

# EVALUATION OF THE BEACON COMMUNITY COOPERATIVE AGREEMENT PROGRAM

---

## Characterizing the Beacon Communities

MARCH 2013

PRESENTED TO:

Office of the National Coordinator  
for Health Information Technology  
200 Independence Avenue, SW  
Washington, DC 20201

PRESENTED BY:

NORC at the  
University of Chicago  
4350 East-West Highway  
Suite 800  
Bethesda, MD 20814



*at the* UNIVERSITY *of* CHICAGO

# Table of Contents

<b>Executive Summary .....</b>	<b>1</b>
Contextual Factors.....	1
<i>Geography and Demographics</i> .....	1
<i>Population Health</i> .....	2
<i>Health Care System Capacity and Characteristics</i> .....	2
<i>Health IT Environment</i> .....	3
Organization-Level Baseline Characteristics.....	3
<i>Type of Lead Organization</i> .....	3
<i>History of Collaboration</i> .....	3
<i>Participation in Related Initiatives</i> .....	4
Beacon Community Interventions .....	4
Summary.....	4
<b>Introduction and Background .....</b>	<b>5</b>
<b>Contextual Factors.....</b>	<b>7</b>
Geography and Demographics .....	7
<i>Population Size</i> .....	7
<i>Population Density</i> .....	8
<i>Race and Ethnicity</i> .....	9
<i>Insurance Coverage</i> .....	12
<i>Socioeconomic Status</i> .....	14
Population Health .....	16
Health Care System Capacity and Characteristics.....	21
<i>Primary Care Physician Supply</i> .....	21
<i>Hospital Capacity</i> .....	22
<i>Health Care Market Competition</i> .....	22
Health IT Environment .....	23
<i>Health IT Infrastructure</i> .....	23
<b>Organization-Level Baseline Characteristics .....</b>	<b>28</b>
Type of Lead Organization.....	28
History of Collaboration .....	29
Participation in Related Initiatives .....	29
<b>Beacon Community Interventions .....</b>	<b>31</b>
<b>Conclusion.....</b>	<b>35</b>
<b>Appendix: Methodology .....</b>	<b>36</b>

## List of Figures and Exhibits

<b>Exhibit 1:</b> Beacon Community Program Logic Model.....	6
<b>Exhibit 2:</b> Total population, by Beacon Community.....	8
<b>Exhibit 3:</b> Population density (people per sq. mile), by Beacon Community.....	9
<b>Exhibit 4:</b> Population Race/Ethnicity, by Beacon Community (2010 data).....	11
<b>Exhibit 5:</b> Medicare Advantage penetration, by Beacon Community .....	12
<b>Exhibit 6:</b> Medicare prescription drug plan (PDP) penetration, by Beacon Community.....	13
<b>Exhibit 7:</b> Population uninsured, by Beacon Community .....	14
<b>Exhibit 8:</b> Percent of population in poverty, by Beacon Community .....	15
<b>Exhibit 9:</b> Percent of Medicare beneficiaries eligible for Medicaid, by Beacon Community.....	16
<b>Exhibit 10:</b> Total population reporting health status as ‘excellent’, ‘very good’ or ‘good’, by Beacon Community.....	17
<b>Exhibit 11:</b> Current smokers in the population, by Beacon Community .....	17
<b>Exhibit 12:</b> Total population with cardiovascular disease, by Beacon Community .....	18
<b>Exhibit 13:</b> Medicare beneficiaries with ischemic heart disease, by Beacon Community .....	18
<b>Exhibit 14:</b> Percent of total population and Medicare beneficiaries with diabetes, by Beacon Community.....	19
<b>Exhibit 15:</b> Total population with asthma, by Beacon Community .....	20
<b>Exhibit 16:</b> Medical discharges and discharges for ambulatory care sensitive conditions per 1,000 Medicare enrollees, by Beacon Community .....	21
<b>Exhibit 17:</b> Hospital System Concentration within the Beacon Communities- Based on the Herfindahl-Hirschman Index (HHI) .....	23
<b>Exhibit 18:</b> Percent of hospitals with a fully implemented EHR, by Beacon Community .....	24
<b>Exhibit 19:</b> Percent of ambulatory providers that adopted an EHR, by Beacon Community .....	25
<b>Exhibit 20:</b> Average e-prescriptions sent via Surescripts and average activated pharmacies per 100,000 people, by Beacon Community .....	26
<b>Exhibit 21:</b> Average percent of hospitals with an HIO in the area and average percent of hospitals participating in an HIO, by Beacon Community.....	27
<b>Exhibit 22:</b> Type of lead organization, by Beacon Community.....	29
<b>Exhibit 23:</b> Clinical focus area, by Beacon Community.....	33
<b>Exhibit 24:</b> Interventions, by Beacon Community.....	34

## Executive Summary

The Office of the National Coordinator for Health Information Technology's (ONC) Beacon Community Cooperative Agreement Program is funding 17 Communities across the country to invest in health IT and health information exchange (HIE) infrastructure to support a variety of interventions, including care-delivery innovations, provider feedback and measurement initiatives, and tools for providers and consumers to enhance care. Each Beacon Community has tailored its interventions and chosen specific and measurable improvement goals relating to quality, efficiency, and population health. The Beacon Community Program is a key initiative of the Health Information Technology for Economic and Clinical Health Act (HITECH), as it aims to complement and inform the other HITECH efforts to spur the adoption and meaningful use of health IT.

ONC contracted with NORC at the University of Chicago (NORC) to design and conduct an overarching evaluation of the Beacon Community program. The three pillars of the Beacon Community Program—to build and strengthen health IT and measurement infrastructures; improve efficiency, quality, and population health; and test innovative approaches to care delivery, performance measurement, and technology integration—served as the framework for the design of the evaluation. In examining the trajectory of the Beacon Communities over the three-year program, as well as charting their progress and outcomes in the interim, it is important to consider the role of contextual and collaborative characteristics as these demographic, economic, historical, and organizational features influence the selection of activities, the implementation process, and Beacon Community outcomes. The first phase of the evaluation explored the ways in which the 17 Beacon Communities differ in terms of specific contextual factors and organization-level baseline characteristics.

### Contextual Factors

---

Contextual factors are environmental and market characteristics that may affect a Beacon Community's ability to facilitate health IT adoption, care transformation, and quality improvements. This section details the range of factors that may play an important role in Communities' priority-setting, implementation processes, and progress overall.

**Geography and Demographics.** Communities' geographies and demographics, including those related to health insurance coverage status, can affect a Beacon Community's ability to implement health IT and performance measurement infrastructure and clinical transformation initiatives, particularly as they relate to population dispersion throughout a Beacon Community catchment area. Such factors may include: total household population; population density; population distribution by race/ethnicity as well as by age; Medicare Advantage penetration; Medicare Prescription Drug Plan penetration; proportions of the population covered by Medicaid, uninsured, and in poverty; and per-capita income.

At baseline, there was significant variation across Beacon Communities in demographic and geographic composition. The total household population in the Beacons ranged from under 160,000 in Bangor to over 3 million in San Diego. Similarly, population density ranged from 101 people per square mile in the Delta BLUES to 5,478 people per square mile in Southeast Michigan. Race/ethnicity, which impacts

clinical conditions of interest as well as culturally sensitive interventions, ranged from 23% White (and 69% Black or African American in Southeast Michigan) to 95% White in Bangor.

Medicare insurance penetration exhibited more consistency across Beacons. Most beneficiaries in the Beacons were enrolled in prescription drug coverage through either Medicare Advantage or Part D. As expected, Beacons with high Medicare Advantage penetration had low Part D enrollment and vice versa. For example, Western New York had 47% Medicare Advantage and 20% Part D enrollees; whereas on the other end of the spectrum, Delta BLUES had 7% Medicare Advantage and 65% Part D enrollees. Medicaid eligibility ranged from 7% in Southeastern Minnesota to 34% in Bangor, tracking with similar patterns in the percent of the population in poverty. Similarly, the uninsured population ranged from 10% in Southeastern Minnesota to 23% in Crescent City.

**Population Health.** The health of the population at baseline may play a key role in the types of interventions implemented by each Community, the health outcomes they hope to achieve, and their likelihood of success in doing so. Important measures available for the Beacon catchment areas include: proportion of the population reporting their health status as ‘good’ or better; percentage of the population who smoke; percentage of the overall and Medicare populations with diabetes or heart disease; percentage of overall population with asthma; medical discharges per 1,000 Medicare enrollees; mortality rates among the Medicare population (age, sex, and race-adjusted); and discharges for ambulatory care sensitive conditions per 1,000 Medicare enrollees.

There was slight variation between Beacons across these clinical measures. The Beacons had between 79% (Crescent City) and 88% (Utah) of patients reporting health status of “good” or better. Across the Communities, between 16% (Rhode Island) and 24% (Central Indiana) of Beacon participants were smokers. Rates of cardiovascular disease in the Beacons ranged from 3% in Greater Cincinnati to 7% in Southeast Michigan, whereas ischemic heart disease affected as many as 52% in Southeast Michigan, the most affected population, and 26% in Inland Northwest and Hawaii County, the least affected. Diabetes affected about a quarter of the population in most Beacon Communities, with Southeast Michigan (38%) and Colorado (16%) as slight outliers. Asthma affected a smaller percentage of the total population, ranging from 4% in Southern Piedmont to 12% in Hawaii County.

**Health Care System Capacity and Characteristics.** The health care resources and capacity within a given area may influence the decisions Beacon Communities make with regard to interventions selected and implementation approach and experience. The Beacon Communities reflect considerable heterogeneity with regard to measures of health care system capacity and characteristics.

In 2008, the national average number of primary care providers (PCPs) per 100,000 people was 248. Among the Beacon Communities, the average number of PCPs per 100,000 people ranged from 101 in the Delta BLUES Beacon Community to 570 PCPs per 100,000 in the Southeast Minnesota Beacon Community catchment area. With regard to hospital capacity, the number of hospital beds per 100,000 people ranged from 173 in the San Diego Beacon catchment area to 486 in Western New York. The Herfindahl-Hirschman Index (HHI)—measuring health care market competition—ranged from 0.15 in San Diego (reflecting moderate concentration, and the most competitive market among the Beacons), to 0.49 in Southeastern Minnesota (reflecting high concentration, and the least competitive market among the Beacons).

**Health IT Environment.** Level of experience with health IT, including the implementation of health IT infrastructure, plays an important role in the activities and outcomes of the Beacon Communities, such as shaping the Communities' priorities and ability to achieve objectives in terms of HIE, and the use and diffusion of other health IT tools. The Beacon Communities reflect a wide range of sophistication and capacity with respect to adoption and use of health IT among both providers and organizations participating in the Beacon effort and within the Communities more broadly.

The percentage of hospitals in the Beacon Communities with a fully functioning electronic health record (EHR) prior to Beacon ranged from less than 1% in the Colorado Beacon Consortium catchment area to 47% in Southeast Michigan, with over half of the Beacon Communities falling at or below the national average of 16%. The percent of ambulatory providers that adopted an EHR as of the fourth quarter of 2010 ranged from 32% in the Delta BLUES catchment area to 74% in Southeastern Minnesota. In the majority of Beacon Communities (n=11), EHR adoption among ambulatory care providers was higher than the national average of 47%. Level of participation in e-prescribing was measured by the average e-prescriptions sent via Surescripts and the average pharmacies activated per 100,000 people. Utah had the fewest e-prescriptions, sending 5,255 e-prescriptions per 100,000 people, while San Diego had the lowest activated pharmacies, with 12 activated pharmacies per 100,000 people in December 2010. Bangor had the highest rates of participation with 26,002 e-prescriptions per 100,000 and 36 pharmacies per 100,000 in the same time period. Although hospitals in most Beacon Communities had access to a health information organization (HIO), or an organization that oversees the exchange of health-related information among organizations, connectivity ranged from 10% in San Diego to 72% in Greater Cincinnati.

## Organization-Level Baseline Characteristics

---

Initial findings on a limited number of the 17 Beacon Communities' organizational characteristics include information about the type of lead organization; history of collaboration among partnering organizations; and participation in related health IT, quality improvement, and clinical transformation activities. The infrastructure and governance of the Beacon Community collaborative are also critical inputs to program implementation and outcomes; they are not addressed here, however, because the evaluation team has not yet collected sufficient information about these features.

**Type of Lead Organization.** A lead organization is defined as the lead applicant for the Beacon Community in response to ONC's Funding Opportunity Announcement (FOA). Types of lead organizations include: integrated delivery networks; academic institutions; HIOs; and, most commonly, not-for-profit 501(c)3 community organizations. The lead organization's role within the Community's governance structure and day-to-day functioning varies from Community to Community, and many additional partners often play critical and active roles as well.

**History of Collaboration.** Beacon Communities in which key partners have a history of collaboration on initiatives similar in scope or purpose to the Beacon Program may also be better-positioned for success. These Communities may, for instance, leverage existing organizational authorities and previous experiences with partnerships to get a head start in terms of communications infrastructure, project management staff, and decision-making processes. Most communities had at least some history of

collaboration prior to the Beacon award, coming together to respond to the Beacon FOA, and a few have built their Beacon Communities on existing governance structures.

**Participation in Related Initiatives.** Within each of the Beacon Communities, at least some of the collaborative's partners previously were or remain engaged in related health IT and quality improvement initiatives. Examples of related initiatives include the Robert Wood Johnson Foundation's Aligning Forces for Quality initiative; the Agency for Healthcare Research and Quality's Chartered Value Exchanges; the ONC State HIE Cooperative Agreement Program; ONC Regional Extension Centers; and patient-centered medical home (PCMH) initiatives. These concurrent and overlapping activities have a number of implications for Beacon program efforts. In addition to providing substantive expertise and experience, in many cases these programs may allow Communities to deploy resources more efficiently, leverage partnerships, and coordinate activities.

## Beacon Community Interventions

---

Beacon Communities are implementing an array of interventions, including innovations in care delivery; provider feedback and performance measurement initiatives; health IT development projects; and tools to improve the process of care for providers and consumers. Some Beacon interventions may be more IT-focused (e.g., EHR and HIE development), while others may focus primarily on transforming clinical care (e.g., PCMHs) or more tightly integrate health IT and clinical transformation goals (e.g., telemedicine).

Although multiple Communities may be tackling similar interventions, their methods and goals may differ. For example, every Beacon Community is committed to developing their HIE solutions, but some are in the initial states of building HIE infrastructure while others are accelerating the expansion of existing HIE systems. Innovations in care delivery include implementation of the Archimedes IndiGO clinical decision support (CDS) platform, standardization and increased use of EHRs used by paramedics, and text messaging pilots. None of the Beacons were utilizing financial incentives and care management payments at baseline.

## Summary

---

In conclusion, this characterization of the Communities informs the evaluation's additional ongoing data collection and analytic work, helps reveal gaps in other accounts of the Communities' efforts, and suggests how the evaluation's findings may be interpreted to best support the broad goals of the Beacon program in new settings and the sustainability of the Communities over time. These analyses provide a critical foundation for the independent evaluation of the Beacon Community Cooperative Agreement Program by detailing the range of contextual factors, baseline characteristics, and intervention components that shape the Beacon Communities and the activities they are leading. Given the complexity and heterogeneity of the Beacon Communities' efforts, a solid understanding of the Program's successes will be greatly enhanced by an empirical grounding in the salient characteristics of each Community and its work.

