



2008 Middlesex Health System

Community Health Assessment

**A COMMUNITY HEALTH
ASSESSMENT FOR
MIDDLESEX COUNTY
CONNECTICUT**

PREPARED FOR AND DISTRIBUTED
AS A COMMUNITY SERVICE BY
MIDDLESEX HEALTH SYSTEM, INC.
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This document has been produced for the benefit of the community. When referenced, please use the citation provided. Middlesex Hospital encourages use of this report for planning purposes and is interested in learning of its utilization. We would appreciate your comments and questions, which may be directed to Catherine Rees, (860) 358-3034, catherine_rees@midhosp.org.

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I. INTRODUCTION

In 2007, Integrated Resources for the Middlesex Area, a subsidiary of the Middlesex Health System (MHS), commissioned the Center for Health Policy, Planning and Research (CHPPR) of the University of New England, to conduct an independent Community Health Needs Assessment (CHNA) for the MHS service area in south-central Connecticut. The primary goal of the study was to identify population and service needs of the Middlesex County area and to provide MHS with service planning information to expand its service base, serve community needs, and collaborate with partners to improve population health. An advisory committee of community members was assembled by Middlesex Hospital to assist in crafting and guiding the goals of the assessment process (see Appendix 1 for a list of members).

CHPPR, a health care research and consulting organization specializing in health services planning, designed and conducted the study, which covered Middlesex County, Middletown, and three peer counties: Litchfield, New London, and Tolland. The study utilized CHPPR's *Community and Institutional Assessment Process* (CIAP) methodology (Appendix 2). The CIAP is a comprehensive planning process that identifies salient health care related issues in the community through a systematic analysis of scientifically derived health indicators, input from local providers, and comparative and best practice information. Indicators were computed from an extensive set of secondary health-related data and a random sample community household telephone survey. Qualitative information is derived from interviews with providers and key stakeholders and from existing reports.

This report is intended to inform efforts to develop and/or organize health services to improve the short and long-term health of residents of the communities served by MHS. It lays the foundation for targeted health services planning for specific services in a community or across the service area. It also provides comprehensive information for strategic business planning for health care systems.

The CHNA findings reveal several priority health issues that if addressed appropriately, could lead to improvements in population health status. The study substantiates the need for continued coordinated efforts among health care providers to address chronic health conditions, mental health and substance abuse services, and integrated care services for older adults that affect the health and well being of the population and consume a significant portion of hospital resources.

II. OBJECTIVES

The five objectives of the CHNA for the MHS area were:

- Describe the health of populations residing in Middletown, Middlesex County and designated peer counties.
- Identify priority health service issues in those populations.
- Identify how priority health needs differ among subgroups of the population.
- Identify opportunities to improve the health status of these populations.
- Provide MHS with service planning information to expand its service base, serve identified community needs, and collaborate with partners to improve population health.

III. METHODS

Steps

The primary steps of the study were to:

- Define study regions
- Profile the demographic composition of regions
- Assess community health status through secondary data sources
- Develop a health status indicator profile and identify priority health issues
- Assess current services for priority health issues
- Develop a health services planning document
- Present findings to the funder and local stakeholders
- Produce and disseminate final planning report

Study Regions

The MHS service area includes two geographic areas: Middlesex County and the city of Middletown. Due to its large population, Middletown was examined separately from the County to identify priority issues that may be specific to the area. We also identified three peer counties with population, socioeconomic, and delivery system characteristics comparable to those found in Middlesex County for comparison purposes: Litchfield, New London, and Tolland counties. The counties were selected by applying a peer county algorithm that used socio-demographic characteristics of Middlesex County (i.e., total population, age distribution) as criteria for selection. Data representing the peer counties were derived at by summing the data from the three counties and then calculating the average for each indicator.

Comparisons to peer communities are generally more informative about the health needs of an area than are comparisons to the State or the nation because of greater similarities in the underlying drivers of health (poverty, income, education, age distribution, etc.) between peer communities. Major differences in disease patterns between the study regions and their respective peers are also more likely to be due to differences in disease burden and/or health care practices and resources rather than demographic differences. However, State and national comparisons are also presented to inform the reader when the study regions and peer counties are above or below expected standards. A listing of the towns within the peer counties is found in Appendix 3 and a map of the study areas is represented in Appendix 4.

In this report, the collective term ‘study areas’ or ‘study regions’ refers to Middletown, Middlesex County, the peer counties, and the State. Information about each area is highlighted when appropriate and contributes meaningful information to the analyses.

Health Indicator Data and Analysis

Health status refers to the present state of wellness or illness in a community. It is defined by indicators of beneficial and harmful health behaviors, the presence of symptoms and conditions indicative of illness and wellness, measures of the burden of illness in a community, the prevalence and incidence of specific diseases, and mortality. As health status is the most important factor driving the demand for health care services, the first step in this assessment was to describe the health status of the population in the study regions. To accomplish this, we

constructed and analyzed a comprehensive set of health and medical indicators for each of the regions (See Appendix 5 for the Health Status Profile). Most indicators were derived from public data sources, such as State birth and death records, hospital discharge databases, cancer registry data, Medicaid enrollment, unemployment records and the 2003-2005 Behavioral Risk Factor Surveillance System (BRFSS) survey (See Appendix 6 for a complete list of data sources and years). Discharge rates for reported conditions were calculated based on standard hospital ICD-9 codes (See Appendix 7 for a complete list of codes).

Survey data were cleaned and normalized prior to performing any analyses. Post-stratification weights were used to adjust for discrepancies between the age and gender composition of each region's survey sample and that of its population. These discrepancies were the result of participant non-response and gaps in telephone service.

From the data we computed several different classes of population health status indicators, including:

- Health-related demographic characteristics and population trends;
- Behavioral and medical risk factors and the presence of chronic disease and acute health episodes in the community (e.g., smoking, obesity, cardiovascular disease, cancer, respiratory health, diabetes, hospital admissions); and
- Characteristics of the health care delivery system for certain health-related conditions (e.g., prenatal care, behavioral health).

All indicators, unless otherwise noted, are expressed as either percents or rates per 100,000 people. For analysis purposes, we organized them by health issue (functional health, cardiovascular, reproductive) and evaluated them by specific age groups (e.g., 0-17, 18-44, 45-64, 65+) and by gender. Except where noted, we analyzed rates for specific age and/or gender groups as opposed to adjusting for age and/or gender differences from standard population rates. The former approach better reflects the disease burden and provides a more precise estimate of the health problems and service needs of a population. As such, it provides a stronger empirical foundation for health service planning.

Patterns in health indicators determine the priority health concerns in the service area. The CIAP approach incorporates information from many sources, including community survey data, secondary data sets, observations, and information provided during interviews to draw conclusions. Unlike other methodologies, the CIAP approach does not exclusively rely on findings of statistical significance of community-level differences in health status indicators to identify key health issues. For example, if a cancer incidence rate in one region is substantially lower (i.e., 10% or more) than that in a comparison community while the cancer mortality rate in that region is substantially higher, the presence of unmet needs for cancer screening is suspected. Likewise, when hospital admission rates for a particular disorder (e.g., diabetes) are low in a community while mortality rates for that disorder are high, a high use of secondary prevention practices is suspected.

Interviews

During the second phase of this study, interviews were arranged with community providers, health care providers and hospital administrators from across the service area to address the continuum of services associated with the priority health issues identified from the data. (See

Appendix 8A for a list of interviewees). The interviews provided an opportunity to identify public health and health care service issues that were not identified during quantitative analyses. The interviews were used to obtain service delivery information to explain the preliminary findings with individuals who have direct interest in the information and can further identify other service delivery issues for specific problems or categories of care. In October 2007, five group interviews were conducted at Middlesex Hospital by Dr. Ronald Deprez, the study's Principal Investigator. The interview sessions focused on priority health issues including geriatric care, behavioral health, emergency department (ED) issues, community health, and geriatric home-based services.

In addition, multiple hospital and community providers (see Appendix 8B) were consulted by MHS staff and subsequently provided information about the programs they offered to complete the community assessment. Their invaluable insight was appreciated and was critical in identifying linkages to care within the community.

Findings

The findings in this report are based on information discerned from both the quantitative indicators and qualitative information compiled for the assessment. For example, preventive health services are assessed based on screening and patterns of behavioral risk factors (e.g., smoking, insufficient physical activity, overweight); detection services are based on patterns of medical risks (e.g., prevalence of diagnosed hypertension), while treatment services are based on significant clinical outcomes (e.g., hospitalizations and deaths due to heart attacks). Findings are then evaluated in light of qualitative information about existing services derived from providers and residents. Recommendations regarding service need are developed only after integrating information from all sources. Useful explanatory notes and definitions that will clarify the findings presented in this report are included in Appendices 6 (data sources), 9 (definition of indicators) and 7 (defining codes).

The findings presented are meant to stimulate discussions among providers and the community regarding the prioritization of health care needs and service delivery changes required to better meet the needs of area residents. In general, the results of this assessment suggest that the health status of the population is good and the health care delivery system is accessible and of high quality.

IV. KEY HEALTH FINDINGS

POPULATION PROFILE AND DEMOGRAPHIC PROFILE

FINDINGS: The population profile of Middlesex County has not changed significantly since 2000. However, demographic changes suggest the population is aging in place with the number of middle age and older adults increasing and the number of younger residents decreasing. The continued shift in population is expected to place more demands on healthcare in the future.

- Between 2000 and 2006, the overall population of Middlesex County increased by 5.3% compared to 2.8% statewide. The population of Middletown and the three peer counties also increased 4.6% and 4.0% respectively.
- Population is aging in place across study regions. Largest increases since 2000 are among adults ages 45-64 (17%) and ages 85+ (19.6%). The demand for services from the 85+ age group is anticipated to place a larger strain on healthcare resources in the future.
- Race, ethnicity, and origin profile of Middlesex County remains relatively constant since 2000: Whites (89%), Blacks (4.6%), Asian (2.2%), American Indian (0.1%), and Hispanic origin (3.6%).

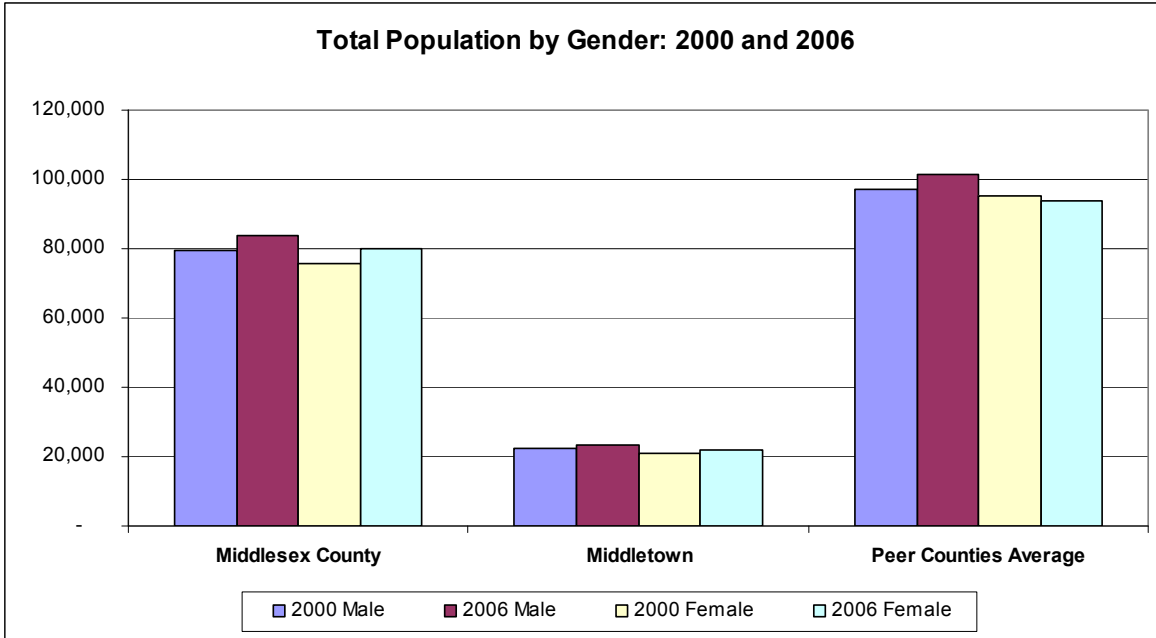
An understanding of the health of a community begins with a comprehensive analysis of demographic characteristics and trends. To accomplish this, CHPPR developed and analyzed a population profile of Middlesex County and the study regions based on 1990 and 2000 census data, current population estimates, and 5-year projections. Population and demographic data are also used throughout the assessment to better understand indicators of current disease burden and to more precisely project future service needs.

Population Profile

Middlesex County is located in southeastern Connecticut and supports a population of approximately 71,037 households. According to 2006 population estimates, 4.6% of Connecticut's population resides in Middlesex County, representing 163,774 adults and children. The county population density is estimated at 420 persons per square mile compared to a State average of 703 persons per square mile.

The population of Middletown accounts for 28% of the total population in Middlesex County with an estimated population of 45,230 residents. The peer counties of Litchfield, New London, and Tolland are similar sized and include a combined total of 601,552 residents. Figure 1 shows population estimates for 2000 and 2006 in each of the study regions.

Figure 1: Population Estimates 2000 and 2006

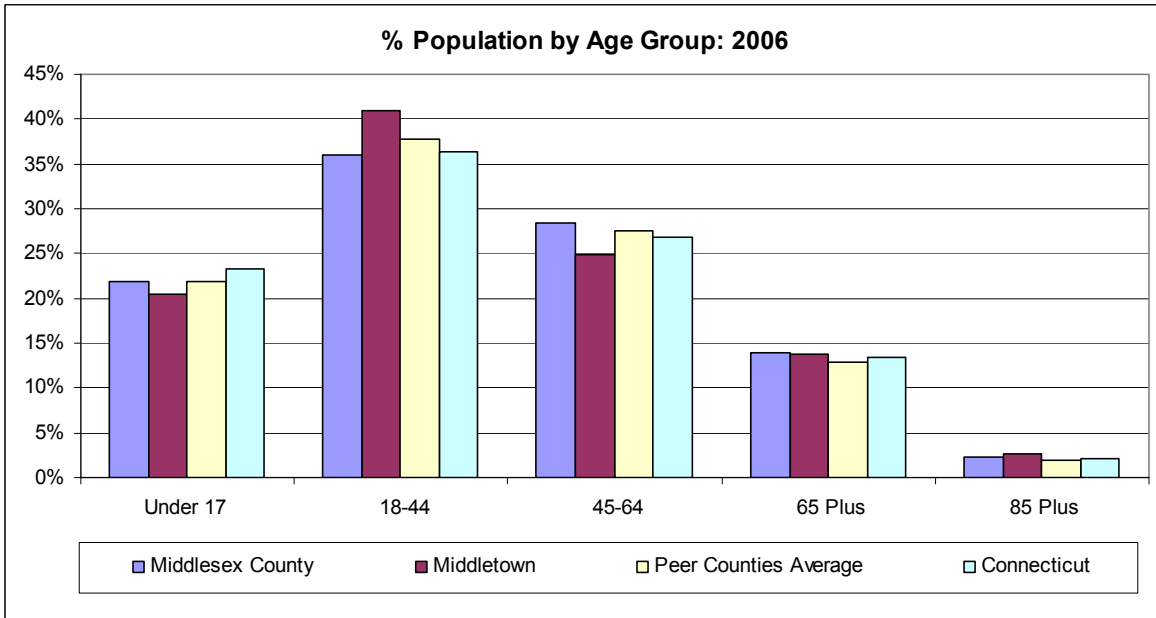


Source: US Census Data 2000; Census Projections 2006.

Population Growth

A community’s population growth can explain changes in community characteristics including health status. Between 2000 and 2006, the overall population of Middlesex County increased by 5.3% compared to 2.8% statewide. The population of Middletown and the three peer counties also increased 4.6% and 4.0% respectively. Population growth within each region can be attributed to increases within specific population age groups.

Figure 2: Population Estimates – Age Composition



Source: US Census Data 2000; Census Projections 2006.

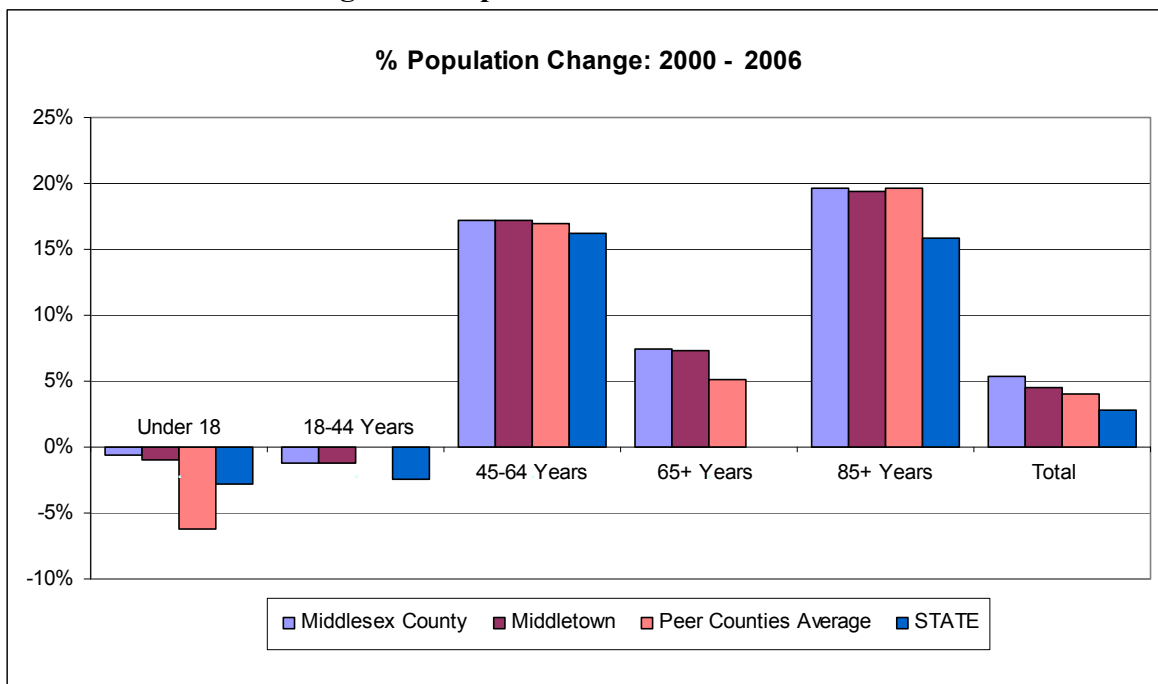
Age Composition

The age composition of a population represents its past fertility, migration and mortality patterns, and influences the prevalence and severity of disease within the population. It is therefore useful to examine age composition by study region and the respective projected changes over time.

