prominent for cancer patients, who described feeling deeply emotional after a cancer diagnosis to then "someway figure out what cancer is, what hospital I should go to, what doctors I qualify for, and finally how I'm supposed to pay for it all. It's exhausting."
- ***Culturally Competent Care.*** Navigating a complex health system is especially challenging when English is not a patient's first language; key informants working with patients and Spanish-speaking cancer survivors described language and cultural barriers as particularly challenging. While provider interviewees reported that they have access to interpretation services and some have bilingual staff (Spanish-speaking), language and cultural barriers still remain a concern.
- ***Transportation.*** Transportation barriers to accessing health care were a common theme across focus groups and interviewees, with residents indicating that public transportation was not a viable option, especially in

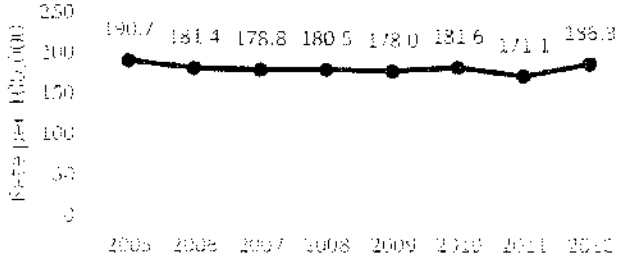
Mattapan and some parts of Dorchester. Parking was also cited as a daily stressor for many residents in these neighborhoods saying, "Parking in Mattapan is terrible. I've lived here for 35 years and each year is worse than the last."

- ***Perceived Disparities in Cancer Treatment and Care.*** Across all focus groups, communities of color were identified as traditionally underserved, yet some focus group participants saw this as changing. Nearly all focus group participants were African American or Hispanic and many discussed the inequities that communities of color face overall and in the health care system. However, the English-speaking cancer survivor focus group, comprised of all African American women above the age of 50, noted that they saw improvements in the last decade as far as the availability of care offered and interactions with providers that they have had.
- ***Information and Access to Clinical Trials.*** Several key informant interviewees described the need for improved access to clinical trials for communities of color as an important step for improving disparities. As one participant said, "having access to clinical trials is hugely important, especially for those in different and racial and ethnic backgrounds, because we don't know what treatments work for these populations."
- ***Awareness of Services.*** While the community has substantial health and social services resources, several respondents reported that people are not always aware of the range of services that are available to them. As one focus group participant noted, "I've been a case manager in Mattapan for five years, and I know of so many underutilized resources because residents simply don't know about them." Other residents felt that services were duplicative and said, "I know of some organizations that provide the same service. If they put their resources together they could help more community members."

Incidence and Mortality

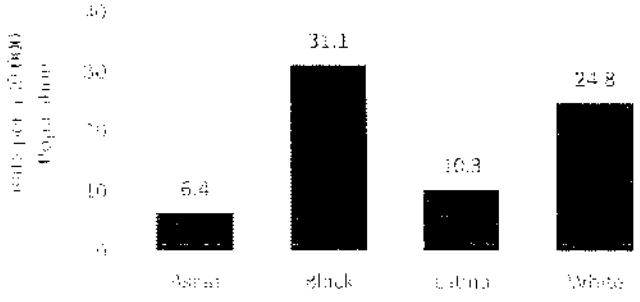
- ***Overall Cancer Mortality.*** Cancer and heart disease remained the top two leading causes of death for all racial/ethnic groups from 2008 to 2013. While there has been an overall downward trend in cancer mortality since 2005, the rate of cancer deaths in the city of Boston increased from 171.1 per 100,000 in 2011 to 186.3 per 100,000 in 2012.
- ***Breast Cancer Incidence and Mortality.*** There is variation in breast cancer incidence in Boston across the last decade with a generally slow decline since 2007; the rate of new cases is lowest among Latina women in Boston. While the mortality rate in Boston was 17.9 deaths per 100,000 population, rates were 23.6 and 20.9 deaths per 100,000 population in Roxbury and Jamaica Plain respectively. Black and Latina women have lower average ages of death from breast cancer compared to White women. Latinas in Boston are on average 57.3 years old and Blacks are on average 62.1 years old at age of death from breast cancer, compared to an average age of 72.5 years old for White women in Boston.

Age-adjusted Cancer Mortality Rate per 100,000 Population, Boston 2005-2012



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation as reported in Health of Boston 2012-2013, 2014-2015

Female Breast Cancer Mortality Rate* per 100,000 Population by Race/Ethnicity, 2001-2012



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

- ***Cervical Cancer Incidence and Mortality.*** Cervical cancer incidence rates have seen a steady decline since 2004, with the most current data indicating the rate of new cases of cervical cancer in Boston as 5.9 cases per 100,000 population. While Latinas have a 10.9 cervical cancer incidence rate per 100,000 population, data should be interpreted with caution given the small number of cases that comprise these rates. Cervical cancer mortality data are unavailable due to the small number of cases. Despite these sample limitations, these data raise concerns and understanding the impacts of cervical cancer is a priority for DFCI that will be further explored in the future.
- ***Prostate Cancer Incidence and Mortality.*** Overall, there has been a downward trend in prostate cancer incidence rates from 215.3 cases per 100,000 in 2001, to 171.0 cases per 100,000 population in 2011, although there have been fluctuations throughout the decade. However, there continues to be great disparity in prostate incidence for Black men compared to all other race and ethnic groups. Black men have higher prostate cancer mortality rates compared to other groups. Prostate cancer mortality rate for Black men in Boston is nearly three times the prostate cancer mortality rate among White men.
- ***Colorectal Cancer Incidence and Mortality.*** Overall, there has been a downward trend in colorectal cancer incidence rates from 63.1 per 100,000 in 2001, to 43.6 per 100,000 population in 2011, and there appears to be little variation by race/ethnicity in current colorectal cancer incidence rates. Mortality rates for colorectal cancer appear to vary by neighborhood and race/ethnicity. Residents in North Dorchester (29.8 deaths per 100,000 population) and Roxbury (25.5 deaths per 100,000 population) experienced higher rates of colorectal cancer death than the city of Boston overall (16.4 deaths per 100,000 population).
- ***Lung Cancer Incidence and Mortality.*** The rate of cancer incidence in the city of Boston has experienced a gentle decline from 81.4 per 100,000 residents in 2004 to 69.2 cases per 100,000 residents in 2012. In 2011 and 2012 combined, White residents (78.9 per 100,000 population) experienced the highest lung cancer incidence rate among all racial and ethnic groups. While mortality rates from lung cancer are highest among Whites across the city, when examining data by neighborhood, Mattapan, a predominantly African American neighborhood, still has the highest lung cancer mortality rate.

<u>Cancer Survivorship: Perceptions and Surveillance Data</u>

- ***Perceptions of Cancer Survivorship.*** The cancer survivors who participated in the CHNA focus groups were optimistic about their future ahead. They had a positive outlook on their health and prognosis for the future and hoped others in the community could see cancer as something that could be overcome. Many indicated that they felt strong and were eager to be engaged with work, their community, and their family. They were grateful to not only their health care providers for the care they received, but also the support staff such as patient navigators, that helped them through their cancer journey.
- ***Use and Access to Cancer Survivor Resources.*** Cancer survivors reported utilizing a number of different resources from multiple venues during their cancer journey and now as a survivor, but they still saw many gaps in resources needed.

> *"Cancer doesn't just affect the person diagnosed; it's a heavy toll for everyone in the family, too."*
> *-Focus group participant*

Several participants indicated that information on resources was available for cancer survivors through resource centers, local hospitals, and the Internet. Interestingly, several cancer survivors reported utilizing support services from multiple hospitals simultaneously saying, "I get care at one hospital, but I attend support groups from multiple places across the city. I

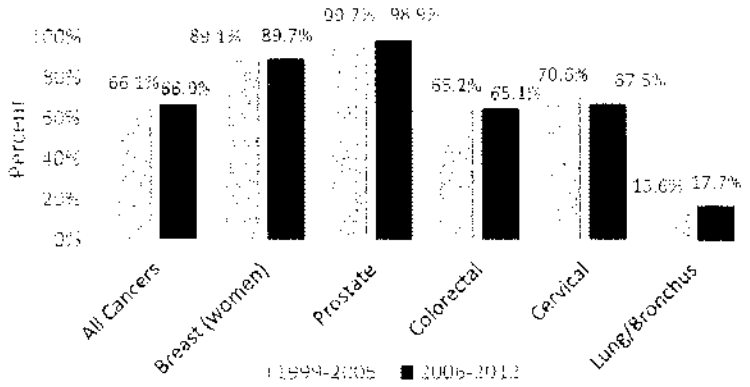
like the diversity and different kinds of groups available...whether it's sewing or peer groups, they all help."

Cancer Survivorship Surveillance Data

- ***Breast Cancer Survivorship.*** Based on SEER statistics on five-year survivorship, 89.7% of total women diagnosed with breast cancer survive for five years, yet rates vary by race. In 2006-2012, 90.8% of White women diagnosed with breast cancer survived after five years, while the rate was 80.3% for Black women. While Boston-specific survivorship data are not available, in 2011, 376 women were diagnosed with breast cancer in Boston. Using these data and assuming a similar incidence rate for the subsequent years, we can roughly estimate that during the five-year period of 2011-2016, 1,686 women will have survived/be living with breast cancer in Boston.
- ***Cervical Cancer Survivorship.*** For cervical cancer, 67.5% of women across the SEER sites had a five-year survival rate, with a nearly 12% difference in five-year survival rates between White and Black women. In 2011, 17 Bostonian women were diagnosed with cervical cancer. Assuming a similar care rate across five years, we estimate that 57 women will have survived/be living with cervical cancer in Boston during the five-year period of 2011-2016.
- ***Prostate Cancer Survivorship.*** Prostate cancer had a 98.9% five-year survival rate across the SEER sites, with somewhat similar survival rates between White and Black men. In 2011, 406 men in Boston were diagnosed with prostate cancer. Using this figure and assuming a consistent incidence rate over subsequent years, we expect that 2,008 men in Boston will have survived/be living with prostate cancer from 2011-2016.

- ***Colorectal Cancer Survivorship.*** The five-year relative colorectal cancer survival rate was 65.1% for 2006-2012, yet these rates varied by race and gender. Overall, White men and women had similar five-year survival rates at approximately 66%, while 59.6% of Black women and 56.5% of Black men survived for five years after a colorectal cancer diagnosis. In 2011, 230 men and women in Boston were diagnosed with colorectal cancer. Based on these figures and assuming a consistent colorectal cancer incidence rate for the subsequent years, we estimate that 661 Bostonians will have survived/be living with colorectal cancer during the five-year period of 2011-2016.
- ***Lung Cancer Survivorship.*** For lung cancer, 17.7% of men and women across the SEER sites had a five-year survival rate, but rates varied most by gender and then by race. Five-year survival rates were highest among White women (20.9%) and Black women (18.1%), but lowest among men (White: 15.1%; Black: 12.0%). Black women also saw the biggest increase in survival rates from 1999-2005 to 2006-2012. In 2011, 361 Bostonians were diagnosed with lung cancer. Using this figure and assuming a consistent lung cancer incidence rate for the next four years, we estimate that over the five-year period of 2011-2016, only 319 Boston residents will have survived/be living with lung cancer.

Five-Year Relative Survival Rate by Cancer Type, 1999-2005 and 2006-2012



DATA SOURCE: SEER Cancer Statistics Review, 1975-2006 and 1975-2013, National Cancer Institute. Bethesda, MD

Community Strengths and Assets

- ***Diversity.*** Focus group participants generally described their communities as vibrant and active neighborhoods that were demographically diverse in terms of age, class, race, and ethnicity. "Our diversity makes us stronger," shared one participant. Residents indicated that they enjoyed sharing and learning about different cultures through community events.
- ***Engaged Community.*** When asked what residents viewed as a strength in their communities, many participants agreed that residents are actively engaged through neighborhood associations and faith-based groups. As one participant shared, "People in Mattapan want to improve the conditions of their neighborhood, and they're willing to work hard for it." Cancer survivors described wanting to "give back to their communities" through volunteering and sharing their experiences with cancer to promote awareness.
- ***Community Cohesion and Social Networks.*** A consistent theme across focus groups and interviews was the strong sense of cohesion among community residents. For example, an interview participant stated that, "People watch out for each other around here. Whether it's keeping an eye out on their kids, sharing a meal, or giving someone a ride, we try and help out where we can." Participants in the Spanish-speaking focus group explained the importance of a collective approach to health, involving family and loved ones in important discussions.
- ***Organizations and Services.*** Another asset discussed by participants was the number of community programs and services present in the community. Interview and focus group participants described many local amenities including churches, social service organizations, and local businesses. Public transportation is available in most neighborhoods, although some participants commented that it can be unreliable and is less accessible in certain neighborhoods. In addition to the large number of small "mom and pop shops" that have fostered a connection to home country for many immigrant families, ethnic-based service organizations such as Inquilinos Boricuas en Acción (IBA) meet the needs of a diverse community.

Community Vision for the Future

- ***Greater Focus on the Social Determinants of Health.*** When discussing their vision for the future, many focus group participants discussed the importance of interventions to address environmental factors such as poverty and built environment issues. Issues such as enhancing financial assistance and improving the built environment including greater access to healthy foods and improved transportation options were discussed in several focus groups. Interview participants cited supporting more employment opportunities in the community as an important element to improving overall community health. Addressing the issue of affordable housing overall in Boston was also cited as an issue that would ease residents' day-to-day burden.
- ***Greater Information and Health Literacy.*** Across focus groups and interviews, participants noted the need to demystify cancer and increase awareness of prevention and screening practices via improved information-sharing in the form of engaged, interactive venues. Several areas for which additional education and support were identified included: smoking cessation, diabetes education, healthy eating/cooking, and cancer.

> *"The key to having a healthy community is having an educated community."*
> *-Focus group participant*

- ***Information on Less Common Cancers.*** Focus group participants in both survivor groups reported that many resources were devoted to more common cancers such as breast cancer, but few were available for less typical cancers such as oral and liver cancer. A Spanish-speaking focus group participant shared the story of challenges regaining her speech after treatment for oral cancer and said, "I felt like there was no one else going through the things I had to go through. I couldn't talk, open my mouth, or eat properly, and it felt like there were no resources to help me figure out how to regain my life." A few participants also stated that a greater focus on support and funding for men's cancers (including testicular and prostate cancer) is needed.
- ***Follow-up Care and Survivorship Programming.*** When asked where residents believed the gaps in services were, many noted that there were limited resources for cancer survivors particularly in the area of emotional support for families, job retraining for cancer survivors, and supports in general for non-English speakers. Groups in the cancer survivor meetings frequently discussed feeling that services "fell-off after a few years after treatment", and wished to see more opportunities to engage in post-treatment support services. More emotional and economic support, specifically for family members of cancer patients, should be offered, survivors suggested.
- ***Expand Patient Navigators.*** Survivors reported patient navigators as a tremendous asset to patients, especially those who were bilingual and/or bicultural, and encouraged hospitals to expand the effort. Currently, there is not enough of a supply of patient navigators for the range of cancer patients. Focus group participants stressed the importance of increasing the number of navigators and ensure that they "look and sound like the community," suggesting that the hospital be focused on diversity initiatives when recruiting navigators. When asked where the hospital should focus recruitment efforts to ensure a diverse staff, participants suggested hosting events at faith-based organizations and places of worship.
- ***Community Engagement and Reach.*** Across many focus groups and interviews, participants discussed the importance of engaging community members in different aspects of programs and services. Community members wanted to be part of the planning process and feel a sense of ownership of community-based programs. Participants suggested several ways to involve the community in the hospital's efforts. One interviewee recommended that the hospital partner with faith-based organizations to conduct periodic seminars or "open houses" for community members. The primary recommendation from residents and key informants was to engage a broader cross-section of the community more through group dialogues and outreach, specifically peer-to-peer learning.
- ***Capacity Building and Collaboration.*** A common suggestion that interview participants mentioned was leveraging resources and investing in capacity building for local organizations throughout Boston. As one interviewee shared, "we have the opportunity to not only reach out and engage the community, but provide technical assistance and training to health centers, coalitions, and other community groups. Health care and social service stakeholders frequently noted that, while many local services exist, there are opportunities to improve communication and coordination between institutions. Focus group and interview participants described a "competitive, not collaborative" health system in the city of Boston and wished to see more collaborative efforts among hospitals, academic institutions, and local organizations.

Key Themes and Conclusions

1. **As discussed in the 2013 CHNA, there are great disparities on several social, economic, and health indicators in DFCI's specific priority neighborhoods, but these neighborhoods also possess numerous strengths and assets.**
   - Issues related to poverty and violence underscore all aspects of daily life for residents of many Boston neighborhoods, although these neighborhoods also possess several strengths. Limited employment opportunities and low education levels among residents have significantly impacted the social and economic context of these areas. Employment challenges were especially prominent among cancer survivors, who indicated a need for more resources for survivors to be *"retrained and re-enter the job force"* after treatment.

2. **Among participants without direct experience with cancer or among key informants not working with cancer patients directly, cancer was not described as a pressing community health concern unless prompted. Mental health, substance abuse, diabetes, and community violence were named as top health concerns in the community when participants were asked unprompted.**
   - Similar to 2013 findings, for community members not directly affected by cancer, cancer was of relatively low priority compared to the daily concerns of meeting basic needs. Although when asked about the topic, it was evident that there is a tremendous amount of fear surrounding the risk of diagnosis.

3. **Similar to the data reviewed in the 2013 CHNA, cancer screening rates are high in many of DFCI's priority neighborhoods, but cancer mortality rates also are high.**
   - Surveillance data indicate that continually Blacks in particular have higher mortality rates than Whites for many cancers. Similar patterns emerge by neighborhood, with Mattapan and Roxbury, two predominantly African American neighborhoods, consistently see higher mortality rates from many common cancers. However, screening rates among these groups are strong.

4. **There is a need for additional support services for cancer survivors and their families, specifically around health literacy and financial resources.**
   - Focus group participants indicated ample resources for cancer patients, but explained that survivor-specific services were limited, especially in languages other than English. Residents wanted more information regarding ways to prevent cancer reoccurrences, how to rejoin the workforce, and workforce retraining for the future. Interestingly, several participants reported participating in services offered by multiple hospitals in the area despite only receiving care from one.

5. **Patient Navigators and social workers were seen as *"critical resources"* in helping patients navigate the complex health system.**
   - Across all groups, a common challenge that emerged was the difficulty navigating the complex health system, especially after receiving a cancer diagnosis. Patient navigators and social workers, said participants, were vital in connecting patients with resources and providing support throughout their cancer journey. Assessment participants strongly encouraged the expansion of patient navigator programs and encouraged DFCI to continue efforts to expand diversity initiatives within these areas.

6. **Strengthening internal and external partnerships through capacity building and technical assistance was a common theme among interview participants.**
    - Assessment participants suggested increased capacity building and technical assistance for community-based organizations, additional funding for scaling up existing programs, and a more coordinated effort across programs and organizations could help current efforts reach a larger audience. Specific suggestions included virtual lunch-hours for providers at FQHCs, community "open houses," and seminars held at faith-based and social service organizations. Further, several participants described a need for additional resources for language services, including translating materials and bi-lingual case management.

7. **There are ample resources in the community, but a competitive health care and organizational system creates resources that are fragmented and duplicative. Greater collaboration, coordination, and alignment are critical for future work.**
    - Similarly noted in the 2013 CHNA, several key informants described a fragmented and uncoordinated health system in the city of Boston, noting that *"the system here is competitive instead of collaborative, and that makes services duplicative."* Stakeholders and staff indicated that coordinating or expanding existing programs would be more effective than developing new programming. Further, suggestions for a shared platform to exchange data and information among institutions was viewed as an opportunity to promote collaborations.

BACKGROUND

Overview of Dana-Farber Cancer Institute

Founded originally in 1947, Dana-Farber Cancer Institute (DFCI) aims to provide expert, compassionate care to children and adults with cancer, while advancing the understanding, diagnosis, treatment, cure, and prevention of cancer and related diseases. As an affiliate of Harvard Medical School and a Comprehensive Cancer Center designated by the National Cancer Institute, Dana-Farber also provides training for new generations of physicians and scientists, designs evidence-based programs that promote public health, particularly among high-risk and underserved populations, and disseminates innovative patient therapies and scientific discoveries to its target communities across the United States and throughout the world. Reinforcing DFCI's exceptional model, *U.S. News & World Report* ranked Dana-Farber/Brigham and Women's Cancer Center New England's top cancer hospital and the 4th best cancer hospital in the nation for adults, as well as the top ranked hospital for pediatric cancer treatment (with Boston Children's Hospital) in the nation.

DFCI Community Benefits Office

In addition to providing expert clinical care, DFCI is committed to educating the community and raising awareness about the importance of cancer prevention, outreach, screening, early detection, and clinical trials. To this end, DFCI's Community Benefits Office provides education and outreach across Boston and beyond, offers support services and resources, and conducts a broad scope of research and evidence-based interventions through its collaborative work in local neighborhoods, as well as through its national and international public and professional education initiatives. The DFCI Community Benefits Internal Committee, the Trustee Community Programs Committee, and the Dana-Farber/Harvard Cancer Center (DF/HCC) Community Engagement Committees all provide input and guidance to DFCI's Community Benefits initiatives and programming.

The mission of DFCI's community benefits and outreach activities contributes to the Institute's goal of advancing the understanding, diagnosis, care, treatment, cure, and prevention of cancer and related diseases by:

- Ensuring that patients from diverse backgrounds receive equitable cancer care and treatment, including education about the importance of clinical trials participation
- Establishing quantifiable, evidence-based, and sustainable programs in cancer prevention focusing on at-risk, underserved, and diverse populations
- Providing expertise in cancer care to city and state health departments, community-based agencies, and health care providers.

The DFCI Community Benefits Office participates in numerous outreach efforts and planning through ongoing partnerships with a range of diverse agencies including: the Massachusetts Department of Public Health Chronic Disease Prevention and Control Unit to collaborate on cancer control priorities; Boston Public Health Commission to implement cancer prevention, screening, and survivorship initiatives; United Way/Jimmy Fund Collaborative to provide direct support to community-based agencies that focus on low-income, underserved, and at-risk communities; Center for Community-Based Research to conduct research focusing on effective intervention strategies at the community level; Dana-Farber/Harvard Cancer Center (DF/HCC) to recruit and engage minority faculty and staff; the City of Boston to provide mobile breast cancer screening, health education, and follow-up tracking for the city's underserved women through the Boston Mammography Van (BMV); the Blum Van to offer cancer education and screenings throughout the region, including local Boston neighborhoods; and the Prostate Health Education Network (PHEN) to provide outreach and advocacy efforts around prostate cancer. A multitude of specific activities and programs have been developed under these larger collaborative relationships.

Dana-Farber Cancer Institute is conducting a community health needs assessment (CHNA) to build off of previous efforts and gain a greater understanding of the health issues facing Boston residents and its specific communities of Dorchester, Roxbury, Mission Hill, Jamaica Plain, and Mattapan (Figure 1), how those needs are currently being addressed, and where there are opportunities to address these needs in the future. In addition to identifying broad health issues facing residents, the 2016 CHNA will delve deeper into behaviors and health outcomes across the cancer continuum of care, exploring behaviors and health outcomes around prevention, screening, treatment/health care utilization, and survivorship. This effort not only complies with the IRS and Massachusetts Attorney General's mandates for conducting community health needs assessment, but aligns with DFCI's approach of utilizing data to inform the development of its initiatives and strengthening of collaborative partnerships.

Figure 1. DFCI Priority Neighborhoods

Previous 2013 Dana-Farber Community Health Needs Assessment

To ensure that Dana-Farber's community outreach activities and programs are meeting the health needs in the community, the Community Benefits Office undertook a comprehensive community health needs assessment (CHNA) ending in 2013. This earlier effort incorporated a two-phased process focusing on Dana-Farber's priority neighborhoods for community benefits work. The 2013 CHNA used a social determinants of health perspective to examine how larger social and economic factors are associated with good and ill health specifically across the cancer continuum.

In **Phase 1** of the previous Dana-Farber CHNA process, social, economic, and epidemiological data at the community level were reviewed and analyzed to provide a health portrait of these communities. Local and national data were compiled to provide a comprehensive portrait of the city and Dana-Farber's priority neighborhoods during this preliminary assessment phase. Data analyses were generally conducted by the original data source (e.g., U.S. Census, Massachusetts Department of Public Health). To tap into local resources as well as gather perspectives on Dana-Farber's engagement with the community, 11 brief interviews were conducted in Phase 1 with several staff members from related organizations in academic, governmental, and nonprofit sectors. All information from these discussions allowed for the exploration of additional data sources and provided further background on Dana-Farber's programs.

Phase 2 of the CHNA involved a comprehensive qualitative study, where Dana-Farber staff, community leaders, and residents provided feedback in focus groups and interviews to identify community needs and assets as well as areas for further community engagement and program expansion. This process included four focus groups and seventeen in-depth interviews with internal Dana-Farber staff and leadership; one discussion group with the Community Benefits External advisory committee; three focus groups with community members (one of which was in Spanish) and one focus group with community-based organization (CBO) staff in the priority neighborhoods. A total of 86 individuals participated in qualitative data collection to discuss their perceptions of their neighborhood, their health concerns, what programming or services are most needed to address these concerns, and the role of Dana-Farber in these efforts.

Focus Area Prioritization Process

Identifying key areas of focus for this plan was conducted through an iterative, multi-phased process. Between phases I and II of the CHNA, 37 Dana-Farber internal staff and stakeholders participated in a day-long retreat. This event included a discussion of quantitative data from CHNA, followed by small group and large group discussions focused on identifying initial key priority areas to build upon Dana Farber's existing portfolio of community benefits activities.

Upon completion of the 2013 CHNA, over a dozen presentations were conducted to internal and external stakeholders, including the Dana-Farber Board of Trustees, Community Benefits External Advisory Committee, and community coalitions among others. The prioritization of focus areas included a number of considerations:

- Alignment with Dana-Farber's mission and current work;
- Potential impact and the ability to demonstrate measurable outcomes;
- Feasibility including technical and financial capacity and strength of partnerships; and
- The magnitude and severity of the issue

As a result of the process described above, Dana-Farber identified key priority areas based on the institution's potential to demonstrate measurable outcomes in reducing cancer incidence and mortality through programmatic enhancements in these areas.

Three focus area priorities were identified:

1. Addressing the cancer burden
2. Reducing access barriers; and
3. Addressing the community perceptions of cancer.

These areas reflect a commitment to meeting the health needs of the medically underserved in DFCI's priority neighborhoods and leveraging the hospital's unique role in the continuum of care as a comprehensive cancer center. In addition, they provide the umbrella under which DFCI's community outreach activities are organized and have guided the approach to the 2016 DFCI community needs assessment.

Review of Initiatives

Since the 2013 CHNA, DFCI has provided a variety of services and programming to address these specific prioritization areas in the community. Appendix A details the priority areas, strategy, and the progress and reach of the initiatives listed in the 2013 CHNA. Among these initiatives, services such as the Dana-Farber Mammography van and patient navigator program were frequently mentioned in focus groups and key informant interviews as strong community assets provided by the hospital. For an overview of the health priorities and programming identified in the previous CHNA, please see the 2013 Implementation Plan on the DFCI website: http://www.dana-farber.org/uploadedFiles/Library/about-us/community-outreach/chna-implementation-plan.pdf

2016 DFCI Community Health Needs Assessment

The 2016 DFCI community health needs assessment is part of an iterative, dynamic process of reviewing and collecting data to inform the program and initiative planning and implementation process. As in 2013, Dana-Farber Cancer Institute partnered with Health Resources in Action (HRiA), a non-profit public health organization, to conduct the most recent 2016 community health needs assessment. The 2016 CHNA focuses on building off of the 2013 process to further advance DFCI's community efforts and priority areas with the main goals as:

- Updating the previous CHNA data to provide a portrait of Boston and DFCI's priority neighborhoods as well as the area's needs and assets
- Delve deeper into specific areas to advance and elevate existing Dana-Farber initiatives, and identify strategic opportunities for the future
- Probe deeply into specific challenges, opportunities, and communication/outreach strategies

With the DFCI's three large umbrella areas of addressing the cancer burden, reducing access barriers, and addressing perceptions of cancer, the 2016 CHNA made a concerted effort to delve deeper into issues related to access and availability of services across the cancer continuum and to experiences and suggestions for resources and supports specifically for cancer survivors.

Aligned with the focus of the DFCI Community Benefits office, the 2016 CHNA focuses on the geographic neighborhoods of Dorchester, Jamaica Plain, Mattapan, Mission Hill, and Roxbury, as well as Boston overall. The DFCI Community Benefits office has identified these neighborhoods as priority focus given DFCI's service area and that they include many of the city's most underserved populations.

APPROACH AND METHODS

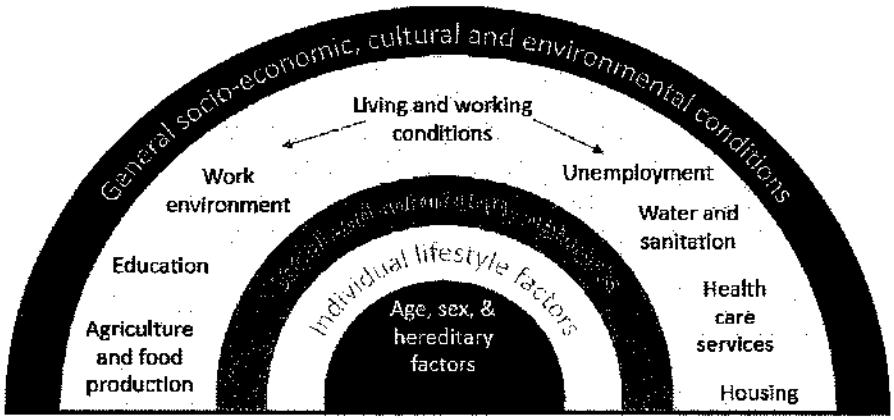
The following section describes how the data for the CHNA were compiled and analyzed, as well as the broader lens used to guide this process. This CHNA defines health in its broadest sense, recognizing that multiple factors—from lifestyle behaviors (e.g., diet and exercise) to clinical care (e.g., access to medical services) to social and economic factors (e.g., employment opportunities)—impact a community's health. The beginning discussion of this section describes the larger social determinants of health framework which helped guide this overarching process.

The CHNA assessment was guided by a participatory, collaborative approach, integrating existing secondary data on social, economic, and health issues in the region with qualitative information from three focus groups with community residents and fifteen interviews with community stakeholders.

Social Determinants of Health Framework

It is important to recognize that multiple factors affect health and there is a dynamic relationship between people and their environments. Where and how we live, work, play, and learn are interconnected factors that are critical to consider. That is, not only do people's genes and lifestyle behaviors affect their health, but health is also influenced by more upstream factors such as employment status and quality of housing stock. The social determinants of health framework, depicted in Figure 1, addresses the distribution of wellness and illness among a population—its patterns, origins, and implications. While the data to which we have access are often a snapshot of a population in time, the people represented by that data have lived their lives in ways that are constrained and enabled by economic circumstances, social context, and government policies. Building on this framework, this assessment utilizes data to examine community-level influences, including social and economic factors that have an impact on health and health outcomes.

Figure 1. Social Determinants of Health Framework



Source: World Health Organization, Commission on the Social Determinants of Health, Towards a Conceptual Framework for Analysis and Action on the Social Determinants of Health, 2005. Graphic reformatted by Health Resources in Action.

Health Equity

In addition to considering the social determinants of health, it is critical to understand how these characteristics disproportionately affect vulnerable populations. Health equity is defined as all people having the opportunity to "attain their full health potential" and entails focused societal efforts to address avoidable inequalities by equalizing conditions for health for all groups, especially for those who have experienced socioeconomic disadvantages or historical injustices. When examining the larger social and economic context of the population (e.g., upstream factors such as housing, employment status, racial or ethnic discrimination, the built environment, and neighborhood-level resources), a robust assessment should capture the disparities and inequities that exist for traditionally underserved groups. Thus, a health equity lens guided the CHNA process to ensure data comprised a range of social and economic indicators and were presented for specific population groups. Understanding factors that contribute to health patterns for these populations can facilitate the identification of data-informed and evidence-based strategies to provide all residents with the opportunity to live a healthy life.

Quantitative Data: Reviewing Existing Secondary Data

To develop a social, economic, and health portrait of DFCI's priority communities through a social determinants of health framework, existing data were drawn from national, state, county, and local sources. Sources of data included, but were not limited to: the U.S. Census, U.S. Bureau of Labor Statistics, Massachusetts Department of Public Health, Boston Public Health Commission, and the Boston Police Department. Types of data included self-report of health behaviors from large, population-based surveys such as the Behavioral Risk Factor Surveillance System (BRFSS), public health disease surveillance data, as well as vital statistics based on birth and death records.

The Boston Redevelopment Authority (BRA) report is the predominant source of demographic data, and the Boston Public Health Commission's (BPHC) Health of Boston report is the predominant source of health data for the city and its neighborhoods. Since these data are publicly accessible, selected secondary data were incorporated to help guide and inform the assessment's larger themes. Additional quantitative data can be found in the Health of Boston report located here: http://www.bphc.org/healthdata/health-of-boston-report/Documents/HOB-2014-2015/FullReport_HOB_2014-2015.pdf, and in the BRA *Boston in Context: Neighborhoods* report located here: http://www.bostonredevelopmentauthority.org/getattachment/7b9b1201-8b4f-4fa9-b0f2-4acbbc083198

It should be noted that in many cases, population group names in the CHNA's graphs reflect the usage by the secondary data source. For example, demographic data pulled from the U.S. Census uses the term Hispanic, while health data from the Boston Public Health Commission uses the term Latino. These different terms by the original and analytical sources are reflected in the DFCI CHNA.

Qualitative Data: Focus Groups and Interviews

While social and epidemiological data can provide a helpful portrait of a community, it does not tell the whole story. It is critical to understand people's health issues of concern, their perceptions of the health of their community, the perceived strengths and assets of the community, and the vision that residents have for the future of their community. Secondary data were supplemented by focus groups and interviews. In total, three focus groups and fifteen key informant individual and group discussions were conducted with members of DFCI's community from March 2016 through June 2016.

Focus groups were held with 39 community residents drawn from the region representing the following population segments:

- English-speaking adult cancer survivors
- Spanish-speaking adult cancer survivors
- Community members residing in DFCI priority neighborhoods

A total of 22 individuals representing the DFCI community as well as the region at large were engaged in key informant and group discussions. Key informants represented a number of sectors including academic research, health care, public health, social service, and city government. Discussions explored participants' perceptions of their communities, priority health concerns, perceptions of cancer and related services across the cancer continuum (prevention, screening, treatment, survivorship), and suggestions for future services and resources to address these issues.

A semi-structured moderator's guide was used across all discussions to ensure consistency in the topics covered. Each focus group and interview was facilitated by a trained moderator and detailed notes were taken during conversations. On average, focus groups lasted 90 minutes and included 9-18 participants, while interviews lasted approximately 30-60 minutes. Participants for the focus groups were recruited by Health Resources in Action, YMCA of Dorchester, the DF/HCC Faces of Faith Campaign, and Dana-Farber Cancer Institute. Eligible participants (cancer survivors and community members residing in priority neighborhoods), were identified by partner organizations and contacted by phone and email and invited to participate. Flyers were also mailed to community residents previously involved in programming at host organizations. The focus groups were intended to be inclusive, so partner organizations did not exclude participants if they did not live in the particular neighborhood. It was also a priority to recruit adults from traditionally underserved populations, including individuals with low-income and those who do not speak English as a primary language. Similar to the demographic of DFCI priority neighborhoods, the majority of focus group participants were African American or Hispanic. As an incentive, focus group participants received a $35 gift card.

Collaboration with Partnering Teaching Hospitals

In addition to the primary data collection, Conference of Boston Teaching Hospitals (COBTH), of which DFCI is an active member, partnered with the Boston Alliance of Community Health (BACH), the city-wide coalition comprising of neighborhood coalitions, to conduct three focus groups with community residents in early Spring 2016 delving into people's experiences with the social determinants of health. The outputs of the neighborhood-level meetings are included in the findings of Dana-Farber's 2016 CHNA and reflect the commitment of Dana-Farber and other COBTH member hospitals to work together in addressing the social, economic, and environmental factors that impact health, well-being, and more specifically, cancer outcomes in our surrounding communities.

Stakeholder Engagement

Towards the final weeks of data analysis, four separate groups were engaged in June 2016 to discuss the CHNA's preliminary data findings. In these sessions, HRiA presented key qualitative and quantitative findings in a 45-minute presentation each to DFCI's: External Advisory Committee, Board of Trustees' Community Programs Committee, Internal Community Benefits Committee, and Community Benefits Office staff. A total of 38 individuals were engaged in this process. During these sessions, HRiA provided an overview of the data findings followed by a discussion with the audience to identify questions, gaps, areas for further exploration, and potential implications. Those discussions helped refine the development of the CHNA report and will guide the planning process.

Analyses
The collected qualitative information was coded and then analyzed thematically for main categories and sub-themes. Analyses identified key themes that emerged across all groups and interviews as well as the unique issues that were noted for specific populations. Frequency and intensity of discussions on a specific topic were key indicators used for extracting main themes. While neighborhood differences are noted where appropriate, analyses emphasized DFCI's priority neighborhoods of Dorchester, Jamaica Plain, Mattapan, Mission Hill, and Roxbury. Selected paraphrased quotes – without personal identifying information – are presented in the narrative of this report to further illustrate points within topic areas.

Limitations
As with all data collection efforts, there are several limitations related to these data that should be acknowledged. A number of secondary data sources were drawn upon for quantitative data in creating this report. Although all the sources used for this purpose (e.g., U.S. Census, Massachusetts Department of Public Health) are considered highly credible, sources may use different methods and assumptions when conducting analyses. For example, how sources define neighborhood boundaries may vary (e.g., the Boston Public Health Commission combines Roxbury and Mission Hill together, while the Boston Redevelopment Authority defines them separately). Similarly, the Boston Redevelopment Authority defines Dorchester by zip codes 02122, 02124, 02125, while the Boston Public Health Commission defines North Dorchester by zip codes 02121, 02125, and South Dorchester as 02122 and 02124.

In addition, multiple sources with differing time periods were used to generate this report. In several instances, neighborhood level data were not available and/or population estimates were based on the most stable and accurate population counts. For example, the Boston Behavioral Risk Factor Survey (BBRFS), neighborhood-level data generally do not include people who are homeless or people whose neighborhood of residence was not reported in the survey (except in the Boston overall numbers). Additionally, the age- and race-adjusted cancer mortality rates—which are calculated using cancer-related mortality data and the U.S. decennial census total population counts—are sensitive to the U.S. census reporting on age and race distributions within the population. Because of this, mortality rates reported between 2005 and 2011 are reflective of the age and race distribution of the Boston population in the 2000 decennial census, while mortality rates reported in 2012 are adjusted to the standard population used in the 2010 decennial census. This methodological approach is used in calculating many of the findings presented in this report and should be taken into account when reviewing. Ultimately, between the 2000 and 2010 decennial census, there has been a change in age and racial make-up of the city which is reflective of the rates reported.

Since the 2013 CHNA, the Boston Public Health Commission has adopted the use of new population data for rate generation, thus impacting earlier data reported by DFCI. Specifically, mortality rates reported in the 2013 CHNA were generated by using the 2000 U.S. Census, which were considered the most stable population data for age-adjusted rates at the time. Data from the 2014-2015 Health of Boston report were reanalyzed using newer population estimates that reflect a shift in the White and Black age distribution across the city of Boston.

Further, it should be noted that some indicators are not comparable year to year. In particular, cancer screening guidelines have changed with regard to time periods or ages recommended for screening. While there may not be consensus among some screening guidelines, analyses by government agencies of who follows different guidelines have changed and thus rates year to year may not be directly comparable. This is also the case for the BBRFS data, where some indicators have changed in accordance with CDC guidelines (e.g. regular physical activity and fruit and vegetable consumption). Additionally, some indicators are no longer being collected and therefore, comparisons between past and current data cannot be made. In particular, the Boston Public Health

Commission stopped collecting Boston-level data about the prostate specific antigen test (PSA) in 2008. At this time, only state-level data are available.

It is also worth mentioning that when examining Boston-level data, in some cases, sample sizes are not large enough to stratify cancer screening by sub-populations. For example, sample sizes are not large enough to stratify cancer screening by Asian ethnicity such as Chinese, Vietnamese, Cambodian, etc.

In terms of examining Boston-level data by demographic factors, in many cases sample sizes are not large enough to stratify cancer screening by sub-populations within racial groups. For example, data are not available by subpopulation within the race categories, as samples are too small. I would mention the Asian community in particular.

Finally, while efforts were made to talk to a diverse cross-section of individuals, demographic characteristics were not collected from the focus group participants or key informants, so it is not possible to confirm whether they reflect the composition of the region. The focus group findings represent a sub-set of community residents, with more women participants than men, and may be limited in their generalizability.

While the focus groups conducted for this study provide valuable insights, results are not statistically representative of a larger population due to non-random recruiting techniques and a small sample size. Lastly, it is important to note that data were collected at one point in time, so findings, while directional and descriptive, should not be interpreted as definitive.

COMMUNITY SOCIAL AND ECONOMIC CONTEXT

The following section highlights key data points on the demographic, social, and economic indicators of DFCI's priority neighborhoods and those upstream factors that have a significant impact on population health. When asked about the pressing health issues in the community, a number of focus group and interview participants discussed issues related to the social determinants of health. Several participants observed that the health challenges in the community were closely related to the poverty and violence in the area. For example, homelessness was brought up multiple times and the health consequences were noted by residents. Several focus group participants also discussed how housing, employment, and violence were related to community health and are significant risk factors for disease. The section below provides an overview of the socioeconomic context of the city of Boston and DFCI priority neighborhoods.

Demographics

The health of a community is associated with numerous factors including the demographic distribution of age, race/ethnicity, employment status, income, and educotional attainment, among others. Who lives in a community is significantly related to the rates of health outcomes and behaviors of the area The following section highlights key data points related to the demographic composition of DFCI's priority neighborhoods.

Population

Table 1 presents the overall population of Boston and DFCI's priority neighborhoods, which comprise 39.3% of Boston's population overall. Since the 2013 CHNA, the population of the city continues to increase, from 617,594 in 2010 to 639,594 in 2014. Two of Boston's most populated neighborhoods are DFCI's priority neighborhoods—Dorchester with 122,598 residents, followed by Roxbury with 49,028.

Table 1. Total Population for Boston City-Wide and by Priority Neighborhood, 2010-2014

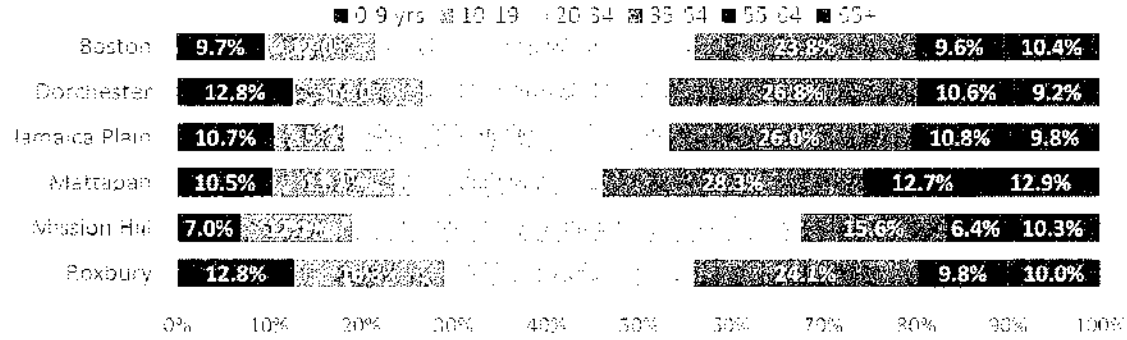
Location	Total Population
Boston	636,479
Dorchester	122,598
Jamaica Plain	38,425
Mattapan	24,043
Mission Hill	16,987
Roxbury	49,028

DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

Age Distribution

As with many demographic characteristics, DFCI's priority neighborhoods vary in the age distribution of their populotion (Figure 2). Roxbury has the largest proportion of younger residents with nearly 3 in 10 residents being 19 years old or younger, whereas Mattapan has the highest proportion of older residents, with 13% being 65+ years old. According to American Community Survey 2010-2014 data, the median age of Boston residents was 31 years, compared to the state median of 39 years.

