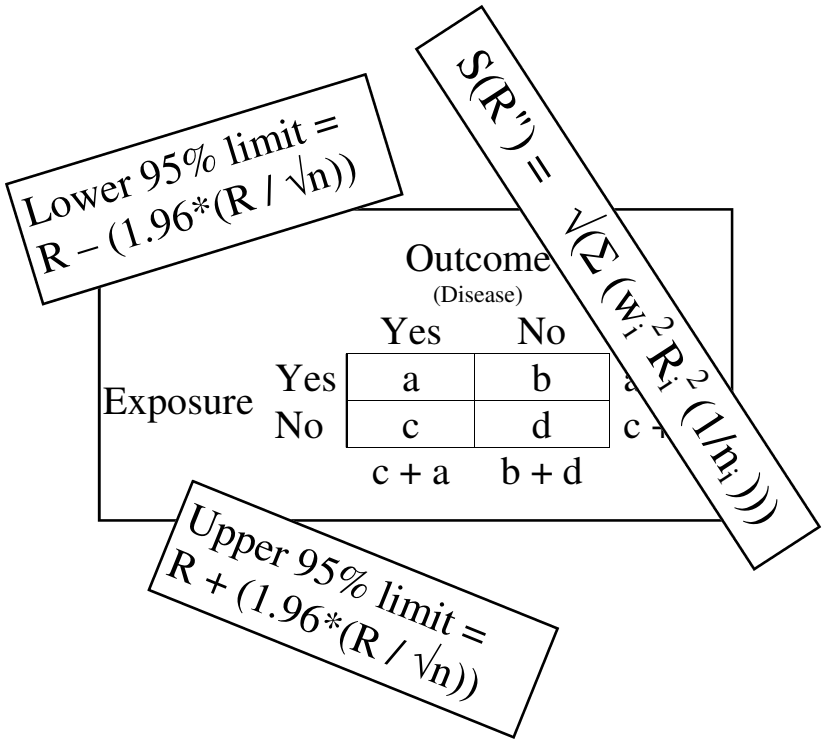
Asthma Burden Report
New Hampshire
2010-2011

Appendix B: Technical Notes and Methods



New Hampshire Department of Health and Human Services
Division of Public Health Services, Asthma Control Program
July 2011

Preface

In order to get available data to you in a timely manner, the New Hampshire Asthma Control Program has decided to publish chapters of the *Asthma Burden Report – New Hampshire 2010-2011* as they are completed. When new chapters are published, the appendices will be updated if needed. The primary purpose of this report is to disseminate data to the Asthma Control Program's partners, health care providers, insurers and public health professionals so this information can be used to develop, plan, implement, and evaluate asthma-related activities.

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Appendix B:
Technical Notes and Methods

Confidence Intervals for Survey Data and Administrative Data

Confidence intervals provide a measure of how much a rate, percentage or other point estimate might vary due to random factors or chance. They do not account for several other sources of uncertainty, including missing or incomplete data, bias resulting from non-response to a survey, or inaccurate data collection.

Confidence Intervals for Survey Data: Percentages that are estimated from survey data (also called point estimates) have a known margin of error that results from random sampling of the population. The survey results are an estimate of the true result that would be found if everyone in the eligible population were interviewed. The reliability of this estimate can be described using a confidence interval (CI). For example, in 2008, the prevalence of current asthma among adults was 10.5%. This is the point estimate. It is our best approximation of the true value in the New Hampshire population; however, it may not be accurate because not all people were interviewed. In order to express our level of certainty about this point estimate, we calculate a confidence interval. The confidence interval is a range with lower and upper limits that are calculated based on the margin of error of the estimate. The 95 percent confidence interval (95% CI) means that we are 95 percent confident that this range contains the true population percent. The 95% CI for the prevalence of current asthma among adults in New Hampshire was 9.5%-11.5% in 2008; this means that we are 95% confident that the true value may be as low as 9.5% or as high as 11.5%.

The width of the confidence interval provides useful information about the stability of the point estimate. A narrower confidence interval means that there is less variability among the sample of people surveyed and/or there is a large sample size. A wider confidence interval indicates more variability and/or a smaller sample size.

All survey data in this report were analyzed using SAS (Proc Surveymeans or Proc Surveyfreq) to take into account the weighting and complex sample design of survey data.

Confidence Intervals for Administrative Data: Unlike survey data where responses are collected from a sample of people, administrative data have records for all events or nearly all events. For example, all deaths, hospital discharges, and emergency department discharges in New Hampshire are collected and reported to various State Departments (e.g., the Department of Health and Human Services).

Although administrative data are not subject to random fluctuation due to the differences between the sample and the population it represents, confidence intervals can be used with administrative data to account for uncertainty that arises from natural variation, such as the random variation that occurs when analyzing time as discrete years.

Confidence intervals for age-specific rates based on 100 or more events are calculated as follows:

Lower 95% limit = $R - (1.96*(R / \sqrt{n}))$

Upper 95% limit = $R + (1.96*(R / \sqrt{n}))$

where

R = the rate

n = the number of deaths, hospitalizations or emergency department visits in the rate

When the number of events is less than 100, the Poisson distribution is used to estimate the confidence interval:

Lower 95% limit = R * L

Upper 95% limit = R * U

where

R = the rate

L and U = values in a table derived from the Poisson distribution for the 95% level

The confidence interval calculation for **age-adjusted rates** is the same as for rates based on fewer than 100 events. When based on more than 100 events, a different procedure is used that is more complex.

Lower 95% limit = $R'' - (1.96*S(R''))$

Upper 95% limit = $R'' + (1.96*S(R''))$

where

R" = standardized rate per 10,000

S(R") = Standard Error of the standardized rate: $\sqrt{\sum_i w_s^2 \cdot \frac{R_i^2}{D_i}}$ [1]

w_i = i^{th} age-specific population proportion in the standard population such that $\Sigma (w_i) = 1.0$

R_i = age-specific rate per 10,000 for the i^{th} age group

D_i = number of events in age interval i

[1] Anderson RN, Rosenberg HM. Age Standardization of Death Rates: Implementation of the Year 2000 Standard. National vital statistics reports; vol 47 no. 3. Hyattsville, Maryland: National Center for Health Statistics. 1998.

Statistical Significance Testing

The 95% confidence interval (95% CI) can be used to determine if the difference between two groups is statistically significant. When the confidence intervals do not overlap, the difference between two groups is considered to be statistically significant and likely not due to chance. When they do overlap, further statistical testing is needed to determine if there is a statistically significant difference. Unless otherwise noted, this report refers to two groups being "statistically significantly different" when the confidence intervals do not overlap. Sometimes a chi-square test is performed when confidence intervals overlap. A chi-square test is a statistical test that can determine if there is a statistically significant difference between two estimates when the confidence intervals overlap. This test produces a p-value; a p-value of < 0.05 indicates that there is greater than a 95% chance that the two estimates are statistically significantly different.

