



Chronic Respiratory Diseases

A Comparison of Prevalence, Utilization, and Payments in New Hampshire Medicaid and Commercially Insured Populations

A report prepared for the
New Hampshire Department of Health and Human Services
By the
Maine Health Information Center

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About the New Hampshire Comprehensive Health Care Information System

The New Hampshire Comprehensive Health Care Information System (NH CHIS) is a joint project between the New Hampshire Department of Health and Human Services and the New Hampshire Insurance Department. The NH CHIS was created by state statute (RSA 420-G:11-a) to make health care data “available as a resource for insurers, employers, providers, purchasers of health care, and state agencies to continuously review health care utilization, expenditures, and performance in New Hampshire and to enhance the ability of New Hampshire consumers and employers to make informed and cost-effective health care choices.” For more information about the NH CHIS, please visit <http://www.nh.gov/nhchis> or www.nhchis.org.

About the Study

This study was conducted by the Maine Health Information Center (MHIC) under a contract with the State of New Hampshire Department of Health and Human Services, Office of Medicaid Business and Policy, titled New Hampshire Comprehensive Health Care Information System. The views expressed are those of the authors and do not necessarily represent the views of the MHIC, or the New Hampshire DHHS. For more information contact Karl Finison, Director of Research, Maine Health Information Center, 207-430-0632, kfinison@mhic.org.

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EXECUTIVE SUMMARY

This study evaluated three chronic respiratory diseases: asthma, chronic obstructive pulmonary disease (COPD), and lung cancer. New Hampshire (NH) Medicaid and NH CHIS commercial administrative eligibility and claims data for services rendered during calendar (CY) year 2005 were used to study disease prevalence and associated utilization and payments.‡

Key Findings:

- During CY2005, 11,004 members with asthma, 4,758 adults with COPD, and 272 adults with lung cancer covered by Medicaid and 18,240 members with asthma, 3,962 members with COPD, and 329 members with lung cancer covered by CHIS commercial were studied.

Asthma

- For Medicaid-only (no Medicare coverage) members, 8,328 (9.6%) had an asthma diagnosis during the year and for Dual Eligible members with both Medicaid and Medicare coverage, 2,676 (14.4%) had an asthma diagnosis during the year.
- Among CHIS commercial members, 18,240 (5.3%) were identified as having any asthma diagnosis during CY2005.
- For members with asthma, the age-standardized* outpatient hospital ED rate for Medicaid-only (397 per 1,000 members) was 2.4 times higher than the CHIS commercial rate (169 per 1,000 members).
- The inpatient hospitalization rate for Medicaid-only (64 per 1,000 members) was 2.1 times higher than the CHIS commercial rate (30 per 1,000 members).
- The office-clinic rate for Medicaid-only (2,136 per 1,000 members) was 5 percent lower than the CHIS commercial rate (2,252 per 1,000 members).
- Although Medicaid typically pays less per service than CHIS commercial, the age-standardized payment PMPM rate for claims with a respiratory diagnosis and respi-

‡ This study was based on standard CHIS reports for chronic respiratory disease developed June 11, 2007 for Medicaid and July 31, 2007 for CHIS Commercial. Utilization and payment reports were revised and updated January 31, 2008. Due to data base changes, numbers reported here may not match numbers in new versions of reports created after these dates. Members were identified as having asthma, COPD, or lung cancer based on finding a single diagnosis on any administrative claim during the year. Payment and utilization were based on the member's payments and use of services during the entire year for claims with a respiratory disease diagnosis or respiratory medications only.

* Indirect standardization of rates for age differences in the Medicaid-only and CHIS commercial populations was used in this report to provide more accurate comparisons of the two populations which have different age distributions. See Appendix for more information.

ratory medications for members with asthma was four percent higher in Medicaid-only (\$104) compared to CHIS commercial (\$100).

Chronic Obstructive Pulmonary Disease (COPD)

- Of the 4,758 members covered by Medicaid with COPD, 3,494 were Dual Eligible and 1,264 were Medicaid-only.
- Excluding Dual Eligible members, the COPD prevalence rate for Medicaid-only members (6.1%) was 3.8 times the prevalence rate for CHIS commercial (1.6%).
- For members with COPD, the age-standardized outpatient hospital ED visit rate for Medicaid-only (451 per 1,000 members) was 2.5 times higher than the CHIS commercial rate (181 per 1,000 members).
- The inpatient hospitalization rate for Medicaid-only (266 per 1,000 members) was 1.8 times higher than the CHIS commercial rate (147 per 1,000 members).
- The office-clinic rate for Medicaid-only (2,561 per 1,000 members) was 17 percent higher than the CHIS commercial rate (2,182 per 1,000 members).
- The age-standardized payment PMPM rate for claims with a respiratory diagnosis and respiratory medications for members with COPD was 16 percent higher in Medicaid-only (\$332) compared to CHIS commercial (\$284).

Lung Cancer

- Of the 272 members covered by Medicaid with lung cancer, 177 were Dual Eligible and 95 were Medicaid-only.
- The prevalence rate of lung cancer in Medicaid-only (0.5%) was five times the rate in CHIS commercial (0.1%).
- For members with lung cancer, the age-standardized outpatient hospital ED rate for Medicaid-only (493 per 1,000 members) was 2 times higher the CHIS commercial rate (248 per 1,000 members).
- The inpatient hospitalization rate for Medicaid-only (1,084 per 1,000 members) was 2.2 times higher than the CHIS commercial rate (504 per 1,000 members).
- The office-clinic rate for Medicaid-only (8,333 per 1,000 members) was 26 percent higher than the CHIS commercial rate (6,600 per 1,000 members).
- Medicaid typically pays less per service than CHIS commercial. The age-standardized payment PMPM rate for claims with a respiratory or lung cancer diagnosis and respiratory medications for members with lung cancer was 13 percent lower in Medicaid-only (\$1,776) compared to CHIS commercial (\$2,033).

Geographical Variations

Disease prevalence rates and service utilization rates were evaluated by the geographical Health Analysis Area of the member's residence.

- Standardized for population age differences, Medicaid prevalence rates of asthma and COPD were higher in northern and more rural New Hampshire HAAs compared to southern HAAs.
- For members with asthma or members with COPD, a pattern of high outpatient ED use was found in the northern and more rural New Hampshire HAAs compared to southern border HAAs. The pattern was found in both the Medicaid and CHIS commercial populations.

Payments and Coexisting Conditions

- The respiratory-disease specific payment rates for Medicaid-only members with asthma were \$1,044 per year (\$87 PMPM), with COPD were \$3,876 per year (\$323 PMPM), and with lung cancer were \$19,128 (\$1,594 PMPM). This indicates the significant financial burden per year to treat these chronic respiratory diseases.
- Selected coexisting conditions were evaluated for persons with chronic respiratory diseases in this study. For example, Medicaid members with COPD incurred \$102.0 million in payments during CY2005 of which only \$16.4 million was specific to COPD, other respiratory diagnoses or respiratory medications.
- Medicaid members with COPD had high prevalence rates of coexisting conditions (e.g. heart disease, diabetes, mental disorders) and a significant number resided in nursing facilities during the year. A similar pattern was found for lung cancer and asthma. Coexisting conditions were less prevalent in the CHIS commercial population with these chronic respiratory diseases.

Limitations: NH CHIS commercial population contains information only on New Hampshire residents whose claims are included in the NH Comprehensive Health Care Information System database, which generally only includes members whose policies were purchased in New Hampshire. Areas close to the borders of New Hampshire may be less well represented in this study than interior areas of the state.

This study is based primarily on administrative claims data. Administrative claims data is collected primarily for the purpose of making financial payments. Specific provider, diagnosis, and procedure coding are typically required as part of the financial payment process. The use of claims data is an efficient and less costly method to report on health care utilization and payments than other methods such as surveys or patient chart audits. Administrative claims data may under-report some diagnostic conditions or services; however, some studies indicate that administrative claims data may provide a more accurate rate than medical chart review.

Differences in utilization and payment measures between Medicaid and NH CHIS commercial may be influenced by differences in the health status of the members covered or differences in the insurance plan delivery model and benefit structure. Medicaid is a fee-for-service program that covers services without co-payments and that covers a wide variety of services that have limited or no benefit coverage in commercial plans. The possibility also exists that the differences in the sources of data and methods of payment may account for some of the variation.

Conclusion and Next Steps: This study demonstrated that chronic respiratory disease was prevalent in the NH Medicaid program and members with chronic respiratory disease contribute significantly to utilization and program costs. Medicaid hospital outpatient ED and inpatient admissions were at higher rates than CHIS commercial. Finally, members with chronic respiratory disease in Medicaid had complex medical problems as indicated by high rates of coexisting chronic respiratory diseases, other serious medical conditions, and mental health disorders. This suggests the potential value of disease management and care coordination for members enrolled in Medicaid to help address these issues. A CHIS project evaluation of the NH Medicaid Disease Management program using administrative claims data is currently underway.

A high proportion of Medicaid members with COPD and lung cancer were Dual Eligible and for these members claims data payments are incomplete. It is recommended that the CHIS investigate opportunities to incorporate Medicare claims into CHIS in order to provide a complete analysis of the experience for Dual Eligibles.

INTRODUCTION

This report was developed to provide a detailed evaluation of the prevalence, utilization, and payments associated with chronic respiratory diseases. The study used New Hampshire (NH) Medicaid and CHIS commercial administrative eligibility and claims data to evaluate rates of prevalence, utilization, and payments for three chronic respiratory diseases: asthma, chronic obstructive pulmonary disease (COPD), and lung cancer.

Chronic respiratory diseases are major contributors to mortality, disability, and medical cost. Nationally, while death rates for other major diseases (heart, cancer, and stroke) have declined, chronic lower respiratory disease death rates increased by 53 percent between 1980 and 2003, and was the fourth leading cause of death during 2003.¹

One of the first studies of prevalence of chronic respiratory diseases in the U.S. was conducted in Berlin, New Hampshire (NH) and published in 1962. Depending on location within the town, the prevalence of chronic non-specific respiratory disease ranged from 15 to 39 percent for men and 15 to 21 percent for women.²

National estimates for 2005 indicate that among adults age 18 and older, 10.7 percent have ever had asthma and 7.2 percent continue to have asthma. The prevalence of chronic bronchitis was 4.1 percent and emphysema was 1.7 percent. Among adults under age 65, those insured by Medicaid had higher prevalence rates of emphysema (3.8% vs. 0.6%), chronic bronchitis (10.6% vs. 3.1%), and asthma (15.3% vs. 6.4%) compared to adults with private insurance. Among adults age 65 and older, those insured by Medicaid and Medicare had higher prevalence rates of emphysema (8.0% vs. 5.3%), chronic bronchitis (9.6% vs. 5.1%), and asthma (14.3% vs. 8.0%) compared to those with Medicare alone.³

During 2005, the rate of adults who have been told they currently have asthma was higher in New Hampshire (10.3%) compared to the national rate (8.0%).⁴ The rate of asthma prevalence in New Hampshire decreased with increasing income level. Adults with income less than \$15,000 (were more than twice as likely to have been told they have asthma compared to adults with income \$50,000 and over (19.1%) vs. 8.3%).

2005 Rates of Adult Asthma Prevalence and Adult Smoking Behavior by State⁴

	Adults who have been told they currently have asthma	Adults who have been told they ever had asthma	Smoke everyday	Adults who are current smokers
National	8.0%	12.6%	15.3%	20.5%
New Hampshire	10.3%	14.2%	15.4%	20.4%
Maine	10.2%	14.7%	15.9%	20.8%
Vermont	9.8%	15.0%	14.4%	19.3%
Massachusetts	9.6%	14.9%	13.5%	18.1%

Source: Centers for Disease Control, Behavioral Risk Factor Surveillance System, 2005.

Smoking behavior has been linked to chronic respiratory disease. The prevalence of current smokers in New Hampshire (20.4%) during 2005 was similar to the national rate (20.5%).⁴ The rate of smoking in New Hampshire is higher with lower income levels. Adults with in-

come less than \$15,000 were more than twice as likely to be current smokers (32.5%) compared with adults with income \$50,000 and over (14.3%).

2005 Rates of Adult Asthma Prevalence and Adult Smoking Behavior by Income⁴

New Hampshire by Income Group	Adults who have been told they currently have asthma	Adults who have been told they ever had asthma	Smoke everyday	Adults who are current smokers
<\$15,000	19.1%	23.2%	27.8%	32.5%
\$15,000 - \$24,999	13.7%	17.7%	26.0%	33.5%
\$25,000 - \$34,999	9.5%	14.7%	20.5%	26.6%
\$35,000 – \$49,999	11.0%	15.5%	18.7%	23.9%
\$50,000 and over	8.3%	12.6%	10.1%	14.3%

Based on CDC trend analysis, the rate of current smokers in NH during 2003 (23.2%) was slightly higher than the rate in 1990 (22.0%).⁵ A CDC study also reports a higher national rate of cigarette smoking (32.9%) among persons living below the poverty level compared to persons above the poverty level (22.2%).⁶ Although smoking behavior cannot be determined from the CHIS data used in this report, this may be one factor explaining differences found between the Medicaid and CHIS commercial in chronic respiratory disease prevalence rates.

Survey data for New Hampshire indicates that rural residents were more likely to be smokers than nonrural residents (25.5% vs. 22.9%).⁷ In this CHIS report, geographical variation in chronic respiratory disease prevalence is evaluated. Geographical variation in smoking behavior may be a factor explaining variations in prevalence rates.

Chronic obstructive pulmonary disease (COPD) is a term referring to two lung diseases, chronic bronchitis and emphysema, that are characterized by obstruction to airflow that interferes with normal breathing. Both of these conditions frequently coexist, hence the term COPD. It does not include other obstructive diseases such as asthma.⁸ This is the definition used for this NH CHIS study.

Lung cancer is a serious chronic respiratory disease. An estimated 740 New Hampshire residents died from lung cancer during 2004.⁹ In this CHIS study, lung cancer prevalence and associated cost were evaluated for the Medicaid and CHIS commercial populations.

The prevalence, utilization of medical services, and cost for chronic respiratory disease in the NH Medicaid program has been previously unknown. Using the administrative claims data, this study evaluated prevalence, and associated utilization and costs for children and adults with asthma, and for adults with COPD or lung cancer. This study, developed by the Maine Health Information Center and the New Hampshire Department of Health and Human Services, represents the first evaluation of chronic respiratory disease using the NH CHIS database.

Overview and Purpose of Report

The purpose of this study was to describe the prevalence of chronic respiratory disease, and associated utilization and payments in the New Hampshire populations covered by Medicaid and CHIS commercial. The scope of the study was to evaluate:

- prevalence of asthma, adult COPD, and adult lung cancer in Medicaid and CHIS commercial insured persons (members);
- inpatient, outpatient emergency department, and office-clinic visit utilization rates with a respiratory diagnosis;
- payment rates per member per month (PMPM) for claims with a respiratory diagnosis or respiratory medications;
- use of medications and pulmonary testing for members with asthma;
- age-specific and age-standardized* rates;
- Dual Eligible and Medicaid-only status;
- Medicaid eligibility group (e.g. low income or disabled);
- prevalence, utilization and payment rates by geographical (Health Analysis Area) location of member residence; and
- prevalence of selected coexisting conditions.