## Introduction and Background

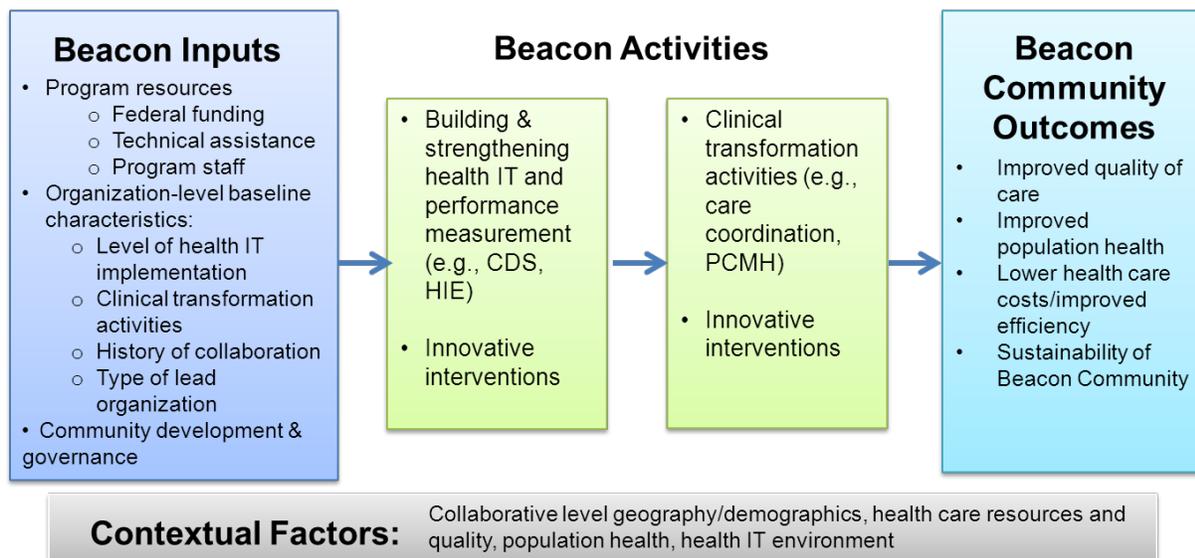
The Office of the National Coordinator for Health Information Technology's (ONC) Beacon Community Cooperative Agreement Program is funding 17 Communities across the country to invest in health IT and health information exchange (HIE) infrastructure to support a variety of interventions, including care-delivery innovations, provider feedback and measurement initiatives, and tools for providers and consumers to enhance care. Each Beacon Community has tailored its interventions and chosen specific and measurable improvement goals relating to quality, efficiency, and population health. The Beacon Community Program is a key initiative of the Health Information Technology for Economic and Clinical Health Act (HITECH), as it aims to complement and inform the other HITECH efforts to spur the adoption and meaningful use of health IT.

ONC contracted with NORC at the University of Chicago (NORC) to design and conduct an overarching evaluation of the Beacon Community program. In examining the trajectory of the Beacon Communities over the three-year program, it is important to consider the role of contextual and collaborative-level characteristics, as these demographic, economic, historical and organizational features influence the selection of activities, the implementation process, and Beacon Community outcomes. The logic model or theory of change for the Beacon program—shown in Exhibit 1—serves as a framework for the evaluation design.

For the purpose of this evaluation, NORC has defined *contextual factors* to include catchment area geographic and demographic characteristics, health care resources and quality, population health, and health IT environment. Beacon Community Program *inputs* include internal and external program resources, organization-level baseline characteristics, and partnership development and governance structure. *Organization-level baseline characteristics* include the type of organization serving as the lead in the Beacon collaborative, participation in related clinical transformation activities, and history of collaboration among Beacon partners. *Long-term program outcomes* include better quality of care and population health, lower health-care costs, and increased efficiency.

This report explores the ways in which the 17 Beacon Communities differ across specific contextual factors and organization-level baseline characteristics, detailing how these factors may affect the progress of the Communities under the Beacon program. It also examines the array of interventions being implemented by the Beacon Communities, grouping the types of interventions into broader categories to facilitate comparison. Beacon Communities' activities include efforts to (1) build and strengthen their health IT and performance measurement infrastructures and (2) activities to transform clinical care. In concluding, we discuss how this characterization of the Communities will help inform the evaluation's additional data-collection efforts, how any existing gaps may be filled over time, and the ways in which the findings presented below can help support the overarching goals of the Beacon program and the sustainability of the Communities over time.

**Exhibit 1:** Beacon Community Program Logic Model



While the infrastructure and governance of the Beacon Community collaborative are critical inputs to program implementation and outcomes,<sup>1</sup> they are not addressed in this report simply due to the particular data collected thus far. Gaining a thorough understanding of the role of these factors insofar as they are associated with programmatic outcomes will be critical to both evaluating the Communities’ work and guiding future efforts modeled on the Beacon Communities.

<sup>1</sup> Alexander JA, Christianson JB, Hearld LR, Hurley R, Scanlon DP. Challenges of Capacity Building in Multisector Community Health Alliances. *Health Educ Behav.* 2010; 37: 645-664.

## Contextual Factors

Contextual factors are environmental and market characteristics that may affect a Beacon Community's ability to facilitate health IT adoption, care transformation, and quality improvements. The sections below detail the range of factors that could be of potential importance for understanding and assessing Beacon Community activities. Data provided are intended to reflect characteristics of each Beacon Community catchment area prior to the start of the Beacon program.

### Geography and Demographics

---

Geography and demographics, including those related to health insurance coverage status, can affect a Beacon Community's ability to implement health IT and performance measurement infrastructure and clinical transformation initiatives, particularly as they relate to population dispersion throughout a Beacon Community catchment area. Such factors may include: total household population; population density; population distribution by race/ ethnicity as well as by age; Medicare Advantage penetration; Medicare Prescription Drug Plan penetration; proportions of the population covered by Medicaid, uninsured, and in poverty; and per-capita income.

### Population Size

The Beacon Communities vary substantially in the total number of individuals residing within their respective catchment areas. In the proposal process, each Beacon Community defined their catchment area in a way that best represented the Community as a whole. As a result, some Communities consist of larger geographic areas (e.g., Central Indiana), while others are more limited in size (e.g., Hawaii County). The population that resided within each Beacon catchment area in 2010 similarly varied, with over 3 million individuals in the San Diego Beacon Community to approximately 159,000 individuals in the Bangor Beacon Community. Note that the population sizes listed in Exhibit 2 represent the total population in the catchment area, not the number of individuals treated by providers engaged with the Beacon Community program. Nonetheless, information on the total population residing within a Beacon's catchment area can provide insight into potential challenges the Community may face in terms of the scale of the program needed to address the Community's needs. Communities with larger populations need to make accommodations for sufficient capacity to store information. A larger population likely also indicates a larger number of providers and provider systems, and thus more individuals who need to be trained in the use of new systems such as specific electronic health record (EHR) programs. In addition, in larger communities it is more difficult to track and coordinate care for patients as they move in and out of health care systems and in the event they visit providers outside of the newly developed health information organizations (HIOs), or organizations that oversee the exchange of health-related information among organizations.

**Exhibit 2: Total population, by Beacon Community**

Beacon Community	Total population (2010)
San Diego	3,091,958
Central Indiana	2,869,935
Greater Cincinnati	2,110,333
Western New York	1,535,018
Inland Northwest	1,280,562
Utah	1,127,129
Greater Tulsa	1,113,940
Rhode Island	1,052,567
Southeast Michigan	875,443
Crescent City	776,372
Southeastern Minnesota	537,160
Southern Piedmont	368,360
Colorado	340,713
Delta BLUES	310,890
Keystone	295,715
Hawaii County	185,079
Bangor	159,683
<b>U.S. Total</b>	<b>308,745,538</b>

Source: Census, 2010

**Population Density**

Population density may impact a Beacon Community’s approach to expansion of health IT tools and infrastructure and design of community-based health IT-enabled health care improvement. Rural areas often face a host of challenges; shortages of non-physician providers, lower access to specialists, higher workloads for clinicians, and lack of broadband connectivity are common barriers.<sup>2</sup> The target population in rural areas may also be older and have less access to transportation, poorer health, and more disabilities than their urban counterparts. Beacons with populations residing in rural areas may develop different models of care, tailoring their approach and care management interventions to address these barriers; for example, Communities may use health IT to bridge the gap caused by distance via telemedicine work with service providers to expand broadband access to rural areas, or establish care management interventions that include providing access to transportation.<sup>3</sup> For example, before Hawaii could implement home monitoring devices as part of its intervention, they first worked with services providers to get individuals in their target population broadband connectivity. Population density can also provide insight into the level of EHR adoption or number of hospitals that receive the Center for Medicare & Medicaid Services’ (CMS’) EHR Stage 1 Meaningful Use (MU) incentive payments.<sup>4</sup> In poor urban areas

<sup>2</sup> Effken JA, Abbott P. Health IT-enabled care for underserved rural populations: The role of nursing. *J Am Med Inform Assoc.* 2009; 16(4):439-445.

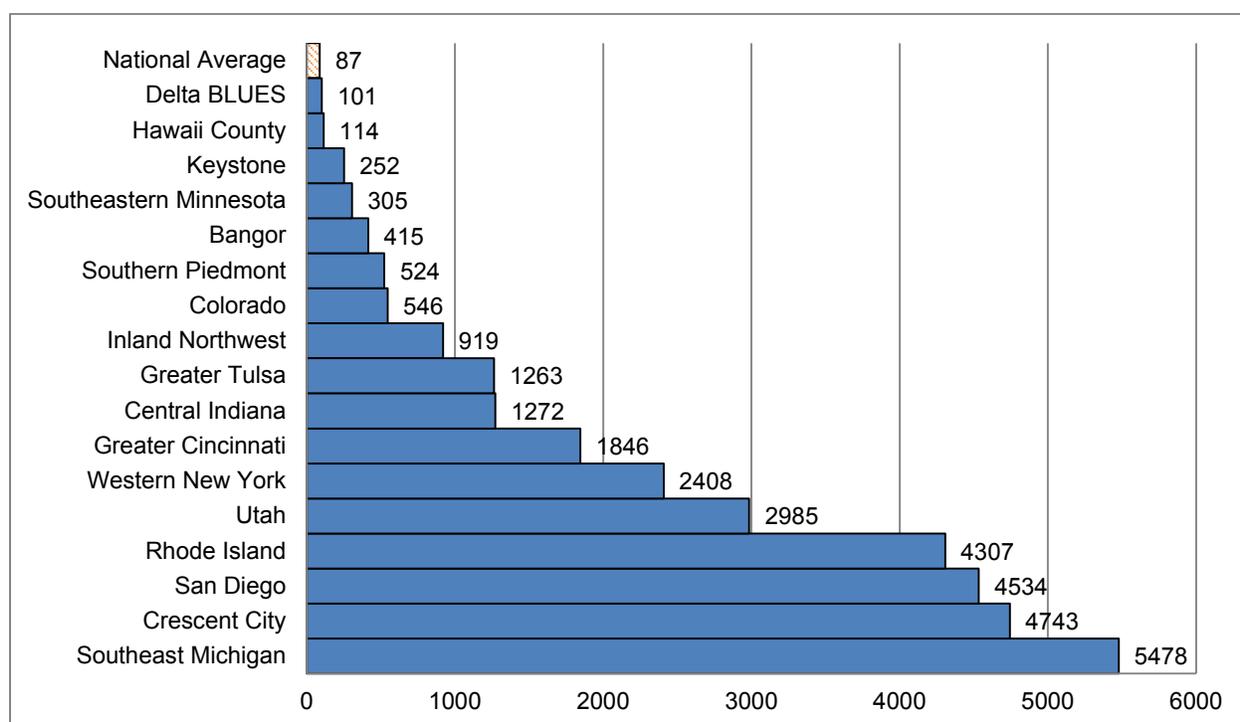
<sup>3</sup> Blumenthal D. Rural health IT is a priority for HHS. Available: <http://www.healthit.gov/buzz-blog/local-implementation-support/rural-health-it-is-a-priority-for-hhs/>. Accessed: February 12, 2013.

<sup>4</sup> General Accounting Office. Electronic Health Records: Number and Characteristics of Providers Awarded Medicare Incentive Payments for 2011. Available: <http://www.gao.gov/assets/600/593078.pdf>. Accessed: February 12, 2013

with high population density, a small scale intervention can impact a high number of people or a health intervention may involve coordination with other social services, such as housing.<sup>5</sup>

Due to inherent differences in the locations of the Beacon Communities across the nation, the population density of the Beacon Communities varies drastically. As illustrated in Exhibit 3, the Delta BLUES Beacon Community, located in Mississippi, was the most rural Community with approximately 101 people per square mile, while the Southeast Michigan Beacon Community was the densest, with 5,478 people per square mile. Notably, because most Beacon Communities are located near a population center, all Beacon Communities had a population density greater than the national average (87 people per square mile).

**Exhibit 3:** Population density (people per sq. mile), by Beacon Community



Source: Census, 2010

### Race and Ethnicity

Beacon Communities with a diverse population may need to tailor their interventions to address differences in culture, language barriers, preferences, and clinical needs.<sup>6,7</sup> Given the racial and ethnic disparities that exist in health care, understanding the composition of the Beacon Communities is important to understanding the most-urgent challenges that new interventions should be designed to

<sup>5</sup> Kjellstrom T, Friel S, Dixon J, Corvalan C, Rehfuess E, Campbell-Lendrum D, Gore F, Bartram J. Urban environmental health hazards and health equity. *J Urban Health*. 2007; 84(3 suppl): i86-97.

<sup>6</sup> Egede LE. Race, ethnicity, culture, and disparities in health care. *J Gen Intern Med*. 2006; 21(6):667-69.

<sup>7</sup> Mukamel DB, Peterson DR, Temkin-Greener H, Delavan R, Gross D, Kunitz SJ, Williams TF. Program characteristics and enrollees' outcomes in the Program of All-Inclusive Care for the Elderly (PACE). *Milbank Q*. 2007;85(3):499-531.

address—and which types of programs will provide the greatest value for a particular region. Beacon Communities can create interventions that use health IT to help address racial and ethnic disparities such as using population data gathered in an HIO to identify racial and ethnic disparities in access to or provision of care or in prevalence of disease, and use that data to tailor quality improvement efforts.<sup>8</sup> Additionally, Communities developing interventions aimed at reducing racial and ethnic disparities may need to incorporate improvements in the physical environment, addressing social and economic factors, improving access to appropriate and effective services, and changing behavioral risk factors.<sup>9</sup>

As illustrated in Exhibit 4 below, Beacon Communities vary with respect to population composition by race and ethnicity. The Bangor Beacon Community and the Keystone Beacon Community were the most homogeneous (95% and 94% white, respectively), especially as compared to the national average (72% white). Among the remaining Beacon Communities, both the Southeast Michigan Beacon Community and the Delta BLUES Beacon Community were composed of a majority of Black or African American individuals (69% and 63%, respectively), compared to a national average of 13%. The Hawaii County Beacon Community had a larger-than-average proportion of Native Hawaiian / Pacific Islander residents (12% compared to 0.2% nationally) and Asian residents (22% compared to 5% nationally). Notably, approximately 10% of residents within the Greater Tulsa Beacon Community were American Indian and Alaska Native, compared to approximately 1% nationally.