Joinpoint software, version 3.4.2, developed by the National Cancer Institute, was used to determine changes in estimates over time. The software is available at www.srab.cancer.gov/joinpoint. Trends were described as statistically significantly increasing or decreasing only if the changes over time were statistically significant with a p-value of < 0.05.

Prevalence Ratio

The prevalence ratio is the ratio of the prevalence of a condition or behavior in one group versus the prevalence in another. For example, the prevalence of asthma among females is 14.3% and among males is 6.4%. The prevalence ratio tells us that the prevalence of asthma in females is 2.23 times higher than in males.

Prevalence Ratio = P_1/P_2

where

P_1 = prevalence in group 1

P_2 = prevalence in group 2

Measuring Changes Using Percentages versus Percentage Points

Percent: The word "percent" is used to describe a relative change. For example, in the year 2000, the prevalence of current asthma among adults in New Hampshire was 8.3%, and in 2008 it was 10.5%. In comparing these two prevalence rates, one could say the prevalence of current asthma among adults in New Hampshire increased 26.5% from 2000 to 2008.

Percentage Points: The term "percentage point" is used to describe the difference between two percentages. As in the example above, compare the prevalence of asthma in New Hampshire from 2000 to 2008. Instead of saying the prevalence of asthma increased 26.5%, we could say it increased 2.2 percentage points. Another way to describe the difference between these rates is to say that the prevalence of asthma among adults in New Hampshire increased an average of 0.24 percentage points per year from 2000 to 2008.

Total Asthma Prevalence

The "total" asthma prevalence rate is based on estimates from the BRFSS for the prevalence of asthma among adults and among children. The manner in which the BRFSS data files are constructed allows one to easily calculate the prevalence of asthma among adults and children separately, but additional steps need to be taken to produce a "total" prevalence that includes both adults and children.

The BRFSS data file contains one record for each adult respondent. The child data are stored in the same record as the data for the adult who responds on behalf of the child. In order to calculate the "total" prevalence, the adult and child data need to be separated and then stacked on top of each other. To do this the following steps are taken:

1. Start with the BRFSS core file. Create a new variable "INDEX" and code it as 2 for all records. Save the file as "ADULT".
2. Using the ADULT file, delete all records with no children and save the remaining records with children as a new file (CHILD) but keep the ADULT file as well. In the CHILD file, change INDEX = 2 to INDEX = 1.
3. Merge the ADULT file and the CHILD file. Save it with a new name ADULTCHILD. The INDEX variable indicates which records are for adults and which are for children.
4. Create a new weight variable so the adult records contain the adult weight and the child records contain the child weight (e.g., If INDEX = 1, then NEWWEIGHT = child finalweight. Else if INDEX = 2, then NEWWEIGHT= adult finalweight).
5. Create a new current asthma variable so that the adult records contain the asthma prevalence information for adults and the child records contain the asthma prevalence information for children (e.g., If INDEX = 1, then "TotalCurrentAsthma" = child current asthma. Else if INDEX = 2, then "TotalCurrentAsthma" = adult current asthma).
6. Repeat Step 5 for lifetime asthma.
7. If using SAS, run SAS PROC SURVEYFREQ for "TotalCurrentAsthma" using INDEX as a new strata variable and the usual STSTR and PSU strata and cluster variables. Use the NEWWEIGHT variable instead of the _finalwt variable.

This method was developed by Cathy M. Bailey, MS, Surveillance Team Lead for the Air Pollution and Respiratory Health Branch, National Center for Environmental Health, Centers for Disease Control and Prevention.

Incidence

Incidence is the number of new cases of a condition, symptom, death or injury that develop during a specific time period, such as a year. The number is often expressed as a rate per 1,000 people at risk of developing the disease.

The number of incident cases are those who report being diagnosed with asthma within the last 12 months. The population at risk of developing asthma is all the respondents who have never been diagnosed with asthma plus those who report first developing asthma in the last 12 months. Incident cases are identified from the NH BRFSS Adult and Child Asthma Call-back Surveys

and are those responding “within the past 12 months” to “How long ago was that? Was it... [within the past 12 months, 1-5 years ago, more than 5 years ago]?” This question follows the question that asks: “How old were you when you were first told by a doctor or other health professional that you had asthma?”

The population at risk of developing asthma is identified from the NH BRFSS and incudes those responding “no” to "Have you ever been told by a doctor, nurse or other health professional that you had asthma?" plus the number of incident cases.

The incidence rate is calculated by dividing the number of incident cases by the population at risk of developing the disease and then multiplying by 1,000 to get an incidence rate per 1,000 people at risk of developing the disease. Estimates are weighted to the civilian, non-institutionalized population of New Hampshire.

The formula for incidence is as follows:

$I = n_I / (P_n + n_I) * \text{constant}$

where

I = incidence

n_I = weighted number of people responding “within the past 12 months” to “How long ago was that? Was it... [within the past 12 months, 1-5 years ago, more than 5 years ago]?” This question follows the question that asks: “How old were you when you were first told by a doctor or other health professional that you had asthma?” on the NH BRFSS Adult and Child Asthma Call-back Surveys.

P_n = weighted number of people responding “no” to "Have you ever been told by a doctor, nurse or other health professional that you had asthma?" on the NH BRFSS.

The development of this measure is based on an article written by Rose Anne Rudd and Jeanne E. Moorman.[2] Jeanne E. Moorman, MS, Survey Statistician for the Air Pollution & Respiratory Health Branch, National Center for Environmental Health, Centers for Disease Control and Prevention, helped modify the procedures slightly to accommodate the data sources available to New Hampshire.

Confidence intervals for incidence rates take into account the standard error of both the numerator and denominator and are based on a formula for calculating the standard error for a ratio of two random variables.[3]

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[2] Rudd RA and Moorman JE. Asthma Incidence: Data from the National Health Interview Survey, 1980-1996. *Journal of Asthma.* 2007; 44:65-70.

[3] Korn EL and Graubard BI. *Analysis of Health Surveys*. New York, NY: John Wiley and Sons Inc; 1999:26.

Asthma Medications

Below are lists of the medications used on the Asthma Call-back Surveys. In 2008, the medication list was changed slightly so that there are now two lists: one covering the surveys administered from 2005-2007 and one covering the 2008 survey. The classification as a control or rescue medication was determined by a group of physicians at the Centers for Disease Control and Prevention.