Data Sources and Methods

This study was based on administrative eligibility and claims data from New Hampshire Medicaid and the NH CHIS commercial database for CY2005 (based on date of service). Members were identified as having asthma, COPD, or lung cancer based on finding a single diagnosis on any administrative claim during the year. Payments and utilization were based on the member's payments and use of services during the entire year for claims with a respiratory diagnosis or respiratory medications only. Methods used in this study are described in Appendix 1 at the end of the report.

Standardization for age differences was made in the comparison of Medicaid to Commercial population rates. Geographical comparisons were also standardized for age differences. The indirect method of age standardization was used and is the preferred method for standardization of rates for geographical analysis of small areas such as the HAAs used in this study. For age-standardized utilization rates, confidence intervals were computed using methods described by Breslow and Day for indirect standardized rates (Statistical Methods in Cancer Research. Volume II – The Design and Analysis of Cohort Studies. World Health Organization. 1987.).

Population Studied in the Report

The CY2005 experience of members covered by NH Medicaid and NH CHIS commercial insurance plans that reported data to the NH CHIS were studied. Consistent with other reporting for New Hampshire Medicaid, the study excluded from the NH Medicaid population members with limited or no Medicaid benefits (e.g. Medicare buy-in programs) and children covered under the SCHIP. The study excluded from the NH CHIS commercial data mem-

* Indirect standardization of rates for age differences in the Medicaid-only and CHIS commercial populations was used in this report to provide more accurate comparisons of the two populations which have different age distributions. See Appendix for more information.

bers age 65 or older and members who resided outside of NH. The study included only NH CHIS commercial members who had both medical and pharmacy coverage linked.

Both children and adult covered members were included in the study of asthma because this disease is prevalent in both children and adults. The studies of COPD and lung cancer were restricted to adults age 19 and older because COPD and lung cancer are relatively rare in children. If a member had more than one respiratory disease during the year (i.e. asthma and COPD, COPD and lung cancer) the member was included in the analysis for both diseases. Members were identified as having asthma, COPD, or lung cancer based on finding a single diagnosis on any administrative claim during the year.

Interpretation of Results and Limitations

This is the first detailed study of chronic respiratory disease prevalence and use comparing NH Medicaid and NH CHIS commercial. The large number of covered members studied in this one-year sample lends credibility to the findings. However, a number of cautions about the data used and results of this study are provided.

This study was based on administrative eligibility and claims data. Variances in provider or insurer claims coding, data processing, or reimbursement arrangements may contribute to the variances shown in this report. Variances in benefits and coding by commercial insurer products (EPO, HMO, Point-of-Service, Indemnity or Third Party Administrator) and plans, may contribute to variances shown in this report.

The New Hampshire CHIS commercial population contains information on those residents whose claims are included in the NH CHIS database, which generally only includes members whose policies were purchased in New Hampshire. Areas close to the borders of New Hampshire may be less well represented than areas in the interior. Additionally, companies that self-fund their health care and do not use a TPA to pay claims are not captured in the data set. Only CHIS commercial members with medical and pharmacy coverage linked were included in the study. Because of these factors, this report underestimates the number of members covered by commercial insurance in New Hampshire.[¶]

This study compared two very different populations: NH Medicaid and NH CHIS commercial. Differences in these two populations could influence the magnitude of differences in rates reported in this study. Medicaid programs typically cover a large population of persons with chronic disease and disability. Persons institutionalized for long periods of time in nursing and other facilities are common in Medicaid but less common in the CHIS commercial population. Children are a higher proportion of the total Medicaid population while children are a lower proportion of the total CHIS commercial population. The Medicaid population covers elders age 65 and over who were not included in the CHIS commercial population studied. Methods used to control for these differences included:

- separate reporting of Dual Eligible and Medicaid-only members;
- separate reporting of disabled and other Medicaid eligibility groups;
- use of age-specific prevalence rates;
- use of age-standardized utilization and payment rates; and

[¶] The statute requiring submission of data is limited to areas regulated by the NH Department of Insurance.

- comparison of Medicaid-only members with CHIS commercial.

Because the CHIS data does not include claims paid by Medicare, payments for Dual Eligible Medicaid members are incomplete and were suppressed in the rates reported.

Additional details about the study methods and limitations are provided in Appendix 1.

RESULTS

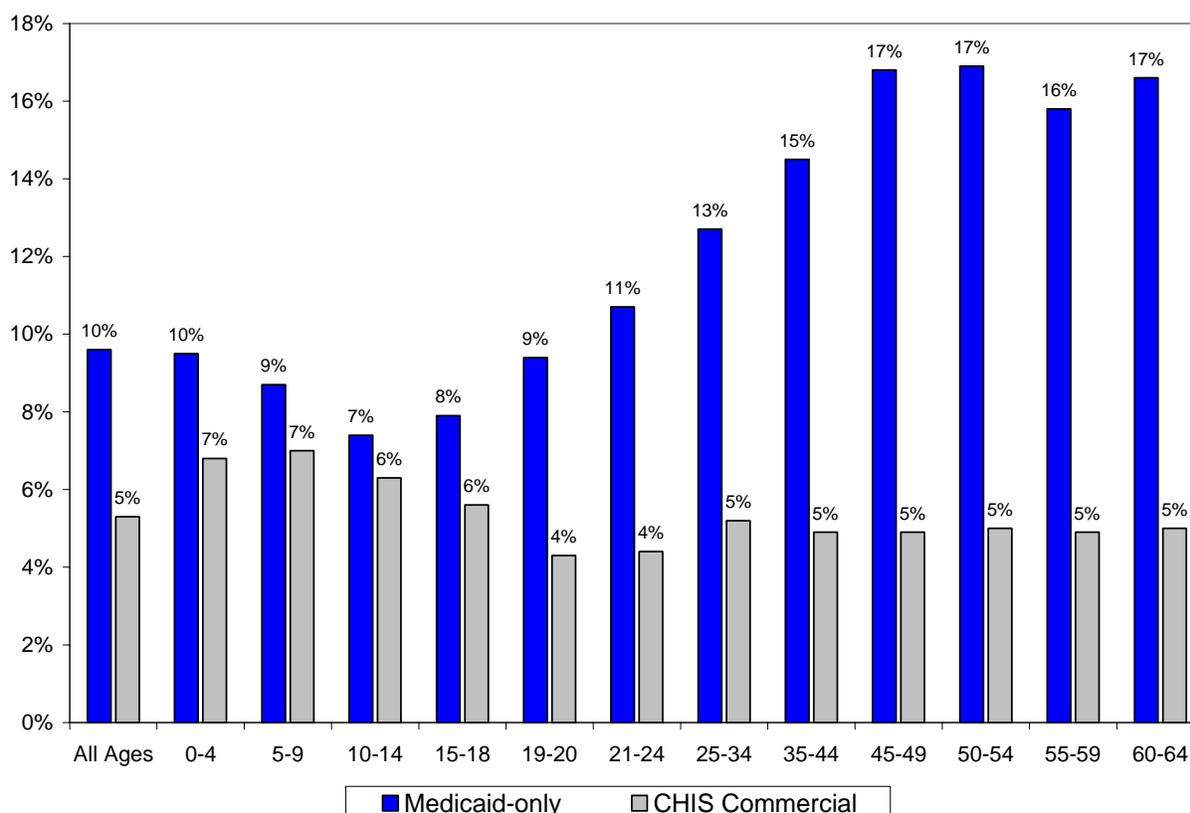
Asthma – Prevalence, Utilization, and Payments

Asthma Prevalence

For this NH CHIS study, determination of asthma was based on a diagnosis of asthma on any administrative medical claim during the year. The CY2005 NH Medicaid and NH CHIS commercial asthma prevalence rates are summarized in Figure 1 and Table 1.

Among 105,053 NH Medicaid members, 11,004 (10.5%) were identified through the administrative claims data as having any diagnosis of asthma during CY2005. For 86,514 average Medicaid-only members, 8,328 (9.6%) had an asthma diagnosis during the year and for 18,538 average Dual Eligible members, 2,676 (14.4%) had an asthma diagnosis during the year. Among 342,852 CHIS commercial average covered members, 18,240 (5.3%) were identified as having any asthma diagnosis during CY2005.

Figure 1. Prevalence of Asthma by Age of Member. NH Medicaid-only and NH CHIS Commercial Members, CY2005.



About half of the NH Medicaid members with asthma were children (5,589) and half were adults (5,415). In contrast, for CHIS commercial population one-third (6,054) of members with asthma were children and two-thirds (12,186) were adults. This reflects in part the

different age distribution of two populations. Within NH Medicaid the highest rate of asthma prevalence was found in the Physically Disabled eligibility group (18.2%).

Medicaid-only members had an asthma prevalence rate (9.6%) that was 1.8 times the CHIS commercial member rate (5.3%). For children age 0-18 the Medicaid-only prevalence rate (8.5%) was 34% higher than the CHIS commercial rate (6.3%). Among adults age 19-64 the Medicaid-only prevalence rate (13.4%) was 2.7 times the CHIS commercial rate (4.9%). For every age group the Medicaid-only prevalence rate was higher than the CHIS commercial prevalence rate.

Table 1. Prevalence Rate (Number of Members) with Asthma by Age, Gender, and Medicaid Eligibility Group. NH Medicaid and NH CHIS Commercial Members, CY2005.

Age Group / Gender / Medicaid Eligibility Group	Medicaid Total	Dual Eligible	Medicaid-only	CHIS Commercial
Total	10.5% (11,004)	14.4% (2,676)	9.6% (8,328)	5.3% (18,240)
Member's Age				
0-4	9.5% (1,797)	**	9.5% (1,796)	6.8% (1,265)
5-9	8.7% (1,570)	**	8.7% (1,570)	7.0% (1,660)
10-14	7.4% (1,250)	**	7.4% (1,250)	6.3% (1,732)
15-18	7.9% (972)	**	7.9% (972)	5.6% (1,397)
19-20	9.4% (141)	11.2% (5)	9.4% (136)	4.3% (364)
21-24	10.9% (397)	13.2% (45)	10.7% (352)	4.4% (715)
25-34	13.0% (1,003)	14.5% (214)	12.7% (789)	5.2% (2,256)
35-44	14.9% (1,071)	15.8% (403)	14.5% (668)	4.9% (3,236)
45-49	17.2% (548)	17.6% (274)	16.8% (274)	4.9% (1,770)
50-54	15.6% (398)	14.5% (203)	16.9% (195)	5.0% (1,630)
55-59	16.5% (334)	17.0% (196)	15.8% (138)	4.9% (1,292)
60-64	18.0% (307)	19.1% (187)	16.6% (120)	5.0% (922)
65-74	15.7% (458)	16.2% (417)	11.8% (41)	NA
75-84	13.3% (434)	13.4% (411)	10.9% (23)	NA
85+	9.4% (324)	9.5% (320)	6.1% (4)	NA
Gender				
Female	11.0% (6,644)	16.2% (1,988)	9.7% (4,656)	6.1% (10,627)
Male	9.7% (4,360)	11.0% (688)	9.5% (3,672)	4.5% (7,612)
Medicaid Eligibility Group				
Low Income Child	8.5% (5,515)	**	8.5% (5,514)	NA
Low Income Adult	12.5% (1,737)	21.6% (188)	11.9% (1,549)	NA
Severely Disabled Child	5.2% (61)	0% (0)	5.2% (61)	NA
Disabled Physical	18.2% (1,348)	19.5% (736)	17.0% (612)	NA
Disabled Mental	13.4% (1,127)	12.4% (608)	14.7% (519)	NA
Elderly	12.6% (1,216)	12.7% (1,143)	11.0% (73)	NA

* One child in NH CHIS Commercial with unknown age. **One Low Income Child was reported as Dual Medicare; prevalence rate not reported due to small number.

Respiratory Disease Utilization and Payments for Members with Asthma

The intent of this section is to summarize utilization and payments specific to respiratory disease for members with asthma. Members with asthma may have multiple coexisting conditions that contribute to utilization and payments. Table 2 summarizes utilization and payments for claims with a respiratory diagnoses or respiratory medications only.

Table 2. Members with Asthma. Respiratory Disease Utilization and Payment Rates. NH Medicaid and NH Commercial Members, CY2005.

Measure*	Medicaid Total	Dual Eligible	Medicaid-only	CHIS Commercial
Members with Condition	11,004	2,676	8,328	8,240
Member Months for Members with Condition	118,814	28,959	89,855	192,195
Total Payments for Members with Condition (millions)	\$13.4**	\$5.6**	\$7.8	\$20.4
Outpatient Emergency Department Visits	4,314	928	3,386	2,521
Office/Clinic Visits	20,397	3,394	17,003	34,881
Inpatient Discharges	786	328	458	475
Statistical Rates				
Payments Per Member Per Month (PMPM)	**	**	\$87	\$106
Outpatient Emergency Department Visits per 1,000 Members	435.7	384.5	452.2	157.4
Office/Clinic Visits per 1,000 Members	2,060.1	1,406.4	2,270.7	2,177.9
Inpatient Discharges per 1,000 Members	79.4	135.9	61.2	29.7

*All utilization metrics measure the utilization and payments for the members with asthma during the year for a respiratory diagnosis or respiratory medications only. **Payment information for Dual Eligible members is incomplete because Medicare administrative claims are not part of the NH CHIS database.

Medicaid members with asthma used 19,252 outpatient ED visits, 83,959 office-clinic visits, and 3,557 inpatient hospitalizations in total during CY2005. Of these visits, 4,314 outpatient ED visits, 20,397 office-clinic visits, and 786 inpatient hospitalizations were for a respiratory diagnosis. Respiratory disease utilization and payment rates were compared between Medicaid-only and CHIS commercial members with asthma. Rates were standardized for age differences in the two populations and are shown in Table 3 and Figure 2.

Table 3. Members with Asthma. Age-Standardized Respiratory Disease Utilization and Payment Rates. NH Medicaid-Only and NH Commercial Members, CY2005. Note: 95% confidence intervals (CI) in parentheses.