U.S. Census population estimates for Middlesex County, the peer counties, and Connecticut indicate that the general population is aging in place, as illustrated in Figure 2. From 2000 to 2006, the size of the young population (ages 0-17) decreased as much as 6.2% within the study regions. Likewise, the number of adults ages 18-44 decreased 1.2% across Middlesex County and Middletown. The population remained relatively stable in the peer counties with an average decrease of less than 1%. U.S. Census projections project continued declines within both age groups through 2015.

Indications of population growth are first apparent among adults ages 45-64 (Figure 3). Middletown, Middlesex County, and the peer counties increased more than 17% from 2000 to 2006 compared to the State increase of 16.2%. Continued growth is projected in this age group between 2000 and 2015, with a projected growth of 36%.

Figure 3: Population Trends 2000 - 2006



Source: US Census Data 2000; Census Projections 2006.

While not increasing at the same rate of growth, the population of adults age 65 and older increased 7.4% within Middlesex County and Middletown, and 5.1% across the peer counties. Statewide, the change was less dramatic with an increase of less than 1%. Growth in the number of adults 65 and older will have significant implications on the health service delivery system as this group is more likely to develop chronic medical conditions requiring more consistent care.

The sub-group of adults age 85 and older within the study regions is also important to note. Although representing only 2.0% of the general population in the regions, it is rapidly growing. From 2000 to 2006, the 85+ population increased 20% in Middlesex County, 19.4% in Middletown, 19.7% in the peer counties, and 15.9% statewide. The demand for services from this age group is anticipated to place a large strain on healthcare resources in the future.

Race, Ethnicity, and Origin Profile

According to the Connecticut Health Foundation, disparities in health among racial and ethnic populations may be the most critical yet least understood health problem in Connecticut.¹ Disparities include differences in the incidence, prevalence, mortality, and burden of diseases among specific populations as well as their access to preventive and treatment services.^{2, 3} A vast body of research suggests factors such as socioeconomic conditions, health behaviors and environmental conditions interact with race, ethnicity and culture, which lead to disparities in health status and mortality. By 2050, the U.S. Census estimates that the percentage of Hispanics and Asian/Pacific Islanders in the U.S. is expected to double and nearly half of the U.S. population will be Hispanic, African American, Asian/Pacific Islander, and American Indian/Alaska Native.

The current racial and ethnic makeup of the communities of the study regions and changes in that makeup over time are expected to impact the burden of disease and demand for health services. According to the 2006 U.S. Census estimates, the population of Middlesex County is 89% White, 4.6% Black, and 2.2% Asian (Figure 4). An increasing number of residents are estimated to be of Hispanic origin (3.7%) compared to 3.0% in the year 2000. However, no reliable estimates of undocumented Hispanic residents are available although anecdotal evidence suggests their presence is affecting the health system in Middlesex County.

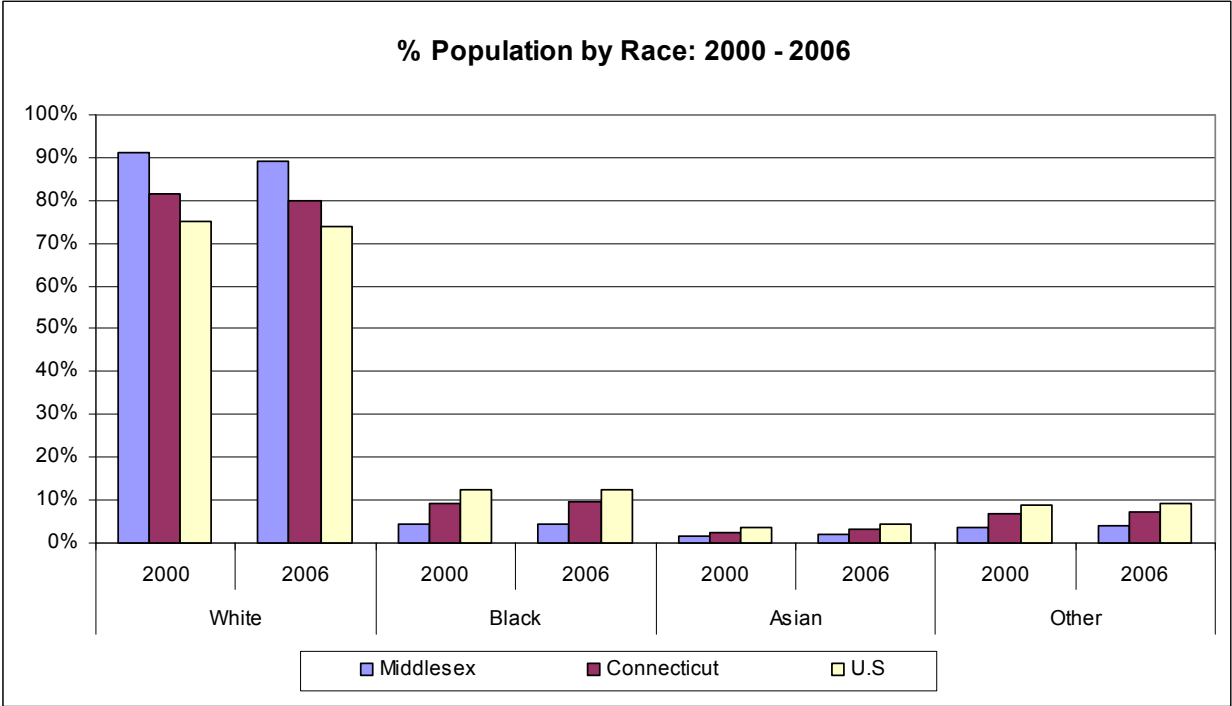
Population health status in the study regions can be expected to decline and the need/demand for health services can be expected to rise as total population, specifically the older adult population, grows. The increase in demand, however, will depend in part on the levels of acute and chronic disease in this population coupled with available resources for prevention, care management and linkages among community healthcare provider.

¹ Connecticut Health Foundation, *Pathways to Equal Health: Eliminating Racial and Ethnic Health Disparities in Connecticut*, Recommendations of the Connecticut Health Foundation's Policy Panel on Racial and Ethnic Health Disparities, March 2005.

² Agency for Healthcare Research and Quality, AHRQ Publication No. 05-0014. *2004 National Healthcare Disparities Report*. Rockville, MD. March 2005. <http://www.ahrq.gov>

³ Kaiser Family Foundation, *Key Facts: Race, Ethnicity, and Medical Care, June 2003 update*. <http://www.kff.org/minorityhealth/upload/Key-Facts-Race-Ethnicity-Medical-Care-Chartbook.pdf>

Figure 4: Racial Composition 2000 – 2006



Source: US Census Data 2000; Census Projections 2006.

HEALTH-BASED SOCIAL AND ECONOMIC CHARACTERISTICS

FINDINGS: More adults and families live below the poverty level in Middletown and Middlesex County than in the peer counties. Middletown also has the lowest rate of high school graduates yet Middlesex County has the highest rate of high school graduates. When compared to peer counties, Middlesex County has the highest level of uninsured adults (under age 65) and a higher rate of adults who do not seek health care due to cost.

- An estimated 7.5% of single adults in Middletown currently live below the Federal Poverty Level (FPL) of \$9,800 per year and 3.5% of families in the area live below the FPL.
- Middlesex County has the lowest rate of adults under age 25 without a high school diploma (11.0%) followed by 13.2% in the peer counties and 15.7% in Middletown. A slightly higher rate occurs statewide at 15.9%.
- Health insurance coverage for adults under age 65 range from an uninsured rate of 9.5% in the peer counties to 11.5% in Middlesex County.
- In Middlesex County, 34% of uninsured adults (under age 65) cannot identify a usual source of care, compared to 7.6% of adults with insurance.
- In Middlesex County, males (13.2%) are more likely to report not having a regular source of care than females (8.3%); a difference which is consistent with the peer counties, State, and national levels.

The health of communities is shaped in part by geographic location, the local health system resources and the practice patterns of providers. In addition, factors such as income, employment, educational attainment, and insurance status have been associated with the health status of a population.⁴ Thus, it is important to understand the socioeconomic conditions of a region in order to understand the health and well being of residents. Socioeconomic measures used in this report include income level, educational attainment, employment status, and health insurance coverage.

Income and Poverty

The average annual household income found within the study regions is relatively consistent, represented by a range of \$47,162 in Middletown to \$59,414 in Middlesex County. Poverty levels for individuals living in Middlesex County and the peer counties are also relatively consistent. According to 2006 U.S. Census estimates, 7.5% of Middletown's single adults live below the Federal Poverty Level (FPL) of \$9,800 per year. Similarly, 7.4% of single adults in Middlesex County were estimated to live in poverty, as were 6% in the peer counties, 8.3% across the State, and 13% nationally. The U.S. Census also estimates that approximately 3.5% of families (of undetermined size) in Middletown live below the FPL.

⁴ Mackenbach JP, Kunst AE, Groenhof F. et. al. "Socioeconomic inequalities in mortality among women and men: An international study." *American Journal Public Health* 1999; 89:1800-1806.

High School Diploma

Educational attainment is an important indicator of future success. Middlesex County has the lowest rate of adults under age 25 without a high school diploma (11.0%) followed by 13.2% in the peer counties and 15.7% in Middletown. A slightly higher rate occurs statewide at 15.9%. Individuals who earn a high school diploma are more likely to have better employment opportunities and earn a higher income. Limited employment opportunities generally correlate with lower household incomes resulting in a lower quality of life in areas such as access to health care.

Uninsured Rates

People who do not have health insurance face health risks associated with inconsistent and inadequate care and the financial risk of large medical bills. The number of uninsured persons in an area contributes disproportionately to the community's burden of disease and disability because health insurance is a resource that can enable access to health care. The Kaiser Commission on Uninsurance and Medicaid,⁵ reported that the uninsured receive fewer preventive and diagnostic services, tend to be more severely ill when diagnosed, and receive less therapeutic care. Therefore, the health of the community may be compromised when high percentages of the population are uninsured.

Because of Medicare, few elders are uninsured. Therefore, an assessment of access to care and insurance must focus on uninsured rates for the population under 65 years of age. Among adults younger than 65 years old and living in Middlesex County and the peer counties, between 9.5% and 11.5% are currently uninsured. This range is relatively consistent with the State average (11.4%) and slightly lower than the national average (16%).

Insurance status has a significant impact on whether individuals report a usual source for receiving health care. In Middlesex County, 34% of uninsured adults (under age 65) report not having a usual source of care, compared with 7.6% of those with insurance. Additionally, in Middlesex County, 13.2% of males do not have a regular source of care, compared with 8.3% of females. The difference between sexes remains prevalent across peer counties, State, and national levels.

⁵ Hadley J. Sicker and Poorer: The Consequences of Being Uninsured. Kaiser Commission on Medicaid and the Uninsured. May 2002. Institute of Medicine. Care without Coverage: Too Little, Too Late. May 2002.

ACCESS TO CARE

FINDINGS: Access to care in Middlesex County is good. More adults in Middlesex County have a personal doctor or health care provider than in the peer counties and the State. Vaccination rates also exceed peer counties and State rates. Barriers to care include lack of health insurance coverage and cost for middle aged adults.

- Currently 89% of adults in Middlesex County have a personal doctor or health care provider, compared with 87% in the peer counties and the State, and 80% nationwide.
- In Middlesex County, 11.9% of adults reported not having a physical exam within the past 2 years; 56% of whom do not have health insurance coverage.
- Cost of care is a problem across all age groups, but more of a deterrent for adults ages 18-44 who are uninsured (13.1%).
- Almost half (47%) of uninsured adults (under the age of 65) did not seek medical care because of the high costs associated with seeking help.
- Over 74% of adults over the age of 65 received influenza vaccines in Middlesex County and the State, compared to 49% in the peer counties.

Access to health care is critical for early diagnosis and treatment of medical conditions. Predictors of access include social and economic indicators mentioned in the previous section. Indicators of access also address regular physical exams, having a usual source of care, cost of care barriers, vaccination rates, and ED visits and hospitalization rates.

Regular physical exams

In Middlesex County, 11.9% of residents reported not having a physical exam within the past 2 years, a comparable rate to peer counties (12.7%) and the State (13.3%). In Middlesex County, the rate increased among those without health insurance coverage (56%) confirming that the uninsured are somewhat less likely to receive preventive care. Among the uninsured, women were more likely to have a physical in the last two years (77%) than men (68%). Comparative rates can be found in the peer counties.

Usual source of care

Approximately 89% of adults in Middlesex County have a personal doctor or health care provider, compared with 87% in the peer counties, 87% across the State, and 80% adults nationally. A national objective for *Healthy People 2010* is that 96% of U.S. adults report having a usual source of care by 2010.⁶ Middlesex County is approaching this goal and surpassing peer counties, the State and nation in this measure. A breakdown of males and females who do not report a usual source of care is provided in Table 1.

⁶ U.S. Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington, DC: U.S. Government Printing Office, November 2000. <http://www.healthypeople.gov/>

Table 1: Usual Source of Care

	Middlesex County	Peer Counties	Connecticut	US
% Without primary doctor or health care provider	10.6	12.7	13.2	20.4
Males	13.2	17.8	17.3	25.8
Females	8.3	7.8	9.4	15.3

Source: BRFSS 2003-2005

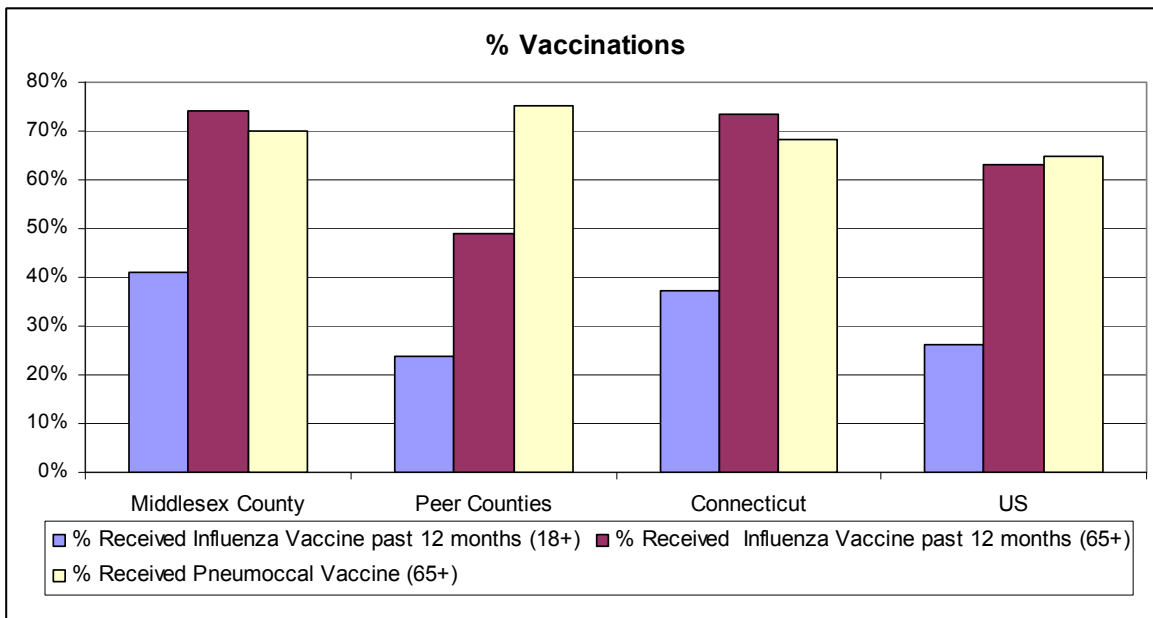
Cost of Care

In Middlesex County, an estimated 9.5% of adults do not seek medical care due to cost. This rate is higher than peer counties (7.5%) and slightly higher than State estimates (9.2%). Barriers to cost are a problem across all age groups, but more of a deterrent for adults in the group of 18-44 who are uninsured (13.1%). Almost half (47%) of uninsured adults (under the age of 65) did not seek medical care because of the high costs associated with seeking help.

Vaccination

Vaccination for pneumonia and influenza is critical for older adults (65+), the age group that is most likely to be susceptible to poor outcomes from respiratory infections. Over 74% of adults over the age of 65 received influenza vaccines in Middlesex County compared to 49% in the peer counties and 74% across the State. Pneumococcal vaccines were obtained by 70% of adults over age 65 in Middlesex County, slightly behind the 76% coverage in the peer counties, and slightly ahead of the 68% across the State. The vaccination rates fell short of the *Healthy People 2010* objective of 90% of U.S. adults over the age of 65 immunized against influenza and pneumonia. Figure 5 provides a comparison in vaccination rates between adults of all ages and adults age 65 and older.

Figure 5: Influenza and Pneumoccal Vaccination Rates



Source: BRFSS 2003-2005, US Census Population Data.

ED Visits/Hospitalizations for ACS Conditions

The rate of hospital admissions and emergency department (ED) visits for ambulatory care sensitive (ACS) conditions is also considered an indicator of primary care access and health quality in a population. ACS conditions (See Appendix 9) are less likely to result in hospitalizations when treated on an outpatient basis with high quality primary medical care and patient adherence. High rates of hospitalizations/ED visits for ACS conditions may be indications that access to and/or quality of primary care in a region needs to be improved. High rates may also be due to poor underlying health status (disease prevalence) in a population, since a higher than expected prevalence of disease can account for elevated ACS hospitalization rates.