---

<sup>8</sup> López L, Green AR, Tan-McGrory A, King R, Betancourt JR. Bridging the digital divide in health care: The role of health information technology in addressing racial and ethnic disparities. *Jt Comm J on Qual Patient Saf.* 2011; 37(10): 437-445.

<sup>9</sup> Cooper LA, Hill MN, Powe NR. Designing and evaluating interventions to eliminate racial and ethnic disparities in health care. *J Gen Intern Med.* 2002; 17(6):477-486.

**Exhibit 4: Population Race/Ethnicity, by Beacon Community (2010 data)**

Beacon Community	Percent White	Percent Black or African American	Percent American Indian and Alaska Native	Percent Asian	Percent Native Hawaiian / Pacific Islander	Percent Some Other Race	Percent Two or More Races
Bangor	95%	1%	1%	1%	0%	0%	1%
Keystone	94%	3%	0%	1%	0%	1%	1%
Southeastern Minnesota	92%	2%	0%	2%	0%	2%	2%
Colorado	88%	1%	1%	1%	0%	7%	2%
Inland Northwest	87%	1%	2%	2%	0%	5%	3%
Western New York	85%	10%	1%	2%	0%	1%	2%
Greater Cincinnati	83%	12%	0%	2%	0%	1%	2%
Central Indiana	83%	10%	0%	2%	0%	3%	2%
Utah	82%	2%	1%	3%	1%	8%	3%
Rhode Island	81%	6%	1%	3%	0%	6%	3%
Southern Piedmont	77%	15%	0%	2%	0%	4%	2%
<b>United States</b>	<b>72%</b>	<b>13%</b>	<b>1%</b>	<b>5%</b>	<b>0%</b>	<b>6%</b>	<b>3%</b>
Greater Tulsa	70%	8%	10%	2%	0%	4%	7%
San Diego	64%	5%	1%	11%	0%	14%	5%
Crescent City	50%	41%	0%	3%	0%	3%	2%
Delta BLUES	35%	63%	0%	1%	0%	1%	1%
Hawaii County	34%	1%	0%	22%	12%	2%	29%
Southeast Michigan	23%	69%	0%	2%	0%	3%	3%

Source: Census, 2010

### Insurance Coverage

Information about insurance coverage provides additional insight about the characteristics of the Beacon Communities in terms of access to care among their populations. Exhibit 5 includes the percentage of Medicare beneficiaries who were enrolled in Medicare Advantage. Most Beacon Communities had a Medicare Advantage penetration within their markets higher than the national average of 25%, with Western New York Beacon Community having the most enrollees in the program (47%) and Delta BLUES Beacon Community having the fewest (7%).

**Exhibit 5:** Medicare Advantage penetration, by Beacon Community

Beacon Community	Medicare Advantage Penetration (2009)
Western New York	47%
Crescent City	43%
San Diego	40%
Rhode Island	36%
Hawaii County	35%
Keystone	34%
Utah	34%
Southeastern Minnesota	29%
Colorado	27%
Greater Cincinnati	26%
Greater Tulsa	26%
<b>National Average</b>	<b>25%</b>
Southeast Michigan	23%
Inland Northwest	20%
Southern Piedmont	17%
Central Indiana	14%
Bangor	11%
Delta BLUES	7%

Source: HRSA Area Resource File, 2009

Similarly, enrollment in Medicare prescription drug plans (PDPs) also differed across the 17 Beacon Communities. The Beacon Communities were fairly evenly distributed above and below the national average of 38% enrollment: the Delta BLUES Beacon Community represents the highest penetration with nearly 65% of Medicare beneficiaries enrolled in Medicare PDPs, while only 20% of beneficiaries in the Western New York Beacon Community were enrolled, the lowest penetration rate among the 17 Beacons. Exhibit 6 below shows Medicare PDP penetration.

**Exhibit 6:** Medicare prescription drug plan (PDP) penetration, by Beacon Community

Beacon Community	Medicare PDP Penetration (2009)
Delta BLUES	65%
Bangor	53%
Southern Piedmont	46%
Central Indiana	45%
Inland Northwest	43%
Keystone	40%
Greater Tulsa	40%
Southeastern Minnesota	39%
<b>National Average</b>	<b>38%</b>
Hawaii County	37%
Colorado	36%
Southeast Michigan	34%
Greater Cincinnati	34%
Rhode Island	34%
Utah	31%
Crescent City	28%
San Diego	28%
Western New York	20%

Source: HRSA Area Resource File, 2009

Lastly, the percentage of a Beacon Community’s population without health insurance may highlight potential problems a Beacon Community may face in increasing access to quality health care and improving population health. Insurance coverage is correlated with better health outcomes. Individuals without insurance may be more likely to go without seeking preventive care, may be more likely to use the emergency room, and may potentially have worse health outcomes than those individuals with insurance.<sup>10,11</sup> Communities with problems related to access to care will also have underdiagnosed clinical areas and may face challenges that will not necessarily be revealed by claims data. As illustrated in Exhibit 7 below, the Crescent City Beacon Community faced the highest proportion of uninsured residents at 23%, while Southeastern Minnesota, Hawaii, and Western New York Beacon Community had the lowest number of uninsured individuals at 10% each. Most Beacon Communities were clustered around the national average, having 17% of individuals without health insurance.

Insurance status can also inform the context of the health care environment in a region, leading to ways in which to focus an intervention. For example, Crescent City Beacon Community (CCBC) had a high uninsured population that uses charity hospitals and safety net clinics. As such, CCBC focused its intervention to these primary care clinics and public hospitals providing care to these patients.

<sup>10</sup> Pauly M. Effect of insurance coverage on use of care and health outcomes for nonpoor young women. *American Economic Review*. 2005; 95(2)L 219-223.

<sup>11</sup> Bernstein J, Chollet D, Peterson S. How does insurance coverage improve health outcomes? *Issue Brief: Mathematica Policy Research*. 2010; Available: [http://www.mathematica-mpr.com/publications/PDFs/health/reformhealthcare\\_IB1.pdf](http://www.mathematica-mpr.com/publications/PDFs/health/reformhealthcare_IB1.pdf).

**Exhibit 7:** Population uninsured, by Beacon Community

Beacon Community	Percent Uninsured (2009)
Crescent City	23%
Delta BLUES	22%
Greater Tulsa	21%
Colorado	20%
San Diego	19%
Inland Northwest	18%
Southern Piedmont	18%
Southeast Michigan	17%
Utah	17%
<b>National Average</b>	<b>17%</b>
Central Indiana	16%
Greater Cincinnati	14%
Keystone	13%
Rhode Island	13%
Bangor	13%
Western New York	10%
Hawaii County	10%
Southeastern Minnesota	10%

Source: Census Small Area Health Insurance Estimates (SAHIE), 2009

**Socioeconomic Status**

Information about socioeconomic status (SES) within a Beacon Community can provide additional insight as to potential barriers to improving population health. Research findings suggest a relationship between SES—which may be assessed through income, occupation, or other measures—and a wide range of risk factors, health problems, and higher mortality.<sup>12,13</sup> We assessed SES using two proxy measures—percentage of population in poverty and percentage of Medicare beneficiaries eligible for Medicaid. When considering the percentage of the Beacon Community’s population in poverty (Exhibit 8), the Delta BLUES Beacon Community was a noticeable outlier, with nearly a third of its catchment area population living in poverty (32%). The other Beacon Communities fell closer to the national average of 13%, with Southeastern Minnesota and Utah once again falling in the lower range of the spectrum (9% each).

<sup>12</sup> Winkleby MA, Kraemer HC, Ahn DK, Varady AN. Ethnic and socioeconomic differences in cardiovascular disease risk factors: findings for women from the Third National Health and Nutrition Examination Survey, 1988-1994. *JAMA*. 1998; 22-29;280(4):356-62.

<sup>13</sup> Quarells RC, Liu J, Davis SK. Social determinants of cardiovascular disease risk factor presence among rural and urban Black and White men. *J Mens Health*. 2012 Jun 1;9(2):120-126.

**Exhibit 8:** Percent of population in poverty, by Beacon Community

Beacon Community	Percent Persons in Poverty (2008)
Delta BLUES	32%
Southeast Michigan	21%
Crescent City	17%
Bangor	15%
Inland Northwest	15%
Greater Tulsa	14%
Western New York	14%
Hawaii County	13%
Keystone	13%
<b>National Average</b>	<b>13%</b>
Central Indiana	13%
San Diego	13%
Southern Piedmont	12%
Rhode Island	12%
Greater Cincinnati	12%
Colorado	10%
Southeastern Minnesota	9%
Utah	9%

Source: HRSA Area Resource File, 2008

Percentage of Medicare beneficiaries who also qualify for Medicaid presents a slightly different picture. Dual eligibles—Medicare beneficiaries who also qualify for Medicaid—tend to be poorer, report lower health status, and have more co-morbidities than their counterparts who are not eligible for Medicaid.<sup>14,15</sup> As illustrated in Exhibit 9, the Bangor Beacon Community had the highest proportion of Medicare beneficiaries eligible for Medicaid (34%), more than twice the national average of 14%. On the other end of the spectrum, both Utah (7%) and Southeastern Minnesota (7%) had substantially lower-than-average rates of Medicaid enrollment among their Medicare beneficiaries.

<sup>14</sup> Kasper J, O'Malley Watts M, Lyons B. Chronic Disease and Co-morbidity among Dual Eligibles: Implications for Patterns of Medicaid and Medicare Service Use and Spending. Kaiser Family Foundation. July 2010. Available: <http://www.kff.org/medicaid/upload/8081.pdf>

<sup>15</sup> MedPAC. A Data Book: Healthcare spending and the Medicare program. June 2012. Available: <http://www.medpac.gov/documents/Jun12DataBookEntireReport.pdf>

**Exhibit 9:** Percent of Medicare beneficiaries eligible for Medicaid, by Beacon Community

Beacon Community	Percent of Medicare beneficiaries 65+ eligible for Medicaid (2008)
Bangor	34%
Crescent City	27%
Delta BLUES	23%
San Diego	23%
Hawaii County	18%
Southeast Michigan	16%
Western New York	15%
Rhode Island	15%
Keystone	15%
<b>National Average</b>	<b>14%</b>
Southern Piedmont	14%
Greater Tulsa	14%
Inland Northwest	11%
Greater Cincinnati	10%
Central Indiana	10%
Colorado	9%
Utah	7%
Southeastern Minnesota	7%

Source: CMS Chronic Conditions Warehouse, 2008

**Population Health**

Population health at baseline may play a key role in the types of interventions being implemented by each Community, the health outcomes they hope to achieve, and their likelihood of success in doing so. Measures available for the Beacon catchment areas include: proportion of the population reporting their health status as ‘good’ or better; percentage of the population who smoke; percent of the overall and Medicare population with diabetes or heart disease; percentage of overall population with asthma; medical discharges per 1,000 Medicare enrollees; and discharges for ambulatory care sensitive conditions per 1,000 Medicare enrollees.

As illustrated in Exhibit 10 below, the percentage of residents within most Beacon Communities reporting a health status of ‘excellent’, ‘very good’, or ‘good’ fell relatively close to the national average of 85%, based on data from the 2010 Behavioral Risk Factor Surveillance System (BRFSS). Notably, the proportions of residents reporting ‘good’ health statuses in the Greater Tulsa Beacon Community and the Crescent City Beacon Community were about 5% less than the national average (81% and 79%, respectively), potentially indicating greater challenges in improving population health for those Communities.

**Exhibit 10:** Total population reporting health status as ‘excellent’, ‘very good’ or ‘good’, by Beacon Community

Beacon Community	Percent of total population reporting a 'good' or better health status (2010)
Utah	88%
Greater Cincinnati	87%
Rhode Island	87%
Southern Piedmont	87%
Inland Northwest	86%
San Diego	86%
<b>National Average</b>	<b>85%</b>
Hawaii County	85%
Western New York	85%
Bangor	84%
Central Indiana	82%
Southeast Michigan	81%
Greater Tulsa	81%
Crescent City	79%

Source: BRFSS, 2010 (No data available for Delta BLUES, Keystone, Southeastern Minnesota, and Colorado.)

Tobacco use also presented a greater problem in some Beacon Communities than others. The available data from 14 Beacon Communities indicated that most Communities faced smoking rates that fell around the national average of 17%. As detailed in Exhibit 11, Communities with the lowest percentage of current smokers tended to be located in the west (San Diego, Utah), while those in the mid-west were relatively more likely to have higher proportions of smokers as residents (Central Indiana, Greater Tulsa).

**Exhibit 11:** Current smokers in the population, by Beacon Community

Beacon Community	Percent of total population that are current smokers (2010)
Central Indiana	24%
Greater Tulsa	24%
Western New York	22%
Greater Cincinnati	21%
Southeast Michigan	20%
Crescent City	20%
Hawaii County	20%
<b>National Average</b>	<b>17%</b>
Southern Piedmont	17%
Inland Northwest	16%
Rhode Island	16%
Bangor	15%
San Diego	12%
Utah	11%

Source: BRFSS, 2010 (No data available for Delta BLUES, Keystone, Southeastern Minnesota, and Colorado.)

Some Communities also face different challenges related to addressing the burden of chronic disease. Heart disease among all residents (Exhibit 12), and Medicare beneficiaries in particular (Exhibit 13), was

more common in the Southeast Michigan Beacon Community and the Western New York Beacon Community especially, as compared to the national average.