Measure*	Medicaid-only	CHIS Commercial
Payments Per Member Per Month (PMPM)**	\$104	\$100
Outpatient Emergency Department Visits per 1,000 Members	397 (384-411)	169 (163-176)
Office/Clinic Visits per 1,000 Members	2,136 (2,104-2,168)	2,252 (2,228-2,276)
Inpatient Discharges per 1,000 Members	64 (58-70)	30 (27-33)

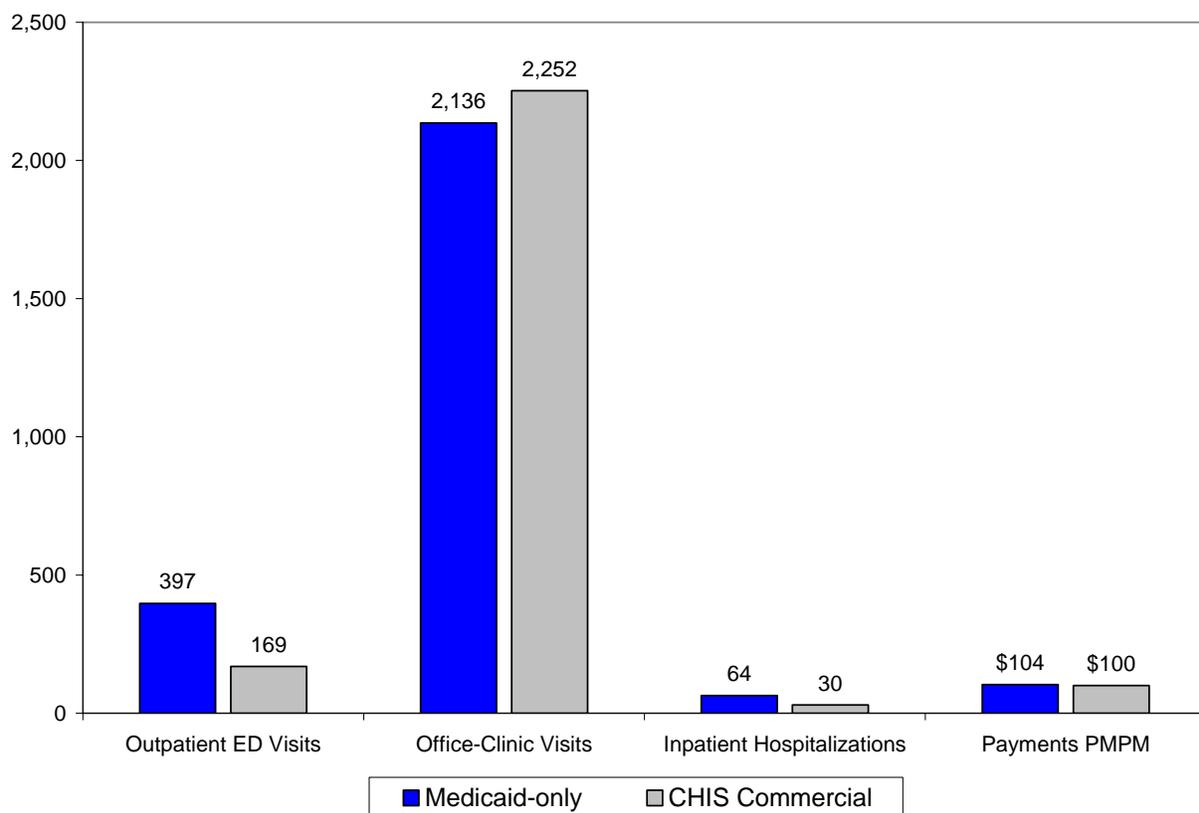
*All utilization metrics measure the utilization and payments for the members with asthma during the year for a respiratory diagnosis or respiratory medications. **95% CI were not computed for payment PMPM rates because CHIS reports do not provide variance estimates and payments may be skewed by outlier cases.

For members with asthma, the age-standardized outpatient hospital ED rate for Medicaid-only (397 per 1,000 members) was 2.4 times higher than the CHIS commercial rate (169 per 1,000 members). The inpatient hospitalization rate for Medicaid-only (64 per 1,000 members) was 2.1 times higher than the CHIS commercial rate (30 per 1,000 members). The

office-clinic rate for Medicaid-only (2,136 per 1,000 members) was 5 percent lower than the CHIS commercial rate (2,252 per 1,000 members). Standardized for age, the hospital use rates were more than two times higher in Medicaid-only compared to CHIS commercial, while the office-clinic use rates were slightly lower. For each of these standardized rates the confidence intervals indicate that the differences between Medicaid-only and CHIS commercial were statistically significant.

Although Medicaid typically pays less per service than CHIS commercial, the age-standardized payment PMPM rate for claims with a respiratory diagnosis and respiratory medications for members with asthma was four percent higher in Medicaid-only (\$104) compared to CHIS commercial (\$100).

Figure 2. Respiratory Disease Utilization and Payment Rates for Members with Asthma. Age-standardized Rates of Utilization per 1,000 Members and Payments per Member per Month (PMPM). NH Medicaid-only and NH CHIS Commercial Members, 2005.



Use of Pulmonary Testing and Respiratory Medication by Members with Asthma

Table 4 provides summary rates of pulmonary testing and the use of asthma medications for members with asthma. Among Medicaid-only members with asthma 16.3 percent had a pulmonary test identified in the administrative claims data compared with 35.4 percent in the CHIS commercial population. While the rate of any asthma medication use was similar in Medicaid-only (89.8%) and CHIS commercial (88.2%), the rate of asthma controller medi-

cation use was slightly lower in Medicaid-only (53.5%) compared to CHIS Commercial (59.2%).

Table 4. Prevalence Rate for Medication Use or Pulmonary Testing. NH Medicaid and NH Commercial Members, CY2005. *Note: 95% confidence intervals (CI) in parentheses.*

Measure*	Medicaid Total	Dual Eligible	Medicaid- only	CHIS Commercial
Any Pulmonary Testing	17.0% (16.3-17.8)	19.4% (17.8-21.0)	16.3% (15.4-17.1)	35.4% (34.7-36.2)
Any Respiratory Medication Use	85.4% (84.7-86.1)	71.8% (70.0-73.6)	89.8% (89.1-90.5)	88.2% (87.7-88.7)
Controller Medications	51.9% (50.9-52.9)	47.1% (45.1-49.1)	53.5% (52.3-54.6)	59.2% (58.5-60.0)
Rescue Medications	79.3% (78.5-80.1)	65.0% (63.1-66.9)	83.9% (83.1-84.8)	74.8% (74.1-75.4)

*Measures in this table cannot be compared with NCQA HEDIS reported measures which use a more restrictive definition to identify members with “persistent” asthma and a two-year study period. Asthma controller medications include inhaled corticosteroids, nedocromil, cromolyn sodium, leukotriene modifiers or methylxanthines.

Geographical Variation in Prevalence and Utilization for Members with Asthma

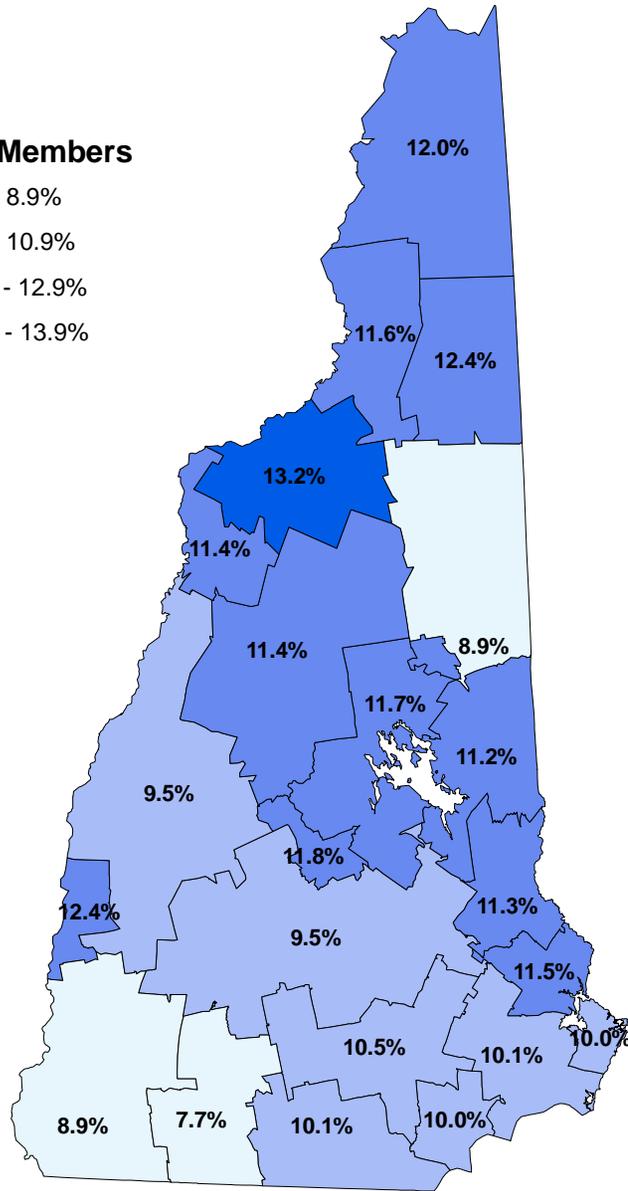
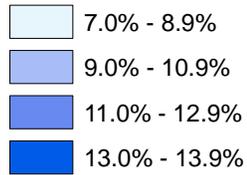
Evaluation of geographical variation in prevalence and use rates was based on the Health Analysis Area (HAA) of the member’s residence. Prevalence and utilization rates for members with asthma are reported in Table 5 for NH Medicaid and Table 6 for CHIS commercial.

Manchester (2,031), Nashua (1,289), and Concord (1,014), had the highest volume of Medicaid members with asthma. Standardized for age differences, the highest prevalence rates for asthma in the NH Medicaid population were Littleton (13.2%), Berlin (12.4%), Claremont (12.4%), and Colebrook (12.0%); the lowest rate area was Peterborough (7.7%). The southern border HAAs (Keene, Peterborough, Nashua, Derry, Exeter, and Portsmouth) all had prevalence rates of asthma lower than the NH Medicaid state average.

Rates of utilization varied by HAA for the Medicaid members with asthma. Laconia (824 per 1,000 members), Colebrook (815), Lancaster (708), and Berlin (561) had the highest rates of outpatient ED visits while Peterborough (304) and Manchester (314) had the lowest rates. The highest rates of respiratory diagnosis office-clinic visits for members with asthma were in Portsmouth (2,668 per 1,000 members), North Conway (2,515), and Keene (2,379) while the lowest rates were in Lancaster (1,718 per 1,000 members), Claremont (1,732), and Concord (1,833).

Asthma Prevalence

Medicaid Members



CHIS Commercial

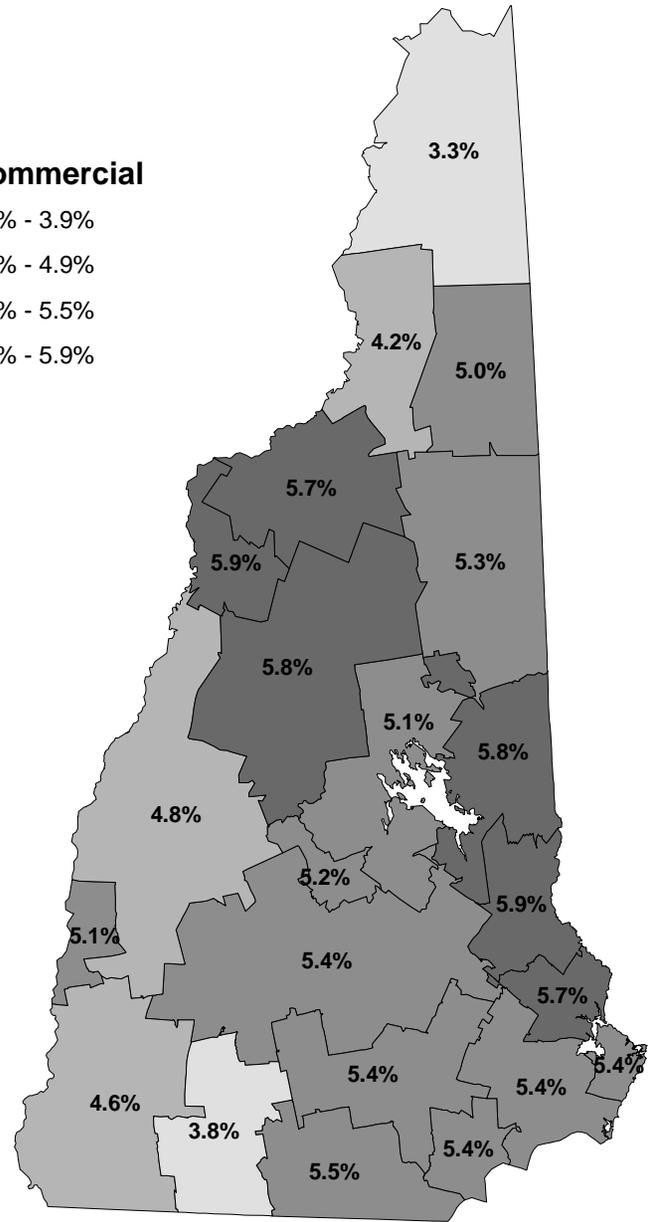
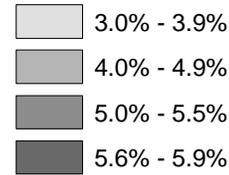


Table 5. Prevalence, Respiratory Disease Utilization, and Controller Medication Use for Members with Asthma by Health Analysis Area. NH Medicaid Members, CY2005.

Health Analysis Area	Asthma Prevalence (Number of Members)	Asthma Prevalence Standardized for Age*	Outpatient Emergency Department Visit Rate per 1,000 Members*	Office-Clinic Visit Rate per 1,000 Members*	Percent of Members Using Controller Asthma Medications*
Total	10.5% (11,004)	10.5%	436	2,060	52%
Berlin	12.7% (304)	12.4%	561	1,855	61%
Claremont	12.8% (362)	12.4%	492	1,732	46%
Colebrook	12.2% (92)	12.0%	815	2,041	43%
Concord	9.6% (1,014)	9.5%	425	1,833	55%
Derry	10.0% (440)	10.0%	425	2,257	46%
Dover	11.8% (588)	11.5%	529	2,074	54%
Exeter	9.9% (585)	10.1%	336	2,015	52%
Franklin	11.7% (275)	11.8%	451	1,979	54%
Keene	9.0% (479)	8.9%	356	2,379	54%
Laconia	11.6% (573)	11.7%	824	1,966	47%
Lancaster	11.5% (139)	11.6%	708	1,718	39%
Lebanon	9.5% (376)	9.5%	388	1,978	52%
Littleton	13.3% (289)	13.2%	481	2,268	52%
Manchester	10.6% (2,031)	10.5%	314	1,990	48%
Nashua	10.1% (1,289)	10.1%	357	2,030	53%
North Conway	8.8% (187)	8.9%	382	2,515	63%
Peterborough	7.2% (168)	7.7%	304	2,246	50%
Plymouth	10.8% (291)	11.4%	491	2,090	51%
Portsmouth	10.7% (227)	10.0%	515	2,668	60%
Rochester	11.3% (673)	11.3%	539	2,288	55%
Wolfeboro	10.6% (269)	11.2%	464	2,242	59%
Woodsville	11.3% (81)	11.4%	333	1,883	51%

* Rates are standardized for age differences in the population using CY2005 Medicaid statewide rates as the basis. Asthma controller medication use in this table cannot be compared with NCQA HEDIS measures which use a more restrictive definition to identify members with “persistent” asthma and a two-year study period. Asthma controller medications include inhaled corticosteroids, nedocromil, cromolyn sodium, leukotriene modifiers or methylxanthines.

The highest rate of asthma controller medication use for Medicaid members with asthma was in North Conway (63%) while the lowest rate was in Lancaster (39%). Comparing the three areas (Manchester, Nashua, and Concord) with the highest number of members with asthma covered by Medicaid, members in Manchester were less likely to have used a controller medication than members in Nashua or Concord.

Prevalence and utilization rates for CHIS commercial members with asthma are reported in Table 6. Manchester (3,396), Nashua (2,986), and Concord (2,393) had the highest volume of members with asthma in the study. Standardized for age differences, the highest prevalence rates for asthma in the NH CHIS commercial population were in Rochester (5.9%), Woodsville (5.9%), Plymouth (5.8%), and Wolfeboro (5.8%) and the lowest rate area was Colebrook (3.3%).

Table 6. Prevalence, Respiratory Disease Utilization, and Controller Medication Use for Members with Asthma by Health Analysis Area. NH CHIS Commercial, CY2005.