The residents of Middletown and Middlesex County who have ACS conditions are accessing medical care and support to help keep their conditions under control. Middlesex County has the lowest rate for all ACS-related ED visits in the study region (2,758 per 100,000), slightly less than the rate reported by the State (2,970/ 100,000) and 20% less than reported by the peer counties (3,449/100,000). Geriatric patients (ages 65+ and 85+) appear to be the primary consumers of ACS-related ED services in Middlesex County.

In Middletown, the ACS-related ED rate was higher than the county and State rates (3,098/100,000). The high ED rates in Middletown suggest that patients are using the ED for primary care. This may be a result of having limited access to primary or specialty care or that care through the ED is more accessible or desirable than community-based care. Yet, despite the high rate of ACS-related ED visits in Middletown, the ACS-related in-patient hospital admission rate was lowest in Middletown (885/100,000) compared to the other regions, and the rates for Middlesex County remained far below those of the peer counties and the State (Table 2). The exception is ACS-related pediatric admissions which are high.

**Table 2: ACS Hospital Admission and ED Visit Rates: Selected Conditions
(Per 100,000)**

	Middletown	Middlesex County	Peer Counties	CT
ACS ED Visits	3,098	2,758	3,446	2,970
ACS Hospital Admissions	885	981	1,205	1,443
ACS Respiratory Hospital Admissions	267	546	675	749
ACS Cardiovascular Hospital Admissions	595	502	579	662
ACS Pediatric Hospital Admissions	338	334	107	133

Source: ChimeData – Connecticut Hospital Association, 2004- 06

Routine and regular care appears to be accessible and utilized by a large majority of residents of the study regions. However, efforts to increase access to primary care within Middletown and among geriatric patients would reduce burden on local emergency departments.

CHRONIC DISEASE BURDEN AND POPULATION WELLNESS

FINDINGS: Based on the CHPPR Wellness profile, adults in Middlesex County are in good health.

- Based on the CHPPR Wellness Profile, 47% of adults in Middlesex County are rated as being well, 11% are at risk for future problems, 40% have some health problems, and 4.4% are not well.
- Approximately 18% of the adult population in all of the study regions are current smokers.
- Approximately 18% of the adult population can be classified as obese.
- More than 25% of adults in Middlesex County and the peer counties reported having at least one of the following chronic conditions: high blood pressure, high cholesterol level, or diabetes.
- Among adults in Middlesex County with high blood pressure 70% are obese, 26% live sedentary lifestyles, and 15% smoke cigarettes. The profile of adults with diabetes is even more serious: 79% are obese, 51% live sedentary lifestyles, and 31% smoke cigarettes. Almost 25% of adults with asthma continue to smoke and 31% of adults with high cholesterol levels are physically inactive.

We used two measures to evaluate the disease burden and overall wellness in the population. These include:

- Chronic disease burden: the percentage of the population with three or more diagnosed chronic health conditions.
- Community wellness profile: a composite measure based on diagnosed chronic health conditions, medical risks, health risk behaviors, and health functioning.

Chronic Disease Burden

More than 25% of adults in Middlesex County and the peer counties reported having at least one of the following chronic conditions: high blood pressure, elevated cholesterol levels, or diabetes. In Middlesex County, over 10% reported having two of the conditions, and 2% reported being diagnosed with all three conditions. Additionally, adults with multiple chronic diseases tend to exhibit significant risk factors, such as smoking and being overweight. Weight control is a pervasive problem across each of the study areas. Over 34% of the adult population in each area is overweight and over 18% are obese. Likewise, current smokers include approximately 18% of the adult population in each study region.

The presence of risk factors causes increased health risks for adults with chronic conditions. In Middlesex County, among adults with high blood pressure, 70% are obese, 26% live sedentary lifestyles, and 15% smoke cigarettes. The profile of adults with diabetes is even more serious: 79% are obese, 51% live sedentary lifestyles, and 31% smoke cigarettes. Almost 25% of adults with asthma continue to smoke and 31% of adults with high cholesterol levels remain physically inactive. People with multiple chronic conditions utilize many health-related services and

therefore are important to consider when doing community health planning. To help address the health profile of a community, the wellness profile was developed to account for concurrent chronic conditions.

Wellness Profile

CHPPR developed a population wellness profile that integrates data on diagnosed chronic illnesses (diabetes), medical risks (hypertension, hypercholesterol), health risk behaviors (overweight, smoking), and self-reports of health and health functioning into a composite measure of overall health. It classifies people into one of four mutually exclusive categories of wellness:

- **Well:** Individuals with no diagnosis of diabetes, hypertension or hypercholesterolemia and no signs of disease symptoms, and have a favorable behavioral and medical risk profile for chronic disease.
- **At risk for future medical problems:** Adults age 35 and over who are either current regular cigarette smokers and/or overweight according to body mass index.
- **Some health problems that require ongoing medical attention:** Individuals who self-report fair or poor health, reduced functional health, and have a diagnosis of diabetes, hypertension, and/or hypercholesterolemia.
- **Not well:** Individuals with multiple chronic conditions, reduced functional health, and reported fair or poor health.

The wellness profile is particularly useful for planning because both health risks and the presence of disease are important predictors of health service utilization as well as need. It also has value in its parsimony since it integrates multiple dimensions of health into a single, overall measure of health status. In creating the profile, three or more chronic diseases were used as indicators of chronic disease burden in the population.

Table 3. Middlesex County Wellness Profile

Wellness Indicator	Sex		Age			Have Health Insurance?		Have Usual Source of Care?	
	Male	Female	18-44	45-64	65+	Yes	No	Yes	No
Well	45%	48%	65%	35%	21%	46%	48%	44%	53%
At risk for problems	11%	12%	11%	16%	1.2%	10%	21%	11%	9.7%
Some health problems	40%	36%	23%	43%	67%	39%	31%	41%	29%
Chronically ill or not well	4.1%	4.7%	1.0%	5.6%	10%	4.9%	0	4.4%	8.5%

Source: BRFSS 2003-05.

Overall, the wellness profile suggests that continued prevention, screening, and treatment initiatives are needed to reduce at risk behaviors and minimize the impact of chronic disease in the population. Table 3 includes a breakdown of Middlesex County’s Wellness Profile.

FUNCTIONAL HEALTH STATUS

FINDINGS: Middlesex County has the most favorable functional health status among the study areas with fewer adults reporting their health as fair or poor.

- Middlesex County has the most favorable functional health profile among the study regions, with the lowest rates of poor physical and mental health and functional impairment.
- 10.9% of adults in Middlesex County reported their health as ‘fair or poor’, a level slightly lower than the State rate of 12% and similar to the peer counties’ rate of 11%.
- 7% of adults in Middlesex County report losing 11 or more days a month to poor physical health and slightly more (7.7%) to poor mental health. Middlesex County rates are 2% below rates identified in the peer counties and the State.
- Adults with 2 chronic diseases frequently reported reduced daily functioning for 11 or more days a month due to physical health problems (29%) or mental health problems (17%).

Self-reported health status is an important indicator of functional health status because it correlates with objective health status, a key driver in the demand for health care services. When survey respondents were asked to rate their health as *excellent, very good, good, fair, or poor*, 10.9% of adults in Middlesex County reported their health was fair or poor, a level slightly lower than the State rate of 12% and similar to the peer counties’ rate of 11%.

In recent years, the concept of functional health status has shifted focus from self-reported health status and identifying diseases and conditions, to recognizing abilities and limitations in activities of daily living and carrying out socially defined tasks or roles.⁷ Limitations in functional health (physical and mental) caused by one or more health conditions that result in poor mental or physical health and can be expressed as ‘days lost’.

When asked to report the number of days lost in the past month to poor physical or mental health, 7% of adults in Middlesex County report losing 11 or more days a month to poor physical health and slightly more (7.7%) to poor mental health. Middlesex County rates are 2% below rates identified in the peer counties and the State, and 3% lower than the nation.

The effect of multiple health conditions on functional health status is a problem for adults in Middlesex County. Not surprisingly, more than three times as many adults with three chronic conditions indicated that some of their daily activities were limited due to health problems compared to those without any chronic conditions (40% vs. 12%). Additionally, 9% who were considered *at risk for future health problems* were also limited in their daily activities by a health

⁷ Institute of Medicine, Board on Health Care Services. *The Dynamics of Disability: Measuring and Monitoring Disability for Social Security Programs*. Washington, D.C. 2002

problem. Adults with two chronic diseases reported reduced daily functioning for 11 or more days a month due to physical health problems (29%) or mental health problems (17%).

The effects of multiple conditions continue to impact functional health status and continue to place avoidable demands on the healthcare system. Taken together, these findings support a continued need to support and enhance treatment and rehabilitative services for residents who suffer from one or more chronic diseases.

V. KEY FINDINGS FOR SPECIFIC AREAS OF HEALTHCARE

CARDIOVASCULAR HEALTH

FINDINGS: Risk factors for cardiovascular disease are similar across study regions, with higher rates of hypertension and hypercholesterol found in Middletown. Hospitalization rates for congestive heart failure, acute myocardial infarction, and cerebrovascular disease are highest in Middletown while hospitalization and mortality rates are lowest in Middlesex County.

- Risk factors associated with cardiovascular disease (smoking, obesity and/or diabetes) are comparable, but slightly lower in Middlesex County compared to the peer counties and the State.
- Rates for hypertension and hypercholesterol are slightly higher in Middlesex County than in the other study areas. Nearly 68% of adults in all areas report having their cholesterol checked during the past year.
- Approximately 3.2% of adults in Middlesex County and 3.6% of adults in the peer counties reported having a diagnosis of heart disease, which is slightly less than the 4.1% of adults diagnosed within the State.
- The hospitalization rates for congestive heart failure, acute myocardial infarction, and cerebrovascular disease in Middletown exceed hospitalization rates for these conditions in other study areas.
- Hospitalization and mortality rates are lowest in Middlesex County.

Cardiovascular disease (CVD) is the number one cause of death in the United States.⁸ It is a category of disorders affecting the heart and blood vessels, and includes coronary heart disease, diseases of the heart, atherosclerosis, hypertension, and cerebrovascular disease (stroke). Behavioral and medical risks for CVD include smoking, physical inactivity, overweight, hypertension, and diabetes. The prevalence of these risk factors was similar across the study regions, as were indicators of disease morbidity and mortality.

Behavioral Risks

Cigarette smoking is widely regarded as the single most preventable cause of disease and death in the United States. Comparable current smoking rates in Middlesex and the peer counties (18%) were slightly higher than the State (16.5%) rates but lower than the national average (20.4%). Despite being lower than the national average, current smoking rates in Connecticut and Middlesex County remain higher than the national *Healthy People 2010* goal of <12%.⁹ Although measures of physical activity are unremarkable in the study regions, risks related to

⁸ Centers for Disease Control, National Center for Health Statistics, Hyattville, MD. Retrieved from <http://www.cdc.gov/nchs/>

⁹ U.S. Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington, DC: U.S. Government Printing Office, November 2000. <http://www.healthypeople.gov/>

being overweight are a concern. Over 18% of adults in Middlesex County reported living a sedentary lifestyle (measured by no physical activity), and 27.2% of them were adults over the age of 65. Being overweight also affects one third (33%) of all adults in Middlesex County, of whom 16% are current smokers.

Medical Risks

The prevalence of physician-diagnosed hypercholesterol and hypertension is slightly higher in Middlesex County (34% and 28% respectively) than the peer counties (28% and 25%). In both areas, nearly 68% of adults indicated having their cholesterol levels checked during the past year. When the health profile of Middlesex County is viewed as a whole, high prevalence rates become less alarming because the aggressive disease detection efforts in the region result in higher prevalence rates. As more residents are screened, reports of medical conditions increase.

Diabetes is a known complicating factor for cardiovascular disease. The prevalence of diabetes in Middlesex County is estimated at 6.8% of the adult population. As the risk for cardiovascular disease increases, so does the prevalence of diabetes. Among older adults (ages 65+) who are more likely to be diagnosed with cardiovascular disease, the prevalence of diabetes also increases. The lowest rate among older adults is found in Middlesex County (12.1%), followed by the peer counties (12.7%), and the State (16.6%).

Healthcare

Approximately 3.2% of adults in Middlesex County and 3.6% of adults in the peer counties reported having a diagnosis of heart disease which is slightly less than the 4.1% of adults diagnosed within the State. The burden of heart disease was most apparent in Middletown, where hospitalization rates for adults (ages 45 and older) with congestive heart failure, acute myocardial infarction, and cerebrovascular disease exceeded hospitalization rates in Middlesex County and the peer counties. As might be expected, the hospitalization rates for adults ages 85 and older accounted for a significant portion of hospitalizations in all regions, accounting for 40% of hospitalizations for adults ages 65 and older.

A comparison of hospital admission rates with mortality rates for corresponding cardiovascular diagnoses indicate that the healthcare system within Middlesex County is better able to handle cardiovascular conditions than the other study regions. Reduced hospitalization rates and lower mortality rates suggest that effective strategies are in place to provide patients with treatment and services to manage their conditions.

There is a continuing need to support and expand primary prevention activities to reduce behavioral and medical risks and continued secondary prevention to improve health status of patients with cardiovascular disease.

RESPIRATORY HEALTH

FINDINGS: Middlesex County has a good respiratory health profile. More smokers have quit smoking and Middlesex County has lower hospitalization rates for asthma and COPD than in the peer counties and the State.

- The prevalence of current smoking in the study regions was comparable (18%).
- 33% of adults in Middlesex County reported being former smokers, followed by 30% within the peer counties and 31% across the State.
- Smoking is almost equal among males and females in Middlesex County (19% vs. 17%) and the peer counties (18% for both).
- Prevalence of asthma among adults is comparable (9%) across Middlesex County, the peer counties, and the State.
- Only 3.7% of adults with asthma in Middlesex County went to the ED for treatment of their condition in the last 12 months compared to 17% in the peer counties and 14% in the State.
- The hospitalization rate for asthma in Middlesex County (45 per 100,000) was markedly lower than the peer counties (88 per 100,000) and the State (124 per 100,000).
- In Middlesex County, ED visit rates for COPD (478 per 100,000) were lower than the peer counties (570 per 100,000) yet much higher than the State (374 per 100,000).
- The mortality rates for COPD are lowest in Middletown (38 per 100,000) yet comparable to Middlesex County and the peer counties (both 47 per 100,000) and the State (41 per 100,000).

Behavioral Factors

Smoking is a risk factor for many respiratory diseases including asthma, lung cancer, chronic obstructive pulmonary disease (COPD),¹⁰ emphysema and bronchitis. Current and former smoking levels are therefore important indicators of the risk for respiratory disease in a community. Current smoking rates were comparable across the study regions: Middlesex County (18.2 %), peer counties (18.3%) and the State (17.7%). One third of the Middlesex County population reported being former smokers, followed by 30% within the peer counties and 31% across the State. While national data on cigarette smoking indicates that males generally smoke more than females (22.5% vs. 18.3%), both sexes appear to engage in smoking almost equally in Middlesex County (18.8% and 17.1%) and the peer counties (18.4% and 18.2%).

¹⁰ Chronic Obstructive Pulmonary Disease (COPD) refers to a permanent condition of lung disease with the presence of chronic bronchitis and/or emphysema that has led to the development of an airway obstruction. COPD (chronic bronchitis, emphysema, chronic airway obstruction) is thought to result from direct interaction of lung tissue with environmental agents, of which tobacco smoke is the most significant; cigarette smoking is thus the strongest risk factor for COPD.

Medical Factors

Utilization rates for clinical preventive services related to respiratory health were generally favorable in all study regions. The vaccination rate for pneumococcal vaccines among adults age 65 and older was higher in the peer counties (76%) than Middlesex County (70%) and the State (68%). Influenza vaccination rates of older adults were highest in Middlesex County and the State with rates of 74%. However, both vaccination rates continue to fall short of the *Healthy People 2010* goal of 90%.¹¹

Nine percent of adults in Middlesex County and the peer counties reported being diagnosed with asthma, with up to 56% having been diagnosed during childhood. ED visit rates for bronchitis and asthma in patients of all age groups were similar across the study regions but lowest in Connecticut (965 per 100,000) and highest in Middletown (1,120 per 100,000). Yet, hospital rates for asthma were nearly twice as high in Connecticut (124 per 100,000) as in Middletown (63 per 100,000) and nearly three times higher than Middlesex County (45 per 100,000). Middlesex County also had the lowest hospitalization rates for each age group, including older adults (ages 65+) and the oldest of old (ages 85+).

Treatment for most patients with respiratory problems can be effectively managed on an outpatient basis. Only 3.7% of adults with asthma in Middlesex County went to the ED for treatment of their condition in the last 12 months compared to 17% in the peer counties and 14% in the State. Likewise, the hospitalization rate for asthma in Middlesex County (45 per 100,000) was lower than the peer counties (88 per 100,000) and the State (124 per 100,000).

Like other ACS conditions, COPD is preventable (See Appendix 9 for a more detailed explanation of ACS conditions). The main risk factor associated with COPD is smoking with the effects of smoking lasting long after smoking cessation. In Middlesex County, approximately 18% of adults are current smokers and 33% are former smokers putting more than half of the adult population at risk for COPD. However, since prevalence data on COPD is not currently collected, creating a current profile of the condition is challenging.

In Middlesex County, ED visit rates for COPD (478 per 100,000) were lower than the peer counties (570 per 100,000) yet much higher than the State (374 per 100,000). However, Middlesex County had the lowest hospitalization rate (130 per 100,000) compared to the peer counties (176 per 100,000) and the State (160 per 100,000). The mortality rates for COPD are lowest in Middletown (38 per 100,000) yet comparable to Middlesex County and the peer counties (both 47 per 100,000) and the State (41 per 100,000). Without having knowledge about COPD prevalence rates, drawing conclusions about ED, hospitalization, and mortality rates remains speculative. Data may indicate that current treatment strategies in Middlesex County are effective in managing COPD and reducing the need for hospitalizations. However, additional focus on improving current interventions is warranted.