**Exhibit 12:** Total population with cardiovascular disease, by Beacon Community

Beacon Community	Percent of total population ever told they have angina or coronary heart disease (2010)
Southeast Michigan	7%
Western New York	5%
Central Indiana	5%
Crescent City	5%
Greater Tulsa	5%
Rhode Island	4%
San Diego	4%
<b>National Average</b>	<b>4%</b>
Bangor	4%
Inland Northwest	4%
Southern Piedmont	4%
Hawaii County	3%
Utah	3%
Greater Cincinnati	3%

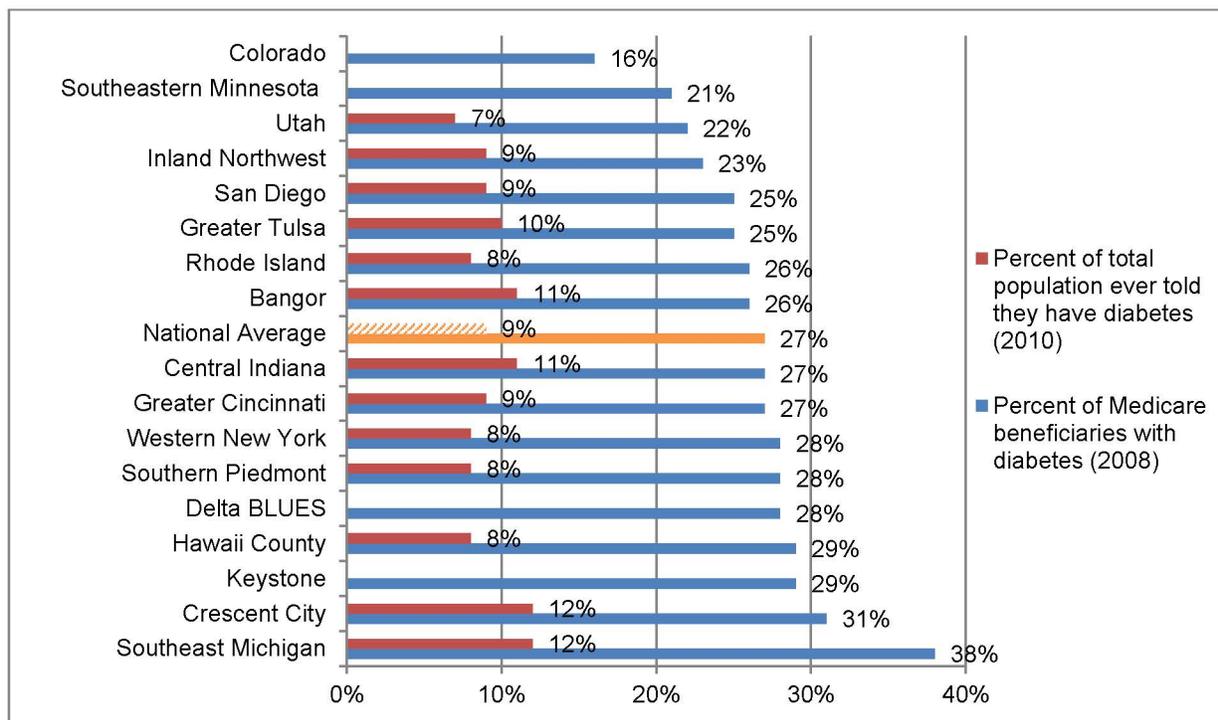
Source: BRFSS, 2010 (Data not available for Delta BLUES, Keystone, Southeastern Minnesota, and Colorado.)

**Exhibit 13:** Medicare beneficiaries with ischemic heart disease, by Beacon Community

Beacon Community	Percent of Medicare beneficiaries with ischemic heart disease (2008)
Southeast Michigan	52%
Western New York	38%
Rhode Island	35%
Keystone	35%
Greater Cincinnati	34%
Greater Tulsa	34%
Central Indiana	33%
Delta BLUES	32%
Bangor	32%
Crescent City	32%
<b>National Average</b>	<b>32%</b>
San Diego	31%
Southern Piedmont	29%
Southeastern Minnesota	27%
Inland Northwest	26%
Hawaii County	26%
Utah	24%
Colorado	21%

Source: CMS Chronic Conditions Warehouse

**Exhibit 14:** Percent of total population and Medicare beneficiaries with diabetes, by Beacon Community



\* Sources: CMS Chronic Conditions Warehouse, 2008; BRFSS, 2010 (No data available for total population for Delta BLUES, Keystone, Southeastern Minnesota, and Colorado.)

Diabetes presents similarly challenging barriers to the improvement of population health in many Beacon Communities, as indicated by the data displaying in Exhibit 14 below. The Southeastern Michigan Beacon Community faced the highest rates of diabetes among its Medicare beneficiaries and total population with diagnosis rates of approximately 38% and 12%, respectively. Notably, a majority of Beacon Communities are implementing interventions to improve diabetes management.

**Exhibit 15:** Total population with asthma, by Beacon Community

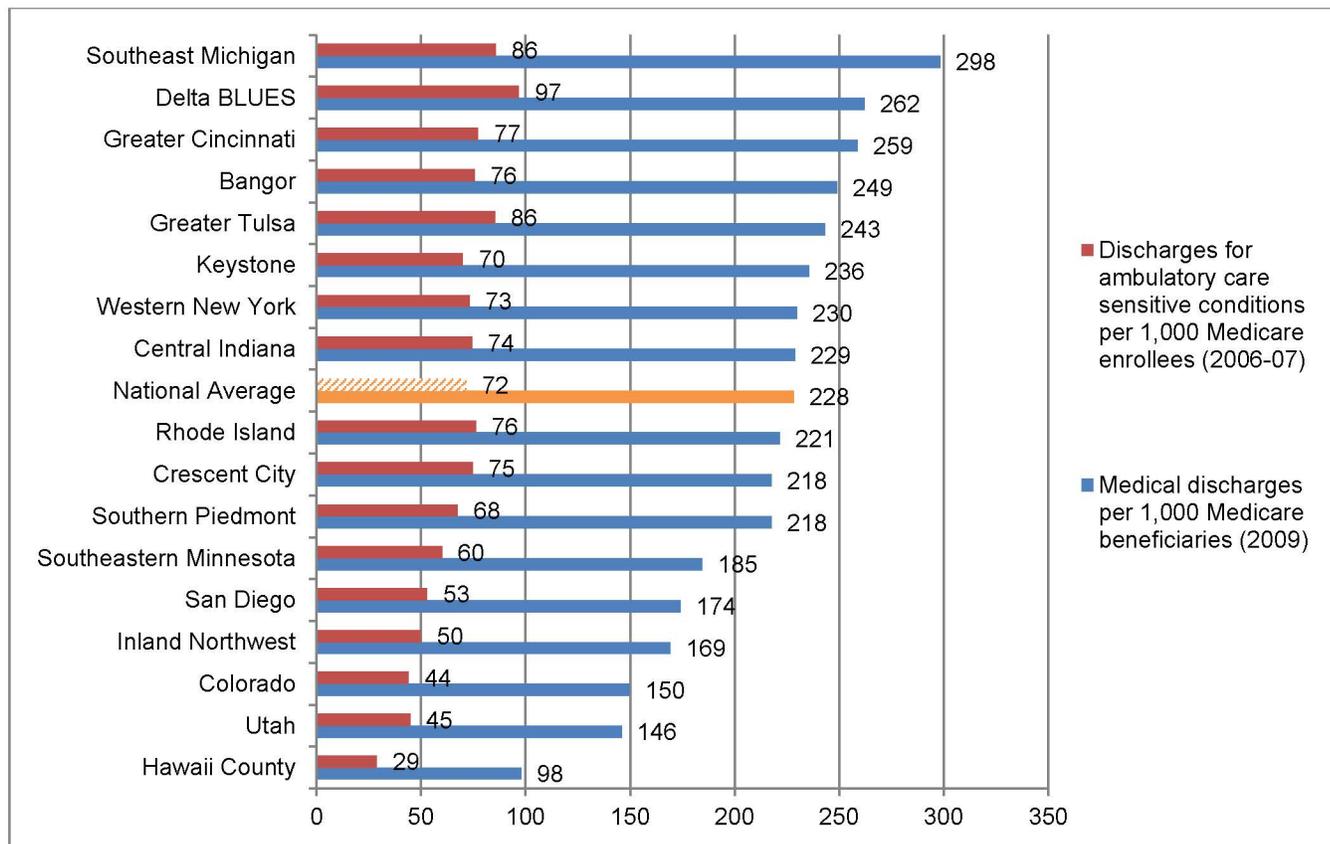
Beacon Community	Percent of total population told they currently have asthma (2010)
Hawaii County	12%
Western New York	12%
Southeast Michigan	12%
Central Indiana	12%
Inland Northwest	11%
Rhode Island	11%
Bangor	11%
Greater Tulsa	10%
Greater Cincinnati	10%
Utah	10%
<b>National Average</b>	<b>9%</b>
San Diego	8%
Crescent City	7%
Southern Piedmont	4%

Sources: BRFSS, 2010 (Data not available for Delta BLUES, Keystone, Southeastern Minnesota, and Colorado.)

Similarly, the increasing prevalence of asthma has motivated Communities to target this condition through Beacon interventions. Among the Communities where data is available, most had asthma prevalence rates that are higher than the national average of 9%, as illustrated in Exhibit 15.

Discharge rates also provide insight as to the population health within the Beacon Communities. Medical discharges and discharges for ambulatory sensitive conditions specifically are illustrated in Exhibit 16. Once again, Southeast Michigan was an outlier in terms of total medical discharges, with an average of 298 discharges per 1,000 Medicare enrollees, considerably higher than the national average of 228 discharges per 1,000 Medicare enrollees. In terms of ambulatory care sensitive conditions, the Hawaii County Beacon Community recorded a rate of 29 discharges per 1,000 Medicare beneficiaries, significantly lower than the 17 other Beacon Communities and the national average of 72 discharges per 1,000 Medicare beneficiaries.

**Exhibit 16:** Medical discharges and discharges for ambulatory care sensitive conditions per 1,000 Medicare enrollees, by Beacon Community



Sources: Dartmouth Atlas, 2006-2007; 2009

## Health Care System Capacity and Characteristics

The health care resources and capacity within a given area may influence the decisions Beacon Communities make with regard to interventions selected and implementation approach and experience. Prior to the start of the Beacon program, there was a lot of heterogeneity across the Communities with regard to physician supply, hospital capacity, and health care market competition, and health care resources.

### Primary Care Physician Supply

The supply of primary care physicians (PCPs) in a Beacon Community may necessitate different implementation strategies and practice redesign, particularly in the scope of interventions.<sup>16,17</sup> An analysis of 2008 data from the HRSA Area Resource File found significant variation across the Beacon

<sup>16</sup> Balasubramanian H, Banerjee R, Denton B, Naessens J, Stahl J. Improving clinical access and continuity through physician panel redesign. *J Gen Intern Med.* 2010; 25(10):1109-15.

<sup>17</sup> Margolius D, Bodenheimer T. Transforming primary care: from past practice to the practice of the future. *Health Aff (Millwood).* 2010 May;29(5):779-84.

Communities in terms of the supply of PCPs. The national average number of primary care providers per 100,000 people was 248. Among the Beacon Communities, the number of PCPs per 100,000 residents ranged from 101 in the Delta BLUES catchment area to 570 in the Southeast Minnesota Beacon Community catchment area.<sup>18</sup>

### Hospital Capacity

There was also substantial variation in hospital capacity across the Beacon Communities. In 2007, Western New York had the most hospital beds per 100,000 people in the Beacon catchment area at 486. Meanwhile, the San Diego Beacon Community had only 173 beds per 100,000 people. During that same year, the national average was 269 beds per 100,000 people. Hospital capacity reflects patterns of investment in health care services and affects both practice patterns and health system efficiency.<sup>19</sup>

### Health Care Market Competition

The extent of health care market competition is one factor that may affect collaborative efforts among partners and scope of activities within Beacon Communities. The Herfindahl-Hirschman Index (HHI) is a measure of the degree of concentration within a given market based on the relative size and quantity of firms in the area. The HHI can range from 0 to 1.0, from a very large number of small firms—least concentrated or most competitive—to a single monopolistic producer—highly concentrated and least competitive. As detailed in Exhibit 17 below, the level of hospital system concentration varied greatly across the 17 Beacon Communities. San Diego had the least concentrated and most competitive market among the Beacons and Southeastern Minnesota had the most highly concentrated and the least competitive market among the Beacons). The degree of market competitions may have affected not only access to care within different Communities, but also the incentives for Beacon Community partners to work together. It is important to note that the formation of accountable care organizations (ACOs) may lead to mergers and alliances that will decrease competition in some health care markets, which may have an impact on the implementation of Beacon interventions.<sup>20,21</sup>

---

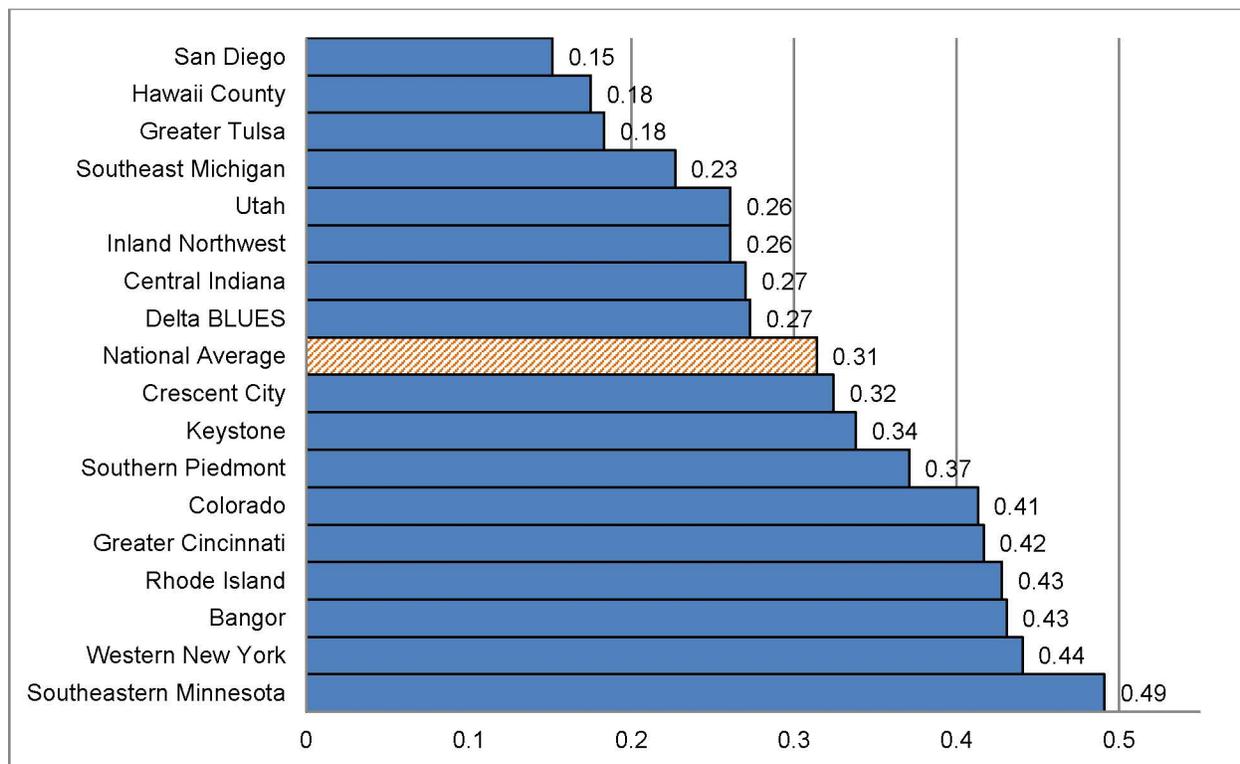
<sup>18</sup> HRSA Area Resource File, 2008.

<sup>19</sup> HRSA Area Resource File, 2008.

<sup>20</sup> Scheffler RM, Shortell SM, Wilensky GR. Accountable Care Organizations and Antitrust: Restructuring the Health Care Market. *JAMA*. 2011; 307:1493-1494.

<sup>21</sup> Greaney TL. Accountable Care Organizations—The Fork in the Road. *N Engl J Med*. 2011; 364: e1.

**Exhibit 17:** Hospital system concentration within the Beacon Communities- Based on the Herfindahl-Hirschman Index (HHI)



## Health IT Environment

The Beacon Communities reflect a wide range of sophistication and capacity with respect to adoption and use of health IT among both the providers and organizations participating in the Beacon effort and within the Communities more broadly. The scope and nature of the health IT infrastructure at the Community level at baseline have shaped the Communities’ priorities and ability to achieve their objectives in terms of HIE and the use and diffusion of other health IT tools. For instance, the state-level approach to patient consent for HIE can affect the effort and resources required for HIE implementation. Differing levels of sophistication and health IT capacity are also evident through the Beacon Communities’ rates of EHR adoption and connectivity to an HIO.