2005-2007 BRFSS Adult and Child Asthma Call-back Survey Medication Lists

Inhalers	**Control/ Rescue**	**Type**
01 Advair (17 + 26)	C	combination: corticosteroid + B2A long
02 Aerobid (16)	C	corticosteroid
03 Albuterol	R E	beta 2 agonist (Short-Acting)
04 Alupent (21)	R	beta 2 agonist (Short-Acting)
05 Atrovent (19)	R	anti-cholinergic
06 Azmacort (31)	C	corticosteroid
07 Beclomethasone dipropionate	C	corticosteroid
08 Beclovent (07)	C	corticosteroid
09 Bitolterol	R	beta 2 agonist (Short-Acting)
10 Brethaire (28)	R	beta 2 agonist (Short-Acting)
11 Budesonide	C	corticosteroid
12 Combivent (19 + 03)	R	combination: anticholinergic + B2A short
13 Cromolyn	C	anti-inflammatory
14 Flovent (17)	C	corticosteroid
15 Flovent Rotadisk (17)	C	corticosteroid
16 Flunisolide	C	corticosteroid
17 Fluticasone	C	corticosteroid
34 Foradil (35)	C	beta 2 agonist (Long-acting)
35 Formoterol	C	beta 2 agonist (Long-acting)
18 Intal (13)	C	anti-inflammatory
19 Ipratropium Bromide	R	anti-cholinergic
20 Maxair (23)	R	beta 2 agonist (Short-Acting)
21 Metaproteronol	R	beta 2 agonist (Short-Acting)
22 Nedocromil	C	anti-inflammatory
23 Pirbuterol	R	beta 2 agonist (Short-Acting)
24 Proventil (03)	R	beta 2 agonist (Short-Acting)
25 Pulmicort Turbuhaler (11)	C	corticosteroid
36 QVAR (07)	C	corticosteroid
26 Salmeterol	C	beta 2 agonist (Long-acting)
27 Serevent (26)	C	beta 2 agonist (Long-acting)
28 Terbutaline	R	beta 2 agonist (Short-Acting)
29 Tilade (22)	C	anti-inflammatory
30 Tornalate (09)	R	beta 2 agonist (Short-Acting)
31 Triamcinolone acetonide	C	corticosteroid
32 Vanceril (08)	C	corticosteroid
33 Ventolin (03)	R	beta 2 agonist (Short-Acting)
66 Other, Please Specify		

Pill Medication	**Control/ Rescue**	**Type**

01 Accolate (45)	C	Leukotriene Modifier
02 Aerolate (35)	C	Methylxanthine
03 Albuterol (+2 brand names)	C	Beta 2 agonist – Short-Acting
04 Alupent (13)	C	Beta 2 agonist – Short-Acting
05 Choledyl (oxtriphylline)	C	Methylxanthins
07 Deltasone	C	Corticosteriod
08 Elixophyllin (35)	C	Methylxanthine
10 Marax (35)	C	Methylxanthine
11 Medrol	C	Corticosteriod
12 Metaprel (13)	C	Beta 2 agonist – Short-Acting
13 Metaproteronol	C	Beta 2 agonist – Short-Acting
14 Methylprednisolone	C	Corticosteriod
15 Montelukast	C	Leukotriene Modifier
17 Pediapred	C	Corticosteriod
18 Prednisolone	C	Corticosteriod
19 Prednisone	C	Corticosteriod
20 Prelone	C	Corticosteriod
21 Proventil (3)	C	Beta 2 agonist – Short-Acting
22 Quibron (35)	C	Methylxanthine
23 Respbid (35)	C	Methylxanthine
24 Singulair (15)	C	Leukotriene Modifier
25 Slo-phyllin (35)	C	Methylxanthine
26 Slo-bid (35)	C	Methylxanthine
27 Sustaire (35)	C	Methylxanthine
28 Theo-24 (35)	C	Methylxanthine
29 Theobid (35)	C	Methylxanthine
30 Theochron (35)	C	Methylxanthine
31 Theoclear (35)	C	Methylxanthine
32 Theodur (35)	C	Methylxanthine
33 Theo-Dur (35)	C	Methylxanthine
34 Theolair (35)	C	Methylxanthine
35 Theophylline	C	Methylxanthine
36 Theo-Sav (35)	C	Methylxanthine
37 Theospan (35)	C	Methylxanthine
38 Theo-X (35)	C	Methylxanthine
40 T-Phyl (35)	C	Methylxanthine
41 Uni-Dur (35)	C	Methylxanthine
42 Uniphyl (35)	C	Methylxanthine
43 Ventolin (03)	C	Beta 2 agonist – Short-Acting
44 Volmax (03)	C	Beta 2 agonist – Short-Acting
45 Zafirlukast	C	Leukotriene Modifier
46 Zileuton	C	Leukotriene Modifier
47 Zyflo Filmtab (46)	C	Leukotriene Modifier
66 Other, Please Specify:		

Syrup Medication	**Control/ Rescue**	**Type**
01 Aerolate (09)	C	Methylxanthine
02 Albuterol	R	Beta 2 agonist – Short-Acting
03 Alupent (04)	R	Beta 2 agonist – Short-Acting
04 Metaproteronol	R	Beta 2 agonist – Short-Acting
05 Prednisolone	C	Corticosteriod
06 Prelone (05)	C	Corticosteriod
07 Proventil (02)	R	Beta 2 agonist – Short-Acting
08 Slo-Phyllin (09)	C	Methylxanthine

09 Theophylline	C	Methylxanthine
10 Ventolin (02)	R	Beta 2 agonist – Short-Acting
66 Other, Please Specify		

Nebulizer Medication	**Control/ Rescue**	**Type**
01 Albuterol	R	Beta 2 agonist – Short Acting
02 Alupent (11)	R	Beta 2 agonist – Short Acting
03 Atrovent (09)	RC	Anti-cholinergic
04 Bitolterol	R	Beta 2 agonist (short acting)
05 Budesonide	C	Corticosteriod
06 Cromolyn	C	Anti-inflammatory
07 Duoneb (01 + 09)	R	Beta 2 agonist (short acting) + anti-cholinergic
08 Intal (06)	C	Anti-inflammatory
09 Ipratroprium bromide	RC	Anti-cholinergic
10 Levalbuterol	R	Beta 2 agonist – Short Acting
11 Metaproteronol	R	Beta 2 agonist – Short Acting
12 Proventil (01)	R	Beta 2 agonist – Short Acting
13 Pulmicort (05)	C	Corticosteriod
14 Tornalate (04)	R	Beta 2 agonist – Short Acting
15 Ventolin (01)	R	Beta 2 agonist – Short Acting
16 Xopenex (10)	R	Beta 2 agonist – Short Acting
66 Other, Please Specify:		

Note: An underlined name indicates the generic (chemical) form.
A name not underlined indicates a brand. Brands are followed by a number in parentheses that refers to the generic term. For example, for inhalers, Advair is a brand that includes both Fluticasone (17) and Salmeterol (26).