Health Analysis Area	Asthma Prevalence (Number of Members)	Asthma Prevalence Standardized for Age*	Outpatient Emergency Department Visit Rate per 1,000 Members*	Office-Clinic Visit Rate per 1,000 Members*	Members Using Controller Asthma Medications per 1,000 Members*
Total	5.3% (18,240)	5.3%	157	2,178	59%
Berlin	5.0% (149)	5.0%	158	1,950	74%
Claremont	5.1% (229)	5.1%	235	1,925	48%
Colebrook	3.3% (32)	3.3%	235	1,584	51%
Concord	5.4% (2,393)	5.4%	143	2,196	61%
Derry	5.4% (932)	5.4%	163	2,423	57%
Dover	5.7% (930)	5.7%	149	2,440	56%
Exeter	5.4% (1,307)	5.4%	179	2,097	58%
Franklin	5.2% (294)	5.2%	231	2,018	53%
Keene	4.6% (622)	4.6%	165	2,172	63%
Laconia	5.1% (793)	5.1%	335	2,005	59%
Lancaster	4.2% (103)	4.2%	305	1,753	64%
Lebanon	4.8% (1,123)	4.8%	152	2,031	55%
Littleton	5.7% (234)	5.7%	265	2,099	57%
Manchester	5.4% (3,396)	5.4%	117	2,087	61%
Nashua	5.5% (2,986)	5.5%	124	2,180	60%
North Conway	5.2% (255)	5.3%	206	2,815	57%
Peterborough	3.9% (369)	3.8%	156	2,264	59%
Plymouth	5.8% (428)	5.8%	179	1,987	59%
Portsmouth	5.3% (523)	5.4%	148	2,455	60%
Rochester	5.9% (664)	5.9%	161	2,420	57%
Wolfeboro	5.8% (394)	5.8%	216	2,274	62%
Woodsville	5.8% (84)	5.9%	102	1,839	66%

* Rates are standardized for age differences in the population using CY2005 CHIS commercial statewide rates as the basis. Rates are standardized for age differences in the population using CY2005 Medicaid statewide rates as the basis. Asthma controller medication use in this table cannot be compared with NCQA HEDIS measures which use a more restrictive definition to identify members with “persistent” asthma and a two-year study period. Asthma controller medications include inhaled corticosteroids, nedocromil, cromolyn sodium, leukotriene modifiers or methylxanthines.

Standardized for age, rates of utilization varied by HAA for the CHIS commercial members with asthma. Laconia (335 per 1,000 members), Lancaster (305 per 1,000), Littleton (265 per 1,000), Claremont (235 per 1,000) and Colebrook (235 per 1,000) had the highest rates of outpatient ED visits with a respiratory diagnosis. These same areas also ranked well above average in outpatient ED use for Medicaid members with asthma.

The lowest rates of office-clinic visit use for respiratory diagnosis were Colebrook (1,584 per 1,000 members), Lancaster (1,753 per 1,000), Woodsville (1,839 per 1,000), Claremont (1,925 per 1,000) and Berlin (1,950 per 1,000). Lancaster, Woodsville, Claremont, and Berlin also had low rates in the Medicaid members with asthma. The highest rate areas were North Conway (2,815 per 1,000 members), Portsmouth (2,455 per 1,000), Dover (2,440 per 1,000), and Derry (2,423 per 1,000).

The highest rate of asthma controller medication use for CHIS commercial members with asthma was in Berlin (74%) while the lowest rate was in Claremont (48%). Comparing the three areas (Manchester, Nashua, and Concord) with the highest number of members with asthma covered by CHIS commercial, there was virtually no difference in the rates of controller medication use.

Asthma and Coexisting Conditions

This study evaluated three chronic respiratory disease conditions: asthma, COPD, and lung cancer. Some of the members with asthma also had administrative claims indicating that they had COPD or lung cancer. Among the 11,004 members covered by Medicaid with asthma, 1,452 (13%) also had COPD and 56 (<1%) also had lung cancer. Among the 18,240 CHIS commercial members with asthma, 936 (5%) also had COPD and 45 (<1%) also had lung cancer.

During CY2005, NH Medicaid members incurred \$850.1 million in claims payment expenses. Of this \$110.0 million (13%) was incurred by 11,004 members who had asthma. For the members with asthma only \$13.4 million was directly attributable to claims with a respiratory diagnosis or respiratory medication. The large difference may be explained by other coexisting conditions these members had.

Because asthma is prevalent in adults and older persons, members with asthma may have other coexisting conditions. Among the 8,328 Medicaid-only members with asthma, 636 (8%) had heart disease, 501 (6%) had diabetes, and 3,115 (37%) had a mental disorder diagnosis. Among the 2,676 Dual Eligible members with asthma, 1,307 (49%) had heart disease, 929 (35%) had diabetes, and 1,609 (60%) had a mental disorder diagnosis. Among the 18,240 CHIS commercial members with asthma, 8 percent had coexisting heart disease, 6 percent had coexisting diabetes, and 25 percent had a coexisting mental health disorder diagnosis.

Because many Medicaid members reside in nursing facilities (skilled or intermediate level) and nursing facility care is a large proportion of the Medicaid payments, this study evaluated the number of members with asthma who also resided in a nursing facility during CY2005. Among the 2,676 Dual Eligible members with asthma, 405 resided in a nursing facility at some time during CY2005. Only 62 of the 8,328 Medicaid-only members with asthma resided in a nursing facility during CY2005, a prevalence rate that was similar to the CHIS commercial rate.

Chronic Obstructive Pulmonary Disease – Prevalence, Utilization, and Payments

COPD Prevalence

For this study of COPD, adults age 19 and older were evaluated because COPD is common in older adults and rare in children. The CY2005 NH Medicaid and NH CHIS commercial adult population COPD prevalence rates are summarized in Table 7 and Figure 3. COPD for this study was defined as chronic bronchitis or emphysema; asthma was not included.

Among 39,115 NH Medicaid members age 19 and older, 4,758 (12.2%) were identified through the administrative claims data as having a diagnosis of COPD. Of the 4,758 members covered by Medicaid with COPD, 3,494 were Dual Eligible and 1,264 were Medicaid-only. The highest prevalence rates of COPD were among the Elderly (24.6%) and Disabled Physical (18.6%) eligibility groups. Among 247,715 NH CHIS commercial members age 19 and older, 3,962 (1.6%) were identified as having a diagnosis of COPD.

Table 7. Prevalence Rate (Number of Members) with Chronic Obstructive Pulmonary Disease (COPD) by Age, Gender, and Medicaid Eligibility Group. NH Medicaid and NH CHIS Commercial Members, CY2005.

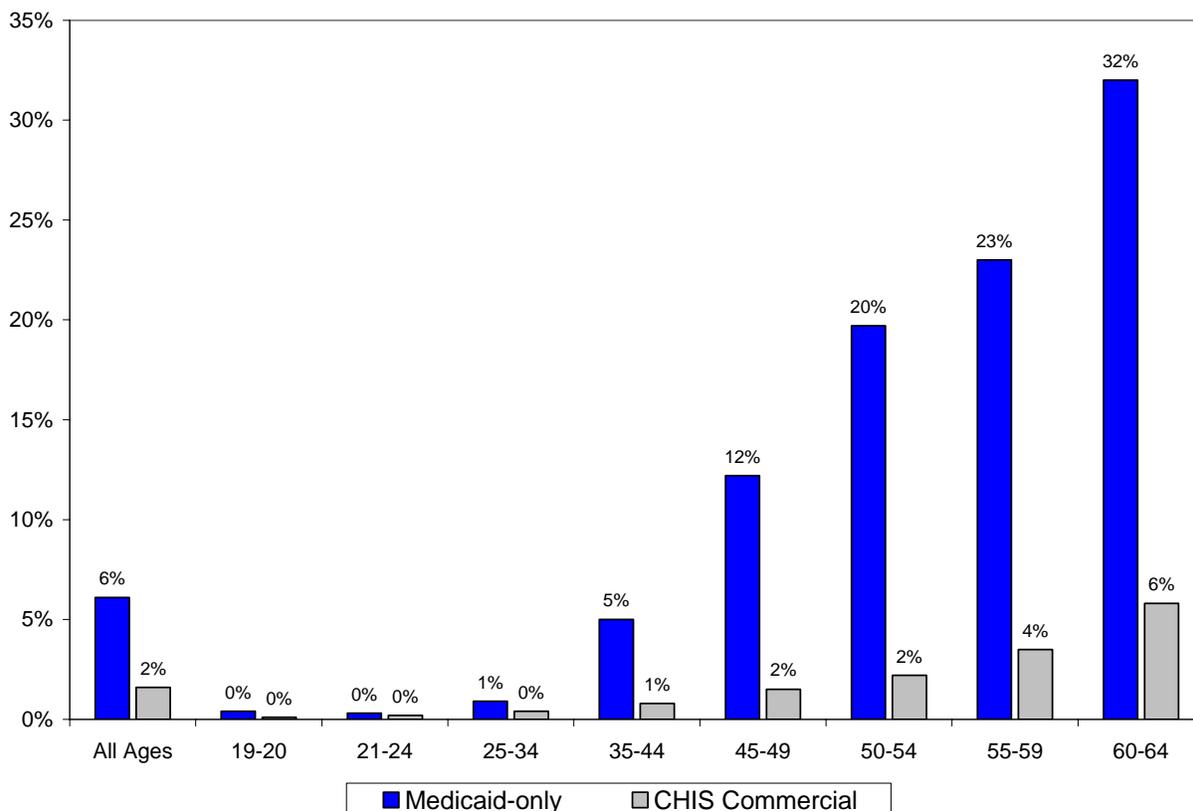
Age Group / Gender / Medicaid Eligibility Group	Medicaid Total	Dual Eligible	Medicaid-only	CHIS Commercial
Total Adults Age 19 and Older	12.2% (4,758)	18.9% (3,494)	6.1% (1,264)	1.6% (3,962)
Member's Age				
19-20	0.5% (7)	2.2% (1)	0.4% (6)	0.1% (11)
21-24	0.3% (12)	0.3% (1)	0.3% (11)	0.2% (29)
25-34	1.3% (98)	2.8% (41)	0.9% (57)	0.4% (180)
35-44	5.5% (391)	6.4% (162)	5.0% (229)	0.8% (528)
45-49	12.1% (387)	12.1% (189)	12.2% (198)	1.5% (533)
50-54	17.5% (448)	15.7% (220)	19.7% (228)	2.2% (703)
55-59	24.1% (489)	24.9% (288)	23.0% (201)	3.5% (919)
60-64	32.9% (561)	33.5% (328)	32.2% (233)	5.8% (1,059)
65-74	31.4% (918)	33.3% (858)	17.2% (60)	NA
75-84	26.2% (858)	26.9% (823)	16.7% (35)	NA
85+	17.1% (589)	17.2% (583)	9.1% (6)	NA
Gender				
Female	11.3% (3,178)	19.0% (2,331)	5.3% (847)	1.5% (1,983)
Male	14.5% (1,580)	18.6% (1,163)	9.0% (417)	1.7% (1,979)
Medicaid Eligibility Group				
Low Income Adult	2.1% (297)	8.0% (70)	1.7% (227)	NA
Disabled Physical	18.6% (1,342)	18.7% (707)	18.5% (635)	NA
Disabled Mental	8.9% (749)	9.4% (459)	8.3% (290)	NA
Elderly	24.6% (2,370)	25.1% (2,258)	16.9% (112)	NA

* COPD for this study was defined as chronic bronchitis or emphysema; asthma was not included in the identification of members with COPD.

Comparison of prevalence rates between Medicaid and CHIS commercial are influenced by the difference in populations covered. Excluding Dual Eligible members, the COPD prevalence rate for Medicaid-only members (6.1%) was 3.8 times the prevalence rate for CHIS commercial (1.6%). Medicaid-only Disabled Physical and Disabled Mental eligibility groups

influence the higher Medicaid-only rate. However, even within the Low Income Adult eligibility group, the age-specific prevalence rates were higher in Medicaid-only compared to CHIS commercial.

Figure 3. Prevalence of Chronic Obstructive Pulmonary Disease by Age of Member. NH Medicaid-only and NH CHIS Commercial Members, CY2005.



Respiratory Disease Utilization and Payments for Members with COPD

Members with COPD may have multiple coexisting conditions that contribute to utilization and payments. The intent of this section is to summarize utilization and payments specific to respiratory disease for members with COPD. Table 8 summarizes CY2005 utilization and payments for respiratory diagnoses and respiratory medications for Medicaid and CHIS commercial members with COPD.

Medicaid members with COPD used 8,065 outpatient ED visits, 36,711 office-clinic visits, and 3,060 inpatient hospitalizations in total. Of these visits, 1,548 outpatient ED visits, 7,062 office-clinic visits, and 970 inpatient hospitalizations were for a respiratory diagnosis.

Table 8. Members with COPD. Respiratory Disease Utilization and Payment Rates. NH Medicaid and NH Commercial Members, CY2005.

Measure*	Medicaid Total	Dual Eligible	Medicaid-only	CHIS Commercial
Members with Condition	4,758	3,494	1,264	3,962
Member Months for Members with Condition	49,988	36,460	13,528	41,727
Total Payments for Members with Condition (millions)	\$16.4**	\$12.1**	\$4.4	\$12.0
Outpatient Emergency Department Visits	1,548	1,030	518	621
Office/Clinic Visits	7,062	4,234	2,828	7,586
Inpatient Discharges	970	671	299	514
Statistical Rates				
Payments Per Member Per Month (PMPM)	**	**	\$323	\$288
Outpatient Emergency Department Visits per 1,000 Members	371.6	339.0	459.5	178.6
Office/Clinic Visits per 1,000 Members	1,695.3	1,393.5	2,508.6	2,181.6
Inpatient Discharges per 1,000 Members	232.9	220.8	265.2	147.8

*All utilization metrics measure the utilization and payments for the members with COPD during the year for a respiratory diagnosis or respiratory medications only. **Payment information for Dual Eligible members is incomplete because Medicare administrative claims are not part of the NH CHIS database.

Respiratory disease utilization and payment rates were compared between Medicaid-only and CHIS commercial members with COPD. Rates were standardized for age differences in the two populations and are shown in Table 9 and Figure 4. For these rates, 95% confidence intervals (CI) were computed.

Table 9. Members with COPD. Age-Standardized Respiratory Disease Utilization and Payment Rates. NH Medicaid-Only and NH Commercial Members, CY2005. Note: 95% confidence intervals (CI) in parentheses.