Finally, cancers of the lung were more common among men with incidence rates ranging from 71 per 100,000 in Middlesex County to 90 per 100,000 in Middletown. Conversely, incidence

¹¹ U.S. Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington, DC: U.S. Government Printing Office, November 2000. <http://www.healthypeople.gov/>

rates for women were slightly lower ranging from 59 per 100,000 in Middletown to 73 per 100,000 in Middlesex County. Mortality rates remained comparable throughout the regions and ranged from 57 to 66 per 100,000 for men and 50 to 59 per 100,000 for women.

The respiratory health profile of Middlesex County is good and indicates that some disease management strategies are in place. Enhanced care may be useful in reducing hospitalizations for respiratory conditions and to improve the health status of patients with pulmonary disease.

REPRODUCTIVE HEALTH

FINDINGS: Maternal and infant health is favorable in Middletown and Middlesex County. Even though teen birth rates are highest in Middletown, babies born to teen mothers in Middletown have better birth outcomes than in the other study areas.

- Teen birth rates are highest in Middletown (4.2 per 1,000) compared to Middlesex County (1.7 per 1,000) and the peer counties (2.4 per 1,000).
- The rate of babies born with birth weights less than 2,500 grams was markedly lower in Middletown (0 per 1,000) and Middlesex (2.6 per 1,000) compared to the State (8 per 1,000) and the peer counties (9 per 1,000).
- The rate of babies born before 37 weeks gestation was again lower in Middletown (13 per 1,000) and Middlesex County (15 per 1,000) compared to the peer counties (19 per 1,000) and the State (18 per 1,000).
- Prenatal care was rated as adequate (using the Kessner Index) for 86% of teen and adult mothers in Middlesex County.
- Antepartum hospitalization rates were highest in Middletown for teen mothers (37.7 per 100,000) and adult mothers (446.2 per 100,000). The lowest rates were found in Middlesex County among teen mothers (17 per 100,000) and adult mothers (327 per 100,000).
- The effectiveness of antepartum hospitalizations was indicated by low neonatal mortality rates of 4-5 deaths per 1,000 across the study areas.
- Rates of Cesarean-section deliveries in Middletown and Middlesex County were (31 per 100 births) and not substantially different from the peer counties (28 per 100 births).

Teen pregnancy is a key indicator of the reproductive health of a community because adolescents who become pregnant are less likely to obtain adequate prenatal care and typically are not emotionally ready for parenting. However, teen pregnancy did not appear to be a priority health issue in the study areas.

The teen birth rate for Middletown (4.2 per 1,000) was higher than Middlesex County (1.7 per 1,000) and the peer counties (2.4 per 1,000) but below the State teen pregnancy rate (5.1 per 1,000).

The implementation of teen prenatal programs that provide education and care for mother and child have likely contributed to good birth outcomes in Middletown and Middlesex County. For example, the rate of babies born with birth weights less than 2,500 grams was markedly lower in Middletown (0 per 1,000) and Middlesex (2.6 per 1,000) compared to the State (8 per 1,000) and the peer counties (9 per 1,000). The rate of babies born before 37 weeks gestation was again lower in Middletown (13 per 1,000) and Middlesex County (15 per 1,000) compared to the peer counties (19 per 1,000) and the State (18 per 1,000). While current teen prenatal programs appear to have a positive influence on teen pregnancies, data continues to indicate ongoing support is still needed.

Having access to adequate prenatal care throughout pregnancy is related to good birth outcomes for pregnant woman of all ages. Over 91% of pregnant women in Middlesex County received prenatal care in their first trimester, compared to 88% in Middletown, and 87% Statewide. Each study area also scored favorably on the Kessner Index, a measure of prenatal care adequacy. The Kessner Index is based on the number of prenatal care visits that a woman receives in relation to the duration of her pregnancy and the age of the fetus at the time of the first visit. It classifies prenatal care as being adequate, intermediate, or inadequate (See Appendix 9 for a complete explanation of the Kessner Index). Based on the Kessner Index, programs targeting teens in Middlesex County provided 86% of teen mothers with adequate care, 14% with intermediate care and none with inadequate care. Prenatal care for in Middlesex County was also identified as adequate for 86% of adult pregnant mothers compared to 82% across the State.

High risk pregnancies that resulted in antepartum hospitalizations occurred more frequently among adult mothers than teen mothers across each of the study regions. Middletown had the highest antepartum hospitalization rates for adult mothers (446.2 per 100,000) and teen mothers (37.7 per 100,000). The lowest antepartum hospitalization rates were found in Middlesex County among adult mothers (327 per 100,000) and teen mothers (17 per 100,000). Antepartum hospitalizations can be effective in reducing neonatal deaths which were low across the study areas (4-5 deaths per 1,000). Likewise, infant deaths remained low across the study regions at 6-7 deaths per 1,000.

Rates of Cesarean-section deliveries in Middletown and Middlesex County are comparable (31 per 100) but not substantially different from the peer counties (28 per 100).

Overall, reproductive health status indicators are favorable in Middletown, Middlesex County and the peer counties.

CANCER HEALTH

FINDINGS: More adults in Middlesex County were screened for cancers (i.e., colonoscopy, mammograms) than adults in the peer counties. However, differences among cancer incidence and mortality across the study areas were unremarkable.

- 72% of women in Middlesex County (ages 40+ and 50+) reported undergoing a diagnostic mammogram during the last year, exceeding the rate of women living in the peer counties by nearly 10% while matching State levels.
- Screening for cervical cancer was comparable across the study regions with 88% of women undergoing a pap test in the last 2 years.
- 96% of adults age 50 and older in Middlesex County reported having a colonoscopy in the last 5 years compared to 88% in the peer counties and 87% in the State.
- Over 90% of men ages 50 and older in Middlesex County and the peer counties received a prostate specific antigen (PSA) test in the last two years and over 80% reported undergoing a digital rectal exam.
- Breast cancer detection rates at the local stage were comparable across the study areas and ranged from 49-56 %.
- Middletown and Middlesex County has the lowest incidence rate for cervical cancer (4 per 100,000) compared to the peer counties and State (7 per 100,000).
- The incidence of colorectal cancer (CRC) is similar among males and females.
- Mortality rates for all cancers were comparable across the study areas ranging from 191-211 per 100,000.
- The mortality rate of smoking-related cancers was also similar across study regions, ranging from 125 -134 cases per 100,000.

Cancer is a leading cause of death nationwide. The types of cancers selected for inclusion in this assessment were chosen based on high incidence rates, knowledge of major causal factors, and availability of effective screening tests that can detect cancers at an early stage.

Lung Cancer

Lung cancer is the most common cause of cancer-related deaths of both men and women in the United States.¹² Approximately 18% of the study population identified themselves as current smokers, a behavior known to be a leading risk factor associated with lung cancer. In Middlesex County and the peer counties, nearly equal rates of males and females are current smokers compared to State and national statistics which indicate up to 23% more males smoke than females.

The incidence rate of lung and bronchus cancer was similar across the study regions ranging from 72 to 74 cases per 100,000. Despite equal prevalence in smoking among males and females, incidence rates for lung cancer among males and females were not the same. In Middlesex County, the incidence rate of lung cancer was greater among females than males,

¹² Surveillance, Epidemiology, and End Results (SEER) Program and the National Center for Health Statistics. Additional statistics and charts are available at <http://seer.cancer.gov/>

which was opposite of the findings in the other study areas, including Middletown, where the incidence rate was 50% higher among males than females (see Appendix 5).

For males, the rate of lung and bronchus cancers was highest in Middletown (90 per 100,000) and lowest in Middlesex County (71 per 100,000). The rate of lung cancers among women was reversed, with the highest rate in Middlesex County (73 per 100,000) and the lowest rate in Middletown (60 per 100,000).

The mortality rate of smoking-related cancers was also similar across study regions ranging from 125-134 cases per 100,000. Slight differences appeared again between males and females. In Middletown, males were 10% more likely to die from lung cancer than females, compared to a 15% greater likelihood in Middlesex County, 20% greater likelihood in the peer counties, and 23% greater likelihood across the State.

Breast Cancer

Breast cancer is the second leading cause of cancer death for women following lung cancer and as such remains a significant health threat to women nationwide.¹³ Approximately, 72% of women in Middlesex County (ages 40+ and 50+) reported undergoing a diagnostic mammogram during the last year. This level of screening exceeded the rate of women living in the peer counties by nearly 10% while matching State levels.

The incidence rate for breast cancer in Middlesex County (104 cases per 100,000) was comparable to the peer counties (99 per 100,000) and the State (102 per 100,000). Each of the areas fell below the national rate of 124 per 100,000. Breast cancer staging data also indicates that the detection of malignancies at the local stage were also comparable across the study areas: Middletown (56%), Middlesex County (50%), peer counties and State (49%). Likewise, the highest rates for distant stage diagnoses were similar: Middletown (6%), Middlesex and the State (4%), peer counties (3%).

Breast cancer mortality was reported as approximately 31 deaths per 100,000 in Middletown, Middlesex County, and the State. In the peer counties, the mortality rate was lowest (25 per 100,000).

These findings support the notion that the utilization of quality breast cancer screening and early detection services improves diagnosis at an early stage. However, the availability and/or adequacy of breast cancer treatment might also be an issue and influence detection within areas such as the peer counties.

Cervical Cancer

Detection of cervical cancer is easily identified by a pap smear test. In Middlesex County and the peer counties 88% of woman indicated having undergone a pap test in the last two years which was comparable to the State rate (86%). While the peer counties had the greatest percentage of women ages 18-44 (94%) undergoing the test, Middlesex County led with 96% of

¹³ American Cancer Society, 2007. <http://www.cancer.org>

women ages 45-64 and 84% of women ages 65 who had undergone a pap test in the last two years.

Approximately 50% of cases of cervical cancer were identified at the local stage in Middlesex County and slightly fewer in the peer counties (48%). However, incidence rates remained low across the study areas. Middlesex County had the lowest incidence rate with 4 per 100,000 compared to 7 per 100,000 in the peer counties and the State.

Colorectal Cancer

Screening for colorectal cancer (CRC) appears to be adequate within the study regions. In the peer counties, the rate of blood stool tests in the past year (43 per 100,000) exceeded Middlesex County (38 per 100,000) and was similar to the State (45 per 100,000). Sigmoid/colonoscopy screenings were highest in Middlesex County (96%) compared to the peer counties (88%), the State (87%), and the nation (84%).

The potential for CRC to occur is equal among males and females. Yet, the CRC incidence rates across the study areas were 17% higher in males than females in the peer counties (64 vs. 55 per 100,000), and 16% higher in males than females in Middlesex County (63% vs. 54% per 100,000). However, in Middletown 10% more females were diagnosed with CRC than males (54 vs. 49 per 100,000). This difference suggests that screening efforts may be focused more on males in Middlesex County and the peer counties and it is possible, that screening programs need to be expanded to better ensure inclusion of all individuals with elevated risks for cancer.

Prostate Cancer

Prostate cancer is the second leading killer of men in the United States.¹⁴ In each of the study regions, over 90% of men ages 50 and older reported receiving a prostate specific antigen (PSA) test in the last two years and over 80% reported undergoing a digital rectal exam to screen for prostate cancer.

Despite similar screening rates across the study regions, incidence rates for prostate cancer were highest in Middlesex County (157 per 100,000) and lowest in the peer counties (128 per 100,000). Detections at the local and distant stages were also highest in Middlesex (85% and 6.7%) and lowest in the peer counties (79% and 4.4%). Likewise, the mortality rate for prostate cancer ranged from a high in Middlesex County (34 per 100,000) to a low in the peer counties (19 per 100,000). While the findings indicate incidence, detection, and mortality are high in Middlesex County, the ratio of rates are relatively similar to the rates found in the other areas and thus do not indicate a significant gap or problem in detection within Middlesex County. However, differences in treatment efforts may contribute to differences in mortality rates.

Findings support the need for continuing efforts to reach the at-risk population without access to screening and detection services.

¹⁴ Surveillance, Epidemiology, and End Results (SEER) Program and the National Center for Health Statistics. Additional statistics and charts are available at <http://seer.cancer.gov/>

MENTAL HEALTH AND SUBSTANCE ABUSE (MH/SA)

FINDINGS: The ED and hospitalization rates for MH/SA related issues were markedly higher in Middletown than rates identified in the other study areas. ED visit rate for alcohol-related psychoses and alcohol-related mental disorders were twice as high in Middletown than in the other study areas. Drug-related ED and hospitalization rates were attributed to recreational drug use among youth and adults while poly-pharmacy issues were a problem for older adults.

- ED visit and hospitalization rates for behavioral and emotional disorders, serious mental illness (SMI), and dementia-related complaints were significantly greater in Middletown than the other study areas.
- Among adults 18-64, the ED visit rate for drug-related mental disorders and psychoses was high and hospitalization rates were high, indicating problems with recreational drug use.
- Among adults ages 65+, the ED visit rate for drug-related mental disorders and psychoses was low and hospitalization rates were high, indicating poly-pharmacy issues.
- The prevalence of binge drinking among young adults (ages 18-44) appeared to be more of a problem when compared to other age groups. Yet, it remains a problem with every age group, with males more likely than females to engage in binge drinking sessions.
- ED visit rate for alcohol-related psychoses in Middletown (46 per 100,000) more than doubled the State rate (18 per 100,000). Additionally, ED visits for alcohol-related mental disorders were twice as high in Middletown (1,139 per 100,000) than in Middlesex County (517 per 100,000) and the State (539 per 100,000).
- Despite the high ED visit rates, hospitalization rates for alcohol-related treatment were significantly lower, which indicates that the ED is responding to the need for care.

Mental Health Status

Mental health status is a critical component in the overall health and well-being of a population. Mental disorders affect millions of American children and adults each year. Besides being extremely costly (the annual costs of mental health disorders are higher than respiratory disorders and nearly as high as the costs of cardiovascular disease), mental health disorders are linked to cirrhosis, lung cancer, heart disease, suicide and other forms of violence.¹⁵ In this study, we examined five categories of mental health problems to represent mental health issues in the study regions: Behavioral and emotional disorders (youth only), serious mental illness (SMI), depression-related complaints, dementia-related complaints, and suicide.

The population of Middletown had the highest proportion of mental health problems across the study areas. This was evidenced by high ED visit and hospitalization rates for behavioral and emotional disorders, SMI, and dementia-related complaints. The peer counties had the highest

¹⁵ Neugebauer R. Mind matters: The importance of mental disorders in public health's 21st century mission. American Journal Public Health. 1999; 89: 1309-1311.

ED visit rate for depression-related complaints (138 per 100,000) which was also 3 times higher than Middlesex County (44 per 100,000) and nearly twice as high as Middletown (71 per 100,000). Yet, Middletown had the highest hospitalization rate for depression-related complaints (274 per 100,000).

Consistent with research on the relationship between suicide and depression, the mortality rate for suicide across the region was highest in the peer counties (10 per 100,000) where depression-related complaints were also reported to be highest. Three times as many males (ages 18-64) committed suicide than females (16 vs. 5 per 100,000) in the peer counties.

The significantly higher hospitalization rates for patients with SMI (1,634 per 100,000) and depression (274 per 100,000) in Middletown compared to Middlesex County (773 and 165 per 100,000 respectively) and the peer counties (282 and 178 per 100,000 respectively), indicated an above average proportion of the population in Middletown suffered from mental health problems.

Higher hospitalization rates also indicated that there may be limited treatment facilities available throughout the study regions, and patients with mental health problems may not have enough support in their daily lives to help them manage their illnesses effectively or to avoid decompensation.¹⁶

Substance Abuse

In 2005, an estimated 22.2 million persons in the U.S. (9.1% of the population aged 12 or older) were classified with substance dependence or abuse in the past year based on criteria specified in the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV).¹⁷ Alcohol represents the third leading cause of premature death in this country, accounting for approximately 5% (100,000) of all deaths in a given year. The hospital rate for substance abuse problems was highest in Middletown (11 per 100,000) and among adults age 18-64 (17 per 100,000). These rates nearly doubled the rates in Middlesex County but were comparable to State hospitalization rates. Peer county rates fell somewhere between with an adult hospitalization rate of 8 per 100,000 and a slightly higher rate of 12 per 100,000 among adults ages 18-64.

Alcohol Abuse

Problem drinking among adults was estimated by the prevalence of CDC-defined chronic heavy drinking and binge drinking among adults in each study region (see Appendix 9 for definitions). The prevalence of chronic heavy drinking among adults remained consistent across the lifespan, affecting 6-7% of the adult population. Even after reaching age 65, 4-6% of older adults (male and female) continued to fit the description of chronic drinkers. The prevalence of binge drinking among young adults (ages 18-44) appeared to be more of a problem than among other adult age groups. Yet, it remained a problem with every age group, with males more likely than females to engage in binge drinking sessions.

¹⁶ According to the American Heritage Medical Dictionary, *decompensation* is a psychiatric term defined as the appearance or exacerbation of a mental disorder due to the failure of personal defense mechanisms.

¹⁷ 2005 National Survey on Drug Use and Health; <http://www.oas.samhsa.org/>

In Middletown, as in most low-income urban areas, alcoholism is a problem. Several study interviewees referred to Middletown as a ‘drunk town’. The comments support our findings that the ED visit rate for alcohol-related psychoses (e.g., paranoia with delusions, persisting amnesic disorders, or alcoholic dementia NOS) in Middletown (46 per 100,000) more than doubled the State rate (18 per 100,000). Additionally, ED visits for alcohol-related mental disorders (e.g., alcohol dependence syndromes) were twice as high in Middletown (1,139 per 100,000) than in Middlesex County (517 per 100,000) and the State (539 per 100,000). While some differences appeared by gender and age groups, increased use of the ED for treatment of alcohol-related problems across the lifespan was problematic.

