ASTHMA IN NEW ENGLAND

Part I: Adults

A Report by the

New England Asthma Regional Council

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May 2003

Acknowledgments

This report was commissioned by the New England Asthma Regional Council (ARC), a program of The Medical Foundation. ARC's mission is:

"To reduce the impact of asthma on children and families across New England through collaborations of health, housing, education, and environmental organizations, with particular focus on the contribution of schools, homes, and communities to asthma and to the disproportionate impact of the disease on low income and/or minority populations."

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The Asthma Regional Council, the U.S. Department of Health and Human Services, Region I (New England), and the six New England states would like to acknowledge ORC Macro, the BRFSS contractor for all six New England states, for adding the childhood asthma questions at no additional charge in 2001. We also want to thank the Jessie B. Cox Charitable Trust, a New England philanthropy, for helping to underwrite the cost of the development of this report, and the Centers for Disease Control and Prevention (CDC) for providing funding to the states to conduct the Behavioral Risk Factor Surveillance System (BRFSS).

The cooperation and efforts of the following BRFSS Coordinators in New England are also acknowledged:

Connecticut:	*Mary Adams, MPH (former)*
	Diane Aye, MPH, PhD (current)
Maine:	*Judith Graber, MS*
Massachusetts:	*Zi Zhang, MPH, MD*
New Hampshire:	*Jo Porter, MPH*
Rhode Island:	*Jana Hesser, MA, PhD*
Vermont:	*Rodney McCormick, PhD*

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Asthma in New England

A Report by the New England Asthma Regional Council

OVERVIEW

Asthma is a chronic inflammation of the airways that causes episodes of wheezing, coughing, and difficulty in breathing. It is among the most common diseases in the U.S. An estimated 15 million people suffer with asthma, and it is estimated to cost the nation about $12.7 billion each year.[1] The disease often begins in childhood and is one of the leading causes of school absence, missed workdays, emergency room visits, and hospitalizations. Between 1980 and 1994, self-reported asthma prevalence rates increased 75% in the U.S., with increases evident in all age groups.[2]

The causes of asthma are unknown. What we do know is that indoor and outdoor environmental conditions can exacerbate the disease. Environmental factors such as air pollution, mold and mildew, dust, pets, climate, cigarette smoke, and certain respiratory illnesses can trigger asthma attacks. There is speculation that environmental conditions may even contribute to the onset of asthma. It is clear that there is still a great deal more to be learned about causation and exacerbation.

Recognizing the urgent need to better understand and address the asthma epidemic, the New England Asthma Regional Council (ARC) was launched in November 2000 by the federal Region I (New England) offices of the Department of Health and Human Services (DHHS), the Environmental Protection Agency (EPA), and the Department of Housing and Urban Development (HUD) in partnership with state leaders from agencies and organizations with similar missions, as well as the U.S. Department of Education. ARC now brings together these federal and state governmental officials, along with community based and academic organizations from the fields of public health, education, housing, health care and the environment, to address asthma from a regional, multi-disciplinary perspective.

ARC's main purpose is to provide a mechanism for all players to work beyond state boundaries for answers and meaningful solutions to the environmental aspects of asthma, because air pollution has no prescribed political or geographic boundaries. Leaders with knowledge, resources and determination within the six New England states have joined forces through ARC to swiftly identify and implement solutions to improve the lives of those with asthma. This is a novel way of doing business by anyone's standards, and it is receiving nationwide attention for its innovative approach to environmental public health issues.

ARC pursues its goal of reducing the environmental contributors to asthma through five core projects: 1) persuading builders of affordable housing to construct asthma-friendly housing; 2) encouraging demand for pollution-control technologies and cleaner fuels for diesel school buses 3) promoting healthier indoor air quality in schools 4) encouraging the clinical research and health care systems to work together to better understand which environmental interventions help reduce indoor asthma triggers, and then working with payers to support these interventions and 5) building a robust asthma surveillance system across New England to better understand how the disease is influenced by outdoor and indoor air quality.

A significant aspect to the fifth project described above involves knowing how, when and where asthma manifests itself across the entire New England region. However, individual states have historically defined and collected asthma data differently, so comparisons made

on a state-by-state basis have been akin to comparing apples and oranges. Collecting uniform data across the region is a first step towards a goal of analyzing information in a consistent manner so that prevalence comparisons can be studied in meaningful ways and connections to the environment can be researched, understood and addressed.