Figure 2. Age Distribution for Boston City-Wide and by Priority Neighborhood, 2010-2014



DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

Demographic Diversity

Participants engaged in the assessment described their communities as "very diverse", mentioning wide racial, linguistic, and cultural diversity, which most focus group participants viewed as a strength in their community. Table 2 shows the increasingly diverse population of the city of Boston and its neighborhoods, with White residents now making up less than half of the city's racial and ethnic composition (46%). Black or African American residents were the second largest racial and ethnic group (23%), followed by Hispanics (18%) and Asians (9%). As seen in the quantitative data, there is substantial variation in the racial and ethnic diversity by DFCI priority neighborhood, with nearly three-quarters of Mattapan residents and half of Roxbury residents identifying as Black or African American. Among DFCI priority neighborhoods, Roxbury and Jamaica Plain have the largest Hispanic populations with 29% and 24% respectively, while Mission Hill and Dorchester have the largest Asian populations among the priority neighborhoods with 14% and 10% respectively.

Table 2. Racial/Ethnic Composition by City and Neighborhoods, 2010-2014

Neighborhood	White, non-Hispanic	Black or African American, non-Hispanic	Hispanic or Latino	Asian, non-Hispanic	Other
Boston	46%	23%	18%	9%	4%
Dorchester	22%	44%	17%	10%	8%
Jamaica Plain	54%	12%	24%	6%	3%
Mattapan	6%	74%	15%	2%	3%
Mission Hill	51%	17%	16%	14%	2%
Roxbury	11%	54%	29%	3%	4%

DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016
Note: 'Other Race' consists of American Indians/Alaskan Natives and Some Other Races. Hispanic is not a racial category reported by the US Census Bureau. Instead, data for the Hispanic population were obtained by subtracting out all individuals from each racial category who self-identify as Hispanic and aggregating them.

Nativity and Language

With nearly 4 in 10 Boston residents speaking a language other than English at home, focus group and interview participants cited language barriers as a challenging factor not only in seeking health care services, but in navigating the day-to-day life of accessing goods and various systems around the city. The table below shows the distribution of languages spoken across Boston and DFCI's priority neighborhoods. As noted in Table 3, other than English, Spanish is the most commonly spoken language at home among residents in the city. Approximately one-quarter of Roxbury and Jamaica Plain residents indicated that they speak Spanish at home. However, in Mattapan, French or Haitian Creole is the most commonly spoken non-English language at home, with nearly one in five residents speaking it at home.

> *What I love about Boston is that you can walk down the street and hear five different languages."*
> *-Focus group participant*

Table 3. Nativity and Language Spoken at Home by City-Wide and by Priority Neighborhood, 2010-2014

	Boston	Dorchester	Jamaica Plain	Mattapan	Mission Hill	Roxbury
% US-Born	69.5%	62.7%	73.9%	61.3%	70.2%	68.4%
Languages spoken at home						
% English	63.4%	58.6%	64.1%	63.7%	61.6%	58.3%
% Spanish	16.1%	14.5%	22.5%	12.8%	13.0%	26.6%
% Chinese	3.9%	1.0%	1.9%	0.3%	7.3%	1.0%
% French or Haitian Creole	5.4%	9.5%	3.1%	19.1%	3.4%	5.1%
% Portuguese or Cape Verdean Creole	1.7%	3.8%	1.2%	1.0%	0.4%	2.5%
% Vietnamese	1.9%	8.1%	0.1%	1.8%	1.1%	0.1%

DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016
NOTE: Spanish includes Spanish Creole. French includes Patois, Cajun, and French Creole. Portuguese includes Portuguese Creole

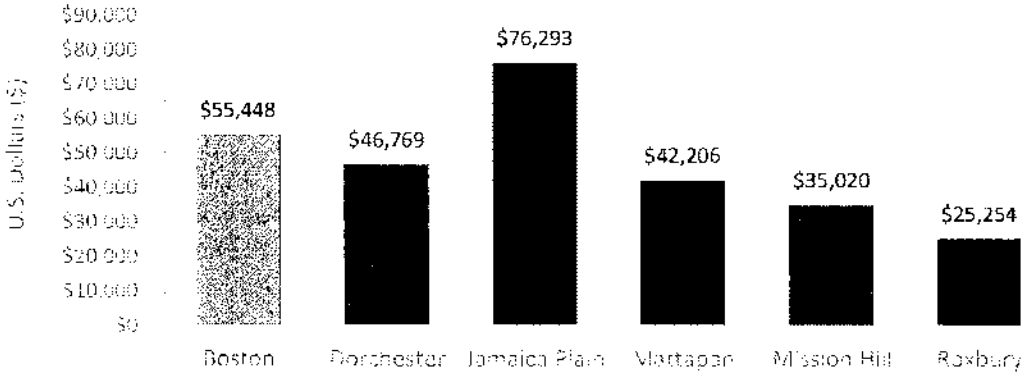
Income and Poverty

With poverty reported as a concern across all focus group and interviews, participants indicated that poverty was the root cause of stress in their lives, reporting challenges meeting basic needs such as food and shelter and difficulty balancing multiple low-wage jobs. Participants also indicated their concern with the wealth disparity in the city. As one participant shared, *"You're either very rich or very poor in Boston; there's usually no middle."*

This bears out in the quantitative data. Figure 3 shows the median household income in Boston is generally high, at $55,448. However, the median incomes of DFCI's priority communities are generally much lower than Boston overall, with Roxbury at a median income of $25,254, Mission Hill at $35,020, and Mattapan at $42,206. More

so, the *distribution of income* across the city varies greatly and clusters on the higher and lower ends of the income spectrum. Table 4 shows that 20% of Boston residents live in a household earning under $15,000, while 28% make $100,000 or more. These distributions are different in many of DFCI's priority neighborhoods, in particular Roxbury and Mattapan, which are more likely to have a greater population at the lower end of the income spectrum. However, Jamaica Plain's income distribution is more likely to mirror Boston overall. This was discussed in more detail in the focus groups as participants talked about the *"two Jamaica Plains"* – one comprised of young professional, upwardly mobile families and the other of mainly lower income Hispanic immigrants.

Figure 3. Median Household Income for Boston City-Wide and by Priority Neighborhood 2010-2014



DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

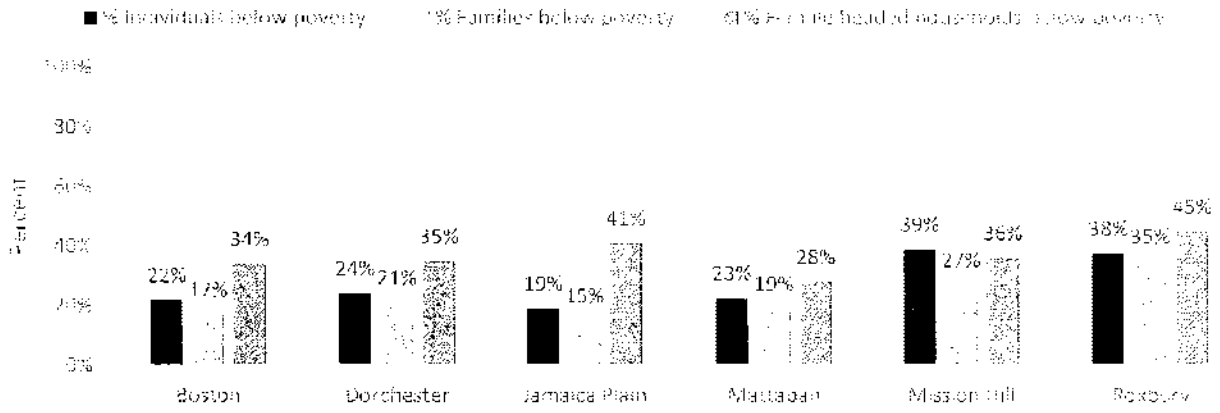
Table 4. Household Income for Boston City-Wide and by Priority Neighborhood, 2010-2014

	Boston	Dorchester	Jamaica Plain	Mattapan	Mission Hill	Roxbury
$14,999 and under	20%	21%	14%	19%	29%	35%
$15,000-$34,999	17%	19%	12%	24%	21%	26%
$35,000-$49,999	10%	12%	9%	16%	12%	11%
$50,000-$74,999	15%	17%	14%	18%	15%	12%
$75,000-$99,999	11%	11%	14%	10%	8%	7%
$100,000-$149,999	14%	12%	19%	9%	8%	7%
$150,000 +	14%	7%	17%	5%	7%	3%

DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

The federal poverty line is a standard measure used across the U.S. and is adjusted by household size, although it is not geographic dependent. Across the U.S., the federal poverty level is $11,770 for a single individual and $24,250 for a family of four, as an example. As seen in Figure 4, residents in DFCI's priority neighborhoods appear to experience higher rates of poverty than Boston overall. Female headed households are especially vulnerable, with 45% of Roxbury female-headed households living below the poverty line.

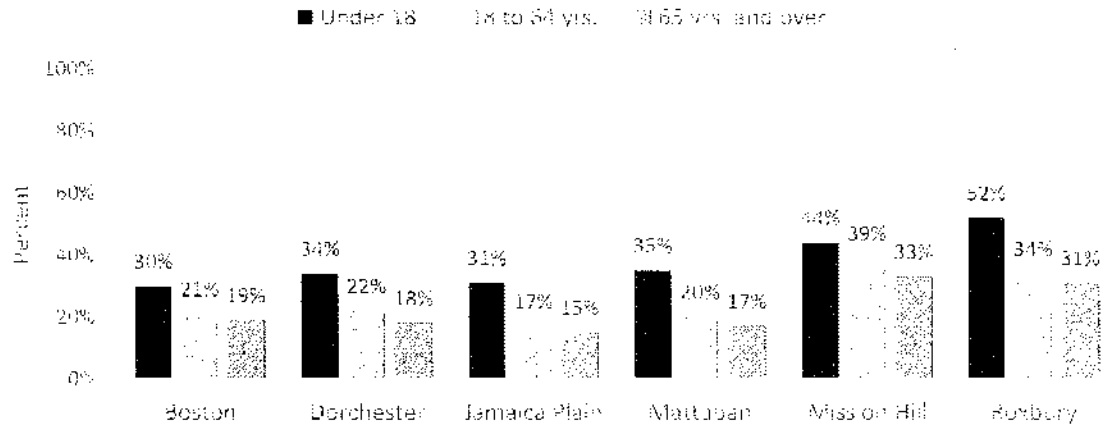
Figure 4. Poverty for Individuals by Boston City-Wide and by Priority Neighborhood, 2010-2014



DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

Children are especially vulnerable to living in poverty. As seen in Figure 5, 44% of children in Mission Hill and 52% of children in Roxbury were living in families earning below the federal poverty line.

Figure 5. Poverty by Age for Boston City-Wide and by Priority Neighborhood, 2010-2014

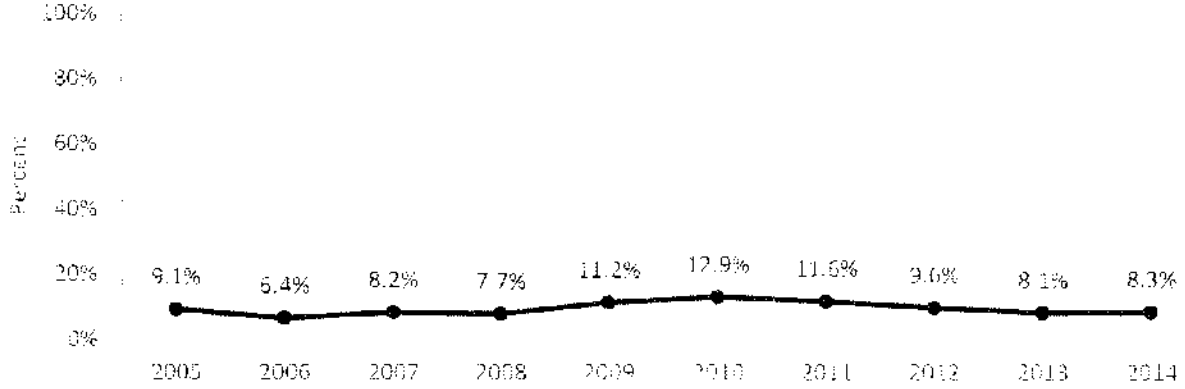


DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

Employment

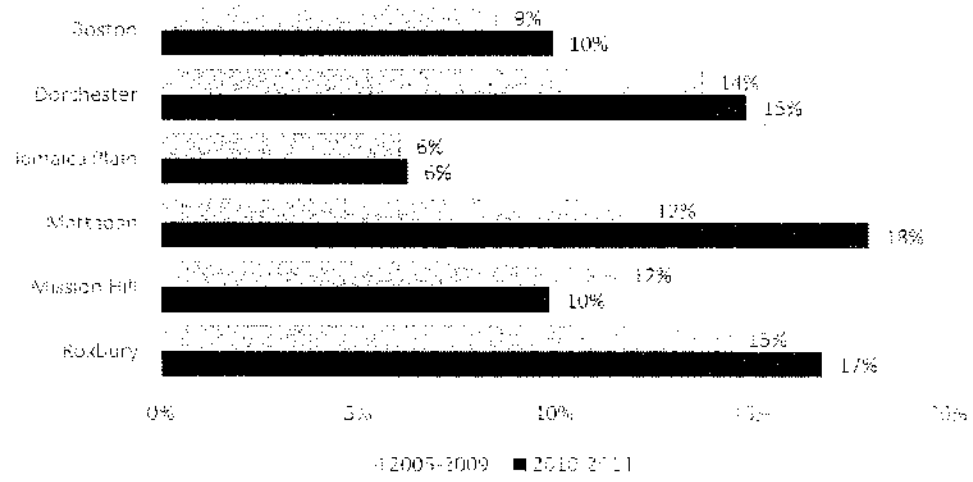
According to the U.S. Census Bureau, there has been an overall downward trend in unemployment rates in the city of Boston, from 12.9% in 2010 to 8.3% in 2014 (Figure 6). Yet underemployment, the stagnation of wages, and insufficient benefits were reported by focus group and interview participants as major barriers to economic mobility and a factor of negative health outcomes. As seen in Figure 7, 18% of Mattapan residents and 17% of Roxbury residents indicated they were unemployed in 2010-2014, above the percent across the city at 10% in the same time period, and higher than what was seen in the five-year period earlier in 2005-2009.

Figure 6. Percent Unemployed, Ages 16+, Boston, 2005-2014



DATA SOURCE: American Community Survey, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 U.S. Census Bureau NOTE: Population 16 and over. Unemployment rates calculated from the 5-year American Community Survey will differ from city, state, or national unemployment rates from the Bureau of Labor Statistics due to differences in timeframe and data collection methods.

Figure 7. Percent Unemployed, Ages 16+, by City and Neighborhoods, 2005-2009 and 2010-2014



DATA SOURCE: U.S. Census Bureau, 5-Year American Community Survey, 2005-2009 and 2010-2014
DATA ANALYSIS: Boston Redevelopment Authority, as reported in ACS 2005-2009 Estimate by Neighborhood and Boston, 2011; and Boston in Context- Neighborhoods, 2016
NOTE: Population 16 and over. Unemployment rates calculated from the 5-year American Community Survey will differ from city, state, or national unemployment rates from the Bureau of Labor Statistics due to differences in timeframe and data collection methods.

Education

Boston is considered a highly educated city, with focus group and interview participants noting the multiple prestigious institutions throughout the region; however, they also remarked that many of the institutions are not necessarily targeted to residents in their community. Focus group participants were proud of the academic rigor that Boston offered, but also were interested in greater outreach and engagement into the communities by local higher educational institutions.

Census data show high educational attainment among Boston's adult residents aged 25 years and older, with 45% having earned a college degree or more. Among DFCI's priority neighborhoods, Jamaica Plain has a high percentage of residents with a college degree (63%). Other neighborhoods such as Mattapan and Roxbury have lower proportions of residents who have completed college, but do have one quarter of residents with some college education or an associate's degree. However, nearly one-quarter of residents in Roxbury, Mattapan, and Dorchester have not completed high school.

Table 5. Educational Attainment of Adults 25 Years and Older by Boston City-Wide and by Priority Neighborhoods, 2010-2014

Neighborhood	Less than High School	High School Graduate	Some College or Associates	Bachelor's Degree or Higher
Boston	15%	20%	19%	45%
Dorchester	22%	32%	25%	22%
Jamaica Plain	8%	14%	15%	63%
Mattapan	23%	35%	27%	15%
Mission Hill	14%	24%	19%	43%
Roxbury	25%	30%	25%	20%

DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

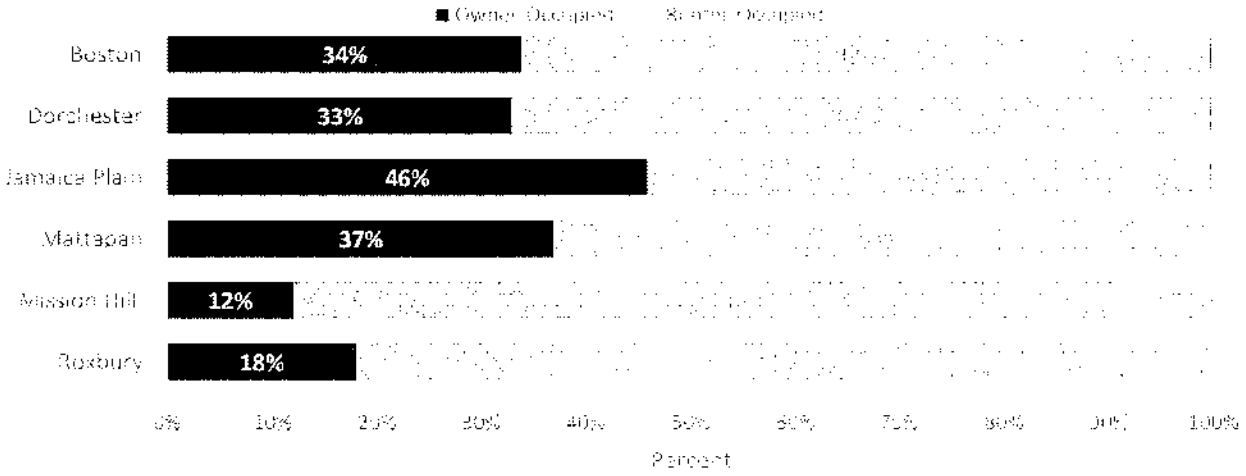
"We're surrounded by the best schools and institutions in the world here in Boston." -*Focus group participant*

Housing and Built Environment

Similar to the 2013 CHNA, focus group participants and key informants overwhelmingly cited housing affordability and availability as the biggest financial challenge to living in Boston. As residents spoke about the middle class being squeezed out of the city, they attributed housing costs to being one of the main contributors to this trend. With housing ownership seemingly out of reach for many Boston residents, Figure 8 shows the variation by neighborhood in housing occupancy in the city. Overall one-third of housing units are owner-occupied in the city, while only 12% of Mission Hill units and 18% of Roxbury units are. However, owner-occupancy rates are high in Jamaica Plain and Mattapan, with 46% and 37% respectively.

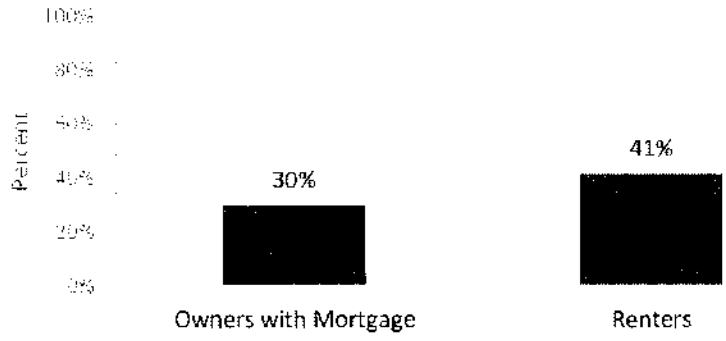
However, housing costs are a large percentage related to cost of living in the city. As Figure 9 shows, 30% of home-owners and 41% of renters in the city pay more than 35% of their household income to housing costs, a high percentage relative to what is earned.

Figure 8. Percent Housing Units Owner- or Renter-Occupied, by Boston City-Wide and by Priority Neighborhoods, 2010-2014



DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

Figure 9. Percent of Residents Whose Housing Costs are 35% or more of Household Income, Boston, 2010-2014

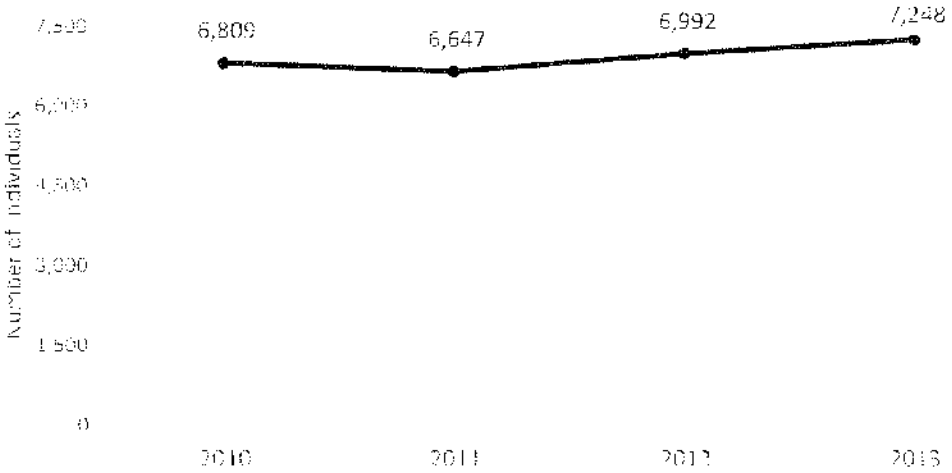


DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey

Homelessness

Concerns over rising homelessness were mentioned in almost all focus groups and interviews. Key informants identified elders, residents in recovery, and those suffering from mental illness among the most vulnerable for becoming homeless. Quantitative data show that the number of homeless individuals in Boston has increased by 32% since 2011 to approximately 7,248 individuals in 2013 (Figure 10).

Figure 10. Homeless Count by Year in Boston, 2010-2013



DATA SOURCE: Emergency Shelter Commission, Boston Public Health Commission

Transportation

While Boston has a comprehensive public transportation system, with more than 30% of residents taking public transportation to work (Table 6), focus group and interview participants indicated that some residents—particularly those living in Mattapan—deal with challenges to accessing transportation on a daily basis. Focus group participants discussed the challenges to finding transportation near them or having to take several bus or train lines to their destination, contributing to several hours of their day comprised of being "en route." Residents who used public transportation from their neighborhood described issues of limited routes, schedules, and stops. Participants in the cancer survivor groups cited several hospital-led initiatives that helped patients with transportation, although a few residents reported living outside of the service area, thus having to rely on friends or family for rides or use taxis when public transit options were not available. Further, residents indicated that more transportation assistance was needed for day-to-day errands, especially for the elderly.

Table 6. Means of Commuting by Boston City-Wide and by Priority Neighborhoods, 2010-2014

	Worked at home	Car, truck, or van	Bus or trolley bus	Subway or elevated	Bicycle	Walked	Other
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dorchester	1.7%	56.3%	19.0%	15.9%	0.7%	4.1%	1.5%
Jamaica Plain	4.7%	41.2%	12.1%	27.9%	6.3%	5.2%	1.5%
Mattapan	2.3%	55.5%	22.0%	13.9%	0.1%	3.3%	2.0%
Mission Hill	2.6%	24.6%	17.3%	19.0%	6.9%	26.8%	1.8%
Roxbury	2.6%	45.0%	25.8%	12.3%	1.6%	10.6%	1.6%

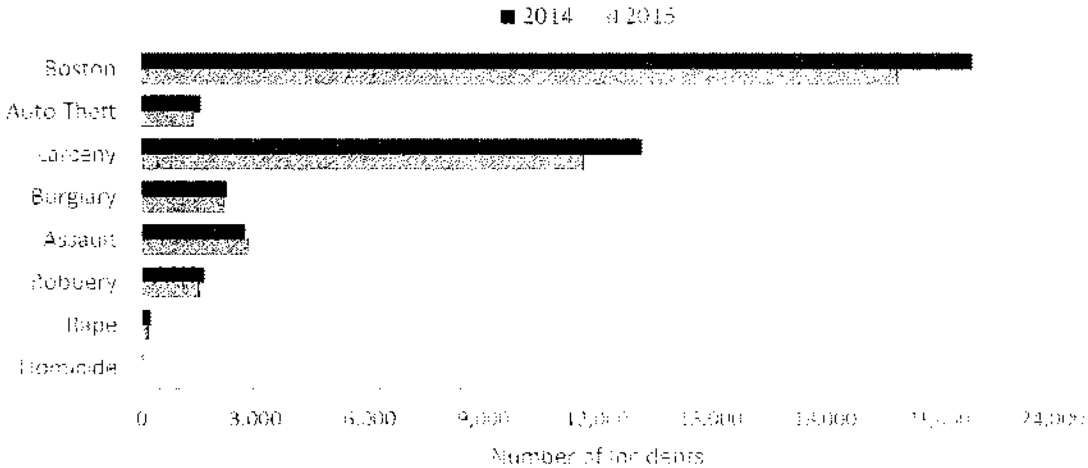
DATA SOURCE: U.S. Census Bureau, 2010-2014 5-Year American Community Survey
DATA ANALYSIS: Boston Redevelopment Authority, as reported in Boston in Context- Neighborhoods, 2016

Violence and Neighborhood Safety

While the overall crime rate in the city of Boston has decreased, many focus group participants reported concerns about personal safety in their communities. As one participant said, "*I worry about my kids getting to school safely or walking home at night. I see people on the streets just waiting to mug them or try and get them involved in drugs.*" Further, interview participants reported communities of color being the most vulnerable to community violence saying, "*There is violence everywhere, but you see concentrated community violence in certain areas where there are more community residents of color, and that has a profound impact on long-term trauma and negative health outcomes.*" Focus group and interview participants cited crime and community violence as one of the biggest concerns in their communities, and discussed issues of violence in relation to drugs, poverty, and mental illness.

While overall counts of crimes and specific violent crimes such as assault and robbery were slightly lower in Boston in 2015 compared to 2014 (Figure 11), DFCI priority neighborhoods of Mattapan and Roxbury experience three times the rate of violent crime as the city overall (Table 7).

Figure 11. Crime Counts by Year, Boston, 2014-2015



DATA SOURCE: Boston Police Department, Year End Crime Statistics, 2015

Table 7. Violent Crime and Property Crime Rate per 100,000 Population by Boston City-Wide and by Priority Neighborhoods, 2015

	Violent Crime Rate	Property Crime Rate
Boston	752.0	[illegible]
Dorchester (C-11)	512.5	1170.6
Jamaica Plain (E-13)	686.4	2573.4
Mattapan (B-3)	2542.8	4052.9
Roxbury/Mission Hill (B-2)	2373.7	4875.8

DATA SOURCE: Boston Police Department, Year End Crime Statistics, 2015

CANCER PREVENTION: PERCEPTIONS AND SURVEILLANCE DATA

Cancer prevention is defined as action taken to lower the chance of getting cancer. Many factors in our genes, our lifestyle, and our environment may increase our risk of getting cancer. The prevention-related information in this section includes CHNA participants' perceptions around cancer prevention as well as self-reported data for risk behaviors that have been associated with cancer including tobacco use, obesity, physical activity and healthy eating, and substance use and abuse.

Perceptions of Cancer Prevention

When CHNA participants were asked about their perceptions of cancer prevention, they were most likely to discuss the relationship between lifestyle behaviors and cancer prevention and how the social determinants of health are critical factors. However, several residents also mentioned environmental hazards related to cancer as well as how they viewed mental health and cancer. The following section describes these findings in more detail.

Perceived Relationship between Lifestyle Behaviors and Cancer Risk

Participants frequently cited smoking, obesity, and sedentary lifestyles as potential contributors to cancer, and were more likely than 2013 CHNA participants to specifically name healthy diet and physical activity as important protective factors. They described avoiding *"red meat, soda, and alcohol"* and how eating healthy meals including fruits and vegetables were important for reducing one's risk of cancer. Community residents involved in the focus group recommended investing resources in local community gardens and neighborhood associations to expand access to healthy food. Similar to the 2013 CHNA, participants in the 2016 CHNA also were well aware of the relationship between smoking and cancer, and consequently that smoking cessation was a method for preventing cancer.

Social Determinants of Health and Cancer Risk

When asked about contributors to cancer or what could be done to lessen cancer risk, participants shared several suggestions, with many focusing on the social determinants of health. Although focus group participants did not use this terminology, they noted that the built environment and structural access to resources were significant factors related to trends in cancer disparities. Specifically, they discussed access to affordable healthy foods and availability of supermarkets in their neighborhood as issues. They also discussed availability of financial assistance to low income families as an important contributor to improving access to protective goods and services. Several participants also cited second-hand smoke exposure as an issue. They viewed the smoke free-housing policies enacted across the city as positive steps, but many believed that second-hand smoke was still a major concern. As one participant said, *"There are signs all over the place that say the building is smoke-free, but I still see people day and night smoking in front of my window."*

Environmental Risks and Cancer

Several focus group participants talked about how they believed that their environmental surroundings have a negative impact on their community's health and could possibly increase the risk of cancer. Specifically, participants mentioned air pollution and their concern of living close to a train or bus station. As one participant said, *"The trains and buses start early in the morning and run non-stop all day, every day. That's a lot of fumes to breathe in one lifetime."* Another resident agreed and described having to frequently wash her walls because of the *"yellow fade that appears every few months,"* which she thought was caused by the fumes emitted by the T stop three block away.

Mental Health

Mental health, especially depression and stress, was a prominent theme across all group and several participants attributed mental health and stress as factors related to cancer. One male focus group participant with Hodgkin's Disease reported that stress played a significant role in his getting cancer. Multiple low-wage jobs, poverty, and family issues, he said, were the main causes of day-to-day stressors that he felt exacerbated his declining health. Another male resident with cancer agreed and added, *"And the environment around us isn't helping either. We're breathing in chemicals at every corner in Dorchester...of course we're going to get cancer."*

Awareness of Cancer Prevention-Related Programs and Services

When asked about specific programs targeting cancer prevention, focus group participants cited several types of initiatives and services ranging from DFCI efforts to activities sponsored by community health centers to large city-wide initiatives. Specifically, community members in all three focus groups reported that the DFCI Mammography Van offered free prevention services. However, there was some confusion about what services were offered, with some residents asking if vaccinations and prostate screenings were also available. The same was true for community health centers. Some participants reported knowing about health education in local community health centers as well as the partnership between DFCI and Whittier Street Health Center, but were unsure about the details or what was available for them specifically. Smoke-free building policies enacted by the city and smoking cessation classes offered at community health centers were also mentioned by a few participants as important prevention-related initiatives.

Cancer-Related Risk Factors and Behaviors

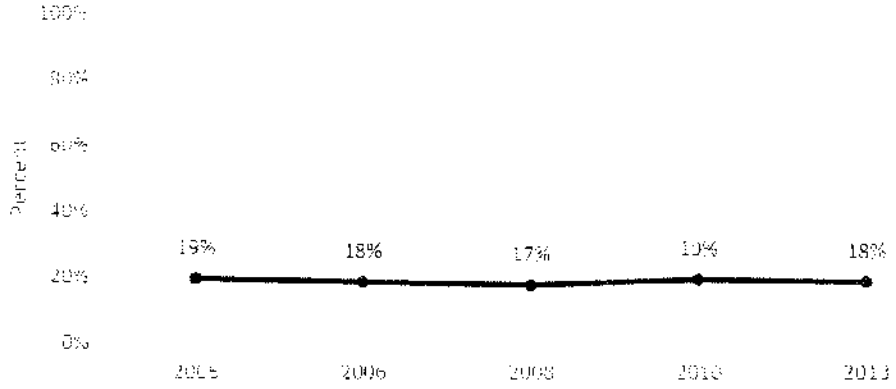
The following section describes a snapshot of cancer-related risk factors and behaviors of smoking, obesity, healthy eating, physical activity, and alcohol use across Boston and by neighborhood, revealing the variation by neighborhood across the city. The following data were captured by the Boston Behavioral Risk Factor Surveillance Survey (BBRFS) and analyzed by the Boston Public Health Commission. Additional findings from the qualitative discussions on these topics are highlighted where appropriate.

Smoking Behaviors

Overall, Boston adult smoking rates have remained steady over time while youth smoking rates have declined. The Boston Behavioral Risk Factor Surveillance Survey (BBRFS) regularly assesses the number of adults who said they currently smoke cigarettes, defined as adults who have smoked at least 100 cigarettes in their life and report smoking every day or some days. Figure 12 shows self-reported cigarette smoking among adults in Boston from 2005-2013 which has been steady and is currently at 19%. For Massachusetts, the statewide percentage of adult smokers is 16% while it is 17% for the U.S. overall.

> *"I'm most concerned about preventable cancers like lung cancer. People know they shouldn't be smoking but they still are."* -Focus group participant

Figure 12. Trends in Self-Reported Cigarette Smoking Among Adults in Boston 2005, 2006, 2008, 2010, and 2013

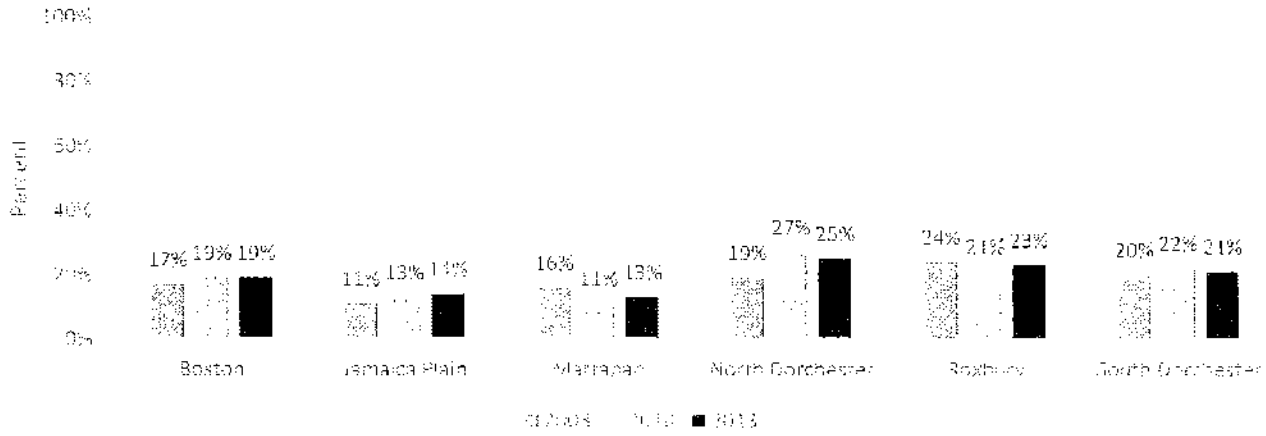


DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFS) 2005, and 2006, 2010, 2013 Boston Public Health Commission (BPHC) Health of Boston 2014-2015 Report
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
NOTE: The BBRFSS dataset was reweighted after the publication of Health of Boston 2012-2013. The rates included in Health of Boston 2014-2015 are from the reweighted BBRFSS and cannot be compared to BBRFS smoking data in previous Health of Boston Reports

Figure 13 shows the percent of current adult smokers by neighborhood. Among DFCI priority neighborhoods, nearly one-quarter of residents in North Dorchester and Roxbury indicated that they were current smokers. When looking at smoking status by various demographic groups,

Table 8 shows that 22% of men in Boston, 30% of adults with less than a high school degree, and 29% of residents earning under $25,000 are considered current smokers.

Figure 13. Percent of Current Smoking among Adults by City and Priority Neighborhood, 2008, 2010, 2013



DATA SOURCE: Boston Behavioral Risk Factor Survey (2013)
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Table 8. Percent of Adults Who Smoke by Select Sociodemographic Indicators, Boston, 2013

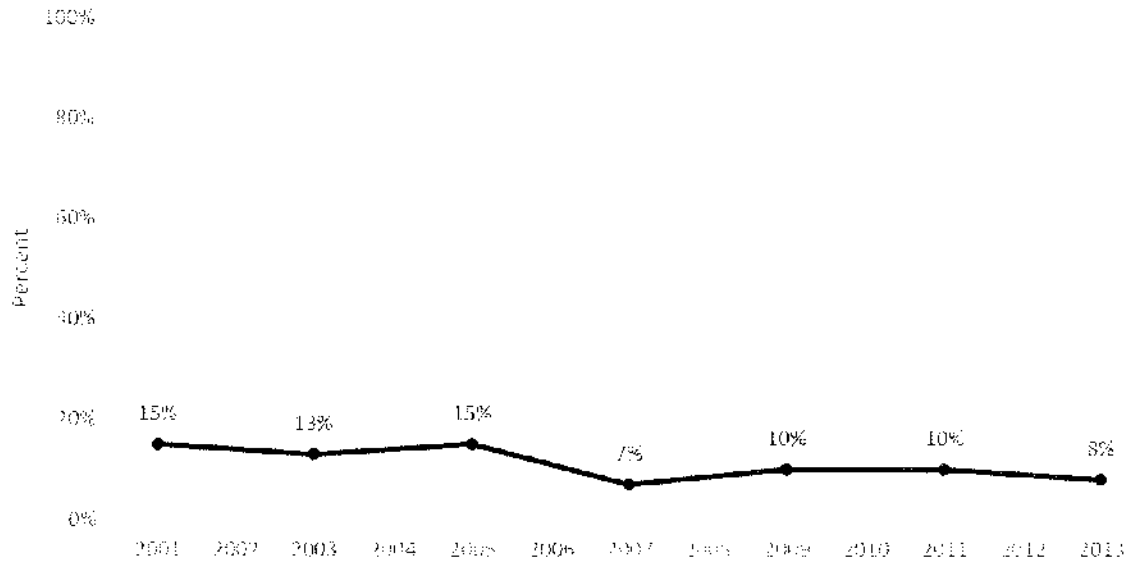
Boston	%
Gender	
Female	15%
Male	22%
Race/Ethnicity	
Asian	15%
Black	19%
Latino	16%
White	19%
Educational Attainment	
Less than High School	30%
High School Diploma or GED	23%
At Least Some College/Bachelor's Degree or Higher	15%
Income	
<$25,000	29%
$25,000-$49,999	18%
$50,000+	11%

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013)
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as Reported in Health of Boston 2014-2015

In focus groups, participants discussed what they saw as a strong relationship between cigarette smoking and cancer risk. They also mentioned—and had differing opinions about—smoking alternatives such as electronic cigarettes (e-cigarettes) and chewing tobacco. City-wide e-cigarette and chewing tobacco data were not available for this assessment. However, in August 2014, the Centers for Disease Control and Prevention (CDC) reported that more than a quarter million youth who had never smoked a cigarette used e-cigarettes in 2013, three times the number of users since 2011. Adult e-cigarette data are not available.

When examining youth smoking rates in Boston, data indicate that the percent of Boston high school students who smoke has declined dramatically in more than a decade. Figure 14 show that the percent of Boston high school students who self-reported smoking has declined by almost half (47%) from 15% in 2001 to 8% in 2013. Among Boston high school students reporting smoking status, 23% of white high school students indicated that they are current smokers compared to 10% of Latino students, 5% of Black students, and 4% of Asian students.

Figure 14. Trends in Self-Reported Cigarette Smoking Among Youth in Boston, 2001, 2003, 2005, 2007, 2009, 2011 and 2013



DATA SOURCE: Youth Risk Behavior Survey, Centers for Disease Control and Prevention
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

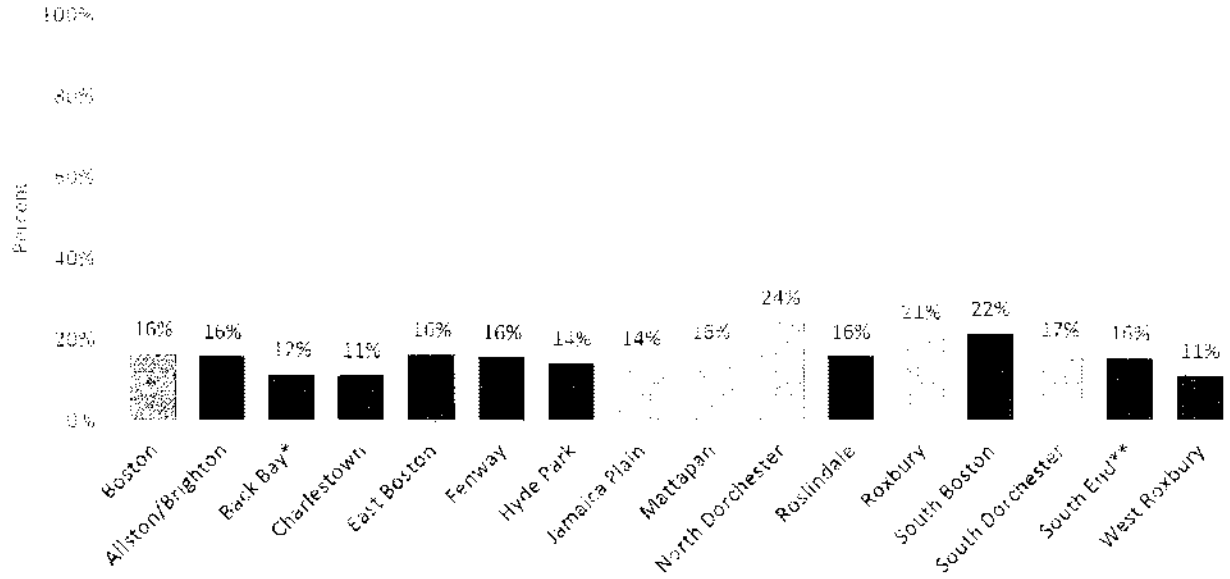
Table 9. Percent of Public High School Students Who Smoke by Select Sociodemographic Indicators, 2011 and 2013 Combined

[illegible]	[illegible]
Gender	
Female	8%
Male	10%
Age of Student	
<16 yrs.	6%
16-17 yrs.	11%
18+ yrs.	10%
Race/Ethnicity	
Asian	4%
Black	5%
Latino	10%
White	23%

DATA SOURCE: Youth Risk Behavior Survey (2011 and 2013), Centers for Disease Control and Prevention
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as Reported in Health of Boston 2014-2015

As noted earlier, focus group participants cited secondhand smoke as a concern and potential contributor to cancer. Self-reported data on exposure to secondhand smoke show that 16% of Boston residents have been exposed to secondhand smoke at home for 1+ hours in the past week, yet that number is 24% among North Dorchester residents and 21% among Roxbury residents.

Figure 15. Percent of Adults Reported to Be Exposed to Secondhand Tobacco Smoke at Home One or More Hours per Week in Past Seven Days by Boston Neighborhood, 2010 and 2013 Combined



*Includes Beacon Hill, Downtown, the North End, and the West End; **Includes Chinatown
DATA SOURCE: Boston Behavioral Risk Factor Survey (BBRFSS), 2010 and 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Alcohol Misuse

Alcohol wos discussed among focus group participants more in relation to substance abuse being a concern in their community and a negative coping mechanism for stress, and less as a risk factor for cancer. As part of the Boston Behavioral Risk Factor Survey (BBRFSS) and Youth Risk Behavior Survey (YRBS), respondents were asked about their consumption of alcohol in the past month. A drink of alcohol was defined as one can or bottle of beer, one glass of wine, one can or bottle of wine cooler, one cocktail, or one shot of liquor. Binge drinking was defined as consumption of five or more drinks on any one occasion in the past month. The following figures present the percent of Boston adults and youth who reported binge drinking between the years 2006-2013. Figure 16 shows that a quarter of adults in the city of Boston reported binge drinking, defined as consumption of five or more drinks on any one occasion in the past month.

