**Factors Associated with Asthma Management in Massachusetts**

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# Introduction

Asthma is a chronic disease that affects the lungs and is marked by chronic inflammation of airways. Airways become constricted with swelling and excessive mucous production, making it difficult to breathe. Symptoms of asthma are wheezing, coughing, and chest tightness. Sometimes the symptoms become so severe they result in an asthma attack that requires immediate medical treatment. Asthma affects individuals differently, resulting in differing severity, presentation of symptoms, and responsiveness to treatment. When not treated, asthma can cause disability and even death.

Although there is no cure, asthma exacerbations and deaths are preventable. People with asthma can control their disease and live healthy active lives. The Expert Panel Report 3 (EPR-3) was developed as a guideline for asthma diagnosis and management, based on the most current asthma knowledge and research. EPR-3 is centered on four components that have been found essential to effective asthma management: measures of assessment and monitoring; education for a partnership in asthma care; control of environmental factors and comorbid conditions that affect asthma; and pharmacologic therapy.[[1]](#endnote-1) Regardless of severity, asthma should be well controlled. The goal of effective asthma management in adults and children is to increase their quality of life and allow them to function with minimal restrictions. (<https://www.nhlbi.nih.gov/files/docs/guidelines/asthgdln.pdf>)

This report presents data from the Asthma Call-back Survey (ACBS) on a variety of factors associated with management and classifications for asthma control among adults and children in Massachusetts reporting current asthma in the Behavioral Risk Factor Surveillance System (BRFSS). While the focus herein is on asthma management and control, a companion report describing asthma prevalence in Massachusetts is available on mass.gov. (<https://www.mass.gov/asthma-prevention-and-control>). This report presented data for adults and children respectively due to CDC conducted ACBS for adults and children separately. Moreover, risk factors may vary by age.

# Data Sources

The BRFSS is a state-based system of health surveys established by the Centers for Disease Control and Prevention (CDC) in 1984. It is a continuous multimode telephone survey of adults ages18 years and older residing in a private residence or college housing and is conducted in all states as a collaboration between federal CDC and state departments of health. The landline telephone portion of the survey has been conducted in Massachusetts since 1986; a cell phone component was added in 2011. The BRFSS collects data on a variety of health risk factors, preventive behaviors, chronic conditions, and emerging public health issues. Additional information about the Massachusetts BRFSS methods can be found at the end of this report and at [www.mass.gov/dph/hsp](http://www.mass.gov/dph/hsp).

The Massachusetts Department of Public Health collects information regarding asthma management through a follow-up survey to the BRFSS, called the Asthma Call-back Survey (ACBS). Topics include: History of asthma symptoms, health care utilization, asthma education, modifications to the environment, medications, cost of care, school, daycare, co-morbid conditions, and complimentary and alternative therapy. Respondents are asked if they would be willing to be called back for a more in-depth interview regarding their or their child’s asthma if in the BRFSS survey they reported that they or their child had lifetime asthma. For more information on the BRFSS or ACBS, see: <https://www.cdc.gov/asthma/brfss/default.htm#2010>.

The limited sample size of the ACBS for adults and children due to low response rate to BRFSS or ACBS, especially, restricted the subgroup analysis in this section. Data for multiple years (2011-2014 data for adult ACBS and 2006-2010 data for child ACBS) were combined to derive more stable estimates.

Table 1. Adults Asthma Call-Back Survey Massachusetts Sample Size/ Response Rates and U.S. Medians

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Massachusetts | | U.S. |
| Sample Size | Response Rate  (%) | Median Response Rate  (%) |
| 2011 | 317 | 50.64 | 66.75 |
| 2012 | 275 | 47.99 | 62.92 |
| 2013 | 186 | 47.45 | 60.10 |
| 2014 | 189 | 42.19 | 61.23 |

Table 2. Child Asthma Call-Back Survey Massachusetts Sample Size/ Response

Rates and U.S. Medians

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Massachusetts | | U.S. |
| Sample Size | Response Rate  (%) | Median Response Rate  (%) |
| 2006 | 109 | 59.56 | 62.77 |
| 2007 | 60 | 45.46 | 63.64 |
| 2008 | 96 | 51.34 | 61.34 |
| 2009 | 94 | 61.04 | 59.22 |
| 2010 | 60 | 90.91 | 65.89 |

# Factors Associated with Asthma Management in Adults

This section presents data on adults who currently have asthma and self-reported asthma symptoms, healthcare utilization, medication, and environmental triggers at home. Asthma control among adults were assessed based on the NHLBI Expert Panel Report 3: Guidelines for the Diagnosis & Management of Asthma by considering daily asthma symptoms, nighttime awakenings due to asthma, frequency of use of “rescue” medications, lung function, interference with normal activity and exacerbations requiring oral corticosteroids.

## General Asthma Management

Figure 1. Level of Asthma Control among Massachusetts Adults with Current Asthma, 2011-2014

|  |  |  |  |
| --- | --- | --- | --- |
| **Asthma Control Level** | **N1** | **%2** | **95% CI3** |
| **Level of Asthma Control** | 677 |  |  |
| Well Controlled |  | 36.0 | 28.3 - 45.5 |
| Not Well Controlled |  | 43.6 | 34.7 - 50.2 |
| Very Poorly Controlled |  | 20.4 | 13.6 - 27.7 |

1. N is the number of respondents who had current asthma and answered the corresponding question(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

The ultimate goal of asthma management is for individuals to have “Well Controlled” asthma. Among adults with current asthma,

* 36.0% were classified as having “Well Controlled” asthma,
* 64.0% were classified as having either “Not Well Controlled” or “Very Poorly Controlled” asthma.