To better understand the burden of asthma in the New England region, ARC and DHHS convened public health surveillance professionals from the six New England states to investigate asthma rates in a collective fashion using the Behavioral Risk Factor Surveillance System (BRFSS) in 2001. The BRFSS is a telephone survey of randomly selected non-institutionalized adults conducted in all 50 states and some territories and is coordinated by the Centers for Disease Control and Prevention (CDC).[3] In 2000, state-specific asthma prevalence rates first became available for all 50 states when the BRFSS included required common questions about adult asthma.[4]

In New England, the 2001 BRFSS survey included these common questions about adult asthma; in addition ARC negotiated with the six states for the addition of two common questions to specifically address childhood asthma. Questions for adults and children were similar and addressed whether the adult respondent (or a child in the household for whom adults were providing information) had (1) ever been told by a doctor, nurse, or other health professional that they had asthma, and (2) whether the adult/child still had asthma.

The BRFSS collaboration described above has led to a two-part ARC report. This report is Part I, which focuses on adult asthma rates in New England. Part II, which is expected out later in 2003, will focus on childhood asthma rates in New England. With respect to Part I, we have first summarized the results in New England as compared to the rest of the United States (Part A below, as well as Figures 1-5 and Table 1); Part B, as well as Figures 6-7 and Table 2, addresses some of the specific findings about adult asthma in New England. The report concludes with discussion and recommendation sections. Please note that technical details of the BRFSS methods and the demographics of the survey sample are in the Appendix.

RESULTS

A. New England Compared with the Rest of the U.S.

In the 2001 Behavioral Risk Factor Surveillance System (BRFSS), five of the six New England states had self-reported asthma rates among the highest of the 50 states. *For the New England region as a whole, the self-reported adult asthma rate was 8.9% (8.5-9.4)[i], a rate significantly higher than the combined rate for the other 44 states and three territories that participate in the BRFSS, which was 7.1% (6.9-7.3), (Figure 1).* This difference was consistent for both men and women, across three age groups, and for white (non-Hispanic) and Hispanic adults, as shown in Table 1 and Figures 2-4. Rates for blacks and older adult age groups were not significantly higher in New England. As noted in Figure 5, rates for five of the six New England states were similar, and not significantly different[ii] from each other.[5] These five states had asthma rates that were significantly higher[ii] than the rest of the U.S., while the rate for the sixth state (Connecticut), was also higher, but not significantly so. Based on these results, an estimated 941,500 adults in New England currently have asthma.

[i] Confidence intervals (CI) are provided in parentheses following point estimates in the text, and also in Tables. The CI is a range of values around the estimated value within which the "true" value probably lies. If the survey were repeated many times, the "true" value would be expected to lie within this range 95 times out of 100 (for a 95% CI as reported here).

[ii] Significant difference based on non-overlapping confidence intervals.

Figure 1. Source: Behavioral Risk Factor Surveillance System (BRFSS)-2001

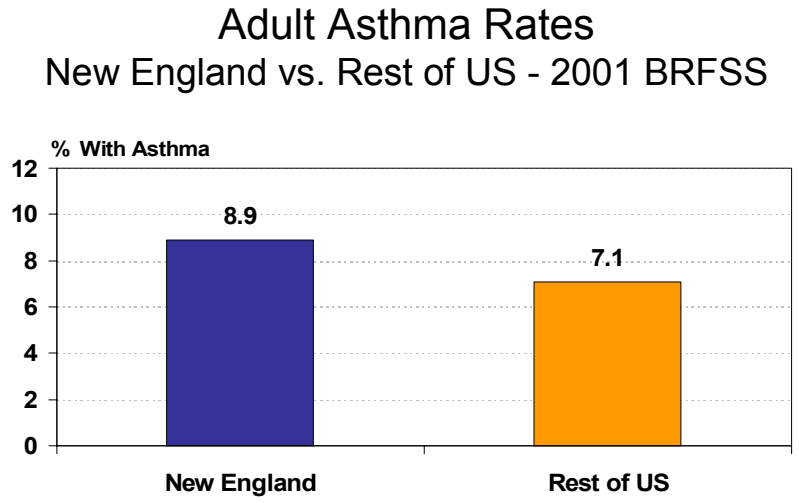

Table 1.
Current Asthma in Adults - BRFSS 2001
New England and the Rest of the U.S.