Measure*	Medicaid-only	CHIS Commercial
Payments Per Member Per Month (PMPM)**	\$332	\$284
Outpatient Emergency Department Visits per 1,000 Members	451 (411-492)	181 (167-196)
Office/Clinic Visits per 1,000 Members	2,561 (2,465-2660)	2,182 (2,133-2,231)
Inpatient Discharges per 1,000 Members	266 (235-300)	147 (135-160)

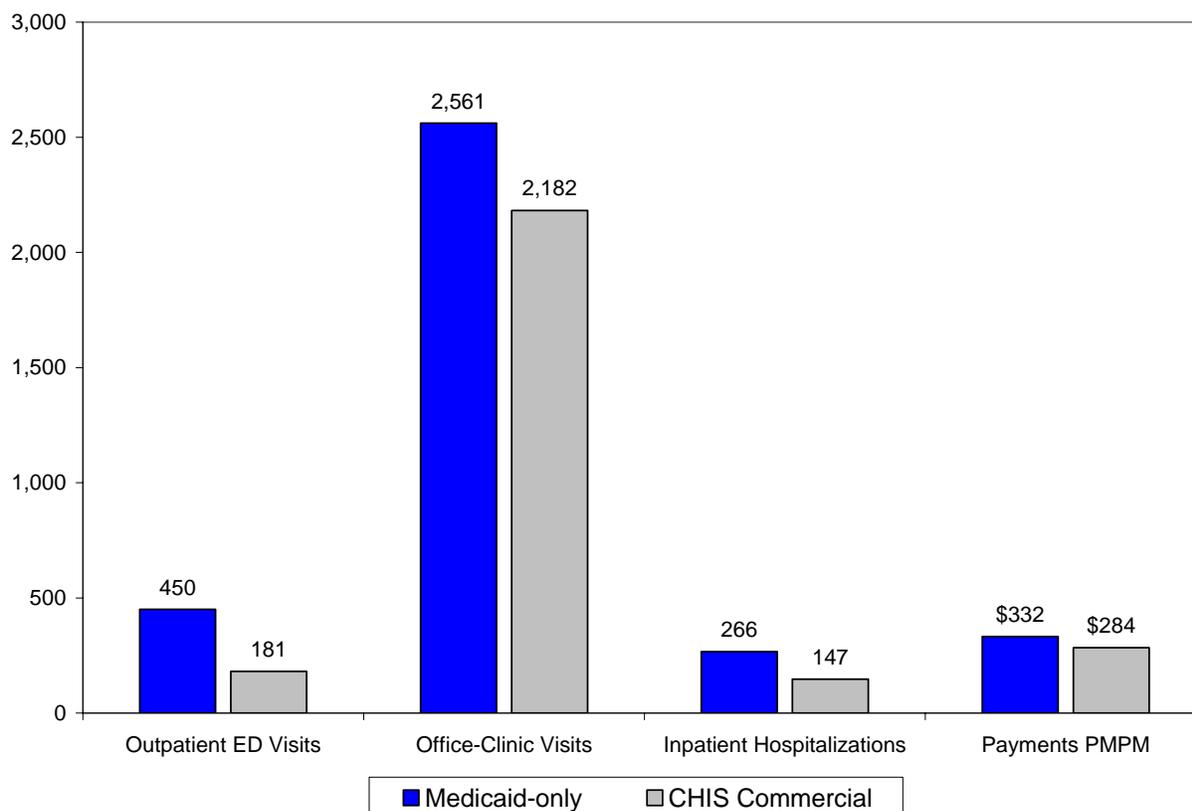
*All utilization metrics measure the utilization and payments for the members with COPD during the year for a respiratory diagnosis or respiratory medications. **95% CI were not computed for payment PMPM rates because CHIS reports do not provide variance estimates and the payments may be skewed by outlier cases.

For members with COPD, the age-standardized outpatient hospital ED visit rate for Medicaid-only (450 per 1,000 members) was 2.5 times higher than the CHIS commercial rate (181 per 1,000 members). The inpatient hospitalization rate for Medicaid-only (266 per 1,000 members) was 1.8 times higher than the CHIS commercial rate (147 per 1,000 members). The office-clinic rate for Medicaid-only (2,561 per 1,000 members) was 17 percent

higher than the CHIS commercial rate (2,182 per 1,000 members). For each of these rates confidence intervals indicate that the difference between Medicaid-only and CHIS commercial were statistically significant.

Although Medicaid typically pays less per service than CHIS commercial, the age-standardized payment PMPM rate for claims with a respiratory diagnosis and respiratory medications for members with COPD was 16 percent higher in Medicaid-only (\$332) compared to CHIS commercial (\$284).

Figure 4. Respiratory Disease Utilization and Payment Rates for Members with COPD. Age-standardized Rates of Utilization per 1,000 Members and Payments per Member per Month (PMPM). NH Medicaid-only and NH CHIS Commercial Members, CY2005.



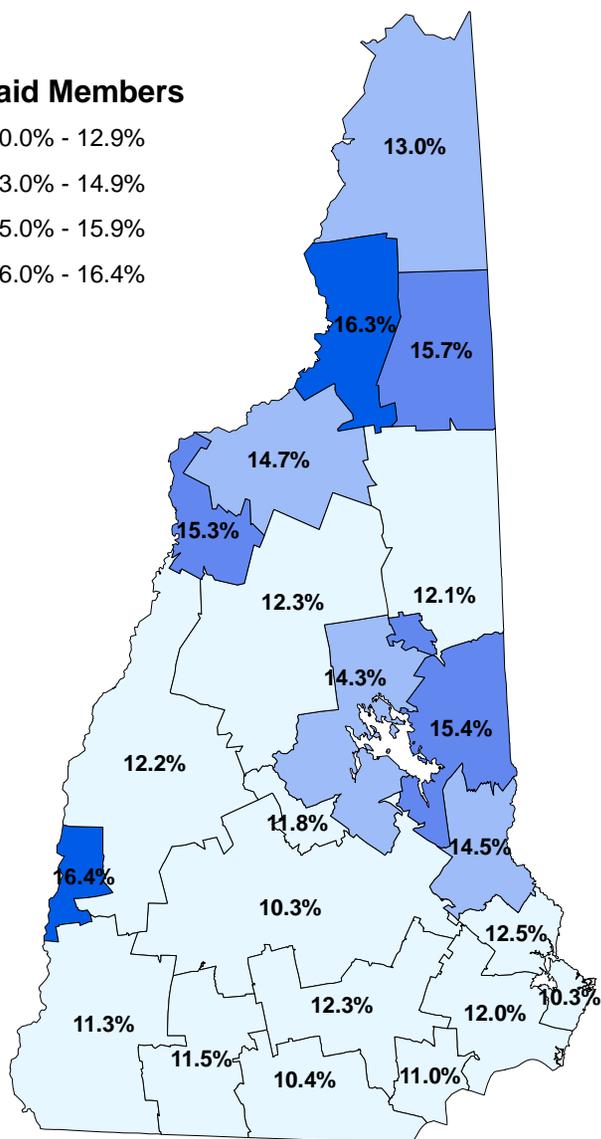
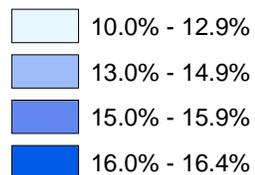
Geographical Variation in Prevalence and Utilization for Members with COPD

Evaluation of geographical variation in rates was based on the Health Analysis Area (HAA) of the member’s residence. Prevalence and utilization rates for members with COPD are reported in Table 10 for NH Medicaid and Table 11 for CHIS commercial.

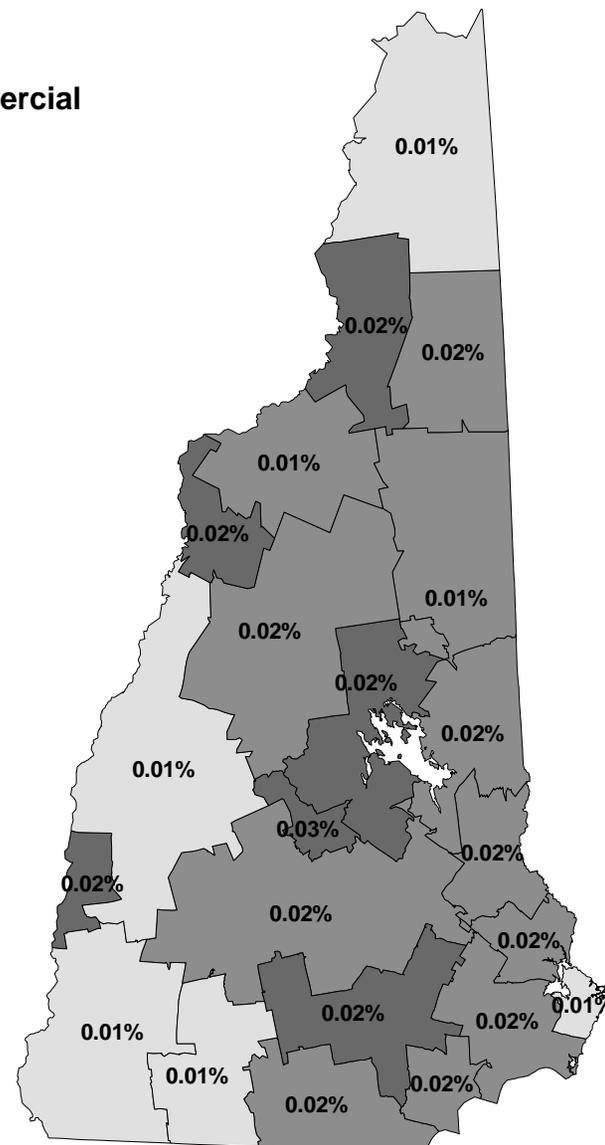
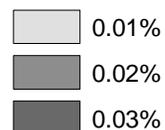
COPD Prevalence

Rates Standardized for Age

Medicaid Members



CHIS Commercial



Manchester (894), Nashua (455), and Concord (441), had the highest volume of Medicaid members with COPD. Standardized for age differences, the highest prevalence rates for COPD in the NH Medicaid population were Claremont (16.4%), Lancaster (16.3%), and Berlin (15.7%); the lowest rate area was Concord (10.3%). The southern border HAAs (Keene, Peterborough, Nashua, Derry, Exeter, and Portsmouth) all had prevalence rates of COPD lower than the state average for NH Medicaid.

Standardized for age differences, rates of utilization with a respiratory diagnosis varied by HAA for the Medicaid members with COPD. Colebrook (715 per 1,000 members) had the highest age-standardized outpatient ED use rate while Exeter (232 per 1,000 members) had the lowest. The rate of office-clinic visits with a respiratory diagnosis for members with COPD was highest in Littleton (2,180 per 1,000 members) and lowest in Nashua (1,356 per 1,000 members). The rate of inpatient hospitalizations with a respiratory diagnosis for members with COPD was highest in Berlin (370 per 1,000 members) and lowest in Claremont (142 per 1,000 members).

Table 10. Prevalence and Respiratory Disease Utilization for Members with COPD by Health Analysis Area. NH Medicaid Members, CY2005.

Health Analysis Area	COPD Prevalence (Number of Members)	COPD Prevalence Standardized for Age*	Outpatient Emergency Department Visit Rate per 1,000 Members*	Office-Clinic Visit Rate per 1,000 Members*	Inpatient Rate per 1,000 Members*
Total	12.2% (4,758)	12.2%	372	1,695	233
Berlin	15.6% (161)	15.7%	568	1,893	370
Claremont	16.5% (197)	16.4%	320	1,529	142
Colebrook	14.9% (46)	13.0%	715	2,145	313
Concord	10.8% (441)	10.3%	365	1,509	249
Derry	11.4% (187)	11.0%	386	1,554	250
Dover	12.3% (244)	12.5%	422	1,909	202
Exeter	12.0% (240)	12.0%	223	1,412	241
Franklin	10.9% (90)	11.8%	710	1,902	358
Keene	11.3% (230)	11.3%	336	2,177	292
Laconia	13.8% (245)	14.3%	488	1,478	240
Lancaster	17.8% (75)	16.3%	432	2,019	291
Lebanon	13.0% (187)	12.2%	391	1,855	185
Littleton	17.4% (143)	14.7%	392	2,180	189
Manchester	12.0% (894)	12.3%	286	1,732	226
Nashua	9.9% (455)	10.4%	230	1,356	196
North Conway	11.5% (80)	12.1%	293	1,738	222
Peterborough	10.7% (68)	11.5%	460	1,535	166
Plymouth	10.9% (82)	12.3%	663	2,054	277
Portsmouth	11.3% (116)	10.3%	343	1,641	212
Rochester	12.9% (280)	14.5%	564	1,742	253
Wolfeboro	15.4% (108)	15.4%	449	1,682	260
Woodsville	21.0% (54)	15.3%	489	1,910	198

* Rates are standardized for age differences in the population using CY2005 Medicaid statewide rates as the basis.

Comparing the three areas (Manchester, Nashua, and Concord) with the highest number of members with COPD covered by Medicaid, members in Concord had higher rates of outpatient ED and inpatient use compared to Manchester or Nashua.

Prevalence and utilization rates for CHIS commercial members with COPD are reported in Table 11. Manchester (888), Nashua (566), and Concord (481) had the highest volume of members with COPD in the study. Standardized for age differences, the highest prevalence rate for COPD in the NH CHIS commercial population was in Franklin (2.7%) and the lowest was in Portsmouth (1.0%). Among the largest population areas the age-standardized prevalence rate in Manchester (2.1%) was higher than Nashua (1.5%) or Concord (1.5%).

Table 11. Prevalence and Respiratory Disease Utilization for Members with COPD by Health Analysis Area. NH CHIS Commercial, CY2005.

Health Analysis Area	COPD Prevalence (Number of Members)	COPD Prevalence Standardized for Age*	Outpatient Emergency Department Visit Rate per 1,000 Members*	Office-Clinic Visit Rate per 1,000 Members*	Inpatient Rate per 1,000 Members*
Total	1.6% (3,962)	1.6%	179	2,182	148
Berlin	1.6% (34)	1.5%	204	1,407	68
Claremont	2.2% (71)	2.2%	169	2,130	148
Colebrook	1.2% (9)	1.1%	**	**	**
Concord	1.5% (481)	1.5%	184	2,317	158
Derry	1.5% (179)	1.6%	174	2,269	230
Dover	1.5% (182)	1.6%	230	1,861	160
Exeter	1.5% (262)	1.6%	188	1,737	155
Franklin	2.7% (111)	2.6%	288	1,435	158
Keene	1.4% (137)	1.3%	93	2,493	134
Laconia	2.2% (248)	2.0%	325	2,136	214
Lancaster	2.2% (40)	1.9%	434	2,134	240
Lebanon	1.0% (170)	1.0%	201	1,942	96
Littleton	1.6% (50)	1.4%	227	2,296	139
Manchester	2.0% (888)	2.1%	135	2,312	99
Nashua	1.5% (566)	1.5%	121	2,300	189
North Conway	1.5% (55)	1.4%	208	2,836	63
Peterborough	1.2% (77)	1.1%	171	1,679	186
Plymouth	1.6% (90)	1.5%	248	2,421	124
Portsmouth	1.0% (70)	1.0%	249	2,774	48
Rochester	1.6% (131)	1.8%	204	2,431	71
Wolfeboro	1.7% (86)	1.5%	194	1,756	135
Woodsville	2.3% (25)	2.3%	**	**	**

* Rates are standardized for age differences in the population using CY2005 CHIS commercial rates as the basis. Colebrook and Woodsville rates not reported due to small sample size.

Standardized for age differences, rates of utilization with a respiratory diagnosis varied by HAA for the CHIS commercial members with COPD. The highest age-standardized outpatient ED use rate was in Lancaster (434 per 1,000 members) and the lowest was Keene (93 per 1,000 members). The rate of office-clinic visits with a respiratory diagnosis for members with COPD was highest in North Conway (2,836 per 1,000 members) and lowest in Berlin (1,407 per 1,000 members). The rate of inpatient hospitalizations with a respiratory

diagnosis for members with COPD was highest in Lancaster (240 per 1,000 members) and lowest in Portsmouth (48 per 1,000 members).