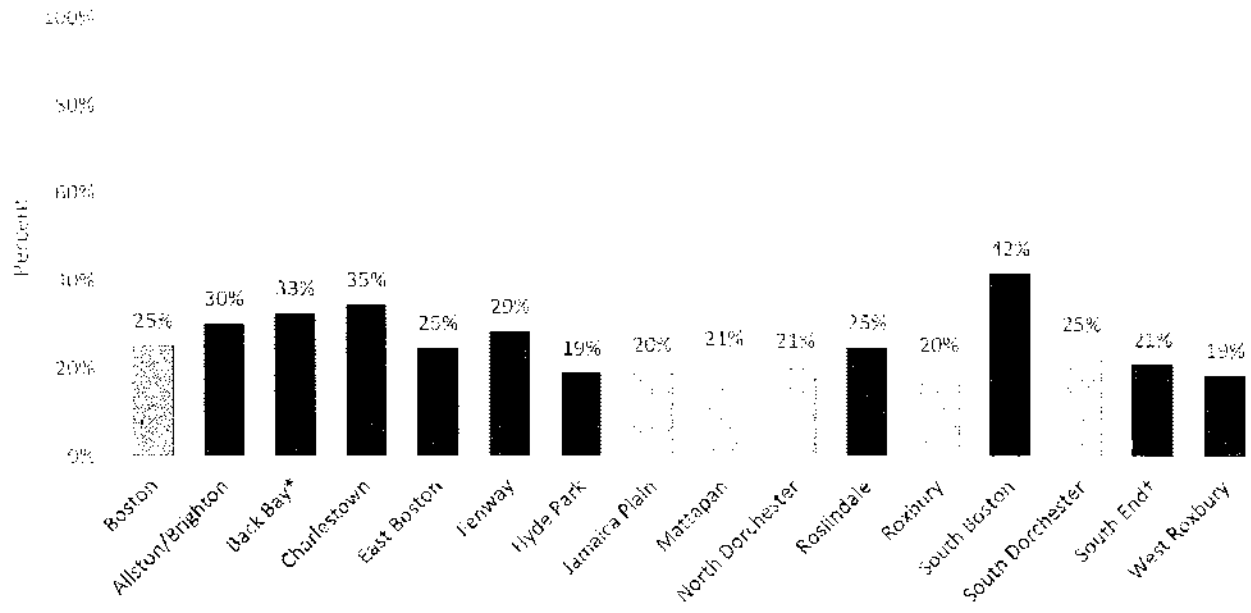
"People often use drugs and alcohol as a coping mechanism for things like stress and depression." -Focus group participant

Figure 16. Percent of Boston Adults Who Reported Binge Drinking by Year 2006, 2008, 2010, 2013

DATA SOURCE: Boston Behavioral Risk Factor Survey (2006, 2008, 2010 and 2013)
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 17 and Table 10 indicate that binge drinking rates tend to hover around 20-21% among DFCI's priority neighborhoods. When looking at data by different demographic groups, 32% of males and 33% of white residents indicated that they have engaged in binge drinking, the highest rates among all groups.

Figure 17. Percent of Boston Adults Who Reported Binge Drinking by Boston City-Wide and by Neighborhood, 2013



*Includes Back Bay, Beacon Hill, West End, and the North End
†Includes Chinatown
DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013;
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

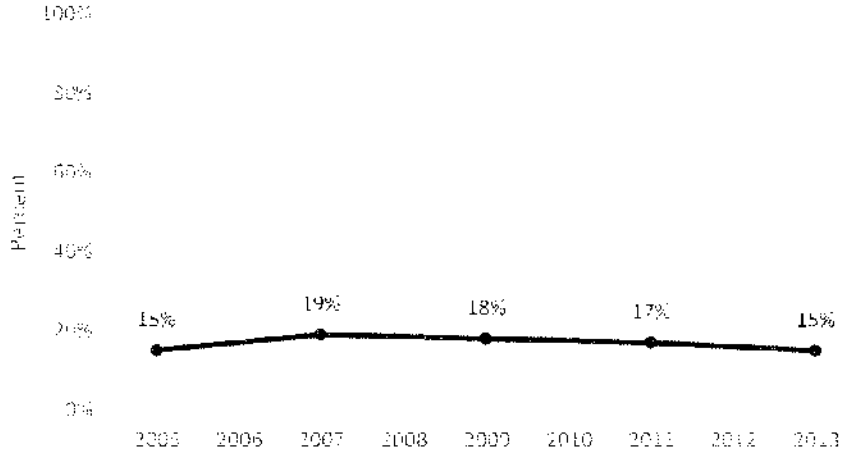
Table 10. Percent of Boston Adults Who Reported Binge Drinking by Select Sociodemographic Indicators, 2013

Boston	25%
Gender	
Female	19%
Male	32%
Race/Ethnicity	
Asian	11%
Black	17%
Latino	22%
White	33%
Educational Attainment	
Less than High School	14%
High School Diploma or GED	21%
At Least Some College	29%
Income	
<$25,000	21%
$25,000-$49,999	25%
$50,000+	31%

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013)
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as Reported in Health of Boston 2014-2015

For youth binge drinking, rates are back to 2005 levels after a rise in 2007 and slow decline back to 15% of Boston high school students reporting having engaged in binge drinking in the past year (Figure 18). Among different groups, 22% of white high school students and 19% of Latino high school students reported binge drinking (Table 11).

Figure 18. Percent of Boston Public High School Students Who Reported Binge Drinking by Year



DATA SOURCE: Youth Risk Behavior Survey (2005, 2007, 2009, 2011, 2013), Centers for Disease Control and Prevention
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as Reported in Health of Boston 2014-2015

Table 11. Percent of Boston Public High School Students Who Reported Binge Drinking by Selected Sociodemographic Indicators, 2013

Boston	15%
Gender	
Female	15%
Male	14%
Age of Student	
<16 yrs.	13%
16-17 yrs.	15%
18+ yrs.	18%
Race/Ethnicity	
Asian	7%
Black	11%
Latino	19%
White	22%

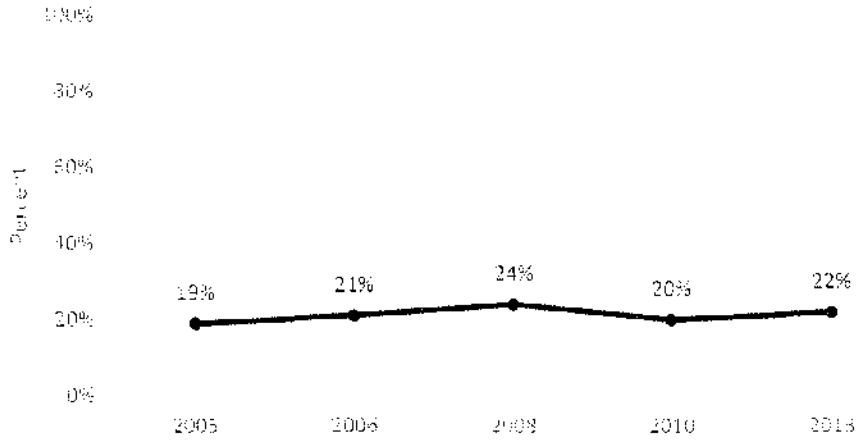
DATA SOURCE: Youth Risk Behavior Survey (2013), Centers for Disease Control and Prevention
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as Reported in Health of Boston 2014-2015

Obesity

Across all focus group and interviews, obesity was identified as a major health concern for residents, and surveillance data indicate that more than one in five Boston adult residents is considered obese. Focus group participants in Dorchester reported limited access to healthy food options, indicating that they often purchased food from convenient stores. Concern about youth obesity was especially prominent, with residents wishing to see more activities that encouraged physical activity for youth, especially during the winter season.

In the BBRFS, all respondents were asked to report their height and weight. Respondents were categorized based on their Body Mass Index (BMI), which equals weight in kilograms divided by height in meters squared. An adult who has a BMI of 30 or higher is considered obese, as defined by the Behavioral Risk Factor Survey. Figure 19 shows that the percent of obese adults declined from 24% in 2008 to 20% in 2010. However, there was a slight increase in obesity among Boston adults from 2010 to 2013.

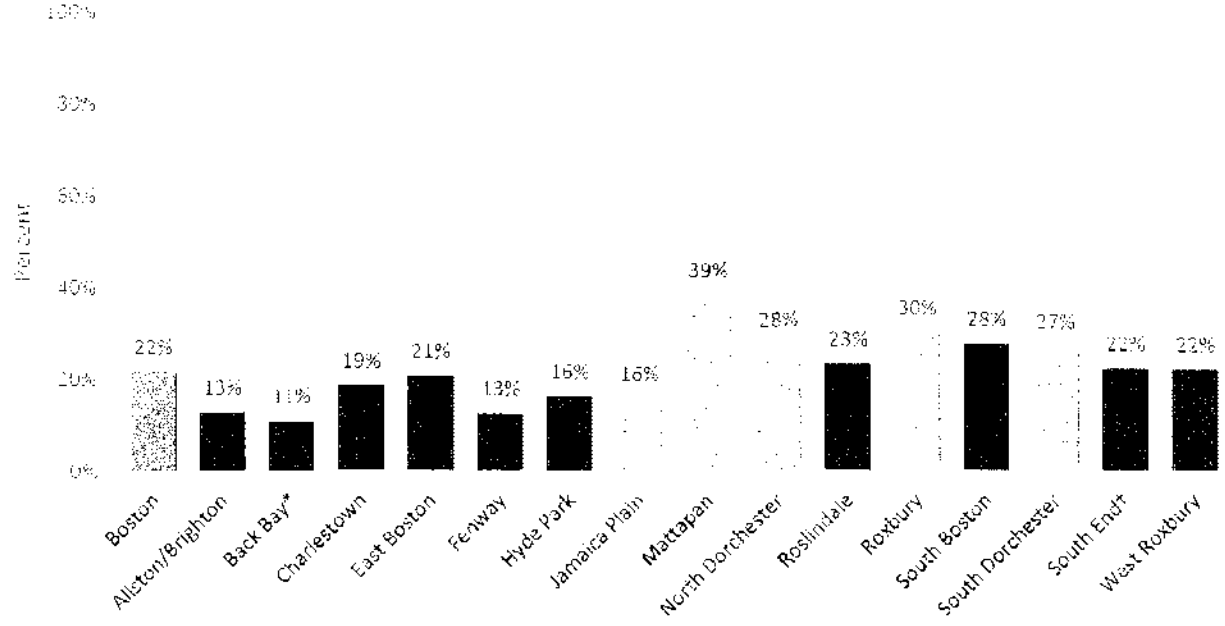
Figure 19. Percent Obesity among Boston Adults by Year



DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2005-2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

However, data indicate that there is variation in obesity by neighborhood. Nearly 4 in 10 Mattapan residents and 3 in 10 Roxbury residents are considered obese (Figure 20).
shows the variation by neighborhood over the last several years, with every neighborhood and Boston overall seeing a slight uptick since 2010.

Figure 20. Percent Obesity among Boston Adults by Neighborhood, 2013



DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
*Includes Back Bay, Beacon Hill, West End, and the North End
†Includes Chinatown

Figure 21. Percent Obesity among Boston Adults, 2008, 2010 and 2013

DATA SOURCE: Boston Behavioral Risk Factor Surveillance System, 2008, 2010, 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Table 12 shows percent of Boston adults considered obese by different demographic groups. The percent of Black residents (33%) who are considered obese was more than double the percent of White residents (16%) and Asian residents (15%). Latino residents had the second highest proportion of obese adults (27%) of all race and ethnic groups. Latino participants in focus groups discussed how acculturation has affected their own obesity struggles, as one participant illustrated, *"It wasn't until after we moved to the United States that we began struggling with weight. We eat more fried and processed food here."*

Table 12. Percent Obesity by Selected Socioeconomic Indicators, 2013

[illegible]	[illegible]
Gender	
Female	23%
Male	20%
Age	
18-24 yrs.	13%
25-44 yrs.	19%
45-64 yrs.	30%
65+ yrs.	27%
Race/Ethnicity	
Asian	15%
Black	33%
Latino	27%
White	16%
Educational Attainment	
Less than High School	22%
High School Diploma or GED	25%
At Least Some College/Bachelor's Degree or Higher	19%
Income	
<$25,000	26%
$25,000-$49,999	18%
$50,000+	17%

DATA SOURCE: Boston Behavioral Risk Factor Survey, 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Focus group and interview participants were particularly concerned about youth obesity, indicating that they thought it was a growing problem among today's students. However, data from the Youth Risk Behavioral Survey show that obesity rates among high school students have remained steady over the past several years at around 14% (Figure 22).

Figure 22. Percent Obesity among Boston Public High School Students by Year

DATA SOURCE: Youth Risk Behavior Survey (2007, 2009, 2011, and 2013), Centers for Disease Control and Prevention as reported in Health of Boston 2014-2015

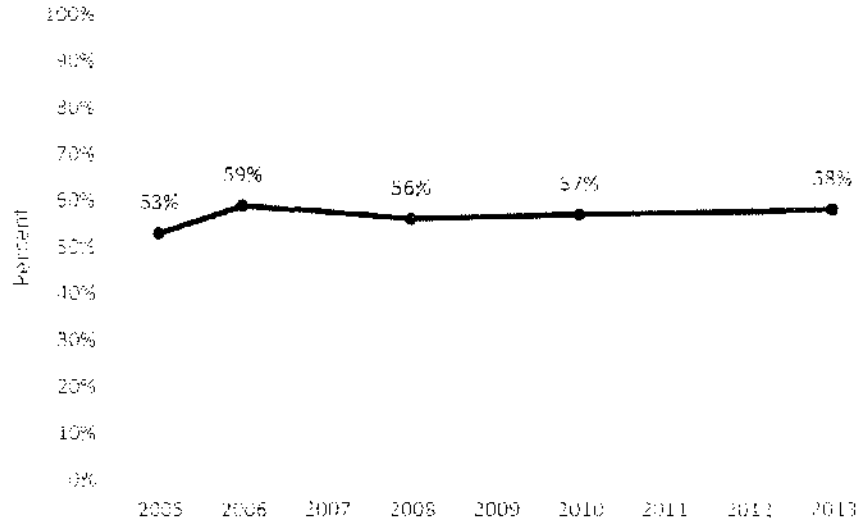
Physical Activity and Healthy Eating

While in the 2016 CHNA, participants focused more than in 2013 on what they saw as an important link between healthy diet, physical activity, and cancer risk; surveillance data indicate that many Boston residents are meeting recommended guidelines in this area. Since 2006, nearly 6 in 10 adults in Boston reported meeting CDC guidelines for aerobic physical activity, defined as 150 minutes in the past week, which is above the state (55%) and national (49%) average.

Among DFCI priority neighborhoods, 69% of Jamaica Plain residents reported participating in enough activity to meet the recommended guidelines, while Roxbury and Dorchester were around the overall Boston rate. Approximately half of Mattapan residents reported this level of activity.

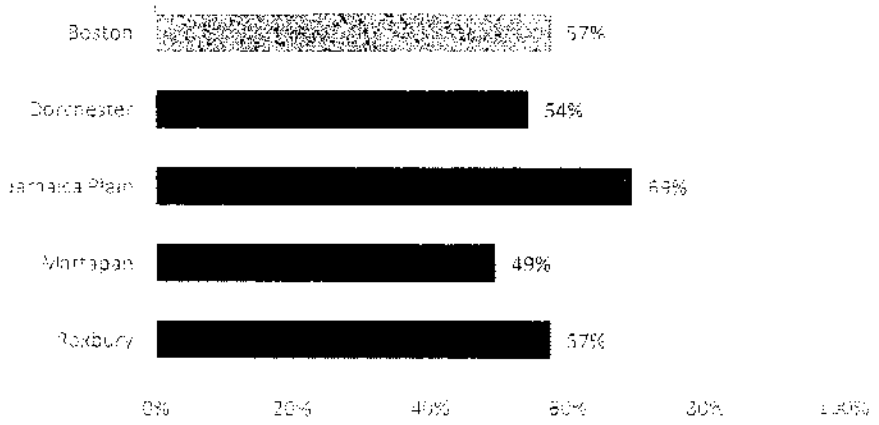
Among different demographic groups, higher percentages of higher educated and higher income adults in Boston reported physical activity levels meeting recommended guidelines (Table 13).

Figure 23. Adults Who Met CDC Guidelines for Aerobic Physical Activity (150 Minutes in the Past Week), 2013



DATA SOURCE: Boston Behavioral Risk Factor Survey, 2001, 2003, 2005, 2006, 2008, and 2010, 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as Reported in Health of Boston 2014-2015

Figure 24. Percent of Adults Who Met CDC Guidelines for Aerobic Physical Activity (150 Minutes in the Past Week) by Priority Neighborhoods, 2013



DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

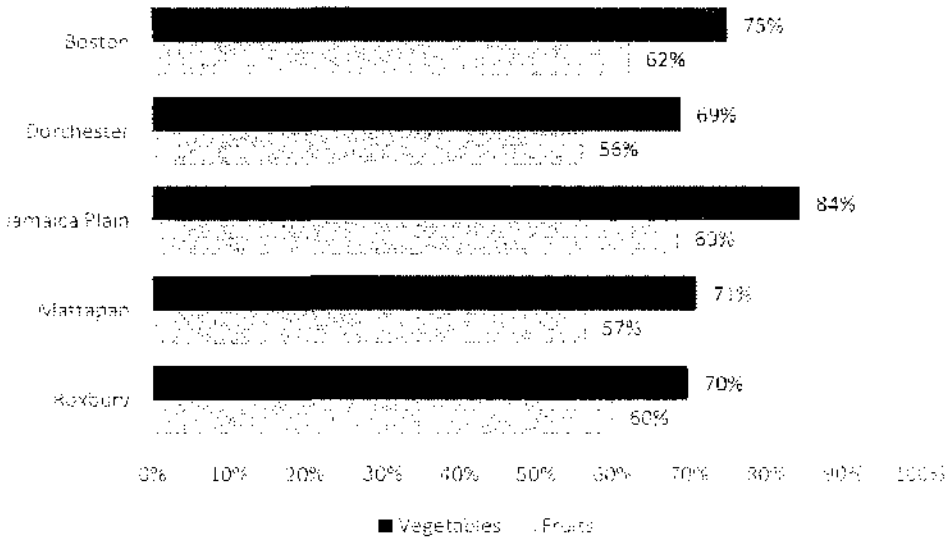
Table 13. Percent of Adults Who Met CDC Guidelines for Aerobic Physical Activity (150 Minutes in the Past Week) by Selected Sociodemographic Indicators, 2013

Boston	60%
Gender	
Female	58%
Male	57%
Age	
18-24 yrs.	54%
25-44 yrs.	56%
45-64 yrs.	61%
65+ yrs.	59%
Race/Ethnicity	
Asian	60%
Black	53%
Latino	47%
White	62%
Educational Attainment	
Less than High School Diploma	43%
High School Diploma or GED	52%
At Least Some College/Bachelor's Degree or Higher	62%
Income	
<$25,000	49%
$25,000-$49,999	54%
$50,000+	68%

DATA SOURCE: Boston Behavioral Risk Factor Survey, 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as Reported in Health of Boston 2014-2015

Data on fruit and vegetable consumption indicate that 75% of Boston residents reported that they had have one or more servings of vegetables daily and 62% have one or more servings of fruits. For Jamaica Plain residents, self-reported behaviors are higher, at 84% and 69% for vegetables and fruits respectively. Other DFCI priority neighborhoods report slightly less fruit and vegetable consumption than Boston overall.

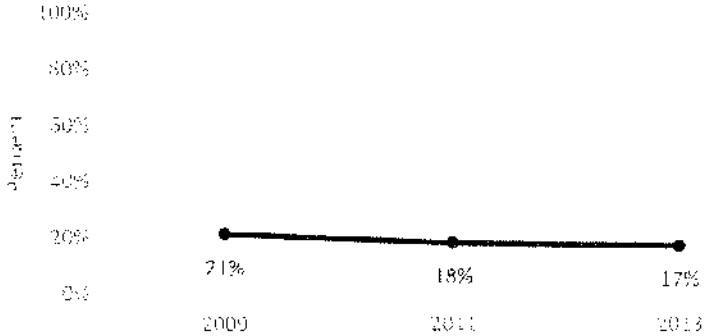
Figure 25. Percent Adults Who Ate One or More Servings per Day of Vegetables and Fruits, by Priority Neighborhood, 2013



NOTE: CDC recommended guidelines are new and were implemented beginning with 2013 BBRFSS data
DATA SOURCE: Boston Behavioral Risk Factor Surveillance System, 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Youth risk behavior survey data show the percent of Boston high school students who had an inadequate consumption of fruits and vegetables, defined as eating less than one serving of fruits or vegetables daily in the past seven days. Rates have declined since 2009, indicating improved fruit and vegetable consumption among high school students (Figure 26); however, Latino and Black students are most likely to have an inadequate consumption of fruits and vegetables (Table 14).

Figure 26. Inadequate Fruit and Vegetable Consumption for Boston Public High School Students by Year



DATA SOURCE: Boston Behavioral Risk Factor Survey (2013), Boston Public Health Commission
DATA ANALYSIS: Boston Public Health Commission as Reported in Health of Boston 2014-2015

Table 14. Inadequate Fruit and Vegetable Consumption for Boston Public High School Students by Select Sociodemographic Indicators, 2013

Boston	17%
Gender	
Female	19%
Male	16%
Age of Student	
<16 yrs.	17%
16-17 yrs.	18%
18+ yrs.	16%
Race	
Asian	6%
Black	19%
Latino	22%
White	11%

DATA SOURCE: Boston Behavioral Risk Factor Survey (2013), Boston Public Health Commission
DATA ANALYSIS: Boston Public Health Commission as Reported in Health of Boston 2014-2015

HPV Vaccination

Nationally, HPV vaccination coverage continues to fall behind other adolescent vaccination coverage estimates and remains below Healthy People 2020 targets of 80% coverage. According to the Centers for Disease Control, four out of ten adolescent girls and six out of ten adolescent boys have not started the HPV vaccine series, and are vulnerable to cancers caused by HPV infections. However, CDC reports that vaccination coverage of ≥2 dose coverage for females in Massachusetts significantly increased from 2013 to 2014 from 48.7% to 62.5%, exceeding the national average of 50.3%

CANCER SCREENING: PERCEPTIONS AND SURVEILLANCE DATA

The following section provides an overview of qualitative themes of perceptions of cancer screenings and key findings from surveillance data on behaviors and practices. Cancer screenings are a test or procedure used to look for cancer prior to the development of symptoms. They are a secondary prevention measure critical for early detection and prompt intervention when the disease is easier to treat. Knowledge of and equal access to comprehensive screening services is essential to improving cancer morbidity and mortality in Boston.

The screening-related information in this section includes self-reported data on cancer screening for breast cancer (mammograms and clinical breast exams), cervical cancer (Pap test), prostate cancer (prostate-specific antigen or PSA test) and colorectal cancer (colonoscopy/sigmoidoscopy). When available, the data are presented by neighborhood (especially for the DFCI priority neighborhoods of Mattapan, Roxbury, Jamaica Plain, Mission Hill and Dorchester), race/ethnicity, education status, and gender.

Perceptions of Cancer Screening

While cancer screening was deemed important by focus group participants and residents who key informant interviewees served, they cited a number of challenges including confusing screening guidelines, uncertainty about insurance coverage, discomfort, opportunity, cost of time and money for lengthier screening tests, and gender-based negative perceptions. Overall, in focus group discussions, there appears to be an awareness of the importance of regular cancer screenings, but this perception did not always translate into action due to barriers. A recurring theme in many discussions was confusion about what the cancer screening guidelines currently were and which tests pertained to which individuals. Focus group participants indicated that they were uncertain, and they sometimes heard differing media reports about screening which were sometimes inconsistent with provider messages.

Several participants also noted confusion about insurance coverage. While participants had insurance, it was not clear to them what their insurance covered, who they could go to for specific services, and how often. A few participants also commented that some screening tests were physically uncomfortable and that they would rather avoid them if they could. Additionally, focus group participants and key informant interviewees noted that for many residents, going to screening tests and other non-urgent health care appointments were challenging from an economic perspective. Residents might work hourly wage jobs and not be able to take time off work for lengthier screening tests or would need to find childcare during the time away.

"There are a lot of misconceptions of when and where people need to get screened." -Focus group participant

"Men generally don't want to talk about things like cancer screening...it's embarrassing."
-Focus group participant

Another key theme that emerged during discussions around screening tests was the gender differences in perspectives. Several key informants and male focus group participants themselves noted that men are more likely to feel emotionally uncomfortable talking about different screening tests with their provider and may be more likely to avoid certain tests—such as screenings for prostate cancer or colorectal cancer—altogether. A

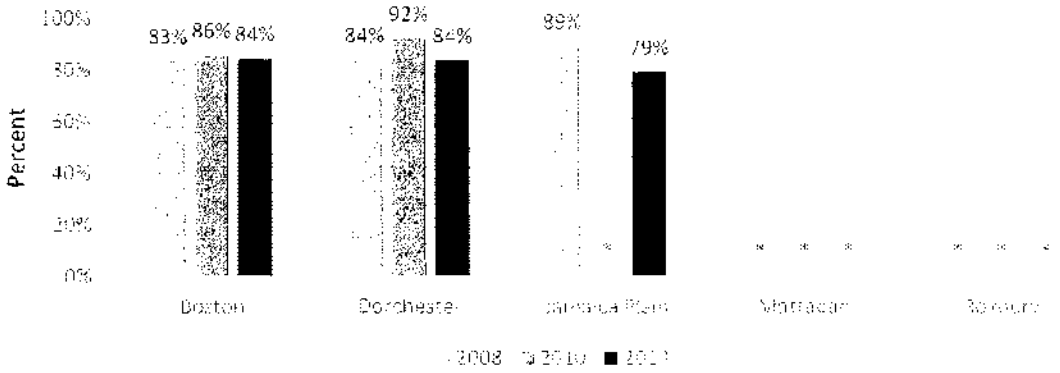
prostate cancer survivor described unique challenges that men face noting, *"I've noticed that men tend to deal with cancer and cancer screenings very differently, meaning no one likes to talk about it. Even among close friends, what I've found is that they don't want to expose their piece of whatever they're dealing with because they're embarrassed."*

Breast Cancer Screening

Screening rates for breast cancer are high in Boston, overall as well as in many populations of color.

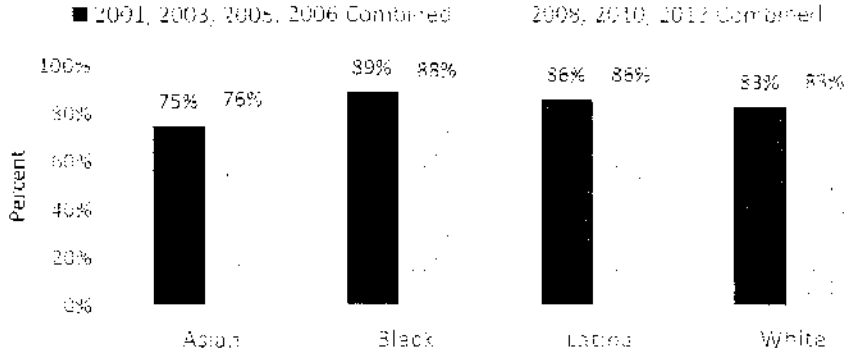
Mammograms, or an x-ray of each breast used to look for cancer, are among the most common breast cancer screening tests. Mammography rates have generally remained steady in Boston, with 84% of women ages 40+ years old reported receiving a mammogram in the past two years (Figure 27). Screening rates among race and ethnic groups have also remained steady over time. With data aggregated among years for a large enough sample size, Figure 28 illustrates that the percentages of women reporting having a mammogram in the past two years are highest among Black and Latina women (88% and 86% respectively) and lowest among Asian women (75%).

Figure 27. Percent Females Ages 40 and Over Reported to Have Had Mammogram Within Past 2 Years by Priority Neighborhood, 2008, 2010, and 2013



* Insufficient sample sizes for Jamaica Plain for 2010, and for Mattapan and Roxbury for 2008, 2010, and 2013
DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2008, 2010, and 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 28. Percent of Mammogram within the Past 2 Years by Race/Ethnicity, Boston Women Ages 40+



DATA SOURCE: Boston Behavioral Risk Factor Survey 2001, 2003, 2005, 2006, 2008, 2010, 2013, Boston Public Health Commission
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

As mentioned above, confusion about screening guidelines was a common theme among assessment participants. Relative to breast cancer screening guidelines specifically, recommendations have changed over the past several years and differ depending on the recommending agency. Comparing screening guidelines issued by the US Preventive Services Task Force between 2009 and 2016 for women with average risk of breast cancer, the Task Force continues to recommend biennial screenings for women ages 50 to 74. However, in 2016, it recommends that only women aged 40 to 49 have mammograms on a case by case basis depending on individual health history and personal values as opposed to all women under 50 based on individual health history. The American Cancer Society (ACS) on the other hand, changed their May 2003 to October 2015 recommendation of annual screening mammograms for women aged 40 and older with regular breast cancer risk to separate recommendations by age category. In these new guidelines issued in October 2015, ACS recommends that 40-44 year old women have the choice to begin annual screening with mammograms if they desire, 45 to 54 year old women should have annual mammograms and that women aged 55 and older should receive mammograms every two years but should have the choice to continue annual screening.

Given the variation in recommendations about what age regular breast cancer screening should begin, many analyses examine mammography rates among women 50-74 years old rather than 40+ years old. Among women 50-74 years old only, data indicate that 90% of Boston women reported having received a mammogram, higher than the 84% seen in Massachusetts overall for this age group. Among this age group, screenings are highest among Latina women, followed by Black and White women (Table 15).

Table 15. Percent of Mammogram within the Past 2 Years by Selected Sociodemographic Indicators, Females 50-74 yrs., 2013

[illegible]	[illegible]
Age	
50-59 years	91%
60-69 years	88%
70-74 years	88%
Race/Ethnicity	
Asian	*
Latina	96%
Black	91%
White	88%
Educational Attainment	
Less than High School	93%
High School Degree/GED	90%
Some College/ Bachelor's or Higher	89%
Income	
Below $25,000	89%
$25,000-$49,999	94%
$50,000 and more	87%
Insurance Status	
Insured	90%

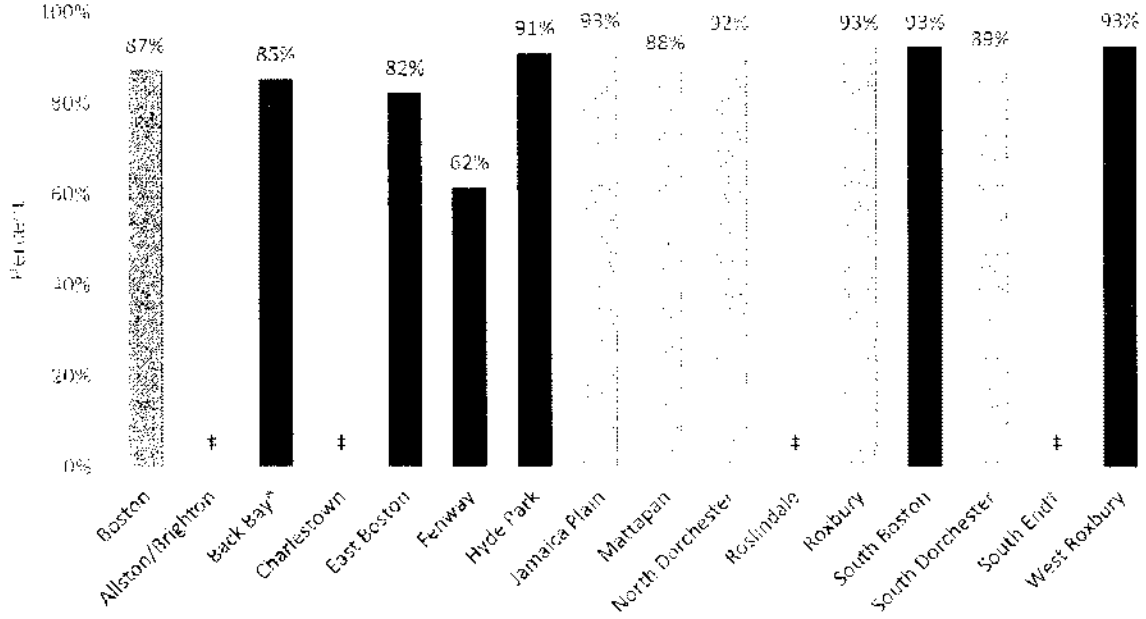
DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as reported in Health of Boston 2014-2015

"Getting breast cancer screenings are painful and uncomfortable. I avoid them if I can."
-Focus group participant

Cervical Cancer Screening

Cervical cancer screening rates are generally high across Boston and in DFCI's priority neighborhoods, although much lower among Asian women in Boston. Among women 21-65 years old in Boston, 87% reported receiving a pap test to screen for cervical cancer in the past three years. Percentages were even higher in many of DFCI's priority neighborhoods, where, for example 92-93% of women in Jamaica Plain, North Dorchester, and Roxbury reported receiving this screening. Among different demographic groups, rates are highest among 30-44 year old women at 95% and White women at 92%. However, only 62% of Asian women in Boston ages 21-65 years old reported receiving a pap test in the past three years.

Figure 29. Percent Females Ages 21-65 Reported to Have Had a Pap Test Within Past 3 Years by Neighborhood, 2013



‡ Insufficient sample
*Includes Back Bay, Beacon Hill, West End, and the North End
†Includes Chinatown
DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

"There are contradictory opinions about who should be screened and how often." -Focus group participant

Table 16. Percent of Females 21-65 yrs. Who Received a Pap Test Within the Past 3 Years by Selected Sociodemographic Indicators, 2013

[illegible]	[illegible]%
Age	
21-29 yrs.	80%
30-44 yrs.	95%
45-59 yrs.	86%
60-65 yrs.	76%
Race/Ethnicity	
Asian	62%
Black	86%
Latino	84%
White	92%
Educational Attainment	
Less than High School	82%
High School Degree/GED	85%
At Least Some College/Bachelor's or Higher	87%
Income	
<$25,000	78%
$25,000-$49,999	89%
$50,000+	93%
Insurance Status	
Insured	87%
Uninsured	*

*Insufficient Sample Size
DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as reported in Health of Boston 2014-2015

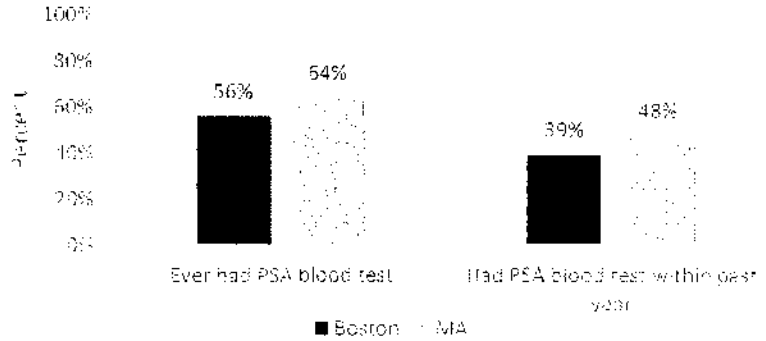
As with breast cancer screening recommendations, cervical cancer screening recommendations vary by age group and this may contribute to some of the confusion about screening expressed by focus group participants. The USPSTF recommends screening for cervical cancer in women age 21 to 65 years with a Pap test every three years. For women age 30 to 65 years who want to lengthen the screening interval, they recommend screening with a pap test and a human papillomavirus (HPV) DNA test every five years.

Prostate Cancer Screening

The proportion of men in Boston who have ever had a PSA test or who have had a PSA test in the past year is lower than the proportion of men in Massachusetts overall. As shown in Figure 30, among adult men 40 years old and over in Boston, 56% reported ever having had a Prostate Specific Antigen (PSA) blood test, whereas 39% reported having the test done within the past year. Compared to Boston, a higher percentage of men in Massachusetts overall reported ever having a PSA blood test (64%) and having had the test within the past year (48%). When looking across race and ethnicity in Boston, a higher proportion of White men reported to have

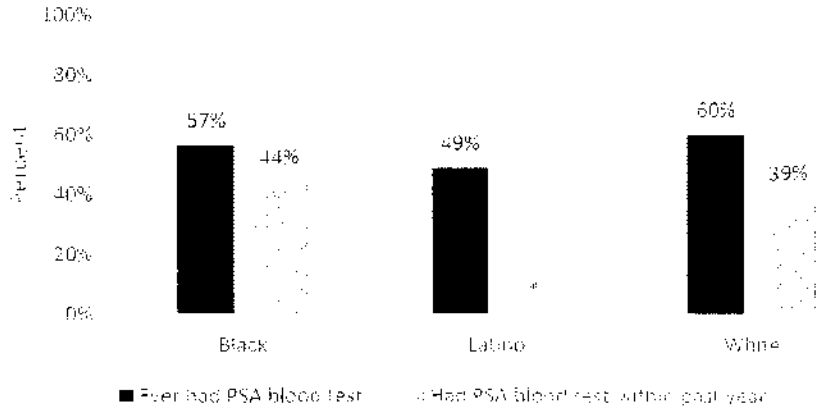
ever had a PSA blood test (60%) than Black (57%) and Latino (49%) men (Figure 31). The comparisons among race and ethnicity were similar when looking at Massachusetts overall.

Figure 30. Percent Males 40 Years Old and Over Reported to Have Ever Had a Prostate Specific Antigen (PSA) Blood Test and Have Had a PSA Within the Past Year, by Boston and Massachusetts, 2011-2013



DATA SOURCE: Massachusetts Behavioral Risk Factor Surveillance Survey (BRFSS), Massachusetts Department of Public Health, MassCHIP, 2011-2013

Figure 31. Percent Boston Males 40 Years Old and Over Reported to Have Ever Had a Prostate Specific Antigen (PSA) Blood Test and Have Had a PSA Within the Past Year, by Race/Ethnicity, 2011-2013



* Insufficient sample size (insufficient sample sizes also for Asian)
DATA SOURCE: Massachusetts Behavioral Risk Factor Surveillance Survey (BRFSS), Massachusetts Department of Public Health, MassCHIP, 2011-2013

Data about shared decision making between patient and provider relative to the PSA test are not available at the city/town-level however, data are available for the state overall. According to Behavioral Risk Factor Surveillance Survey (BRFSS) from the Massachusetts Department of Public Health, in 2014, nearly four in ten (37.0%) men in Massachusetts reported discussing the advantages and disadvantages of the prostate specific antigen test to screen for prostate cancer with their health care provider. Black non-Hispanic men (53.4%) were more likely to discuss the advantages of PSA test with their providers than White-non-Hispanic men (35.0%) or Hispanic men (30%).

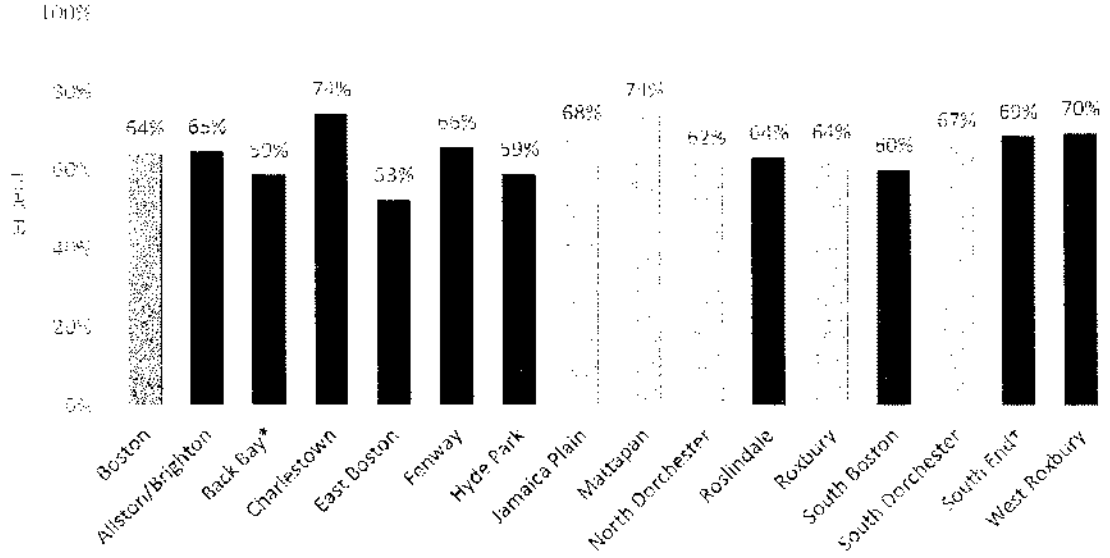
Similar to breast and cervical cancer screenings, assessment participants discussed confusion around prostate cancer screening guidelines. Changing recommendations and differing screening recommendations between

guideline issuing institutions may be a contributing factor to this lack of clarity. The USPSTF recommended against prostate specific antigen based screening tests for prostate cancer in 2012. This was a stronger recommendation than it had made previously in 2008 when it concluded that men over 75 should not be screened and that there was not enough evidence to recommend for or against screening in younger men. The USPSTF recommendation differs slightly from those of many other expert groups, including the American Cancer Society. The American Cancer Society recommends men make an informed decision about whether to be tested after learning about the potential risks and benefits of testing.

Colorectal Cancer Screening

As discussed previously, focus group participants indicated that longer screening tests such as colonoscopies have greater challenges for many residents, which is validated in the quantitative data that indicate that only 64% of Boston residents ages 50-75 years old have had a colonoscopy or sigmoidoscopy in the past five years. For data by neighborhood, 74% of Mattapan residents and 69% of Jamaica Plain residents in this age group indicated receiving a colonoscopy/sigmoidoscopy in the past five years (Figure 32). Table 17 shows the breakdown of the data by demographic group, indicating rates are somewhat equally distributed although 67% of those with at least some college education reported receiving a colonoscopy/sigmoidoscopy while 56% with those less than a high school education did.

Figure 32. Colonoscopy/Sigmoidoscopy within Past 5 Years, Adults Ages 50-75 by Neighborhood, 2013



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
*Includes Beacon Hill, Downtown, the North End, and the West End
†Includes Chinatown

Table 17. Percent Adults Age 50-75 Who Received Sigmoidoscopy or Colonoscopy in the Past 5 Years, 2013

Boston	64%
Age	
50-59 yrs.	60%
60-69 yrs.	70%
70-75 yrs.	68%
Race/Ethnicity	
Asian	*
Black	67%
Latino	66%
White	64%
Educational Attainment	
Less than High School	56%
High School Degree/GED	64%
At Least Some College/ Bachelor's or Higher	67%
Income	
<$25,000	62%
$25,000-$49,999	66%
$50,000+	69%
Insurance Status	
Insured	65%
Uninsured	*

DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as reported in Health of Boston 2014-2015

Screening guidelines for colorectal cancer have not changed drastically in the past several years with similar recommendations being issued by different institutions. In their most recent guidelines issued in 2016, the USPSTF recommends screening for colorectal cancer starting at age 50 and continuing until age 75. For adults aged 76 to 85, the Task Force recommends that the decision whether or not to screen should be an individual one, taking into account the patient's overall health and prior screening history. Similarly, the American Cancer Society since 2008 continues to recommend that adults aged 50 and older get a colonoscopy every ten years or a flexible sigmoidoscopy every five years.

HEALTH CARE UTILIZATION, CANCER INCIDENCE, AND MORTALITY: PERCEPTIONS AND SURVEILLANCE DATA

The following section describes the focus group and key informant participants' overall perceptions of cancer, the health care system, barriers, and experiences along with key quantitative findings, following by quantitative and qualitative findings related to cancer incidence and mortality in Boston.

Perceptions of Cancer Incidence

Focus group and interview discussions asked participants about the issues in their community that were most concerning and where cancer fell on that list. The following section describes the key themes regarding participants' overall levels of concern around cancer in their community. The sections that follow detail the findings from the qualitative discussions and surveillance data specifically related to cancer prevention, screening, treatment, and survivorship.