2008 BRFSS Adult and Child Asthma Call-back Survey Medication lists

Inhaler Medication	**Control/ Rescue**	**Type**
01 Advair (17 + 26)	C E	Combination: corticosteroid + B2A long
02 Aerobid (16)	C	Corticosteroid
03 Albuterol (+ A. sulfate or salbutamol)	R E	Beta 2 Agonist (Short-Acting)
04 Alupent (21)	R	Beta 2 Agonist (Short-Acting)
40 Asmanex (twisthaler) (39)	C	Corticosteroid
05 Atrovent (19)	R	Anti-cholinergic
06 Azmacort (31)	C	Corticosteroid
07 Beclomethasone dipropionate	C	Corticosteroid
08 Beclovent (07)	C	Corticosteroid
09 Bitolterol	R E	Beta 2 Agonist (Short-Acting)
10 Brethaire (28)	R E	Beta 2 Agonist (Short-Acting)
11 Budesonide	C	Corticosteroid
12 Combivent (19 + 03)	R E	Combination: Anticholinergic + B2A short
13 Cromolyn	C E	Anti-inflammatory
14 Flovent (17)	C	Corticosteroid
15 Flovent Rotadisk (17)	C	Corticosteroid
16 Flunisolide	C	Corticosteroid
17 Fluticasone	C	Corticosteroid
34 Foradil (35)	C E	Beta 2 Agonist (Long-acting)

35 Formoterol	C E	Beta 2 Agonist (Long-acting)
18 Intal (13)	C E	Anti-inflammatory
19 Ipratropium Bromide	R	Anti-cholinergic
37 Levalbuterol tartrate	R	Beta 2 Agonist (Short-Acting)
20 Maxair (23)	R E	Beta 2 Agonist (Short-Acting)
21 Metaproterenol	R	Beta 2 Agonist (Short-Acting)
39 Mometasone furoate	C	Corticosteroid
22 Nedocromil	C E	Anti-inflammatory
23 Pirbuterol	R E	Beta 2 Agonist (Short-Acting)
41 Pro-Air HFA (03)	R E	Beta 2 Agonist (Short-Acting)
24 Proventil (03)	R E	Beta 2 Agonist (Short-Acting)
25 Pulmicort Turbuhaler (11)	C	Corticosteroid
36 QVAR (07)	C	Corticosteroid
03 Salbutamol (or Albuterol)	R E	Beta 2 Agonist (Short-Acting)
26 Salmeterol	C E	Beta 2 Agonist (Long-acting)
27 Serevent (26)	C E	Beta 2 Agonist (Long-acting)
42 Symbicort (11 + 35)	C	Combination: Corticosteroid + B2A long
28 Terbutaline	R	Beta 2 Agonist (Short-Acting)
29 Tilade (22)	C E	Anti-inflammatory
30 Tornalate (09)	R E	Beta 2 Agonist (Short-Acting)
31 Triamcinolone acetonide	C	Corticosteroid
32 Vanceril (07)	C	Corticosteroid
33 Ventolin (03)	R E	Beta 2 Agonist (Short-Acting)
38 Xopenex HFA (37)	R	Beta 2 Agonist (Short-Acting)
66 Other, Please Specify		

Pill Medication	**Control/ Rescue**	**Type**
01 Accolate (45)	C	Leukotriene Modifier
02 Aerolate (35)	C	Methylxanthine
03 Albuterol	C	Beta 2 agonist – Short-Acting
04 Alupent (13)	C	Beta 2 agonist – Short-Acting
49 Brethine (48)	C	Beta 2 agonist – Short-Acting
05 Choledyl (oxtriphylline)	C	Methylxanthine
07 Deltasone (19)	C	Corticosteriod
08 Elixophyllin (35)	C	Methylxanthine
11 Medrol (14)	C	Corticosteriod
12 Metaprel (13)	C	Beta 2 agonist – Short-Acting
13 Metaproterenol	C	Beta 2 agonist – Short-Acting
14 Methylprednisolone	C	Corticosteriod
15 Montelukast	C	Leukotriene Modifier
17 Pediapred (18)	C	Corticosteriod
18 Prednisolone	C	Corticosteriod
19 Prednisone	C	Corticosteriod
21 Proventil (3)	C	Beta 2 agonist – Short-Acting
23 Respbid (35)	C	Methylxanthine
24 Singulair (15)	C	Leukotriene Modifier
25 Slo-phyllin (35)	C	Methylxanthine
26 Slo-bid (35)	C	Methylxanthine
48 Terbutaline (+ T. Sulfate)	C	Beta 2 agonist - Short-Acting
28 Theo-24 (35)	C	Methylxanthine
30 Theochron (35)	C	Methylxanthine
31 Theoclear (35)	C	Methylxanthine
32 Theodur (35)	C	Methylxanthine
33 Theo-Dur (35)	C	Methylxanthine

35 Theophylline	C	Methylxanthine
37 Theospan (35)	C	Methylxanthine
40 T-Phyl (35)	C	Methylxanthine
42 Uniphyl (35)	C	Methylxanthine
43 Ventolin (03)	C	Beta 2 agonist - Short-Acting
44 Volmax (03)	C	Beta 2 agonist - Short-Acting
45 Zafirlukast	C	Leukotriene Modifier
46 Zileuton	C	Leukotriene Modifier
47 Zyflo Filmtab (46)	C	Leukotriene Modifier
66 Other, Please Specify:		

Syrup Medication	**Control/ Rescue**	**Type**
01 Aerolate (09)	C	Methylxanthine
02 Albuterol	RE	Beta 2 agonist – Short Acting
03 Alupent (04)	R	Beta 2 agonist – Short Acting
04 Metaproteronol	R	Beta 2 agonist – Short Acting
05 Prednisolone	C	Corticosteriod
06 Prelone (05)	C	Corticosteriod
07 Proventil (02)	RE	Beta 2 agonist – Short Acting
08 Slo-Phyllin (09)	C	Methylxanthine
09 Theophylline	C	Methylxanthine
10 Ventolin (02)	RE	Beta 2 agonist – Short Acting
66 Other, Please Specify		

Nebulizer Medication	**Control/ Rescue**	**Type**
01 Albuterol	RE	Beta 2 agonist – Short Acting
02 Alupent (11)	R	Beta 2 agonist – Short Acting
03 Atrovent (09)	RC	Anti-cholinergic
04 Bitolterol	R	Beta 2 agonist – Short Acting
05 Budesonide	C	Corticosteriod
06 Cromolyn	CE	Anti-inflammatory
07 Duoneb (01 + 09)	R	Combination: B2A (short) + Anti-cholinergic
08 Intal (06)	CE	Anti-inflammatory
09 Ipratroprium bromide	RC	Anti-cholinergic
10 Levalbuterol	RE	Beta 2 agonist – Short Acting
11 Metaproteronol	R	Beta 2 agonist – Short Acting
12 Proventil (01)	RE	Beta 2 agonist – Short Acting
13 Pulmicort (05)	C	Corticosteriod
14 Tornalate (04)	R	Beta 2 agonist – Short Acting
15 Ventolin (01)	RE	Beta 2 agonist – Short Acting
16 Xopenex (10)	RE	Beta 2 agonist – Short Acting
66 Other, Please Specify:		

Note: An underlined name indicates the generic (chemical) form.
A name not underlined indicates a brand. Brands are followed by a number in parentheses that refers to the generic term. For example, for inhalers, Advair is a brand that includes both Fluticasone (17) and Salmeterol (26).