Table 3. Demographic and Socioeconomic Factors of Massachusetts Adults with Current Asthma by Level of Control, 2011-2014

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Well Controlled** | | **Not Well Controlled** | | **Very Poorly Controlled** | |
|  | **N1** | **%2** | **95% CI3** | **%2** | **95% CI** | **%2** | **95% CI3** |
| **Sex** | 677 |  |  |  |  |  |  |
| Male |  | 41.6 | 28.8 - 54.5 | 43.9 | 31.0 - 56.7 | 14.5 | 6.8 - 22.1 |
| Female |  | 33.5 | 22.7 - 44.3 | 43.4 | 33.9 - 52.5 | 23.1 | 14.4 - 31.8 |
| **Race/Ethnicity** | 677 |  |  |  |  |  |  |
| White, Non-Hispanic |  | 38.0 | 28.4 - 47.5 | 42.1 | 33.5 - 50.8 | 19.9 | 12.0 - 27.8 |
| All Other |  | 34.2 | 14.4 - 54.0 | 37.3 | 19.7 - 54.8 | 28.5 | 13.4 - 43.7 |
| **Age Group** | 676 |  |  |  |  |  |  |
| 18-34 |  | 47.0 | 26.9 - 67.1 | 36.4 | 19.0 - 53.7 | 16.6\* | 1.7 - 31.5 |
| 35-64 |  | 32.1 | 24.5 - 39.6 | 45.9 | 37.6 - 54.3 | 22.0 | 14.4 - 29.6 |
| 65+ |  | 25.4 | 16.6 - 34.2 | 51.2 | 40.1 - 62.3 | 23.4 | 13.9 - 32.9 |
| **Income** | 594 |  |  |  |  |  |  |
| < $25,000 |  | 27.5 | 7.1 - 48.0 | 42.4 | 26.2 - 58.6 | **30.1** | **15.4 - 44.7** |
| $25-75,000 |  | 34.4 | 23.5 - 45.4 | 45.2 | 33.5 - 56.9 | 20.4 | 9.8 - 31.0 |
| $75,000+ |  | 52.1 | 39.4 - 64.8 | 39.7 | 27.3 - 52.1 | 8.2 | 2.6 - 13.9 |
| **Education** | 675 |  |  |  |  |  |  |
| Less than high school |  | --\*\* | NA | 61.6 | 40.5 - 82.6 | 28.5 | 9.4 - 47.6 |
| High school |  | 25.3 | 11.2 - 39.3 | 33.5 | 18.8 - 48.2 | **41.2** | **22.6 - 59.9** |
| At least some college |  | 44.1 | 33.9 - 54.2 | 43.8 | 34.5 - 53.0 | 12.2 | 7.5 - 16.9 |
| **Smoking Status** | 673 |  |  |  |  |  |  |
| Current smoker |  | 23.2\* | 7.4 - 39.0 | 40.8 | 23.4 - 58.2 | 36.1 | 18.7 - 53.4 |
| Former smoker |  | 24.9 | 15.3 - 34.6 | 49.4 | 35.8 - 63.1 | 25.6 | 11.3 - 39.5 |
| Never smoker |  | 44.0 | 32.3 - 55.7 | 42.3 | 31.8 - 52.8 | 13.7 | 6.2 - 21.1 |
| **Cost as a Barrier to Care4** | 677 |  |  |  |  |  |  |
| Cost is a barrier to care |  | --\*\* | NA | 46.9 | 19.5 - 74.4 | 21.6\* | 6.2 - 37.1 |
| Cost is not a barrier to care |  | 36.9 | 29.1 - 44.7 | 43.0 | 35.2 - 50.7 | 20.2 | 13.0 - 27.3 |

1. N is the number of respondents who had current asthma answered the corresponding question(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Yes” to any of the following: a.) “Was there a time in the past 12 months when you needed to see your primary care doctor for your asthma but could not because of the cost?”, b.)”Was there a time in the past 12 months when you were referred to a specialist for asthma but could not go because of the cost?”, or c.)”Was there time in the past 12 months when you needed to buy medication for your asthma but could not because of the cost?”

\*Relative Standard Error is > 30%. Results should be interpreted with caution due to instability of the estimate.

\*\*Sample size is too small, cannot be reported.

Note: percentages do not add up to 100% due to rounding

bolded percents mean statistically significant

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* + Females were more likely to be classified as Not Well Controlled or Very Poorly Controlled, but the difference was not statistically significant.
  + Those in the ‘all other’ race/ethnicity category were more likely to be classified as “Not Well Controlled” or “Very Poorly Controlled, compared to white, non-Hispanics. However, the difference was not statistically significant because insufficient sample size.
  + As age increased, the likelihood of being classified as “Not Well Controlled” or “Very Poorly Controlled” increased, but the increase was not statistically significant.
  + Those experiencing cost barriers to asthma care in the last year were more likely to have “Very Poorly Controlled” asthma than individuals who did not report experiencing these same cost barriers. However, difference was not statistically significant.

Table 4. Measures of Impairment among Massachusetts Adults with Current Asthma, 2011-2014

|  |  |  |  |
| --- | --- | --- | --- |
| **Measures of Impairment** | **N1** | **%2** | **95% CI3** |
| **Has symptoms of asthma, past 30 days4** | 703 |  |  |
| 0 days |  | 34.1 | 26.1 - 42.2 |
| 1-8 days |  | 28.2 | 21.6 - 34.8 |
| 9-29 days |  | 24.5 | 17.5 - 31.5 |
| 30 days |  | 13.2 | 9.2 - 17.2 |
| **Sleep disrupted by asthma, past 30 days5** | 705 |  |  |
| 0 days |  | 72.3 | 65.1 - 79.0 |
| 1-2 days |  | 8.5 | 4.4 - 12.5 |
| 3-12 days |  | 10.6 | 6.3 - 14.9 |
| 13-30 days |  | 8.6 | 4.2 - 13.1 |
| **Completely symptom-free, past 2 weeks6** | 695 |  |  |
| 0 days |  | 22.5 | 16.3 - 28.6 |
| 1-10 days |  | 25.6 | 19.0 - 32.3 |
| 11-14 days |  | 51.9 | 43.9 - 59.9 |
| **Asthma attack or episode, past 12 months7** | 712 |  |  |
| Yes |  | 46.7 | 38.8 - 54.6 |
| **Limited usual activities due to asthma, past 12 months8** | 234 |  |  |
| Not at all |  | 32.7 | 20.6 - 44.7 |
| A little |  | 44.9 | 32.0 - 57.8 |
| A moderate amount or A lot |  | 22.4 | 10.0 - 34.8 |
| **Unable to work or carry out usual activities due to asthma, past 12 months9** | 692 |  |  |
| 0 days |  | 68.4 | 60.5 - 76.4 |
| 1-10 days |  | 23.6 | 16.1 - 31.1 |
| ≥11 days |  | 8.0 | 3.4 - 12.6 |
| **Had emergency department visits or other urgent care for asthma, past 12 months10** | 718 |  |  |
| None |  | 88.4 | 84.1 - 92.7 |
| 1 Visit |  | 5.7 | 3.1 - 8.3 |
| 2+ Visits |  | 5.9 | 2.4 - 9.4 |
| **Overnight hospital stay, past 12 months11** | 719 |  |  |
| Yes |  | 4.9 | 1.6 - 8.1 |

1. N is the number of respondents who had current asthma answered the corresponding question(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “During the past 30 days, on how many days did you have symptoms of asthma?”