Cancer as a Community Concern

Among participants without direct experience with cancer or among key informants not working with cancer patients directly, cancer was not described as a pressing community health concern unless prompted. Mental health, substance abuse, diabetes, and community violence were named as top health concerns in the community when participants were asked unprompted. When the facilitator asked focus group and interview participants specifically about whether cancer was a critical health concern in their community, most participants agreed that it was. Types of cancers frequently mentioned by focus group participants included breast, colon, prostate, and stomach cancers. Residents were also concerned about the perceived increase of less typical cancers such as oral cancer, liver cancer, and Hodgkin's Disease. Residents wondered whether there was a gradual increase in cancer diagnoses among youth and young adults, indicating that they have heard more about cancers in younger populations recently. As one focus group participant shared, *"My niece is in her early twenties and was just diagnosed [with cancer]. It seems like people are getting cancer younger and younger these days; rare ones at that."*

Participants also noted that cancer is not just a condition in their neighborhoods but across the city, state, and country. They noted that cancer can affect anyone. As one participant shared, *"Cancer doesn't discriminate. People in all communities regardless of age, gender, or race are vulnerable."*

Level of Concern around Cancer

Similar to the 2013 CHNA findings, focus group participants without any direct experience with cancer expressed a tremendous amount of fear associated with cancer and the high risk of death from the disease. They recognized that people survived the condition, but they indicated that they were incredibly fearful of a cancer diagnosis for them or a family member. In the 2016 CHNA, discussions also explored perceptions among cancer survivors. Cancer survivors who were part of the conversations reported a positive outlook on their cancer diagnosis agreeing that *"cancer is no longer the big C."* They were optimistic about their health and life ahead and did not want others to think that a cancer diagnosis would end that.

Cultural Norms and Beliefs

When discussing how they viewed cancer, both key informant interviewees and focus group participants acknowledged that there are many cultural beliefs that shape their perceptions. As one interviewee said, *"There are different cultural approaches to care that need to be taken into consideration such as religion, language, and social norms."* Many of these beliefs and norms are rooted not only in culture but by gender. Given that certain cancer-related issues focus on the reproductive system, comfort levels vary by culture in how

patients discuss these issues with their providers. Additionally, many participants remarked that men often avoid doctors and diagnoses out of fear and further delay these activities (e.g., colonoscopy, PSA exam) when the focus is related to certain organs. Similarly, participants reported that they preferred having a provider that matched their gender, claiming that it was easier to connect and feel comfortable asking questions.

Perceptions of the Local Health Care System

Overall, participants reported positive perceptions about health services in the city of Boston, citing ample medical services, hospitals, and community centers in the city. Focus group participants recognized the multitude of services and health care institutions in the city and noted that this is a world-class city with regards to quality of care both in primary and specialty care. Participants viewed the academic medical centers in the city as incredible institutions with a wealth of expertise. When asked about where they received their primary care, most focus group participants reported obtaining their primary care from community health centers, which were viewed as important anchors in the community who provided high quality of care. However, there were varying opinions of how easy it was to receive care from local centers. Some focus group participants, many of whom participated in the Spanish-speaking focus group, described challenges to accessing services at local health centers, citing long wait times, insufficient interpretation services, and limited face-to-face interactions with providers. Other participants disagreed and indicated that they received high-quality care at local health centers saying, *"When I was diagnosed with prostate cancer, I had a primary care provider who went above and beyond to help me. This made things relatively easy for me, but I dread to think about those without a good health plan or who don't have a sensitive and knowledgeable PCP."*

Barriers and Challenges to Accessing Health Care Services

While focus group participants and key informant interviewees noted the quantity and prestige of the health care institutions in the city, they also recognized that there was not necessarily equal access for all patients. Participants discussed a number of barriers and challenges that they have encountered or community members they know have experienced in accessing health care services in the city. Key themes included the following:

<u>Insurance Status and Cost-Related Barriers</u>

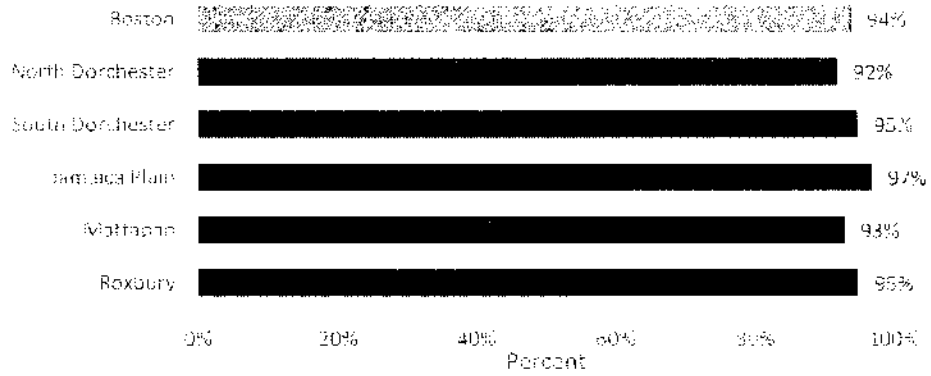
While interviewees and focus group participants generally stated that it seemed that most community members have access to health insurance, there was much confusion about the details of coverage, deductibles, which providers were covered, and the co-pays required. These themes were slightly different than in the 2013 CHNA, where lack of insurance was a prominent issue. In 2016, the conversations focused more on uncertainty of what insurance actually covered. Many focus group participants described *"being treated differently if you have MassHealth,"* perceiving longer wait times, less access to specialty care, and fewer access to support services. Further, there were several assumptions that specialty hospitals in Boston did not take MassHealth, with residents indicating that they did not seek out more information because *"I know you need to have the best insurance to go to the best hospitals."*

> *"We're limited in what hospitals or doctors we can see because of our health insurance coverage."*
> *-Focus group participant*

Several interviewees and focus group participants discussed confusion related to high deductibles and co-pays. They were not clear what types of services were covered and which were not. If there were high deductibles or co-pays, then this presented an additional barrier to patients. The consequence, several shared, is that people decide not to get health care or had trouble affording medications.

As seen in Figure 33, the majority of Boston residents reported having health insurance in 2013. Since 2005, Latinos have had the lowest rates of insurance coverage among all other racial/ethnic groups in the city of Boston (Table 18).

Figure 33. Percent Adults with Health Insurance Coverage by Boston City-Wide and Priority Neighborhood, 2013



DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Table 18. Trends in Adults with Health Insurance Coverage by Race/Ethnicity in Boston, 2005-2013

	2005	2006	2008	2010	2013
Boston	90.6%	92.1%	97.1%	95.5%	94.1%
Asian	89.6%	92.7%	-	-	94.8%
Black	88.9%	91.1%	96.3%	93.8%	93.6%
Latino	83.6%	88.1%	93.0%	89.4%	87.0%
White	93.4%	94.7%	98.9%	97.5%	96.4%

DATA SOURCE: Boston Behavioral Risk Factor Surveillance Survey (BBRFSS), 2013
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Navigating a Complex Health System

A common theme among assessment participants was the difficulty navigating the complex health system, especially when dealing with a chronic disease. Residents described confusion around insurance coverage as well as being overwhelmed by the number of appointments they needed to make and steps that had to be taken. These issues were especially prominent for cancer patients, who described feeling deeply emotional after a cancer diagnosis to then *"someway figure out what cancer is, what hospital I should go to, what doctors I qualify for, and finally how I'm supposed to pay for it all. It's exhausting."* Patient navigators and social workers were described as *"critical"* throughout one's cancer journey, with cancer survivors saying, *"I honestly don't know what I would have done if social workers hadn't connected me to financial help and support groups. I felt like they helped me carry some of the weight of this very heavy burden."*

> *"Navigating the health care system is daunting when you have cancer."* -Focus group participant

Culturally Competent Care

Navigating a complex health system is especially challenging when English is not a patient's first language; key informants working with patients and Spanish-speaking cancer survivors described language and cultural barriers as particularly challenging. While provider interviewees reported that they have access to interpretation services and some have bilingual staff (Spanish-speaking), language and cultural barriers still remain a concern. Residents indicated this was especially problematic when calling for information or administrative services. Key informants noted that it is challenging enough for well-educated, English-speaking patients to navigate the complex health system in America. The frustration and confusion are compounded when the patient does not speak English and has trouble obtaining the logistical and administrative information on top of a challenging diagnosis.

Spanish speakers explained that they could not participate in many educational programs because they were not offered in their language. As one interviewee shared, *"I am grateful for all of the services provided by the hospitals, and I would like to participate in more, but I wish more groups were available in Spanish."* Further, focus group participants explained that there are many cultural approaches to care, and providers should consider language, cultural norms, and religion when caring for patients. This rapport could be established, suggested residents, by engaging in healthcare providers in community dialogues focused on cultural exchanges.

Transportation

As previously mentioned, transportotion barriers to accessing health core were o common theme across focus groups and interviewees, with residents indicating thot public transportation was not a viable option, especially in Mattapan and some ports of Dorchester. Parking was also cited as a daily stressor for many residents in these neighborhoods saying, *"parking in Mattapan is terrible. I've lived here for 35 years and eoch year is worse than the last."* Focus group participants and internal interviewees reported several hospital-led initiatives to address the transportation challenges, but indicated that there were gaps in services to assist patients with day-to-day chores such as grocery shopping.

Perceived Disparities in Cancer Treatment and Care

Across all focus groups, communities of color were identified as traditionally underserved, yet some focus group participants saw this as changing. Nearly all focus group participants were African American or Hispanic and many discussed the inequities that communities of color face overall and in the health care system. However, the English-speaking cancer survivor focus group, comprised of all African American women above the age of 50 noted that they saw improvements in the last decade as far as the availability of care offered and interaction with providers that they have had. As one participant said, *"I remember being treated so much differently than White patients back in the 80's. It was very hard to come by support services or therapy. We've come a long way since then, but there's still some ways to go [in improving cancer care for people of color]."*

Information and Access to Clinical Trials

Several key informant interviewees described the need for improved access to clinical trials for communities of color as an important step for improving disparities. As one participant said, *"having access to clinical trials is hugely important, especially for those in different racial and ethnic backgrounds, because we don't know what treatments work for these populations. We should be training community health workers and patient navigators to tell residents about clinical opportunities and who to contact."* Several key informant interviews discussed the importance of improving outreach and trust in the communities as well as training providers and researchers on engagement strategies.

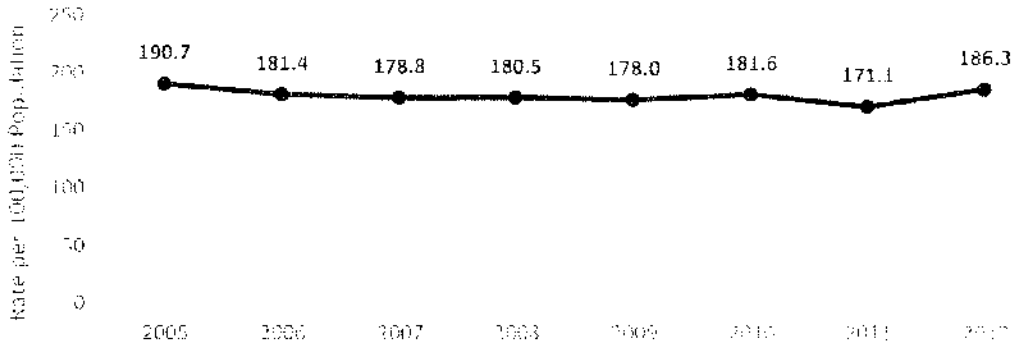
Awareness of Services

While the community has substantial health and social services resources, several respondents reported that people are not always aware of the range of services that are available to them. As one focus group participant noted, *"I've been a case manager in Mattapan for five years, and I know of so many underutilized resources because residents simply don't know about them."* Other residents felt that services were duplicative and said, *"I know of some organizations that provide the same service. If they put their resources together they could help more community members."* Across all groups the Mammography Van was cited as a strong presence in their communities, but some residents were unaware of the services offered saying, *"I see the van come every Tuesday, but I'm not sure if it's for women only or if men can get services too."* In these conversations, access to services was not the issue, but instead, promotion and increasing awareness of existing services—as well as coordination across services—were seen as important to improving the quality of care.

Overall Cancer Mortality

Cancer is the leading cause of death in Boston, followed by heart and cerebrovascular disease (including stroke). Cancer and heart disease remained the top two leading causes of death for all racial/ethnic groups from 2008 to 2013 (data not shown). Since 2005 there has been an overall downward trend in cancer mortality; in 2012 however, the rate of cancer deaths in the city of Boston increased from 171.1 per 100,000 in 2011 to 186.3 per 100,000.

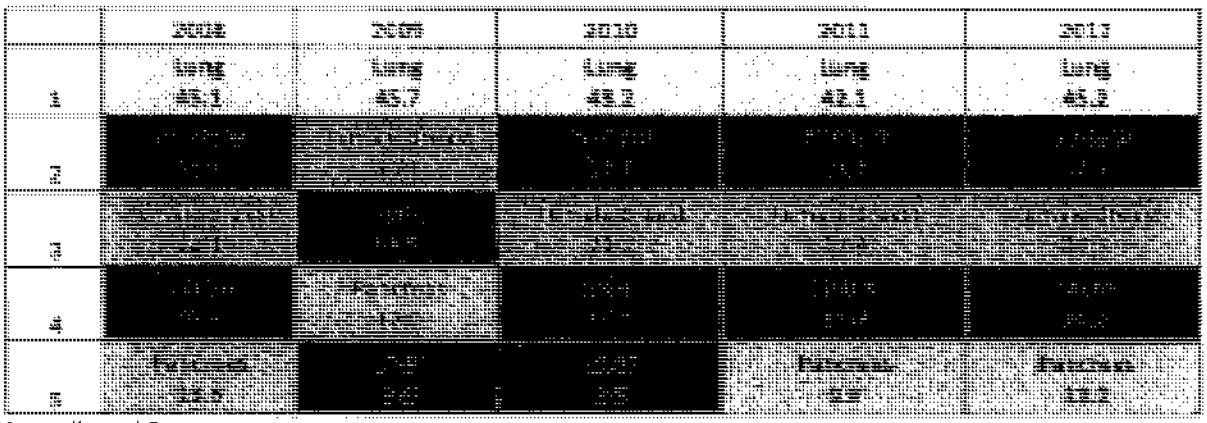
Figure 34. Age-adjusted Cancer Mortality Rate per 100,000 Population, Boston 2005-2012



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation as reported in Health of Boston 2012-2013, 2014-2015

As shown in Figure 35, lung, prostate, female breast, and colon cancers were the leading types of cancer deaths in Boston from 2010-2015. The five leading age-adjusted cancer death types stayed relatively stable from 2008-2012. Death rates increased slightly for all five cancers (lung, prostate, female breast, colon, pancreas) from 2011 to 2012.

Figure 35. Leading Types of Cancer Death Rate per 100,000 Boston Residents by Year, 2008-2012



*Age-adjusted Rates
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office as reported in Health of Boston 2014-2015

Similar to 2013 findings, Black residents had the highest age-adjusted cancer death rates of from 2010-2012, followed by White residents. Asian and Latino residents had the lowest age-adjusted cancer rates from 2010-2012.

As discussed in the Limitations section, the Boston Public Health Commission has adopted the use of new population data for rate generation, thus impacting earlier data reported by DFCI. Specifically, mortality rates reported in the 2013 CHNA were generated by using the 2000 U.S. Census, and data from the 2014-2015 Health of Boston report were reanalyzed using newer population estimates that reflect a shift in the White and Black age distribution across the city of Boston. As a result of the change in age and racial make-up of the city, updated cancer mortality rates by race show less variation by race than originally reported in 2013.

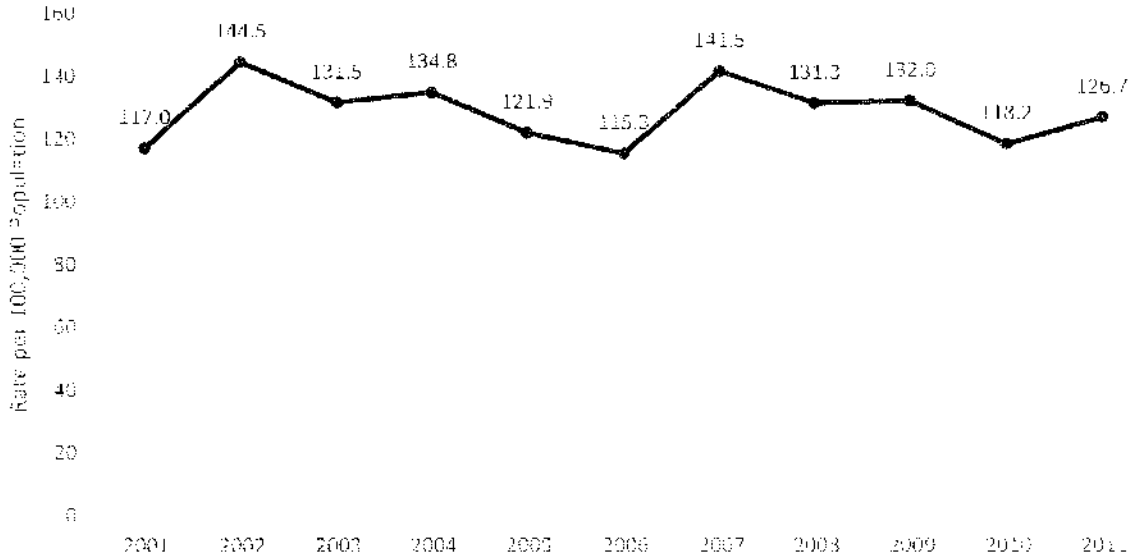
Breast Cancer Incidence and Mortality

While breast cancer incidence has remained steady and mortality has declined, mortality rates due to cancer are still disproportionately higher among Black women in Boston. The following section describes the data in greater detail.

Breast Cancer Incidence

There is variation in breast cancer incidence in Boston across the last decade with a generally slow decline since 2007; the rate of new cases is lowest among Latina women in Boston. Figure 36 shows the age-adjusted rate of new cases of breast cancer per 100,000 population among females in Boston from 2001-2011.

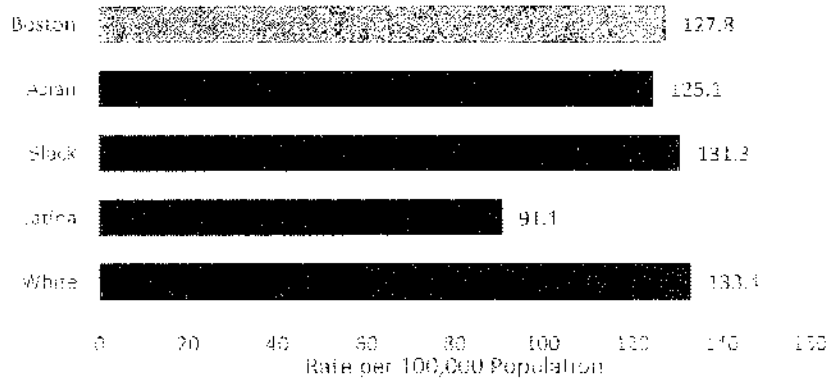
Figure 36. Age-Adjusted Breast Cancer Incidence Rate per 100,000 Population, Boston, 2001-2011



DATA SOURCE: Massachusetts Department of Public Health, Massachusetts Cancer Registry, BPHC Health of Boston 2009 Report; 2006-2010 data from Massachusetts Cancer Registry, MassCHIP

Figure 37 shows the 2011-2012 aggregated rate by race/ethnicity in Boston, illustrating that Latinas experienced the lowest rate of breast cancer incidence in the city of Boston with 91.1 cases per 100,000 population. Conversely, White and Black residents experienced the highest breast cancer incidence rates of 133.4 cases per 100,000 and 131.3 per 100,000 population, respectively.

Figure 37. Age-Adjusted Breast Cancer Incidence Rate per 100,000 Population by Race/Ethnicity, Boston 2011 and 2012 Combined

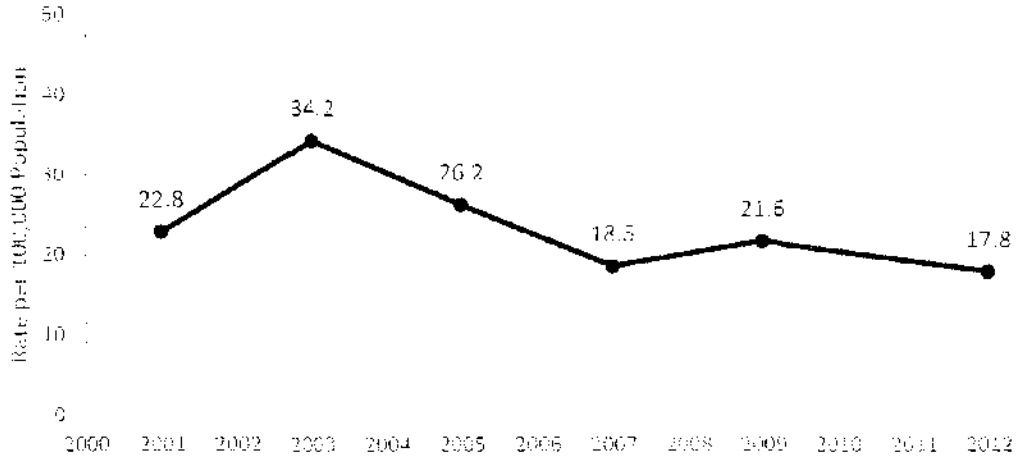


DATA SOURCE: Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Breast Cancer Mortality

Breast cancer mortality has significantly declined in the past decade in Boston, yet rates vary by racial/ethnic group. Figure 38 illustrates the breast cancer mortality rate per 100,000 population among female Boston residents from 2001-2012 and indicates a steady decline in those years particularly since 2002.

Figure 38. Female Breast Cancer Mortality Rate* per 100,000 Population, Boston Residents, 2001-2012



*age-adjusted rates. 4.5% year to year decrease p<.001

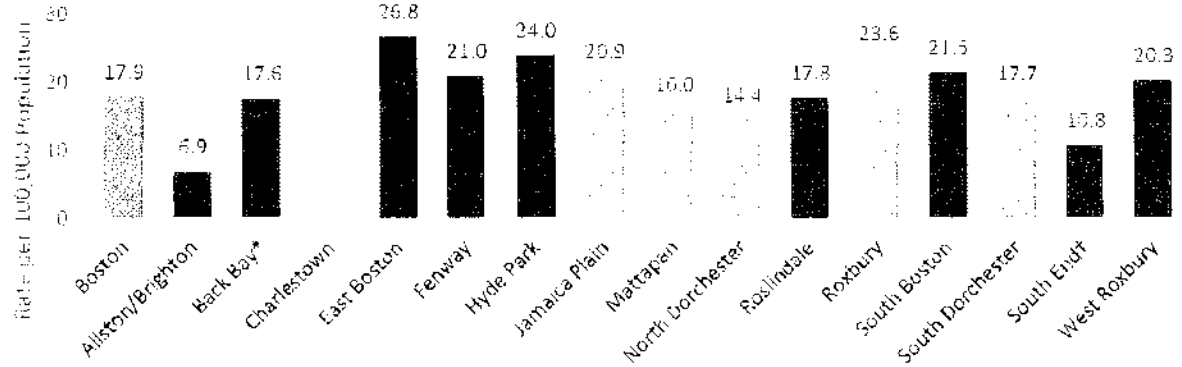
NOTE: Death data for 2012 are preliminary and should be interpreted with caution. Until data are final, some changes in data values may occur during data quality processes.

DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 39 provides data on the breast cancer mortality rate in Boston and by neighborhood aggregated for 2011-2013 to ensure a robust sample size. While the mortality rate in Boston was 17.9 deaths per 100,000 population, rates were 23.6 and 20.9 deaths per 100,000 population in Roxbury and Jamaica Plain respectively. As shown in Figure 40, breast cancer mortality using 10-year aggregated data was significantly higher among Black women as compared to their White, Latina, and Asian counterparts.

Figure 39. Age-Adjusted Female Breast Cancer Mortality Rate per 100,000 Population by Neighborhood, 2011, 2012, and 2013 Combined



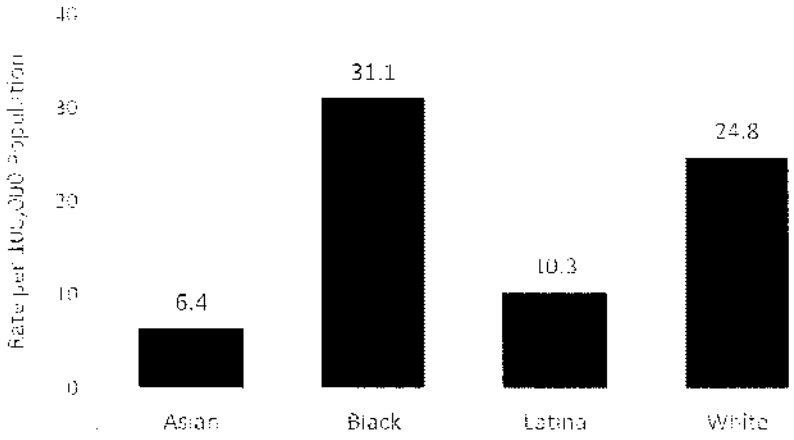
NOTE: Insufficient data to calculate rate for Charlestown

DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

*Includes Beacon Hill, Downtown, the North End, and the West End; †Includes Chinatown

Figure 40. Female Breast Cancer Mortality Rate* per 100,000 Population by Race/Ethnicity, 2001-2012

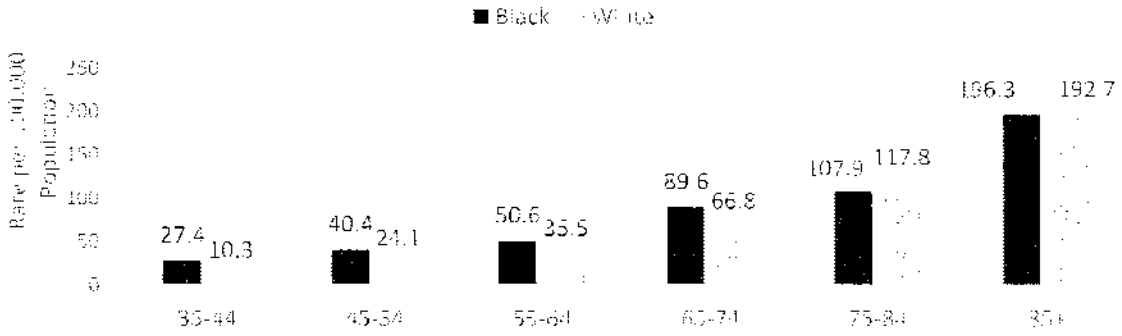


*average annual (i.e., annualized 12-year) age-adjusted rates. B >A,L,W
NOTE: Death data for 2012 are preliminary and should be interpreted with caution. Until data are final, some changes in data values may occur during data quality processes.
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office B:W+25 p<.01

When examining breast cancer deaths by age group and overall mean age of death by race/ethnicity, the figures below indicate that minority women in Boston are more likely to die at a younger age from breast cancer compared to White women. For example, mortality rates among White women in the 45-54 year age range and 55-64 year age range were 24.1 deaths per 100,000 population and 35.5 deaths population per 100,000 respectively, compared 40.4 deaths per 100,000 and 50.6 deaths per 100,000 for Black women (Figure 41).

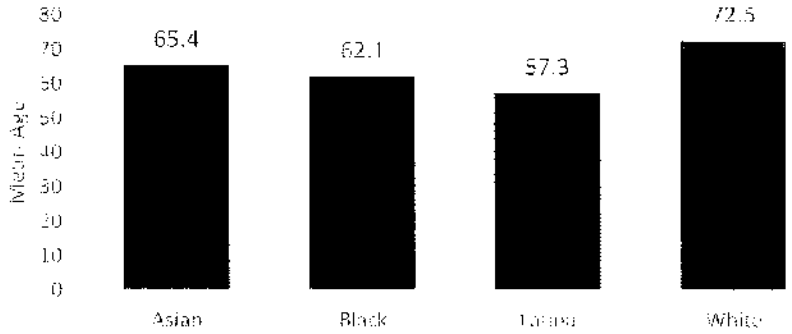
Similarly, 2001-2012 aggregated data across races/ethnicities indicate that the Black and Latina women have lower average ages of death from breast cancer compared to White women. Latinas in Boston are on average 57.3 years old and Blacks are on average 62.1 years old at age of death from breast cancer, compared to an average age of 72.5 years old for White women in Boston (Figure 42).

Figure 41. Female Breast Cancer Mortality Rate* per 100,000 Population by Age Group 2007-2012



* Average annual (i.e., annualized 6-year) age-specific rates.
NOTE: Death data for 2012 are preliminary and should be interpreted with caution. Until data are final, some changes in data values may occur during data quality processes.
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 42. Mean Age of Female Breast Cancer Mortality by Race/Ethnicity, 2001-2012



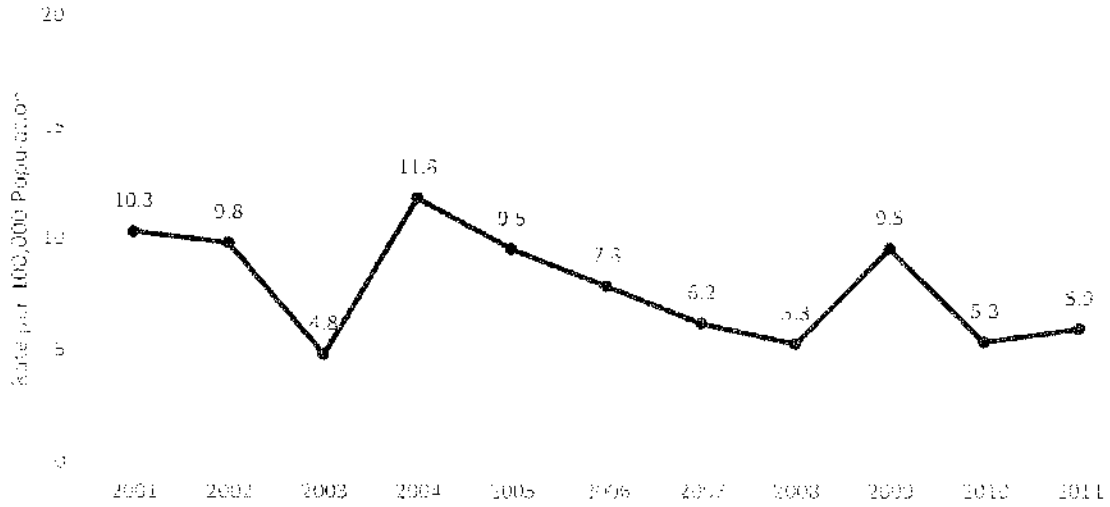
NOTE: Death data for 2012 are preliminary and should be interpreted with caution. Until data are final, some changes in data values may occur during data quality processes.
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Cervical Cancer Incidence

Cervical cancer incidence rates have seen a steady decline since 2004. As seen in Figure 43, the most current data indicate the rate of new cases of cervical cancer in Boston as 5.9 cases per 100,000 population.

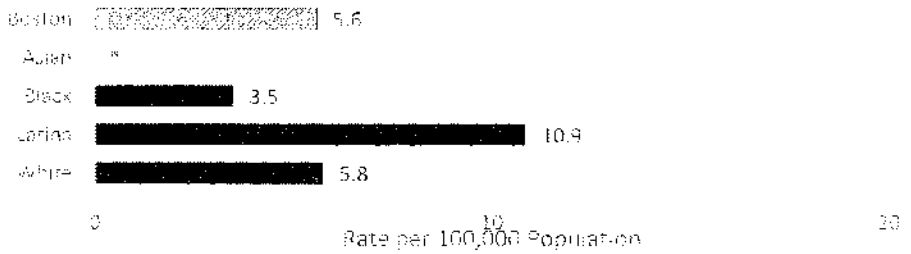
Figure 44 shows aggregated cervical cancer incidence data for 2011-2012 by race/ethnicity. While Latinas have a 10.9 cervical cancer incidence rate per 100,000 population, data should be interpreted with caution given the small number of cases that comprise these rates. A small change in the actual case number can alter the rate dramatically given that cervical cancer is not as common as other cancers in Boston. Cervical cancer mortality data are unavailable due to the small number of cases.

Figure 43. Age-Adjusted Cervical Cancer Incidence Rate per 100,000 Population, Boston, 2001-2011



DATA SOURCE: Massachusetts Department of Public Health, Massachusetts Cancer Registry, MassCHIP
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation, as Reported in Health of Boston 2013

Figure 44. Age-Adjusted Cervical Cancer Incidence Rates per 100,000 by Race/Ethnicity, Boston, 2011 and 2012 Combined



DATA SOURCE: Massachusetts Department of Public Health, Massachusetts Cancer Registry, MassCHIP
DATA ANALYSIS: Massachusetts Department of Public Health
*Insufficient Sample
Note: All rates by race/ethnicity have very small counts of less than 20 each and should interpreted with caution

Prostate Cancer Incidence and Mortality

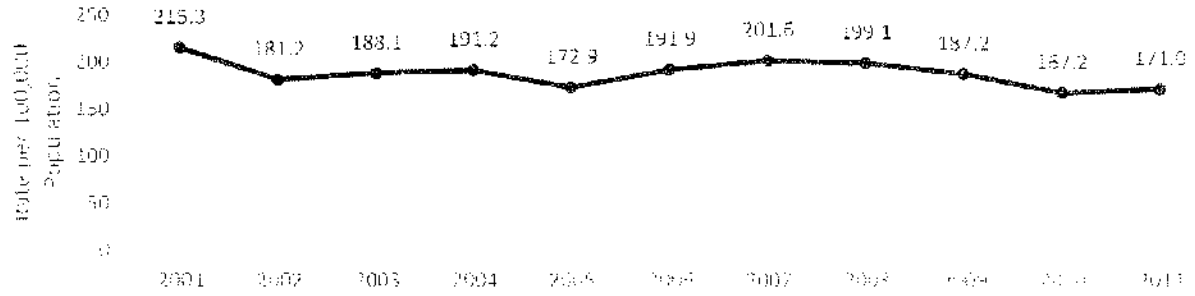
For both prostate cancer incidence and mortality, rates appear to be disproportionately higher among Black men in Boston compared to other groups. The following sections provide more detailed data on these trends.

Prostate Cancer Incidence

Overall, there has been a downward trend in prostate cancer incidence rates from 215.3 cases per 100,000 in 2001, to 171.0 cases per 100,000 population in 2011 (Figure 45), although there have been fluctuations throughout the decade. However, there continues to be great disparity in prostate incidence for Black men compared to all other race and ethnic groups. In 2012, Black men were more than twice as likely to be diagnosed with prostate cancer than their White counter parts, and more than four times as likely than Asian men (
Figure 46).

Qualitative discussions mirrored these findings, with male African American cancer survivors describing perceived disparities in cancer screening and treatment among African American men. As one participant described, *"The evidence suggests that African American men and other high-risk groups are not getting screened [for prostate cancer] in the same way. There are conflicting opinions around screening guidelines and protocols."* Several African American prostate cancer survivors remarked that dealing with prostate cancer for men is challenging—from screening confusion and embarrassment, to health care access issues, to their own delay in seeking care.

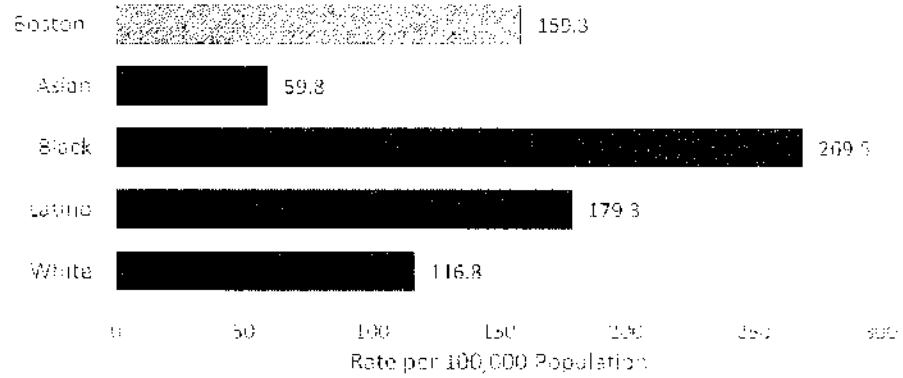
Figure 45. Age- Adjusted Prostate Cancer Incidence Rate per 100,000 Population, Boston, 2001-2011



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health; 2006-2010 data from Massachusetts Cancer Registry, MassCHIP

DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Figure 46. Age-Adjusted Prostate Cancer Incidence Rate per 100,000 Population by Race/Ethnicity Boston 2011 and 2012 Combined



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Prostate Cancer Mortality

Similar to trends in incidence, Black men have higher prostate cancer mortality rates compared to other groups. Table 19 indicates that the prostate cancer mortality rate for Black men in Boston is nearly three times the prostate cancer mortality rate among White men. Similarly, as Figure 47 shows mortality rates by neighborhood, Mattapan, a predominantly African American neighborhood, has a prostate mortality rate three times that of Boston overall.

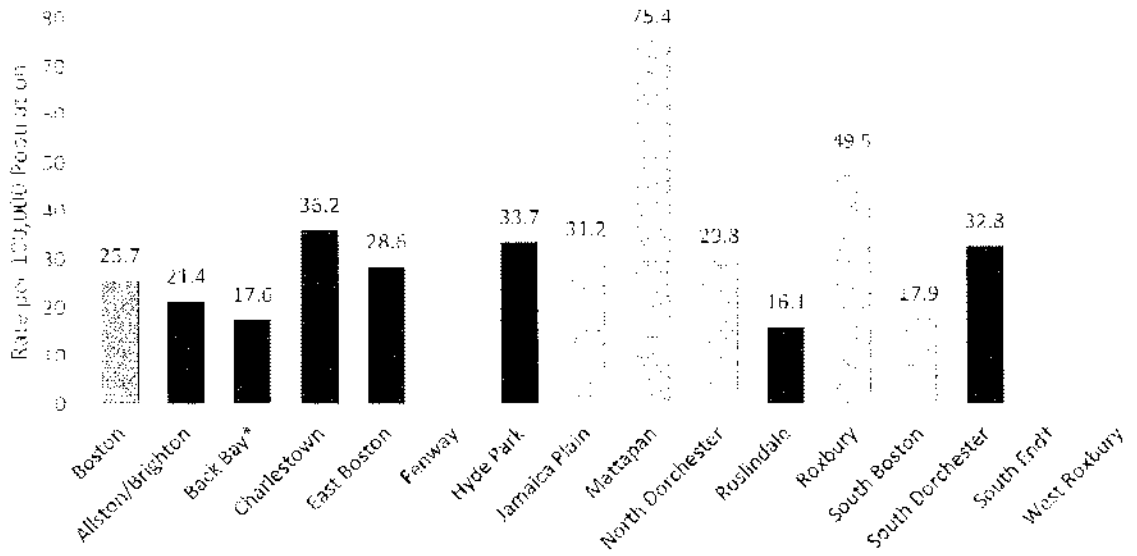
Table 19. Age-Adjusted Prostate Cancer Mortality Rate per 100,000 Population, by Race and Ethnicity and Year, Boston, 2008-2012

Race/Ethnicity	2008	2009	2010	2011	2012
Asian	†	†	†	†	†
Black	55.3	32.3	66.7	52.2	58.9
Latino	†	†	45.6	23.7	†
White	22.7	26.1	†	†	20.1

†Not calculated, n<5; *Age-adjusted rates
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

"In my opinion prostate cancer survivors carry the heaviest burden as far as needing to know information and navigating the system." -Interview participant

Figure 47. Age-Adjusted Prostate Cancer Mortality Rate per 100,000 Population by Neighborhood, 2011, 2012, and 2013 Combined



NOTE: Data insufficient to calculate rates for Fenway, South End, and West Roxbury
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
*Includes Beacon Hill, Downtown, the North End, and the West End; †Includes Chinatown

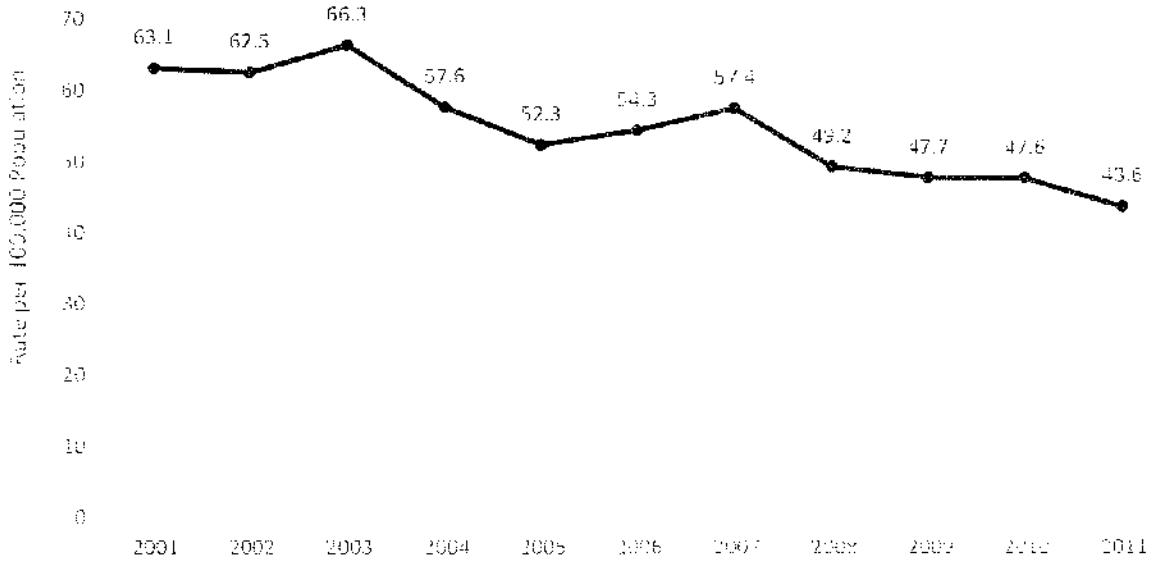
Colorectal Cancer Incidence and Mortality

While colorectal cancer screening rates is a bit lower compared to other cancers, colorectal cancer incidence and mortality has seen a general trend downward over many years. The following section provides more detailed data on incidence and mortality for this type of cancer.

Colorectal Cancer Incidence

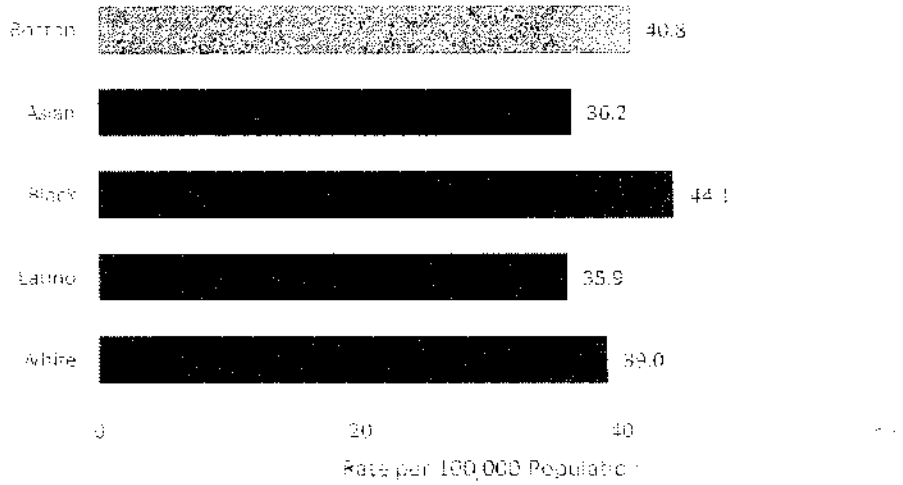
Overall, there has been a downward trend in colorectal cancer incidence rates from 63.1 per 100,000 in 2001, to 43.6 per 100,000 population in 2011, and there appears to be little variation by race/ethnicity in current colorectal cancer incidence rates. Figure 48 presents data on age-adjusted colorectal cancer incidence rates in Boston from 2001-2011, while Figure 49 illustrates the most current colorectal cancer incidence rate data (2011-2012 combined) per 100,000 population by race/ethnicity.