Despite the high ED visit rates, hospitalization rates for alcohol-related treatment were significantly lower, which indicated that the ED is responding to the need for care. The ED visit rates were high (suggesting urgency to the problems), but hospitalization rates were low (suggesting that patients received treatment and were sent home to manage their condition). Low hospitalization rates also indicated that inebriated patients may be using the ED as a place to ‘dry out’ and/or to get their healthcare needs met, thus placing unnecessary demands on ED services.

There remains little doubt that alcoholism is a problem and sometimes leads to death. The mortality rate for alcohol-related liver disease was comparable in the study areas but slightly higher in Middlesex County (11 per 100,000) and lowest in the peer counties (8.8 per 100,000). In Middletown, despite having a slightly higher prevalence of males with problem drinking behaviors, alcohol-related deaths among females were slightly higher than among males (13 vs. 11 per 100,000). In Middlesex County, the mortality rate for alcohol-related deaths was twice as high among males compared to females (17 vs. 8 per 100,000).

Drug Abuse

Drug-related conditions were more prevalent for all age groups in Middletown than in the other study areas. The patterns of ED and hospitalization rates for drug-related mental disorders and psychoses among youth (under age 18) and adults (ages 18-64) indicated that patient visits likely represented conditions corresponding to recreational drug use. Again, the ED visit rates were high (suggesting urgency to the problems), but hospitalization rates were low (suggesting that patients received treatment and were sent home to manage their condition).

Among adults ages 65+ (including the subgroup of adults ages 85+), the ED visit rate for drug-related mental disorders and psychoses was opposite to that of younger adults. ED utilization rates were low and hospitalization rates were high. This suggests that medication and poly-pharmacy issues were more likely the problem than recreational drug use. Onset of conditions was less acute not requiring emergency services; however, severe enough to require hospitalization and the need for medical oversight once identified. Poly-pharmacy issues are caused by taking multiple medications (potentially prescribed by a variety of providers) for comorbid conditions. This is known to be a recurring problem for many older patients who are without support in managing their medications.

ARTHRITIS, DIABETES, AND OTHER CHRONIC CONDITIONS

FINDINGS: Treatment of arthritis, diabetes, and bone health in Middlesex County was generally favorable although ongoing strategies are needed to address risk factors related to chronic conditions, promote patient self-management activities, and enhance evidence-based strategies within practices.

- The prevalence of arthritis throughout the study regions was slightly higher in Middlesex County (32%) than the peer counties (29%). In Middlesex County, 70% of adults age 65 and older were diagnosed with arthritis.
- The prevalence of diabetes across the study areas was comparable (7-8%).
- The mortality rate for diabetes in Middletown (27 per 100,000) was similar to Middlesex County (21 per 100,000), the State (20 per 100,000) and the peer counties (18 per 100,000).
- Hospitalization rates for joint procedures were relatively consistent across the study regions. Rates of hip procedure hospitalizations in Middlesex County (196 per 100,000) were higher than the other regions as were the largest hospitalization rates among adults ages 65 and older (913 per 100,000).
- The percent of adults ages 65 and older with osteoporosis was highest in Middlesex County (20%) compared to 14% in the peer counties and 18% in the State.

Arthritis and other rheumatic conditions are among the most common diseases in this country. They are also among the leading causes of disability and health-related activity limitations among adults.¹⁸ Therefore, in evaluating the burden of chronic disease in a population, it is important to assess arthritis as well as other indicators of bone and joint health.

The prevalence of arthritis throughout the study areas was slightly higher than that in the US. Prevalence estimates, both overall and among middle aged and older adults, were highest in Middlesex County (32% of population). Not surprisingly, adults ages 65 and older, experienced higher levels of arthritis than younger adults. In Middlesex County, 70% of adults age 65 and older indicated having a diagnosis of arthritis, followed by 57% in the peer counties, and 54% across the State.

The prevalence of diabetes among adults was found to be comparable across the study areas (7 - 8%). Diabetes is the leading cause of end-stage renal disease among adults of all ages, and the leading cause of blindness among working-age adults. Risks for Type II (adult onset) diabetes from inactivity and obesity were a risk for 18-20% of the study populations and prevention efforts continue to be needed throughout the service areas to address obesity-related risks for diabetes.

Diabetes-related hospitalizations were comparable in the study regions. Admission rates due to short term complications were lower than hospitalizations for long-term complications. This

¹⁸ CDC. Prevalence of arthritis—United States 1997. 2001;50(17): 334-6.

suggests that patients with diabetes may have better access to primary care to help them manage their disease and support their self-management strategies.

The mortality rate for diabetes in Middletown (27 per 100,000) was similar to Middlesex County (21 per 100,000), the State (20 per 100,000) and the peer counties (18 per 100,000). Deaths attributed to diabetes were more prevalent among older adults ages 65 and older.

Other indicators showed that bone and joint health were generally favorable in the study area. The percent of adults ages 65 and older with osteoporosis was highest in Middlesex County (20%) compared to 14% in the peer counties and 18% in the State. Rates of joint procedure hospitalizations in Middlesex County (196 per 100,000) were slightly higher than the peer counties (180 per 100,000) and the State (168 per 100,000). Hip procedure hospitalizations were also higher in Middlesex County (87 per 100,000) than in the peer counties (72 per 100,000) and the State (81 per 100,000). As might be expected, the largest hospitalization rates were among adults ages 65 and older for both hip and joint hospitalizations.

INFECTIOUS DISEASES

FINDINGS: Middletown had a lower incidence rate for Hepatitis C and a higher incidence rate for Gonorrhea, Chlamydia, and HIV-infection hospitalizations compared to Middlesex County and the peer counties.

- Hepatitis C infection rate in Middletown (26 per 100,000) was lower than Middlesex County (38 per 100,000) and the peer counties (54 per 100,000), and less than half of the State rate (65 per 100,000).
- Incidence rates for Gonorrhea (98 per 100,000) in Middletown nearly tripled the rates in Middlesex County (38 per 100,000) and the peer counties (34 per 100,000), yet were more similar to the State rate (83 per 100,000).
- Chlamydia is the most frequently reported STD in Connecticut. Rates in Middletown (271 per 100,000) were more than double the rates in Middlesex County (115 per 100,000) but were lower than the State (290 per 100,000) and national rates (327 per 100,000), indicating that Chlamydia is a growing public health problem.

Hepatitis C virus infection is the most common blood borne infection in the United States. Of those infected, approximately 55-85% develop long-term infections, 70% may develop chronic liver disease, and 5% to 20% may develop cirrhosis over a period of 20 to 30 years. Hepatitis C is the leading indication for liver transplantation in American adults. The incidence rate for Hepatitis C infection in Middletown (26 per 100,000) was lower than Middlesex County (38 per 100,000) and the peer counties (54 per 100,000) and less than half of the State rate (65 per 100,000).

In 2005, there were 8,821 persons living with HIV or AIDS in Connecticut.¹⁹ HIV Infection-related hospitalization rates were 4 times higher in Middletown (36 per 100,000) than Middlesex County (9 per 100,000), 3 times higher than in the peer counties (12 per 100,000), yet only slightly higher than the State rate (27 per 100,000). In this study, there were too few deaths within the study regions to produce reliable rates of HIV/AIDS mortality for analysis. Data suggests however, that most deaths related to HIV-Infection occurred among adult men between the ages of 18-64.

The incidence rates of sexually transmitted diseases, including Gonorrhea and Chlamydia, were highest in Middletown. For example, incidence rates for Gonorrhea (98 per 100,000) nearly tripled rates in Middlesex County (38 per 100,000), the peer counties (34 per 100,000), and the State (83 per 100,000). Likewise, incidence rates for Chlamydia in Middletown (271 per 100,000) were double the rates in Middlesex County (115 per 100,000) but were lower than State (290 per 100,000) and national rates (327 per 100,000), suggesting that Chlamydia is a growing public health problem in Middletown.

¹⁹ Connecticut Department of Public Health, Epidemiology and Emerging Infections Program
<http://www.dph.state.ct.us/bch/infectiousdise/epidemio.htm>

Despite evidence that the State and national incidence rates for STDs are climbing, the incidence rates reported in 2006 for Middlesex County dropped to 2003 levels, after steadily climbing and peaking in 2005. This decrease in infection rates is probably not the result of disease reduction, but can be attributed to a reduction in funding earmarked for infectious disease detection programs and services in the area.

VI. PRIORITY HEALTH ISSUES

Priority health issues pose a disproportionate threat to the health of a population and are modifiable with delivery system intervention at the patient or provider level. They can either be a disease, such as asthma or diabetes, or a service need, that if not addressed will result (or will continue to result) in poor health status and high use/costs of services. They can also be “emerging issues” that have just appeared without the future health effects being known. Issues are identified as priorities if, in the analysis of the quantitative assessment data, a pattern of findings surrounding related indicators suggests that a certain population has a particular need for either preventive, screening, diagnosis, treatment or follow-up services. Priority health issues can also emerge as a result of interviewing providers and other stakeholders about the health of their community provided they are raised by a number of those interviewed. An example of the latter is access to transportation to and from medical care services.

The data reviewed for this study indicate that the Middlesex Health System is doing a very good job in meeting the healthcare needs of people in its service area. Evidence of good general health, high rates of preventative and diagnostic screenings, and local stage detection and early diagnoses of conditions contribute to a healthy population profile. In addition, health conditions appear to be managed in primary care settings, resulting in lower hospitalization rates and lower mortality rates compared to the other study areas.

A wide array of healthcare services is currently available to patients, due to ongoing collaborative efforts among health practices, agencies, and organizations. Many of these efforts have already provided a foundation for building a continuum of care within the service area. Yet, like other areas, the system faces challenges and obstacles in providing a comprehensive scope of services to patients with specialized needs including older adults (65+) and individuals with mental health and substance abuse problems. The challenge in serving each population efficiently and effectively requires using non-traditional approaches that place patients at the center of the treatment process while taking into account their preferences, lifestyles, and living situations without fragmenting the coordination of services.²⁰

Based on the information analyzed for this study, several priority health issues emerged that if addressed, could further enhance MHS service delivery and community presence. They include: a) access to and coordination of geriatric services; b) coordination of MH/SA services with community providers, serial inebriety, MH/SA reimbursement, access to primary care by MH/SA patients, and social issues affecting MH/SA patients; and, c) care improvement for patients with selected conditions not being reached by current programs. A review of each issue follows:

Geriatric Care

The population of Middlesex County is aging in place as evidenced by the increasing number of adult residents since 2000: age 65+ (increase of 7.4%) and age 85+ (increase of 19.6%). From this continuing growth, increasing demands upon the healthcare system should be expected and additional avenues for primary care services need to be identified and established to

²⁰ President’s New Freedom Commission report 2003. <http://www.mentalhealthcommission.gov/>

accommodate increasing demands. In this study, data indicated that geriatric patients are already relying heavily on ED services as a source for routine care, perhaps for a lack of access to appropriate care elsewhere. For example, ED utilization rates for chronic conditions were elevated among older adults without corresponding hospitalization rates, indicating some reliance on the ED for routine care. High ED rates for drug-related mental disorders also suggest that poly-pharmacy issues may be a problem for older adults who are not being adequately monitored through other primary care settings.

Several of the informants in this study confirmed that some older adults are seeking non-emergency treatment in the ED. MHS Homecare representatives reported awareness of the situation and regularly advised their patients to seek help from their regular doctor rather than the ED. Other informants suggested that older adults access the ED when they become panicked about their condition and when they lack the support of family and friends to help them work through their concerns. Another informant suggested that there were simply not enough primary care physicians that accept older adults as patients, so the ED has become a source of primary care for many adults. Others suggested that geriatric patients simply wait too long to seek care or do not recognize the severity of their condition until it is too late and end up requiring emergency care.

Healthcare delivery for older adults is dependent on the patient's abilities and limitations, access to healthcare (e.g., primary care access and transportation), financial resources, and a personal support network. As a result, effective healthcare services (that lead to reduced ED utilization rates) must be responsive to these potential barriers and include service delivery within community-based settings as well as traditional medical venues. The often complicated health and social needs of older adults combined with the variety of care settings serving them demands a system-level rethinking of how best to provide health care to this population.

Mental Health and Substance Abuse Services

The high prevalence of alcohol-related behaviors (chronic drinking and binge drinking) among adults of all ages in Middletown and Middlesex County is substantiated by high ED and hospital utilization rates for treatment. Likewise, high ED utilization rates for mental health problems (e.g., serious mental illness, depression) indicate a need for better treatment options for patients prior to decompensation and their need for acute care. In this study, the high utilization rates for substance abuse and mental health problems may be indicative of one or more of the following conditions and should be considered in developing new strategies to reduce ED rates:

1. The service area includes a large percentage of the population with MH/SA problems (transient and permanent residents).
2. Patients with MH/SA conditions lack access to primary care services and rely on the hospital system for routine treatment.
3. Limited types and number of services for MH/SA treatment are available outside of the hospital system.
4. Patients have limited access to MH/SA treatment programs in the service area.

In addition, MHS is contracted by the local Mental Health Authority to triage patients with mental health problems who are in crisis. Depending on the patients' needs and their health insurance status, some are discharged from the ED, some are admitted to the hospital, and some

are transferred to other medical settings in the area. Due to MHS contractual agreements with community mental health providers, potentially more patients with mental health and substance abuse problems could be treated in the ED and account for the high ED utilization rate. Yet, a cursory review of physician encounters with patients who sought MH/SA services through the Middletown ED presents another possible explanation. During the course of 21 months (FY06-3 quarters of 07) 42% of ED patients (for behavioral/substance abuse-related conditions) were repeat users of ED services. Twenty-five of those patients accounted for 430 visits (20% of visits) and three utilized the ED a minimum of 28 times each. Twenty-one percent of repeat users of ED services were non-Middletown residents.²¹ The frequency of which these patients access the ED points to a systemic problem in the access and delivery of MH/SA services that also needs to be reviewed in more depth.

Evidence-Based Practices and Chronic Conditions

The increasing chronic disease burden in the United States has resulted in increased utilization of healthcare and, subsequently, increased costs. The strain on the healthcare system caused by the exacerbation of chronic conditions has prompted a nationwide focus on systems and tools for improving the management of chronic disease. Integrated Resources for the Middlesex Area (IRMA), a member of the Middlesex Health System, provides chronic care treatment and preventive services through The Center for Chronic Care Management (CCCM). The Center currently has programs for chronic heart failure, asthma, diabetes and smoking cessation. These services are excellent examples of a state of the art chronic disease prevention and management program and testimony to a committed and proactive health system focused on improving the health status of the area population. This is an especially challenging venture since reimbursement for many of the services provided in this program is not yet available from private insurance companies, Medicare or Medicaid. The Center has recently initiated *Fit for Kids*, a childhood obesity program for children under the age of seven, funded by a two year grant from the Children's Fund of Connecticut Innovation Fund Grant Program.

In addition to current services provided by CCCM, there is a need for similar services for Chronic Obstructive Pulmonary Disease (COPD). Informants interviewed indicated that there is currently no evidence-based program in place for care and treatment of patients with COPD. However, discussions to implement a program are in the initial stages.

COPD is the fourth leading cause of mortality in the United States.²² COPD includes chronic bronchitis and emphysema, and affects over 5% of the US population. Of the top 5 causes of mortality, it is the only one that is increasing.

Guidelines and best practice standards are available and have been demonstrated as effective. For COPD especially, proper disease management may effectively lower health care utilization rates. One study estimates that up to 40 – 50% of patients with COPD discharged from hospitals are

²¹ Information provided by Dr. Katherine Schneider

²² United Nations Global Initiative for Chronic Obstructive Lung Disease. [Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. Executive Summary.](#) December 2006

readmitted during the following year.^{23,24,25} Yet another 17% of patients who visit the emergency department with COPD-related exacerbations require immediate hospitalization.²⁶

Priority Issue Summary

The findings in this study indicate that MHS does an excellent job in providing medical care within its service area. As might be expected, room for improvement can be found in three areas of service delivery:

- Geriatric care
- MH/SA services
- Care for chronic health conditions, specifically Chronic Obstructive Pulmonary Disease (COPD)

While the current structure of MHS service delivery provides reliable and quality healthcare, the connections between hospital and community services appear to be somewhat disconnected and less intentional than desired. Findings indicate that this is of more concern in the areas of MH/SA and geriatric services. Further examination of how these services can be more effectively integrated is warranted and recommended.

Additionally, the routine use of evidence-based practices in the care of patients with COPD has yet to be established, despite evidence supporting those best practices. While some disease management strategies are in place, institutionalizing enhanced care practices throughout MHS may be useful in reducing hospitalizations for respiratory conditions and in improving the health status of patients with pulmonary disease.

²³ Osman IM, Godden DJ, Friend JA, Legge JS, Douglas JG. Quality of life and hospital readmission in patients with chronic obstructive pulmonary disease. *Thorax* 1997; 52:67 – 71.

²⁴Connors AFJ, Dawson NV, Thomas C, et al. Outcomes following acute exacerbation of severe chronic obstructive lung disease. *American Journal of Respiratory Critical Care Medicine* 1996; 154(4): 959-967.

²⁵Emerman CL, Efrom D, Lukens TW. Spirometric Criteria for Hospital Admission of Patients with Acute Exacerbation of COPD. *Chest* 1991; 99:595-599.