5. “During the past 30 days, on how many days did symptoms of asthma make it difficult to stay asleep?”

6. “During the past 14 days, on how many days were you completely symptom-free that is No coughing, wheezing or other symptoms of asthma?”

7. “During the past 12 months, have you had an episode or an asthma attack?”

8. “During the past 12 months, would you say you limited your usual activities due to asthma Not at all, a little, a moderate amount, or a lot?”

9. “During the past 12 months, how many days were you unable to work or carry out your usual activities because of your asthma?”

10. “During the past 12 months, how many times did you visit an emergency room or urgent care center because of your asthma?”

11. “During the past 12 months, that is since [one year ago today], have you had to stay overnight in a hospital because of your asthma? Do not include an overnight stay in the emergency room.”

\*Relative Standard Error is > 30%. Results should be interpreted with caution due to instability of the estimate.

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* Nearly two-thirds (65.9%) reported experiencing asthma symptoms on at least one day in the past 30 days.
* More than a quarter (27.7%) reported that asthma made it difficult to sleep at least one night in the past 30 days.
* One-quarter (22.5%) reported experiencing symptoms every day over the last two weeks.
* Nearly half reported having an asthma attack or episode in the last year.
* 67.3% reported having some limitations in their usual activities.
  + 63.9% reported “a little” to “a moderate amount” of limitations
* 33.6% reported that their asthma prohibited them from working or carrying out usual activities on at least one day in the past year.
  + 23.6% reported the inability to work 1-10 days
  + 8.0% reported the inability to work ≥11 days
  + The average number of days per year of unable to work was approximately seven days (Data not shown)
* 11.6% reported ≥1 visits to the emergency room or urgent care during the past 12 months because of their asthma.
* 4.9% reported ≥1 overnight hospital stays during the past 12 months because of their asthma.

Figure 2. Asthma Self-Management Education among Massachusetts Adults with Current Asthma, 2011-2014

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Self-Management Education** | **N1** | **%2** | **95% CI3** |
| Taken a class on asthma management  4 | 722 | 4.4 | 2.5 - 6.4 |
| Received an asthma action plan5 | 722 | 31.6 | 23.6 - 39.7 |
| Taught how to use a peak flow meter6 | 722 | 50.0 | 42.2 - 58.7 |
| Taught to recognize early signs or symptoms of an asthma attack7 | 722 | 67.7 | 60.7 - 74.7 |
| Taught to respond to an asthma attack8 | 722 | 81.5 | 76.7 - 86.2 |
| Taught how to use a prescribed inhaler9 | 692 | 96.5 | 94.5 - 98.5 |
| Health professional advised to change aspects of home, school or work10 | 719 | 39.4 | 31.9 - 46.8 |

1. N is the number of respondents who had current asthma answered the corresponding question(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. Have you ever taken a course or class on how to manage your asthma?

5. Has a doctor or other health professional ever given you an asthma action plan?

6. Has a doctor or other health professional ever taught you how to use a peak flow meter to adjust your daily medications?

7. Has a doctor or other health professional ever taught you how to recognize early signs or symptoms of an asthma episode?

8. Has a doctor or other health professional ever taught you what to do during an asthma episode or attack?

9. Did a doctor or other health professional show you how to use the inhaler?

10. Has a health professional ever advised you to change things in your home, school, or work to improve your asthma?

Note: percentage of item should not add up to 100% because they were all independent questions

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* 31.6% had ever received an asthma action plan.
* 50.0% had been taught how to use a peak flow meter to adjust daily medications
* 67.7% had been taught how to detect early signs and symptoms of an asthma episode.
* 81.5 % had been taught how to respond to an asthma episode.
* 96.5 % had been taught by a health care professional to use an inhaler.

## Proactive Health care Utilization

Infrequent use of routine health care services is a risk factor in asthma exacerbations. Health care utilization in adults with current asthma is measured by the frequency of routine checkups for asthma and whether the individual has received a flu shot in the past year.

Routine visits with a health care professional about a person’s asthma provide a platform for open and unrestricted communication between the clinician, the patient and, when appropriate, the patient’s family. Through routine checkups, clinicians are able to better assess a number of factors, such as the patient’s attitude toward the management regimen, adherence to medications, and any overall concerns.

Flu vaccinations are recommended for everyone over 6 months of age, but the CDC also highly recommends them for certain subsets of the population, including people with asthma, and older adults. Although asthma does not increase one’s risk of contracting influenza, the flu can be more severe in this subset of people, regardless of their level of asthma control[[2]](#endnote-2).

Table 5. Proactive Healthcare Utilization among Massachusetts Adults with Current Asthma, 2011- 2014

|  |  |  |  |
| --- | --- | --- | --- |
| **Proactive Healthcare Utilization** | **N1** | **%2** | **95% CI3** |
| **Had routine checkup for asthma, past 12 months4** | 708 |  |  |
| None |  | 39.7 | 32.0 - 47.4 |
| 1 Visit |  | 24.7 | 18.7 - 30.8 |
| 2+ Visits |  | 35.5 | 27.7 - 43.4 |
| **Received flu vaccine, past 12 months5** |  |  |  |
| 18-64 Years of Age | 317 | 55.6 | 45.6 - 65.5 |
| 65+ Years of Age | 123 | 67.7 | 55.5 - 79.9 |

1. N is the number of respondents who had current asthma answered the corresponding question(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval

4. During the past 12 months how many times did you see a doctor or health professional for a routine checkup for your asthma?”

5. “Yes” to “During the past 12 months, have you had a flu shot?” or “During the past 12 months, have you had a flu vaccine that was sprayed in your nose?”