Figure 48. Age-Adjusted Colorectal Cancer Incidence Rate per 100,000 Population, Boston, 2001-2011



DATA SOURCE: Massachusetts Department of Public Health, Massachusetts Cancer Registry, BPHC Health of Boston 2009 Report; and Department of Public Health, MassCHIP, 2011

Figure 49. Age- Adjusted Colorectal Cancer Incidence Rates per 100,000 by Race/Ethnicity, Boston 2011 and 2012 Combined



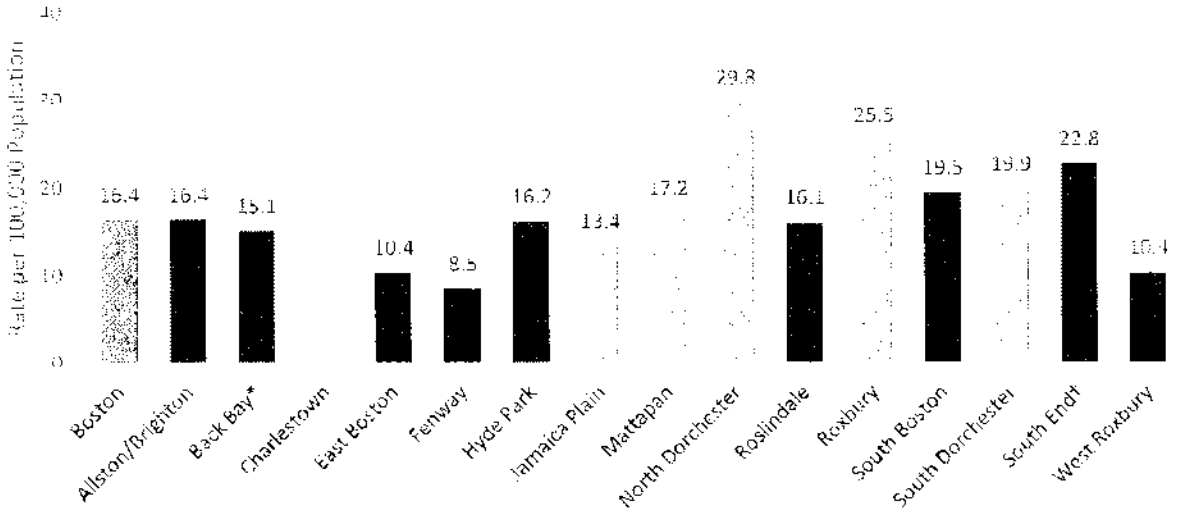
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Colorectal Cancer Mortality

Mortality rates for colorectal cancer appear to vary by neighborhood and race/ethnicity. Residents in North Dorchester (29.8 deaths per 100,000 population) and Roxbury (25.5 deaths per 100,000 population) experienced higher rates of colorectal cancer death than the city of Boston overall (16.4 deaths per 100,000 population) (Figure 50).

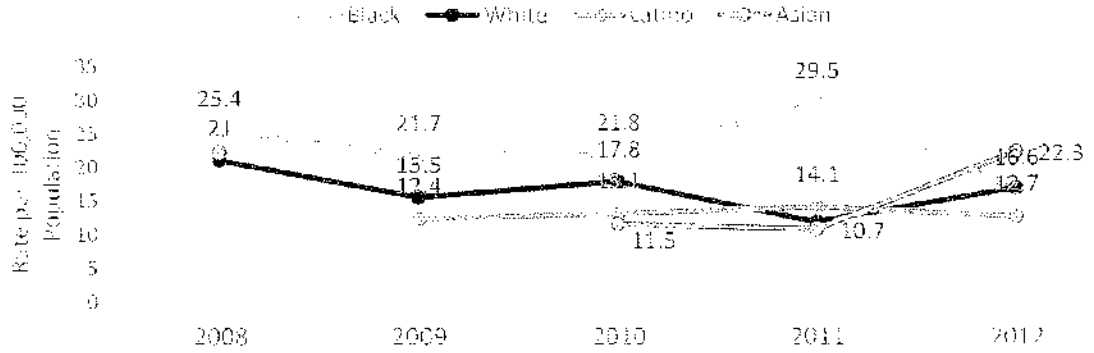
Figure 51 shows that both Whites and Blacks in Boston have lower colorectal cancer mortality rates over time from 2008-2012. Fluctuations from year to year should be interpreted with caution given that small case numbers can exaggerate the change in mortality rate per 100,000 population.

Figure 50. Age- Adjusted Colorectal Cancer Mortality Rate per 100,000 Population by Neighborhood, 2011, 2012, and 2013 Combined



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
*Includes Beacon Hill, Downtown, the North End, and the West End; †Includes Chinatown

Figure 51. Age- Adjusted Colorectal Cancer Mortality Rate per 100,000 Population by Race/Ethnicity and Year 2008-2012



*Not calculated, n<5 for Latino residents in 2008 and Asian residents in 2009
DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

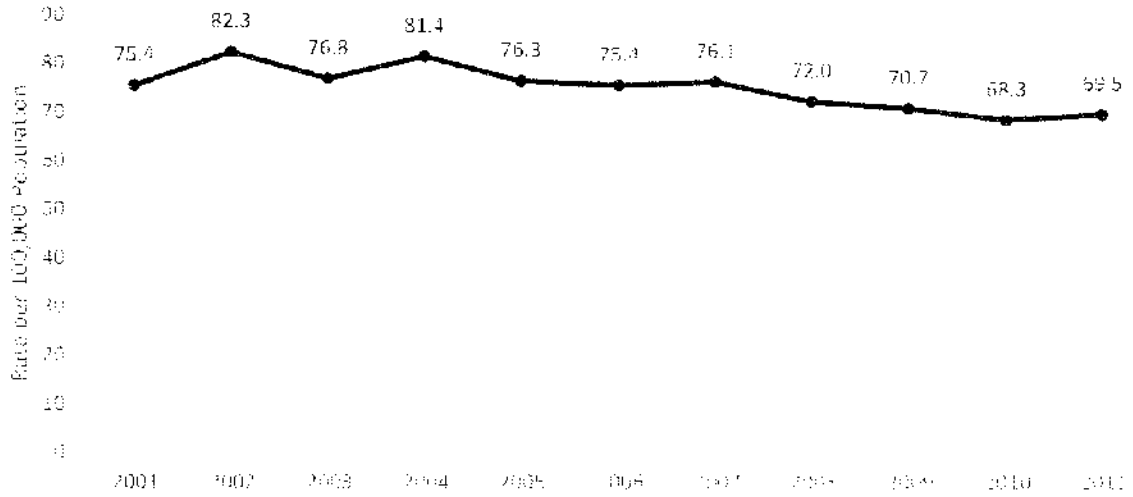
Lung Cancer Incidence and Mortality

Lung cancer is one of the only cancers in Boston where the standardized rates are higher among White residents in the city. The following section provides more details on these data.

Lung Cancer Incidence

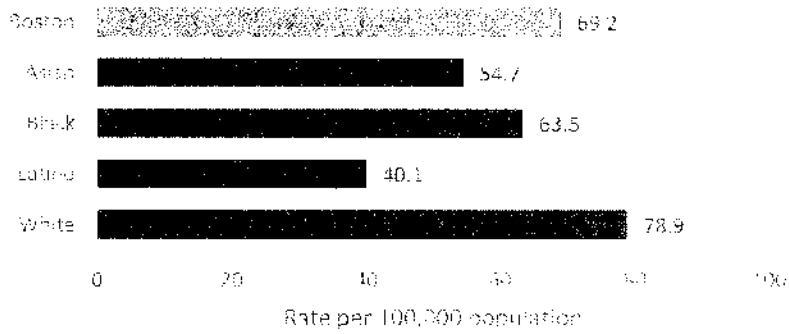
The rate of cancer incidence in the city of Boston has experienced a gentle decline from 81.4 per 100,000 residents in 2004 to 69.2 cases per 100,000 residents in 2012 (Figure 52). In 2011 and 2012 combined, White residents (78.9 per 100,000 population) experienced the highest lung cancer incidence rate among all racial and ethnic groups (Figure 53). Latino and Asian residents had the lowest lung cancer incidence rates at 40.1 per 100,000 Boston residents and 54.7 per 100,000, respectively.

Figure 52. Age-Adjusted Lung Cancer Incidence Rate per 100,000 Population, Boston, 2001-2011



DATA SOURCE: Massachusetts Department of Public Health, Massachusetts Cancer Registry, MassCHIP

Figure 53. Lung Cancer Incidence Rate per 100,000 Population by Race/Ethnicity, Boston 2011 and 2012 Combined

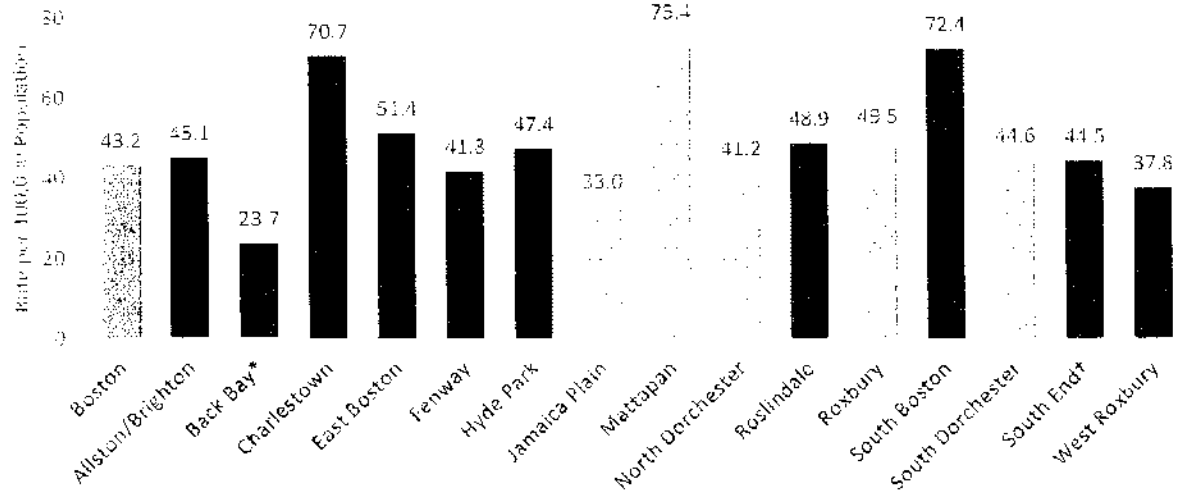


DATA SOURCE: Massachusetts Department of Public Health, Massachusetts Cancer Registry, MassCHIP
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

Lung Cancer Mortality

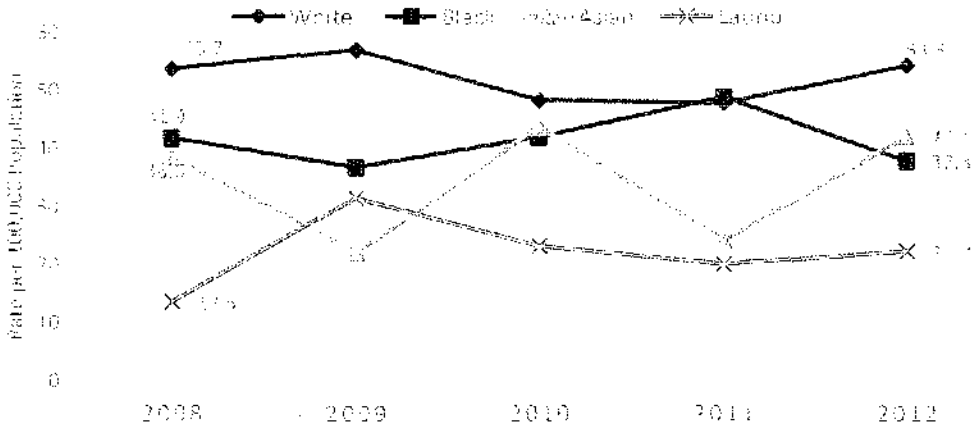
While mortality rates from lung cancer are highest among Whites across the city, when examining data by neighborhood, Mattapan, a predominantly African American neighborhood, still has the highest lung cancer mortality rate. The mortality rate from lung cancer in Mattapan (75.4 deaths per 100,000 population) is nearly twice that of Boston overall (43.2 deaths per 100,000 population) (Figure 54). South Boston, while not a DFCI priority neighborhood, has a similar lung cancer mortality rate to Mattapan. Latinos have the lowest lung cancer mortality rate among racial/ethnic groups, although the Latino mortality rate from lung cancer has climbed from 2008-2012 (Figure 55).

Figure 54. Age-Adjusted Lung Cancer Mortality Rate per 100,000 Population by Neighborhood 2011, 2012, and 2013 combined



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office
*Includes Beacon Hill, Downtown, the North End, and the West End; †Includes Chinatown

Figure 55. Age-Adjusted Lung Cancer Mortality Rate per 100,000 Population by Race/Ethnicity, Boston 2008-2012



DATA SOURCE: Boston Resident Deaths, Massachusetts Department of Public Health
DATA ANALYSIS: Boston Public Health Commission Research and Evaluation Office

CANCER SURVIVORSHIP: PERCEPTIONS AND SURVEILLANCE DATA

In the 2016 CHNA, two focus groups were conducted specifically with cancer survivors, one with English speakers and one with Spanish speakers. Additionally, several key informant interviews worked with cancer patients and cancer survivors and discussed the experiences they had during their cancer journey and beyond. This section discusses the perceptions and experiences with cancer survivorship as well as surveillance data on five-year survivor rates for the most common cancers.

Perceptions of Cancer Survivorship

As discussed earlier, the cancer survivors who participated in the CHNA focus groups were optimistic about their future ahead. They had a positive outlook on their health and prognosis for the future and hoped others in the community could see cancer as something that could be overcome. Many indicated that they felt strong and were eager to be engaged with work, their community, and their family. They recognized that they went through an emotionally and physically grueling time. They were grateful to not only their health care providers for the care they received, but also the support staff such as patient navigators that helped them through their cancer journey. They looked forward to a bright future ahead.

> *"I'm not a cancer survivor, I'm a cancer winner."*
> *-Focus group participant*

Use and Access to Cancer Survivor Resources

Cancer survivors reported utilizing a number of different resources from multiple venues during their cancer journey and now as a survivor, but they still saw many gaps in resources needed. Several participants indicated that information on resources was available for cancer survivors through resource centers, local hospitals, and the Internet. Interestingly, several cancer survivors reported utilizing support services from multiple hospitals simultaneously saying, *"I get care at one hospital, but I attend support groups from multiple places across the city. I like the diversity and different kinds of groups available...whether it's sewing or peer groups, they all help."*

While the English-speaking cancer survivor participants could name a number of survivor resources in the city, the Spanish-speaking survivor participants could not. They described challenges to accessing the many services provided by local institutions due to language barriers. They looked forward to the future of having more language-appropriate and culturally-appropriate survivor resources that they could feel comfortable accessing.

When asked about gaps in survivor resources and support services, participants across both groups noted that they would like to see more support for caretakers and family members saying, *"My daughter dropped everything to take care of me. I may be the one with cancer, but her life changed just os much, if not more, than mine."* Another cancer survivor described the burden her diagnosis had on her young children saying, *"I don't know how to explain to a seven and a four-year-old why their mommy can't play with them. They see me deteriorating, and I worry about how it will affect them in the future."*

> *"Cancer doesn't just affect the person diagnosed; it's a heavy toll for everyone in the family, too."*
> *-Focus group participant*

Additionally, a common theme among cancer survivors was the importance rejoining the job force after completing treatment. Focus group participants described the challenges of obtaining employment after cancer

treatment, noting that *"Many times we can't go back to our old jobs dealing with chemicals or cleaning supplies, but there are no opportunities to learn new skills or be trained."* Many described the inability to find work causing them to feel *"useless"* and *"dependent"*. They were interested in seeing more survivor resources and supports related to job re-training for employment that may be more appropriate for them at this stage in their lives.

Lastly, one's faith was also a considerable source of support for survivors– several participants mentioned the role of faith or their church in providing emotional support throughout their cancer journey. Several cancer survivors described seeing a decline in support services after completing treatment, but indicated that they supplemented those gaps by engaging in faith-based organizations. In addition to engaging with their faith-based organization, many cancer survivors in the focus groups discussed that they felt more engaged in the community. They wanted to use their time to *"give back to the community"* by volunteering and sharing their experience as cancer survivors and looked forward to greater opportunities for this work.

Cancer Survivorship Surveillance Data

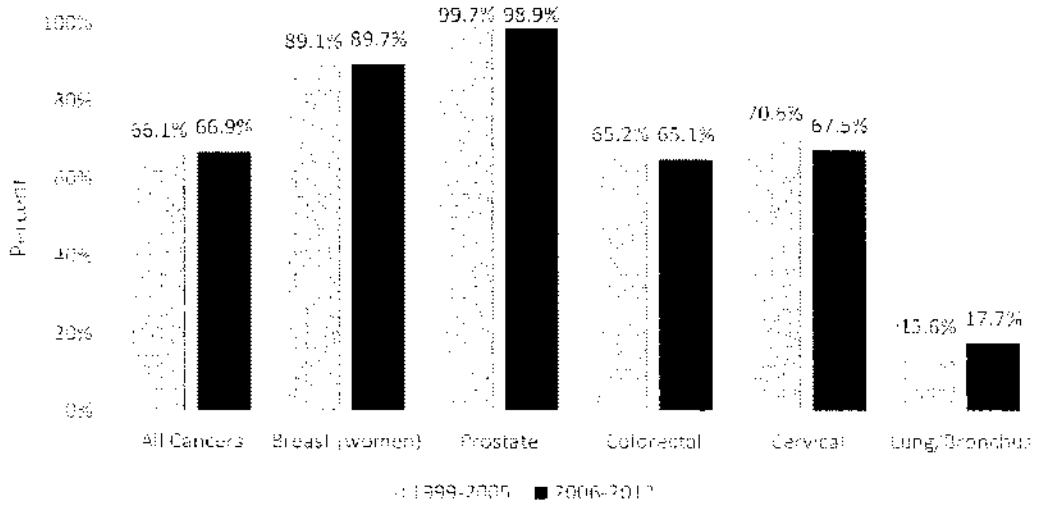
The overall five-year cancer survivor rate for all cancers was 66.9% for 2006-2012, a similar rate to what was seen in 1999-2005; however, rates vary greatly by cancer and by race/ethnicity as discussed in this section.

The following section describes the five-year relative cancer survival rates from 1999-2005 and 2006-2012 for overall cancer diagnoses as well as for specific cancers. These data are drawn from the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute (NCI). SEER collects and publishes cancer incidence and survival data from population-based cancer registries covering approximately 26% of the U.S. population. The SEER Program is the only comprehensive source of population-based information in the United States that includes stage of cancer at the time of diagnosis and patient survival data. The SEER program includes the following 17 sites: San Francisco, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, Atlanta, San Jose-Monterey, Los Angeles, Alaska Native Registry, Arizona Indian Registry, Rural Georgia, Kentucky, Louisiana, and New Jersey. These data were not available for Massachusetts, Boston, or Boston neighborhoods. When possible, rough calculations approximate the five-year cancer survival rate for Boston by cancer type.

The survival rates presented here are based on the relative survival rate, which is a measure of net survival that is calculated by comparing observed (overall) survival with expected survival from a comparable set of people that do not have cancer to measure the excess mortality that is associated with a cancer diagnosis. All statistics in this section are based on SEER incidence and NCHS mortality statistics.

Figure 56 presents data on the five-year survival rates for the most common cancers. Prostate cancer had an almost 100% five-year survival rate (98.9%) while only 17.7% of those diagnosed with lung cancer survived after five years.

Figure 56. Five-Year Relative Survival Rate by Cancer Type, 1999-2005 and 2006-2012

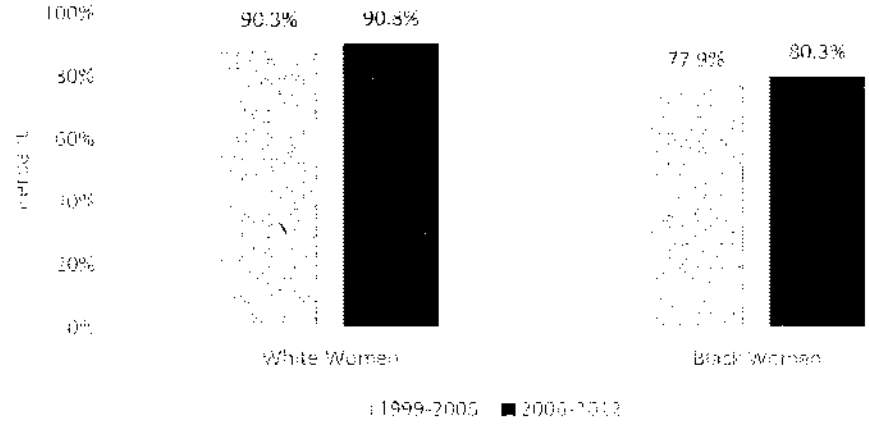


NOTE: Relative survival rates are expressed as percentages.
DATA SOURCE: SEER Cancer Statistics Review, 1975-2006 and 1975-2013, National Cancer Institute. Bethesda, MD

Breast Cancer Survivorship

Based on SEER statistics on five-year survivorship, 89.7% of total women diagnosed with breast cancer survive for five years, yet rates vary by race. In 2006-2012, 90.8% of White women diagnosed with breast cancer survived after five years, while the rote was 80.3% for Black women. While Boston-specific survivorship data are not available, in 2011, 376 women were diagnosed with breast cancer in Boston. Using these data and assuming a similar incidence rate for the subsequent years, we can roughly estimate that during the five-year period of 2011-2016, 1,686 women will have survived/be living with breast cancer in Boston.

Figure 57. Five-Year Relative Survival Rate for Breast Cancer by Race, 1999-2005 and 2006-2012

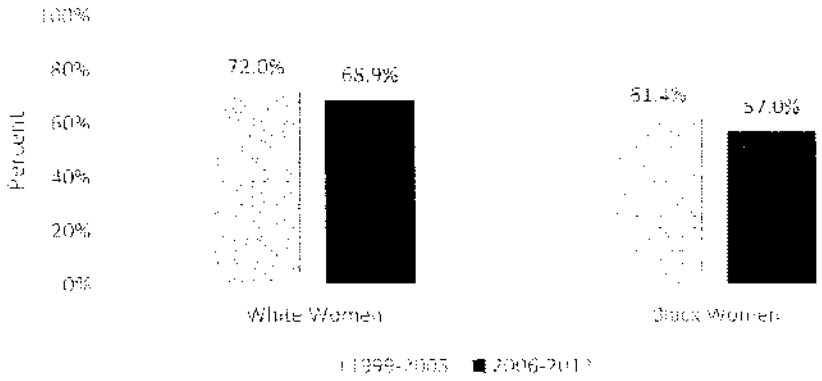


NOTE: Relative survival rates are expressed as percentages.
DATA SOURCE: SEER Cancer Statistics Review, 1975-2006 and 1975-2013, National Cancer Institute. Bethesda, MD

Cervical Cancer Survivorship

For cervicol cancer, 67.5% of women across the SEER sites had a five-year survival rate with a nearly 12% difference in five-year survival rates between White and Black women. In 2011, 17 Bostonian women were diagnosed with cervical cancer. Assuming a similar care rate across five years, we estimate that 57 women will have survived/be living with cervical cancer in Boston during the five-year period of 2011-2016.

Figure 58. Five-Year Relative Survival Rate for Cervical Cancer by Race, 1999-2005 and 2006-2012

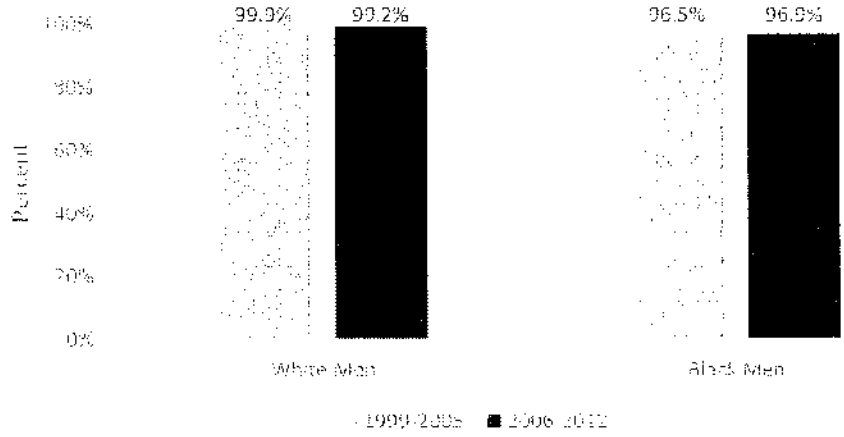


NOTE: Relative survival rates are expressed as percentages.
DATA SOURCE: SEER Cancer Statistics Review, 1975-2006 and 1975-2013, National Cancer Institute. Bethesda, MD

Prostate Cancer Survivorship

Prostate cancer had a 98.9% five-year survival rate ocross the SEER sites, with somewhat similar survival rates between White and Black men. In 2011, 406 men in Boston were diagnosed with prostate cancer. Using this figure and assuming a consistent incidence rate over subsequent years, we expect that 2,008 men in Boston will have survived/be living with prostate cancer from 2011-2016.

Figure 59. Five-Year Relative Survival Rate for Prostate Cancer by Race, 1999-2005 and 2006-2012

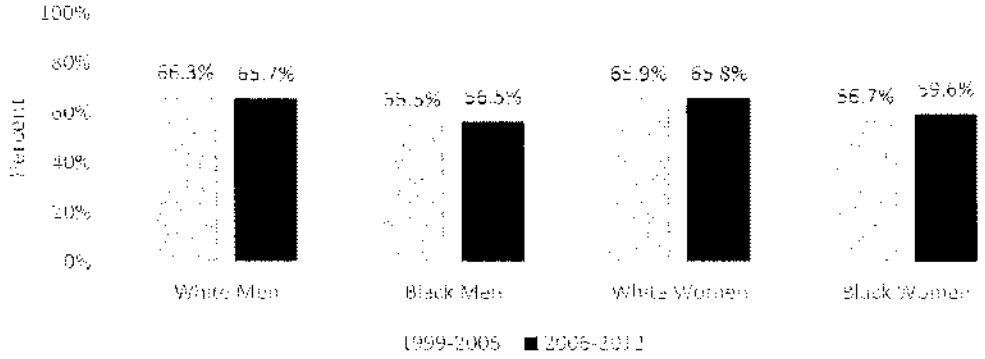


NOTE: Relative survival rates are expressed as percentages.
DATA SOURCE: SEER Cancer Statistics Review, 1975-2006 and 1975-2013, National Cancer Institute. Bethesda, MD

Colorectal Cancer Survivorship

The five-year relative colorectal cancer survival rate was 65.1% for 2006-2012, yet these rates varied by race and gender. Overall, White men and women had similar five-year survival rates at approximately 66%, while 59.6% of Black women and 56.5% of Black men survived for five years after a colorectal cancer diagnosis. In 2011, 230 men and women in Boston were diagnosed with colorectal cancer. Based on these figures and assuming a consistent colorectal cancer incidence rate for the subsequent years, we estimate that 661 Bostonians will have survived/be living with colorectal cancer during the five-year period of 2011-2016.

Figure 60. Five-Year Relative Survival Rate for Colorectal Cancer by Gender and Race, 1999-2005 and 2006-2012



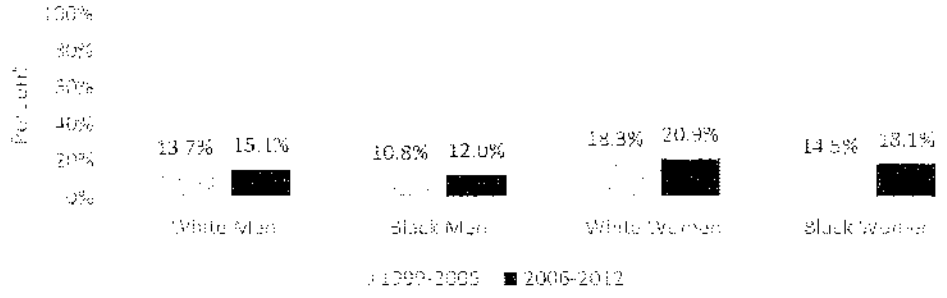
NOTE: Relative survival rates are expressed as percentages.
DATA SOURCE: SEER Cancer Statistics Review, 1975-2006 and 1975-2013, National Cancer Institute. Bethesda, MD

Lung Cancer Survivorship

For lung cancer, 17.7% of men and women across the SEER sites had a five-year survival rate, but rates varied most by gender and then by race. Five-year survival rates were highest among White women (20.9%) and Black women (18.1%), but lowest among men (White: 15.1%; Black: 12.0%). Black women also saw the biggest increase in survival rates from 1999-2005 to 2006-2012.

In 2011, 361 Bostonians were diagnosed with lung cancer. Using this figure and assuming a consistent lung cancer incidence rate for the next four years, we estimate that over the five-year period of 2011-2016, only 319 Boston residents will have survived/be living with lung cancer.

Figure 61. Five-Year Relative Survival Rate for Lung Cancer by Gender and Race, 1999-2005 and 2006-2012



NOTE: Relative survival rates are expressed as percentages.
DATA SOURCE: SEER Cancer Statistics Review, 1975-2006 and 1975-2013, National Cancer Institute. Bethesda, M

COMMUNITY STRENGTHS AND ASSETS

In addition to discussing concerns and health needs, CHNA focus group and interview participants were also asked about the strengths, assets, and resources in their community. Discussions covered both concrete factors, such as specific organizations, to less tangible concepts, such as resilience and cohesion. The following section highlights key themes from these discussions.

Diversity

Focus group participants generally described their communities as vibrant and active neighborhoods that were demographically diverse in terms of age, class, race, and ethnicity. *"Our diversity makes us stronger,"* shared one participant. Residents indicated that they enjoyed sharing and learning about different cultures through community events. Health centers, community-based organizations, and local businesses were also viewed as contributing to the activity and cultural richness of neighborhoods. Focus group participants described a perceived increase in immigrants from Asia and the Middle East, and with that, the need for more language services for these communities. Cancer survivors who reported seeking support services from multiple institutions across the city said they liked the diversity of the various groups and *"wanted to take advantage of everything out there."*

Engaged Community

When asked what residents viewed as a strength in their communities, many participants agreed that residents are actively engaged through neighborhood associations and faith-based groups. As one participant shared, *"People in Mattapan wont to improve the conditions of their neighborhood, and they're willing to work hard for it."* Cancer survivors described wanting to *"give back to their communities"* through volunteering and sharing their experiences with cancer to promote awareness. Residents also indicated that youth were especially engaged and curious about new initiatives happening in the neighborhood, and suggested that targeted outreach be focused on youth in the future.

Community Cohesion and Social Networks

A consistent theme across focus groups and interviews was the strong sense of cohesion among community residents. For example, an interview participant stated that, *"People watch out for each other around here. Whether it's keeping an eye out on their kids, sharing a meal, or giving someone o ride, we try and help out where we can."* Participants in the Spanish-speaking focus group explained the importance of a collective approach to health, involving family and loved ones in important discussions.

Organizations and Services

Another asset discussed by participants was the number of community programs and services present in the community. Interview and focus group participants described many local amenities including churches, social service organizations, and local businesses. Public transportation is available in most neighborhoods, although some participants commented that it can be unreliable and is less accessible in certain neighborhoods. In addition to the large number of small *"mom and pop shops"* that have fostered a connection to home country for many immigrant families, ethnic-based service organizations such as Inquilinos Boricuas en Acción (IBA) meet the needs of a diverse community. In addition, residents shared that there are many social service organizations serving the community, including the the Greater Boston Food Bank, the YMCA, the Boston Public Health Commission, and The Prostate Health Education Network (PHEN). Across all groups, participants agreed that Boston offers *"the best healthcare around"* and indicated that they felt *"lucky"* to live in close proximity to several world-class institutions.

COMMUNITY VISION FOR THE FUTURE

Focus group and key informant participants were asked about their vision for the future and ideas for future services in their community. Several overarching issues were discussed in relation to the programming and service environment in content related areas as well as approaches. Key themes and suggestions by focus group and key informant participants are discussed below.

Greater Focus on the Social Determinants of Health

When discussing their vision for the future, many focus group participants discussed the importance of interventions to address environmental factors such as poverty and built environment issues. Issues such as enhancing financial assistance and improving the built environment including greater access to healthy foods and improved transportation options were discussed in several focus groups. Interview participants cited supporting more employment opportunities in the community as an important element to improving overall community health. Addressing the issue of affordable housing overall in Boston was also cited as an issue that would ease residents' day-to-day burden.

> *"The key to having a healthy community is having an educated community."*
> *-Focus group participant*

Greater Information and Health Literacy

Across focus groups and interviews, participants noted the need to demystify cancer and increase awareness of prevention and screening practices via improved information-sharing in the form of engaged, interactive venues. Several areas for which additional education and support were identified included: smoking cessation, diabetes education, healthy eating/cooking, and cancer. Interview participants reported the need for more targeted health literacy initiatives, especially related to cancer screenings, saying *"there is still a lot of misinformation about what screenings are about and what body parts need to be checked."* Residents expressed confusion about prevention and screening guidelines saying, *"I think you're supposed to get a blood test to see if you have cancer, but I don't know how often you need it."*

While some participants agreed that print information (i.e., brochures and flyers) were readily available, they did not consider it the most effective method for educating their communities. Rather, participants expressed a desire to have these conversations face-to-face with providers, whether doctors, nurses, or community health workers, in order to feel comfortable. Several participants also discussed learning from their peers or community leaders as they were trusted sources of information. A few participants suggested alternative forms of media, such as television and advertisements on public transit, while others felt that because resources were readily available, the community had a personal responsibility to seek information. It was also noted that it was important to leverage existing known resources—such as the Mammography Van or well-known community organizations such as YMCAs or place of worship—to broaden their reach and increase awareness of cancer prevention and screening to a larger population.

Information on Less Common Cancers

Focus group participants in both survivor groups reported that many resources were devoted to more common cancers such as breast cancer, but few were available for less typical cancers such as oral and liver cancer. A Spanish-speaking focus group participant shared the story of challenges regaining her speech after treatment for oral cancer and said, *"I felt like there was no one else going through the things I had to go through. I couldn't talk, open my mouth, or eat properly, and it felt like there were no resources to help me figure out how to regain*

my life." A few participants also stated that a greater focus on support and funding for men's cancers (including testicular and prostate cancer) is needed.

Follow-up care and Survivorship Programming

When asked where residents believed the gaps in services were, many noted that there were limited resources for cancer survivors particularly in the area of emotional support for families, job retraining for cancer survivors, and supports in general for non-English speakers. Groups in the cancer survivor meetings frequently discussed feeling that services *"fell-off after a few years after treatment"*, and wished to see more opportunities to engage in post-treatment support services. More emotional and economic support, specifically for family members of cancer patients, should be offered, survivors suggested. As one resident said, *"I'm the one with cancer, but it affects the entire family and they need support too."* Residents noted that community organizations such as the YMCA offered cancer-programming described as extensions to traditional cancer treatment that focused on survivorship issues. Some suggested sustaining and expanding these initiatives before creating new programs.

Expand Patient Navigators

Survivors reported patient navigators as a tremendous asset to patients, especially those who were bilingual and/or bicultural, and encouraged hospitals to expand the effort. Currently, there is not a sufficient supply of patient navigators for the range of cancer patients. Focus group participants stressed the importance of increasing the number of navigators and ensure that they *"look and sound like the community,"* suggesting that the hospital be focused on diversity initiatives when recruiting navigators. When asked where the hospital should focus recruitment efforts to ensure a diverse staff, participants suggested hosting events at faith-based organizations and places of worship.

Community Engagement

Across many focus groups and interviews, participants discussed the importance of engaging community members in different aspects of programs and services. Community members wanted to be part of the planning process and feel a sense of ownership of community-based programs. Participants suggested several ways to involve the community in the hospital's efforts. One interviewee recommended that the hospital partner with faith-based organizations to conduct periodic seminars or *"open houses"* for community members. Continuous partnering with the community through group discussions and focus groups were described as ways to keep community members engaged. Others reported that community members should be included on committees. For example, one interviewee suggested that, *"We have very active neighborhood associations. I bet people would be interested in a special committee on health."* Focus group and interview participants also stressed the importance of identifying community champions that can engage residents in health initiatives.

Broaden the Community Reach

The primary recommendation from residents and key informants was to engage a broader cross-section of the community more through group dialogues and outreach, specifically peer-to-peer learning. As one participant noted, *"I'm very grateful for discussions like these where we can share and learn from each other. I wish there was more of this in Dorchester."* Youth were viewed as a critical audience to target for programming and services related to economic development (e.g., job training) and disease prevention (e.g., increasing opportunities for physical activity). Participants reported the importance of meeting residents in familiar spaces, saying *"You have to meet the people where they're at. The hospitals should be going into the communities and churches and teaching them preventative measures there."*

Capacity Building

A common suggestion that interview participants mentioned was leveraging resources and investing in capacity building for local organizations throughout Boston. As one interviewee shared, *"we have the opportunity to not only reach out and engage the community, but provide technical assistance and training to health centers, coalitions, and other community groups."* Specific suggestions for the format of these sessions included virtual lunch hours where health experts presented topics such as best-practices in cancer screening. Further, several interview participants indicated that there is a need for sustained support for language services, noting financial challenges to providing adequate services such as bi-lingual case management, and printing translated materials in more than one language.

Collaboration

Health care and social service stakeholders frequently noted that, while many local services exist, there are opportunities to improve communication and coordination between institutions. Focus group and interview participants described a "*competitive, not colloborative*" health system in the city of Boston and wished to see more collaborative efforts among hospitals, academic institutions, and local organizations. Informants suggested that developing a common agenda, including defining clear scopes and roles for partners, is a needed next step to improving population health for Boston residents. Many described the need for a system to share city-wide information and data noting, *"We are all collecting similar information...can you imagine the impact we could have if we deliberately built off each other's efforts?"* Participants also recommended strengthening "*clinical linkages*" so specialty providers like oncologists were in frequent communication with primary care providers in order to prevent cancer reoccurrences. As one participant said, *"The hospitals can use their reputations and make sure warm hand-offs, from specialists back to PCPs, are common practice, in order to continuously monitor high-risk patients."*

CONCLUSIONS

Residents in DFCI's priority communities encounter numerous social and economic challenges, including poverty, neighborhood violence, and limited employment opportunities, which have a significant impact on population health. However, residents are resilient and there are numerous assets and strengths. In addition to organizational programs and services, a diverse, engaged and cohesive community are considered strengths of these communities. The following section provides an overview of key findings of the 2016 assessment:

1. **As discussed in the 2013 CHNA, there are great disparities on several social, economic, and health indicators in DFCI's specific priority neighborhoods, but these neighborhoods also possess numerous strengths and assets.**

- Issues related to poverty and violence underscore all aspects of daily life for residents of many Boston neighborhoods, although these neighborhoods also possess several strengths. Limited employment opportunities and low education levels among residents have significantly impacted the social and economic context of these areas. Employment challenges were especially prominent among cancer survivors, who indicated a need for more resources for survivors to be *"retrained and re-enter the job force"* after treatment. Despite considerable socioeconomic challenges, social cohesion and residents' resiliency were considered important neighborhood assets. Existing organizations and resources were also viewed as strengths. As previously discussed, communities of color were described as the most vulnerable for negative health outcomes with many residents perceiving less access to resources and institutional racism as contributing factors

2. **Among participants without direct experience with cancer or among key informants not working with cancer patients directly, cancer was not described as a pressing community health concern unless prompted. Mental health, substance abuse, diabetes, and community violence were named as top health concerns in the community when participants were asked unprompted.**

- Similar to 2013 findings, for community members not directly affected by cancer, cancer was not a top of mind concern compared to the daily challenges of meeting basic needs. Although when asked about the topic, it was evident that there is a tremendous amount of fear surrounding the risk of diagnosis. However, cancer survivors were optimistic about their health and future ahead. They were eager to share their viewpoint with others and be engaged in future community efforts.

3. **Cancer-prevention behaviors are a significant challenge, particularly among Blacks and Latino residents.**

- Obesity and concerns related to maintaining a healthy lifestyle emerged as challenges for priority neighborhoods, with residents indicating that environmental factors such as community violence and access to healthy foods made living a healthy lifestyle challenging. Smoke-free policy initiatives were mentioned as an effort to improve environmental conditions, but according to participants, second-hand smoke is still a major problem in their communities.

4. **Similar to the data reviewed in the 2013 CHNA, cancer screening rates are high in many of DFCI's priority neighborhoods, but cancer mortality rates also are high.**

- Surveillance data indicate that continually Blacks in particular have higher mortality rates than Whites for many cancers. Similar patterns emerge by neighborhood, with Mattapan and Roxbury, two predominantly African American neighborhoods, consistently see higher mortality rates from many common cancers. However, screening rates among these groups are strong. It is unclear why this pattern emerges. The larger cancer literature indicates that there could be a multitude of reasons

including that overall Blacks are more likely to have comorbid conditions that complicate cancer treatment, are being diagnosed at a later or more invasive stage of cancer when receiving initial diagnosis, and face disproportionate barriers to care due lower socioeconomic status, discrimination, and cultural factors. Disentangling the issues within DFCI's priority neighborhoods in more detail in the future may help understand better the complicated relationship between screening, health care access, and survivorship.

5. **There is a need for additional support services for cancer survivors and their families, specifically around health literacy and financial resources.**

- Focus group participants indicated ample resources for cancer patients, but explained that survivor-specific services were limited, especially in languages other than English. Residents wanted more information regarding ways to prevent cancer reoccurrences, how to rejoin the workforce, and workforce retraining for the future. Interestingly, several participants reported participating in services offered by multiple hospitals in the area despite only receiving care from one.

6. **Patient Navigators and social workers were seen as *"critical resources"* in helping patients navigate the complex health system.**

- Across all groups, a common challenge that emerged was the difficulty navigating the complex health system, especially after receiving a cancer diagnosis. Patient navigators and social workers, said participants, were vital in connecting patients with resources and providing support throughout their cancer journey. Assessment participants strongly encouraged the expansion of patient navigator programs, and encouraged DFCI to continue efforts to expand diversity initiatives within these areas.

7. **Strengthening internal and external partnerships through capacity building and technical assistance was a common theme among interview participants.**

- Assessment participants suggested increased capacity building and technical assistance for community-based organizations, additional funding for scaling up existing programs, and a more coordinated effort across programs and organizations could help current efforts reach a larger audience. Specific suggestions included virtual lunch-hours for providers at FQHCs, community "open houses," and seminars held at faith-based and social service organizations. Further, several participants described a need for additional resources for language services, including translating materials and bi-lingual case management.

8. **There are ample resources in the community, but a competitive health care and organizational system creates resources that are fragmented and duplicative. Greater collaboration, coordination, and alignment are critical for future work.**

- Similarly noted in the 2013 CHNA, several key informants described a fragmented and uncoordinated health system in the city of Boston, noting that *"the system here is competitive instead of collaborative, and that makes services duplicative."* Stakeholders and staff indicated that coordinating or expanding existing programs would be more effective than developing new programming. Further, suggestions for a shared platform to exchange data and information among institutions was viewed as an opportunity to promote collaborations.

PRIORITIZATION OF NEEDS

In Spring of 2016, HRiA led a facilitated conversation with Dana-Farber Cancer Institute to discuss priority areas and strategies for the future. This conversation included a presentation of the priorities identified by the community health needs assessment (CHNA), including the magnitude and severity of these issues and their impact on DFCI priority neighborhoods. As a result of this process, Dana-Farber identified the following key priority areas based on the hospital's potential to demonstrate measurable outcomes in reducing cancer incidence and mortality through programmatic enhancements in these areas:

1. Addressing the cancer burden
2. Reducing access barriers
3. Advancing survivorship
4. Addressing community perceptions of cancer

Specific strategies to address the identified needs above are detailed in the 2016-2019 Community Health Needs Assessment Implementation Plan that accompanies this report.

APPENDIX A- STRATEGIC IMPLEMENTATION ACTIVITIES

The following tables highlight the major priority areas, strategies, and key activities undertaken since the 2013 CHNA.