²⁶ *ibid.*

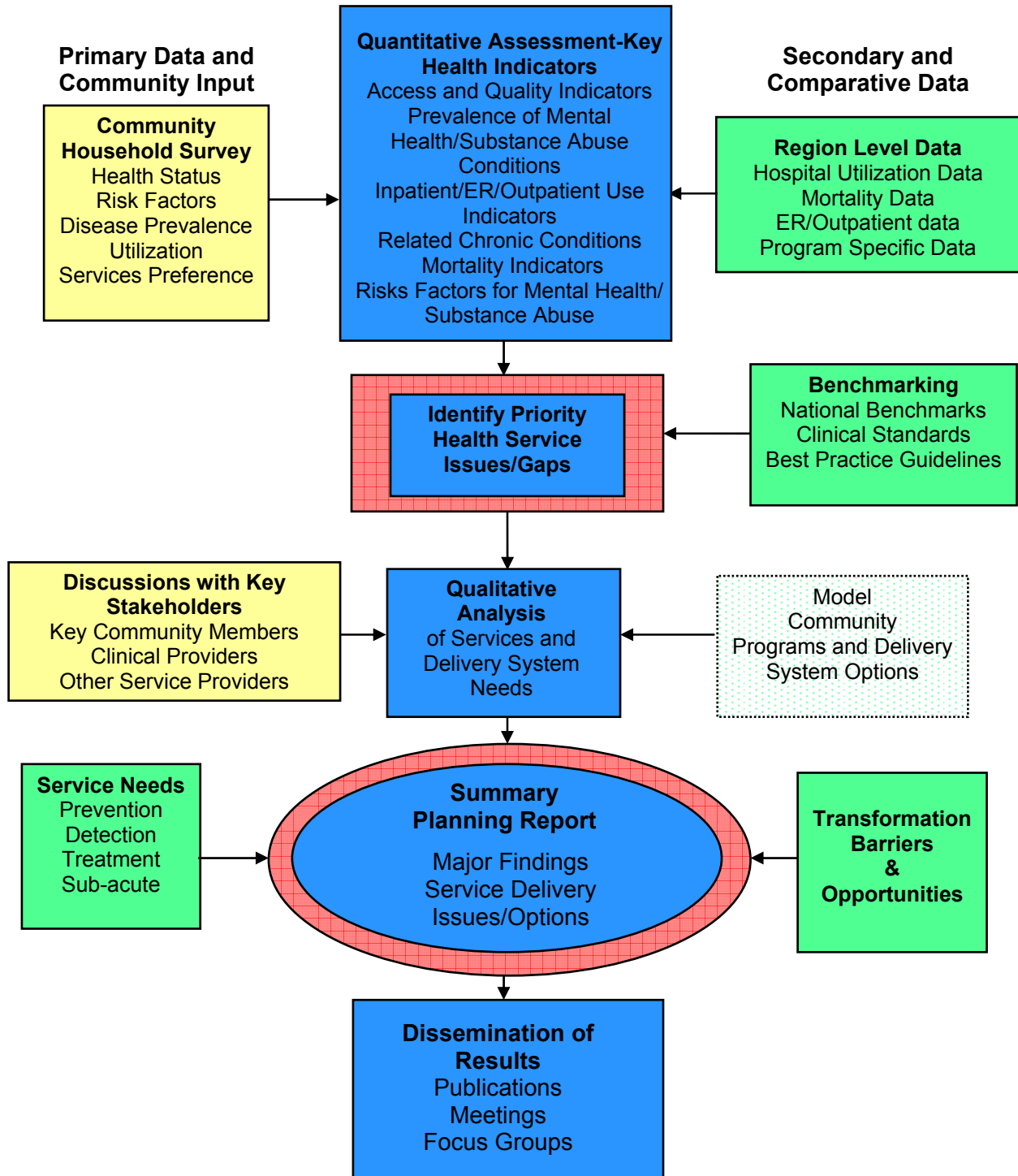
APPENDICIES

APPENDIX 1: COMMUNITY HEALTH ASSESSMENT ADVISORY GROUP

Name	Organization/Title
Ed Bonilla, MBA, MS	Senior Director for Community Resources, Middlesex United Way
Vincent Capece	Senior Vice President; Chief Operating Officer, Middlesex Hospital
Elizabeth DePierro	Project Specialist, IRMA, Middlesex Hospital
Paula Ferrara	Executive Director, Estuary Council of Seniors
Margaret Flinter, APRN	Vice President and Clinical Director, Community Health Center
Thad King, MPH, RS	Director of Health, Chatham Health District
Susan Martin	Vice President Finance, Middlesex Hospital
Maura McQueeney, BSN, MPH	Executive Director, Middlesex Hospital Homecare
Susan Menichetti	Vice President Operations, Middlesex Hospital
Donald Mitchell	Chatham Health District
Elizabeth Morgan	Director of Middlesex Coalition for Children
Edwina Ranganathan, MSW, LADC	Rushford
Catherine Rees, MPH	Community Benefit Coordinator, IRMA, Middlesex Hospital
Katherine Schneider, MD, M.Phil	Chief Medical Officer, IRMA, Middlesex Hospital
Kathleen Ulm, MA, LADC, CCS	Director of Behavioral Health Services, Rushford
Barbara Weiss	Board Member, Middlesex Hospital; Middletown Board of Education

APPENDIX 2: CIAP PROCESS

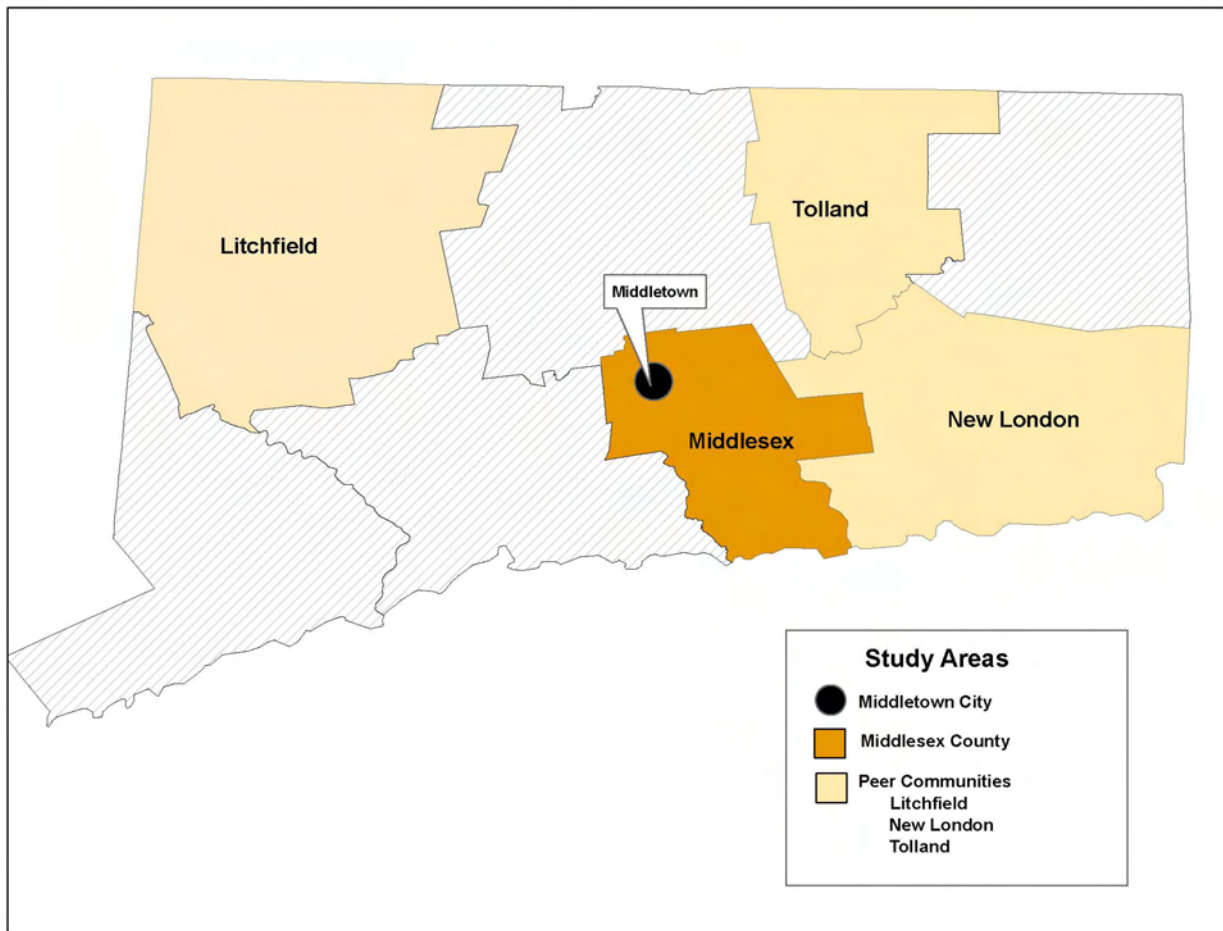
CHPPR Behavioral Health Assessment Process



APPENDIX 3: STUDY REGION GROUPINGS

**Middletown
Middlesex County
Peer Counties
(Litchfield, New London, Tolland)**

APPENDIX 4: MAP OF STUDY AREAS



APPENDIX 5: HEALTH STATUS PROFILE (HSP)

	Middletown	Middlesex County	Peer Counties	Connecticut	US
GENERAL HEALTH STATUS					
Total Population 2006 Estimates	45,230	163,774	601,552	3,504,809	299,038,484
Annual Household Income (1999)	\$47,162	\$59,414	\$55,596	\$57,483	\$43,318
% of Labor Force Unemployed	3.0	3.4	2.6	3.5	5.7
% Population Not Attaining H.S. Diploma (>25 yrs)	15.7	11.0	13.2	15.9	15.4
% Population Under the Age of 18	20.5	21.8	21.9	23.4	24.5
% Population Between Ages 18-44	40.9	35.9	37.7	36.3	38.0
% Population Between Ages 45-64	24.8	28.3	27.6	26.9	25.0
% Population Age 65+	13.8	13.9	12.9	13.4	12.5
% Population Age 85+	2.6	2.3	1.9	2.2	1.8
% Uninsured (< 65yrs)		11.5	9.5	11.4	16.0
% Projected Population Change (2000-2010)				4.8	NA
% Projected Population Change (2000-2015)				6.3	NA
FUNCTIONAL HEALTH STATUS					
% Health Fair to Poor		10.9	11.0	12.1	16.6
% Adults (18+) Limited Activity due to health problem		15.5	16.7	15.8	18.1
% 11+ Days Physical Health Not Good		7.2	9.3	9.2	11.1
% 11+ Days Mental Health Not Good		7.7	9.9	9.2	10.3
% 11+ Days Lost due to Poor Mental or Physical Health		9.3	10.3	10.5	11.1
Wellness Categories:					
Well		46.5	51.2	47.8	36.2
At Risk for Future Medical Problems		11.2	9.4	9.8	9.8
Some Health Problems		37.9	35.7	38.4	39.1
Not Well		4.4	3.6	3.9	14.9
ACCESS TO CARE					
% Without Usual Source of Primary Care		10.6	12.7	13.2	20.4
Males		13.2	17.8	17.3	25.8
Females		8.3	7.8	9.4	15.3
% Not Having a Checkup Within the Past 2 Years		11.9	12.7	13.3	16.6
Males		12.5	16.2	15.0	20.9
Females		11.2	9.2	11.6	12.6
% Received Influenza Vaccine past 12 months (Ages 18+)		40.9	23.9	37.1	26.2
Males		44.6	22.1	35.0	24.6
Females		37.3	25.7	38.9	27.6
% Received Influenza Vaccine past 12 months (65+)		74.2	48.8	73.5	63.1
Males		76.6	50.7	75.5	64.6
Females		72.5	47.3	72.0	62.1
% Never Received Pneumoccal Vaccine (Ages 18+)		71.4	68.0	69.3	69.8
Males		70.5	69.7	67.1	68.1
Females		72.3	66.4	71.4	71.4
% Never Received Pneumoccal Shot (65+)		30.1	24.9	31.7	35.0
Males		35.8	23.6	31.5	36.6
Females		25.9	25.8	31.8	33.9
% Could not see a doctor because of cost		9.5	7.5	9.2	13.5

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
ACCESS TO CARE cont.					
ED Visits per 100,000 population	41,942	33,892	34,917	32,894	38,200.0
Ages <18	36,505	29,802	35,818	33,084	NA
Ages 18-44	49,689	39,556	41,777	40,697	NA
Ages 45-64	35,825	27,607	26,450	24,152	30,600.0
Ages 65+	38,062	38,495	31,418	28,947	45,400.0
Age 85+	53,231	55,246	43,612	40,318	NA
Ambulatory Care Sensitive (ACS), ED Visit Rate	3,098	2,758	3,446	2,970	NA
Ages <18	4,538	3,444	5,372	4,938	NA
Ages 18-44	2,799	2,565	3,279	2,759	NA
Ages 45-64	2,272	2,043	2,284	1,820	NA
Ages 65+	3,331	3,633	3,157	2,418	NA
Age 85+	3,758	4,577	3,426	2,563	NA
Hospitalizations per 100,000 Population	10,800	9,217	10,660	10,421	11,923.0
Ages <18	2,499	2,290	2,424	2,943	NA
Ages 18-44	8,349	7,010	6,803	8,097	NA
Ages 45-64	11,684	8,708	8,946	9,487	11,789.0
Ages 65+	28,786	26,838	28,866	31,591	36,299.0
Age 85+	42,869	39,778	42,579	48,934	58,570.0
Ambulatory Care Sensitive (ACS), Hospital Admission Rate	885	981	1,205	1,443	NA
Ages 0-17	338	334	520	634	NA
Ages 18-44	254	213	280	387	NA
Ages 45-64	793	682	916	1,070	NA
Ages 65+	3,731	4,591	5,691	6,455	NA
Age 85+	6,576	8,763	11,001	12,738	NA
CARDIOVASCULAR HEALTH					
% Current Smokers (Age 18+)		18.2	18.3	17.7	20.4
% Sedentary Lifestyle (measured by no physical activity)		18.1	18.3	20.4	25.4
% Overweight (Ages 18+)		34.3	34.9	34.7	35.1
% Obesity (Ages 18+)		18.9	18.6	18.6	23.4
% High Cholesterol		34.2	29.0	32.1	35.7
% High Blood Pressure		28.0	25.3	26.2	26.1
% Heart Disease		3.2	3.6	4.1	4.5
% Having Cholesterol Checked (within the past year)		67.7	67.7	70.7	71.0
% Advised by health professional to exercise to lower BP		80.5	74.3	78.4	66.5
% Advised by health professional to change eating habits to lower BP		59.2	59.0	59.1	61.5
% Advised by health professional to take medications to lower BP		86.2	84.0	86.2	86.6
% Rehab following Heart Attack or Stroke Hospitalization		36.9	49.8	40.2	34.2
Male		36.7	41.9	45.9	38.9
Female		37.3	56.7	32.1	26.8
% Take Aspirin to Reduce Heart Attack (age 35+)		32.3	29.5	30.8	32.6
Male		33.1	34.4	34.8	36.3
Female		31.6	25.1	27.3	29.4

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
CARDIOVASCULAR HEALTH cont.					
Congestive Heart Failure, Hospital Admissions (Ages 18+)	318.9	272.1	347.7	426.2	476.4
Ages 45-64	157.4	94.8	134.3	186.4	330.0
Ages 65+	1515.9	1313.1	1783.7	2002.2	2250.0
Ages 85+	3615.1	3187.4	4000.7	4534.3	4720.0
AMI, Hospital Admission Rate	171.7	140.0	133.1	121.9	250.0
Ages 45-64	148.5	84.7	113.8	88.6	325.0
Ages 65+	928.7	808.0	756.6	705.2	1266.0
Ages 85+	2277.3	1945.5	1616.4	1663.3	2565.0
Cerebrovascular Disease (stroke), Hospital Admission Rate	86.2	71.2	74.0	87.3	NA
Ages 45-64	41.6	40.2	50.1	65.5	NA
Ages 65+	507.1	407.0	446.0	492.0	NA
Ages 85+	1110.2	833.8	828.4	927.6	NA
CABG, Hospital Admission Rate	17.7	18.5	24.2	26.4	NA
Ages 45-64	44.6	31.6	33.6	37.7	NA
Ages 65+	48.0	68.8	109.7	115.6	NA
Ages 85+	0.0	8.7	49.1	51.1	NA
Heart Disease, Mortality Rate	215.2	216.2	221.8	239.1	219.1
Ages 45-64	136.6	102.0	105.0	106.2	NA
Ages 65+	1270.3	1316.0	1451.7	1524.9	767.9
AMI, Mortality Rate	42.7	42.1	44.9	44.2	58.7
Ages 45-64	20.8	15.1	22.9	21.5	NA
Ages 65+	256.2	265.0	289.9	281.2	126.6
Cerebrovascular Disease (stroke), Mortality Rate	70.7	58.0	50.3	51.2	54.2
Ages 45-64	8.9	8.6	12.5	14.3	NA
Ages 65+	496.4	396.7	357.9	344.6	NA
RESPIRATORY HEALTH					
% Current Smokers		18.2	18.3	17.7	20.4
Male		18.8	18.4	19.8	22.5
Female		17.1	18.2	16.9	18.3
% Former Smokers		33.4	29.6	30.5	24.2
% Current Asthma (Ages 18+)		9.2	9.2	8.6	7.8
% Diagnosed with Asthma after age 18		44.1	46.3	45.4	44.9
Lung Cancer, Males, Incidence Rate*	90.1	70.9	79.5	74.4	78.5
Lung Cancer, Females, Incidence Rate*	59.8	72.7	68.7	67.6	51.3
% Received Influenza Vaccine past 12 months (Ages 18+)		40.9	23.9	37.1	26.2
Males		44.6	22.1	35.0	24.6
Females		37.3	25.7	38.9	27.6
% Never Received Pneumoccal Vaccine (Ages 18+)		71.4	68.0	69.3	69.8
Males		70.5	69.7	67.1	68.1
Females		72.3	66.4	71.4	71.4
Influenza, Hospital Admission Rate (Ages 65+)	23.6	23.4	46.9	79.6	NA
% ED visit for Asthma last 12 months		3.7	16.5	14.3	16.1
% Visit health professional for Asthma last 12 months		33.8	26.0	26.4	27.8