	New England		Rest of the U.S.	
	Asthma Prevalence (%)	**Confidence Interval**	**Asthma Prevalence (%)**	**Confidence Interval**
Sex				
Male	7.0	6.4-7.6	5.3	5.0-5.6
Female	10.8	10.2-11.4	8.8	8.6-9.1
Total	8.9	8.5-9.4	7.1	6.9-7.3
Age				
18-24	13.0	11.2-15.0	8.3	7.6-8.9
25-34	9.9	8.9-10.9	7.1	6.7-7.6
35-44	8.8	8.0-9.8	6.8	6.4-7.2
45-54	8.2	7.3-9.2	7.2	6.8-7.7
55-64	8.6	7.6-9.8	7.4	6.9-7.9
65+	6.6	5.8-7.5	6.5	6.1-7.0
Race/Ethnicity				
White	9.0	8.5-9.5	7.1	6.9-7.4
Black	9.1	7.3-11.2	8.5	7.8-9.3
Hispanic	9.5	8.0-11.4	6.0	5.5-6.7

Shading denotes significant difference between New England and the Rest of the U.S. based on non-overlapping confidence intervals. Rest of U.S. includes 44 states plus the District of Columbia, Puerto Rico, Guam, and Virgin Islands

Figure 2. Source: Behavioral Risk Factor Surveillance System (BRFSS)-2001

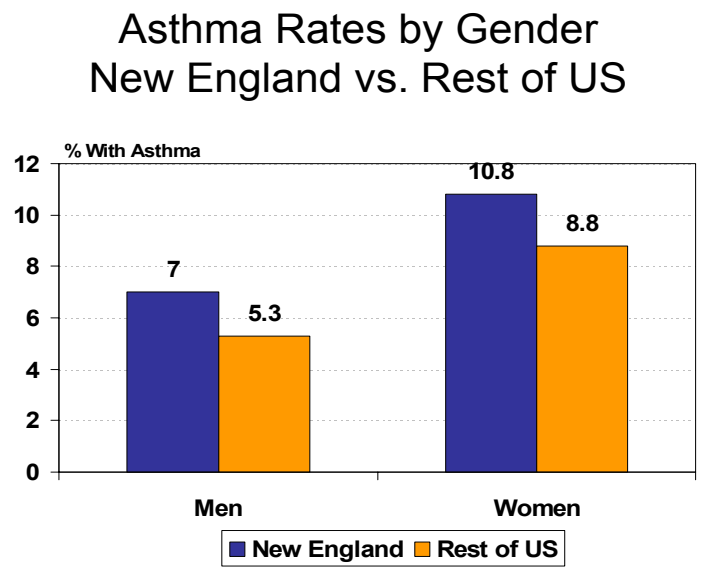

Figure 3. Source: Behavioral Risk Factor Surveillance System (BRFSS)-2001

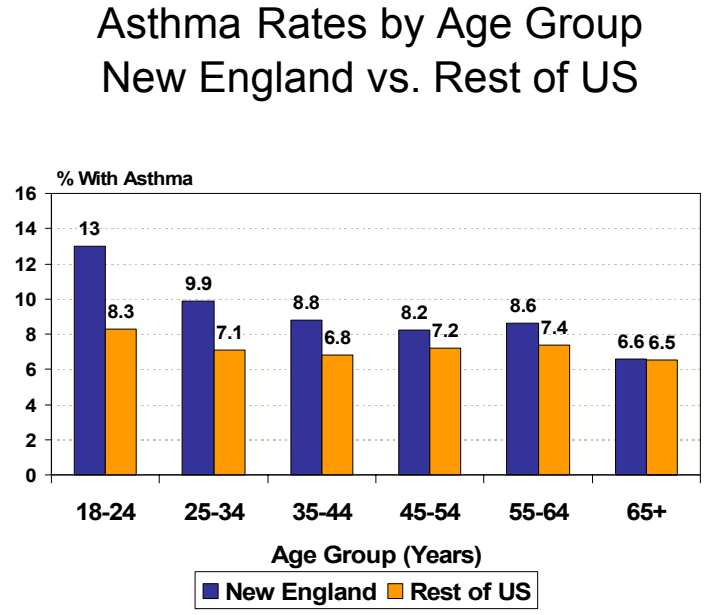

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Figure 4. Source: Behavioral Risk Factor Surveillance System (BRFSS)- 2001