Note: percentages do not add up to 100% due to rounding.

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* 60.3% reported one or more routine checkups with their health professional in the past 12 months.
* 67.7% of adults aged 65 years and older reported receiving a flu vaccination within the past 12 months, while 55.6% of younger adults did. The prevalence were higher than general population (57.8% and 42.1%, respectively).

## Medication Use

There are two major classes of asthma medications: long-term control medications and quick-relief medications. Long-term control medications, or simply “control medications,” are used to achieve and maintain control of persistent asthma. Examples include corticosteroids, long-acting beta2-agonists and leukotriene modifiers. Quick-relief medications, also known as “rescue medications,” are used to treat acute symptoms and episodes of marked increases in asthma symptoms, and reduction in lung function or asthma exacerbations. Examples include short-acting beta2-agonists and anticholinergics. Figures below depict the proportions of adults with current asthma using either control or rescue medications.

Figure 3. Medication Use in the Past 3 Months among Massachusetts Adults with Current Asthma, 2011-2014

\*\*

\*\*

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Type of Medication Used in Past 3 months** | **N1** | **%2** | **95% CI3** |
| Used any prescription asthma medication4 | 722 | 65.5 | 57.0 - 74.0 |
| **Control Medications** |  |  |  |
| Used inhaled corticosteroid5 | 722 | 30.9 | 24.4 - 37.3 |
| Used inhaled long- acting beta2-agonist6 | 722 | 14.9 | 10.0 - 19.8 |
| Used leukotriene modifier7 | 722 | 10.5 | 6.1 - 14.9 |
| **Rescue Medications** |  |  |  |
| Used inhaled anti-inflammatory8 | 722 | --\*\* | NA |
| Used inhaled anticholinergic9 | 722 | --\*\* | NA |
| Used inhaled short- acting beta2- agonist10 | 722 | 24.1 | 18.3 – 29.9 |

1. N is the number of respondents who had current asthma answered the corresponding question(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Yes” to “In the past 3 months, \_\_\_\_\_\_\_\_” to any of the following: Have you taken prescription asthma medicine using an inhaler?”; Have you taken prescription asthma medication in pill form?”; Have you taken prescription asthma medication in syrup form?”; Were any of your asthma medicines used with a nebulizer?”

5.“One or more” inhaled corticosteroid in the past three months

6. “One or more” inhaled long-acting beta2-agonists in the past three months

7. “One or more” leukotriene modifier in the past three months

8. “One or more” inhaled anti-inflammatory in the past three months

9. “One or more” inhaled anticholinergic in the past three months

10. “One or more” inhaled short-acting beta2-agonists in the past three months

\*\* Sample size is too small, cannot be reported.

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* 65.5% reported using any prescription asthma medications in the past three months.
* 30.9% reported using an inhaled corticosteroid in the past three months.
* 14.9% reported using an inhaled long-acting beta2 agonist in the past three months.
* 10.5% reported using a leukotriene modifier (a control medication)in the past three months.

Figure 4. Comorbidities among Massachusetts Adults with Current Asthma, 2011-2014

|  |  |  |  |
| --- | --- | --- | --- |
| **Co-Morbidity** | **N1** | **%2** | **95% CI3** |
| Any Respiratory Disorder7 | 722 | 27.4 | 21.5 - 33.4 |
| Chronic Bronchitis4 | 715 | 23.2 | 17.6 - 28.9 |
| Emphysema5 | 715 | 8.0 | 4.7 - 11.3 |
| Chronic Obstructive Pulmonary Disease (COPD)6 | 711 | 14.7 | 10.6 - 18.9 |
| Depression8 | 717 | 37.5 | 30.0 – 45.0 |

1. N is the number of respondents who has current asthma answered the corresponding question(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Yes” to “Have you been told by a doctor or health professional that you have chronic bronchitis?”

5. “Yes” to “Have you been told by a doctor or health professional that you have emphysema?”

6. “Yes” to “Have you been told by a doctor or health professional that you have chronic obstructive pulmonary disease also known as COPD?”  
7. “Yes” to any of the following: 1) “Have you ever been told by a doctor or health professional that you have chronic obstructive pulmonary disease also known as COPD?”, 2)”Have you ever been told by a doctor or health professional that you have emphysema?”, or 3) Have you ever been told by a doctor or health professional that you have chronic bronchitis?”

8. “Yes” to “Have you ever been told by a doctor or health professional that you were depressed?”

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* 27.4% reported being told by a health professional that they also had another respiratory disorder (chronic bronchitis, emphysema, or COPD).
* Depression was the most prevalent comorbidity with 37.5% receiving a diagnosis of depression from a health care professional.

## Environmental Triggers in Homes

Asthma triggers are allergens or irritants that can cause asthma or make one’s asthma symptoms, episodes, or asthma attacks worse. Reducing exposure to known asthma triggers is imperative for effective asthma control. Common asthma triggers include any chemical, pollutant, smoke, pets, pests, mold, and dust mites. Methods for reducing asthma trigger exposure include: preventing exposure to tobacco smoke indoors, using mattress and pillow covers, and washing sheets and bed covers in hot water to reduce exposure to dust mite.

Figure 5. Environmental Asthma Triggers in Homes of Massachusetts Adults with Current Asthma, 2011-2014

|  |  |  |  |
| --- | --- | --- | --- |
| **Environmental Triggers in The Home** | **N1** | **%2** | **95% CI3** |
| Has pets inside home4 | 722 | 57.2 | 49.5 - 65.0 |
| Carpeting or rugs in bedroom5 | 721 | 51.0 | 43.3 - 58.8 |
| Gas used for cooking6 | 721 | 48.8 | 41.1 - 56.6 |
| Pets allowed in bedroom7 | 722 | 43.7 | 36.1 - 51.3 |
| Wood burning fireplace/stove8 | 722 | 20.0 | 13.4 - 26.6 |
| Smoking inside the home, past week9 | 722 | 16.2 | 11.1 - 21.3 |
| Mold inside the home, past 30 days10 | 722 | 12.7 | 8.2 - 17.3 |
| Mice or rats inside the home, past 30 days11 | 722 | 7.0 | 4.1 - 9.8 |
| Gas fireplace or unvented gas stove12 | 719 | 4.4 | 2.3 - 6.4 |
| Cockroaches inside the home, past 30 days13 | 721 | 2.1\* | 0.3 - 3.9 |

1. N is the number of respondents who had current asthma answered the corresponding questions(s).

2. Percent are weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Yes” to Does your household have pets such as dogs, cats, hamsters, birds or other feathered or furry pets that spend time indoors?