**Health IT Infrastructure.** Level of experience with health IT, including the implementation of health IT infrastructure, plays an important role in the activities and outcomes of the Beacon Communities. A key goal of the Beacon program is “building and strengthening health IT” and many of the Communities are focused on improving their health IT infrastructure as part of their Beacon activities. Most important, however, the ease with which many of the clinical interventions will be diffused through the Communities will be contingent on facility and broad adoption of health IT. There is ample evidence in the research literature as well that this is an important predictor of success in similar initiatives. For instance, a Robert Wood Johnson Foundation (RWJF) study of the Aligning Forces for Quality (AF4Q) communities also

used status of health IT infrastructure as one of seven variables to measure health care markets’ readiness to drive sustainable quality and value in the ambulatory care of chronic conditions.<sup>22</sup>

Levels of health IT adoption, as portrayed through the percent of hospitals with fully implemented EHRs and ambulatory providers adopting electronic health records (EHRs), varied at baseline across Beacon Communities. Exhibit 18 below lists the percent of hospitals with fully functioning EHRs.<sup>23</sup> The percentage of hospitals in the Beacon Communities with fully implemented EHRs ranged from .4% to 47%, with over half of the Beacon Communities falling at or below the national average of 16%. Southeast Michigan had the highest percentage of hospitals with fully implemented EHRs.

**Exhibit 18:**Percent of hospitals with a fully implemented EHR, by Beacon Community

Beacon Community	Percent of hospitals with fully implemented EHR (2009)
Southeast Michigan	47%
Southern Piedmont	29%
Central Indiana	26%
Crescent City	25%
Rhode Island	23%
Keystone	20%
Bangor	17%
<b>National Average</b>	<b>16%</b>
Inland Northwest	15%
Utah	15%
San Diego	12%
Greater Cincinnati	11%
Southeastern Minnesota	10%
Hawaii County	9%
Western New York	6%
Delta BLUES	5%
Greater Tulsa	3%
Colorado	0%

Source: AHA Annual Survey, 2009

The percentage of ambulatory providers adopting EHRs by the last quarter of 2010 also varied greatly across Beacon Communities, ranging from 32% to 74% (Exhibit 19). Most Beacon Communities had a higher percentage than the national average of 47% of ambulatory providers adopting EHRs.

<sup>22</sup> Powers PE, Painter MW. A Checkup on Health Care Markets: Study of 14 communities shows why quality improvement efforts must account for local, regional variations. *Robert Wood Johnson Foundation*. 2007; Available: <http://www.rwjf.org/qualityequality/product.jsp?id=18651>

<sup>23</sup> This measure represents the percentage of hospitals responding ‘Yes, fully implemented’ to the question: “Does your hospital have an electronic health record?” in the 2009 AHA Annual Survey. Other responses were: ‘Yes, partially implemented’ and ‘No’. This measure does not provide information on the capabilities or functionalities of the implemented systems.

**Exhibit 19:** Percent of ambulatory providers that adopted an EHR, by Beacon Community

Beacon Community	Percent of ambulatory providers that adopted an EMR (as of Q4 2010)
Southeastern Minnesota	74%
Southern Piedmont	72%
Utah	68%
Hawaii County	68%
Colorado	65%
Inland Northwest	64%
Keystone	63%
Bangor	56%
Central Indiana	56%
Greater Cincinnati	50%
Western New York	49%
<b>National Average</b>	<b>47%</b>
Rhode Island	42%
San Diego	42%
Greater Tulsa	41%
Southeast Michigan	35%
Crescent City	34%
Delta BLUES	32%

Source: SK&A, 2010

**Exhibit 20:** Average e-prescriptions sent via Surescripts and average activated pharmacies per 100,000 people, by Beacon Community

Beacon Community	Average e-prescriptions sent via Surescripts per 100,000 people during December 2010	Average activated pharmacies per 100,000 people during December 2010
Bangor	26,002	36
Keystone	25,091	27
Rhode Island	21,206	19
Western New York	20,817	24
Greater Cincinnati	17,216	19
Greater Tulsa	16,164	24
Colorado	15,300	22
Southeastern Minnesota	15,127	22
Central Indiana	14,908	20
Hawaii County	14,115	21
Inland Northwest	12,524	22
<b>National Average</b>	<b>12,323</b>	<b>20</b>
Southern Piedmont	11,982	23
San Diego	11,819	12
Crescent City	11,668	19
Southeast Michigan	9,908	29
Delta BLUES	8,251	26
Utah	5,255	16

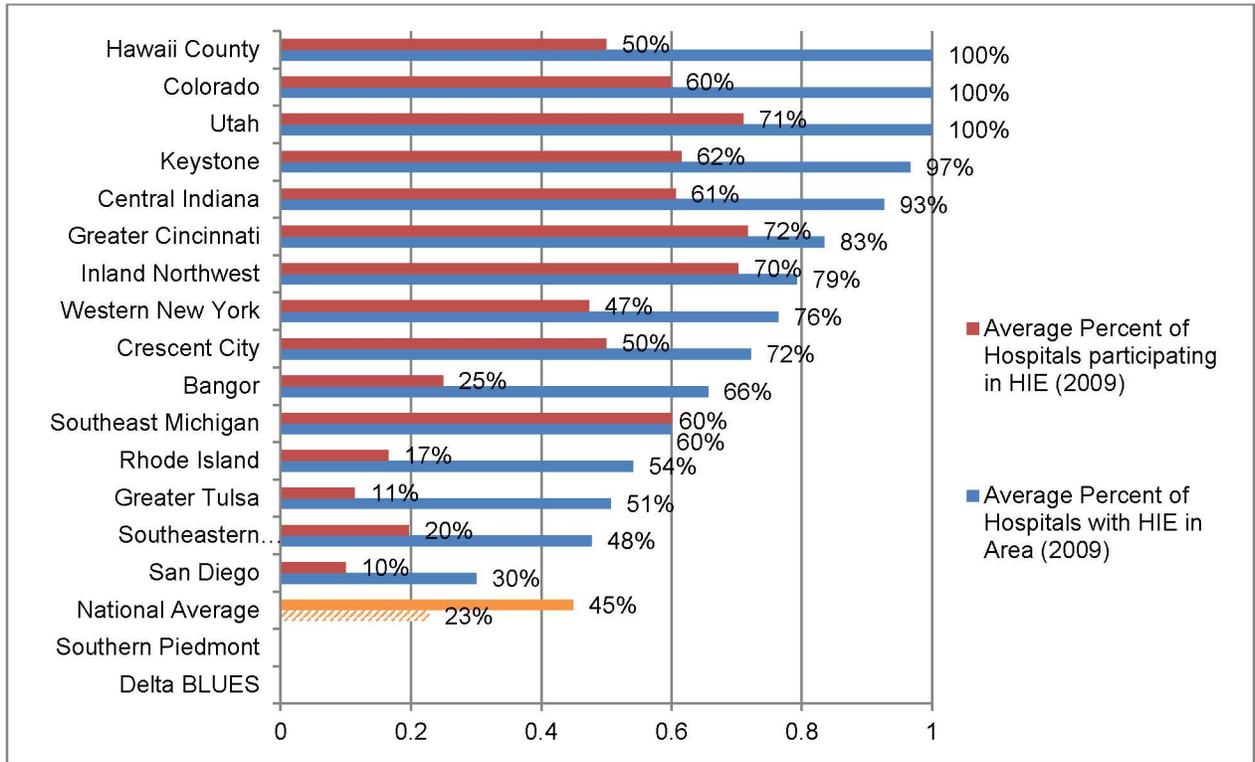
Source: Surescripts, 2011

Beacon Communities also actively participated in e-prescribing, one of the criteria for receiving CMS’ EHR Stage 1 MU incentive payments. Most sites sent, on average, more e-prescriptions per 100,000 people than the national average, with only six Communities sending fewer e-prescriptions than the national average of 12,323. Additionally, most Beacon Communities had a higher average of activated pharmacies per 100,000 than the national average of 20. Exhibit 20 below shows the average e-prescriptions sent and pharmacies activated in December 2010.

Hospital access and level of connectivity to an HIO varied greatly across Beacon Communities. Hospitals in most Beacon Communities had access to an HIO in their area. For these Communities with access to an HIO, the average percent of hospitals with arrangements in their area to share electronic patient-level clinical data through an HIO were all higher than the national average of 23%, and ranged from 30% to 100%. Two states, Mississippi and North Carolina, had no hospitals in the Beacon catchment area reporting access to an HIO.

Despite access to an HIO, not all hospitals were connected to one; the percent of hospitals participating in an HIO ranged, on average, from 0 to 72%. Greater Cincinnati had the greatest percentage of hospitals participating in an HIO with 72% of hospitals participating out of 83% of hospitals with access to an HIO. The majority of the Beacon Communities had a higher percentage than the national average (45%) of hospitals participating in an HIO. Exhibit 21 below shows the average percent of hospitals with access to an HIO in their area and the average percent participating in an HIO, by Beacon community.

**Exhibit 21:** Average percent of hospitals with an HIO in the area and average percent of hospitals participating in an HIO, by Beacon Community



Source: AHA IT Supplement, 2009

## Organization-Level Baseline Characteristics

Health care system improvement initiatives taking place at the community level often rely on community collaboratives to initiate change by engaging local stakeholders. This is the model underlying the Beacon Community Cooperative Agreement Program, which solicited applications from “*Existing multi-stakeholder collaboration[s] to promote health IT, improve community health, and/or enable quality reporting.*” While much of the research on the factors involved in making a community-wide effort successful has been inconclusive,<sup>24</sup> some studies have identified a particular collaborative’s history within the community as an important proxy for trust and respect among member partners and the “maturity” of the coalition.<sup>25,26</sup> Others have indicated that the nature of the organization leading the collaborative can influence its ability to motivate change, insofar as this organization often must play a neutral role in building trust and negotiating agreements among partners with differing priorities and interests.<sup>27,28</sup>

Using this previous literature as a starting point, the sections that follow detail selected initial findings on a limited number of the 17 Beacon Communities’ organization-level baseline characteristics. Specifically, these conditions include type of lead organization; history of collaboration; and participation in related health IT, quality improvement, and clinical transformation activities.

### Type of Lead Organization

For the purposes of this report, a lead organization is defined as the lead applicant for the Beacon Community in response to the Funding Opportunity Announcement (FOA). It is evident, however, that the lead organization’s role within the Community’s governance structure and day-to-day functioning varies from Community to Community, and that many additional partners often play a critical and very active role as well.

There is some literature suggesting that having a neutral party as the lead partner, trusted to act in the interest of the whole rather than in the interest of their individual organization, can be important to success.<sup>29</sup> This may be particularly important in more competitive markets, where health systems, other providers, payers, and additional stakeholders may face challenges forging alliances with one another.

The lead organizations for the 17 Beacon Communities vary in type but, as detailed in Exhibit 22 below, eight of the 17 are led by not-for-profit 501(c)3 community organizations. The remaining Communities are led by integrated delivery networks, academic institutions, HIOs, and health plans. Among those led by a community organization, some have a primarily public health focus (e.g., Crescent City,

<sup>24</sup> Harvey JB, Beich J, Alexander JA, Scanlon D. Building the Scaffold to Improve Health Care Quality in Western New York. *Health Aff (Millwood)*. 2012; 31(3):636-641

<sup>25</sup> Alexander JA, Christianson JB, Hearld LR, Hurley R, Scanlon DP. Challenges of Capacity Building in Multisector Community Health Alliances. *Health Educ Behav*. 2010; 37: 645.

<sup>26</sup> Butterfoss FD, Gilmore LA, Krieger JW, Lachance LL, Lara M, Meurer JR, Orians CE, Peterson JW, Rose SW, Rosenthal MP. From Formation to Action: How Allies Against Asthma Coalitions Are Getting the Job Done. *Health Promot Pract*. 2006; 7: 34S.

<sup>27</sup> Lorenzi N. Strategies for Creating Successful Local Health Information Infrastructure Initiatives. 2003; Available: <http://aspe.hhs.gov/sp/nhii/lhii-lorenzi-12.16.03.pdf>.

<sup>28</sup> Butterfoss FD, Goodman RM, Wandersman A. Community coalitions for prevention and health promotion: factors predicting satisfaction, participation, and planning. *Health Educ Q*. 1996; 23(1): 65-79.

<sup>29</sup> Lorenzi 2003.

Southeastern Michigan), while others have worked primarily to improve health care delivery and quality (e.g., Delta BLUES, Inland Northwest, Southern Piedmont, Tulsa, Utah, Rhode Island).

**Exhibit 22:** Type of lead organization, by Beacon Community

Type of Lead Organization	Beacon Communities
Integrated Delivery Network	Bangor, Keystone
Academic Institution	Southeast Minnesota, San Diego, Hawaii
501(c)3 Non-profit Community Organization	Colorado, Crescent City, Delta BLUES, Inland Northwest, Southeastern Michigan, Tulsa, Utah, Southern Piedmont, Rhode Island
HIO	Cincinnati, Central Indiana, Western New York

**History of Collaboration**

Beacon Communities with a previous history of collaboration on initiatives similar in scope or purpose to the Beacon Program may also be better-positioned for success. Communities in which partners have collaborated previously may, for instance, leverage existing governance structures for the Beacon initiative, giving them a head start in terms of communications infrastructure, project management staff, and decision-making processes. In addition, Communities with partnerships in place from previous grant-funded initiatives have likely had important experiences with measuring their success, providing a valuable organizational expertise with performance measurement that many Beacon Communities lacked at the outset.<sup>30</sup> Based on initial discussions with the Beacon Communities and data gathered from the Beacon Communities’ responses to the FOA, most communities had at least some history of collaboration prior to the Beacon award, coming together to respond to the Beacon FOA. In fact, the majority of Beacon Communities had a relatively strong history of collaboration, having partnered through other national initiatives. Several Beacon Communities—for example, Bangor and Cincinnati—built their Beacon Community on existing governance structures.

**Participation in Related Initiatives**

Within each of the Beacon Communities, at least some of the collaboratives’ partners previously were or currently are engaged in related health IT and quality improvement initiatives. The multiplicity of concurrent state, federal, and foundation-supported initiatives and demonstrations in which the Beacon Communities are involved in whole or in part include the following:<sup>31</sup>

- *AF4Q*. Lead organizations and/or partners from six Communities—Bangor, Cincinnati, Keystone, Southeast Michigan, Southeastern Minnesota, and Western New York— participate in AF4Q, an RWJF effort to lift the overall quality of health care in targeted communities, reduce racial and ethnic disparities, and provide models for national reform.<sup>32</sup>

<sup>30</sup> McKethan A, Brammer C, Fatemi P, Kim M, Kirtane J, Kunzman J, Rao S, Jain S. An Early Status Report On The Beacon Communities' Plans For Transformation Via Health Information Technology. *Health Aff (Millwood)*. 2011, 30(4):782-788.