Comparing the three areas (Manchester, Nashua, and Concord) with the highest number of members with COPD covered by CHIS commercial, members in Concord had higher rates of outpatient ED use compared to Manchester or Nashua. Office-clinic visit use rates were virtually identical between the three areas.

COPD and Coexisting Conditions

This study evaluated three chronic respiratory disease conditions: asthma, COPD, and lung cancer. Some of the members with COPD also had administrative claims indicating that they had lung cancer or asthma. Among the 4,758 members covered by Medicaid with COPD, 1,452 (31%) also had asthma and 154 (3%) also had lung cancer. Among the 3,962 CHIS commercial members with COPD, 936 (24%) also had asthma and 99 (2%) also had lung cancer.

During CY2005, NH Medicaid members incurred \$850.1 million in claims payment expenses. Of this \$102.0 million (12%) was incurred by members who had COPD. For the members with COPD only \$16.4 million was directly attributable to claims with a respiratory diagnosis or medication. This large difference may be explained by other coexisting conditions these members had.

Because COPD is prevalent among older persons, members with COPD may have other coexisting conditions. Among the 1,264 Medicaid-only members with COPD, 592 (47%) had heart disease, 395 (31%) had diabetes, and 753 (60%) had a mental disorder diagnosis. Among the 3,494 Dual Eligible members with COPD, 2,310 (66%) had heart disease, 1,296 (37%) had diabetes, and 1,988 (57%) had a mental disorder diagnosis. Among the 3,962 CHIS commercial members with COPD, 31 percent had coexisting heart disease, 16 percent had coexisting diabetes, and 29 percent had a coexisting mental disorder diagnosis.

Because many Medicaid members reside in nursing facilities (skilled or intermediate level) and nursing facility care is a large proportion of Medicaid payments, this study evaluated the number of members with COPD who also resided in a nursing facility. Among the 3,494 Dual Eligible members with COPD, 1,211 resided in a nursing facility at some time during CY2005. Only 100 of the 1,264 Medicaid-only members with COPD resided in a nursing facility during CY2005, a prevalence rate that was similar to the CHIS commercial rate.

Lung Cancer – Prevalence, Utilization, and Payments

Lung Cancer Prevalence

For this study of lung cancer, adults age 19 and older were evaluated because lung cancer is relatively more common in older adults and rare in children. The CY2005 NH Medicaid and NH CHIS commercial adult population lung cancer prevalence rates are summarized in Table 12.

Among 39,115 NH Medicaid members age 19 and older, 272 (0.7%) were identified through the administrative claims data as having a diagnosis of lung cancer. Of the 272 members covered by Medicaid with lung cancer, 177 were Dual Eligible and 95 were Medicaid-only. Among adults the highest prevalence of lung cancer was among the Elderly and Disabled Physical eligibility groups. Among 247,715 NH CHIS commercial average members age 19 and older, 329 (0.1%) were identified as having a diagnosis of lung cancer. The prevalence rate of lung cancer in Medicaid-only (0.5%) was five times the rate in CHIS commercial (0.1%).

Table 12. Prevalence Rate (Number of Members) with Lung Cancer by Age, Gender, and Medicaid Eligibility Group. NH Medicaid and NH CHIS Commercial Members, CY2005.

Age Group / Gender / Medicaid Eligibility Group	Medicaid Total	Dual Eligible	Medicaid-only	CHIS Commercial
Total Adults Age 19 and Older	0.7% (272)	1.0% (177)	0.5% (95)	0.1% (329)
Member's Age				
19-20	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (1)
21-24	0.1% (2)	0.0% (0)	0.1% (2)	0.0% (1)
25-34	0.1% (4)	0.0% (0)	0.1% (4)	0.0% (4)
35-44	0.2% (16)	0.2% (5)	0.2% (11)	0.0% (25)
45-49	0.7% (21)	0.7% (11)	0.6% (10)	0.1% (38)
50-54	1.5% (38)	1.1% (16)	1.9% (22)	0.2% (59)
55-59	1.8% (37)	1.8% (21)	1.8% (16)	0.3% (87)
60-64	2.5% (43)	1.9% (19)	3.3% (24)	0.6% (114)
65-74	1.9% (57)	2.1% (55)	0.6% (2)	NA
75-84	1.3% (44)	1.3% (41)	1.4% (3)	NA
85+	0.3% (10)	0.3% (9)	1.5% (1)	NA
Gender				
Female	0.6% (158)	0.8% (103)	0.3% (55)	0.1% (185)
Male	1.0% (114)	1.2% (74)	0.9% (40)	0.1% (144)
Medicaid Eligibility Group				
Low Income Adult	0.1% (17)	0.6% (5)	0.1% (12)	NA
Disabled Physical	1.6% (118)	1.2% (47)	2.1% (71)	NA
Disabled Mental	0.3% (25)	0.4% (19)	0.2% (6)	NA
Elderly	1.2% (112)	1.2% (106)	0.9% (6)	NA

Note: Prevalence rates based on small numbers (fewer than 20 cases) may be unreliable for statistical comparisons.

Prevalence rates of lung cancer increased with age for both the Medicaid and CHIS commercial populations. Medicaid covered more females (158) with lung cancer than males (114) but the prevalence rate was higher for males (1.0%) compared to females (0.6%).

Respiratory Disease Utilization and Payments for Members with Lung Cancer

Members with lung cancer may have multiple coexisting conditions that contribute to utilization and payments. The intent of this section is to summarize utilization and payments specific to respiratory disease for members with lung cancer. Table 13 summarizes CY2005 utilization and payments for respiratory diagnoses or respiratory medications for Medicaid and CHIS commercial members with lung cancer.

Table 13. Members with Lung Cancer. Respiratory Disease Utilization and Payment Rates. NH Medicaid and NH Commercial Members, CY2005.

Measure*	Medicaid Total	Dual Eligible	Medicaid-only	CHIS Commercial
Members with Condition	272	177	95	329
Member Months for Members with Condition	2,378	1,612	766	3,139
Total Payments for Members with Condition (millions)	\$1.7**	\$0.5**	\$1.2	\$6.5
Outpatient Emergency Department Visits	75	46	29	66
Office/Clinic Visits	1,062	590	472	1,773
Inpatient Discharges	114	52	62	130
Statistical Rates				
Payments Per Member Per Month (PMPM)	**	**	\$1,594	\$2,070
Outpatient Emergency Department Visits per 1,000 Members	378	342	454	252
Office/Clinic Visits per 1,000 Members	5,359	4,392	7,394	6,778
Inpatient Discharges per 1,000 Members	575	387	971	497

*All utilization metrics measure the utilization and payments for the members with lung cancer during the year for a respiratory diagnosis or respiratory medications only. **Payment information for Dual Eligible members is incomplete because Medicare administrative claims are not part of the NH CHIS database.

Medicaid members with lung cancer used 404 outpatient ED visits, 2,699 office-clinic visits, and 263 inpatient hospitalizations in total. Of these visits, 75 outpatient ED visits, 1,062 office-clinic visits, and 114 inpatient hospitalizations were for a respiratory diagnosis. Respiratory disease utilization and payment rates were compared between Medicaid-only and CHIS commercial members with lung cancer. Rates were standardized for age differences in the two populations and are shown in Table 14 and Figure 5. For these rates 95% confidence intervals (CI) were computed.

For members with lung cancer, the age-standardized outpatient hospital ED rate for Medicaid-only (493 per 1,000 members) was 2 times higher than the CHIS commercial rate (248 per 1,000 members). The inpatient hospitalization rate for Medicaid-only (1,084 per 1,000 members) was 2.2 times higher than the CHIS commercial rate (504 per 1,000 members). The office-clinic rate for Medicaid-only (8,333 per 1,000 members) was 26 percent higher than the CHIS commercial rate (6,600 per 1,000 members). Despite the wide 95% confidence intervals due to small numbers, the differences between Medicaid-only and CHIS commercial were statistically significant. Medicaid-only members with lung cancer used

hospital outpatient ED and hospital inpatient services at a greater rate than CHIS commercial members with lung cancer.

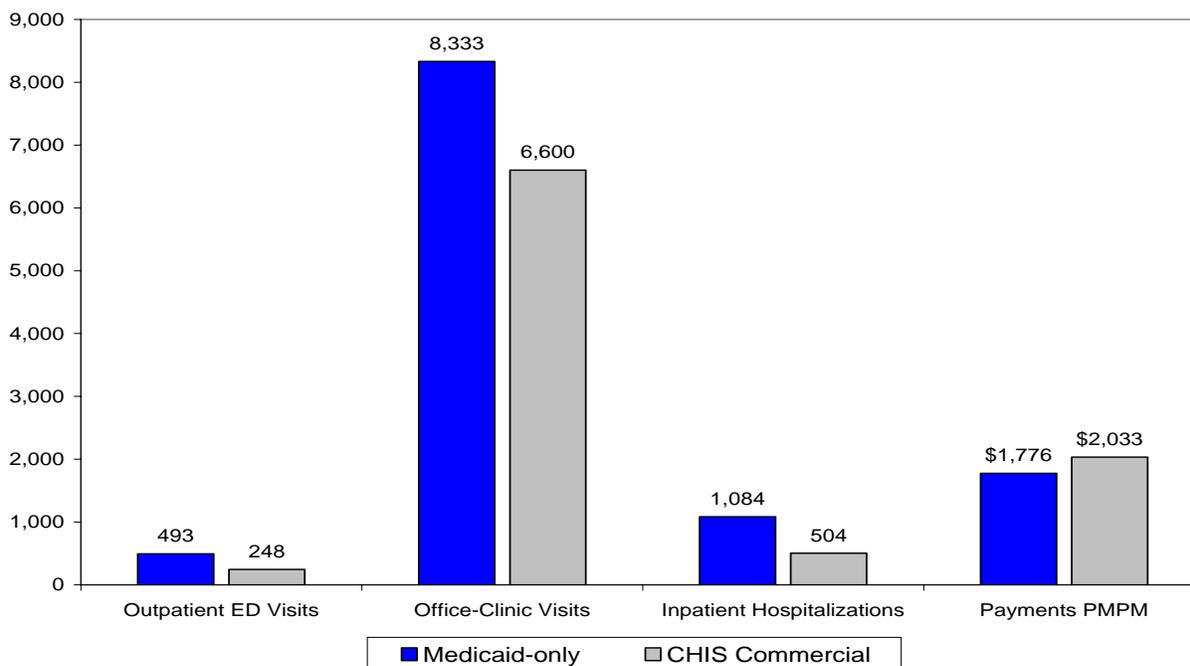
Table 14. Members with Lung Cancer. Age-Standardized Respiratory Disease Utilization and Payment Rates. NH Medicaid-Only and NH Commercial Members, CY2005. Note: 95% confidence intervals (CI) in parentheses.

Measure*	Medicaid-only	CHIS Commercial
Payments Per Member Per Month (PMPM)**	\$1,776	\$2,033
Outpatient Emergency Department Visits per 1,000 Members	493 (330-708)	248 (191-315)
Office/Clinic Visits per 1,000 Members	8,333 (7,598-9,120)	6,600 (6,297-6,915)
Inpatient Discharges per 1,000 Members	1,084 (831-1,389)	504 (421-598)

*All utilization metrics measure the utilization and payments for the members with asthma during the year for a respiratory diagnosis or respiratory medications. **95% CI were not computed for payment PMPM rates because CHIS reports do not provide variance estimates and the payments may be skewed by outlier cases.

The age-standardized payment PMPM rate for claims with a respiratory or lung cancer diagnosis and respiratory medications for members with lung cancer was 13 percent lower in Medicaid-only (\$1,776) compared to CHIS commercial (\$2,033).

Figure 5. Respiratory Disease Utilization and Payment Rates for Members with Lung Cancer. Age-standardized Rates of Utilization per 1,000 Members and Payments per Member per Month (PMPM). NH Medicaid-only and NH CHIS Commercial Members, CY2005.



Geographical Variation in Prevalence and Utilization for Members with Lung Cancer

The number of members with lung cancer in Medicaid (272) or CHIS commercial (329) was relatively small. Reporting prevalence and utilization rates by HAA using small numbers would not be statistically reliable.

Lung Cancer and Coexisting Conditions

This study evaluated three chronic respiratory disease conditions: asthma, COPD, and lung cancer. Some of the members with lung cancer also had administrative claims indicating that they had COPD or asthma. Among the 272 members covered by Medicaid with lung cancer, 154 (57%) also had COPD and 56 (21%) also had asthma. Among the 329 CHIS commercial members with lung cancer, 99 (30%) also had COPD and 45 (14%) also had asthma.

During 2005, NH Medicaid members incurred \$850.1 million in claims payment expense. Of this \$6.6 million (1%) was incurred by the 272 members who had lung cancer. For the members with lung cancer \$1.7 million was directly attributable to lung cancer or respiratory diagnosis. This large difference may be explained by other coexisting conditions these members may have had.

Because lung cancer is most often a condition of older persons, members with lung cancer often had other coexisting conditions. Among the 95 Medicaid-only members with lung cancer, 43 (45%) had heart disease, 17 (18%) had diabetes, and 39 (41%) had a mental disorder diagnosis. Among the 177 Dual Eligible members with lung cancer, 114 (64%) had heart disease, 55 (31%) had diabetes, and 73 (41%) had a mental disorder diagnosis. Among the 329 CHIS commercial members with lung cancer, 42 percent had coexisting heart disease, 13 percent had coexisting diabetes, and 29 percent had coexisting mental disorder diagnosis.

Because many Medicaid members reside in nursing facilities (skilled or intermediate level) and nursing facility care is a large proportion of Medicaid payments, this study evaluated the number of members with lung cancer who also resided in a nursing facility. Among the 177 Dual Eligible members with lung cancer, 41 resided in a nursing facility at some time during CY2005. Among the 95 Medicaid-only members with lung cancer, 14 resided in a nursing facility during CY2005. Among the 329 CHIS commercial members with lung cancer, 11 resided in a nursing facility during CY2005 based on the administrative claims data.

DISCUSSION AND NEXT STEPS

This study evaluated three chronic respiratory diseases: asthma, chronic obstructive pulmonary disease (COPD), and lung cancer. Using NH Medicaid and NH CHIS commercial administrative eligibility and claims data for services rendered during CY2005, disease prevalence and associated utilization and payment rates were measured for the first time in these two populations.

Results of this study indicate that chronic respiratory disease was prevalent in the Medicaid and CHIS commercial populations. During CY2005, 11,004 members with asthma, 4,758 adults with COPD, and 272 adults with lung cancer covered by Medicaid, and 18,240 members with asthma, 3,962 members with COPD, and 329 members with lung cancer covered by CHIS commercial were identified using the claims data.[†]

Age-specific prevalence rates for Medicaid-only members compared to CHIS commercial indicated that asthma, COPD, and lung cancer all had higher prevalence rates in Medicaid compared to CHIS commercial. For COPD the prevalence rate (6.1%) in Medicaid-only members was almost four times the rate in CHIS commercial, and for lung cancer the prevalence rate in Medicaid-only was five times the rate in CHIS commercial. These findings are consistent with national survey data indicating that adults insured by Medicaid have higher rates of emphysema, chronic bronchitis, and asthma compared to adults enrolled in private insurance.³

CDC BRFSS survey data indicate that during 2005, the rate of adults who have been told they currently have asthma was higher in New Hampshire (10.3%) compared to the national rate (8.0%) and higher rates are reported for lower income groups.⁴ Smoking behavior has been linked to chronic respiratory disease and smoking behavior has been found at higher rates among persons living below poverty level. The finding of higher rates of chronic respiratory disease in the NH Medicaid population compared with CHIS commercial is consistent with associations between poverty, smoking, and chronic respiratory disease in other studies.^{3,6} These results demonstrate a significant disease burden in the NH Medicaid population from chronic respiratory disease.