5. “Yes” to “Do you have carpeting or rugs in your bedroom?”

6. “Yes” to “Is gas used for cooking?”

7. “Yes” to “ Are pets allowed in your bedroom?”

8. “Yes” to “Is a wood burning fireplace or wood burning stove used in your home?”

9. “Yes” to “In the past week, has anyone smoked inside your home?”

10. “Yes” to “In the past 30 days, has anyone seen or smelled mold or a musty odor inside your home?”

11. “Yes” to “In the past 30 days, has anyone seen mice or rats inside your home?”

12. “Yes” to “Are unvented gas logs, unvented gas fireplaces, or unvented gas stoves used in your home?”

13. “Yes” to “In the past 30 days, has anyone seen a cockroach inside your home?”

\*Relative Standard Error is > 30%. Results should be interpreted with caution due to instability of the estimate.

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* The most commonly reported environmental exposures in the home were pets (57.2%), and carpeting or rugs in bedrooms (51.0%).
* Less commonly reported were use of gas fireplaces (4.0%), and exposure to rodents (7.0%).

### 

Figure 6. Home Modifications among Massachusetts Adults with Current Asthma, 2011-2014

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Modifications** | | **N1** | **%2** | **95% CI3** |
| Exhaust fan used in bathroom4 | 713 | | 67.4 | 60.5- 74.4 |
| Exhaust fan regularly used in kitchen5 | 712 | | 56.9 | 49.3- 64.6 |
| Sheets and pillowcases washed in hot water6 | 703 | | 37.6 | 30.5- 47.7 |
| Mattress cover used7 | 701 | | 44.1 | 36.5- 51.8 |
| Dehumidifier regularly used8 | 721 | | 31.6 | 25.0- 38.2 |
| Pillow cover used9 | 712 | | 38.3 | 30.7- 45.8 |
| Air cleaner or purifier regularly used10 | 716 | | 22.0 | 16.1- 27.9 |

1. N is the number of respondents who had current asthma answered the corresponding questions(s).

2. Percent are weighted to population characteristics.

3. 95% Confidence Interval.

4. “Yes” to “In your bathroom, do you regularly use an exhaust fan that vents to the outside?”

5. “Yes” to “Is an exhaust fan that vents to the outside used regularly when cooking in your kitchen?”

6. “Hot” to “Are your sheets and pillowcases washed in cold, warm or hot water?”

7. “Yes” to “Do you use a mattress cover that is made especially for controlling dust mites?”

8. “Yes” to “Is a dehumidifier regularly used to reduce moisture inside your home?”

9. “Yes” to “Do you use a pillow cover that is made especially for controlling dust mites?”

10. “Yes” to “Is an air cleaner or purifier regularly used inside your home?”

Data Source: 2011-2014 MA BRFSS Adult Asthma Call-back Survey

Among adults with current asthma:

* Use of an exhaust fan in the bathroom (67.4%), and in the kitchen (56.9%) were reported most often as an environmental modification.
* Regular use of an air cleaner or purifier was reported least often (22.0%).

# Factors Associated with Asthma Management in Children

This section presents the data on a variety of factors of associated with asthma management and classification for asthma control among children with current asthma. The limited sample sizes for children restricted the subgroup analysis and therefore the analyses among children are not as extensive as those among adults.

## General Asthma Management

Figure 7. Level of Control among Massachusetts Children with Current Asthma, 2006-2010

|  |  |  |  |
| --- | --- | --- | --- |
|  | **N1** | **%2** | **95% CI3** |
| **Level of Asthma Control** | 254 |  |  |
| Well Controlled |  | 33.8 | 24.8- 42.8 |
| Not Well Controlled |  | 48.0 | 38.8- 57.2 |
| Very Poorly Controlled |  | 18.2 | 10.9- 25.5 |

1 N is the number of respondents who had current asthma answered the corresponding questions(s).

2 Percent are weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3 95% Confidence Interval.

Data Source: 2006-2010 MA BRFSS Child Asthma Call-back Survey

Among children with current asthma:

* 33.8% were classified as having “Well Controlled” asthma
* 66.2% were classified as having “Not Well Controlled” (48.0 %), or “Very Poorly Controlled” asthma (18.2%).
* However, due to small sample size, the equivalent Table 3 could not be generated for children.

Table 6. Measures of Impairment among Massachusetts Children with Current Asthma, 2006-2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measures of Impairment** | | **N1** | **%2** | **95% CI3** |
| **Had symptoms of asthma, past 30 days4** | |  |  |  |
| 1+ Days | | 268 | 45.0 | 36.2 - 53.9 |
| **Nighttime awakenings, past two weeks5** |  | 270 | 21.6 | 13.9 - 29.2 |
| 0-10 Days | |  | 29.3 | 21.1 - 37.5 |
| 11-14 Days | |  | 70.7 | 62.5 - 78.9 |
| **Symptom-free days, past two weeks6** | | 273 |  |  |
| 0-10 Days | |  | 29.3 | 21.1 - 37.5 |
| 11-14 Days | |  | 70.7 | 62.5 - 78.9 |
| **Asthma attack or episode, past 12 months7** | | 273 | 52.3 | 43.4 - 61.2 |
| **Limited activity, past 12 months8** | | 272 |  |  |
| Not at all | |  | 44.8 | 35.9 - 53.7 |
| A little | |  | 39.2 | 30.6 - 47.8 |
| A moderate amount to a lot | |  | 16.0 | 9.2 - 22.8 |
| **Missed school or daycare due to asthma, past 12 months9** | | 247 | 41.1 | 32.2 - 50.0 |
| **Had emergency department visits or other urgent care for asthma, past 12 months10** | | 274 | 18.5 | 11.3 - 25.6 |
| **Overnight hospital stay, past 12 months11** | | 276 | 6.5\* | 1.2 - 11.7 |

1. N is the number of respondents who had current asthma answered the corresponding questions(s).

2. Percent are weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “During the past 30 days, how many days did [child] have symptoms of asthma?”