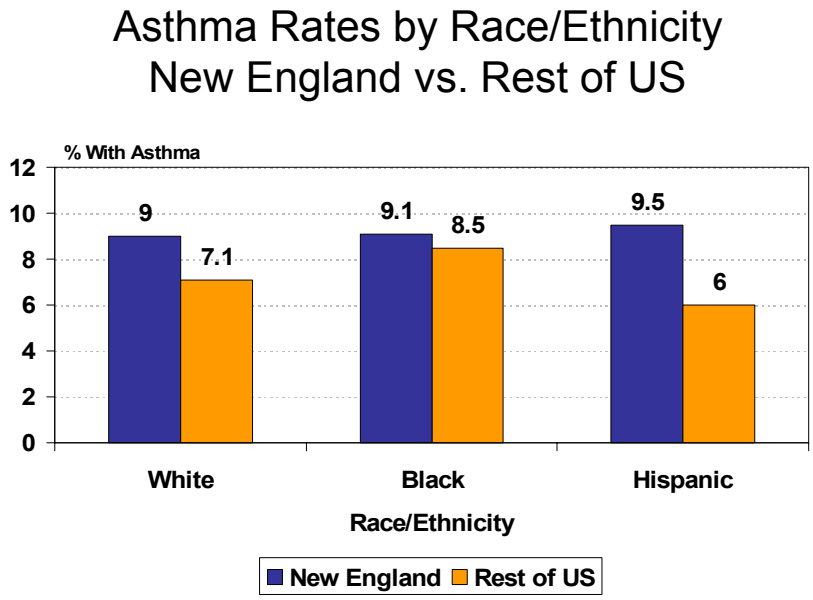
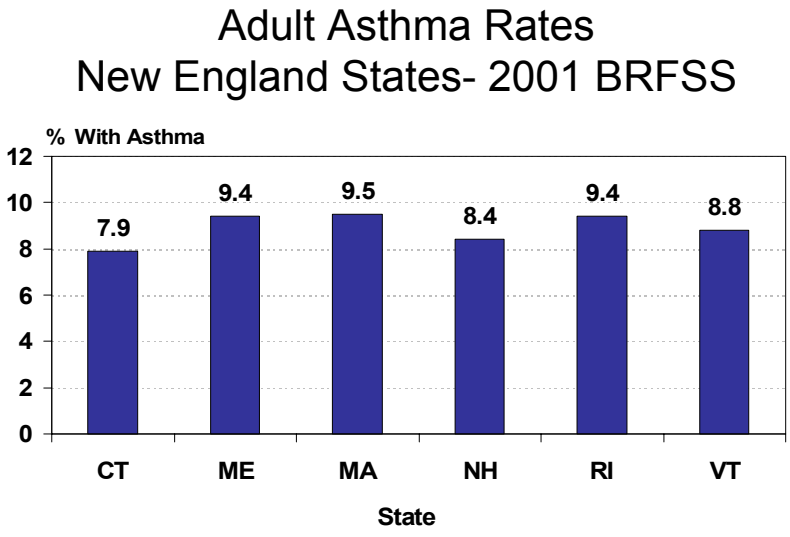


Figure 5. Source: Behavioral Risk Factor Surveillance System (BRFSS)- 2001



*** Of the top seven U.S. states with the highest self-reported adult asthma rates in 2001, five of them are from New England**

B. Asthma among New England Adults

Regional adult asthma prevalence broken down by various categories is shown in Table 2.* Although individual states may differ slightly from one another, the purpose of this report is to show the combined results for the six New England states. The New England data were further examined to better understand the relationship of asthma to other factors. Significant factors are summarized in the bulleted highlights below, with selected graphs shown as Figures 6-7. Except where noted, "asthma" refers to currently having asthma.