Depression Using PHQ-8

The Centers for Disease Control and Prevention has developed optional modules that states can choose to add to their BRFSS. One of these modules is called the Depression and Anxiety Module. This module was developed based on the Patient Health Questionnaire-9 (PHQ-9) developed by Dr. Kurt Kroenke and Dr. Robert Spitzer. The original PHQ-9 asks nine questions on which the diagnosis of depression is based. The last question in the series asks if in the last two weeks you have had thoughts that you would be better off dead or of hurting yourself in some way. This question was not part of the module because those conducting the interview would not be able to provide an adequate intervention over the telephone to ensure the person would not harm themselves. The deletion of this question has only a minor effect on determining the presence and severity of depression because thoughts of self-harm are fairly uncommon in the general population.[4] As a result the module contains the first eight questions of the PHQ-9 otherwise known as PHQ-8. These questions were also modified slightly from their original form so that responses are based on the actual number of days respondents had the feelings/mood asked about, whereas the original set of questions asks respondents to categorize their responses into one of the following categories: "Not at all," "Several days," "More than half the days," "Nearly every day."

Below are the eight PHQ questions in the module:

"Now, I am going to ask you some questions about your mood. When answering these questions, please think about how many days each of the following has occurred in the past 2 weeks."

- "Over the last 2 weeks, how many days have you had little interest or pleasure in doing things?"
- "Over the last 2 weeks, how many days have you felt down, depressed or hopeless?"
- "Over the last 2 weeks, how many days have you had trouble falling asleep or staying asleep or sleeping too much?"
- "Over the last 2 weeks, how many days have you felt tired or had little energy?"
- "Over the last 2 weeks, how many days have you had a poor appetite or ate too much?"
- "Over the last 2 weeks, how many days have you felt bad about yourself – or that you were a failure or had let yourself or your family down?"
- "Over the last 2 weeks, how many days have you had trouble concentrating on things, such as reading the newspaper or watching TV?"
- "Over the last 2 weeks, how many days have you moved or spoken so slowly that other people could have noticed? Or the opposite –being so fidgety or restless that you were moving around a lot more than usual?"

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[4] Kroenke K and Spitzer R. The PHQ-9: A New Depression and Diagnostic and Severity. Psychiatric Annals. 2002; 32(9):509-521

The number of days for each question are converted to points as follows:

- 0-1 day = 0 points
- 2-6 days = 1 point
- 7-11 days = 2 points
- 12-14 days = 3 points

(e.g., 9 days of little interest or pleasure in doing things = 2 points)

The number of points are totaled across the eight questions in order to determine the depressive symptoms severity score. A score of = 10 has been shown to have an 88% sensitivity and specificity for major depression.[5] Several studies have been done on the modified PHQ-9 indicating that it is effective in the general population, can detect depression in different race/ethnicities, and is reliable when used in assessments made by telephone.[6,7,8] All changes that were made to the PHQ-9 were approved by Dr. Kroenke and Dr. Spitzer.

Crude Rates

A crude rate is the number of events (such as deaths) in a specified time period divided by the number or people at risk of these events (typically, a state or county population) in that period. This figure is generally multiplied by a constant (e.g., 10,000) to get a number that is easy to read and compare. Crude rates adjust for differences in population size but not differences in population characteristics, such as age.

The formula for calculating a crude rate is as follows: R = n/p * constant

where

R = crude rate

n = number of events during time period

p = population during time period.

Age-Specific Rates

An age-specific rate is a rate for a specific age group. It is calculated by dividing the actual number of cases in a given year for a specific age group by the population in that age group for that year. This figure is then multiplied by a constant (e.g., 10,000) to get a number that is easy to read and compare.

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[5] Kroenke K, Spitzer R, and Williams JBW. The PHQ-9 Validity of a Brief Depression Severity Measure. J Gen Intern Med. 2001; 16:606-613.

[6] Martin A et al. Validity of the Brief Patient Health Questionnaire Mood Scale (PHQ-9) in the general population. Gen Hosp Psych. 2006; 28:71-77.

[7] Huang FY et al. Using the Patient Health Questionnaire-9 to Measure Depression among Racially and Ethnically Diverse Primary Care Patients. J Gen Intern Med. 2006; 21:547-552.

[8] Pinto-Meza A et al. Assessing Depression in Primary Care with the PHQ-9: Can It Be Carried Out over the Telephone? J Gen Intern Med. 2005; 20:738-742.

The formula for calculating an age-specific rate is as follows: $R_i = n_i/p_i * \text{constant}$

where

R_i = age-specific rate for the i^{th} age-group

n_i = number of events during time period for the i^{th} age-group

p_i = population during time period for the i^{th} age-group

Age-Adjusted Rates

To compare populations where the distribution of age is different, an adjustment or standardization needs to be made. For example, if New Hampshire and the United States are compared for rates of asthma hospitalizations and one of them has a higher percentage of adults 65 and older and children 0-4, the one with the higher percentages will probably show higher rates of hospitalizations due to asthma as a result of the different age distributions alone. Standardization makes the two populations look similar in regard to age distribution. This makes it possible to know that a difference in rates, if it exists, is not the result of differences in age distribution.

To accomplish this, a "standard" population is chosen. The standard population used in this report is the US Census 2000 population. For each age group in the standard population, a proportion of the total population is calculated. For example, the 0-4 age group comprises 6.9136 percent of the total 2000 US Standard Population. These proportions are calculated so that the sum of proportions equals one. For each age group, the age group proportion is multiplied by the age-specific rate of the population of interest. Basically, this proportion is used to "weight" the age-specific rate calculated for the population of interest. Then, all weighted age-specific rates are summed and the result is the age-adjusted or standardized rate. Standardized rates can be compared with each other as long as the same standard population is used for each calculation.

Generally, the calculation for age-adjusted rates is as follows:

$R'' = \Sigma\, w_i R_i$ = standardized rate (per 10,000)

where

R'' = age-adjusted rate

w_i = i^{th} age specific population proportion in the standard population such that $\Sigma\,(w_i) = 1.0$

R_i = age-specific rate (per 10,000) for the i^{th} age group

At-Risk Based Health Care Utilization Rates

The denominators for crude rates, age-specific rates and age-adjusted rates are all population based. For at-risk based health care utilization rates, the denominator is limited to those with current asthma. It is derived from the BRFSS, which covers the civilian, non-institutionalized population. It is likely that the at-risk based health care utilization rates are a slight over-estimate of the actual rates because the numerator includes all events being measured and is not

limited to the civilian, non-institutionalized population. The civilian, non-institutionalized population represents 99% of the total civilian population.