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
RESPIRATORY HEALTH cont.					
Asthma, Hospital Admission Rate	63.4	45.2	87.6	124.4	170
Ages 0-17	75.5	55.9	86.7	141.0	NA
Ages 18-44	39.7	28.3	53.9	86.6	NA
Ages 45-64	74.3	48.8	89.7	120.4	159
Ages 65+	96.1	64.4	176.3	205.9	287
Ages 85+	56.9	26.1	193.4	220.3	366
Bronchitis and Asthma, ED Visit Rate	1119.5	993.7	1042.0	965.4	NA
Ages <18	1269.5	803.6	968.6	1029.6	NA
Ages 18-44	1393.3	1269.3	1358.8	1279.5	NA
Ages 45-64	855.4	881.1	840.8	712.5	NA
Ages 65+	560.5	809.5	669.3	510.0	NA
Ages 85+	654.7	7990.0	704.1	481.3	NA
COPD, Hospital Admission Rate (Ages 18+)	131.6	130.2	176.0	157.9	226.9
Ages 45-64	121.8	101.2	126.5	107.7	NA
Ages 65+	523.1	515.3	767.8	667.4	NA
Ages 85+	341.6	529.8	756.3	735.2	NA
COPD, ED Visit Rate	555.7	477.9	569.6	374.1	NA
Ages 45-64	638.6	444.5	596.8	398.7	NA
Ages 65+	1403.8	1427.3	1315.3	924.5	NA
Ages 85+	1565.6	1624.1	1376.9	911.9	NA
Adult Bacterial Pneumonia, Hospital Admission Rate (Ages 18+)	72.3	370.8	411.0	466.9	408.9
Ages 45-64	74.3	196.0	224.2	241.9	NA
Ages 65+	96.1	1480.0	1661.1	1803.1	NA
Ages 85+	56.9	2848.7	3484.0	3839.7	NA
Bacterial Pneumonia, Hospital Admission Rate (0-17)	46.8	55.0	105.5	101.5	NA
Lung Cancer, Males, Mortality Rate	65.7	60.1	57.3	58.9	62.9
Lung Cancer, Females, Mortality Rate	57.0	58.8	54.4	49.9	46.1
COPD, Mortality Rate	37.6	46.8	46.8	41.4	43.5
Ages 45-64	17.8	15.8	15.5	14.5	NA
Ages 65+	240.2	303.0	323.4	275.2	NA
Pneumonia/Influenza, Mortality Rate	13.3	16.9	21.7	25.1	21.2
Smoking Related Neoplasms, Mortality Rate	125.3	133.7	127.8	131.4	NA
Male	131.4	143.1	139.4	145.2	NA
Female	119.6	124.8	116.5	118.4	NA

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
DIABETES					
% Sedentary Lifestyle (measured by no physical activity)		18.1	18.3	20.4	25.4
% Obesity (Ages 18+)		18.9	18.6	18.6	23.4
% Diagnosed Diabetes (All Adults 18+)		6.8	6.9	7.8	7.8
Ages 18-44		3.9	3.8	4.3	2.5
Ages 45-64		8.1	9.3	8.9	10.9
Ages 65+		12.1	12.7	16.6	17.8
% Hemoglobin A1c measurement (at least once) in past year (Age 18+)		68.8	79.4	71.4	71.3
Male		84.8	84.6	75.6	72.4
Female		55.2	78.1	68.4	70.1
% Retinal eye exam in past year (Age 18+)		42.3	32.5	32.1	68.0
Male		37.4	35.9	34.0	21.1
Female		46.4	29.2	30.2	21.0
% Foot examination in past year (Age 18+)		68.9	71.5	71.5	66.7
Male		82.9	70.9	74.6	68.3
Female		57.7	72.0	68.4	65.1
Diabetes, ED Rate	215.9	151.6	152.1	174.5	NA
Ages 45-64	243.6	160.9	193.3	225.1	NA
Ages 65+	560.5	408.4	389.7	410.3	NA
Uncontrolled Diabetes, Hospital Admission Rate (Ages 18+)	7.4	4.2	4.8	7.3	22.0
Ages 45-64	3.0	2.2	5.0	7.8	NA
Ages 65+	21.4	13.2	13.8	16.2	NA
Ages 85+	28.5	17.4	28.9	20.1	NA
Short-term Complications, Admission Rate (Ages 18+)	50.1	33.3	37.2	49.2	55.2
Long-term Complications, Admissions Rate (Ages 18+)	65.8	58.8	65.4	90.1	124.9
Lower Extremity Amputations, Admissions Rate (Ages 18+)	28.7	24.7	28.7	38.4	38.3
Diabetes, Mortality Rate	27.3	21.2	18.2	20.0	25.5
Ages 45-64	29.7	12.2	14.9	13.4	NA
Ages 65+	144.1	125.9	103.7	117.5	NA

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
REPRODUCTIVE HEALTH					
% Mammogram past 3 years (Age 18+)		91.5	88.5	89.3	92.4
% Mammogram past 2 years (Age 40+)		89.6	85.4	86.7	82.6
% Mammogram past 2 years (Age 50+)		90.3	86.8	86.0	83.2
% Pap Smear past 2 years (Ages 18-44)		87.0	93.9	88.8	88.9
% Pap Smear past 2 years (Ages 45-64)		95.6	89.5	90.0	78.3
% Pap Smear past 2 years (Age 65+)		84.4	66.1	69.7	56.9
Teen Birth Rate (10-17 yrs) Per 1,000 Female Population by Age	4.2	1.7	2.4	5.1	4.1
% Inadequate Prenatal Care	0.9	0.5	0.3	0.5	NA
Ages 10-17	0.0	0.0	0.9	2.0	NA
Ages 18-49	0.9	0.5	0.3	0.5	NA
% Adequate Prenatal Care	82.8	85.7	84.6	81.5	NA
Ages 10-17	70.8	71.8	57.6	59.2	NA
Ages 18-49	83.0	85.8	85.1	82.0	NA
% Pregnant Women Receiving Prenatal Care in First Trimester	87.6	91.1	89.5	87.0	83.7
High Risk, Hospital Admission Rate (10-49 year old females)	387.5	273.5	279.7	316.6	NA
Ages 10-17	37.7	17.0	18.1	75.4	NA
Ages 18-49	446.2	326.9	339.9	427.9	NA
C-Section Rate per 100 births	31.2	30.7	27.8	28.0	28.9
Primary C-Section Rate per 100 births	20.2	19.6	17.6	17.5	18.0
VBAC rate per 100 births	0.6	0.8	1.4	1.3	1.1
% Low Birthweight (<2500 grams)	6.7	6.2	5.4	6.2	8.1
Ages 10-17	0.0	2.6	9.0	8.0	NA
Ages 18-49	6.8	6.3	5.4	6.1	NA
% Prematurity (< 37 weeks)	19.9	18.6	16.6	17.1	7.8
Ages 10-17	12.5	15.4	19.3	17.8	NA
Ages 18-49	20.0	18.6	16.5	17.1	NA
Infant Mortality Rate per 1,000 births	7.2	6.0	6.7	5.8	6.8
Neonatal Mortality Rate per 1,000 births	4.8	4.4	4.8	4.1	4.6
CANCER					
% Current Smokers (Age 18+)		18.2	18.3	17.7	20.4
% Sedentary Lifestyle (measured by no physical activity)		18.1	18.3	20.4	25.4
% Obesity (Ages 18+)		18.9	18.6	18.6	23.4
All Cancers, Incidence Rate	538.0	605.3	468.9	584.1	459.6
Male	537.7	598.7	560.0	574.3	540.0
Female	538.3	611.6	380.2	593.5	404.1
% Stage All Cancers Female, Local	42.1	45.4	43.7	45.6	NA
% Stage All Cancers Female, Distant	27.2	23.5	22.0	21.6	NA
% Stage All Cancers Male, Local	41.0	40.4	42.1	40.4	NA
% Stage All Cancers Male, Distant	23.9	21.9	18.5	18.8	NA

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
CANCER cont.					
All Cancers, Mortality Rate	190.9	210.7	193.9	205.5	191.5
Ages 45-64	187.1	178.8	175.5	175.5	NA
Ages 65+	982.1	1097.9	1075.3	1128.9	NA
Male	186.4	221.1	198.0	211.5	201.3
Ages 45-64	167.0	192.9	178.5	185.1	NA
Ages 65+	1160.8	1317.4	1282.1	1368.2	NA
Female	195.1	200.7	190.0	199.8	182.0
Ages 45-64	205.7	165.2	172.6	166.4	NA
Ages 65+	860.7	938.9	923.1	961.2	NA
Respiratory:					
Lung Cancer, Incidence Rate	74.4	71.8	74.0	71.0	62.7
% Stage Lung Local	11.9	15.0	18.7	17.4	NA
Male	3.4	10.0	16.5	15.2	NA
Female	23.8	19.7	21.2	19.8	NA
% Stage Lung Distant	53.5	53.0	50.1	51.1	NA
Male	54.2	54.1	50.3	49.9	NA
Female	52.4	51.9	50.0	52.3	NA
Lung Cancer, Mortality Rate	61.2	59.4	55.8	54.3	54.4
Other:					
Melanoma, Incidence Rate	19.2	45.0	43.9	41.0	18.7
Melanoma, Mortality Rate	2.2	4.3	2.3	3.1	2.7
Gastrointestinal:					
Colorectal, Incidence Rate	51.6	58.2	59.3	63.7	49.5
Male	48.9	62.6	64.2	65.8	58.0
Female	54.1	54.1	54.5	61.6	42.8
% Stage Colorectal, Local	31.4	35.7	43.8	39.8	NA
Male	31.3	36.7	45.1	41.2	NA
Female	31.6	34.6	42.4	38.5	NA
% Stage Colorectal, Distant	21.4	16.1	15.0	15.3	NA
Male	18.8	15.3	13.1	14.6	NA
Female	23.7	16.9	17.1	16.0	NA
% Reported Blood Stool Test Past Year (Age 50+)		37.7	42.5	45.3	42.8
% Reported Having Sigmoid/Colonoscopy Past 5 Years (Age 50+)		95.8	87.5	86.8	84.3
Colorectal, Mortality Rate	14.7	18.3	18.6	20.2	19.2
Male	12.2	18.8	18.1	20.0	19.6
Female	17.1	17.9	19.0	20.4	18.9
Female Breast:					
Female Breast Cancer, Incidence Rate	87.7	103.2	98.9	101.5	124.2
% Stage Female Breast, Local	56.3	50.3	48.7	48.5	NA
% Stage Female Breast, Distant	5.9	4.3	3.1	3.6	NA
% Mammogram past year, Age 40+		71.8	66.4	71.3	64.9
% Mammogram past year, Age 50+		71.9	68.8	71.5	66.1
Female Breast Cancer, Mortality Rate	31.3	31.0	24.9	30.2	28.2

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
CANCER cont.					
Reproductive:					
Cervix Uteri, Incidence Rate	4.3	4.0	7.3	7.1	7.1
% Stage Cervix Uteri Female, Local	33.3	50.3	47.8	48.4	NA
% Stage Cervix Uteri Female, Distant	0.0	20.0	14.9	11.2	NA
% Reported Pap Smear past 2 years		88.1	87.8	86.2	85.4
Ages 18-44		87.0	93.9	88.8	88.9
Ages 45-64		95.6	89.5	90.0	78.3
Ages 65+		84.4	66.1	69.7	56.9
Female Cervix Uteri, Mortality Rate	0.0	0.4	1.6	2.0	2.7
Prostate:					
Male Prostate Gland, Incidence Rate	136.0	156.5	127.6	146.8	164.9
% Stage Prostate, Local	85.4	84.5	79.0	82.7	NA
% Stage Prostate, Distant	5.6	6.7	4.4	4.0	NA
% Prostate Exam (PSA test) past 2 yrs (Age 50+)		90.7	90.8	90.3	85.8
% Digital Rectal Exam past 2 years (Age 50+)		80.3	81.4	85.6	79.9
Male Prostate Gland, Mortality Rate	24.4	34.2	19.4	23.9	20.7
MENTAL HEALTH					
% 11+ Days Mental Health Not Good		8.4	9.9	9.3	10.3
Ages 18-64		8.6	10.6	10.0	11.1
Ages 65+		4.3	6.6	5.5	6.3
Behavioral and Emotional Disorders (ages 0-17)					
ED Visit Rate	629.3	509.0	512.8	477.6	NA
Hospital Admission Rate	89.9	74.6	71.3	97.4	NA
Serious Mental Illness(ages 18+)					
ED Visit Rate	438.4	237.5	376.7	300.8	NA
Hospital Admission Rate	1634.2	773.1	282.0	317.4	NA
Depression-related complaints					
ED Visit Rate	70.7	44.2	137.5	84.3	NA
Hospital Admission Rate	274.2	165.3	177.9	183.7	158.0
Dementia-related complaints					
ED Visit Rate	69.3	56.0	41.2	43.3	NA
Hospital Admission Rate	28.7	23.4	17.9	28.2	NA
Suicide, Mortality Rate					
Males	7.6	11.3	15.5	12.7	17.6
Females	5.7	3.2	4.7	3.4	4.3

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
SUBSTANCE ABUSE					
% Chronic Heavy Drinking (Past Month)		6.1	6.9	6.2	5.0
Ages 18-64		6.3	7.2	6.6	5.4
Male		47.9	53.8	47.4	59.5
Female		52.1	46.2	52.6	40.5
Ages 65+		5.7	5.0	4.3	3.2
Male		54.8	48.7	41.2	46.4
Female		45.2	51.3	58.8	53.6
% Binge Drinking (Past Month)		19.0	14.1	14.6	14.1
Ages 18-64		22.4	16.7	17.3	16.3
Male		72.9	72.4	72.2	74.2
Female		27.1	27.6	27.8	25.8
Ages 65+		4.6	2.8	3.0	3.2
Male		100.0	71.5	80.6	79.0
Female		0.0	28.5	19.4	21.0
Substance Abuse, Hospital Admission Rate	11.1	5.5	7.8	10.1	NA
Ages 18-64	16.8	8.2	11.5	15.5	NA
Ages 65+	0.0	0.0	2.6	2.2	NA
Acute Alcohol-Related Mental Disorders, Hospital Admission Rate	17.7	11.8	23.4	29.3	NA
Ages 18-44	19.8	11.3	28.5	32.7	NA
Ages 45-64	23.8	18.7	39.6	51.5	NA
Ages 65+	21.4	16.1	11.6	23.2	NA
Alcohol-Related Psychoses, Hospital Admission Rate	90.6	56.2	47.3	52.5	NA
Ages 18-44	88.3	49.9	50.7	55.5	NA
Ages 45-64	207.9	121.1	87.9	102.1	NA
Ages 65+	21.4	36.3	30.1	36.2	NA
Acute Drug-Related Mental Disorders, Hospital Admission Rate	7.4	3.3	3.7	10.3	NA
Ages 18-44	16.2	8.5	7.2	21.8	NA
Ages 45-64	3.0	0.7	3.2	7.7	NA
Ages 65+	0.0	0.0	0.0	0.7	NA
Drug-Related Psychoses, Hospital Admission Rate	53.1	27.9	24.5	34.2	NA
Ages 0-17	0.0	0.9	2.0	1.6	NA
Ages 18-44	93.7	53.3	41.1	60.9	NA
Ages 45-64	47.5	20.8	19.5	27.7	NA
Ages 65+	21.4	19.0	24.5	31.8	NA
Ages 85+	56.9	43.4	34.6	58.9	NA
Acute Alcohol-Related Mental Disorders, ED Visit Rate	1138.6	516.6	463.2	539.4	NA
Ages 0-17	79.1	92.3	93.8	78.8	NA
Ages 18-44	1364.5	706.0	695.4	727.7	NA
Ages 45-64	2174.1	789.9	609.9	875.9	NA
Ages 65+	181.5	136.1	96.3	156.7	NA
Alcohol-Related Psychoses, ED Visit Rate	45.7	27.1	28.7	17.7	NA
Ages 18-44	50.5	38.0	38.8	25.3	NA
Ages 45-64	98.0	44.5	48.5	29.2	NA
Ages 65+	5.3	5.9	6.9	5.0	NA

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
SUBSTANCE ABUSE cont.					
Acute Drug-Related Mental Disorders, ED Visit Rate	148.1	88.5	83.9	118.1	NA
Ages 0-17	61.1	42.9	32.5	29	NA
Ages 18-44	272.2	180.8	177.3	257.3	NA
Ages 45-64	98.0	47.4	35.2	64.8	NA
Ages 65+	0.0	5.9	2.2	2.6	NA
Drug-Related Psychoses, ED Visit Rate	73.7	44.6	39.8	42.0	NA
Ages 0-17	7.2	2.8	4.6	2.7	NA
Ages 18-44	128.0	89.5	74.8	87.1	NA
Ages 45-64	74.3	37.3	29.6	30.9	NA
Ages 65+	10.7	8.8	19.4	10.7	NA
Ages 85+	0.0	0.0	28.9	12.7	NA
Alcohol-Related Mortality Rate	11.8	12.4	10.0	9.9	NA
Males	10.7	16.7	13.1	13.3	NA
Females	12.8	8.3	6.9	6.8	NA
Alcohol Liver Disease, Mortality Rate	10.3	10.8	8.6	8.8	NA
Motor Vehicle Accidents, Mortality Rate	9.6	11.0	11.6	10.1	16.5
Males	15.3	16.3	15.9	15.1	23.3
Females	4.3	6.0	7.4	5.5	10.0
ACCIDENTS/SAFETY					
Total Accidents, Mortality Rate	34.6	35.2	33.5	33.9	37.6
Male	45.8	48.4	45.4	45.1	49.3
Female	24.2	22.7	21.9	23.4	26.2
Motor Vehicle Accidents, Mortality Rate	9.6	11.0	11.6	10.1	16.5
Male	15.3	16.3	15.9	15.0	23.3
Female	4.3	6.0	7.4	5.5	10.0
YOUTH HEALTH					
Teen Birth Rate (10-17 yrs) Per 1,000 Female Population by Age	4.2	1.7	2.4	5.1	4.1
Asthma and Bronchitis, Hospital Admission Rate (Ages 0-17)	75.5	55.9	86.7	141.0	NA
Pneumonia, Hospital Admission Rate (Ages 0-17)	46.8	55.0	105.5	101.5	NA
Psychoses Hospital Admission Rate (Ages 0-17)	129.5	146.4	172.3	164.2	NA
Major Depressive Disorder, Hospital Admission Rate (Ages 0-17)	86.3	65.3	61.6	72.6	NA
Bipolar Disorder, Hospital Admission Rate (Ages 0-17)	10.8	40.1	45.7	46.9	NA
Anxiety, Personality, and Other Disorders, Hospital Admit Rate (Ages 0-17)	25.2	18.6	22.1	31.7	NA
Other Mental Conditions, Hospital Admission Rate (Ages 0-17)	64.7	55.9	49.2	65.7	NA
Acute Alcohol-Related Mental Disorders, Hospital Admission Rate (Ages 0-17)	3.6	0.9	1.0	2.1	NA
Acute Drug-Related Mental Disorders, Hospital Admission Rate (Ages 0-17)	0.0	0.0	0.3	0.7	NA
Drug-Related Psychoses, Hospital Admission Rate (Ages 0-17)	0.0	0.9	2.0	1.6	NA
Pediatric gastroenteritis, Hospital Admissions (Ages 0-17)	57.5	69.0	520.4	633.5	98.1
ACS Conditions, Hospital Admission Rate (0-17)	338.0	333.7	107.0	133.0	NA