Highlights: Asthma among New England Adults, 2001 BRFSS

- Women were more likely than men to report ever having had asthma and to report they still had asthma (10.8% vs. 7.0%).
- Asthma prevalence was associated with age, with adults ages 18-24 most likely to report asthma while those age 65 and over were the least likely to report it (13.0% vs. 6.6% respectively).
- Self-reported current asthma rates were similar for black (non-Hispanic),white (non-Hispanic), and Hispanic adults.
- Adults with household incomes below $25,000 were more likely than those in other income groups to report asthma. (Figure 6)
- Asthma was associated with poorer self-reported health status; 23.8% of adults with asthma reported fair or poor health compared with 10.9% of those without asthma.
- Obese adults and smokers were more likely to report asthma than the non-obese and non-smokers. Obesity was defined as having a body mass index (BMI) of 30 or greater and overweight is a BMI of 25-29.99. (Figure 7)
- Asthma was associated with disability, defined as "limited in any way in any activity because of physical, mental or emotional problems." (Note that this is a specific definition of disability based on this single BRFSS question and that results using a different definition may differ.)

* Unless otherwise noted, differences and comparisons reflect significant differences based on Chi Square tests. See Table 2. for confidence intervals and P values of tests.

Table 2.
Current Asthma Among Adults - BRFSS 2001
New England Region Combined (n=31,156)

	Asthma Prevalence (%)	Confidence Interval		Asthma Prevalence (%)	Confidence Interval
Sex			**Household Income**		
Male	7.0	6.4-7.6	<$25,000	11.9	10.9-13.1
Female	10.8	10.2-11.4	$25-50,000	8.4	7.6-9.3
Total	8.9	8.5-9.4	$50-75,000	8.4	7.5-9.5
P value	<0.001		≥$75,000	8.1	7.2-9.0
Age			P value	<0.001	
18-24	13.0	11.2-15.0	**Health Insurance Status**		
25-34	9.9	8.9-10.9	Insured	9.1	8.7-9.6
35-44	8.8	8.0-9.8	Uninsured	7.4	6.1-9.0
45-54	8.2	7.3-9.2	P value	0.0475	
55-64	8.6	7.6-9.8	**Self-reported Health Status**		
65+	6.6	5.8-7.5	Ex/V. good	6.9	6.4-7.4
P value	<0.001		Good	9.8	9.0-10.8
Race/Ethnicity			Fair/poor	17.7	16.1-19.5
White	9.0	8.5-9.5	P value	<0.001	
Black	9.1	7.3-11.2	**Smoking Status**		
Hispanic	9.5	8.0-11.4	Current smoker	10.1	9.1-11.2
Other	7.9	6.4-9.8	Non-smoker	8.6	8.2-9.1
P value	0.588		P value	0.010	
Employment Status			**Weight Category**		
Employed	8.3	7.8-8.8	Obese	13.2	12.0-14.5
Unemployed	12.7	10.5-15.3	Overweight	8.1	7.4-8.8
Unable to work	22.3	19.5-25.5	Neither	7.8	7.2-8.5
Retired	6.6	5.8-7.4	P value	<0.001	
Student	14.3	11.0-18.4	**Disability Status**		
Homemaker	9.4	7.7-11.3	Disabled*	18.1	16.7-19.5
P value	<0.001		Not disabled	7.2	6.7-7.6
			P value	<0.001	

* Limited in any way in any activities because of physical, mental, or emotional problems
P values are from Chi square test of association; P<0.05 indicates significant difference