ADDRESSING THE CANCER BURDEN	
STRATEGIES	**KEY ACTIVITES & SELECTED ACCOMPLISHMENTS**
Enhancing the community-based clinical care program at Dana-Farber Community Cancer Care (DFCCC) at Whittier St Health Center (WSHC).	• Through a comprehensive program approach, medical oncologists, a geneticist, a genetic counselor, and a program nurse navigator provide consultations in collaboration with primary care physicians at WSHC. The physicians perform consultations, aid in the diagnosis and work-up of suspected oncologic issues, and provide guideline-based cancer screening services. Patients diagnosed with cancer are offered a referral to Dana-Farber for potential treatment and diagnostic procedures. Patient navigation services are provided to each patient to ensure seamless movement through various systems as well as coordination of care. • Launched a smoking cessation program in November 2013 for WSHC patients and staff, which receives approximately 100 referrals per year. • Launched lung cancer screening pilot program at WSHC which provides free low-dose chest CT scans to patients who are at greater risk for developing lung cancer.
By leveraging the nurse patient navigation model, enhance relationships between primary care physicians and oncologists to facilitate care coordination across settings	• DFCCC at WSHC continues to provide streamlined diagnosis, treatment, and education for medically underserved patients with suspected malignancies throughout the continuum of care. In addition to clinic services, DFCI staff participate in existing WSHC programs, grandrounds, lectures, health fairs, and ongoing educational forums focused on mens and women's health. • Tracking time from initial appointment to resolution with a goal of ≤21 days as a measure of clinic and navigation efficacy. The median # of days to resolution for patients at the WSHC clinic is 13 days, which exceeds the goal of 21 days to resolution, set at the program's launch. • Working with internal stakeholders to update Dana-Farber's patient navigation model across the Institute.
Establish metrics to measure impact	• Launch of data collection and reporting tool – Red Cap – to monitor the impact of DFCCC at WSHC. • Data collection tool has been integrated between DFCCC at WSHC and the tobacco cessation program.
Implement operational improvements to streamline referral and insurance eligibility processes	• Partnering with Access Management to identify barriers and implement solutions to ensure timely access to care. • Created processes for ongoing monitoring and evaluation of referral and insurance eligibility, particularly for patients served on Dana-Farber's Mammography Van.

REDUCING HEALTHCARE ACCESS BARRIERS	
STRATEGIES	**KEY ACTIVITIES & SELECTED ACCOMPLISHMENTS**
Launch the Dana-Farber Mammography Suite at WSHC	• Opened a mammography suite at WSHC in 2013 offering digital mammography to patients served at the health center's Roxbury site. • Since inception, the suite has provided more than 1500 mammograms to community residents.
Continue to develop and expand Dana-Farber's long history of comprehensive community-based programming and partnerships	• Leveraged partnerships with Sociedad Latina, the Boston Public Health Commission, Boston Public Schools, and Team Maureen (a cervical cancer prevention focused advocacy group) to increase education and awareness among youth about HPV and the link to cancer, as well as increasing youth vaccine uptake in Boston. o Launched HPV cancer prevention and peer youth education program with Sociedad Latina in Mission Hill. o Completed 3 HPV vaccine clinics held at 2 Boston Public School Based Health Centers. o Launched and held the first 3 Annual HPV Summits at Dana-Farber, which included approximately 350 attendees • Launched text message reminder system for mammography van patients to reduce appointment no-show rate. • Engaged more than 4100 community residents in sun safety education/skin cancer screening. • Reached over 4300 community residents in Community Benefits programs and initiatives at community outreach events and health fairs.
Develop a CBO program evaluation plan	• Created logic models, identified impact indicators and metrics, and developed data collection instruments, including the Red Cap database. • An evaluation of the youth HPV education curriculum demonstrated efficacy. • Ongoing data-collection and analysis of Community Benefits programs and activities.
Seek DFCI representation on cancer-related and health disparities committees at the state and local level.	• In collaboration with BPHC, Dana-Farber convened a coalition of health care providers, public health experts, researchers and community residents to determine future action steps to address the persistent female breast cancer disparities in the City of Boston. The group has formally become the Boston Breast Cancer Equity Coalition, which includes representatives from over 40 organizations and continues to meet quarterly to advance this health equity work. o Launched workgroups on patient navigation and data analysis focused on the City of Boston. o Developing applications for grant funding to sustain and expand current efforts. • DFCI is actively involved in developing and implementing community health improvement strategies through representation on a variety of committees and coalitions including the Massachusetts Comprehensive Cancer Prevention and Control Network Advisory Committee, Massachusetts Comprehensive Cancer Prevention and Control HPV Working Group, Boston Alliance for Community Health, and the Conference of Boston Teaching Hospitals Community Benefits Data Collection Workgroup, among others.

ADDRESSING COMMUNITY PERCEPTIONS OF CANCER

STRATEGIES	KEY ACTIVITIES & SELECTED ACCOMPLISHMENTS
Develop an Ambassador Program: Recruit and train cancer survivors in our priority neighborhoods who can share their cancer experience with members of their own social networks	• Completed program development in articulating overall goals and purpose of the program, identifying key staff, recruitment strategies, success metrics, and the Ambassadors' role including responsibilities and time commitment. • Completed training curriculum and manual for Community Ambassadors. • Ongoing collaboration with Volunteer Services on diversity in recruitment of Ambassadors and Volunteers across the Institute.
Educating our target community about cancer prevention, early detection, and screening. Addressing the misperception that cancer is not a survivable disease.	• Developing a robust Community Benefits brochure to raise awareness about Dana-Farber's community programs and activities. • Continue to partner with ethnic media to deliver language-appropriate cancer prevention messages. • Ongoing marketing and media efforts to highlight DFCI's community outreach activites and ensure DFCI is visible in our surrounding communities. o Over 55 community support ads and flyers o Public cancer awareness campaigns on the MBTA o Advertorials and features in ethnic media including El Mundo and Salud y Familia, among others. o Features in other local media outlets including the Bay State Banner, Sampan, CBS Boston, Charlestown Patch, Boston Globe, Boston.com, WCVB Channel 5, US News, and the Boston Metro, among others. • Ongoing cancer prevention education with schools, community groups, local prisons and other partnering organizations, including over 100 students at Fenway High School who participated in school-based events led by Dana-Farber faculty and staff. • DFCI participates in a program to train lay individuals and key community health stakeholders on how to deliver information about clinical trials to their respective community partners, including faith-based networks.

Attachment/Exhibit

B

Dana-Farber Cancer Institute
Supplemental Information to the CHNA/CHIP Self-Assessment Form

I. Background

This narrative is to supplement the responses outlined on the Community Health Initiative ("CHI") *CHNA/CHIP Self-Assessment Form* and provide an overview of the Dana-Farber Cancer Institute ("DFCI") – 2016 Community Health Needs Assessment ("CHNA"), including the methodology employed to obtain community feedback, such as relevant data and key informant interviews.

DFCI is one of the world's leading cancer treatment and research centers. In addition to providing expert clinical care, DFCI is committed to educating the community and raising awareness about the importance of cancer prevention, outreach, screening, early detection, and clinical trials. To this end, DFCI's Community Benefits Office provides education and outreach across Boston and beyond, offers support services and resources, and conducts a broad scope of research and evidence-based interventions through its collaborative work in local neighborhoods, as well as through its national and international public and professional education initiatives. The mission of DFCI's community benefits and outreach activities contributes to the larger goal of advancing the diagnosis, care, treatment, cure, and prevention of cancer and related diseases. DFCI's Board of Trustees Community Programs Committee oversees the development and implementation of DFCI's Community Benefits Plan. In their oversight capacity, Committee members provide the Community Benefits staff with guidance and leadership around program initiatives and monitor the completion of the CHNA and Community Health Implementation Plan ("CHIP"). The Community Benefits External Advisory Committee (which is now shifting to be known as the External DoN Advisory Committee) was established in 1997 and consists of representatives from various constituencies who share DFCI's commitment to reducing disparities in cancer care, education, and treatment. Additionally, the DFCI Community Benefits Internal Advisory Committee provides input and shares responsibility for the implementation of key initiatives in the overall Community Benefits Plan.

The 2016 DFCI CHNA is part of an iterative, dynamic process of reviewing and collecting data to inform the program and initiative planning and implementation process. For this CHNA, DFCI partnered with Health Resources in Action ("HRiA"), a non-profit public health organization, to conduct the most recent 2016 CHNA. This assessment focuses on building off of the 2013 CHNA process to further advance DFCI's community efforts and priority areas with the main goals as:

- Updating the previous CHNA data to provide a portrait of Boston and DFCI's priority neighborhoods as well as the area's needs and assets;
- Delve deeper into specific areas to advance and elevate existing DFCI initiatives, and identify strategic opportunities for the future; and
- Probe deeply into specific challenges, opportunities, and communication/outreach strategies.

Within DFCI's three large umbrella areas of addressing the cancer burden, reducing access barriers, and addressing perceptions of cancer, the 2016 CHNA made a concerted effort to focus on issues related to access and availability of services across the cancer continuum and to experiences and suggestions for resources and supports specifically for cancer survivors. Aligned with the focus of the DFCI Community Benefits Office, the 2016 CHNA focuses on the geographic neighborhoods of Dorchester, Jamaica Plain, Mattapan, Mission Hill, and Roxbury, as well as Boston overall. The DFCI Community Benefits Office has identified these

neighborhoods as priority focus given DFCI's service area and these neighborhoods include many of the city's most underserved populations.

II. Approach and Methods

DFCI's 2016 CHNA defines health in its broadest sense, recognizing that multiple factors—from lifestyle behaviors (e.g., diet and exercise) to clinical care (e.g., access to medical services) to social and economic factors (e.g., employment opportunities)—impact a community's health. The CHNA assessment was guided by a participatory, collaborative approach, integrating existing secondary data on social, economic, and health issues in the region with qualitative information from three focus groups with community residents and fifteen interviews with community stakeholders.

A. Social Determinants of Health

It is important to recognize that multiple factors affect health and there is a dynamic relationship between people and their environments. Where and how we live, work, play, and learn are interconnected factors that are critical to consider. That is, not only do people's genes and lifestyle behaviors affect their health, but health is also influenced by more upstream factors such as employment status and quality of housing stock. The social determinants of health framework addresses the distribution of wellness and illness among a population—its patterns, origins, and implications. While the data to which we have access are often a snapshot of a population in time, the people represented by that data have lived their lives in ways that are constrained and enabled by economic circumstances, social context, and government policies. Building on this framework, this assessment utilizes data to examine community-level influences, including social and economic factors that have an impact on health and health outcomes.

B. Health Equity

In addition to considering the social determinants of health, it is critical to understand how these characteristics disproportionately affect vulnerable populations. Health equity is defined as all people having the opportunity to "attain their full health potential" and entails focused societal efforts to address avoidable inequalities by equalizing conditions for health for all groups, especially for those who have experienced socioeconomic disadvantages or historical injustices. When examining the larger social and economic context of the population (e.g., upstream factors such as housing, employment status, racial or ethnic discrimination, the built environment, and neighborhood-level resources), a robust assessment should capture the disparities and inequities that exist for traditionally underserved groups. Thus, a health equity lens guided the CHNA process to ensure data comprised a range of social and economic indicators and were presented for specific population groups. Understanding factors that contribute to health patterns for these populations can facilitate the identification of data-informed and evidence-based strategies to provide all residents with the opportunity to live a healthy life.

C. Quantitative Data: Reviewing Existing Secondary Data

To develop a social, economic, and health portrait of DFCI's priority communities through a social determinants of health framework, existing data were drawn from national, state, county, and local sources. Sources of data included, but were not limited to: the U.S. Census, U.S.

Bureau of Labor Statistics, Massachusetts Department of Public Health, Boston Public Health Commission, and the Boston Police Department. Types of data included self-report of health behaviors from large, population-based surveys such as the Behavioral Risk Factor Surveillance System (BRFSS), public health disease surveillance data, as well as vital statistics based on birth and death records.

The Boston Redevelopment Authority (BRA) report is the predominant source of demographic data, and the Boston Public Health Commission's (BPHC) Health of Boston report is the predominant source of health data for the city and its neighborhoods. Since these data are publicly accessible, selected secondary data were incorporated to help guide and inform the assessment's larger themes. Additional quantitative data can be found in the Health of Boston report located here: http://www.bphc.org/healthdata/health-of-boston-report/Documents/HOB-2014-2015/FullReport_HOB_2014-2015.pdf, and in the BRA Boston in Context: Neighborhoods report located here: http://www.bostonredevelopmentauthority.org/getattachment/7b9b1201-8b4f-4fa9-b0f2-4acbbe083198

It should be noted that in many cases, population group names in the CHNA's graphs reflect the usage by the secondary data source. For example, demographic data pulled from the U.S. Census uses the term Hispanic, while health data from the Boston Public Health Commission uses the term Latino. These different terms by the original and analytical sources are reflected in the DFCI CHNA.

D. Qualitative Data: Focus Groups and Interviews

While social and epidemiological data can provide a helpful portrait of a community, it does not tell the whole story. It is critical to understand people's health issues of concern, their perceptions of the health of their community, the perceived strengths and assets of the community, and the vision that residents have for the future of their community. Secondary data were supplemented by focus groups and interviews. In total, three focus groups and fifteen key informant individual and group discussions were conducted with members of DFCI's community from March 2016 through June 2016.

Focus groups were held with 39 community residents drawn from the region representing the following population segments:

- English-speaking adult cancer survivors
- Spanish-speaking adult cancer survivors
- Community members residing in DFCI priority neighborhoods

A total of 22 individuals representing the DFCI community, as well as the region at large were engaged in key informant and group discussions. Key informants represented a number of sectors including academic research, health care, public health, social service, and city government. Discussions explored participants' perceptions of their communities, priority health concerns, perceptions of cancer and related services across the cancer continuum (prevention, screening, treatment, survivorship), and suggestions for future services and resources to address these issues.

A semi-structured moderator's guide was used across all discussions to ensure consistency in the topics covered. Each focus group and interview were facilitated by a trained moderator and detailed notes were taken during conversations. On average, focus groups lasted 90 minutes and included 9-18 participants, while interviews lasted approximately 30-60 minutes.

Participants for the focus groups were recruited by Health Resources in Action (HRiA), YMCA of Dorchester, the DF/HCC Faces of Faith Campaign, and DFCI. Eligible participants (cancer survivors and community members residing in priority neighborhoods) were identified by partner organizations and contacted by phone and email and invited to participate. Flyers were also mailed to community residents previously involved in programming at host organizations. The focus groups were intended to be inclusive, so partner organizations did not exclude participants if they did not live in the particular neighborhood. It was also a priority to recruit adults from traditionally underserved populations, including individuals with low-income and those who do not speak English as a primary language. Similar to the demographic of DFCI priority neighborhoods, the majority of focus group participants were African American or Hispanic. As an incentive, focus group participants received a $35 gift card.

E. Collaboration with Partnering Teaching Hospitals

In addition to the primary data collection, Conference of Boston Teaching Hospitals (COBTH), of which DFCI is an active member, partnered with the Boston Alliance of Community Health (BACH), the city-wide coalition comprising of neighborhood coalitions, to conduct three focus groups with community residents in early Spring 2016 delving into people's experiences with the social determinants of health. The outputs of the neighborhood-level meetings are included in the findings of DFCI's 2016 CHNA and reflect the commitment of DFCI and other COBTH member hospitals to work together in addressing the social, economic, and environmental factors that impact health, well-being, and more specifically, cancer outcomes in our surrounding communities.

F. Stakeholder Engagement

Towards the final weeks of data analysis, four separate groups were engaged in June 2016 to discuss the CHNA's preliminary data findings. In these sessions, HRiA presented key qualitative and quantitative findings in a 45-minute presentation to DFCI's: DFCI's Board of Trustees Community Programs Committee, DFCI's Community Benefits External Advisory Committee, DFCI Community Benefits Internal Advisory Committee and Community Benefits Office staff. A total of thirty-eight individuals were engaged in this process. During these sessions, HRiA provided an overview of the data findings followed by a discussion with the audience to identify questions, gaps, areas for further exploration, and potential implications. Those discussions helped refine the development of the CHNA report and will guide the planning process.

G. Analyses

The collected qualitative information was coded and then analyzed thematically for main categories and sub-themes. Analyses identified key themes that emerged across all groups and interviews, as well as the unique issues that were noted for specific populations. Frequency and intensity of discussions on a specific topic were key indicators used for extracting main themes. While neighborhood differences are noted where appropriate, analyses emphasized DFCI's priority neighborhoods of Dorchester, Jamaica Plain, Mattapan, Mission Hill, and Roxbury. Selected paraphrased quotes – without personal identifying information – are presented in the narrative of the CHNA to further illustrate points within topic areas.

H. Limitations

As with all data collection efforts, there are several limitations related to these data that should be acknowledged. A number of secondary data sources were drawn upon for quantitative data in creating this report. Although all the sources used for this purpose (e.g., U.S. Census, Massachusetts Department of Public Health) are considered highly credible, sources may use different methods and assumptions when conducting analyses. For example, how sources define neighborhood boundaries may vary (e.g., the Boston Public Health Commission combines Roxbury and Mission Hill together, while the Boston Redevelopment Authority defines them separately). Similarly, the Boston Redevelopment Authority defines Dorchester by zip codes 02122, 02124, 02125, while the Boston Public Health Commission defines North Dorchester by zip codes 02121, 02125, and South Dorchester as 02122 and 02124.

In addition, multiple sources with differing time periods were used to generate this report. In several instances, neighborhood level data were not available and/or population estimates were based on the most stable and accurate population counts. For example, the BRFSS' neighborhood-level data, generally, do not include people who are homeless or people whose neighborhood of residence was not reported in the survey (except in the Boston overall numbers). Additionally, the age- and race-adjusted cancer mortality rates—which are calculated using cancer-related mortality data and the U.S. decennial census total population counts—are sensitive to the U.S. census reporting on age and race distributions within the population. Consequently, mortality rates reported between 2005 and 2011 are reflective of the age and race distribution of the Boston population in the 2000 decennial census, while mortality rates reported in 2012 are adjusted to the standard population used in the 2010 decennial census. This methodological approach is used in calculating many of the findings presented in the CHNA and should be taken into account when reviewing. Ultimately, between the 2000 and 2010 decennial census, there has been a change in age and racial make-up of the City of Boston which is reflective of the rates reported.

Since the 2013 CHNA, the Boston Public Health Commission has adopted the use of new population data for rate generation, thus impacting earlier data reported by DFCI. Specifically, mortality rates reported in the 2013 CHNA were generated by using the 2000 U.S. Census, which were considered the most stable population data for age-adjusted rates at the time. Data from the 2014-2015 Health of Boston report were reanalyzed using newer population estimates that reflect a shift in the White and Black age distribution across the City of Boston.

Further, it should be noted that some indicators are not comparable year to year. Specifically, cancer screening guidelines have changed with regard to time periods or ages recommended for screening. While there may not be consensus among some screening guidelines, analyses by government agencies of who follows different guidelines have changed and thus rates year to year may not be directly comparable. This is also the case for the BRFSS data, where some indicators have changed in accordance with CDC guidelines (e.g. regular physical activity and fruit and vegetable consumption). Additionally, some indicators are no longer being collected and therefore, comparisons between past and current data cannot be made. In particular, the Boston Public Health Commission stopped collecting Boston-level data about the prostate specific antigen test (PSA) in 2008. At this time, only state-level data are available.

It is also worth mentioning that when examining Boston-level data, in some cases, sample sizes are not large enough to stratify cancer screening by sub-populations. For example, sample sizes are not large enough to stratify cancer screening by Asian ethnicity such as Chinese, Vietnamese, Cambodian, etc.

In terms of examining Boston-level data by demographic factors, in many cases sample sizes are not large enough to stratify cancer screening by sub-populations within racial groups. For example, data are not available by subpopulation within the race categories, as samples are too small.

Finally, while efforts were made to talk to a diverse cross-section of individuals, demographic characteristics were not collected from the focus group participants or key informants, so it is not possible to confirm whether they reflect the composition of the region. The focus group findings represent a sub-set of community residents, with more women participants than men, and may be limited in their generalizability.

While the focus groups conducted for this study provide valuable insights, results are not statistically representative of a larger population due to non-random recruiting techniques and a small sample size. Lastly, it is important to note that data were collected at one point in time, so findings, while directional and descriptive, should not be interpreted as definitive.

Attachment/Exhibit

C

Dana-Farber Cancer Institute

Deteremination of Need

8a. Community Health Initiative

Sector Type	Organization Name	Name of Primary Contact	Title in Organization	Email Address	Phone Number
Municipal Staff	Department of Public Health	Anita Christie, RN, MHA, CPHQ	Director, Office of Clinical Preventative Services		
Municipal Staff	Boston Public Health Commission	Margaret Reid	Director, Office of Health Equity		
Education	Fenway High School	Carol Lazarus	Director, Development and School Partnerships		
Education	Fenway High School	Rawchayl Sahadeo	Special Education Coordinator		
Housing	Roxbury Tenants of Harvard	Karen Gately	Executive Director		
Housing	Roxbury Tenants of Harvard	Roxanne Haecker	Director of Program Development		
Planning & Transportation	To Be Determined				
Housing/Community Based Organizations	Madison Park Development Corporation	Jeanne Pinado	CEO		
Housing/Community Based Organizations	Madison Park Development Corporation	Abrigal Forrester	Director of Community Action		
Community Based Organizations	Asian Women for Health	Chien-Chi Huang	Executive Director		
Community-based organizations	YWCA of Boston	Beth Chandler	President and CEO		
Community-based organizations	YWCA of Boston	Kamarah Silka	Director of Strategic Initiatives and Health Programs		
Community-based organizations	Brigham and Women's Hospital	Maisha Douyon Cover	Director, Health Equity Programs and Center for Community Health and Health Equality		
Community health center and Social Service Organization	Whittier Street Health Center	Brus Guerrier	Director of Nursing		

Dana-Farber Cancer Institute
Deteremination of Need
8a. Community Health Initiative

Community-based organization and Social Service Organization	Inquilinos Boricua en Accion (IBA)	Mayra Negron	Chief Operating Officer		
Community-based organization and Sqcial Service Organization	Inquilinos Boricua en Accion (IBA)	Suzeth Dunn-Dyer	Director, Resident Services Program		
Community-based organizations and Social Service Organization	Sociedad Latina, Inc.	Alexandra Oliver-Davila	Executive Director		
Community-based organizations	American Cancer Society	Nicole Sanders O'Toole	Account Representative		
Community-based organizations	DFCI Community Benefits Staff	Anne Levine	Vice-President, External Affairs		
Community-based organizations	DFCI Community Benefits Staff	Magnolia Contreras	Director, Community Benefits		
Consumer	BPHC Pink & Black Ambassador	Thelma Burns	Cancer Survivor		

Attachment/Exhibit

D

I. Community Health Initiative Monies

The breakdown of Community Health Initiative ("CHI") monies for Dana-Farber Cancer Institute's ("DFCI or the Applicant") Proposed Project is as follows:

- Maximum Capital Expenditure: $174,850,000
- Community Health Initiative: $8,742,500 (5% of Maximum Capital Expenditure)
- CHI Administrative Fee to be retained: $174,850 (2% of the CHI monies)
- CHI Money – less the Administrative Fee: $8,567,650

- CHI Funding for Statewide Initiative: $2,141,912 (25% of CHI monies – less the administrative fee)
- CHI Local Funding: $6,425,738 (75% of CHI monies – less the administrative fee)

II. Overview of Community Benefits at DFCI and a Discussion of the 2016 CHNA Process

Background: The Community Health Initiative ("CHI") processes and community engagement for the proposed Determination of Need ("DoN") Project[1] will be conducted by DFCI's Community Benefits Office. Founded originally in 1947, DFCI aims to provide expert, compassionate care to children and adults with cancer, while advancing the understanding, diagnosis, treatment, cure, and prevention of cancer and related diseases. As an affiliate of Harvard Medical School and a National Cancer Institute ("NCI")-designated Comprehensive Cancer Center, DFCI also designs evidence-based programs that promote public health, particularly among high-risk and underserved populations, and disseminates innovative patient therapies and scientific discoveries to its target communities across the region, the United States and throughout the world. In addition to providing expert clinical care, DFCI is committed to educating the community and raising awareness about the importance of cancer prevention, outreach, screening, early detection, and clinical trials. To this end, DFCI provides education and outreach across Boston and beyond, offers support services and resources, and conducts a broad scope of research and evidence-based interventions through its collaborative work in local neighborhoods, as well as through its national and international public and professional education initiatives.

In regard to community benefit and engagement, DFCI's Board of Trustees Community Programs Committee oversees the development and implementation of DFCI's Community Benefits Plan. In their oversight capacity, Committee members provide the Community Benefits staff with guidance and leadership around program initiatives and monitor the completion of the Community Health Needs Assessment ("CHNA") and Community Health Implementation Plan ("CHIP"). The Community Benefits External Advisory Committee (which is now shifting to be known as the External DoN Advisory Committee) was established in 1997 and consists of

---

[1] The proposed Project is for a substantial capital expenditure and the acquisition of DoN-required equipment. The proposed expenditure is for the construction of a new hospital satellite facility located at 300 Boylston Street, Newton, MA 02467 that will provide expert multi-disciplinary cancer care, including exam, infusion, imaging, clinical trials, and supportive services. This new facility will also provide much needed additional space for patient care. In addition, the Applicant will acquire the following DoN-required equipment to facilitate the oncology services provided at the facility: two magnetic resonance imaging ("MRI") units, two computed tomography ("CT") units and one positron emission tomography/CT ("PET/CT") unit.

representatives from various constituencies who share DFCI's commitment to reducing disparities in cancer care, education, and treatment. Additionally, the DFCI Community Benefits Internal Advisory Committee provides input and shares responsibility for the implementation of key initiatives in the overall Community Benefits Plan.

In 1995, the Dana-Farber Cancer Institute Board of Trustees formally adopted a Community Benefits Mission Statement. This mission contributes to DFCI's goal of advancing the understanding, diagnosis, care, treatment, cure, and prevention of cancer and related diseases by: 1) Ensuring that patients from diverse backgrounds receive equitable cancer care and treatment, including education about the importance of clinical trials participation; 2) Establishing quantifiable, evidence-based, and sustainable programs in cancer prevention focusing on at-risk, underserved, and diverse populations; and 3) Providing expertise in cancer care to city and state health departments, community-based agencies, and health care providers.

To meet this Mission, DFCI's Community Benefits staff participate in community outreach and planning activities with the following organizations:

- **Massachusetts Department of Public Health (MDPH):** Through ongoing partnerships with MDPH's Chronic Disease Prevention and Control Unit, programs in colorectal, prostate, skin and women's cancers have been established with MDPH and other community agencies across the Commonwealth.

- **Massachusetts Comprehensive Cancer Prevention and Control Network (MCCPCN):** DFCI continues its leadership role as a member of the MCCPCN and has continued to identify cancer control priorities and opportunities for greatest impact in addressing cancer incidence, morbidity, mortality and survivorship.

- **Boston Public Health Commission (BPHC):** DFCI works closely with the BPHC to implement and sustain initiatives that address the need for cancer prevention education, screening services, and survivorship education. BPHC also plays a key leadership role in DFCI's Community Benefits External Advisory Committee and as the co-convener of the Boston Breast Cancer Equity Coalition. Additionally, DFCI served on the steering committee of the Let's Get Healthy, Boston! project, a three-year partnership initiative between the BPHC and the Boston Alliance for Community Health aimed at creating healthier environments for Boston-area residents. The project ended in September 2017.

- **Boston Breast Cancer Equity Coalition:** Launched in 2014, this cross-sector coalition seeks to eliminate the differences in breast cancer care and outcomes by promoting equity and excellence in care among women of all racial/ethnic groups in the City of Boston.

- **Boston Alliance for Community Health (BACH):** As a steering committee member of BACH, DFCI continues to work alongside fellow health care institutions, neighborhood coalitions and community development corporations to address the racial and ethnic disparities in health that exist in Boston and throughout the region.

- **Madison Park Development Corporation (MPDC):** DFCI has a longstanding history of collaboration with MPDC and continues to partner with MPDC to implement mutually

agreed upon community health improvement strategies, including providing health and wellness programming for MPDC residents.

- **Massachusetts Coalition for HPV and Related Cancer Awareness:** DFCI continues to serve on the steering committee of the Massachusetts Coalition for HPV and Related Cancer Awareness, with the goal of increasing HPV knowledge and vaccination rates in order to reach the Healthy People 2020 goal of 80% vaccination among eligible youth regardless of race/ethnicity or socioeconomic status.

- **Boston Public Schools Health and Wellness Department:** DFCI partners with Boston Public Schools to provide education about HPV and cancer prevention to youth, parents, and clinical staff.

- **Tobacco Free Mass Coalition:** As a member of the Tobacco Free Mass Coalition, DFCI supports the development of policies that aim to reduce youth access to tobacco, prevent nicotine addiction, and increase tobacco control funding.

- **DFCI's Center for Community-Based Research (CCBR):** CCBR conducts cancer prevention research with the goal of developing effective intervention strategies to reduce the risk of cancer. CCBR works extensively with neighborhood health centers, low-income housing, faith-based organizations, health departments and community-based organizations.

- **Dana-Farber/Harvard Cancer Center (DF/HCC):** DFCI and the DF/HCC continue to collaborate and develop programming in a variety of areas aimed at reducing the unequal burden of cancer in partnership with the Faith-based Cancer Disparities Network and other community-based organizations. Early in its history, the consortium created the Initiative to Eliminate Cancer Disparities (IECD) to maximize the acceptance and desirability of cancer research in communities that have traditionally experienced significant disparities in cancer care. The DF/HCC IECD is also the convener of the Patient Navigator Network (PNN).

- **Prostate Health Education Network (PHEN):** DFCI and PHEN partner on education, outreach and advocacy efforts and together sustain a prostate cancer support group for men of color that meets monthly at DFCI.

- **The Conference of Boston Teaching Hospitals (COBTH):** DFCI is an active member of COBTH, a coalition of thirteen Boston-area teaching hospitals who collaborate on community outreach and planning activities. Through the shared efforts of the COBTH Community Benefits Committee, a series of neighborhood-level meetings and focus groups were held as part of DFCI's 2016-2019 Community Health Needs Assessment (CHNA) process. DFCI has also been an active participant in the planning process to develop a joint citywide CHNA and CHIP for 2019.

Community Health Needs Assessment Process: To ensure that DFCI's outreach activities and programs are meeting the health needs in the community, the DFCI Community Benefits Office retained Health Resources in Action ("HRiA"), a non-profit public health consultancy organization in Boston, to undertake a comprehensive community needs assessment effort. The 2016 community health needs assessment ("CHNA") builds on previous efforts to gain a

greater understanding of the health issues facing Boston residents and its specific communities of Dorchester, Roxbury, Mission Hill, Jamaica Plain, and Mattapan, how those needs are currently being addressed, and where there are opportunities to address these needs in the future. In addition to identifying broad health issues facing residents, the 2016 CHNA delves deeper into behaviors and health outcomes across the cancer continuum, exploring behaviors and health outcomes around prevention, screening, treatment/health care utilization, and survivorship. This assessment complies with the IRS and Massachusetts Attorney General's mandates for conducting a CHNA, and also aligns with DFCI's approach of utilizing data to inform the development of its initiatives and strengthening of collaborative partnerships.

- Methodology: The 2016 CHNA aimed to identify the health-related needs and strengths of DFCI's priority communities through a social determinants of health framework, which defines health in the broadest sense and recognizes numerous factors at multiple levels— from lifestyle behaviors (e.g., healthy eating and active living) to clinical care (e.g., access to medical services) to social and economic factors (e.g., poverty) to the physical environment (e.g., air quality)—which have an impact on a community's health. It is important to recognize that multiple factors affect health and there is a dynamic relationship between people and their environments. Where and how we live, work, play, and learn are interconnected factors that are critical to consider. That is, not only do people's genes and lifestyle behaviors affect their health, but health is also influenced by more upstream factors, such as employment status and quality of housing stock. The social determinants of health framework addresses the distribution of wellness and illness among a population—its patterns, origins, and implications. While the data to which researchers have access are often a snapshot of a population in time, the people represented by that data have lived their lives in ways that are constrained and enabled by economic circumstances, social context, and government policies. Building on this framework, this assessment utilizes data to examine community-level influences, including social and economic factors that have an impact on health and health outcomes.

  Moreover, existing social, economic, and health data were drawn from national, state, county, and local sources, such as the National Cancer Institute, the U.S. Census, U.S. Bureau of Labor Statistics, Massachusetts Department of Public Health, Boston Public Health Commission, and the Boston Police Department. Over 60 individuals, representing healthcare providers, community stakeholders, and residents were engaged in focus groups and interviews to gauge their perceptions of the community, priority health concerns, and identify services or resources that are most needed to address these concerns.

- Focus on Health Equity: The 2016 CHNA sought to understand how these characteristics disproportionately affect vulnerable populations. Health equity is defined as all people having the opportunity to "attain their full health potential" and entails focused societal efforts to address avoidable inequalities by equalizing conditions for health for all groups, especially for those who have experienced socioeconomic disadvantages or historical injustices. When examining the larger social and economic context of the population (e.g., upstream factors such as housing, employment status, racial or ethnic discrimination, the built environment, and neighborhood-level resources), a robust assessment must capture the disparities and inequities that exist for traditionally underserved groups. Accordingly, a health equity lens guided the 2016 CHNA process to ensure data comprised a range of social and economic indicators

and were presented for specific populations. Understanding factors that contribute to health patterns for these populations can facilitate the identification of data-informed and evidence-based strategies to provide all residents with the opportunity to live a healthy life.

III. External DoN Advisory Committee Duties

The 2016 CHNA was led by the Community Benefits team at DFCI with oversight provided by the DFCI's Board of Trustees Community Programs Committee and feedback provided by the Community Benefits External Advisory Committee (which is now shifting to be known as the External DoN Advisory Committee) and the DFCI Community Benefits Internal Advisory Committee. To ensure continuity between these committees, two of the individuals that are currently members of the DFCI Community Benefits Internal Advisory Committee (Anne Levine and Magnolia Contreras) will also sit on the External DoN Advisory Committee. The External DoN Advisory Committee is tasked with the following responsibilities:

- Ensuring appropriate engagement with residents from targeted communities and community partners around the CHI.
- Determining the Health Priorities for CHI funding based upon DFCI's most recent CHNA and Implementation Plan and aligned with the Department of Public Health's ("Department") Health Priorities and the Executive Office of Health and Human Services' Focus Areas.
- Selecting Health Priorities
- Providing oversight to a third-party vendor that is selected to carry out the evaluation of CHI-funded projects.
- Reviewing third-party vendor reports on evaluation activities and the creation of a forum to determine if there are best practices that may be learned from the CHI projects.
- Conducting a conflict of interest disclosure process to determine which members also will populate the External DoN Allocation Committee (a Conflict of Interest Form is in the process of being developed).

IV. External DoN Allocation Committee Duties

The External DoN Allocation Committee will be comprised of External DoN Advisory Committee members who do not have a conflict of interest, as well as members of DFCI's Board of Trustees Community Programs Committee and the Community Benefits Internal Advisory Committee. The scope of work that the Allocation Committee will carry out includes:

- Completing and submitting the Health Priorities and Strategies Selection Form for approval by the Department of Public Health.
- Carrying out a formal solicitation process for the disbursement of CHI funds for the noted Health Priorities and Strategies. This process will include the development of a request for proposal ("RFP") and Bidders Conference (complete with technical assistance resources present).
- Engaging technical assistance resources that can support and assist applicants with their responses to the RFP.
- Disbursement of CHI funding.
- Review and analyze grantee reports on the impact of CHI funding.

V. Timeline for CHI Activities

Upon a Notice of Determination of Need being issued by the Public Health Council, the External DoN Advisory Committee will commence meeting and begin the CHI Process. The timeline for CHI activities is as follows:

- One-month post-approval: The External DoN Advisory Committee will begin selection of the Health Priorities for CHI funding.
- Three months post-approval: The External DoN Advisory Committee selects Health Strategies for noted Health Priorities and submits the Health Priorities and Strategies Selection Form to the Department of Public Health for review and approval.
- Four months post-approval: The External DoN Advisory Committee conducts a conflict of interest disclosure process to determine which members of the Committee will move on to the External DoN Allocation Committee.
- Four-six months post-approval: The External DoN Allocation Committee is developing the RFP process and determining how this process will work in tandem with ongoing community benefit activities and engagement being conducted by the DFCI Community Benefits Office.
- Six months post-approval: DFCI's Community Benefits Office will begin working with HRiA to provide technical assistance to applicants submitting RFP responses. HRiA will begin this work at the Bidders conferences for the RFP.
- Seven months post-approval: The RFP for funding is released.
- Eight months post-approval: Bidders conferences are held on the RFP.
- Twelve months post-approval: Responses are due for the RFP.
- Fifteen months post-approval: Funding decisions are made, and the disbursement of funds begins.
- Eighteen months post-approval: A third-party evaluator will begin evaluation work on the CHI funded initiatives.

The aforementioned process is longer than the process outlined in the DoN Guidelines for Tier 3 projects. However, given previous experience with similar RFP processes, the Director of Community Benefits at DFCI, as well as other senior staff feel strongly that it will take seven months to develop a RFP process that is transparent, fair and appropriate and that providing four months for applicants to respond to the RFP is critical to obtaining thoughtful, well-written and technically accurate RFP responses.

VI. Request for Additional Years of Funding

DFCI is seeking additional time to carry out the disbursement of funds for the CHI. Based on previous initiatives conducted by DFCI's Community Benefits Office, DFCI is seeking to provide potential multi-year grants with CHI funding that leads to sustainable programs in the target communities. To achieve these sustainable programs, DFCI is seeking to disburse these monies over a three to five-year period to ensure the greatest impact for the largest number of individuals, as well as continued sustainability of specific projects that need additional support.

VII. Evaluation Overview

DFCI is seeking to use 10% of all CHI funding ($642,573) for evaluation. These monies will allow DFCI to engage a third-party evaluator to carry out evaluation of the planning process as well as assess the overall impact of CHI funding. Through this evaluation, DFCI is seeking to learn from each of its grantees and develop a forum for sharing best practices and understanding the feasibility of replicating interventions. The evaluation team will develop annual reports for review by the External DoN Advisory Committee and post-review, submission to the Department of Public Health.

VIII. Justification for Administrative Monies

Applicants submitting a Tier 3 CHI are eligible to obtain 2% of the CHI amount for administrative costs. Consequently, DFCI is requesting 2% of the CHI funding ($174,850) for administrative expenses to carry out the CHI work. First, administrative monies will be used to offset the development of a robust solicitation process. These monies will pay for assistance in developing the RFP, technical assistance resources that will be available to organizations that are submitting grant applications, and publication fees associated with advertising the solicitation process in local papers, as well as other operational costs, such as supplies. Funding will also be used to supplement staff time directed at CHI processes, such as the development and oversight of the solicitation process.

Attachment/Exhibit

E

Community Engagement Plan Form Section 3 Supplement

The Dana-Farber Cancer Institute ("DFCI") Board of Trustees Community Programs Committee oversees the development and implementation of DFCI's Community Benefits Plan, which includes the Community Health Needs Assessment ("CHNA") Report and Community Health Implementation Plan ("CHIP"). In their oversight capacity, Committee members provide the Community Benefits staff and Cancer Care Equity Program ("CCEP") with guidance and leadership around program initiatives. Additionally, the DFCI Community Benefits External Advisory Committee (which has shifted to be the External DoN Advisory Committee) provides input and guidance to DFCI's Community Benefits programs and consists of representatives from various constituencies who share DFCI's commitment to reducing disparities in cancer care, education, and treatment. Through its Community Benefits activities, DFCI works with city and state health departments, community partners, and Boston-based coalitions to assess and monitor the needs of local residents with respect to cancer control. Through collaborative and inter-disciplinary work across various departments within the hospital, the DFCI Community Benefits Office serves as a bridge to community organizations and supports evidence-based and sustainable outreach programs.

In addition to our programs and comprehensive community outreach approach, DFCI's longstanding commitment to eliminating health care disparities and promoting diversity and health equity is also reflected in other ways including our participation in the American Hospital Association's pledge for Health Equity. DFCI has committed to identifying internal quality improvement projects related to health equity that are important to the community's health and ensuring that patients from medically underserved backgrounds are receiving culturally appropriate, patient-centered care throughout their cancer journey.

As outlined in DFCI's 2016-2019 CHNA and CHNA Implementation Plan, the hospital has undertaken robust community engagement activities to *Assess Needs and Resources, Focus on What's Important*, as well as *Choose Effective Policies and Programs*. Accordingly, this Community Engagement Plan is focused on the *Act on What's Important* and *Evaluate Actions* components of engagement. Accordingly, to ensure appropriate engagement for all levels of the community health initiative ("CHI") engagement process, DFCI will carry out the following activities:

1. Development of an External Determination of Need ("DoN") Advisory Committee: To ensure continuity between DFCI's Board of Trustees Community Programs Committee, the existing External Advisory Committee and the Internal Community Benefits Committee, members of DFCI's leadership that sit on these committees provide continuity to the External DoN Advisory Committee, including feedback on the 2016-2019 CHNA findings. The External DoN Advisory Committee is tasked with selecting health priorities and strategies for the CHI.

2. Development of an External DoN Allocation Committee: This Committee is charged with facilitating a transparent RFP process and disbursing funds to selected organizations.

3. Act on What's Important: Based on the 2016-2019 CHNA and CHNA Implementation Plan, the Allocation Committee will facilitate a transparent funding and allocation process. This Committee is tasked with developing a sound solicitation process including a Bidders Conference that allows DFCI to provide potential applicants with information on the request for proposal ("RFP"). Additionally, the Allocation Committee will ensure that technical assistance resources are available during the RFP process. The Allocation

Committee also will ensure there are no conflicts of interest with the distribution of funds. For the procurement process aspect of this phase, DFCI will reach the "Involve" level of engagement. Additionally, for the CHI implementation aspect of this phase, where CHI funds are distributed to organizations and CHI projects are implemented, DFCI will reach the "Consult" level of engagement.

4. Evaluate Actions: Post-Public Health Council approval, DFCI will select an evaluation team to collaborate with on the CHI process. The evaluation team will be tasked with monitoring and evaluating the community partners on an ongoing basis and reporting progress to DFCI on CHI activities on an annual basis. Post-review, these reports will be submitted to the Department of Public Health. For this phase, DFCI will reach the "Consult" level of engagement.

Attachment/Exhibit

5

PUBLIC ANNOUNCEMENT CONCERNING A PROPOSED HEALTH CARE PROJECT

Dana-Farber Cancer Institute, Inc. ("Applicant") located at 450 Brookline Avenue, Boston, MA 02215 intends to file a Notice of Determination of Need ("Application") with the Massachusetts Department of Public Health for a substantial capital expenditure and the acquisition of DoN-required equipment ("Project"). The proposed expenditure is for the construction of a new hospital satellite facility located at 300 Boylston Street, Newton, MA 02467 that will provide expert multi-disciplinary cancer care, including exam, infusion, imaging, clinical trials, and supportive services. This new facility will also provide much needed additional space for patient care. In addition, the Applicant will acquire the following DoN-required equipment to facilitate the oncology services provided at the facility: two magnetic resonance imaging ("MRI") units, two computed tomography ("CT") units and one positron emission tomography/CT ("PET/CT") unit. The total value of the Project based on the maximum capital expenditure is $174,850,000. The Applicant does not anticipate any price or service impacts on the Applicant's existing Patient Panel as a result of the Project. Any ten Taxpayers of Massachusetts may register in connection with the intended Application no later than 30 days of the filing of the Notice of Determination of Need by contacting the Department of Public Health, Determination of Need Program, 250 Washington Street, 6th Floor, Boston, MA 02108.