5. “During the past 30 days, how many days did asthma make it difficult for [child] to sleep?”

6. “During the past 2 weeks, how many days was [child] completely symptom free, that is no coughing, wheezing, or other symptoms of asthma?”

7. “During the past 12 months, how many times did [child] have an episode of asthma or an asthma attack?”

8. “During the past 12 months, would you say [child] limited [his/her] usual activities due to asthma not at all, a little, a moderate amount, or a lot?”

9. “During the past 12 months, about how many days or school did [child] miss because of his/her asthma?” or “During the past 12 months, about how many days of daycare did [child] miss because of his/her asthma?”

10. “During the past 12 months, has [child] had to visit an emergency room or urgent care center because of his/her asthma?” and “During the past 12 months how many times did [child] visit an emergency room or urgent care center because of his/her asthma?”

11. “During the past 12 months, has [child] had to stay overnight in a hospital because of his/her asthma?” and “During the past 12 months how many different times did [child] stay overnight in a hospital because of his/her asthma?”

Note: Subcategories were selected to correspond to the EPR-3 Guidelines when possible. Subcategories were collapsed to derive more stable estimates when possible.

Data Source: 2006-2010 MA BRFSS Child Asthma Call-back Survey

From 2006 to 2010, among Massachusetts children with current asthma, approximately:

* + 45.0% experienced symptoms of asthma at least once within the past 30 days.
  + 70.7% were completely symptom-free for more than 10 days in the last two weeks.
  + 52.3% reported having at least one asthma attack in the last 12 months.
  + 41.1% reported having missed school or daycare in the past 12 months due to asthma (average of approximately 2.1 days).
  + 18.5% visited the emergency room or urgent care centers in the past 12 months due of their asthma.

Table 7. Asthma Self-Management Education among Massachusetts Children or Caretakers with Current Asthma, 2006-2010

|  |  |  |  |
| --- | --- | --- | --- |
| **Self-Management Education** | **N1** | **%2** | **95% CI3** |
| Taken a class on asthma management4 | 275 | 8.4 | 4.6 - 12.1 |
| Received an asthma action plan5 | 269 | 49.6 | 40.7 - 58.4 |
| Taught how to use a peak flow meter6 | 272 | 50.8 | 41.8 - 59.7 |
| Taught to recognize early signs and symptoms of an asthma attack 7 | 275 | 85.9 | 79.3 - 92.5 |
| Taught response to an asthma attack 8 | 274 | 91.7 | 87.7 - 95.8 |
| HCP showed how to use inhaler9 | 242 | 98.1 | 95.9 -100.0 |
| HCP advise to change environment (such as aspects of home, school or work)10 | 272 | 45.0 | 36.1 - 53.8 |

1. N is the number of respondents who had current asthma answered the corresponding questions(s).

2. Percent are weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Have you [or child] ever taken a course or class on how to manage your asthma?”

5. “Has a doctor or other health professional ever given you [or child] an asthma action plan?”

6. “Has a doctor or other health professional ever taught you [or child] how to use a peak flow meter to adjust your daily medications?”

7. “Has a doctor or other health professional ever taught you [or child] how to recognize early signs or symptoms of an asthma episode?”

8. “Has a doctor or other health professional ever taught you [or child] what to do during an asthma attack or episode?”

9. “Did a doctor or other health professional show [child] how to use the inhaler?” or “Did a doctor or health professional watch [child] use the inhaler?”

10. “Has a health professional ever advised you to change things in [child’s] home, school, or work to improve his/her asthma?”

Data Source: 2006-2010 MA BRFSS Child Asthma Call-back Survey

Among children with current asthma:

* The five-year average annual percentage of asthma self-management education varied by educational components.
* A majority of children or caretakerswere taught to recognize early signs and symptoms of an asthma episode, taught what to do during an asthma attack and shown how to use an inhaler (85.9%, 91.7%, and 98.1% respectively).
* Approximately 8.4% of children or caretakerswith current asthma had taken a class on how to manage their asthma; the least commonly reported method of self-management education.

## Proactive Health Care Utilization

Table 8. Proactive Healthcare Utilization among Massachusetts Children with Current Asthma, 2006- 2010

|  |  |  |  |
| --- | --- | --- | --- |
| **Proactive Healthcare Utilization** | **N1** | **%2** | **95% CI3** |
| Had routine checkup for asthma, past 12 months4 | 271 | 79.3 | 72.8- 85.9 |
| Received flu vaccination, past 12 months5 | 275 | 61.9 | 53.1- 70.6 |

1. N is the number of respondents who had current asthma answered the corresponding questions(s).

2. Percent is weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. During the past 12 months how many times did [child] see a doctor or health professional for a routine checkup for your asthma?”

5. “During the past 12 months, has [child] had a flu shot?” or “During the past 12 months, has [child] had a flu vaccine that was sprayed in his/her nose?”

Data Source: 2006-2010 MA BRFSS Child Asthma Call-back Survey

Among children with current asthma:

* More than three quarters (79.3%) reported having routine visits with their health provider, and 61.8% received a flu vaccination in the past 12 months.
* Lack use of routine healthcare services is a risk factor in asthma exacerbations and flu vaccinations are recommended for all patients over 6 months of age.

## Medication Use

Table 9. Medication Use in the Past 3 Months among Massachusetts Children with Current Asthma, 2006-2010

\*

\*

|  |  |  |  |
| --- | --- | --- | --- |
| **Medication Use, past 3 months** | **N1** | **%2** | **95% CI3** |
| Used any asthma prescription medication4 | 275 | 68.8 | 60.2 - 77.3 |
| **Control Medications** |  |  |  |
| Used inhaled corticosteroids5 | 276 | 31.1 | 23.0 - 39.2 |
| Used inhaled long-acting beta2 agonist6 | 276 | - -\* | - - - - - |
| Used leukotriene modifiers7 | 276 | 12.4 | 7.4 - 17.4 |
| **Rescue Medications** |  |  |  |
| Used inhaled anticholinergic8 | 276 | - -\* | - - - - - |
| Used inhaled short-acting beta2 agonist9 | 276 | 42.6 | 34.1 - 51.2 |
| Used any inhaled prescription medication10 | 272 | 56.1 | 47.2 - 64.9 |
| Used spacers11 | 162 | 66.3 | 56.2 - 76.5 |

1. N is the number of respondents who answered the corresponding questions(s).

2. Percent are weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Yes” to “In the past three months, \_\_\_\_\_\_\_\_” to any of the following:

Has [child] taken prescription asthma medicine using an inhaler?”