<sup>31</sup> See the Alliance for Health Reform Select Community Quality Initiative Map, available at <http://www.allhealth.org/community-initiatives.asp> and the *2012 NQF Report to Congress* (p.25), available at: [http://www.qualityforum.org/News\\_And\\_Resources/Report\\_to\\_Congress/Report\\_to\\_Congress.aspx](http://www.qualityforum.org/News_And_Resources/Report_to_Congress/Report_to_Congress.aspx).

<sup>32</sup> Robert Wood Johnson Foundation. *AF4Q Alliances Overview*. Available: <http://forces4quality.org/af4q-alliances-overview>.

- *Chartered Value Exchanges (CVEs)*. Lead organizations and/or partners from nine Communities—Bangor, Cincinnati, Colorado, Crescent City, Central Indiana, Southeast Michigan, Southeastern Minnesota, Keystone, Western New York—are a part of the Agency for Healthcare Research and Quality (AHRQ) CVEs, a national program with a mission focused on quality improvement and transparency through multi-stakeholder community collaboratives.<sup>33</sup>
- *State HIE Program*. At least 12 Beacon Communities are connected with ONC’s State HIE Cooperative Agreement Program through partnerships, with the lead organization in one Beacon Community—Rhode Island—also serving as the qualified State Designated Entity (SDE) under the State HIE Cooperative Agreement.
- *ONC Regional Extension Centers (RECs)*. At least 12 Beacon Communities are connected with ONC’s Health IT Extension Program through partnerships with RECs, with lead organizations in three Beacon Communities—Cincinnati, Utah, and Rhode Island—also serving as the REC.

Similarly, some Beacon Communities have previous experience with clinical transformation activities through state, local, or organizational initiatives, providing resources and lessons learned that give some Communities a leg up in their work as part of the Beacon Community program. Specifically, Beacon Communities are charged with “*translating investments in health IT in the short run to measureable improvements in cost, quality and population health.*”<sup>34</sup> Based on discussions with the Beacon Communities and data gathered from the Beacon Communities’ responses to the FOA, at least seven Beacon Communities had prior experience implementing patient-centered medical home (PCMH) models through collaborations involving multiple partners (e.g., Bangor, Cincinnati, Crescent City, Rhode Island, and Western New York), while the chronic care model had been implemented on a wide-scale in one Community—Colorado—prior to the Beacon award.

In addition, based on the same sources described above, approximately 12 Beacon Communities—Bangor, Cincinnati, Colorado, Delta BLUES, Indiana, Keystone, Rhode Island, San Diego, Southeast Michigan, Southeastern Minnesota, Utah, and Western New York—implemented quality improvement initiatives involving multiple partners prior to the Beacon award. Other researchers have found this to be a distinguishing factor as well, as a RWJF study of the AF4Q communities used communities’ ability to support provider quality improvement as one of seven variables to measure health care market readiness to drive sustainable quality and value in the ambulatory care of chronic conditions.<sup>35</sup>

These concurrent and overlapping activities have a number of implications for the conduct of Beacon program efforts. In addition to providing substantive expertise and experience, in many cases these programs may allow Communities to deploy resources more efficiently, leverage partnerships, and coordinate activities. Provider groups in several of the Beacon catchment areas are exploring or making plans to establish ACOs or participate in any of a number of CMS advanced primary care pilots. The extent of concurrent initiatives contributes to a complex and dynamic landscape in which the Beacon Community collaboratives pursue their work.

<sup>33</sup> Agency for Healthcare Research and Quality. *Overview: AHRQ Learning Network for Chartered Value Exchanges*. 2011; Available: <http://www.ahrq.gov/qual/value/Inceveover.htm>.

<sup>34</sup> The Office of the National Coordinator for Health Information Technology. *The Beacon Community Program*. 2012; Available: <http://www.healthit.gov/sites/default/files/pdf/fact-sheets/beacon-communities-lessons-learned.pdf>.

<sup>35</sup> Powers PE, Painter MW. A Checkup on Health Care Markets: Study of 14 communities shows why quality improvement efforts must account for local, regional variations. *Robert Wood Johnson Foundation*. 2007; Available: <http://www.rwjf.org/qualityequality/product.jsp?id=18651>.

## Beacon Community Interventions

The Beacon Communities have implemented a wide variety of interventions, including innovations in care delivery, provider feedback and performance measurement initiatives, health IT development projects, and tools to improve the process of care for providers and consumers. Each Beacon Community has tailored its activities to reflect its unique resources, goals, and populations, resulting in a broad range of activities.

In many cases, the Communities have chosen to focus all or some of their efforts on specific disease categories. Exhibit 23 shows the full range of the Beacon Communities' clinical focus areas. The most common conditions are diabetes, cardiovascular disease, and pediatric asthma. Six Communities are focusing on three or more clinical areas, while the remainder are addressing one to two.

Beacon interventions may be more IT-focused (e.g., EHR and HIE development), focused primarily on achieving clinical transformation (e.g., PCMHs), or closely combine health IT and clinical transformation goals (e.g., telemedicine). To facilitate assessment of the diverse interventions that the Communities are undertaking, the Beacon initiatives are grouped below into several categories. However, it is important to note that the majority of Beacon interventions are not being implemented in isolation, but rather in conjunction with others that are either Beacon-related or a component of other ongoing work. In practice, individual interventions may fall under more than one category and thus the intervention categories may not necessarily be mutually exclusive. The matrix in Exhibit 24 provides a non-exhaustive breakdown of some of the more common Beacon interventions being implemented in the Communities. The dominant focus areas of these interventions include:

- **Care management.** Eleven of the 17 Beacon Communities (Bangor, Cincinnati, Crescent City, Delta BLUES, Indiana, Inland Northwest, Keystone, SE Michigan, San Diego, Southern Piedmont, and Utah) are initiating or expanding care manager programs in at least one of three settings—hospital, ambulatory, or remote/telephonic. For example, the Keystone Beacon Community is establishing care management programs through three venues. Care managers stationed in ambulatory physician practices will assist patients with medication and care coordination, those embedded in hospitals will focus on tasks such as discharge planning and follow-up scheduling with primary care practices, and a centralized call center will provide telephonic case management for patients.
- **Care transitions.** Several Communities (e.g., Cincinnati, Crescent City, Hawaii, Indiana, Inland Northwest, Rhode Island, Southeast Minnesota, San Diego, Southern Piedmont, Utah, and Western NY) are implementing one or more activities focusing on improving transitions of care. These interventions include electronic admission and/or discharge notifications for PCPs or care managers, planning and education for patients at time of discharge, and asthma action plans for children and adults. For example, the Crescent City Beacon Community is implementing an electronic admissions/discharge/transfer notification system, which provides physicians with alerts and discharge summaries, and facilitates communication between emergency departments, inpatient, and ambulatory providers.

- **Population health management.** Many Beacons are initiating activities aimed at improving population health management, including community or practice-level disease registries, as in the case of the Bangor, Cincinnati, Colorado, Crescent City, Delta BLUES, Southeast Michigan, Southeast Minnesota, San Diego, Tulsa, Utah, and Western New York Beacon Communities. Other Beacons, including Hawaii, Inland Northwest, Southeast Michigan, and Southeast Minnesota, are creating clinical data repositories to support their population health management efforts. Examples of population health management interventions include Colorado’s community-based Crimson Care Registry, which provides longitudinal monitoring capabilities and streamlines reporting and patient communication; and Southeast Minnesota’s clinical data repository, which supports population health management for diabetes and asthma patients.
- **Clinical decision support (CDS).** Several Communities are implementing computerized CDS tools for providers. In some Communities, including Cincinnati, Crescent City, Delta BLUES, Inland Northwest, Southeast Michigan, Southeast Minnesota, Utah, and Western New York, CDS is tied to EHRs, while Hawaii is implementing a cloud-based tool. Meanwhile, the Colorado and Tulsa Beacon Communities are adopting Archimedes’ innovative Individualized Guidelines and Outcomes (IndiGO) platform to assist physicians in creating individualized treatment plans.
- **HIE development.** All of the Beacon Communities have committed to developing HIE infrastructures in their catchment areas. Some Communities, such as Tulsa, are focusing on building HIE infrastructures while others, such as Colorado, are using Beacon funding to accelerate the expansion of existing HIE systems.

The Communities are also implementing various other interventions that include text messaging programs, PCMH models, physician data reporting, patient education and outreach, telemedicine, medication management therapy, and specialist referral management programs. Under the Beacon program, many Communities are pioneering innovative health IT and clinical transformation activities. For the purpose of this independent evaluation, interventions that are in a pilot phase and have not been similarly implemented elsewhere on a wide scale are considered “innovative.” Examples of innovative Beacon activities include:

- **Archimedes IndiGO.** The Colorado and Tulsa Beacon Communities are implementing the IndiGO CDS platform, which generates individualized patient guidelines designed to assist providers in making preventive care and treatment decisions.
- **Emergency Medical Services (EMS) Information Systems.** The San Diego Beacon Community has assisted four paramedic service organizations in the area to convert their EHRs to the National EMS Information System standard, which allows for transfer of medical information to hospitals prior to a patient’s arrival.
- **Text messaging.** The Cincinnati, Crescent City, and Southeast Michigan Communities are adopting Tx4Health, a text-based diabetes education service designed to help patients understand their risks. Additionally, the San Diego Beacon Community is implementing a pilot study to determine the cost-effectiveness of using text messaging to improve child vaccination rates.

In several Beacon Communities, payers—specifically employer or health plan partners—are initiating financial incentives or care management payments. But these appeared at baseline not to be Beacon-wide in any of the Communities. As the Communities move into their final year of Beacon funding, the adoption of such arrangements will be critical to the sustainability of many of the Beacon interventions.

**Exhibit 23:** Clinical focus area, by Beacon Community

Clinical Focus	Bangor	Central Indiana	Cincinnati	Colorado	Crescent City	Delta Blues	Hawaii	Inland NW	Keystone	SE Michigan	SE Minnesota	Rhode Island	San Diego	Southern Piedmont	Tulsa	Utah	Western NY	TOTAL
Diabetes	X	X	X	X	X	X	X	X		X	X	X		X		X	X	14
Cardiovascular Care	X	X		X	X		X		X				X	X				8
Asthma	X			X										X				3
Asthma - Pediatric			X								X							2
Behavioral Health												X						1
COPD	X	X							X									3
Obesity				X														1
Other preventive: cancer screening		X													X			2
Other preventive		X		X			X					X			X			5
<b>TOTAL</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	

**Exhibit 24:** Interventions, by Beacon Community

Intervention Category	Intervention Activity	Bangor	Cincinnati	Colorado	Crescent City	Delta BLUES	Hawaii	Indiana	Inland NW	Keystone	Rhode Island	SE Michigan	SE Minnesota	San Diego	Southern Piedmont	Tulsa	Utah	Western NY	TOTAL
Care Transitions	Electronic admission/discharge/transfer notifications		X		X			X			X			X	X		X	X	8
	Discharge planning/education		X				X				X				X				4
	Asthma action plans												X		X				2
Text Messaging	Childhood immunization reminders													X					1
	Txt4Health- diabetes education		X		X							X							3
EMS	Transfer of information prior to arrival at hospital													X					1
Patient-Centered Medical Homes			X	X			X		X	X	X				X				7
Physician Data Reporting			X	X				X	X		X	X				X	X	X	9
Patient Education, Engagement & Outreach			X	X		X	X			X		X	X	X			X	X	10
Clinical Decision Support	EHR-based		X		X	X			X			X	X				X	X	8
	Archimedes IndiGO			X												X			2
	Cloud-based						X												1
Telemedicine		X						X					X		X	X		X	6
Population Health	Registry-based management	X	X	X	X	X						X	X	X		X	X	X	11
	Clinical data repositories						X		X			X	X						4
Care Managers	Hospital-based					X				X				X	X				4
	Ambulatory	X <sup>36</sup>	X		X				X	X		X			X		X		7
	Remote/telephone							X	X	X		X							5
Medication Therapy Management						X				X									2
Specialist Referral Management/ PCP Specialist Communication											X					X	X	X	4
HIE Development	Building				X	X	X					X	X	X		X			7
	Strengthening/Expanding	X	X	X				X	X	X	X				X		X	X	10

<sup>36</sup> While the majority of care managers are based in primary care practices, two are associated with mental health facilities. One is in an inpatient mental health facility and the other is in a community-based outpatient mental health facility.

## Conclusion

This brief provides a critical foundation for the independent evaluation of the Beacon Community Cooperative Agreement Program by detailing the range of contextual factors, baseline characteristics, and intervention components that shape the Beacon Communities and the activities they are leading. This exercise both serves a descriptive purpose—in terms of highlighting key similarities and differences among the Communities—and will affect the analytical scope of the evaluation insofar as it informs hypotheses to be tested both quantitatively and qualitatively over time. Given the complexity and heterogeneity of the Beacon Communities’ efforts, a solid understanding of the Program’s successes will be greatly enhanced by an empirical grounding in the salient characteristics of each Community and their work. Simply put, it will be critical to understand not just “whether it works,” but the context and circumstances in which we see some efforts succeed.

As the evaluation is in many ways just getting underway, there remain several gaps to be filled in the data elements identified above as important in examining and understanding the Beacon Program. This brief is intended as an important initial step in the construction of a framework of such elements that will be both validated and further populated over time as additional data are collected and hypotheses are tested and refined. In the end, a robust characterization of the Communities with respect to their context and characteristics at baseline, their Beacon-related objectives, and their interventions will provide a critical lens through which the Program may be understood by a range of audiences—including policymakers, the general public, and the Beacons themselves. It will also provide a useful roadmap for other Communities around the country looking for guidance in leveraging health IT and collaborative strategies to improve population health, lower health-care costs, and increase efficiency.

## Appendix: Methodology

This appendix provides information on the calculation of the contextual characteristics for the 17 Beacon Communities for the purposes of activities conducted for the Beacon Community Program Evaluation by NORC at the University of Chicago and its partners.

### Developing Geographic Crosswalks for Beacon Catchment Areas

For the purposes of calculating the measures detailed in the table below, each Beacon Community's catchment area needed to be mapped to the unit of analysis for the data source of interest. Each Beacon Community application includes a section describing the geographic area where services are provided and from which data will be analyzed. In addition, updated zip code information was obtained from a majority of the Communities in Spring 2012. Four different methods of describing the geographic service area were found in the applications:

1. Individual zip codes representing the service area were explicitly stated.
2. The community listed the counties comprising the service area.
3. The community referred to counties included in a Metropolitan Statistical Area (MSA) as defined by the U.S. Census Bureau.
4. The community listed a Dartmouth Health Atlas Hospital Referral Region (HRR) as the service area.

In some instances, an applicant provided elements from more than one method listed above. For example, one applicant listed an HRR and included additional counties adjacent to the HRR that when combined, comprised the service area. When a Beacon Community applicant explicitly listed zip codes defining the service area in their application, the zip codes were used. If instead the applicant listed counties or referred to an MSA, a commercial data source ([www.hometownlocator.com](http://www.hometownlocator.com)) was used to collect zip codes associated with counties listed in the application. If an applicant referred to an MSA in defining their catchment area, the counties comprising the MSA were confirmed using the most recent information from the U.S. Census Bureau (<http://www.census.gov/population/www/metroareas/lists/2009/List4.txt>).<sup>37</sup> Finally, if a Beacon Community referred to an HRR as defined by the Dartmouth Atlas, data for the HRR was copied directly from the most recent data file (2007) found at the Dartmouth Health Atlas website (<http://www.dartmouthatlas.org/downloads/geography/ZipHsaHrr07.xls>).