Figure 6. Source: Behavioral Risk Factor Surveillance System (BRFSS)- 2001

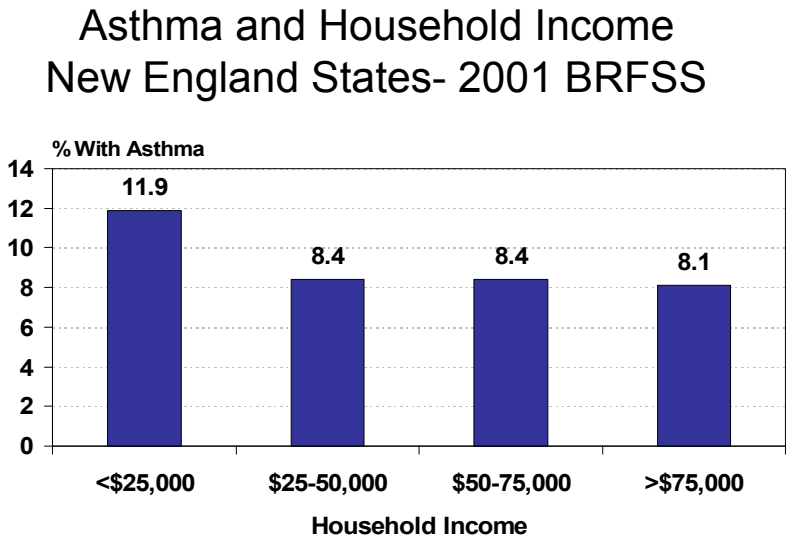
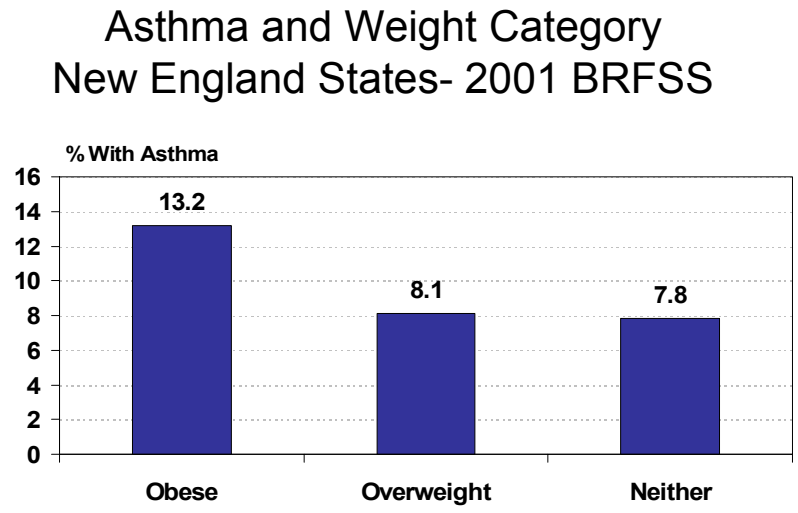


Figure 7. Source: Behavioral Risk Factor Surveillance System (BRFSS)- 2001



DISCUSSION

Based on the data analyzed through the 2001 BRFSS survey, asthma rates among New England adults are higher as compared to adults in the rest of the United States. This is true of every state in the region. This finding appears to be consistent across gender, age groupings, and white (non-Hispanic) and Hispanic adults. Further, five New England states comprise the top seven states in the country with the highest adult asthma rates.

The reasons for the high asthma rate among New England adults are not clear. Although variations between state or regional populations by age, gender, or race could be expected to affect the results, it is unlikely that they were a significant contributor here. (See Appendix Table A, for demographic comparisons.) For instance, while New England and the rest of the U.S. differ in racial and ethnic composition, the asthma rates in New England were similar for whites, blacks and Hispanics. Further, where asthma rates vary considerably across age groups both nationally and locally, the age distribution in New England was quite similar to the age distribution in the rest of the U.S. As shown in Figures 3 and 4, the differences in asthma rates between New England and the rest of the U.S. appeared to be greatest for younger adults and Hispanics. A disproportionately younger population in New England might be thought to account for a higher asthma rate, but that is clearly not the case based on demographic comparisons. The higher adult asthma rate in New England also cannot be attributed to a singularly elevated rate in one or two states, since the rate was relatively consistent across five of the six states.

A number of factors associated with asthma may be responsible for the higher levels of this disease in New England. For example, indoor and outdoor air quality may play a role. Occupational exposures, the quality and age of the housing stock, and seasonal changes that can affect allergies may also contribute to regional differences in asthma rates. Further, health care providers may use different criteria for diagnosing asthma in different parts of the country, leading to higher reporting rates. Continued investigation of these and other issues are needed to better understand the dynamics behind the results reported here. These findings also suggest potential public health and economic effects of asthma that warrant further study. For example, in the case of the association between asthma and disability, it is unclear if the disability creates a predisposition for asthma, or whether the disability is the result of having asthma. The need for ongoing monitoring of asthma in New England using the BRFSS and other data sources is clear.