Disease prevalence rates were evaluated by the geographical Health Analysis Area of the member's residence. Standardized for population age differences, Medicaid prevalence rates of asthma and COPD were higher in northern and more rural New Hampshire HAAs compared to southern HAAs. Although causality cannot be determined, survey data for New Hampshire indicates higher rates of smoking among rural compared to non-rural residents.⁷

[†] This study identified members with asthma, COPD, or lung cancer by a diagnosis on any medical claim during the year (CY2005). A wide variety of different algorithms have been used to identify members with asthma from administrative claims data.¹⁵ The National Committee for Quality Assurance (NCQA) uses a more complex algorithm to identify members with "persistent" asthma.¹⁶ A recent study of children by the NH CHIS project using the NCQA HEDIS methodology yielded a prevalence rate for children covered by Medicaid (9.0%) similar to the rate for children in this report (8.5%).¹⁷

This study identified utilization specific to respiratory diagnoses and medication for the members with asthma, COPD, and lung cancer. For each disease, adjusting for population age differences, the Medicaid-only outpatient ED and inpatient use rates were double the CHIS commercial rates.

Utilization rates were evaluated by geographical Health Analysis Area in this study. For members with asthma or members with COPD, a pattern of high outpatient ED use was found in the northern and more rural New Hampshire HAAs compared to southern border HAAs. The pattern was found in both the Medicaid and CHIS commercial populations. This pattern is consistent with an earlier NH CHIS study for CY2005 outpatient ED use.¹¹

Despite relatively lower payments per service in Medicaid compared to CHIS commercial, the age-standardized payment rates PMPM for Medicaid-only were higher for members with asthma or COPD compared to CHIS commercial. Higher hospital use rates for ED and inpatient service among Medicaid members is a factor in these differences.

The respiratory-disease specific payment rates for Medicaid-only members with asthma were \$87 PMPM, with COPD were \$323 PMPM, and with lung cancer were \$1,594 PMPM. This indicates the significant financial burden per year to treat these chronic respiratory diseases. These rates were restricted to respiratory diagnoses and medications only. Asthma, COPD, or lung cancer may contribute to other diseases that are not specific to respiratory diagnosis. For example, if lung cancer spreads to other body areas, those claim payments would not have been included in this study if a different diagnostic code were assigned. Therefore, the rates reported here may underestimate the total burden of these diseases.

Selected coexisting conditions were evaluated for persons with chronic respiratory disease in this study. For example, Medicaid members with COPD incurred \$102.0 million in payments during CY2005 of which only \$16.4 million was specific to COPD, other respiratory diagnoses or respiratory medications. Medicaid members with COPD had high prevalence rates of coexisting conditions (e.g. heart disease, diabetes, mental disorders) and a significant number resided in nursing facilities during the year. A similar pattern was found for lung cancer and asthma. Coexisting conditions were less prevalent in the CHIS commercial population with these chronic respiratory diseases.

The study demonstrated that chronic respiratory disease was prevalent in the NH Medicaid program and members with chronic respiratory disease contribute significantly to utilization and medical payments of the program. Medicaid hospital outpatient ED and inpatient admissions were at higher rates than CHIS commercial. Finally, members with chronic respiratory disease in Medicaid had complex medical problems as indicated by high rates of coexisting chronic respiratory diseases and other serious medical conditions, and mental disorders. This suggests the potential value of disease management and care coordination for members enrolled in Medicaid to help address these issues.

Starting in March 2005 the NH Medicaid Health Management program initiated a Disease Management program for Medicaid recipients with high-cost, chronic diseases. Two of the diseases (asthma and COPD) evaluated in this study of CY2005 Medicaid and CHIS commercial were targeted by the program.

Next Steps

The current study provided a baseline CY2005 evaluation of prevalence, utilization, and payments associated with three chronic respiratory diseases: asthma, COPD, and lung cancer. For the first time NH Medicaid members with chronic respiratory disease were compared with those with commercial insurance. Several possible areas for future work and evaluation are suggested.

This study determined that Medicaid members, and to a lesser degree CHIS commercial members, with chronic respiratory diseases had complex coexisting medical and mental conditions. This includes both coexisting chronic respiratory diseases (e.g. COPD and asthma), coexisting medical (e.g. COPD and heart disease), and coexisting mental conditions. This study focused on evaluating the utilization and payments specifically associated with respiratory disease and respiratory medications only, but noted that these payments and utilization only represented a small proportion of the total use and payments for these members with chronic respiratory diseases. A more detailed evaluation of the impact of coexisting conditions on utilization and payments could provide further insight for disease management efforts. Use of a risk grouper might be used to quantify the overall disease burden of these two populations when comparing utilization and payment rates. This would be particularly useful in making comparisons between the Medicaid-only and CHIS commercial populations.

For members with chronic respiratory disease, outpatient ED use was significantly higher in the Medicaid population compared to the CHIS commercial population. A new study of chronic outpatient ED users is currently underway by the CHIS project which will help identify the role respiratory diseases play in Medicaid members who use the hospital outpatient ED repetitively during the year.

National Committee for Quality Assurance, Health Effectiveness Data Information Set (HEDIS) includes a number of quality measures related to respiratory diseases.¹⁶ These measures include spirometry testing for new cases of COPD, asthma medication management for members with “persistent” asthma, and the percent of children with an upper respiratory infection who were not dispensed an antibiotic. Rates of appropriate medication management for asthma using HEDIS have recently been evaluated and published for children in the NH Medicaid program.¹⁷ The NH CHIS baseline CY2005 study of chronic respiratory diseases did not evaluate in detail preventive and quality of care measures. A follow-up study comparing utilization and cost for members with asthma using controller medication to members with asthma not using controller medications could help quantify the benefits of programs working to increase controller medication use in New Hampshire.

Asthma and COPD are addressed by the Medicaid Disease Management program that was initiated during the CY2005 study year. A more detailed evaluation of the Disease Management program is currently underway by NH CHIS in a separate project.

This study identified a high prevalence of chronic respiratory diseases in the Medicaid Dual Eligible population. In fact, more Medicaid Dual Eligible members had COPD and lung cancer than Medicaid-only members. Currently the NH CHIS project does not have access

to Medicare claims data. Therefore, the complete claims payments experience for chronic respiratory disease is unknown, some preventive measures cannot be evaluated, and evaluations using pharmacy will not be possible due to Medicare Part-D for CY2006 and after. It is recommended that efforts be made to acquire and include Medicare claims data into the CHIS data source.

APPENDICES

Appendix 1: Chronic Respiratory Disease in New Hampshire – Study Methods

This study was based on administrative eligibility and claims data from New Hampshire Medicaid and the NH CHIS commercial databases for CY2005 (based on date of service). CHIS commercial includes only those members under age 65, residing in NH with both medical and pharmacy coverage linked.

1. NH Medicaid AID groupings. Aggregated enrollment groupings based on the Medicaid program they were eligible for (Appendix 2 provides crosswalk to NH Medicaid detailed eligibility categories).

- Elderly
- Disabled due to physical condition
- Disabled due to mental condition
- Severely disabled children
- Low income adult
- Low income children

Members who had limited or no Medicaid benefits, referred to as the Medicare Buy-In Program (e.g., Qualified Medicare Beneficiary (QMB), or Specified Low-Income Medicare Beneficiary (SLMBY)) were excluded. The Healthy Kids Silver (SCHIP) is not a Medicaid program and members in this category were also excluded.

2. NH Medicaid was further stratified by Dual Eligible (Medicaid members who were also enrolled in Medicare) and Medicaid-only (Medicaid members who were not also enrolled in Medicare).

3. NH Medicaid Health Analysis Areas. Aggregation of zip codes based on New Hampshire Medicaid Health Analysis Area (HAA) for NH Medicaid enrollees was utilized (Appendix D). Health Analysis Areas are more relevant to how health care is delivered in NH than counties. HAAs are based on the plurality of hospital preference in a given zipcode.

4. Definition of children. Children are defined as age 0-18. A member age 18 is considered a child as requested by New Hampshire DHHS and corresponds to the definition of child for Medicaid eligibility purposes. Age 19 and older defines adults in this report.

5. Member Assignment. Because members may change age, location of residence, or eligibility grouping during the year, each member was assigned to one and only one category for reporting. Their eligibility group and Health Analysis Area on the last day of the last month enrolled and their age on the first day of the last month enrolled were used. This methodology is consistent with other NH CHIS reporting.

6. Health Analysis Areas are defined in Appendix 3.

7. Chronic Respiratory Disease (CRD) cohort definitions. Three distinct cohorts were used to define CRD. A member with any of the diagnosis codes listed below on any claim during the year was assigned to a CRD cohort.

Asthma was not included in the COPD definition in this report; the American Lung Association excludes asthma from the definition of COPD.⁸

“Chronic obstructive pulmonary disease (COPD) is a term referring to two lung diseases, chronic bronchitis and emphysema, that are characterized by obstruction to airflow that interferes with normal breathing. Both of these conditions frequently coexist, hence physicians prefer the term COPD. It does not include other obstructive diseases such as asthma.”

Reporting was not mutually exclusive and the same member could be reported in Asthma and also in COPD if they had claims meeting both diagnostic criteria.

Disease	ICD-9 Codes	NH CHIS Study Cohort
Malignant neoplasms of trachea, bronchus, and lung	162	Lung Cancer
Chronic Bronchitis	491	COPD
Emphysema	492	COPD
Chronic airway obstruction, not elsewhere classified	496	COPD
Asthma	493	Asthma

8. Coexisting Conditions. Three coexisting conditions (diabetes, heart disease or stroke, and mental illness) were evaluated for members with CRD.

a) Diabetes. This broad definition identified any member with any diagnosis code of diabetes (ICD-9 250, 357.2, 362.0, 366.41, 648.0) or dispensed insulin or oral hypoglycemics/antihyperglycemics, MHICDRUG 3410,3420,3430.

b) Heart, cerebrovascular (stroke), or arterial diseases. This definition identified any member with any ICD-9 diagnosis of 402, 404, 410-414, 415-417, 420-438, 440-447.

c) Mental Illness. This definition identified any member with any diagnosis code of mental disorder ICD-9 295, 296.2 -296.3, 296-296.1, 296.4-296.7, 296.8, 296.9, 293, 294, 297, 298, 299, 300, 301, 302, 306, 307, 308, 309, 310, 311, 312, 313, 314, 316.

9. Outpatient Emergency Department Visit Definition. This study focused on outpatient hospital emergency department visits. Emergency department visits were selected based on UB revenue codes 0450-0459 or CPT codes 99281-99285. Visits resulting in inpatient hospitalization were excluded by using Medicaid category of service codes 1,3,103. This definition includes revenue code 0456 hospital urgent care visits which are sometimes excluded from other studies. Visits were further stratified to identify those visits associated with a respiratory disease primary ICD-9 diagnosis code (460-519,162).

10. Office/Clinic Visit Definition. Office or Clinic visits were identified based on CPT codes: 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99354, 99355, 99381, 99382, 99383, 99384, 99385, 99386, 99387, 99391, 99392, 99393, 99394, 99395, 99396, 99397, 99401, 99402, 99403, 99404, 99411, 99412, 99420, 99429, 99432, T1015, 99241, 99242, 99243, 99244, 99245 or UB revenue codes 510-519, 520-529, or 983. This definition was based on codes found in NCQA HEDIS specifications plus additional codes for NH rural health centers and federally qualified health centers. Visits were further stratified to identify those visits associated with a respiratory disease primary ICD-9 diagnosis code (460-519,162).

11. Inpatient Discharges. NH_CTG_SVC= 1 (corresponds to NH Medicaid category of service codes 1, 3, and 103). Inpatient discharges were further stratified to identify those visits associated with a respiratory disease primary ICD-9 diagnosis code (460-519,162).

12. Members with Community or Home Care. NH_CTG_SVC=9 (corresponds with NH Medicaid category of service codes 26, 49, 50, 57, 60, 63, 64, 65, 66, 73, and 76).

13. Members with Nursing Home Care. NH_CTG_SVC=10 (corresponds to NH Medicaid category of service codes 11, 12, 13, 14, 15, 16, 101, 880).

14. Payments. For Medicaid and CHIS commercial, payments are determined as the claim payments to the provider from the administrative claim files. NH Medicaid or commercial payers may make retroactive payment settlements with hospitals. This study is based only on the payments reflected in the administrative claim files and could not adjust for any retroactive payment settlements.

15. Pulmonary Testing. Includes HEDIS CPT codes to identify spirometry (94010, 94014, 94015, 94016, 94060, 94070, 94620) and other pulmonary testing CPT codes (94150, 94160, 94200, 94240, 94250, 94260, 94350, 94360, 94370, 94375, 94400, 94450, 94620, 94621, 94680, 94681, 94690, 94720, 94725, 94750, 94760, 94761, 94762, 94770, 94772, 94799).

16. Oxygen Use. Includes HCPC Level II codes E0424 - E0484, E0550 - E0590, E1353 - E1406

17. Medication Use. For this report use of asthma controller and rescue medications were evaluated. Controller medications included: inhaled corticosteroids (e.g. Advair Diskus™), leukotriene modifiers (e.g. Singulair™), nedocromil, cromolyn sodium, or methylxanthines (e.g. theophylline); MHICDRUG class 0210. Rescue medications include quick acting bronchodilators (e.g. albuterol); MHICDRUG class 0220. Use of tiotropium (Spiriva™), a new generation of inhaled therapy for treatment of COPD, was not evaluated in this study.

18. Denominator for Population-Based Rates. This study was based on rates of use per member population covered. Not all members are covered for a full year. This is particularly true for the Medicaid population where a significant proportion of persons are not covered under Medicaid for the entire year. Therefore, a person covered for a full 12 months would be twice as likely to have an ED visit during the year compared with a person covered for only 6 months. We used standard methods to adjust our denominators for these

differences in exposure time. Thus, average members (cumulative member months divided by 12) was utilized as denominator for rates in this study.

19. Limitations of Medicaid and CHIS Commercial Comparisons. There are some limitations in the rate comparisons made in this report. Detailed examination of the NH CHIS commercial data revealed that 4 percent of the members were covered by Indemnity plans (fee-for-service, TPAs). Of the 18,240 CHIS commercial members identified with asthma, 358 (2%) were enrolled in Indemnity plans. Differences in rates could be due to the benefit structures of these plans; claims may not be submitted or paid due to deductibles.

Age was limited to age 0-64 in the NH Commercial data; however, the NH Medicaid data included 9 percent of members age 65 or older. These older members were included as part of standard reporting rules for NH Medicaid.

20. Standardization of rates for age differences in the Medicaid-only and CHIS commercial populations was used in this report. The indirect method of age standardization was used and is the preferred method for standardization of rates for geographical analysis of small areas such as the HAAs used in this study. Confidence intervals were computed using methods described by Breslow and Day for indirect standardized rates.¹⁸

21. Claims paid by Medicare were not available to the CHIS project and the completeness of data for NH Medicaid members who were Dual Eligible cannot be evaluated. Payment amounts for Dual Eligibles are provided but payment rates PMPM for Dual Eligible members were suppressed.