For those measures not calculated at the zip code level, the evaluation team determined how well the applicant encapsulated the geographic units of the descriptive data sources, i.e. Hospital Service Areas (HSAs), HRRs, and counties. The team first mapped the zip codes within the Beacon catchment areas determined from the above methods to Zip Code Tabulation Areas (ZCTAs) using a Dartmouth Health Atlas zip code-ZCTA crosswalk, then mapped the 2008 population onto those ZCTAs, and lastly rolled up populations and computed each Beacon Community's share of the area population.

<sup>37</sup> MSAs in this document were defined by the Office of Management and Budget in December 2009.

## Measure Definitions

Measure	Data Source	Year	Definition
<b>Dimension: Demographics</b>			
Total household population	Census	2010	This measure is the estimated total persons in the United States, using data from the 2010 U.S. Census. <sup>38</sup>
Race/ethnicity	Census	2010	These race/ethnicity distributions present the percent of respondents that identified themselves as: White, Black or African American, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, Some Other Race, Two or More Races, and/or Hispanic, using data from the 2010 U.S. Census. <sup>39</sup>
CMS (Centers for Medicare & Medicaid Services) Medicare Advantage penetration	HRSA Area Resource File	2009	This measure is from the State County Penetration Data for Medicare Advantage Files. Penetration is the ratio of enrollees over eligibles multiplied by 100. 'Enrollees' are defined as individuals who are currently enrolled in a Medicare Advantage plan. 'Eligibles' are defined as those enrolled in either Medicare part A (hospital insurance) or part B (supplemental medical insurance). <sup>40</sup>
CMS Medicare Prescription Drug Plan penetration	HRSA Area Resource File	2009	This measure is from the State County Penetration Data for Prescription Drug Plan Files, as of December 2009. Medicare prescription drug coverage is also known as Medicare Part D. The Medicare Prescription Drug Improvement and Modernization Act (MMA) of 2003 added prescription drug coverage to Medicare (Part D) beginning January 1, 2006. Penetration is the ratio of enrollees over eligibles multiplied by 100. 'Enrollees' are defined as individuals who are currently enrolled in a Stand Alone Prescription Drug Plan. 'Eligibles' are individuals who are either currently or formerly, entitled or enrolled in either part A or part B original Medicare. <sup>41,42</sup>

<sup>38</sup> U.S. Census Bureau. 2012. What is the Census? <http://www.census.gov/2010census/about/>.

<sup>39</sup> Humes, K.R., Jones, N.A., and Ramirez, R.R. Overview of Race and Hispanic Origin: 2010. *Washington, DC: U.S. Census Bureau*. 2011; Available: <http://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf>

<sup>40</sup> Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services (HHS). *User Documentation for the Area Resource File (ARF) 2009-2010 Release*. Rockville, MD: HRSA. 2011; Available: <http://sodapop.pop.psu.edu/codebooks/arf/USR2009.doc>.

<sup>41</sup> Ibid.

<sup>42</sup> Centers for Medicare & Medicaid Services (CMS). 2012. SCP – State County Plan File, 1993-2005; Available: <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/HealthPlanRepFileData/SCP.html>.

Measure	Data Source	Year	Definition
Percent uninsured	Census Small Area Health Insurance Estimates (SAHIE)	2009	This measure is modeled using county estimates of the number of people with and without health insurance coverage by age, sex, and income. The 2009 SAHIE estimates are adjusted so that for key estimates, before rounding, the county numbers sum to their respective state totals and similarly the states sum to the national 2009 American Community Survey (ACS) poverty universe for the numbers insured and uninsured. The Census SAHIE uses the following data inputs to create their estimate: ACS, Annual Social and Economic Supplement of the Current Population Survey, County Business Patterns, Demographic Population Estimates, Federal Tax Returns, Supplemental Nutrition Assistance Program (SNAP) Benefit Recipients, Medicaid Participation, Children's Health Insurance Program Participation, and Census 2000. <sup>43</sup>
Percent persons in poverty	HRSA Area Resource File	2008	This measure is from the Bureau of Census' Small Area Income Poverty Estimates (SAIPE) files. The SAIPE are constructed from statistical models based, in part, on summary data from the ACS, prior year Federal income tax returns, data about participation in SNAP, and the previous census. <sup>44</sup>
<b>Dimension: Population Health</b>			
Percent of Medicare beneficiaries with breast cancer	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with breast cancer (numerator) divided by the Medicare beneficiaries age 65+ with full Fee For Service (FFS) Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with the Chronic Care Warehouse (CCW) 2008 CNCRBRST chronic condition flag values of "1" or "3" were determined to have had breast cancer. <sup>45</sup>
Percent of Medicare beneficiaries with chronic kidney disease	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with chronic kidney disease (numerator) divided by Medicare beneficiaries age 65+ years with full FFS Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with CCW 2008 CHRNKIDN chronic condition flag values of "1" or "3" were determined to have had chronic kidney disease. <sup>46</sup>

<sup>43</sup> U.S. Census Bureau. 2011. Small Area Health Insurance Estimates – Data Inputs. 2011; Available: <http://www.census.gov/did/www/sahie/methods/inputs/index.html>.

<sup>44</sup> Ibid.

<sup>45</sup> Health Indicators Warehouse, National Center for Health Statistics. 2012. Breast cancer Medicare beneficiaries (percent). Available: [http://healthindicators.gov/Indicators/Breast-cancer-Medicare-beneficiaries-percent\\_300/Profile](http://healthindicators.gov/Indicators/Breast-cancer-Medicare-beneficiaries-percent_300/Profile).

<sup>46</sup> Health Indicators Warehouse, National Center for Health Statistics. 2012. Chronic kidney disease Medicare beneficiaries (percent). Available: [http://healthindicators.gov/Indicators/Chronic-kidney-disease-Medicare-beneficiaries-percent\\_288/Profile](http://healthindicators.gov/Indicators/Chronic-kidney-disease-Medicare-beneficiaries-percent_288/Profile).

Measure	Data Source	Year	Definition
Percent of Medicare beneficiaries with diabetes	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with diabetes (numerator) divided by Medicare beneficiaries age 65+ years with full FFS Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with CCW 2008 DIABETES chronic condition flag values of "1" or "3" were determined to have had diabetes. <sup>47</sup>
Percent of Medicare beneficiaries with heart failure	CMS Chronic Conditions Warehouse	2008	This measure is calculated using the count of Medicare beneficiaries with heart failure (numerator) divided by Medicare beneficiaries age 65+ years with full FFS Medicare all 12 months of 2008 (denominator). Full FFS Medicare is defined as 12 months of Part A and B coverage and zero months of managed care coverage for 2008. Age is the beneficiary's age at the end of 2008. Of this population, beneficiaries with CCW 2008 CHF chronic condition flag values of "1" or "3" were determined to have had heart failure. <sup>48</sup>
<b>Dimension: Preventative Care</b>			
Average annual percent of diabetic Medicare enrollees age 65-75 having Hemoglobin A1c test	Dartmouth Atlas	2006-2007	This measure is calculated by dividing the number of non-HMO Medicare enrollees age 65-75 with diabetes that received Hemoglobin A1c testing (numerator) divided by the total number of non-HMO Medicare enrollees age 65-75 (as of 12/31/2007) with a diabetes diagnosis. To qualify as a diabetic, an individual needs two face-to-face encounters with different dates of service in an ambulatory setting or non-acute inpatient setting or one face-to-face encounter in an acute inpatient or emergency room setting during either the measurement or prior year. <sup>49</sup>

<sup>47</sup> Health Indicators Warehouse, National Center for Health Statistics. 2012. Diabetes Medicare beneficiaries (percent). Available: [http://healthindicators.gov/Indicators/Diabetes-Medicare-beneficiaries-percent\\_294/Profile](http://healthindicators.gov/Indicators/Diabetes-Medicare-beneficiaries-percent_294/Profile).

<sup>48</sup> Health Indicators Warehouse, National Center for Health Statistics. 2012. Heart failure Medicare beneficiaries (percent). Available: [http://healthindicators.gov/Indicators/Heart-failure-Medicare-beneficiaries-percent\\_296/Profile](http://healthindicators.gov/Indicators/Heart-failure-Medicare-beneficiaries-percent_296/Profile).

<sup>49</sup> The Dartmouth Institute for Health Policy and Clinical practice (TDI). Percent of diabetic Medicare enrollees receiving appropriate management, by race and type of screening. *The Dartmouth Atlas of Health Care*. Lebanon, NH: TDI. 2003-2007; Available: <http://www.dartmouthatlas.org/data/topic/topic.aspx?cat=25>.

Measure	Data Source	Year	Definition
Average annual percent of diabetic Medicare enrollees age 65-75 having blood lipids (LDL-C) test	Dartmouth Atlas	2006-2007	This measure is calculated by dividing the number of non-HMO Medicare enrollees age 65-75 (as of 12/31/2007) with diabetes that received blood lipids testing (numerator) divided by the total number of non-HMO Medicare enrollees age 65-75 (as of 12/31/2007) with a diabetes diagnosis. To qualify as a diabetic, an individual needs two face-to-face encounters with different dates of service in an ambulatory setting or non-acute inpatient setting or one face-to-face encounter in an acute inpatient or emergency room setting during either the measurement or prior year. <sup>50</sup>
Average percent of female Medicare enrollees age 67-69 having at least one mammogram over a two-year period	Dartmouth Atlas	2006-2007	This measure is calculated by dividing the number of non-HMO female Medicare beneficiaries' ages 67-69 (as of 12/31/2007) that had a mammogram within the past two years by the total number of all non-HMO female Medicare beneficiaries ages 67-69. <sup>51</sup>
<b>Dimension: System Capacity</b>			
Total primary care physicians per 100,000 residents	HRSA Area Resource File	2008	This measure is calculated using data from the Area Resource File (ARF), adding the total Medical Doctors (M.D.s) to the total Doctors of Osteopathic Medicine s (D.O.s), dividing by the total population, and multiplying the quotient by 100,000. The estimates for total non-Federal M.D.s and D.O.s were obtained by the ARF from the 2008 American Medical Association Physician Masterfiles. The 2008 population estimates were obtained by the Health Resources and Services Administration (HRSA) for the ARF from the Census Bureau. The Census data estimate the number of people living in an area from a components of change model that incorporates information on natural change (births, deaths) and net migration (net internal migration, net international migration) that has occurred in an area since a Census 2000 reference date. <sup>52</sup>

<sup>50</sup> Ibid.

<sup>51</sup> The Dartmouth Institute for Health Policy and Clinical practice (TDI). Percent of female Medicare enrollees age 67-69 having at least one mammogram every two years, by race. *The Dartmouth Atlas of Health Care*. 2003-2007; Available: <http://www.dartmouthatlas.org/data/map.aspx?ind=169>.

<sup>52</sup> HRSA, 2010.

Measure	Data Source	Year	Definition
Total hospital beds per 100,000 residents	HRSA Area Resource File	2008	This measure is calculated using data from the ARF, dividing the total Short Term General Hospital Beds by the total population, and multiplying the quotient by 100,000. All hospital data in the ARF are from the American Hospital Association (AHA) Annual Survey of Hospitals database. To be reported as a "hospital", an institution must have at least six inpatient beds, cribs or pediatric bassinets that are continually available for the care of patients. Beds by hospital type were calculated using the AHA hospital survey variable "Beds Set Up and Staffed at End of Reporting Period". The variable "Statistical Beds" was derived by adding the total number of beds available each day during the hospital's reporting period and dividing this figure by the total number of days in the reporting period. Short Term General Hospitals are those coded with: Length of Stay = '1', Short term; and, Type of Service = '10', General medical and surgical. These hospitals provide non-specialized care, and the majority of their patients stay for fewer than 30 days. The 2008 population estimates were obtained by HRSA for the ARF from the Census Bureau. The Census data estimate the number of people living in an area as of July 1, 2008 from a components of change model that incorporates information on natural change (births, deaths) and net migration (net internal migration, net international migration) that has occurred in an area since a Census 2000 reference date. <sup>53,54</sup>
Total hospitals per 10,000 residents	HRSA Area Resource File	2008	This measure is calculated using data from the ARF, dividing the Total Short Term General Hospitals by the total population, and multiplying the quotient by 10,000. All hospital data in the ARF are from the AHA Annual Survey of Hospitals database. To be reported as a "hospital", an institution must have at least six inpatient beds, cribs or pediatric bassinets that are continually available for the care of patients. Short Term General Hospitals are those coded with: Length of Stay = '1', Short term; and, Type of Service = '10', General medical and surgical. These hospitals provide non-specialized care, and the majority of their patients stay for fewer than 30 days. The 2008 population estimates were obtained by HRSA for the ARF from the Census Bureau. The Census data estimate the number of people living in an area as of July 1, 2008 from a components of change model that incorporates information on natural change (births, deaths) and net migration (net internal migration, net international migration) that has occurred in an area since a Census 2000 reference date. <sup>55,56</sup>

<sup>53</sup> American Heart Association (AHA). 2009 AHA Annual Survey Health Forum, L.L.C. Dallas, TX: AHA. 2009; Available: <http://www.ahadata.com/Documents/data/2009AHAAnnualSurvey.pdf>.

<sup>54</sup> HRSA, 2010.

<sup>55</sup> AHA, 2009.

<sup>56</sup> HRSA, 2010.

Measure	Data Source	Year	Definition
Herfindahl-Hirschman Index - hospital system market competition	AHA Annual Hospital Survey	2009	The Herfindahl-Hirschman Index (HHI) is calculated from 2009 AHA Annual Hospital Survey data. The HHI is a commonly used measure of market concentration. It is an estimation of the size of firms in relation to the industry and an indicator of the amount of competition among those firms. The HHI can range from 0 to 1, ranging from a large number of small firms to a single monopolistic producer. It is calculated by squaring the quotient of the number of hospital beds in the unit of interest (in this case, the hospital system), divided by the total number of hospital beds in the hospital referral region. <sup>57,58</sup> This measure was calculated using data from the AHA Annual Survey of Hospitals Database. To be reported as a "hospital", an institution must have at least six inpatient beds, cribs or pediatric bassinets that shall be continually available for the care of patients. The variable "Statistical Beds" was derived by adding the total number of beds available each day during the hospital's reporting period and dividing this figure by the total number of days in the reporting period. Short Term General Hospitals are those coded with: Length of Stay = '1', Short term; and, Type of Service = '10', General medical and surgical. These hospitals provide non-specialized care, and the majority of their patients stay for fewer than 30 days. <sup>59</sup>
<b>Dimension: Quality of Care</b>			
Total Mortality: ASR (Age, Sex, Race)-adjusted percent of deaths among Medicare enrollees	Dartmouth Atlas	2007	This measure is calculated using the count of beneficiaries age >= 65 on June 30, 2005 and Part A entitlement in June 2005 from the Medicare Denominator File. <sup>60</sup>

<sup>57</sup> U.S. Department of Justice. Herfindahl-Hirschman Index.2012; Available: <http://www.justice.gov/atr/public/guidelines/hhi.html>.