Has [child] taken prescription asthma medication in pill form?”

Has [child] taken prescription asthma medication in syrup form?”

Were any of [child’s] asthma medicines used with a nebulizer?”

5. “One or more” inhaled corticosteroid in the past three months

6. “One or more” inhaled long-acting beta2-agonists in the past three months

7. “One or more” leukotriene modifier in the past three months

8. “One or more” inhaled anticholinergic in the past three months

9. “One or more” inhaled short-acting beta2-agonists in the past three months

10. “One or more” inhaled prescription asthma medications in the past three months

11. “Yes” to “Does [child] use a spacer with [list of medications taken with an inhaler]?”

\* Sample size is too small, cannot be reported.

Data Source: 2006-2010 MA BRFSS Child Asthma Call-back Survey

Among children with current asthma:

* 66.3% of those using an inhaled prescription asthma medication used a spacer. The use of a spacer or holding chamber with an inhaler can decrease oral bioavilability and thus enhance safety and efficacy.

## Environmental Triggers in Homes

Table 10. Environmental Asthma Triggers in Home among Massachusetts Children with Current Asthma, 2006-2010

|  |  |  |  |
| --- | --- | --- | --- |
| **Environmental Triggers in the Home** | **N1** | **%2** | **95% CI3** |
| Gas used for cooking4 | 274 | 54.3 | 45.4 - 63.1 |
| Has pets inside the home5 | 274 | 53.3 | 44.5 - 62.1 |
| Carpeting or rugs in bedroom6 | 274 | 53.0 | 44.2 - 61.9 |
| Wood-burning fireplace/stove7 | 274 | 28.4 | 19.8 - 36.9 |
| Pets allowed in bedroom8 | 274 | 27.1 | 19.2 - 35.0 |
| Mice or rats inside the home, past 30 days9 | 274 | 11.9 | 6.4 - 17.5 |
| Mold inside the home, past 30 days10 | 274 | 11.3 | 6.0 - 16.6 |
| Smoking inside the home, past week11 | 274 | 4.7 | 2.3 - 7.2 |
| Gas fireplace or unvented gas stove12 | 271 | 3.8\* | 1.0 - 6.7 |
| Cockroaches inside the home, past 30 days13 | 274 | 2.5\* | 0.5 - 4.4 |

1. N is the number of respondents who answered the corresponding questions(s).

2. Percent are weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Yes” to “Is gas used for cooking?”

5. “Yes” to Does your household have pets such as dogs, cats, hamsters, birds or other feathered or furry pets that spend time indoors?

6. “Yes” to “Do you have carpeting or rugs in your bedroom?”

7. “Yes” to “Is a wood-burning fireplace or wood burning stove used in your home?”

8. “Yes” to “ Are pets allowed in your bedroom?”

9. “Yes” to “In the past 30 days, has anyone seen mice or rats inside your home?”

10. “Yes” to “In the past 30 days, has anyone seen or smelled mold or a musty odor inside your home?”

11. “Yes” to “In the past week, has anyone smoked inside your home?”

12. “Yes” to “Are unvented gas logs, unvented gas fireplaces, or unvented gas stoves used in your home?”

13. “Yes” to “In the past 30 days, has anyone seen a cockroach inside your home?”

\*Relative Standard Error > 30%. Results should be interpreted with caution due to instability of the estimate.

Data Source: 2006-2010 MA BRFSS Child Asthma Call-back Survey

Among children with current asthma:

* More than half reportedly were exposed to pets, carpeting, and gas used in cooking in their homes (53.3%, 53.0%, and 54.3%, respectively).

Table 11. Modifications in Homes among Massachusetts Children with Current Asthma, 2006-2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Modifications** | **N1** | **%2** | | **95% CI3** |
| Exhaust fan regularly used in kitchen4 | 274 | 62.7 | 54.4 - 70.9 | |
| Exhaust fan used in bathroom5 | 274 | 60.5 | 51.6 - 69.4 | |
| Sheets and pillowcases washed in hot water6 | 269 | 44.8 | 35.9 - 53.6 | |
| Mattress cover used7 | 271 | 41.5 | 32.9 - 50.0 | |
| Dehumidifier regularly used8 | 274 | 38.1 | 29.7 - 46.5 | |
| Pillow cover used9 | 272 | 38.1 | 29.6 - 46.5 | |
| Air cleaner or purifier regularly used10 | 273 | 28.8 | 20.9 - 36.7 | |

1. N is the number of respondents who answered the corresponding questions(s).

2. Percent are weighted to population characteristics by sex, age, race/ethnicity, marital status, education, and owner/renter status.

3. 95% Confidence Interval.

4. “Yes” to “Is an exhaust fan that vents to the outside used regularly when cooking in your kitchen?”

5. “Yes” to “In your bathroom, do you regularly use an exhaust fan that vents to the outside?”

6. “Hot” to “Are your sheets and pillowcases washed in cold, warm or hot water?”

7. “Yes” to “Do you use a mattress cover that is made especially for controlling dust mites?”

8. “Yes” to “Is a dehumidifier regularly used to reduce moisture inside your home?”

9. “Yes” to “Do you use a pillow cover that is made especially for controlling dust mites?”

10. “Yes” to “Is an air cleaner or purifier regularly used inside your home?”

Data Source: 2006-2010 MA BRFSS Child Asthma Call-back Survey

Among children with current asthma:

* The most commonly reported home modifications were exhaust fans in the bathroom (60.5%), and in the kitchen (62.7%).
* 44.8% of children’s sheets were washed in hot water, 41.4% used a mattress cover, and 38.1% used a dehumidifier.