PUBLIC ANNOUNCEMENT CONCERNING A PROPOSED HEALTH CARE PROJECT

Dana-Farber Cancer Institute, Inc. ("Applicant") located at 450 Brookline Avenue, Boston, MA 02215 intends to file a Notice of Determination of Need ("Application") with the Massachusetts Department of Public Health for a substantial capital expenditure and the acquisition of DoN-required equipment ("Project"). The proposed expenditure is for the construction of a new hospital satellite facility located at 300 Boylston Street, Newton, MA 02467 that will provide expert multi-disciplinary cancer care, including exam, infusion, imaging, clinical trials, and supportive services. This new facility will also provide much needed additional space for patient care. In addition, the Applicant will acquire the following DoN-required equipment to facilitate the oncology services provided at the facility: two magnetic resonance imaging ("MRI") units, two computed tomography ("CT") units and one positron emission tomography/CT ("PET/CT") unit. The total value of the Project based on the maximum capital expenditure is $174,850,000. The Applicant does not anticipate any price or service impacts on the Applicant's existing Patient Panel as a result of the Project. Any ten Taxpayers of Massachusetts may register in connection with the intended Application no later than 30 days of the filing of the Notice of Determination of Need by contacting the Department of Public Health, Determination of Need Program, 250 Washington Street, 6th Floor, Boston, MA 02108.

Attachment/Exhibit

6

Analysis of the Reasonableness of Assumptions Used For and Feasibility of Project Financials of:

Dana-Farber Cancer Institute, Inc.

For the Years Ending September 30, 2018
Through September 30, 2023

BDO

BDO

Tel: 617-422-0700
Fax: 617-422-0909
www.bdo.com

One International Place
Boston, MA 02110-1745

July 18, 2018

Elizabeth A. Liebow, Senior Vice President
Business Development, Clinical Planning and Community Site Operations
Dana-Farber Cancer Institute
450 Brookline Avenue
Boston, MA 02215

RE: **Analysis of the Reasonableness of Assumptions and Projections Used to Support the Financial Feasibility and Sustainability of the Proposed Project**

Dear Ms. Liebow:

Enclosed is a copy of our report on the reasonableness of assumptions used for and feasibility of the financial projections for DFCI. Please contact me to discuss this report once you have had an opportunity to review.

Sincerely,

BDO USA, LLP

TABLE OF CONTENTS

BDO

Tel: 617-422-0700
Fax: 617-422-0909
www.bdo.com

One International Place
Boston, MA 02110-1745

July 18, 2018

Elizabeth A. Liebow, Senior Vice President
Business Development, Clinical Planning and Community Site Operations
Dana-Farber Cancer Institute
450 Brookline Avenue
Boston, MA 02215

RE: Analysis of the Reasonableness of Assumptions and Projections Used to Support the Financial Feasibility and Sustainability of the Proposed Project

Dear Ms. Liebow:

We have performed an analysis related to the reasonableness and feasibility of the financial projections (the "Projections") of Dana-Farber Cancer Institute, Inc. ("DFCI" or "the Applicant") related to a proposed project in connection with a new satellite facility to be located at 300 Boylston Street, Newton (the "New Hospital Satellite Facility"). This report details our analysis and findings with regards to the reasonableness of assumptions used in the preparation of the Projections and feasibility of the projected financial results prepared by the management of DFCI ("Management"). This report is to be used by DFCI in connection with its Determination of Need ("DoN") Application - Factor 4(a) and should not be distributed or relied upon for any other purpose.

I. EXECUTIVE SUMMARY

The scope of our review was limited to an analysis of the six year financial projections for the Applicant for the fiscal years ("FY") 2018 through 2023 (the "Projection Period") prepared by Management and the supporting documentation in order to render an opinion as to the reasonableness of assumptions used in the preparation and feasibility of the Projections.

The Projections exhibit a cumulative operating surplus of approximately 1.9 percent of cumulative projected revenue for DFCI for the six years from 2018 through 2023. Based upon our review of the relevant documents and analysis of the Projections, we determined the anticipated operating surplus is a reasonable expectation and based upon feasible financial assumptions. Accordingly, we determined that the Projections are reasonable and feasible, and not likely to have a negative impact on the DFCI patient panel or result in a liquidation of DFCI's assets. A detailed explanation of the basis for our determination of reasonableness and feasibility is contained within this report.

II. RELEVANT BACKGROUND INFORMATION

Dana-Farber Cancer Institute, Inc. is a not-for-profit comprehensive cancer care center and center for AIDS research. The Applicant provides adult and pediatric cancer care services at its main campus in Boston and satellite facilities in Brighton, Milford, Roxbury, and Weymouth, Massachusetts and Londonberry, New Hampshire. DFCI also operates physician practices in Lawrence, Methuen, and Weymouth, Massachusetts. Through its principal teaching affiliate of Harvard Medical School, the Applicant provides training for new generations of physicians and scientists, design programs that promote public health, and disseminates innovative patient therapies and scientific discoveries to its target community across the United States and throughout the world. A pioneer in cancer care and research, the Applicant provided care to 88,626 unique patients in FY 2017. The Applicant also is involved in over 800 clinical trials and is internationally renowned for its blending of research and clinical excellence.

The Applicant proposes capital expenditures and an acquisition of technology for a new satellite facility to be located at 300 Boylston Street, Newton (Chestnut Hill), Massachusetts (the "Proposed Project"). The New Hospital Satellite Facility will provide oncology services, which include infusion and imaging services for the diagnosis and treatment of cancer. The Proposed Project includes renovation of the space to be leased and the acquisition of two magnetic resonance imaging ("MRI") machines, two computed tomography machines ("CT"), and one positron emission tomography/computed tomography ("PET/CT") machine. The Proposed Project will result in the creation of a New Hospital Satellite Facility on two floors (140,000 square feet) of leased space. The implementation of the Proposed Project will occur in two phases. The initial phase is comprised of the construction of approximately half of the clinical space and will include exams rooms and the installation of infusion chairs to support the following oncology specialties at the new facility: breast, gastrointestinal, genitourinary, gynecologic and thoracic. To provide patients with essential imaging services, during the first phase of the Proposed Project, the Applicant will acquire and install one 1.5T MRI and two CTs. The second phase of the Proposed Project includes the construction of additional exam rooms and the installation of additional infusion therapy chairs. To ensure appropriate imaging capacity is available on-site for patients, the second phase of the Proposed Project includes the installation of one 3T MRI and one PET/CT. At completion, the New Hospital Satellite Facility will have approximately 45 exams rooms and 65 infusion chairs. Additionally, the New Hospital Satellite Facility will offer genetic testing and counseling, survivorship programming, centralized phlebotomy and lab services, palliative care, supportive services (e.g., social workers, financial counselors, resource specialists, etc.), clinical trials and imaging consultations.

III. SCOPE OF REPORT

The scope of this report is limited to an analysis of the six year financial projections for DFCI, the Applicant, for the fiscal years 2018 through 2023 (the "Projections"), prepared by Management, and the supporting documentation in order to render an opinion as to the reasonableness of assumptions used in the preparation and feasibility of the Projections. Reasonableness is defined within the context of this report as supportable and proper, given the underlying information. Feasibility is defined as based on the assumptions used the Proposed Project is not likely to result in a liquidation of the underlying assets or the need for reorganization.

This report is based on prospective financial information provided to us by Management. BDO has not audited or performed any other form of attestation services on the projected financial information related to the operations of DFCI.

If BDO had audited the underlying data, matters may have come to our attention that would have resulted in our using amounts that differ from those provided. Accordingly, we do not express an opinion or any other assurances on the underlying data presented or relied upon in this report. We do not provide assurance on the achievability of the results forecasted by the Applicant because events and circumstances frequently do not occur as expected, and the achievement of the forecasted results are dependent on the actions, plans, and assumptions of Management. We reserve the right to update our analysis in the event that we are provided with additional information.

IV. SOURCES OF INFORMATION UTILIZED

In formulating our opinions and conclusions contained in this report, we reviewed documents produced by Management as well as third party industry data sources. The documents and information upon which we relied are identified below or are otherwise referenced in this report:

1. Final_DFCI 9.30.2017 Audited Financial Statements.pdf;
2. Longwood Decant - BoT Combined Exec Comm and Finance Comm 2017 05 11_FINAL.pptx;
3. historical & projected volume - exclude CH.xlsx;
4. Metrics & CH.xlsx;
5. Payor Mix.xlsx;
6. Atrium Option B 051017.xlsx;
7. FY18 Operating Budget Presentation to Finance Committee Sept. 26, 2017.pdf;
8. Projected Fin Stmnts & CH v2.xlsx;
9. Visit metrics.xlsx;
10. DFCI First Amendment of Lease (9).pdf;
11. Lease (14).pdf;
12. Fin stmnts service breakout.xlsx;
13. Metrics.xlsx;
14. DFCI_Determination of Need Narrative Draft_v14 5212018.pdf;
15. DF CH DON costs.pdf;
16. Quarterly Statement - Dana-Farber Cancer Institute FQE December 31, 2017.pdf;

17. Investment Balance Breakout.xlsx;
18. DoN Costs - Capital Equipment Summary.pdf;
19. DoN Costs - Design & Const Summary.pdf;
20. A-E Payette Contract.pdf;
21. WBI REV 2 May 7 2018 Chestnut Hill Conceptual Cost Estimate.pdf;
22. 18-14001-900929 Life Time Center - Dana-Farber.pdf;
23. DON Cash Flows F5 version.xlsx;
24. DoN Factor 4 - F4a.ii_792018.XLSX;
25. IBISWorld Industry Report, Specialty Hospitals in the US, dated June 2017; and
26. RMA Annual Statement Studies, published by Risk Management Associates.

V. REVIEW OF THE PROJECTIONS

This section of our report summarizes our review of the reasonableness of the assumptions used and feasibility of the Projections.

The following tables present the Key Metrics, as defined below, which compare the operating results of the Projections to market information from RMA Annual Studies ("RMA")[1] and IBISWorld[2] as well as DFCI's historical performance, to assess the reasonableness of the projections.

[1] Data from RMA Annual Studies for the year ended March 31, 2017.
[2] Data from IBISWorld for the year ended March 31, 2016.

Key Financial Metrics and Ratios	Actual		Projected					
Dana-Farber Cancer Institute, Inc.	2016	2017	2018	2019	2020	2021	2022	2023
Profitability								
Operating Margin (%)	2.1%	-2.4%	1.5%	1.5%	2.0%	2.0%	2.0%	2.0%
Excess Margin (%)	2.6%	1.4%	3.0%	3.0%	3.5%	3.5%	3.5%	3.5%
Debt Service Coverage Ratio (x)	2.7x	2.8x	4.5x	4.8x	5.4x	5.7x	6.1x	6.3x
Liquidity								
Days of Available Cash and Investments on Hand (#)	218.0	219.0	226.0	215.0	199.0	196.0	197.0	200.0
Operating Cash Flow Margin (%)	10.0%	4.1%	5.5%	7.1%	6.0%	7.0%	7.7%	7.3%
Solvency								
Current Ratio (x)	2.2x	1.2x	1.1x	1.0x	1.0x	1.1x	1.2x	1.3x
Ratio of Total Debt to Total Capitalization (%)	54.4%	46.6%	44.6%	42.6%	40.2%	37.9%	35.6%	33.5%
Ratio of Cash Flow to Total Debt (%)	17.6%	10.2%	15.1%	21.1%	20.6%	26.1%	31.3%	32.1%
Unrestricted Net Assets ($ in thousands)	668,782	702,810	753,586	809,505	880,558	957,067	1,039,555	1,127,582
Total Net Assets ($ in thousands)	1,393,573	1,508,635	1,562,338	1,611,117	1,675,319	1,745,412	1,822,058	1,896,243

Key Financial Metrics and Ratios	Industry Data			
Dana-Farber Cancer Institute, Inc.	RMA - Specialty Hospitals	RMA - Offices of Physicians	RMA - Research and Development	IBIS
Profitability				
Operating Margin (%)	9.9%	5.5%	6.9%	14.7%
Excess Margin (%)	8.7%	5.0%	5.2%	NA
Debt Service Coverage Ratio (x)	NA	NA	NA	3.4x
Liquidity				
Days of Available Cash and Investments on Hand (#)	NA	NA	NA	NA
Operating Cash Flow Margin (%)	NA	NA	NA	14.2%
Solvency				
Current Ratio (x)	1.8x	1.1x	1.5x	1.9x
Ratio of Total Debt to Total Capitalization (%)	37.6%	61.2%	34.3%	NA
Ratio of Cash Flow to Total Debt (%)	NA	NA	NA	NA
Unrestricted Net Assets ($ in thousands)	NA	NA	NA	NA
Total Net Assets ($ in thousands)	33,499	6,719	33,048	NA

The Key Metrics fall into three primary categories: profitability, liquidity, and solvency. Profitability metrics are used to assist in the evaluation of management performance in how efficiently resources are utilized. Liquidity metrics, including common ratios such as "days of available cash and investments on hand", measure the quality and adequacy of assets to meet current obligations as they come due. Solvency metrics measure the company's ability to take on and service debt obligations. Additionally, certain metrics can be applicable to multiple categories. The table below shows how each of the Key Metrics are calculated.

Key Financial Metrics and Ratios Ratio Definitions	Calculation
Profitability	
Operating Margin (%)	Operating Surplus Divided by Total Operating Revenues
Excess Margin (%)	Excess of Revenues Over Expenses Divided by Total Operating Revenues
Debt Service Coverage Ratio (x)	(Adjusted Excess of Revenues Over Expenses + Depreciation and Amortization + Interest - Unrealized Gains and Losses - Swap Interest (Net) - Swap to Market) / Maximum Annual Debt Service
Liquidity	
Days of Available Cash and Investments on Hand (#)	[Cash and Cash Equivalents + Board Designated Investments + Accumulated Realized and Unrealized Returns + TR (NARFR) DOUBLED + TR (NARFR)] / [(Operating Expenses - Depreciation and Amortization) / 365]
Operating Cash Flow Margin (%)	Net Cash Provided By Operating Activities / Total Operating Revenues
Solvency	
Current Ratio (x)	Current Assets Divided by Current Liabilities
Ratio of Total Debt to Total Capitalization (%)	(Series Bonds + Capital Lease Obligations) / (Series Bonds + Capital Lease Obligations + Unrestricted Net Assets)
Ratio of Cash Flow to Total Debt (%)	Net Cash Provided By Operating Activities / (Series Bonds + Capital Lease Obligations)
Unrestricted Net Assets ($ in thousands)	Total Unrestricted Net Assets
Total Net Assets ($ in thousands)	Total Net Assets

1. Revenues

We analyzed the projected revenues within the Projections. Revenues for the Applicant include net patient service revenue, research, net assets released, unrestricted gifts, and other operating revenues. Approximately two-thirds of revenues are derived from net patient service revenues. Based upon our discussions with Management and the documents provided, the projected net patient service revenues were estimated based upon Management's anticipated changes in net patient service revenues per visit and number of visits. Net patient service revenues are projected to increase between 7.1 percent and 9.5 percent annually, except for FY 2020, which are expected to increase 18.0 percent in large part due to the opening of the first phase of the Proposed Project in the first quarter of FY 2020.

Net Patient Service Revenue per Visit

Management provided net patient service revenue per visit for six categories of patient revenues: clinic, infusion, imaging, radiation therapy, lab services, and all other. We

noted the projected net patient service revenue per visit for clinic, imaging, radiation therapy, and lab services was equal to historical levels or expected to decline modestly, which was deemed conservative. Net patient service revenue per visit for infusion and all other increased over the Projection Period. We understand based on discussions with Management that these increases primarily relate to increases in expected pharmaceutical prices and that such increases flow through to the payor. We also noted a similar level of increase in direct expense per visit for these categories representative of the increased price of pharmaceuticals, as discussed further below.

Volume Increases

Management projected volume increases for the following patient services: clinic, infusion, imaging, and radiation therapy. Revenues related to imaging and radiation therapy account for approximately 10.0 percent or less of the total net patient service revenues. Projected volume growth ranges from -5.6 percent to 1.7 percent for imaging and from 1.3 percent to 2.7 percent for radiation. Historical and projected volume growth, including volume expected from the New Hospital Satellite Facility, for clinic and infusion visits is shown in the table below:

Historical and Projected Volume Increases[3]

	2016	2017	2018	2019	2020	2021	2022	2023
Clinic Visits	3.8%	6.0%	3.8%	3.9%	5.7%	3.5%	3.8%	2.9%
Infusion Visits	4.7%	3.9%	3.5%	3.6%	4.1%	3.1%	3.6%	2.7%

The projected volume growth for the four patient services provided by Management is within range or below historical volume growth.

[3] Source information for this volume data: DFCI May 2017 pro forma.

In order to determine the reasonableness of the projected revenues, we reviewed the underlying assumptions upon which Management relied. Based upon our review, Management relied upon the historical operations and anticipated market movements. The six year compound annual growth rate ("CAGR") in the Projections of 8.5 percent approximated DFCI's historical revenue growth rate for FY 2017.

Based upon the foregoing, it is our opinion that the revenue growth projected by Management reflects a reasonable estimation of future revenues of DFCI.

2. Operating Expenses

We analyzed each of the categorized operating expenses for reasonableness and feasibility as it related to the Projections, which include incremental expenses related to the New Hospital Satellite Facility including rent expense, operating expenses related to the new location, and direct patient care expenses. Operating expenses include the following categories: direct patient care, direct research expenditures, general, administrative, and plant, depreciation and amortization, and interest.

Based upon our analysis, almost 50.0 percent of expenses as a percentage of revenues relate to direct patient care expense. We reviewed direct patient care expense on a per visit basis for the same services as the net patient service revenue per visit. We noted direct patient care expense per visit was within range or above historical metrics for each service and year except for lab services. Direct patient care expense for lab services on a per visit basis for FY 2018, FY 2019, and FY 2020 was slightly below historical levels. We noted projected per visit expense of

$141 to $145 within the Projections compared to $147 per visit in FY 2017. We further noted lab services revenues comprised less than 10.0 percent.

We additionally considered the operating surplus in the Projections to assess the reasonableness of the operating expenses in conjunction with the projected revenues. We understand per discussions with Management, review of historical information, and the FY 2018 operating budget presented to the finance committee that the Applicant aims to maintain an operating surplus between 1.5 percent and 2.0 percent. The projected operating surplus ranges from 1.5 percent to 2.0 percent in the Projections.

Based upon the foregoing, it is our opinion that the operating expenses projected by Management reflects a reasonable estimation of future expenses of the Applicant.

3. Capital Expenditures and Proposed Project Financing

We reviewed the capital expenditures projected related to the Proposed Project. The total project costs of $118.25 million[4] related to the construction of the New Hospital Satellite Facility are included within the Projections between FY 2018 and FY 2022. The Proposed Project includes two phases as discussed in the Relevant Background Information section. The total project cost budget for the New Hospital Satellite Facility is based on: (1) an initial construction estimate by the Proposed Project's construction manager, Walsh Brothers; (2) a design contract with Payette Associates, Inc., and (3) estimated equipment expenses from various vendors and

[4] Total project costs of $118.25 million excludes the fair market value of the leased space (the fair market value was independently valued by Cushman & Wakefield of Connecticut, Inc.) and the costs associated with community benefits, as well as the filing fee.

department heads. Total project costs include construction costs, architectural and engineering, fixed capital equipment, technical and consultants, and logistics and moving. We note that construction cost of $101 million is approximately 85.0 percent of the total project cost, including $14 million in contingencies.

In addition to capital expenditures, we also reviewed the proposed financing of the project. It is our understanding that the expenditures related to the Proposed Project are expected to be funded through the Applicant's net assets and cash flows. The capital expenditures are included within the Applicant's cash flows with no additional debt financing anticipated. We note that the Projections include cumulative capital expenditures of over $660 million, of which the Proposed Project will represent approximately 17.8 percent. Therefore, there appears to be sufficient room to accommodate the financing for the Proposed Project within the Applicant's normal capital expenditures without the need for debt financing.

VI. FEASIBILITY

We analyzed the Projections and Key Metrics for the Proposed Project. In preparing our analysis we considered multiple sources of information including industry metrics, historical results, and Management expectations. It is important to note that the Projections do not account for any anticipated changes in accounting standards. These standards, which may have a material impact on individual future years, are not anticipated to have a material impact on the aggregate Projections.

Within the projected financial information, the Projections exhibit a cumulative operating surplus of approximately 1.9 percent of cumulative projected revenue for the six years from 2018 through 2023. We note a net decrease in cash in the Projections for the first three years of the Projections; however, positive cash flow for each year thereafter. Based upon our review of the relevant documents and analysis of the Projections, we determined the anticipated operating surplus is a reasonable expectation and based upon feasible financial assumptions. Accordingly, we determined that the Projections are reasonable and feasible, and not likely to have a negative impact on the patient panel or result in a liquidation of assets of DFCI.

Respectively submitted,

Erik Lynch
Partner, BDO USA LLP,

Attachment/Exhibit

7

A 1

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF CORPORATIONS AND TAXATION
HENRY F. LONG, COMMISSIONER
238 STATE HOUSE, BOSTON

ARTICLES OF ORGANIZATION

We, Martin J. Mullin, President, M. Murray Weiss, Treasurer, Herman [illegible], Clerk or Secretary, and [illegible] Finkel, Parker D. Howe, [illegible] Farber, Louis R. Perini, James J. Britt, Joseph S. Cifre

being a majority of the directors (or officers having the power of directors)

of CHILDREN'S CANCER RESEARCH FOUNDATION, INC.

elected at its first meeting, in compliance with the requirements of General Laws, Chapter 180, Section 3, hereby certify that the following is a true copy of the agreement of association to form said corporation, with the names of the subscribers thereto:

We, whose names are hereto subscribed, do, by this agreement, associate ourselves with the intention of forming a corporation under the provisions of General Laws, Chapter 180.

The name by which the corporation shall be known is

CHILDREN'S CANCER RESEARCH FOUNDATION, INC.

The location of the principal office of the corporation in Massachusetts is to be the Town or City of Boston, Street [illegible] Ripley [illegible]

To operate, conduct and support an institute of pediatric research in the treatment and supervision of diseases of children in the Jimmy Fund Building in the Children's Medical Center, Boston, Massachusetts, and to do all things necessary or advisable in the furtherance of said purposes; and without limiting the generality of the foregoing, particularly to conduct and support research [illegible] treatment and prevention of cancer in children, [illegible] furnishing medical, surgical and technical facilities for [illegible] in the care, treatment and nursing of children and in equipping, maintaining and supporting research facilities for such work, in such [illegible] or places in the United States of America as the Corporation may from time to time determine; provided, however, that the net earnings and assets of this Corporation shall be used only in furtherance of the charitable purposes for which it is formed, and all gifts and bequests to, and all other assets of this Corporation, shall be used only within the United States of America exclusively for said purposes, and no part of the net earnings of this Corporation shall inure to the benefit of any private individual, and no part of the activities of this Corporation shall consist of the carrying on of propaganda or otherwise attempting to influence legislation.

IN WITNESS WHEREOF we hereto sign our names, this 8th day of June, 1951.

(Type or plainly print the name and address of each incorporator in space below.)

NAME	RESIDENCE Give Number and Street, City or Town
MARTIN J. MULLIN	76 Gordon Road, Newton, Mass.
M. MURRAY WEISS	Hotel Kenmore, Boston, Mass.
PARKER D. HOWE	633 Chestnut St., Needham, Mass.
SAMUEL FINANSKI	180 Ivy Street, Brookline, Mass.
SIDNEY FARBER	74 Amory Street, Brookline, Mass.
LOUIS R. PERINI	32 Maugus Avenue, Wellesley, Mass.
JAMES J. BRITT	341 Marlboro St., Boston, Mass.
JOSEPH S. CIFRE	26 Wedgewood St., Quincy, Mass.

A

And we further state that the first meeting of the subscribers to said agreement was held on the 8th day of June in the year 19 51.

The name, residence, and post office address of each of the officers of the corporation is as follows:

	NAME	CITY OR TOWN OF RESIDENCE (Actual place of domicile must be given)	POST OFFICE ADDRESS (Same as residence)
President	Martin J. Mullin	Newton, Massachusetts	260 Tremont St., Boston, Mass.
Treasurer	M. Murray Weiss	Boston, Massachusetts	624 Washington St., Boston, Mass.
Clerk Secretary	Parkman D. Howe	Needham, Mass.	53 State St., Boston, Mass.

Directors (or officers having the power of directors)

Martin J. Mullin — Newton, Massachusetts — 260 Tremont St., Boston, Mass.
M. Murray Weiss — Boston, Massachusetts — Hotel Kenmore Boston
Parkman D. Howe — Needham, Massachusetts — 53 State Street, Boston
Samuel Pinanski — Brookline, Massachusetts — 648 Washington St., Boston
Sidney Farber — Brookline, Massachusetts — 306 Longwood Ave. Boston
Louis R. Perini — Wellesley, Massachusetts — 32 Maugus Ave. Wellesley
James J. Britt — Boston, Massachusetts — 341 Marlboro St., Boston
Joseph S. Cifre — Quincy, Massachusetts — 44 Winchester St., Boston
John J. Darvin — New York, N. Y. — c/o Monogram Pictures Corp. 1540 Broadway, N.Y.C.
Walter A. Brown — Shady Hill Rd., Newton, Mass. — 260 Tremont St., Boston
E. Harold Stoneman — Newton, Mass. — 260 Tremont St., Boston
Louis M. Gordon — Boston, Massachusetts — 260 Tremont St., Boston
Arthur H. Lockwood — Brookline, Mass. — 260 Tremont St., Boston
John J. Quinn — 808 Commonwealth Ave. Newton — Braves Field, Boston
William H. Sullivan — 5 Bay State Rd., Wellesley — Braves Field, Boston

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we hereto sign our names, this eighth day of June, 1951.

(President, Treasurer, Clerk or Secretary, and majority of Directors or of other Board, sign in space below.)

Martin J. Mullin — President and Trustee

M. Murray Weiss — Treasurer & Trustee

Parkman D. Howe — Secretary & Trustee

Samuel Pinanski — Trustee

Sidney Farber — Trustee

Louis R. Perini — Trustee

James J. Britt — Trustee

Joseph S. Cifre — Trustee

Leave this space for binding

THE COMMONWEALTH OF MASSACHUSETTS

WRITE NOTHING BELOW

NOV 20 1951

CORPORATION DIVISION
SECRETARY'S OFFICE

CORPORATIONS FOR CHARITABLE AND CERTAIN OTHER PURPOSES

Children's Cancer Research Foundation, Inc.

ARTICLES OF ORGANIZATION

GENERAL LAWS, CHAPTER 180, SECTION 7

Filed in the office of the Secretary of the Commonwealth and Certificate of Incorporation issued

as of November 20, 1951

I hereby certify that, upon an examination of the within-written articles of organization, the agreement of association, and the record of the first meeting of the incorporators, including the by-laws, duly submitted to me, it appears that the provisions of the General Laws relative to the organization of corporations have been complied with, and I hereby approve said articles

this 20th day of November, 1951

Commissioner of Corporations and Taxation

DEPARTMENT OF
T.
R.
NOV 20 1951
CORPORATIONS AND TAXATION

CERTIFICATE
RECEIVED
JAN 9 - 1952
BY SECRETARY'S OFFICE
FROM DEPARTMENT OF CORPORATIONS
AND TAXATION

CHARTER TO BE SENT TO

Herman A. Mintz
50 Federal St.
Boston

NOTIFICATION SENT TO

same

Boston, Newton, Needham, Brookline,
Wellesley, Quincy n'd 1-10-52

The Commonwealth of Massachusetts

JOHN F. X. DAVOREN

Secretary of the Commonwealth

STATE HOUSE BOSTON, MASS.

CHANGE OF XXXXX PURPOSE XXXXXXXXX
General Laws, Chapters XXXXXXXXXXXX 180 Section 10

We, Dr. Sidney Farber, President Theodore Fleisher, Treasurer,

XXXXXX Joseph T. Cummiskey, Secretary, and Thomas A. Yawkey, Joseph R. Cronin, William S. Koster, Arthur H. Lockwood, Donald L. Miller, and Richard H. O'Connell being a majority of the XXXXXXXX officers having the power of directors of CHILDREN'S CANCER RESEARCH FOUNDATION, INC.

a corporation duly organized under the provisions of Chapter 180 of the General Laws, in compliance with the provisions of XXXXXXXXXXXXXXXX Chapter 180 Section 10 of the General Laws, as amended, do hereby certify that at a meeting of the members XXXXXXXXXXXX XXXXX of said corporation duly called for the purpose and held on the 9th day of June 1969, by an affirmative vote of 29 members XXXXXXXX XXXXXXXXX of said corporation, being at least two-thirds of the persons legally entitled to vote, it was voted to change the XXXXX purposes XXXXXXX of the corporation to be as follows:

To operate, conduct and support an institution of pediatric research in the treatment and supervision of diseases of children in the Jimmy Fund Building in Boston, Massachusetts, and to do all things necessary or advisable in the furtherance of said purposes; and without limiting the generality of the foregoing, particularly to conduct and support research into the causes, treatment and prevention of cancer in children by providing and aiding in furnishing medical, surgical and technical facilities for such work, and in the care, treatment and nursing of children and in equipping, maintaining and supporting research facilities for such work, in such place or places in the United States of America as FOUNDATION may from time to time, (continued) *

Signed this 3rd day of July 1969 under the penalties of perjury.

President: Sidney Farber M.D.

Treasurer: Theodore Fleisher

XXXXX Secretary: Joseph T. Cummiskey

XXXXXXXXXXXXX together with the following named persons, being a majority of officers having the power of directors. **

IMPORTANT: Amendments under Chapter 155 Section 10 must be filed within 30 days of the date of the vote. If more space is needed use continuation sheets which must be 8½" wide x 11" high paper, and used on one side only.
*DELETE ANY INAPPLICABLE WORDS.

C-180-1 (Rev.) 2M-5-44-947235

Jay

CD 1444-1. 1M-10-64-008865

determine; provided, however, that the net earnings and assets of FOUNDATION shall be used only in furtherance of the charitable purposes for which it is formed, and all gifts and bequests to, and all other assets of FOUNDATION shall be used only within the United States of America exclusively for said purposes, and no part of it net earnings shall inure to the benefits of any private individual, and no part of its activities shall consist of the carrying on of propaganda or otherwise attempting to influence legislation.

In furtherance of the foregoing, to construct, operate and maintain a hospital or hospitals, a hoptel or hoptels, a Cancer Center and other facilities anywhere in the United States of America to provide for persons with cancer regardless of age, and to carry on anywhere in the United States of America all activities related or incident thereto including, but without limitation thereto, research, study, teaching, clinical investigation, care of patients and training of medical students, scientists, nurses, research assistants and paramedical personnel.

Thomas A. Yawkey

Arthur H. Lockwood

Joseph E. Cronin

Donald L. Miller

William S. Koster

Richard E. O'Connell

RECEIVED
$5 CK.

MAY 1 3 1970

CORPORATION DIVISION
SECRETARY'S OFFICE

2857

GENERAL LAWS
CHAPTER 180 SECTION 10

I hereby approve the within amendment, and the filing fee having been paid, said certificate is deemed to have been filed with me this 13th day of May, 1970.

John F. X. Davoren

JOHN F. X. DAVOREN
Secretary of the Commonwealth

GENERAL LAWS
CHAPTER 155 SECTION 10

I hereby approve the within amendment and direct the officers of the corporation to publish in a newspaper published in the county where the corporation has its principal office or place of business notice of change of name this
day of 19 .

JOHN F. X. DAVOREN
Secretary of the Commonwealth

RECEIVED

JUL 8 - 1970

CORPORATION DIVISION
SECRETARY'S OFFICE

Notice having been properly published and the filing fee having been paid this amendment is deemed to have been filed with me this
day of 19 .

JOHN F. X. DAVOREN
Secretary of the Commonwealth

Mailed
7-8-70

Mr. Jack Hayes
Bingham, Dana & Gould 542-7756
One Federal Street
Boston 02110

CO–180–S. 7-2. 10M–11–71–050701

The Commonwealth of Massachusetts

JOHN F. X. DAVOREN

Secretary of the Commonwealth

STATE HOUSE, BOSTON, MASS. 02133

ARTICLES OF AMENDMENT

General Laws, Chapter 180, Section 7

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of members or stockholders adopting the amendment. The fee for filing this certificate is $5.00 as prescribed by General Laws, Chapter 180, Section 11C(b). Make check payable to the Commonwealth of Massachusetts.

We, Richard A. Smith, President/~~Vice President~~, and John L. Harrington, Secretary ~~Clerk/Assistant Clerk~~

of Children's Cancer Research Foundation, Inc.
(Name of Corporation)

located at 39 Binney Street, Boston, Massachusetts

do hereby certify that the following amendment to the articles of organization of the corporation was duly adopted at a meeting held on June 12, 1974, by vote of 28 members ...., ~~stockholders~~, being at least two thirds of its members legally qualified to vote in meetings of the corporation ~~(or, in the case of a corporation having capital stock, by the holders of at least two thirds of the capital stock having the right to vote therein)~~:

VOTED: That, subject to the laws of the Commonwealth of Massachusetts, the Articles of Organization of the corporation are hereby amended by changing the name of this corporation from Children's Cancer Research Foundation, Inc. to Sidney Farber Cancer Center, Inc., and that the proper officers of this corporation are hereby authorized in the name and on behalf of this corporation to take any and all action which they may deem necessary or advisable to make the foregoing amendment effective.

NOTE: Amendments for which the space provided above is not sufficient should be set out on continuation sheets to be numbered 2A, 2B, etc. Continuation sheets shall be on 8½" wide x 11" high paper and must have a left-hand margin 1 inch wide for binding. Only one side should be used.

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 180, Section 7 of the General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 26th day of June, in the year 1974.

RAS Richard A. Adduci ..... President/~~Vice President~~

John L. Harrington ..... Secretary
~~Clerk/Assistant Clerk~~

4624

RECEIVED

JUN 28 1974

CORPORATION DIVISION
SECRETARY'S OFFICE

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF AMENDMENT

(General Laws, Chapter 180, Section 7)

I hereby approve the within articles of amendment and, the filing fee in the amount of $ 10.00 having been paid, said articles are deemed to have been filed with me this 3rd day of July, 19 74.

John F. X. Davoren

JOHN F. X. DAVOREN
Secretary of the Commonwealth
State House, Boston, Mass.

TO BE FILLED IN BY CORPORATION
PHOTO COPY OF AMENDMENT TO BE SENT

TO: Margaret H. Douglas-Hamilton, Esq.
Bingham, Dana & Gould
100 Federal Street
Boston, Massachusetts 02110

Copy Mailed JUL 11 1974

CD—180—S, 7-2, 25M-8-73-082769

The Commonwealth of Massachusetts

PAUL GUZZI

Secretary of the Commonwealth

STATE HOUSE, BOSTON, MASS. 02133

ARTICLES OF AMENDMENT

General Laws, Chapter 180, Section 7

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of members of stockholders adopting the emendment. The fee for filing this certificate is $10.00 as prescribed by General Laws, Chapter 180, Section 11C(b). Make check payable to the Commonwealth of Massachusetts.

We, Richard A. Smith, President/~~Vice President and~~
John L. Harrington, Secretary
~~Clerk/Assistant Clerk~~ of:

Sidney Farber Cancer Center, Inc.
(Name of Corporation)

located at 44 Binney Street, Boston, Massachusetts

do hereby certify that the following amendment to the articles of organization of the corporation was duly adopted at a meeting held on June 7, 1976, by vote of 37 members ~~shareholders~~ being at least two thirds of its members legally qualified to vote in meetings of the corporation ~~(or, in the case of a corporation having a capital stock, by the holders of at least two thirds of the capital stock having the right to vote thereon)~~:

VOTED: That, subject to the laws of the Commonwealth of Massachusetts, the Articles of Organization of the corporation are hereby amended by changing the name of this corporation from Sidney Farber Cancer Center, Inc. to Sidney Farber Cancer Institute, Inc., and that the proper officers of this corporation are hereby authorized in the name and on behalf of this corporation to take any and all action which they may deem necessary or advisable to make the foregoing amendment effective.

NOTE: Amendments for which the space provided above is not sufficient should be set out on continuation sheets to be numbered 2A, 2B, etc. Continuation sheets shall be on 8½" wide x 11" high paper and must have a left-hand margin 1 inch wide for binding. Only one side should be used.

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 180, Section 7 of the General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 7th day of June, in the year 19 76.

.... President/~~Vice President~~

.... Secretary ~~Clerk/Assistant Clerk~~

6078

RECEIVED

JUN 7 1976

CORPORATION DIVISION
SECRETARY'S OFFICE

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF AMENDMENT

(General Laws, Chapter 180, Section 7)

I hereby approve the within articles of amendment and, the filing fee in the amount of $ 10.00 having been paid, said articles are deemed to have been filed with me this 8th day of June, 1976.

Paul Guzzi

PAUL GUZZI
Secretary of the Commonwealth
State House, Boston, Mass.

TO BE FILLED IN BY CORPORATION
PHOTO COPY OF AMENDMENT TO BE SENT

TO: Margaret H. Douglas-Hamilton, Esq.
Bingham, Dana & Gould
100 Federal Street
Boston, Massachusetts 02110

Copy Mailed JUN 14 1976

CD—180—S. 7-2. 25M-8-73-082769

JM

The Commonwealth of Massachusetts

PAUL GUZZI

Secretary of the Commonwealth

STATE HOUSE, BOSTON, MASS. 02133

ARTICLES OF AMENDMENT

General Laws, Chapter 180, Section 7

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of members of stockholders adopting the emendment. The fee for filing this certificate is $10.00 as prescribed by General Laws, Chapter 180, Section 11C(b). Make check payable to the Commonwealth of Massachusetts.

We, Richard A. Smith, President/~~Vice President~~, and John L. Harrington, Secretary, ~~Clerk~~/~~Assistant Clerk~~ of

Sidney Farber Cancer Institute, Inc.

(Name of Corporation)

located at 44 Binney Street, Boston, Massachusetts

do hereby certify that the following amendment to the articles of organization of the corporation was duly adopted at a meeting held on July 25, 1978, by vote of 42 members ~~shareholders~~, being at least two thirds of its members legally qualified to vote in meetings of the corporation (or, in the case of a corporation having capital stock, by the holders of at least two thirds of the capital stock having the right to vote thereon):

To add to the purposes of the corporation as follows:

"To make contracts, give guarantees and incur liabilities, borrow money at such rates of interest as the corporation may determine, issue its notes, bonds and other obligations, and secure any of its obligations by mortgage, pledge or encumbrance of, or security interest in, all or any of its property or any interest therein, wherever situated."

NOTE: Amendments for which the space provided above is not sufficient should be set out on continuation sheets to be numbered 2A, 2B, etc. Continuation sheets shall be on 8½" wide x 11" high paper and must have a left-hand margin 1 inch wide for binding. Only one side should be used.

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 180, Section 7 of the General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 25th day of July, in the year 1978.

Richard [illegible] Smith ..... President/~~Vice President~~

John L. Harrington ..... ~~Clerk/Assistant Clerk~~ Secretary

7777

RECEIVED

AUG 23 9 1

CORPORATION DIVISION
SECRETARY'S OFFICE

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF AMENDMENT

(General Laws, Chapter 180, Section 7)

I hereby approve the within articles of amendment and, the filing fee in the amount of $ 10.00 having been paid, said articles are deemed to have been filed with me this 28th day of Aug, 19 78.

Paul Guzzi

PAUL GUZZI
Secretary of the Commonwealth
State House, Boston, Mass.

TO BE FILLED IN BY CORPORATION
PHOTO COPY OF AMENDMENT TO BE SENT

TO: Margaret H. Douglas-Hamilton, Esq.
Bingham, Dana & Gould
100 Federal Street
Boston, Massachusetts 02110

Copy Mailed AUG 25 1978

041

$10.00

CD-180-S. 7-2 15M-10-79-152328

T. H.

Examined

I.S.

Name Approved

C

3

P.C.

The Commonwealth of Massachusetts

MICHAEL JOSEPH CONNOLLY
Secretary of State
ONE ASHBURTON PLACE, BOSTON, MASS. 02108

FEDERAL IDENTIFICATION NO. 04-2263040

ARTICLES OF AMENDMENT

General Laws, Chapter 180, Section 7

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of members or stockholders adopting the amendment. The fee for filing this certificate is $10.00 as prescribed by General Laws, Chapter 180, Section 11C(b). Make check payable to the Commonwealth of Massachusetts.

We, Baruj Benacerraff, M.D., President/~~Vice President~~, and
Kirsten G. Henderson, ~~Clerk~~/Assistant Clerk of

Sidney Farber Cancer Institute, Inc.
(Name of Corporation)

located at 44 Binney Street, Boston, Massachusetts

do hereby certify that the following amendment to the articles of organization of the corporation was duly adopted at a meeting held on Tuesday, January 18, 1983, by vote of 55 members ..... shareholders, being at least two thirds of its members legally qualified to vote in meetings of the corporation (or, in the case of a corporation having capital stock, by the holders of at least two thirds of the capital stock having the right to vote thereon):

To change the corporate name as follows:

Voted: That, in accordance with the laws of the Commonwealth of Massachusetts, the Articles of Organization of the corporation are hereby amended to change the corporate name from Sidney Farber Cancer Institute, Inc. to Dana-Farber Cancer Institute, Inc. and that the proper officers of the corporation are hereby authorized to take all necessary and appropriate actions on behalf of the corporation to effectuate this corporate name change.

Note: If the space provided under any article or item on this form is insufficient, additions shall be set forth on separate 8½ x 11 sheets of paper leaving a left hand margin of at least 1 inch for binding. Additions to more than one article may be continued on a single sheet so long as each article requiring each such addition is clearly indicated.

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 180, Section 7 of the General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 18th day of January, in the year 1983.

Barry Benacerraf .... President/~~Vice President~~

Kirsten G. Henderson .... ~~Clerk~~/Assistant Clerk

11431

5-10
2763

SECRETARY OF
COMMONWEALTH

1983 JAN 19 AM 11:0

REGISTRATION DIVISION

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF AMENDMENT

(General Laws, Chapter 180, Section 7)

I hereby approve the within articles of amendment and, the filing fee in the amount of $ 10.00 having been paid, said articles are deemed to have been filed with me this 19th day of January, 1983.

Michael Joseph Connolly

MICHAEL JOSEPH CONNOLLY

Secretary of State

TO BE FILLED IN BY CORPORATION

PHOTO COPY OF AMENDMENT TO BE SENT

TO:

Rhoda S. Isselbacher

Epstein, King & Isselbacher

131 State Street

Boston, Massachusetts 02109

Telephone ....742-5400.....

Copy Mailed JAN 31 1983

CD-180-S. 7-2 1

Examined

Name Approved

C ☐

P.C.

The Commonwealth of Massachusetts

MICHAEL JOSEPH CONNOLLY
Secretary of State
ONE ASHBURTON PLACE, BOSTON, MASS. 02108

FEDERAL IDENTIFICATION NO. 04-2263040

ARTICLES OF AMENDMENT

General Laws, Chapter 180, Section 7

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of members or stockholders adopting the amendment. The fee for filing this certificate is $10.00 as prescribed by General Laws, Chapter 180, Section 11C(b). Make check payable to the Commonwealth of Massachusetts.

We, Baruj Benacerraff, M.D., President/~~Vice President~~ and Kirsten G. Henderson, ~~Clerk~~/Assistant Clerk of

Dana-Farber Cancer Institute, Inc.
(Name of Corporation)

located at 44 Binney Street, Boston, Massachusetts

do hereby certify that the following amendment to the articles of organization of the corporation was duly adopted at a meeting held on Tuesday, January 20, 1987, by vote of 47 members ..... shareholders, being at least two thirds of its members legally qualified to vote in meetings of the corporation (or, in the case of a corporation having capital stock, by the holders of at least two thirds of the capital stock having the right to vote thereon):

To add to the corporation's Articles of Organization the following provision:

"No trustee or officer of the Corporation shall be personally liable to the Corporation for monetary damages for any breach of fiduciary duty by such trustee as a trustee or by such officer as an officer. Notwithstanding the foregoing sentence, a trustee or officer may be liable to the extent of applicable law for any breach of the trustee's or officer's duty of loyalty to the Corporation or its members, for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, or for any transaction from which the trustee or officer derived an improper personal benefit. No amendment to or repeal of the first sentence of this paragraph shall apply to or have any effect on the liability or alleged liability of any trustee or officer of the Corporation occurring prior to the effective date of such amendment or repeal. The provisions of the first sentence of this paragraph shall not be subject to any

Note: If the space provided under any article or item on this form is insufficient, additions shall be set forth on separate 8½ x 11 sheets of paper leaving a left hand margin of at least 1 inch for binding. Additions to more than one article may be continued on a single sheet so long as each article requiring each such addition is clearly indicated.

exceptions or limitations other than as set forth in this paragraph.