At-risk based health care utilization rates were included to assess if the increasing trend in asthma hospital discharge rates was due in part to the overall increasing prevalence of asthma in the state. Unlike the population-based rates, the at-risk based health care utilization rates control for the changing prevalence of the disease of interest.

These at-risk based health care utilization rates can be used to compare the risk for outcomes (e.g., hospitalization or death) among subgroups controlling for different prevalence levels.

Confidence intervals for at-risk based health care utilization rates take into account the standard error of both the numerator and denominator and are based on a formula calculating the standard error for a ratio of two random variables.[9]

The formula for at-risk based health care utilization rates is:

$R_a = n/p_a * \text{constant}$

where

R_a = at-risk based health care utilization rate

n = number of events during time period

p_a = population at risk for these events during time period (e.g., those at risk of having an asthma hospitalization are those who have asthma). The population at risk for asthma events is based on the weighted number of people on the NH BRFSS who report having "current asthma."

Asthma Control

Several questions from the BRFSS Asthma Call-back Surveys (ACBS) are used to measure the impairment construct of asthma control - see footnotes below Table 1. These questions are summarized into three main categories based on the NHLBI EPR-3 *Guidelines for the Diagnosis and Management of Asthma*: symptoms (frequency and duration), nighttime awakenings, and use of short-acting beta$_2$-agonists (SABA).

The *Guidelines* also include interference with normal activity and lung function measures (FEV1 and PEF) as part of determining control status (see Table 2), but they are not part of this assessment. 1) Lung function measures are not available in the ACBS and therefore not included in the classification of asthma control in the burden report. 2) Results from the question on the ACBS regarding interference with normal activity, more than any other used to assess control, classified individuals as "not well controlled" or "very poorly controlled." The question also refers to interference with normal activities over the last 12 months, whereas the *Guidelines* suggest looking at the last 2 to 4 weeks. Because of these issues, interference with normal activity was not included as part of determining control status in this report.

It is also important to note that the level of control is based on the most severe level across the

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[9] Korn EL and Graubard BI. *Analysis of Health Surveys*. New York, NY: John Wiley and Sons Inc; 1999:26.

Table 1
Defining asthma control based on results from the BRFSS Asthma Call-back Survey (ACBS)

	Well Controlled			Not Well Controlled			Very Poorly Controlled		
Variable	Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+
Symptoms [1]	0 ≤ x ≤ 8 days in the past 30 days			9 ≤ x ≤ 30 days in the past 30 days and do not have symptoms all the time			x = 30 days in the past 30 days and throughout the day		
Nighttime Awakenings [2]	0 ≤ x ≤ 1 nights in the past 30 days		0 ≤ x ≤ 2 nights in the past 30 days	2 ≤ x ≤ 4 nights in the past 30 days	2 ≤ x ≤ 8 nights in the past 30 days	3 ≤ x ≤ 12 nights in the past 30 days	≥ 5 nights in the past 30 days	≥ 9 nights in the past 30 days	≥ 13 nights in the past 30 days
Inhaled SABA Use (uses per day) [3]	No prescription asthma medication with an inhaler used in the past 3 months OR No inhaled SABA medication used in the past 3 months OR Used SABA only prior to exercise OR Total inhaled SABA medication used ≤ 0.29 times per day			Total inhaled SABA medication use is > 0.29 times per day and < 2.00 times per day			≥ 2.00 times per day		

[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 3 months, have you taken prescription asthma medications using an inhaler?", "In the past 3 months, what prescription asthma medications did you take by inhaler?", "In the past 3 months, did you take inhaler medicines when you had an asthma episode or attack", "In the past 3 months, did you take inhaler medicines before exercising?", "How many times per day or per week do you use inhaler medicines?"

three categories (i.e., if for any one of the three levels someone was classified as "very poorly

Table 2
Assessing Asthma Control using the EPR-3 National Guidelines

Components of Control		Well Controlled			Not Well Controlled			Very Poorly Controlled		
		Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+
Impairment	Symptoms	≤ 2 days/ week but not more than once a day		≤ 2 days a week	> 2 days/week or multiple times on ≤ 2 days/week		> 2 days/ week	Throughout the day		
	Nighttime awakenings	≤ 1x/ month		≤ 2x/month	> 1x/ month	≥ 2x/ month	1-3x/week	> 1x/ week	≥ 2x/ week	≥ 4x/week
	Interference with normal activity	None			Some limitations			Extremely limited		
	Short-acting $beta_2$ agonist use for symptom control	≤ 2 days/ week			> 2 days/week			Several times per day		
	Lung function FEC1 (predicted) or peak flow personal best	N/A	> 80%	> 80% predicted/ personal best	N/A	60-80%	60-80% predicted/ personal best	N/A	< 60%	< 60% predicted/ personal best

Source: Figures 12 and 15 from NHLBI *Guidelines for the Diagnosis and Management of Asthma - Expert Panel Report 3*

controlled," then regardless of the classification for the other measures they were classified as "very poorly controlled").

Assessment of control based on symptoms
The first category used to assess control is frequency of *symptoms*. Responses to the following two questions were used to assess control based on *symptoms*: "During the past 30 days, on how many days did you have any symptoms of asthma?" and "Do you have symptoms all the time?" Respondents who had an equivalent of less than or equal to two days per week were classified as

"well controlled." Cut points for determining "well controlled" based on *symptoms* were derived by determining how many days in a 30 day period are equal to 2 days per week (2 days/ 7 days per week = x days/ 30 day period; x = 8.6 days). The result was rounded down to the next whole number (8 days). Thus, respondents who had symptoms on less than or equal to 8 of the past 30 days were classified as "well controlled" based on *symptoms*.

The NHLBI EPR-3 *Guidelines* classify having symptoms on more than 2 days per week but not all day long as "not well controlled." As a result, "not well controlled" was defined as greater than or equal to 9 days and up to 30 days but not all day. The *Guidelines* classify having symptoms all day or throughout the day on more than two days a week as "very poorly controlled." Based on survey results, "very poorly controlled" was defined as having symptoms on 30 out of 30 days with symptoms occurring throughout the day.

Assessment of control based on nighttime awakenings

The *Guidelines* for assessing asthma control based on *nighttime awakenings* are slightly different based on age. Responses to the following question were used to assess control based on *nighttime awakenings*, "During the past 30 days, on how many days did symptoms of asthma make it difficult for you to stay asleep?" For the purpose of the survey results, it was assumed one month equals 30 days.