These results are subject to several limitations. Asthma was defined by self-report and the validity of this measure on the BRFSS is not known. Adults who did not respond to the survey, either because they refused to participate, lived in a household with no residential telephone, could not be reached, or lived in an institution, were not included in the BRFSS. There is no way to know if the results for adults who did not respond would be similar to those that did participate.

RECOMMENDATIONS OF THE ASTHMA REGIONAL COUNCIL

Because New England appears to be disproportionately affected by the asthma epidemic, ARC believes that it is especially urgent to develop a fast-track research agenda focused on unlocking the mystery of asthma, investigating the root causes of this disease, identifying asthma clusters, and recommending ways to better prevent and control it.

To date, the vast expenditure of research dollars on asthma have been geared to a biomedical response, focused on medical treatment and management issues. Fortunately, we have made great strides in this area, and as a result, the quality of many lives has been improved. We need to continue to ensure that our efforts to treat asthma are given attention, especially for our highest risk populations. But we also need to know more about what causes asthma in the first place, why it is growing at such alarming rates, and what communities are being most affected so that we can better target our research and response efforts. This research agenda must include:

- Creating more sophisticated asthma surveillance systems that can track prevalence across state boundaries. Common definitions and reporting of asthma must be encouraged, and consistent data must be collected that can be analyzed on both large and small geographical levels.
- Studying connections between asthma prevalence and environmental factors
- Directing research dollars to finding the root causes of asthma and its associated triggers

The Trust for America's Health issued a report[6] in July 2001 that concludes "*Given the strong link between asthma and environmental factors, health officials and medical experts agree that tracking asthma's prevalence in communities across America … is critical to fighting its wildfire spread*…. Additionally, the Trust found that *"…state officials know and are willing to do what it takes to step up the fight against asthma. They simply lack the resources. For years, the national, state, and local health agencies have been poorly funded relative to the challenges they face*…"

Fortunately, this state of affairs is beginning to change. In 2002, CDC received for the first time a $17.5 million appropriation to establish a national environmental public health tracking system. The CDC has awarded grants to four of the six New England states to either implement or plan surveillance systems that integrate data on chronic diseases with data on environmental factors. In 2003, Congress approved an additional $28 million for this purpose. We are hopeful that this investment will begin to help us understand chronic diseases and the possible environmental factors which influence them.

-END-

APPENDIX

METHODS:

The 2001 BRFSS data were obtained from www.cdc.gov/brfss. Data for all 50 states plus the District of Columbia, Guam, Puerto Rico, and the Virgin Islands were included. All results were adjusted for the number of residential telephones and the number of adults in each household to account for the probability of selection. Results were further adjusted to represent the adult population in each state, using weights for each respondent provided by CDC. This adjustment accounts for the fact that the distribution of the sample of persons interviewed is not the same as the composition of the state population by age and gender. All analyses were conducted using STATA software which takes into account the complex sample design of the BRFSS. A regional rate for New England was determined by combining the data for the six states, with STATA treating each state as a stratum in the sample design. Demographics of the New England region and the rest of the U.S. (which includes states, territories, and D.C.) from the BRFSS data are shown in Table A. The two areas are quite similar in age distribution but differ in racial and ethnic composition. Compared with the other BRFSS states and territories, New England has a higher proportion of non-Hispanic white adults and fewer minorities. Unless otherwise noted, significant differences were determined by Chi Square testing using an alpha of 0.05.

Table A.
Demographics
New England and Rest of the U.S.
2001 Behavioral Risk Factor Surveillance System

	Percentage *	
Group	New England	Rest of the U.S.
Age (years)		
18-24	12.6	12.7
25-34	17.6	18.4
35-44	21.1	20.7
45-54	18.2	18.3
55-64	12.3	12.3
65+	18.1	17.5
Race/ethnicity		
White	84.6	70.4
Black	3.4	9.4
Hispanic	6.6	12.9
Other	5.4	7.3
*Percentages are from the weighted BRFSS data that are adjusted to each state's adult population by age and gender.		

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