The foregoing amendment will become effective when these articles of amendment are filed in accordance with Chapter 180, Section 7 of the General Laws unless these articles specify, in accordance with the vote adopting the amendment, a later effective date not more than thirty days after such filing, in which event the amendment will become effective on such later date.

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this Fifth day of March, in the year 19 87

Barry Berenson ..... President/Vice President

Kirsten S. Henderson ..... Clerk/Assistant Clerk

14748 010806

1987 MAR -9 PM 4:10

CORPORATION

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF AMENDMENT

(General Laws, Chapter 180, Section 7)

I hereby approve the within articles of amendment and, the filing fee in the amount of $ 10.00 having been paid, said articles are deemed to have been filed with me this 10th day of March, 1987.

Michael J. Connolly

MICHAEL JOSEPH CONNOLLY

Secretary of State

TO BE FILLED IN BY CORPORATION

PHOTO COPY OF AMENDMENT TO BE SENT

TO: Neal J. Curtin, Esq.
Bingham, Dana & Gould

100 Federal Street

Boston, MA 02110

Telephone 348-8000

Copy Mailed

The Commonwealth of Massachusetts

OFFICE OF THE SECRETARY OF STATE
ONE ASHBURTON PLACE, BOSTON, MA 02108

Michael Joseph Connolly, *Secretary*

FEDERAL IDENTIFICATION NO. 04-2263040

RESTATED ARTICLES OF ORGANIZATION

General Laws, Chapter 180, Section 7

This certificate must be submitted to the Secretary of the Commonwealth within sixty days after the date of the vote of members or stockholders adopting the restated articles of organization. The fee for filing this certificate is $30. Make check payable to the Commonwealth of Massachusetts.

We, Baruj Benacerraf
Neal J. Curtin
, President and
Secretary, of

DANA-FARBER CANCER INSTITUTE, INC.

(Name of Corporation)

located at 44 Binney Street, Boston, Massachusetts

do hereby certify that the following restatement of the articles of organization of the corporation was duly adopted at a meeting held on October 30, 1990, by vote of 73 members being at least two thirds of its members legally qualified to vote in meetings of the corporation (or, in the case of a corporation having capital stock, by the holders of at least two thirds of the capital stock having the right to vote thereon):

1. The name by which the corporation shall be known is:- DANA-FARBER CANCER INSTITUTE, INC.

2. The purposes for which the corporation is formed are as follows:-

To operate, conduct and support an institute for research into the causes, treatment and prevention of cancer and other diseases in children and adults and to provide for the care, treatment and nursing of persons having such diseases, and in furtherance of the foregoing, to construct, operate and maintain a hospital or hospitals, a cancer center and other facilities in Boston, Massachusetts or anywhere in the United States of America to provide for persons with cancer and other diseases regardless of age; to promote the purposes of Dana-Farber, Inc. and to transfer funds and donations to it so long as it controls the corporation; and to carry on anywhere in the United States of America all activities related or incident thereto including, but without limitation thereto, research, study, teaching, clinical investigation, care of patients and training of medical students, scientists, nurses, research assistants and para medical personnel.

NOTE: If provisions for which the space provided under Articles 2, 3 and 4 is not sufficient additions should be set out on continuation sheets to be numbered 2A, 2B, etc. Indicate under each Article where the provision is set out. Continuation sheets shall be on 8½" x 11" paper and must have a left-hand margin 1 inch wide for binding. Only one side should be used.

3. If the corporation has more than one class of members, the designation of such classes, the manner of election or appointment, the duration of membership and the qualification and rights, including voting rights, of the members of each class, are as follows:—

Provisions relating to Members of the Corporation shall be as set forth in the By-Laws of the Corporation as amended from time to time.

* 4. Other lawful provisions, if any, for the conduct and regulation of the business and affairs of the corporation, for its voluntary dissolution, or for limiting, defining, or regulating the powers of the corporation, or of its directors or members, or of any class of members, are as follows:—

See attached pages 4A through 4F.

* If there are no provisions state "None".

DANA-FARBER CANCER INSTITUTE, INC.

ARTICLE 4

Other Lawful Provisions for Conduct and Regulation of the Business and Affairs of the Corporation, for its Voluntary Dissolution, and for Limiting, Defining and Regulating the Powers of the Corporation and of its Member and Trustees.

4.1. The Corporation shall have the following powers in furtherance of its corporate purposes:

(a) The Corporation shall have perpetual succession in its corporate name.

(b) The Corporation may sue and be sued.

(c) The Corporation may have a corporate seal which it may alter at pleasure.

(d) The Corporation may elect or appoint Trustees, Officers, employees and other agents, fix their compensation and define their duties and obligations, and may indemnify such corporate personnel.

(e) The Corporation may purchase, receive or take by grant, gift, devise, bequest or otherwise, lease, or otherwise acquire, own, hold, improve, employ, use and otherwise deal in and with, real or personal property, or any interest therein, wherever situated, in an unlimited amount.

(f) The Corporation may solicit and receive contributions from any and all sources and may receive and hold, in trust or otherwise, funds received by gift or bequest.

(g) The Corporation may sell, convey, lease, exchange, transfer or otherwise dispose of, or mortgage, pledge, encumber or create a security interest in, all or any of its property, or any interest therein, wherever situated.

(h) The Corporation may purchase, take, receive, subscribe for, or otherwise acquire, own, hold, vote, employ, sell, lend, lease, exchange, transfer, or otherwise dispose of, mortgage, pledge, use and otherwise deal in and with, bonds and other obligations, shares, or other securities or interests issued by others, whether engaged in similar or different business, governmental, or other activities.

(i) The Corporation may make contracts, give guarantees and incur liabilities, borrow money at such rates of interest as the Corporation may determine, issue its notes, bonds and other obligations, and secure any of its obligations by mortgage, pledge or encumbrance of, or security interest in, all or any of its property or any interest therein, wherever situated.

(j) The Corporation may lend money, invest and reinvest its funds, and take and hold real and personal property as security for the payment of funds so loaned or invested.

(k) The Corporation may do business, carry on its operations, and have offices and exercise the powers granted by Massachusetts General Laws, Chapter 180, in any jurisdiction within or without the United States.

(l) The Corporation may pay pensions, establish and carry out pension, savings, thrift and other retirement, incentive and benefit plans, trusts and provisions for any or all of its Trustees, Officers and employees.

(m) The Corporation may make donations in such amounts as the Member or Trustees shall determine, irrespective of corporate benefit, for the public welfare or for community fund, hospital, charitable, religious, educational, scientific, civic or similar purposes, and in time of war or other national emergency in aid thereof, including without limitation donations to Dana-Farber, Inc.; provided that, as long as the Corporation is entitled to exemption from federal income tax under Section 501(c)(3) of the Internal Revenue Code, it shall make no contribution for purposes prohibited under such section.

(n) The Corporation may be an incorporator, member or stockholder of other corporations of any type or kind.

(o) The Corporation may be a partner in any business enterprise which it would have power to conduct by itself.

(p) The Corporation shall have and may exercise all powers necessary or convenient to effect any or all of the purposes for which the Corporation is formed and may exercise such powers to the same extent as might an individual, either alone or in a joint venture or other arrangement with others, or through a wholly or partly owned or controlled Corporation; provided, however, that no such power shall be exercised in a manner inconsistent with Massachusetts General Laws, Chapter 180 or any other chapter of the General Laws of The Commonwealth of Massachusetts; and provided, further, that the Corporation shall not engage in any activity or exercise any power which would deprive it of any exemption from federal income tax which the Corporation may receive under Section 501(c)(3) of the Internal Revenue Code.

4.2. Meetings of the Member may be held anywhere in the United States.

4.3. No Trustee or Officer of the Corporation shall be personally liable to the Corporation or its Member for monetary damages for breach of fiduciary duty as such Trustee or Officer notwithstanding any provision of law imposing such liability; provided, however, that this provision shall not eliminate the liability of an Officer or Trustee (i) for any breach of the Officer's or Trustee's duty of loyalty to the Corporation or its Member, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, or (iii) for any transaction from which the Officer or Trustee derived an improper personal benefit.

4.4.(a) The Corporation shall, to the extent legally permissible, indemnify the Member and each person who serves as one of the Corporation's Trustees or Officers, or who serves at its request as a member, director, trustee or officer of another organization or in a capacity with respect to any employee benefit plan (each such person being called in this Section 4.4 a "Person"), against all liabilities and expenses, including amounts paid in satisfaction of judgments, in compromise or as fines and penalties, and counsel fees, reasonably incurred by such Person in connection with the defense or disposition of any action, suit or other proceeding, whether civil or criminal, in which such Person may be involved or with which such Person may be threatened, while in office or thereafter, by reason of being or having been such a Person, except with respect to any

matter as to which such Person shall have been adjudicated in any proceeding not to have acted in good faith in the reasonable belief that his, her or its action was in the best interests of the Corporation or, to the extent that such matter relates to service at the request of the Corporation for another organization or an employee benefit plan, in the best interests of such other organization or of the participants or beneficiaries of such employee benefit plan. Such best interests shall be deemed to be the best interests of the Corporation for purposes of this Section 4.4.

(b) Notwithstanding the foregoing, as to any matter disposed of by a compromise payment by any Person, pursuant to a consent decree or otherwise, no indemnification either for said payment or for any other expenses shall be provided unless such compromise shall be approved as in the best interests of the Corporation, after notice that it involves such indemnification, (a) by a majority of the disinterested Trustees then in office, provided that there has been obtained an opinion in writing of independent legal counsel to the effect that such Person appears to have acted in good faith in the reasonable belief that his or her action was in the best interests of the Corporation, or (b) by the Member.

(c) Expenses, including counsel fees, reasonably incurred by any Person in connection with the defense or disposition of any such action, suit or other proceeding may be paid from time to time by the Corporation in advance of the final disposition thereof upon receipt of an undertaking by such Person to repay the amounts so paid if such Person ultimately shall be adjudicated to be not entitled to indemnification under this Section 4.4. Such an undertaking may be accepted without reference to the financial ability of such Person to make repayment.

(d) The right of indemnification hereby provided shall not be exclusive. Nothing contained in this Section shall affect any other rights to indemnification to which any Person or other corporate personnel may be entitled by contract or otherwise under law.

(e) As used in this Section 4.4, the term "Person" includes such Person's successors in interest (if a corporation), heirs, executors and administrators, and a "disinterested" Trustee or Officer is one against whom in such capacity the proceeding in question, or another proceeding on the same or similar grounds, is not then pending.

4.5.(a) No person shall be disqualified from holding any office by reason of any interest. In the absence of fraud, any Trustee, Officer or Member of the Corporation, or any concern in which any such Trustee, Officer or Member has any interest, may be a party to, or may be pecuniarily or otherwise interested in, any contract, act or other transaction (a "transaction") of the Corporation, and

(1) such transaction shall not be in any way invalidated or otherwise affected by that fact; and

(2) no such Trustee, Officer, Member or concern shall be liable to account to the Corporation for any profit or benefit realized through any such transaction;

provided, however, that such transaction either was fair at the time it was entered into or is authorized or ratified either (i) by a majority of the Trustees who are not so interested and to whom the nature of such interest has been disclosed, or (ii) by vote of the Member at any meeting of the Member the notice of which, or an accompanying statement, summarizes the nature of such transaction and such interest. No interested Trustee of the Corporation may vote or may be counted in determining the existence of a quorum at any meeting at which such transaction shall be authorized, but may participate in discussion thereof.

(b) For purposes of this Section 4.5, the term "interest" shall include personal interest and also interest as a trustee, director, officer, stockholder, member or beneficiary of any concern; and the term "concern" shall mean any corporation, association, trust, partnership, firm, person or other entity other than the Corporation.

(c) No transaction shall be avoided by reason of any provisions of this paragraph 4.5 which would be valid but for such provisions.

4.6. The Corporation shall be a nonprofit corporation and shall have no stock. No part of the assets or net earnings of the Corporation shall inure to the benefit of any Officer or Trustee of the Corporation or any other individual; no substantial part of the activities of the Corporation shall be the carrying on of propaganda, or otherwise attempting, to influence legislation except to the extent permitted by Section 501(h) of the Internal Revenue Code; and the Corporation shall not participate in, or intervene in (including the publishing or distributing of statements), any political campaign on behalf of (or in opposition to) any candidate for public office. It is intended that the Corporation shall be entitled to exemption from federal income tax under Section 501(c)(3) of the Internal Revenue Code and shall not be a private foundation under Section 509(a) of the Internal Revenue Code.

4.7. Upon the liquidation or dissolution of the Corporation, after payment of all of the liabilities of the Corporation or due provision therefor, all of the assets of the Corporation shall be disposed of pursuant to Massachusetts General Laws, Chapter 180, Section 11A, to Dana-Farber, Inc., a Massachusetts charitable corporation, or if it is not then in existence and exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code, to one or more other organizations with similar purposes and similar tax exemption.

4.8. The Corporation shall not discriminate in administering its policies and programs or in the employment of its personnel on the basis of race, color, religion, national or ethnic origin, sex, handicap or otherwise.

4.9. All references herein: (i) to the Internal Revenue Code shall be deemed to refer to the Internal Revenue Code of 1986, as now in force or hereafter amended; (ii) to the General Laws of The Commonwealth of Massachusetts, or any chapter thereof, shall be deemed to refer to said General Laws or chapter as now in force or hereafter amended; and (iii) to particular sections of the Internal Revenue Code or said General Laws shall be deemed to refer to similar or successor provisions hereafter adopted.

"We further certify that the foregoing restated articles of organization effect no amendments to the articles of organization of the corporation as heretofore amended, except amendments to the following articles 2, 3 and 4

("If there are no such amendments, state "None".)

IN WITNESS WHEREOF AND UNDER THE PENALTIES OF PERJURY, we have hereto signed our names this 30th day of October in the year 19 90

Barry Blackwell President

Neal J Curtin Secretary

356404

THE COMMONWEALTH OF MASSACHUSETTS

RESTATED ARTICLES OF ORGANIZATION

(General Laws, Chapter 180, Section 7)

I hereby approve the within restated articles of organization and, the filing fee in the amount of $5.00 having been paid, said articles are deemed to have been filed with me this 1st day of March 19 91

SECRETARY OF THE COMMONWEALTH
1991 MAR -1 PM 4:11
CORPORATION DIVISION

Michael Joseph Connolly

MICHAEL JOSEPH CONNOLLY

Secretary of the Commonwealth

State House, Boston, Mass.

TO BE FILLED IN BY CORPORATION

PHOTO COPY OF RESTATED ARTICLES OF ORGANIZATION TO BE SENT

TO Paul F. Perkins, Esq.
Ropes & Gray
One International Place
Boston, MA 02110
(617) 951-7469

In order to assist the Corporations Division process your Restated Articles as quickly as possible, please address all documents to:

Office of the Secretary of State
ATT: In-put Section
One Ashburton Place, Room 1717
Boston, MA 02108

Copy Mailed

FEDERAL IDENTIFICATION
NO. 042263404
Fee: $15.00

Examiner

The Commonwealth of Massachusetts

William Francis Galvin
Secretary of the Commonwealth
One Ashburton Place, Boston, Massachusetts 02108-1512

042
044

ARTICLES OF AMENDMENT
(General Laws, Chapter 180, Section 7)

Name Approved

We, David G. Nathan, M.D., *President / ~~*Vice President~~,

and Kirsten G. Henderson, Assistant Secretary *~~Clerk / *Assistant Clerk~~,

of Dana-Farber Cancer Institute, Inc.,
(Exact name of corporation)

located at 44 Binney Street, Boston, Massachusetts 02115,
(Address of corporation in Massachusetts)

do hereby certify that these Articles of Amendment affecting articles numbered:

2,4
(Number those articles 1, 2, 3, and/or 4 being amended)

of the Articles of Organization were duly adopted at a meeting held on January 20 1998, by vote of:

39 members, _____ directors, or _____ shareholders,

being at least two-thirds of its members/directors legally qualified to vote in meetings of the corporation (or, in the case of a corporation having capital stock, by the holders of at least two thirds of the capital stock having the right to vote therein):

1. Replace existing Articles 2 and 4 with the attached.

2. ~~Replace existing Bylaws with the attached Amended and Restated Bylaws of Dana-Farber Cancer Institute, Inc., as adopted on January 20, 1998.~~

C ☐
P ☐
M ☐
R.A. ☐

9
C.

*~~Delete the inapplicable words.~~
Note: If the space provided under any article or item on this form is insufficient, additions shall be set forth on one side only of separate 8 1/2 x 11 sheets of paper with a left margin of at least 1 inch. Additions to more than one article may be made on a single sheet so long as each article requiring each addition is clearly indicated.

DANA-FARBER CANCER INSTITUTE, INC.

ARTICLE 2

To operate, conduct and support an institute for research into the causes, treatment and prevention of cancer and other diseases in children and adults and to provide for the care, treatment and nursing of persons having such diseases, and in furtherance of the foregoing, to construct, operate and maintain a hospital or hospitals, a cancer center and other facilities in Boston, Massachusetts or anywhere in the United States of America to provide for persons with cancer and other diseases regardless of age; and to carry on anywhere in the United States of America to provide for persons with cancer and other diseases regardless of age; and to carry on anywhere in the United States of America all activities related or incident thereto including, but without limitation thereto, research, study, teaching, clinical investigation, care of patients and training of medical students, scientists, nurses, research assistants and paramedical personnel.

DANA-FARBER CANCER INSTITUTE, INC.

ARTICLE 4

4.1. The Corporation shall have the following powers in furtherance of its corporate purposes:

(a) The Corporation shall have perpetual succession in its corporate name.

(b) The Corporation may sue and be sued.

(c) The Corporation may have a corporate seal which it may alter at pleasure.

(d) The Corporation may elect or appoint Trustees, Officers, employees and other agents, fix their compensation and define their duties and obligations, and may indemnify such corporate personnel.

(e) The Corporation may purchase, receive or take by grant, gift, devise, bequest or otherwise, lease, or otherwise acquire, own, hold, improve, employ, use and otherwise deal in and with, real or personal property, or any interest therein, wherever situated, in an unlimited amount.

(f) The Corporation may solicit and receive contributions from any and all sources and may receive and hold, in trust or otherwise, funds received by gift or bequest.

(g) The Corporation may sell, convey, lease, exchange, transfer or otherwise dispose of, or mortgage, pledge, encumber or create a security interest in, all or any of its property, or any interest therein, wherever situated.

(h) The Corporation may purchase, take, receive, subscribe for, or otherwise acquire, own, hold, vote, employ, sell, lend, lease, exchange, transfer, or otherwise dispose of, mortgage, pledge, use and otherwise deal in and with, bonds and other obligations, shares, or other securities or interests issued by others, whether engaged in similar or different business, governmental, or other activities.

(i) The Corporation may make contracts, give guarantees and incur liabilities, borrow money at such rates of interest as the Corporation may determine, issue its notes, bonds and other obligations, and secure any of its obligations by mortgage, pledge or encumbrance of, or security interest in, all or any of its property or any interest therein, wherever situated.

(j) The Corporation may lend money, invest and reinvest its funds, and take and hold real and personal property as security for the payment of funds so loaned or invested.

(k) The Corporation may do business, carry on its operations, and have offices and exercise the powers granted by Massachusetts General Laws, Chapter 180, in any jurisdiction within or without the United States.

(l) The Corporation may pay pensions, establish and carry out pension, savings, thrift and other retirement, incentive and benefit plans, trusts and provisions for any or all of its Trustees, Officers and employees.

(m) The Corporation may make donations in such amounts as the Trustees shall determine, irrespective of corporate benefit, for the public welfare or for community fund, hospital, charitable, religious, educational, scientific, civic or similar purposes, and in time of war or other national emergency in aid thereof, including without limitation donations to Dana-Farber, Inc; provided that, as long as the Corporation is entitled to exemption from federal income tax under Section 501(c)(3) of the Internal Revenue Code, it shall make no contribution for purposes prohibited under such section.

(n) The Corporation may be an incorporator, member or stockholder of other corporations of any type or kind.

(o) The Corporation may be a partner in any business enterprise which it would have power to conduct by itself.

(p) The Corporation shall have and may exercise all powers necessary or convenient to effect any or all of the purposes for which the corporation is formed and may exercise such powers to the same extent as might an individual, either alone or in a joint venture or other arrangement with others, or through a wholly or partly owned or controlled corporation; provided, however, that no such power shall be exercised in a manner inconsistent with Massachusetts General Laws, Chapter 180 or any other chapter of the General Laws of The Commonwealth of Massachusetts; and provided, further, that the Corporation shall not engage in any activity or exercise any power which would deprive it of any exemption from federal income tax which the Corporation may receive under Section 501(c)(3) of the Internal Revenue Code.

4.2 The By-Laws may provide that the Trustees may make, amend or repeal the By-Laws in whole or in part.

4.3. Meetings of the Trustees may be held anywhere in the United States.

4.4. No Trustee or Officer of the Corporation shall be personally liable to the Corporation for monetary damages for breach of fiduciary duty as such Trustee or Officer notwithstanding any provision of law imposing such liability; provided, however, that this provision shall not eliminate the liability of an Officer or Trustee (i) for any breach of the Officer's or Trustee's duty of loyalty to the Corporation, (ii) for acts or omissions not in good

faith or which involve intentional misconduct or a knowing violation of law, or (iii) for any transaction from which the Officer or Trustee derived an improper personal benefit.

4.5. (a) The Corporation shall, to the extent legally permissible, indemnify each person who served as one of its Trustees or Officers, or who serves at its request as a member, director, trustee or officer of another organization or in a capacity with respect to any employee benefit plan (each such person being called in this Section 4.5 a "Person"), against all liabilities and expenses, including amounts paid in satisfaction of judgments, in compromise or as fines and penalties, and counsel fees, reasonably incurred by such Person in connection with the defense or disposition of any action, suit or other proceeding, whether civil or criminal, in which such Person may be involved or with which such Person may be threatened, while in office or thereafter, by reason of being or having been such a Person, except with respect to any matter as to which such Person shall have been adjudicated in any proceeding not to have acted in good faith in the reasonable belief that his, her or its action was in the best interests of the Corporation or, to the extent that such matter relates to service at the request of the Corporation for another organization or an employee benefit plan, in the best interests of such other organization or of the participants or beneficiaries of such employee benefit plan. Such best interests shall be deemed to be the best interests of the Corporation for purposes of this Section 4.5.

(b) Notwithstanding the foregoing, as to any matter disposed of by a compromise payment by any Person, pursuant to a consent decree or otherwise, no indemnification either for said payment or for any other expenses shall be provided unless such compromise shall be approved as in the best interests of the Corporation, after notice that it involves such indemnification, by a majority of the disinterested Trustees then in office, provided that there has been obtained an opinion in writing of independent legal counsel to the effect that such Person appears to have acted in good faith in the reasonable belief that his or her action was in the best interests of the Corporation.

(c) Expenses, including counsel fees, reasonably incurred by any Person in connection with the defense or disposition of any such action, suit or other proceeding may be paid from time to time by the Corporation in advance of the final disposition thereof upon receipt of an undertaking by such Person to repay the amounts so paid if such Person ultimately shall be adjudicated to be not entitled to indemnification under this Section 4.5. Such an undertaking may be accepted without reference to the financial ability of such Person to make repayment.

(d) The right of indemnification hereby provided shall not be exclusive. Nothing contained in this Section shall affect any other rights to indemnification to which any Person or other corporate personnel may be entitled by contract or otherwise under law.

(e) As used in this Section 4.5, the term "Person" includes such Person's successors in interest (if a corporation), heirs, executors and administrators, and a "disinterested" Trustee or Officer is one against whom in such capacity the proceeding in question, or another proceeding on the same or similar grounds, is not then pending.

4.6. (a) No person shall be disqualified from holding any office by reason of any interest. In the absence of fraud, any Trustee or Officer of the Corporation, or any concern in which any such Trustee or Officer has any interest, may be a party to, or may be pecuniarily or otherwise interested in, any contract, act or other transaction (a "transaction") of the Corporation, and

(1) such transaction shall not be in any way invalidated or otherwise affect by that fact; and

(2) no such Trustee, Officer, or concern shall be liable to account to the Corporation for any profit or benefit realized through any such transaction;

provided, however, that such transaction either was fair at the time it was entered into or is authorized or ratified by a majority of the Trustees who are not so interested and to whom the nature of such interest has been disclosed at any meeting of the Trustees the notice of which, or an accompanying statement, summarized the nature of such transaction and such interest. No interested Trustee of the Corporation may vote or may be counted in determining the existence of a quorum at any meeting at which such transaction shall be authorized, but may participate in discussion thereof.

(b) For purposes of this Section 4.6, the term "interest" shall include personal interest and also interest as a trustee, director, officer, stockholder, member of beneficiary of any concern; and the term "concern" shall mean any corporation, association, trust, partnership, firm, person or other entity other than the Corporation.

(c) No transaction shall be avoided by reason of any provisions of this paragraph 4.6 which would be valid but for such provisions.

4.7. The Corporation shall be a nonprofit corporation and shall have no stock. No part of the assets or net earnings of the Corporation shall inure to the benefit of any Officer or Trustee of the Corporation or any other individual; no substantial part of the activities of the Corporation shall be the carrying on of propaganda, or otherwise attempting, to influence legislation except to the extent permitted by Section 501(h) of the Internal Revenue Code; and the Corporation shall not participate in, or intervene in (including the publishing or distributing of statements), any political campaign on behalf of (or in opposition to) any candidate for public office. It is intended that the Corporation shall be entitled to exemption from federal income tax under Section 501(c)(3) of the Internal Revenue Code and shall not be a private foundation under Section 509(a) of the Internal Revenue Code.

4.8. Upon the liquidation or dissolution of the Corporation, after payment of all of the liabilities of the Corporation or due provision therefor, all of the assets of the Corporation shall be disposed of pursuant to Massachusetts General Laws, Chapter 180, Section 11A, to Dana-Farber, Inc., a Massachusetts charitable corporation, or if it is not then in existence and exempt

from federal income tax under Section 501(c)(3) of the Internal Revenue Code, to one or more other organizations with similar purposes and similar tax exemption.

4.9. The Corporation shall not discriminate in administering its policies and programs or in the employment of its personnel on the basis of race, color, religion, national or ethnic origin, sex, handicap or otherwise.

4.10. All references herein: (i) to the Internal Revenue Code shall be deemed to refer to the Internal Revenue Code of 1986, as now in force or hereafter amended; (ii) to the General Laws of The Commonwealth of Massachusetts, or any chapter thereof, shall be deemed to refer to said General Laws or chapter as now in force or hereafter amended; and (iii) to particular sections of the Internal Revenue Code or said General Laws shall be deemed to refer to similar or successor provisions hereafter adopted.

The foregoing amendment(s) will become effective when these Articles of Amendment are filed in accordance with General Laws, Chapter 180, Section 7 unless these articles specify, in accordance with the vote adopting the amendment *later* effective date not more than *thirty days* after such filing, in which event the amendment will become effective on such later date.

Later effective date: _____

SIGNED UNDER THE PENALTIES OF PERJURY, this 22nd day of April, 19 98

Neil G. Nelson, *President / ~~*Vice President~~,

Kirsten G. Henderson, Assistant Secretary
*Clerk / ~~*Assistant Clerk~~.

*Delete the inapplicable words.

134

THE COMMONWEALTH OF MASSACHUSETTS

SECRETARY OF THE COMMONWEALTH
99 JUN -8 AM 3:57
06612

ARTICLES OF AMENDMENT

(General Laws, Chapter 180, Section 7)

I hereby approve the within Articles of Amendment and, the filing fee in the amount of $ 15.00 having been paid, said articles are deemed to have been filed with me this 1st day of JUNE 19 99.

Effective date: _____

William Francis Galvin

WILLIAM FRANCIS GALVIN

Secretary of the Commonwealth

TO BE FILLED IN BY CORPORATION

Photocopy of document to be sent to:

Office of General Counsel

Dana-Farber Cancer Institute

44 Binney Street, Boston, MA 02115

Telephone: 617-632-3605

IDENTIFICATION
no. 042263040
Filing Fee: $15.00

Examiner

Name Approved

The Commonwealth of Massachusetts

William Francis Galvin
Secretary of the Commonwealth
One Ashburton Place, Room 1717, Boston, Massachusetts 02108-1512

ARTICLES OF AMENDMENT
(General Laws, Chapter 180, Section 7)

We, Laurie H. Glimcher, M.D., *President / ~~*Vice President~~,

and Richard S. Boskey, Esq., *~~Clerk~~ / *Assistant Clerk,

of Dana-Farber Cancer Institute, Inc.,
(Exact name of corporation)

located at 450 Brookline Avenue, Boston, Massachusetts 02215,
(Address of corporation in Massachusetts)

do hereby certify that these Articles of Amendment affecting articles numbered:

2
(Number those articles 1, 2, 3, and/or 4 being amended)

of the Articles of Organization were duly adopted at a meeting held on January 29 20 13, by vote of:

_____ members, 40 directors, or _____ shareholders**,

☐ Being at least two-thirds of its members legally qualified to vote in meetings of the corporation; OR

☑ Being at least two-thirds of its directors where there are no members pursuant to General Laws, Chapter 180, Section 3; OR

☐ In the case of a corporation having capital stock, by the holders of at least two-thirds of the capital stock having the right to vote therein.

Replace existing Article 2 of the text with the following:

C ☐
P ☐
M ☐
RA ☐

To operate, conduct and support an institute for research into the causes, treatment and prevention of cancer and other diseases in children and adults and to provide for the care, treatment and nursing of persons having such diseases, and in furtherance of the foregoing, to construct, operate and maintain a hospital or hospitals, a cancer center and other facilities in Boston, Massachusetts, anywhere in the United States of America or elsewhere in the world to provide for persons with cancer and other diseases regardless of age; to promote health care in communities around the world by educating and supporting other providers in effective cancer care and research; and to carry on all activities related or incident thereto including, but without limitation thereto, research, study, teaching, clinical investigation, care of patients and training of medical students, scientists, nurses, research assistants and paramedical personnel.

**Delete the inapplicable words.*
***Check only one box that applies.*
Note: If the space provided under any article or item on this form is insufficient, additions shall be set forth on one side only of separate 8 1/2 x 11 sheets of paper with a left margin of at least 1 inch. Additions to more than one article may be made on a single sheet so long as each article requiring each addition is clearly indicated.

P.C.

The foregoing amendment(s) will become effective when these Articles of Amendment are filed in accordance with General Laws, Chapter 180, Section 7 unless these articles specify, in accordance with the vote adopting the amendment, a *later* effective date not more than *thirty days* after such filing, in which event the amendment will become effective on such later date.

Later effective date: N/A .

SIGNED UNDER THE PENALTIES OF PERJURY, this 21st day of February, 20 18

, *President / ~~*Vice President~~,

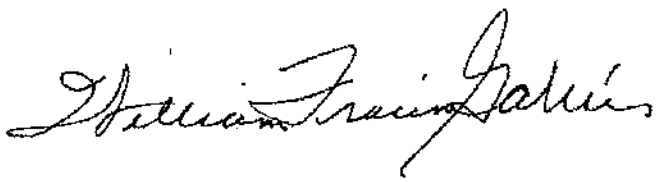
, ~~*Clerk~~ / *Assistant Clerk.

*Delete the inapplicable words.

THE COMMONWEALTH OF MASSACHUSETTS

I hereby certify that, upon examination of this document, duly submitted to me, it appears that the provisions of the General Laws relative to corporations have been complied with, and I hereby approve said articles; and the filing fee having been paid, said articles are deemed to have been filed with me on:

February 27, 2018 01:24 PM



WILLIAM FRANCIS GALVIN

Secretary of the Commonwealth

Attachment/Exhibit

8

Massachusetts Department of Public Health
Determination of Need
Affidavit of Truthfulness and Compliance with Law and Disclosure Form 100.405(B)

Version: 7-6-17

Instructions: Complete Information below. When complete check the box "This document is ready to print:". This will date stamp and lock the form. Print Form. Each person must sign and date the form. When all signatures have been collected, scan the document and e-mail to: **dph.don@state.ma.us** Include all attachments as requested.

Application Number: DCFI-18060111-HE

Original Application Date: 7/19/2018

Applicant Name: Dana-Farber Cancer Institute, Inc.

Application Type: Hospital/Clinic Substantial Capital Expenditure

Applicant's Business Type: (•) Corporation ( ) Limited Partnership ( ) Partnership ( ) Trust ( ) LLC ( ) Other

Is the Applicant the sole member or sole shareholder of the Health Facility(ies) that are the subject of this Application? (•) Yes ( ) No

The undersigned certifies under the pains and penalties of perjury:

1. The Applicant is the sole corporate member or sole shareholder of the Health Facility[ies] that are the subject of this Application;
2. I have ~~read~~* 105 CMR 100.000, the Massachusetts Determination of Need Regulation;
3. I understand and agree to the expected and appropriate conduct of the Applicant pursuant to 105 CMR 100.800;
4. I have ~~read~~* this application for Determination of Need including all exhibits and attachments, and ~~certify that~~** all of the information contained herein is accurate and true;
5. I have submitted the correct Fliing Fee and understand it is nonrefundable pursuant to 105 CMR 100.405(B);
6. I have submitted the required copies of this application to the Determination of Need Program, and, as applicable, to all Parties of Record and other parties as required pursuant to 105 CMR 100.405(B);
7. I have caused, as required, notices of intent to be published and duplicate copies to be submitted to all Parties of Record, and all carriers or third-party administrators, public and commercial, for the payment of health care services with which the Applicant contracts, and with Medicare and Medicaid, as required by 105 CMR 100.405(C), et seq.;
8. I ~~have caused~~** proper notification and submissions to the Secretary of Environmental Affairs pursuant to 105 CMR 100.405(E) and 301 CMR 11.00; will be made if applicable
9. If subject to M.G.L. c. 6D, § 13 and 958 CMR 7.00, I have submitted such Notice of Material Change to the HPC - in accordance with 105 CMR 100.405(G);
10. Pursuant to 105 CMR 100.210(A)(3), I certify that both the Applicant and the Proposed Project are in material and substantial compliance and good standing with relevant federal, state, and local laws and regulations, as well as with all ~~previously issued~~ Notices of Determination of Need ~~and the terms and Conditions attached therein~~***;
11. I have ~~read~~* and understand the limitations on solicitation of funding from the general public prior to receiving a Notice of Determination of Need as established in 105 CMR 100.415;
12. I understand that, if Approved, the Applicant, as Holder of the DoN, shall become obligated to all Standard Conditions pursuant to 105 CMR 100.310, as well as any applicable Other Conditions as outlined within 105 CMR 100.000 or that otherwise become a part of the Final Action pursuant to 105 CMR 100.360;
13. Pursuant to 105 CMR 100.705(A), I certify that the Applicant has Sufficient Interest in the Site or facility; and
14. Pursuant to 105 CMR 100.705(A), I certify that the Proposed Project is authorized under applicable zoning by-laws or ordinances, whether or not a special permit is required; or,
    a. If the Proposed Project is not authorized under applicable zoning by-laws or ordinances, a variance has been received to permit such Proposed Project; or,
    b. The Proposed Project is exempt from zoning by-laws or ordinances.

Corporation:

Attach a copy of Articles of Organization/Incorporation, as amended

Laurie H. Glimcher, M.D.

CEO for Corporation Name: | Signature: | Date

Joshua Bekenstein

Board Chair for Corporation Name: | Signature: Joshua Bekenstein | Date

*been informed of the contents of
**have been informed that
***issued in compliance with 105 CMR 100.00, the Massachusetts Determination of Need Regulation effective January 27, 2017

Massachusetts Department of Public Health
Determination of Need
Affidavit of Truthfulness and Compliance with Law and Disclosure Form 100.405(B)

Version: 7-6-17

Instructions: Complete information below. When complete check the box "This document is ready to print:". This will date stamp and lock the form. Print Form. Each person must sign and date the form. When all signatures have been collected, scan the document and e-mail to: **dph.don@state.ma.us** Include all attachments as requested.

Application Number: DFCI-18060111-HE

Original Application Date: 7/19/2018

Applicant Name: Dana-Farber Cancer Institute, Inc.

Application Type: Hospital/Clinic Substantial Capital Expenditure

Applicant's Business Type: (•) Corporation ( ) Limited Partnership ( ) Partnership ( ) Trust ( ) LLC ( ) Other

Is the Applicant the sole member or sole shareholder of the Health Facility(ies) that are the subject of this Application? (•) Yes ( ) No

The undersigned certifies under the pains and penalties of perjury:

1. The Applicant is the sole corporate member or sole shareholder of the Health Facility[ies] that are the subject of this Application;
2. I have *~~read~~ 105 CMR 100.000, the Massachusetts Determination of Need Regulation;
3. I understand and agree to the expected and appropriate conduct of the Applicant pursuant to 105 CMR 100.800;
4. I have *~~read~~ this application for Determination of Need including all exhibits and attachments, and **~~certify that~~ all of the information contained herein is accurate and true;
5. I have submitted the correct Filing Fee and understand it is nonrefundable pursuant to 105 CMR 100.405(B);
6. I have submitted the required copies of this application to the Determination of Need Program, and, as applicable, to all Parties of Record and other parties as required pursuant to 105 CMR 100.405(B);
7. I have caused, as required, notices of intent to be published and duplicate copies to be submitted to all Parties of Record, and all carriers or third-party administrators, public and commercial, for the payment of health care services with which the Applicant contracts, and with Medicare and Medicaid, as required by 105 CMR 100.405(C), et seq.;
8. I **~~have caused~~ proper notification and submissions to the Secretary of Environmental Affairs pursuant to 105 CMR 100.405(E) and 301 CMR 11.00; will be made if applicable
9. If subject to M.G.L. c. 6D, § 13 and 958 CMR 7.00, I have submitted such Notice of Material Change to the HPC - in accordance with 105 CMR 100.405(G);
10. Pursuant to 105 CMR 100.210(A)(3), I certify that both the Applicant and the Proposed Project are in material and substantial compliance and good standing with relevant federal, state, and local laws and regulations, as well as with all ~~previously issued~~ Notices of Determination of Need ***~~and the terms and Conditions attached therein~~;
11. I have *~~read~~ and understand the limitations on solicitation of funding from the general public prior to receiving a Notice of Determination of Need as established in 105 CMR 100.415;
12. I understand that, if Approved, the Applicant, as Holder of the DoN, shall become obligated to all Standard Conditions pursuant to 105 CMR 100.310, as well as any applicable Other Conditions as outlined within 105 CMR 100.000 or that otherwise become a part of the Final Action pursuant to 105 CMR 100.360;
13. Pursuant to 105 CMR 100.705(A), I certify that the Applicant has Sufficient Interest in the Site or facility; and
14. Pursuant to 105 CMR 100.705(A), I certify that the Proposed Project is authorized under applicable zoning by-laws or ordinances, whether or not a special permit is required; or,
    a. If the Proposed Project is not authorized under applicable zoning by-laws or ordinances, a variance has been received to permit such Proposed Project; or,
    b. The Proposed Project is exempt from zoning by-laws or ordinances.

Corporation:

Attach a copy of Articles of Organization/Incorporation, as amended

Laurie H. Glimcher, M.D.	Signature:	7-10-18
CEO for Corporation Name:		Date
Joshua Bekenstein		
Board Chair for Corporation Name:	Signature:	Date

*been informed of the contents of
**have been informed that
***issued in compliance with 105 CMR 100.00, the Massachusetts Determination of Need Regulation effective January 27, 2017

Attachment/Exhibit

9

[redacted]

DANA-FARBER CANCER INSTITUTE P.O. Box 479102 Brookline, MA 02447-9102

[redacted]

AMOUNT PAID: $349,700.00

Direct Inquiries To: 617-632-3094

[redacted]

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF HEALTH HUMAN S
DEPARTMENT OF PUBLIC HEALTH DETERMI
250 WASHINGTON STREET
BOSTON MA 02108

Vendor Number: 0000001496

Invoice Date	Invoice Number	Voucher ID	Description	Gross Amount	Discount	Net Amount
07/03/18	FILINGFEE07/03/18	01770419	FILING FEE COMMUNITY HEALTH INITIATIVE (CHI)	$349,700.00	$0.00	$349,700.00
			TOTALS	**$349,700.00**	**$0.00**	**$349,700.00**

PLEASE DETACH BEFORE DEPOSITING CHECK

DANA-FARBER CANCER INSTITUTE P.O. Box 479102 Brookline, MA 02447-9102

CHECK NUMBER [redacted]

50-937
213

July 3, 2018

PAY TO THE ORDER OF:
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF HEALTH HUMAN S
DEPARTMENT OF PUBLIC HEALTH DETERMI
250 WASHINGTON STREET
BOSTON, MA 02108

CHECK AMOUNT
$349,700.00

EXACTLY *********349,700 DOLLARS AND 00 CENTS

Security feature included. Details on back.

JPMorgan Chase Bank, N.A.
Syracuse, NY

Authorized Signer

[redacted]

Attachment/Exhibit

10

Factor 4: Financial Feasibility and Reasonableness of Expenditures and Costs

Applicant has provided (as an attachment) a certification, by an independent certified public accountant (CPA) as to the availability of sufficient funds for capital and ongoing operating costs necessary to support the Proposed Projects without negative impacts or consequences to the Applicant's existing Patient Panel

F4a.i **Capital Costs Charts:**

For each Functional Area document the square footage and costs for New Construction and/or Renovations

		Present Square Footage		Square Footage Involved in Project				Resulting Square Footage		Total Cost		Cost/Square Footage	
				New Construction		Renovation							
Add/Del Rows	Functional Areas	Net	Gross	Net	Gross	Net	Gross	Net	Gross	New Construction	Renovation	New Construction	Renovation
	Clinical Oncology					48,700	79,400	48,700	79,400		$61,878,008		$779.32
	Imaging					12,700	19,400	12,700	19,400		$15,118,808		$779.32
	Pharmacy					4,900	5,300	4,900	5,300		$4,130,680		$779.36
	Patient Amenities					10,000	15600	10,000	15600		$12,157,390		$779.32
	Building Support					7,400	9000	7,400	9000		$7,013,880		$779.32
	Mechanical						900		900		$701,234		$779.15
	Total: (calculated)	0	0	0	0	83700	129600	83700	129600	0	101000000	0	$779.33

F4a.ii For each Category of Expenditure document New Construction and/or Renovation Costs.				
	Category of Expenditure	New Construction	Revnoation	Total
	Land Costs			
	Land Acquisition Cost		$0	$0
	Site Survey and Soil Investigation		$0	$0
	Other Non-Depreciable Land Development		$0	$0
	Total Land Costs		$0	$0
	Construction Contract (including bonding cost)			
	Depreciable Land Development Cost		$0	$0
	Building Acquisition Cost: Fair Market Value of Leased Space		$56,600,000	$56,600,000
	Construction Contract (including bonding cost)		$101,000,000	$101,000,000
	Fixed Equipment Non in Contract		$12,200,000	$12,200,000
	Architectural Cost (Including fee, Printing, supervision etc.) and Engineering Cost		$4,400,000	$4,400,000
	Pre-filing Planning and Development Costs		$250,000	$250,000
	Post-filing Planning and Development Costs		$150,000	$150,000
Add/Del Rows	Other (specify): Technical and Consultants		$250,000	$250,000
	Net Interest Expensed During Construction		$0	$0
	Major Movable Equipment		$0	$0
	Total Construction Costs		$174,850,000	$174,850,000
	Financing Costs			
	Cost of Securing Financing (legal, administrative, feasibility studies, mortgage insurance, printing, etc		$0	$0
	Bond Discount		$0	$0
Add/Del Rows	Other (specify)		$0	$0
				$0
	Total Financing Costs		$0	$0
	Estimated Total Capital Expenditure		$174,850,000	$174,850,000