# Appendix A. Data Sources and Technical Notes

**Data Sources**

**Massachusetts Asthma Call-back Survey (Adult and Child)**

Source: Health Survey Program, Massachusetts Department of Public Health

The asthma call-back survey is a standardized questionnaire on asthma developed by the Centers for Disease Control and Prevention, administered on the telephone.[[3]](#endnote-3) The survey examines the health, socioeconomic, behavioral, and environmental predictors that affect the control of asthma. It also is used to characterize the type of care and health care experiences of people with asthma. The data are available in Massachusetts beginning in 2006.

Respondents to the BRFSS who reported that they, or the selected child in their household, have ever been diagnosed with asthma were asked at the end of the BRFSS interview if they would be willing to participate in a follow-up interview on asthma. Respondents who agreed to participate were called back within two weeks and administered the survey. Adult proxies include parents, legal guardians, grandparents, adult siblings, other relatives, and other non-related adults living in the selected child’s household. For more information on the call-back methodology, visit the CDC’s website.

Topics covered on the ACS include:

* History of asthma symptoms
* Health care utilization
* Asthma education
* Modifications to the environment
* Medications
* Access to care
* School, daycare, and workplace
* Comorbid conditions
* Complementary and alternative therapy

To view the complete survey for both children and adults, visit the CDC’s website.

A combined total of 967 adults (ages 18 years and older) participated in the 2011-2014 adults call-back, and 419 adult proxies of children with asthma (ages 0-17 years), participated in the 2006-2010 call-back. Among them, 677 adults and 254 children were classified as having current asthma. Because of the relatively small number of children included in this survey, the 95% confidence intervals for the reported percentages are wide (i.e., the estimates are not as precise as those for the adults). The underlying sample size (Sample Size) in the presented tables is the number of people with current asthma who answered the corresponding questions or whose response was assumed based on an answer to a previous question. The crude proportion (%) in the presented tables is a weighted ratio of those who answered “Yes” to the corresponding questions versus all who responded to the question. These percentages are designed to be representative of all Massachusetts adults and children with asthma.

Call-back data are based on self-reported information from respondents, and therefore may be subject to error for several reasons: individuals may have difficultly remembering past events; individuals may respond differently to questions depending on what they perceive to be the socially desirable answer; and individuals may also respond to survey questions differently due to their respective cultural and linguistic backgrounds. The call-back survey is administered only to individuals with landline telephones, and can be conducted in English or Spanish only. Therefore, individuals who do not speak one of these two languages and individuals living in households without landline telephones are not included in the sample, and BRFSS results may not be generalizable to these populations.

For all data set, percentages were not generated on counts less than 10.

*Definition of Asthma Control for Adults and Children with Current Asthma (all ages)*

Several questions are used to measure the impairment construct of asthma control from the ACS (see footnotes below table). These questions are summarized into four main categories based on the EPR-3 Guidelines: symptoms (frequency and duration), nighttime awakenings, use of short-acting beta agonists (SABA), and interference with normal activities.[[4]](#endnote-4) Control status was based on the most severe level across the three categories. It is important to note that lung function measures (FEV1 and PEF), are not available from the ACS and therefore, are not included in the classification of asthma control in this report.

Cut points were derived by assuming “the past 30 days” refers to one month with four weeks, and were modified to meet the EPR-3 Guidelines where possible. For example, the ACS measures the number of days the respondent had symptoms in the past 30 days. Using the EPR-3 Guidelines, symptoms are classified as “Well Controlled” if they occur ≤2 days per *week*. Using the ACS, ≤2 days per week \* four weeks is approximately eight days/month (x/7 = 8/30, x=1.86). Therefore, the cut point for “Well Controlled” symptoms includes symptoms reported occurring on eight days or less in the past 30 days.

The EPR-3 Guidelines for assessing asthma control are slightly different for children ages 0-4 years and 5-11 years. For the purpose of this report, the classification of asthma control for patients ages 12 years and older (see grid below) were also applied for children ages 0-4 and 5-11 years.

Classification of Asthma Control for Adults and Children

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Well Controlled | Not Well Controlled | Very Poorly Controlled |
| Symptoms1 | 0 ≤ x ≤ 8 days in the past 30 days | 9 ≤ x ≤ 29 days in the past 30 days,  or  x= 30 days in the past 30 days but not throughout the day | x= 30 days in the past 30 days,  and  throughout the day |
| Nighttime Awakenings2 | 0 ≤ x ≤2 nights in the past 30 days | 3 ≤ x ≥ 12 nights in the past 30 days | 13 ≤ x ≥ 30 nights in the past 30 days |
| Inhaled SABA Use (uses per day)3 | No prescription asthma medication with an inhaler use in the past three months,  or  no inhaled SABA medication use in the past three months,  or  total inhaled SABA medication use ≤ 0.29x per day. | 0.29 <Total inhaled SABA medication use ≤ 1.00x per day | Total inhaled SABA medication use ≥ 1.00x per day |
| Interference with Normal Activity4 | Not at all,  or no symptoms past year | A little,  or a moderate amount | A lot |

1 “During the past 30 days, on how many days did you have any symptoms of asthma?”, “Do you have symptoms all the time?”

2 “During the past 30 days, on how many days did symptoms of asthma make it difficult for you to stay asleep?”

3 “In the past three months, have you taken prescription asthma medications using an inhaler?”, “In the past three months, what prescription asthma medications did you take by inhaler?”, “How many times per day or per week do you use [list of medications]?”

4 During the past 12 months, would you say you limited your usual activities due to asthma not at all, a little, a moderate amount, or a lot?

1. National Heart, Lung, and Blood Institute. 2007. Expert Panel Report 3 (EPR3): Guidelines for the diagnosis and management of asthma. National Institutes of Health, Bethesda, MD. [↑](#endnote-ref-1)
2. Centers for Disease Control and Prevention (CDC), Flu and People with Asthma. Available at: <http://www.cdc.gov/flu/asthma/> [↑](#endnote-ref-2)
3. Centers for Disease Control and Prevention (CDC), National Center for Environmental Health. Behavioral Risk Factor Surveillance Systems Call-back Surveys. Available at <http://www.cdc.gov/asthma/questions.htm#callback> [↑](#endnote-ref-3)
4. National Heart, Lung, and Blood Institute. 2007. Expert Panel Report 3 (EPR3): Guidelines for the diagnosis and management of asthma. National Institutes of Health, Bethesda, MD. [↑](#endnote-ref-4)