For children 0 to 4 years old, the *Guidelines* define "well controlled" as having nighttime awakenings on fewer than or equal to one night a month. Survey responses of 0 to 1 days in the last 30 days equal "well controlled." The *Guidelines* indicate "very poorly controlled" as more than once per week. "Very poorly controlled" for children 0 to 4 years old was derived by determining how many days in a 30 day period are equal to 1 day per week (1 day/ 7 days per week = x days/ 30 day period; x = 4.2 days). The result was rounded up to the next whole number (5 days). Based on these results, "very poorly controlled" asthma for children 0 to 4 years old is defined as having nighttime awakenings on 5 or more nights in the last 30 days. Based on the cut points of "well controlled" and "very poorly controlled", "not well controlled" is 2 to 4 days out of 30 days.

A similar process was used for children 5 to 11 years old. As with children 0 to 4 years old, the *Guidelines* define "well controlled" as having nighttime awakenings on fewer than or equal to one night a month. Survey responses of 0 to 1 days in the last 30 days equal "well controlled." The *Guidelines* define "very poorly controlled" as greater than or equal to 2 days per week. "Very poorly controlled" was derived by determining how many days in a 30 day period are equal to 2 days per week (2 days/ 7 days per week = x days/ 30 day period; x = 8.6 days). The result was rounded up to the next whole number (9 days). Based on these results, "very poorly controlled" asthma for children 5 to 11 years old is defined as having nighttime awakenings on 9 or more nights in the last 30 days. Based on the cut points of "well controlled" and "very poorly controlled," "not well controlled" is 2 to 8 days out of 30 days.

For individuals 12 and older, the *Guidelines* define "well controlled" as fewer than or equal to 2 nighttime awakenings per month. As a result, responses of 0 to 2 days in the last 30 days equal "well controlled." The *Guidelines* define "not well controlled" as 1 to 3 times per week. Based on survey responses, "not well controlled" was derived by determining how many days in a 30 day period are equal to 1 day per week (1 day/ 7 days per week = x days/ 30 day period; x = 4.2 days) and 3 days per week (3 days/ 7 days per week = x days/ 30 day period; x = 12.8 days). To cover the range of responses, 3 days/30 days was selected as the lower bound and 12 days/ 30

days was selected as the upper bound. The *Guidelines* define "very poorly controlled" as greater than or equal to 4 times per week. Based on survey responses, "very poorly controlled" was derived by determining how many days in a 30 day period are equal to 4 days per week (4 days/ 7 days per week = x days/ 30 day period; x=17.1 days). Because the upper bound of "not well controlled" is 12 days, 13 or more days was selected as the cut point for "very poorly controlled" in order to cover the range of possible responses.

Assessment of control based on use of short-acting beta$_2$-agonists per day
Determining control status based on *use of short-acting beta$_2$-agonists (SABA)*, is the same for all three age groups. This indicator only includes SABA medications taken by inhaler since the frequency of SABAs taken in some other form (including nebulizer) is not captured on the survey. Therefore, control assessed by SABA use will be an underestimate and may pose a severe limitation, especially among 0 to 4 year olds.

Responses to the following questions were used to assess control based on *use of short-acting beta$_2$-agonists per day:* "In the past 3 months, have you taken prescription asthma medications using an inhaler?", "In the past 3 months, what prescription asthma medications did you take by inhaler?", "In the past 3 months, did you take inhaler medicines when you had an asthma episode or attack?", " In the past 3 months, did you take inhaler medicines before exercising?" and "How many times per day or per week do you use inhaler medicines?"

SABA medications were identified based on responses to "In the past 3 months, what prescription asthma medications did you take by inhaler?" Each SABA medication was assessed to see if respondents only used it prior to exercise. If the SABA was taken only for treatment before exercise, it did not contribute to the *total SABA frequency per day*.

Frequency of use for each SABA medication was converted to number of times per day. "Never used" was scored as 0 times per day; less often than once per week was scored as 1 per 10 days or 0.10 times per day, number of uses per week were divided by 7 to get an average number of times per day (e.g., 2 times per week = 0.286 uses per day), and when the respondent reported the number of times per day used then the actual number of times per day was used. If none of the reported asthma medications in the past 3 months were SABAs, then the *total SABA frequency per day* is "0" and the respondent is classified as "well controlled" for SABA use. Once the frequency of use was converted to number of times per day for each SABA, a total across the SABAs was calculated so that if someone took more than one SABA, use of each of the SABA medications is included in the *total SABA frequency per day*.

"Well controlled" for *SABA* was derived by determining how many times per day is equal to 1 use per day on no more than 2 days per week (1 use/day * (2 day per week / 7 days per week) = 0.286 uses/ day). This was rounded to 0.29 uses per day. Thus "well controlled" is less than or equal to 0.29 uses per day. "Very Poorly Controlled" was derived by assuming several times per day equals at least 2 times per day. Based on other cut points, "not well controlled" is more than 0.29 uses per day and less than 2 times per day.

Final control assessment
Once control was defined for each variable, the most severe level across the 3 variables was used to determine the overall level of control for the respondent. See Table 3 for the prevalence of asthma control using each of the three constructs independently and combined for an overall assessment of asthma control status.

Table 3
Prevalence of asthma control level using each of the 3 constructs independently and then combined for overall asthma control status - New Hampshire, 2006-2008

	Well Controlled		Not Well Controlled		Very Poorly Controlled	
	Percent	95% CI	**Percent**	95% CI	**Percent**	95% CI
ADULTS						
Level of control based on:						
Symptoms	**64.0**	59.6 - 68.3	**27.3**	23.3 - 31.3	**8.7**	6.4 - 11.0
Nighttime awakenings	**81.4**	78.0 - 84.7	**10.5**	7.8 - 13.1	**8.1**	5.9 - 10.4
SABA use	**75.5**	71.5 - 79.5	**10.9**	8.1 - 13.8	**13.6**	10.6 - 16.6
Overall Control Status	**54.7**	50.1 - 59.3	**23.9**	20.0 - 27.8	**21.3**	17.9 - 24.8
CHILDREN						
Level of control based on:						
Symptoms	**86.8**	80.5 - 93.0	**11.2**	5.4 - 17.0	**2.1***	0.0 - 4.5
Nighttime awakenings	**86.4**	80.1 - 92.7	**7.1**	3.8 - 10.4	**6.5***	0.9 - 12.2
SABA use	**80.5**	73.2 - 87.8	**12.9**	6.5 - 19.3	**6.6***	2.2 - 11.1
Overall Control Status	**66.0**	57.9 - 74.1	**20.0**	14.2 - 25.7	**14.0**	7.0 - 21.0

Data Source: 2006-2008 NH BRFSS Adult and Child Asthma Call-back Surveys

* Relative standard error is greater than 30% - interpret with caution.