<sup>58</sup> Health Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality (AHRQ). Hospital Market Structure Files. Rockville, MD: AHRQ. 2007; Available: <http://www.hcup-us.ahrq.gov/toolssoftware/hms/hms.jsp>.

<sup>59</sup> AHA, 2009.

<sup>60</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). Research Methods. *The Dartmouth Atlas of Health Care*. Lebanon, NH: TDI. 2012; Available: [http://www.dartmouthatlas.org/downloads/methods/research\\_methods.pdf](http://www.dartmouthatlas.org/downloads/methods/research_methods.pdf).

Measure	Data Source	Year	Definition
Discharges for ambulatory care sensitive conditions per 1,000 Medicare enrollees	Dartmouth Atlas	2006-2007	Ambulatory care-sensitive conditions (ACSCs) refer to hospitalizations that are preventable when access to primary care is adequate. ACSC discharges are identified using ICD-9-CM diagnosis codes for the following conditions: convulsions, chronic obstructive pulmonary disease, bacterial pneumonia, asthma, hypertension, angina, cellulitis, diabetes, gastroenteritis, kidney/ urinary infection, and dehydration (numerator). Eligible enrollees are counted using 100% of Medicare enrollees age 65-99 with full Part A entitlement and no HMO enrollment during the measurement period (denominator). Rates are adjusted for age, sex and race using the indirect method, using the U.S. Medicare population as the standard. <sup>61,62</sup>
Percent Medicare enrollees readmitted within 30 days of hospital discharge	Dartmouth Atlas	2009	This measure is the proportion of Medicare beneficiaries' medical and surgical discharges (all medical and surgical DRGs) in which the individual is admitted to a hospital within 30 days. Researchers studied 100% of FFS Medicare beneficiaries with full Part A and Part B coverage during the study periods. Hospital claims from short-term acute or critical access hospitals were identified among the study population for each cohort, with the first period of index discharges as July 1, 2003 – June 30, 2004 and the second as July 1, 2008 - June 30, 2009. Because of the way hospitals are paid under Medicare in Maryland, readmission rates for Maryland hospital referral regions were suppressed. Data was adjusted for differences in age, sex and race. <sup>63,64</sup>
Percent Medicare enrollees seeing a primary care clinician within 14 days of hospital discharge	Dartmouth Atlas	2009	This measure is the proportion of Medicare beneficiaries' medical and surgical discharges (all medical and surgical DRGs) in which the individual visited a primary care physician within 14-days of discharge from the hospital. Those included in the numerator were restricted to the following CMS specialties: family medicine, general internal medicine, general practice and geriatrics. Researchers used 100% of FFS Medicare beneficiaries who resided in the 306 Dartmouth Atlas hospital referral regions and had full Part A (acute care in facilities, including hospitals) and Part B (clinician services) coverage during the study periods. The rates are adjusted for the age, sex and race of the underlying Medicare population using the indirect method. <sup>65,66</sup>

<sup>61</sup> Ibid.

<sup>62</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). Discharges for ambulatory care-sensitive conditions per 1,000 Medicare enrollees, by race. *The Dartmouth Atlas of Health Care*. Lebanon, NH: TDI. 2003-2007; Available: <http://www.dartmouthatlas.org/data/table.aspx?ind=164>.

<sup>63</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). Percent of patients readmitted within 30 days of discharge, by cohort. *The Dartmouth Atlas of Health Care*. Lebanon, NH: TDI. 2009; Available: <http://www.dartmouthatlas.org/data/map.aspx?ind=192>.

<sup>64</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). U.S. Hospitals, Facing New Medicare Penalties, Show Wide Room for Improvement at Reducing Readmission Rates. Lebanon, NH: TDI. 2011; Available: [http://www.dartmouthatlas.org/downloads/press/Post\\_Acute\\_Care\\_Release\\_092811.pdf](http://www.dartmouthatlas.org/downloads/press/Post_Acute_Care_Release_092811.pdf).

<sup>65</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). Percent of patients visiting a primary care clinician within 14 days of discharge, by cohort. *The Dartmouth Atlas of Health Care*. Lebanon, NH: TDI. 2009; Available: <http://www.dartmouthatlas.org/data/map.aspx?ind=193>.

Measure	Data Source	Year	Definition
Percent Medicare enrollees having an ER (Emergency Room) visit within 30 days of hospital discharge	Dartmouth Atlas	2009	This measure is the proportion of Medicare beneficiaries' medical and surgical discharges (all medical and surgical DRGs) in which the individual visited an ER within 30-days of discharge from the hospital. The numerator includes outpatient claims: revenue center code: 0450-0459 (emergency room) and 0981 (professional fees-emergency room) and revenue center visit date not within an acute short-stay or critical access hospital claim that has emergency room payment; or 2) hospital claims: any acute short-stay or critical access hospital claims from the MedPAR file with emergency room payment and did not have associated outpatient claims defined as above. Researchers used 100% of FFS Medicare beneficiaries who resided in the 306 Dartmouth Atlas hospital referral regions and had full Part A (acute care in facilities, including hospitals) and Part B (clinician services) coverage during the study periods. The rates are adjusted for the age, sex and race of the underlying Medicare population using the indirect method. <sup>67,68</sup>
<b>Dimension: Claims-based Reimbursements</b>			
Price-Adjusted Medicare payments per enrollee	Dartmouth Atlas	2008	This measure is calculated from the Continuous Medicare History Sample (CMHS) from CMS. The file documents reimbursements by calendar year for each component of the Medicare program. The data are from a random 5% sample of Medicare enrollees selected on the basis of the terminal digits in the Social Security number. FFS patients enrolled in Medicare Parts A and B are included. Patients enrolled in risk-bearing health maintenance organizations (HMOs) are excluded. The rates are adjusted for the age, sex and race of the underlying Medicare population using the indirect method, as well as regional price differences. <sup>69</sup>
<b>Dimension: HIE/HIT</b>			
Average number of Surescripts e-Rx transactions per 100,000 people	Surescripts (proprietary, provided by ONC)	2010	According to the SureScripts data dictionary received from ONC, <sup>70</sup> the variable 'eRxTransactions' indicates whether the pharmacy sent or received any electronic new Rx (prescription), refill request, or refill response messages during the measurement month (numerator). The denominator is for every 100,000 people of the 2010 U.S. Census population.

<sup>66</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). After Hospitalizations: A Dartmouth Atlas Report on Post-Acute Care for Medicare Beneficiaries. Lebanon, NH: TDI. 2011; Available: [http://www.dartmouthatlas.org/downloads/reports/Post\\_discharge\\_events\\_092811.pdf](http://www.dartmouthatlas.org/downloads/reports/Post_discharge_events_092811.pdf).

<sup>67</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). Percent of patients having an emergency room visit within 30 days of discharge. *The Dartmouth Atlas of Health Care*. Lebanon, NH: TDI. 2009; Available: <http://www.dartmouthatlas.org/data/map.aspx?ind=191>.

<sup>68</sup> TDI, 2011.

<sup>69</sup> The Dartmouth Institute for Health Policy and Clinical Practice (TDI). Price-adjusted Medicare payments per enrollee, by adjustment type and program component. Lebanon, NH: TDI. 2009; Available: <http://www.dartmouthatlas.org/data/map.aspx?ind=188>.

<sup>70</sup> Not publicly available.

Measure	Data Source	Year	Definition
Average number of Surescripts-activated pharmacies per 100,000 people	Surescripts (proprietary, provided by ONC)	2010	According to the SureScripts data dictionary received from ONC, <sup>71</sup> the variable 'SurescriptsNetwork' Indicates if the pharmacy is activated on the Surescripts network to receive electronic prescriptions (numerator). The denominator is for every 100,000 people of the 2010 U.S. Census population.
Average percent of hospitals with fully implemented EHRs	AHA Annual Survey	2009	This measure represents the average proportion of hospitals per hospital referral region (HRR) responding 'Yes, fully implemented' to the question: "Does your hospital have an electronic health record?" Other responses were: 'Yes, partially implemented' and 'No'.
Average percent of hospitals with a health information exchange in their area	AHA IT Supplement	2009	This measure represents those hospitals responding 'Yes' to the following: "Do any arrangements exist in your area to share electronic patient-level clinical data through an electronic health information exchange (HIE) or a regional health information organization (RHIO)?" (numerator) divided by all 'General medical and surgical' hospitals in the US that responded to the IT supplement (denominator). <sup>72</sup>
Average percent of hospitals participating in a health information exchange	AHA IT Supplement	2009	This measure is calculated by dividing the number of hospitals that responded that they are 'Participating and actively exchanging data in at least one HIE/RHIO' to the following question, "Please indicate your level of participation in a regional health information exchange (HIE) or regional health information organization (RHIO)?" (numerator), by all 'General medical and surgical' hospitals in the US that responded to the IT supplement (denominator). <sup>73</sup>
Average percent of ambulatory providers that adopted an EMR as of Q4 2010	SK&A (proprietary, provided by ONC)	2010	This measure is calculated by dividing the number that responded 'Yes' to the question, 'emrsoftwar' in the data received from ONC, <sup>74</sup> labeled as "The Medical Office has Adopted an EHR" (numerator), divided by the total number of ambulatory providers responding to the SK&A survey (denominator).

<sup>71</sup> Not publicly available.

<sup>72</sup> American Hospital Association (AHA). 2011 Hospital HER Adoption. 2011; Available: <http://www.ahadataviewer.com/book-cd-products/EHR-Database/>.

<sup>73</sup> Ibid.

<sup>74</sup> Not publicly available.

Measure	Data Source	Year	Definition
<b>Dimension: Behavioral Risk Factor Surveillance System (BRFSS)</b>			
Percent of population with diabetes	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "Have you ever been told by a doctor or other health professional that you have pre-diabetes or borderline diabetes?" (If 'Yes' and respondent is female, they were also asked whether "this only when you were pregnant?" If they responded 'Yes' to that follow-up, they are excluded from the numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>75</sup>
Percent of population with asthma	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following questions: "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?" and, "Do you still have asthma?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>76</sup>
Percent of population that received a flu vaccine	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to either of the following questions: "A flu shot is an influenza vaccine injected into your arm. During the past 12 months, have you had a seasonal flu shot?" or, "The seasonal flu vaccine sprayed in the nose is also called FluMist™. During the past 12 months, have you had a seasonal flu vaccine that was sprayed in your nose?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>77</sup>
Percent of population that received pneumonia vaccine	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "A pneumonia shot or pneumococcal vaccine is usually given only once or twice in a person's lifetime and is different from the flu shot. Have you ever had a pneumonia shot?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>78</sup>

<sup>75</sup> Centers for Disease Control and Prevention (CDC). 2010 Behavioral Risk Factor Survey Surveillance System (BRFSS) Questionnaire. 2009; Available: <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2010brfss.pdf>.

<sup>76</sup> Ibid.

<sup>77</sup> CDC, 2009.

<sup>78</sup> Ibid.

Measure	Data Source	Year	Definition
<b>Dimension: Behavioral Risk Factor Surveillance System (BRFSS)</b>			
Percent of population with cardiovascular disease	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to any of the following questions: "Has a doctor, nurse, or other health professional EVER told you that you had ..." "a heart attack, also called a myocardial infarction;" "angina or coronary heart disease;" or, "a stroke?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>79</sup>
Percent of women (age 40+) having a mammogram within the past year	BRFSS	2010	This measure is calculated by dividing the number of respondents over 40 years of age that responded 'Yes' to the following question: "A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?" and responded 'Within the past year (anytime less than 12 months ago)' to the question, "How long has it been since you had your last mammogram?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). Only women were asked either of these questions. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>80</sup>
Percent of women having a pap test within the past year	BRFSS	2010	This measure is calculated by dividing the number of respondents over 40 years of age that responded 'Yes' to the following question: "A Pap test is a test for cancer of the cervix. Have you ever had a Pap test?" and responded 'Within the past year (anytime less than 12 months ago)' to the question, "How long has it been since you had your last Pap test?" (numerator), by the total number of question respondents – i.e., no 'Don't know'/ 'Refusals' (denominator). Only women were asked these questions. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>81</sup>

<sup>79</sup> Ibid.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

Measure	Data Source	Year	Definition
Percent (age 50+) having a colorectal screening within the past 3 years	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "Sigmoidoscopy and colonoscopy are exams in which a tube is inserted in the rectum to view the colon for signs of cancer or other health problems. Have you ever had either of these exams?," and responded 'Within the past year (anytime less than 12 months ago)' or 'Within the past 2 years (1 year but less than 2 years ago)' or 'Within the past 3 years (2 years but less than 3 years ago)' to the question, "How long has it been since you had your last sigmoidoscopy or colonoscopy?," by the total number of question respondents – i.e., no 'Don't know' / 'Refusals' (denominator). Only people 50 years of age and older were asked these questions. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>82</sup>
Percent of population - ever smoked	BRFSS	2010	This measure is calculated by dividing the number that responded 'Yes' to the following question: "Have you smoked at least 100 cigarettes in your entire life?" (numerator), by the total number of question respondents – i.e., no 'Don't know' / 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>83</sup>
Percent of population - current smokers	BRFSS	2010	This measure is calculated by dividing the number that responded 'Every day' to the following question: "Do you now smoke cigarettes every day, some days, or not at all?" (numerator), by the total number of question respondents – i.e., no 'Don't know' / 'Refusals' (denominator). Those responding 'Some days' were not counted as a current smoker. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>84</sup>
Percent of population with reported health status as "good" or better	BRFSS	2010	This measure is calculated by dividing the number that responded 'Excellent' 'Very good' or 'Good' to the following question: "Would you say that in general your health is --" (numerator), by the total number of question respondents – i.e., no 'Don't know' / 'Refusals' (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>85</sup>

<sup>82</sup> CDC, 2009.

<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Ibid.

Measure	Data Source	Year	Definition
<b>Dimension: Behavioral Risk Factor Surveillance System (BRFSS)</b>			
For those who reported at least one day of poor mental health, average # of days (in past month) with poor mental health	BRFSS	2010	This measure is calculated by averaging the response values of those respondents that provided a number to the following question: “Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?” Those responding 0 or ‘None’ were not included. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>86</sup>
For those who reported at least one day of poor physical health, average # of days (in past month) with poor physical health	BRFSS	2010	This measure is calculated by averaging the response values of those respondents that provided a number to the following question: “Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?” Those responding 0 or ‘None’ were not included. The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>87</sup>
Percent of population receiving a checkup within the past year	BRFSS	2010	This measure is calculated by dividing the number that responded ‘Within past year (anytime less than 12 months ago)’ to the following question: “About how long has it been since you last visited a doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition.” (numerator), by the total number of question respondents – i.e., no ‘Don’t know’/ ‘Refusals’ (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>88</sup>
Percent of population reporting exercise during the past month	BRFSS	2010	This measure is calculated by dividing the number that responded ‘Yes’ to the following question: “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?” (numerator), by the total number of question respondents – i.e., no ‘Don’t know’/ ‘Refusals’ (denominator). The county-level estimates were then weighted by the percent of the county population in the Beacon catchment area. <sup>89</sup>

<sup>86</sup> CDC, 2009.

<sup>87</sup> Ibid.

<sup>88</sup> Ibid.

<sup>89</sup> Ibid.