Peer Counties: Litchfield, New London, Tolland

	Middletown	Middlesex County	Peer Counties	Connecticut	US
YOUTH HEALTH cont.					
ED Asthma/Bronchitis Visits per 100,000 Population	1119.5	993.7	1042.0	965.4	NA
Ages < 18	1269.5	803.6	968.6	1029.6	NA
ED Pneumonia Visits per 100,000 Population	313.2	301.2	274.3	242.0	NA
Ages < 18	348.8	256.4	346.7	323.6	NA
ED Otitis Visits per 100,000 Population	894.0	833.3	1408.5	1213.5	NA
Ages < 18	2747.5	2228.9	3781.6	3437.1	NA
ORAL HEALTH					
% Reporting not visiting dentist past year		18.4	17.5	20.3	29.3
ORTHOPEDECS					
% Diagnosed Arthritis		32.1	29.1	26.8	26.5
Ages 45-64		37.5	37.2	34.6	36.1
Ages 65+		69.7	57.2	54.3	55.8
% Diagnosed Osteoporosis (65+)		19.7	13.7	17.8	16.5
Orthopedics, Hospital Admissions Rate	714.9	667.0	609.4	661.7	NA
Hip Procedures, Hospital Admission Rate	98.0	86.9	72.0	80.8	NA
Ages 65+	549.8	512.3	447.8	497.5	NA
Joint Procedure Hospital Admission Rate	190.1	196.4	180.4	167.7	NA
Ages 65+	896.7	913.4	847.3	798.0	NA
INFECTIOUS DISEASE					
% High Risk Sexual Behaviors		5.1	4.0	3.7	4.0
HIV-Infection, Hospital Admissions Rate	36.1	9.0	11.6	27.4	NA
HIV-Infection Mortality Rate	4.4	1.6	2.5	5.4	4.7
Hepatitis C, Incidence Rate	26.1	38.3	54.2	65.1	NA
Sexually Transmitted Disease Incidence Rate:	369.7	152.8	173.6	372.6	440.1
Gonorrhea	98.6	37.9	34.0	83.1	113.6
Chlamydia	271.1	114.9	139.5	289.5	326.5

Peer Counties: Litchfield, New London, Tolland

APPENDIX 6: DATA SOURCES

Data Type	Years Used	Source
Birth	2002-2004	Connecticut Dept. of Public Health - Office of Vital Records
Mortality	2002-2004	Connecticut Dept. of Public Health - Office of Vital Records
Hospital Inpatient	FY 2004,2005, 2006	ChimeData – Connecticut Hospital Association
Hospital ED	FY 2004, 2005, 2006	ChimeData – Connecticut Hospital Association
Behavioral Risk Factor Surveillance System (BRFSS)	2003, 2004, 2005	Connecticut Dept. of Public Health, Centers for Disease Control and Prevention (CDC)
Cancer Incidence and Staging	2003-2005	Connecticut Dept. of Public Health - Tumor Registry
Infectious Disease: Hepatitis C, Chlamydia/ Gonorrhea	2002-2006	Connecticut Dept. of Public Health – Bureau of Community Health
Population, Income, and Education	2000, 2006 Estimate	US Census Bureau

APPENDIX 7: LISTING OF DEFINITION CODES

Indicator	Defining Code(s)
MORTALITY	ICD-10 Codes
Major Cardiovascular Disease	I00-I78
Disease of the Heart	I00-I09, I11, I13, I20-I51
AMI	I21-I22
Cerebrovascular Disease	I60-I69
COPD	J40-J47
Pneumonia/Influenza	J10-J18
Smoking-Related Neoplasms	C000-C268,C64-689,C250-250,C320-C349, C530-C539
Alcohol-Related	F10, G31.2, G62.1, I42.6, K29.2, K70, K73-K74, R78.0, X45, X65, Y15
Alcohol Liver Disease	K70, K73-K74
Drug-Induced	F11-F19, R78, X40-X44, X60-X64, X85, Y10-Y14
Suicide	X60-X84, Y87.0
All Cancers	C00-C97
Female Breast Cancer	C50
Cervical Cancer	C53
Colorectal Cancer	C18-C20, C26.0
Prostate Cancer	C61
Bladder Cancer	C67
Lung Cancer	C33-C34
Malignant Melanoma	C43
Digestive System	C15-C26.9, C48-C48.2
Diabetes	E10-E14
HIV	B20-B24
All Accidents	V01-X59, Y85-Y86
Motor Vehicle	V01-V99, Y85

APPENDIX 8: KEY INFORMANTS

APPENDIX 8A: LISTING OF PERSONS INTERVIEWED

Name	Organization/Title
Margaret Arico	Manager, Public Relations & Communications, Middlesex Hospital
Stephan Allison	Program Director, Senior Center, City of Middletown
Vincent Capece	Senior Vice President; Chief Operating Officer, Middlesex Hospital
Andrew Degling, MS, OTR/L	Smoking Intervention Service, Center for Chronic Care Management, Middlesex Hospital
Elizabeth DePierro	Project Specialist, IRMA, Middlesex Hospital
Margaret Flinter, APRN	Vice President and Clinical Director, Community Health Center
Robert Grillo, MD	Chair of Psychiatry Department, Middlesex Hospital
Jane Hylan	Director of School Based Health Services, Community Health Center
Joanne Ligas, RNC	Homecare, Middlesex Hospital
Susan Martin	Vice President Finance, Middlesex Hospital
Laura Martino	Vice President Development, Middlesex Hospital
Susan Menichetti	Vice President Operations, Middlesex Hospital
Edwina Ranganathan, MSW, LADC	Rushford
Catherine Rees, MPH	Community Benefit Coordinator, IRMA, Middlesex Hospital
John Santopietro, MD	Mental Health Services, Middlesex Hospital
Raymond Santostefano	Director, Parks & Recreation, City of Middletown
Michael Saxe, MD	Chair of Emergency Medicine Department, Middlesex Hospital
Katherine Schneider, MD, M.Phil	Chief Medical Officer, IRMA, Middlesex Hospital
Patricia M. Winter, BSN RN-BC	Chronic Heart Failure Management, Center for Chronic Care Management, Middlesex Hospital

**APPENDIX 8B: LISTING OF PERSONS CONSULTED IN IDENTIFYING LINKAGES TO
COMMUNITY PROGRAMS**

Name	Organization/Title
Domenic Biello, MSN,RN	Psychiatry, Middlesex Hospital
Jack Boehme	Laboratory, Middlesex Hospital
Thomas Bondarchuk, BA, MS, C-APRN	Homecare, Middlesex Hospital
Gail Brock, PT, MCSP	Administrative Director Rehabilitation Services and Hand Therapy and Occupational Medicine, Middlesex Hospital
Jane Buss, MD	Connecticut Valley Hospital
Jackie Calamari, MS, BSN, RN, CEN	Director Emergency Departments, Satellite Facilities, Middlesex Hospital
Kimberly M. Daniels, PSY.D	Mental Health Services, Middlesex Hospital
Terri DiPietro, OTR/L, MBA	Director of Outpatient Mental Health, Middlesex Hospital
Winsome Donaldson, PT MS	Homecare, Middlesex Hospital
Tricia Downey	Program Director, Hospice & Palliative Care, Middlesex Hospital
Beth Fisher	Director of Programs, KUHN Employment Opportunities, Inc.
Brad Fowler, EMT-P, RT(R)	EMS Department, Middlesex Hospital
Steven Gersten, MD	Neuropsychiatry Practice, Middletown
Mary-Caryl Goff, LCSW	Social Services, Middlesex Hospital
Joyce Gootkin	Information Specialist, Senior Resources Agency on Aging
George Grady, LCSW	Social Services, Middlesex Hospital
Robert Grillo, MD	Chair of Psychiatry Department, Middlesex Hospital
Lisa M. Kaveney, MS	Director of Operations, Gilead Community Services, Inc.
Ronald R. Krom	Executive Director, St. Vincent DePaul Place
Eileen Lader, MA	Family Advocacy Program, Middlesex Hospital
Joanne Ligas, RNC	Homecare, Middlesex Hospital
Raymond Minor	Homecare, Middlesex Hospital
Margaret O'Donoghue, MD	Neurology, Middlesex Hospital
Office of Daniel Belin, MD	Rheumatology Practice, Middletown
Office of Gary Lian, MD	Neurology Practice, Essex
Office of Christopher Sinclair, MD	River Valley Neurology, Middletown
Office of Peter Pace, MD	Middlesex Hospital Pulmonology
Office of Kort Knudson, MD	Middlesex Diabetes & Endocrinology, Middletown
Carey A. O'Neill, PSY.D	Mental Health Services, Middlesex Hospital
Victor Pallet	Rushford (MISA Program)
Edwina Ranganathan, MSW, LADC	Rushford
Howard D. Reid	Director, River Valley Services
Edward Roberts	Director of Contracting, IRMA, Middlesex Hospital
William Savinelli, MS, LPC, LADC	Director of Adult Addiction Services, Rushford Center

APPENDIX 8B: LISTING OF PERSONS CONSULTED (CONTINUED)

Name	Organization/Title
Susan Serkey	MHS Primary Care
Pauline Simko	Lifeline, Middlesex Hospital
Nancy Sinkowski	Director of Patient Services, Connecticut VNA
Denise Slater, RN, BC	Cardiac Rehab., Middlesex Hospital
Jill Tierney, BSN, RN, CCM	Director of Case Management, IRMA, Middlesex Hospital
Maria Tomasetti	Family Services Coordinator, Alzheimer's Association, CT Chapter
Linda Worden, BSN, MPH	Director of Clinical Services, Senior Whole Health
Stephen Wyatt, MD	Psychiatry, Middlesex Hospital

APPENDIX 9: DEFINITIONS OF INDICATORS

- √ **ACS** = Ambulatory Care Sensitive
The hospital admission rate for ACS conditions is used as a measure of access to and need of primary medical care in a community. ACS conditions are those that are less likely to result in hospitalization when treated on an outpatient basis with high quality primary medical care and good patient compliance.²⁷ Therefore, higher rates of hospitalizations for ACS conditions may be an indication of poorer access to and/or quality of primary care in an area. Those conditions considered to be ambulatory care sensitive are:
- Adult and Child Ear Infection
 - Chronic Obstructive Pulmonary Disease (COPD)
 - Adult and Child Bronchitis & Asthma
 - Cardiac Arrest
 - Chest Pain
 - Cellulitis
 - Respiratory Infection & Inflammation
 - Adult and Child Pneumonia
 - Heart Failure & Shock
 - Hypertension (High Blood Pressure)
 - Angina Pectoris
 - Diabetes
- √ **AMI** = Acute Myocardial Infarction, commonly referred to as a heart attack
- √ **Annual Household Income** = The reported annual household income for each region, the peers, and the state is the average household income in that region (Source: Claritas), the reported annual household income for the U.S. is the median household income of the U.S. (Source: U.S. Census Bureau).
- √ **ARDI** = Alcohol-Related Disease Impact
ARDI Software has been developed for the Centers for Disease Control (CDC) to permit calculation mortality associated with alcohol use and misuse. The mortality related measure is computed for 35 diagnoses related to alcohol use and misuse.
- √ **Obesity** = Women with a body mass index of ≥ 27.3 , and men with a body mass index of ≥ 27.8 .
- √ **Chronic Heavy Drinking** = Two or more drinks of alcohol every day over the past 30 days.
- √ **Current Smoker** = Respondents who have smoked at least 100 cigarettes in lifetime, and reported smoking currently.
- √ **Former Smoker** = Respondents who have smoked 100 cigarettes in lifetime but currently do not smoke.
- √ **HIV/AIDS** = Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
- √ **Incidence Rate** = the number of new cases of a particular disease or condition that develop in a population of individuals during a specified period of time.

²⁷ Billings, J. D., Hasselblad, V. A preliminary study: use of small area analysis to assess the performance of the outpatient deliver system in New York City. November 24, 1989 (Unpublished manuscript available from the Codman Research Group, Inc., Lyme, New Hampshire).

- √ **Infant Deaths** = Deaths to a live born infant less than 1 year old
- √ **Neonatal Deaths** = Deaths to a live born infant less than 27 days old
- √ **Physical Activity** =
 - No Physical Activity** = Survey respondents who reported no physical activity for exercise in the past month.
 - Vigorous Physical Activity** = Survey respondents who reported engaging in physical activity for exercise for 30 minutes or more at least 5 times a week.
- √ **PNC** = Prenatal Care
- √ **Kessner Index** = The Kessner Index is a measure of the adequacy of prenatal care being provided in a community. The Index is based upon the month PNC began, the number of visits, and the gestational age at birth.

The classification of prenatal care as adequate, intermediate or inadequate is derived from the Institute of Medicine’s Three-Factor Prenatal Care Index. The classes of care are in accordance with recommendations for prenatal care set by the American College of Obstetricians and Gynecologists and the World Health Organization. This classification scheme accounts for length of gestation by requiring fewer prenatal visits for pregnancies with short gestation time. Records with missing information (i.e., last normal menstrual period, gestation weeks, number of visits, or month prenatal care began) are assigned to the inadequate prenatal care category.

The gestation weeks are calculated by subtracting the last menstrual date from the child’s birth date. If the last menstrual date is missing from the birth record, the doctor’s (or other medical professional’s) estimate of gestation is used. The accuracy of the level of prenatal care is as reliable as the information provided by the mother and her caregiver.

The table below shows the Institute of Medicine’s Three-Factor Prenatal Care Index.

Prenatal Care	Gestation (Weeks)	Number of Prenatal Visits
ADEQUATE (Includes women who started their first prenatal visits within the first three months of pregnancy)	13 or less	1 or more or not stated
	14 – 17	2 or more
	18 – 21	3 or more
	22 – 25	4 or more
	26 – 29	5 or more
	30 – 31	6 or more
	32 – 33	7 or more
INADEQUATE (Includes women who started care within the third trimester)	34 – 35	8 or more
	36 or more	9 or more
	14 – 21	0 or unstated
	22 – 29	1 or less or unstated
	30 – 31	2 or less or unstated
INTERMEDIATE	32 – 33	3 or less or unstated
	34 or more	4 or less or unstated
	Unstated	
	All combinations not stated above	

√ **Prevalence Rate** = the proportion of individuals in a population who have a particular disease or condition at a specific point in time

√ **Premature Delivery** = Delivery following a pregnancy of a gestational period less than 37 weeks.

√ **VBAC** = Vaginal Birth after C-Section.

√ **3+ Chronic Diseases** = The diseases included in this measure are diabetes, hypertension, hypercholesterol, heart disease, lung disease, cancer, arthritis, asthma, depression, substance abuse, and psychiatric conditions other than depression.

√ **Wellness Profile** =

Well = Survey respondents that had never been diagnosed with any of the three long-standing conditions (hypertension, high cholesterol, or diabetes), that reported their health as excellent, very good, or good, had good functional health, and, if over 35 years old, did not smoke and were not *at risk for overweight* based on their body mass index.

At Risk for Future Medical Problems = Survey respondents never diagnosed with any of the three long-standing conditions (hypertension, high cholesterol, or diabetes), but were 35 years of age or older and smoked cigarettes regularly or were *at risk for overweight* based on their body mass index.

Some Health Problems = Survey respondents who reported their health as fair or poor, had reduced functional health, or had been diagnosed with high blood pressure, high cholesterol or diabetes.

Not Well = Survey respondents that have been diagnosed with all three long-standing conditions (hypertension, high cholesterol, or diabetes), or had been diagnosed with at least one chronic disease and reported their health as either fair or poor or experienced significant functional health problems.

Formulae:

$$\text{Hospital Admission Rate} = \frac{\text{Admissions}}{\text{Population}} \times 100,000$$

$$\text{Average Mortality Rate} = \frac{\text{Total Deaths}}{\text{Total Population}} \times 100,000$$

$$\text{Cancer Incidence Rate} = \frac{\text{Cancer Incidence}}{\text{Total Population}} \times 100,000$$

$$\text{Infant (or Neonatal) Mortality Rate} = \frac{\text{Infant Deaths (or Neonatal Deaths)}}{\text{Total Births}} \times 1,000$$

$$\text{Low Birthweight Rate} = \frac{\text{Low Birthweight Births}}{\text{Total Births}} \times 1,000$$

$$\text{Teen Birth Rate} = \frac{\text{Total Births (Age 10-17)}}{\text{Female Population (Age 10-17)}} \times 1,000$$

$$\% \text{ Prematurity} = \frac{\text{Total Births of <37 Weeks Gestation}}{\text{Total Births}} \times 100$$

Note: All case weights used were developed by HCFA based on DRG payments



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