This method was developed by the ACBS Control Measure Working Group:

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Asthma Severity: Intermittent versus Persistent Asthma

The current NHLBI EPR3 *Guidelines for the Diagnosis and Management of Asthma* places greater emphasis on control of asthma than on severity. The *Guidelines* outline two methods for assessing asthma severity. The first method is based on the same signs and symptoms used to assess control. This method is used for individuals who are not currently on long-term asthma control medication. The second method is used for individuals currently on long-term asthma control medication and is based on the level of medical intervention needed to keep the person's asthma under control.

Table 4 displays the *Guidelines* assessment of severity based on signs and symptoms. In essence, "well controlled" asthma as shown in Table 2 is equivalent to intermittent asthma. The only

Table 4
Assessing Asthma Severity among individuals not currently taking long-term control medication using the EPR-3 National Guidelines

Components of Severity		Intermittent			Persistent								
					Mild			Moderate			Severe		
		Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+	Ages 0-4	Ages 5-11	Ages 12+
Impairment	Symptoms	= 2 days/ week but not more than once a day		= 2 days/ week	> 2 days/week but not daily		> 2 days/ week	Daily			Throughout the day		
	Nighttime awakenings	0 / month	= 2x/ month	= 2x/ month	1- 2x/ month	3-4x/ month	3-4x/month	3– 4x/ month	>1x/ week but not night- ly		>1x/ week	Often 7x/ week	
	Interference with normal activity	None			Minor limitations			Some limitations			Extremely limited		
	Short-acting beta$_2$ agonist use for symptom control	= 2 days/ week			> 2 days/week		> 2 days/ week but not >1x day	Daily			Several times per day		
	Lung function FEC1 (predicted) or peak flow personal best	N/A	> 80%		N/A	> 80%		N/A	60-80%		N/A	< 60%	

Source: Figures 3-4a– 3-4c from NHLBI *Guidelines for the Diagnosis and Management of Asthma - Expert Panel Report 3*

difference between "well controlled" asthma and intermittent asthma is the frequency of nighttime awakenings among children 0 to 4 years old and 5 to 11 years old. "Not well" and "very poorly" controlled asthma is approximately equivalent to persistent asthma.

Table 5 displays the *Guidelines* assessment of severity based on the amount of medical intervention needed to maintain control for individuals on a long-term control medication. It is difficult to assess severity using this method based on results from the BRFSS Asthma Call-back Survey.

Due to BRFSS Asthma Call-back Survey limitations, it is not possible to use either of these

Table 5
Classifying severity in patient after asthma becomes well controlled, by lowest level of treatment required to maintain control

	Intermittent Asthma	Persistent Asthma				
	Step 1	Mild Step 2	Moderate Step 3 OR Step 4		Severe Step 5 OR Step 6	
Children 0 to 4 years old	*Preferred:* SABA	*Preferred:* Low-dose ICS *Alternative:* Cromolyn or Montelukast	*Preferred:* Medium-dose ICS	*Preferred:* Medium-dose ICS + either LABA or Montelukast	*Preferred:* High-dose ICS + either LABA or Montelukast	*Preferred:* High-dose ICS + either LABA or Montelukast Oral systemic corticosteroid
Children 5 to 11 years old	*Preferred:* SABA	*Preferred:* Low-dose ICS *Alternative:* Cromolyn, LTRA, Nedocromil, or Theophylline	*Preferred:* EITHER: Low-dose ICS + either LABA, LTRA, or Theophylline OR Medium-dose ICS	*Preferred:* Medium-dose ICS + LABA *Alternative:* Medium-dose ICS + either LTRA or Theophylline	*Preferred:* High-dose ICS + LABA *Alternative:* High-dose ICS + either LTRA or Theophylline	*Preferred:* High-dose ICS + LABA + oral systemic corticosteroid *Alternative:* High-dose ICS + either LTRA or Theophylline + Oral systemic corticosteroid
Individuals 12 years old and older	*Preferred:* SABA	*Preferred:* Low-dose ICS *Alternative:* Cromolyn, LTRA, Nedocromil, or Theophylline	*Preferred:* Low-dose ICS + LABA OR Medium-dose ICS *Alternative:* Low-dose ICS + either LTRA, Theophylline, or Zileuton	*Preferred:* Medium-dose ICS + LABA *Alternative:* Medium-dose ICS + either LTRA, Theophylline, or Zileuton	*Preferred:* High-dose ICS + LABA AND Consider Omailzumab for patients who have allergies	*Preferred:* High-dose ICS + LABA + oral corticosteroid AND Consider Omailzumab for patients who have allergies

ICS= Inhaled Cortixosteroid; LABA=Inhaled Log-Acting Beta$_2$-Agonist; SABA= inhaled short-acting beta$_2$-agonist: LTRA= leukotriene receptor antagonist
Source: Figures 4-1a and b, and 4-5 from NHLBI *Guidelines for the Diagnosis and Management of Asthma – Expert Panel Report 3*

methods alone to determine asthma severity. Some survey respondents are not on medications or only occasionally take a rescue medication. For these respondents, assessment of asthma control based on signs and symptoms is appropriate. However, for respondents who are on a controller medication, the second method is more appropriate but only if their asthma is under control. If it is not, then this method is inadequate for assessing severity. Thus a combination of the two methods was used to define severity in this report.

Based on the advice of clinical provider partners, the New Hampshire Asthma Control Program developed a severity definition using control status and types of medications. The severity definition used in this report is applied only to *intermittent* and *persistent* asthma; no attempt is made to distinguish between the different levels of persistent asthma.

Table 6 depicts how control status and prescription asthma medication use were used to define intermittent versus persistent asthma. For the purposes of this report, *intermittent asthma* is defined as "well controlled. asthma with no asthma medication or only a rescue medication used in the last three months. *Persistent asthma* is defined as "well controlled" asthma with controller medication used in the last three months, or "not well" or "very poorly" controlled asthma.

The following assumptions were made:

- Anyone reporting "not well" or "very poorly" controlled asthma likely had *persistent asthma*. If someone with *intermittent asthma* had uncontrolled asthma at the time the survey was administered, then they are misclassified as having *persistent asthma*.
- Individuals with "well controlled" asthma, who were on no asthma medications or only a rescue medication in the last three months, likely had *intermittent asthma* as they needed little or no medication to keep their asthma "well controlled".
- Individuals with "well controlled" asthma who were on a controller medication in the last three months likely had *persistent asthma* as they needed daily medication to keep their asthma "well controlled."

Table 6
Definitions of Intermittent and Persistent Asthma based on control status and use of prescription asthma medications in the last three months.

<table>
<tr><th></th><th>Used ONLY a rescue medication in the last 3 months</th><th>Used a controller medication in the last 3 months</th><th>Used NO Prescription Asthma Medications in last 3 months</th></tr>
<tr><td>Well Controlled Asthma</td><td colspan="2">Intermittent Asthma</td><td rowspan="3">Persistent Asthma</td></tr>
<tr><td>Not Well Controlled Asthma</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>Very Poorly Controlled Asthma</td></tr>
</table>

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