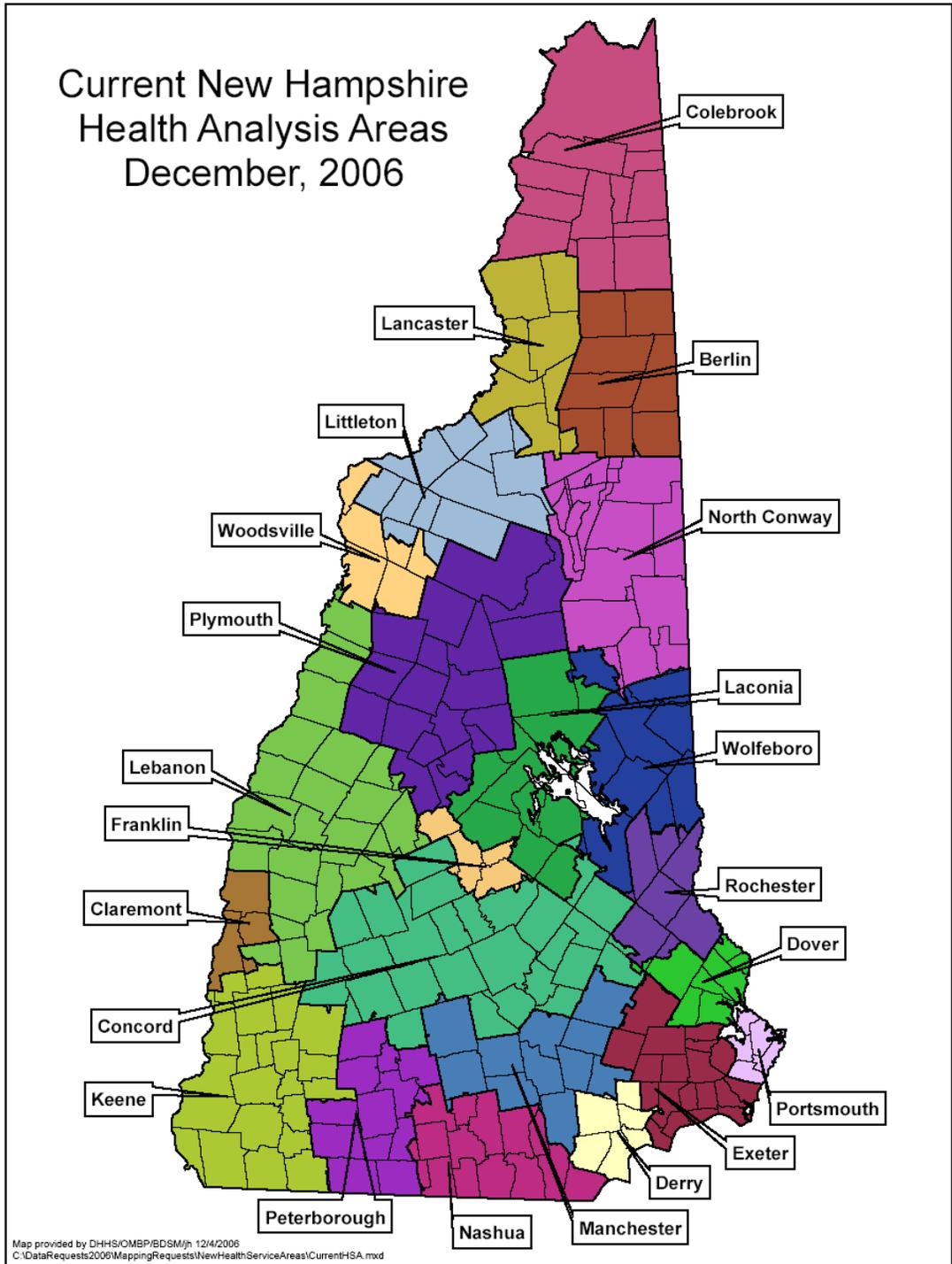
Appendix 2: NH Medicaid Eligibility Collapsed Groupings

Source: New Hampshire Comprehensive Health Information System Special Project: Defining Medicaid Eligibility Groups. Institute for Health Policy, Muskie School of Public Service, University of Southern Maine.

Aid Category w Code	Medicaid Benefits	Collapsed Groupings
10 OAA/CATEGORICALLY NEEDY	Yes	Elderly
11 OAA/MONEY PAYMENT/CATEGORICALLY NEEDY	Yes	Elderly
12 OAA/MEDICALLY NEEDY	Yes	Elderly
20 AFDC/CATEGORICALLY NEEDY	Yes	Low Income Adult/Child ²
21 AFDC/MONEY PAYMENT/CATEGORICALLY NEEDY	Yes	Low Income Adult/Child
22 AFDC/MEDICALLY NEEDY	Yes	Low Income Adult/Child
24 AFDC/REG POV LVL/CAT NEEDY 185%FPL	Yes	Low Income Adult/Child
27 HEALTHY KIDS GOLD - EXPANDED ELIGIBILITY	Yes	Low Income Child
28 AFDC/POVLEV PREG WOMAN/CHILD/CAT/NEEDY170% FPL	Yes	Low Income Adult/Child
2B AFDC/HOME CARE-CHILD/SEVERE DISA/MEDI NEEDY	Yes	Severely Disabled Child
2C AFDC/CHILD WITH SEVERE DISABILITIES/CAT NEEDY	Yes	Severely Disabled Child
2D AFDC/CHILD WITH SEVERE DISABILITIES/MEDI NEEDY	Yes	Severely Disabled Child
2E AFDC/EXTENDED MA/FIRST 6 MONTH PERIOD/CAT NEEDY	Yes	Low Income Adult/Child
2F AFDC/EXT MA/SCND 6 MNTH PER/CAT NEEDY	Yes	Low Income Adult/Child
2H AFDC/POV LVL PREG WMN/CHILD/CAT NDY/REF170% FPL	Yes	Low Income Adult/Child
2K AFDC/HOME CARE-CHILD SEV DIS/CAT. NDY FOR INSTI	Yes	Severely Disabled Child
2U AFDC/AFDC-UP/MONEY PAYMENT/CATEGORICALLY NDY	Yes	Low Income Adult/Child
2V AFDC/AFDC-UP/CATEGORICALLY NEEDY/MA	Yes	Low Income Adult/Child
2W AFDC/AFDC-UP/MEDICALLY NEEDY	Yes	Low Income Adult/Child
2X ADFC/POV LVL PREG WOMEN/POV LVL CHLD CAT NEEDY	Yes	Low Income Adult/Child
30 ANB/CATEGORICALLY NEEDY	Yes	Disabled Physical
31 ANB/MONEY PAYMENT/CATEGORICALLY NEEDY	Yes	Disabled Physical
32 ANB/MEDICALLY NEEDY	Yes	Disabled Physical
40 IV-E-OR-MA /ADOPT SUB-CAT NEEDY	Yes	Low Income Child
41 AFDC/FC OR MONEY PAYMENT/CATEGORICALLY NDY	Yes	Low Income Child
42 AFDC/FC OR MEDICALLY NEEDY	Yes	Low Income Child
50 APTD/MENTAL/CATEGORICALLY NEEDY	Yes	Disabled Mental
51 APTD/MENTAL/MONEY PAYMENT/CATEGORICALLY NEEDY	Yes	Disabled Mental
52 APTD/MENTAL/MEDICALLY NEEDY	Yes	Disabled Mental
61 HEALTHY KIDS SILVER	No	Omitted
66 QUALIFIED MEDICARE BENEFICIARY - SLMB120	No	Omitted
67 QUALIFIED MEDICARE BENEFICIARY - SLMB135	No	Omitted
68 QUALIFIED MEDICARE BENEFICIARY - QDWI	No	Omitted
69 QMB	No	Omitted
70 APTD/PHYSICAL/CATEGORICALLY NEEDY	Yes	Disabled Physical
71 APTD/PHYSICAL/MONEY PAYMENT	Yes	Disabled Physical
72 APTD-PHYSICAL/MEDICALLY NEEDY	Yes	Disabled Physical
80 MEAD WITH ANB/APTD APPROVAL - BLIND	Yes	Disabled Physical
81 MEAD WITH ANB/APTD APPROVAL - PHYSICAL	Yes	Disabled Physical
82 MEAD WITH ANB/APTD APPROVAL - MENTAL	Yes	Disabled Mental
83 MEAD ONLY APPROVAL - BLIND	Yes	Disabled Physical
84 MEAD ONLY APPROVAL - PHYSICAL	Yes	Disabled Physical
85 MEAD ONLY APPROVAL - MENTAL	Yes	Disabled Mental

² Age at beginning of the month is used to designate member as Child <=18 or Adult >18.

Appendix 3: Health Analysis Area Definitions



New Hampshire			New Hampshire		
Health Service	Zip	Zip Name	Health Service	Zip	Zip Name
Area	Code		Area	Code	
Berlin	00169	Sucess	Dover	03878	Somersworth
Berlin	03570	Berlin	Exeter	03042	Epping
Berlin	03581	Gorham	Exeter	03044	Fremont
Berlin	03588	Milan	Exeter	03077	Raymond
Berlin	03593	Randolph	Exeter	03290	Nottingham
Claremont	03603	Charlestown	Exeter	03291	West Nottingham
Claremont	03743	Claremont	Exeter	03819	Danville
Colebrook	00170	Second College Grant	Exeter	03827	East Kingston
Colebrook	00186	Erving's Location	Exeter	03833	Exeter
Colebrook	00187	Dix Grant	Exeter	03842	Hampton
Colebrook	03576	Colebrook	Exeter	03844	Hampton Falls
Colebrook	03579	Errol	Exeter	03848	Kingston
Colebrook	03592	Pittsburg	Exeter	03856	Newfields
Colebrook	03597	West Stewartstown	Exeter	03857	Newmarket
Concord	03046	Dunbarton	Exeter	03858	Newton
Concord	03216	Andover	Exeter	03859	Newton Junction
Concord	03218	Barnstead	Exeter	03865	Plaistow
Concord	03221	Bradford	Exeter	03874	Seabrook
Concord	03224	Canterbury	Exeter	03885	Stratham
Concord	03225	Center Barnstead	Franklin	03235	Franklin
Concord	03229	Contoocook	Franklin	03235	Franklin
Concord	03234	Epsom	Franklin	03243	Hill
Concord	03242	Henniker	Franklin	03276	Tilton
Concord	03244	Hillsboro	Franklin	03298	Tilton
Concord	03252	Lochmere	Franklin	03299	Tilton
Concord	03255	Newbury	Keene	03431	Keene
Concord	03258	Chichester	Keene	03435	Keene
Concord	03261	Northwood	Keene	03441	Ashuelot
Concord	03263	Pittsfield	Keene	03443	Chesterfield
Concord	03268	Salisbury	Keene	03445	Sullivan
Concord	03272	South Newbury	Keene	03446	Swanzy
Concord	03275	Suncook	Keene	03447	Fitzwilliam
Concord	03278	Warner	Keene	03448	Gilsum
Concord	03280	Washington	Keene	03450	Harrisville
Concord	03301	Concord	Keene	03451	Hinsdale
Concord	03302	Concord	Keene	03455	Marlborough
Concord	03303	Concord	Keene	03456	Marlow
Concord	03304	Bow	Keene	03457	Nelson
Concord	03305	Concord	Keene	03462	Spofford
Concord	03307	Loudon	Keene	03464	Stoddard
Concord	03837	Gilmanton Iron Works	Keene	03465	Troy
Derry	03038	Derry	Keene	03466	West Chesterfield
Derry	03041	East Derry	Keene	03467	Westmoreland
Derry	03073	North Salem	Keene	03469	West Swanzy
Derry	03079	Salem	Keene	03470	Winchester
Derry	03087	Windham	Keene	03602	Alstead
Derry	03811	Atkinson	Keene	03604	Drewsville
Derry	03826	East Hampstead	Keene	03607	South Acworth
Derry	03841	Hampstead	Keene	03608	Walpole
Derry	03873	Sandown	Keene	03609	North Walpole
Dover	03805	Rollinsford	Laconia	03220	Belmont
Dover	03820	Dover	Laconia	03226	Center Harbor
Dover	03821	Dover	Laconia	03227	Center Sandwich
Dover	03822	Dover	Laconia	03237	Gilmanton
Dover	03823	Madbury	Laconia	03246	Laconia
Dover	03824	Durham	Laconia	03247	Laconia
Dover	03825	Barrington	Laconia	03249	Gilford
Dover	03869	Rollinsford	Laconia	03253	Meredith
			Laconia	03254	Moultonborough
				03256	New Hampton

New Hampshire Health Service Area			New Hampshire Health Service Area		
Zip Code	Zip Name	Zip Code	Zip Name	Zip Code	Zip Name
03259	North Sandwich	03101	Manchester	03101	Manchester
03269	Sanbornton	03102	Manchester	03102	Manchester
03289	Winnisquam	03103	Manchester	03103	Manchester
03883	South Tamworth	03104	Manchester	03104	Manchester
00185	Kilkenny	03105	Manchester	03105	Manchester
03582	Groveton	03106	Manchester	03106	Hooksett
03583	Jefferson	03107	Manchester	03107	Manchester
03584	Lancaster	03108	Manchester	03108	Manchester
03587	Meadows	03109	Manchester	03109	Manchester
03590	North Stratford	03110	Manchester	03110	Bedford
03230	Danbury	03111	Manchester	03111	Manchester
03231	East Andover	03281	Manchester	03281	Weare
03233	Elkins	03031	Nashua	03031	Amherst
03240	Grafton	03033	Nashua	03033	Brookline
03257	New London	03048	Nashua	03048	Greenville
03260	North Sutton	03049	Nashua	03049	Hollis
03273	South Sutton	03051	Nashua	03051	Hudson
03284	Springfield	03052	Nashua	03052	Litchfield
03287	Wilmot	03054	Nashua	03054	Merrimack
03601	Acworth	03055	Nashua	03055	Milford
03605	Lempster	03057	Nashua	03057	Mont Vernon
03741	Canaan	03060	Nashua	03060	Nashua
03745	Cornish	03061	Nashua	03061	Nashua
03746	Cornish Flat	03062	Nashua	03062	Nashua
03748	Enfield	03063	Nashua	03063	Nashua
03749	Enfield Center	03064	Nashua	03064	Nashua
03750	Etna	03076	Nashua	03076	Pelham
03751	Georges Mills	03082	Nashua	03082	Lyndeborough
03752	Goshen	03086	Nashua	03086	Wilton
03753	Grantham	00168	North Conway	00168	Beans Purchase
03754	Guild	00172	North Conway	00172	Hadleys Purchase
03755	Hanover	00173	North Conway	00173	Cutts Grant
03756	Lebanon	00174	North Conway	00174	Beans Grant
03765	Haverhill	00176	North Conway	00176	Sargents Purchase
03766	Lebanon	00177	North Conway	00177	Pinkham Grant
03768	Lyme	00179	North Conway	00179	Chandlers Purchase
03769	Lyme Center				Thompson/Meserves
03770	Meriden	00180	North Conway	00180	Purch
03773	Newport	00181	North Conway	00181	Low and Burbanks Grant
03777	Orford	00182	North Conway	00182	Crawfords Purchase
03779	Piermont	00183	North Conway	00183	Greens Grant
03781	Plainfield	00184	North Conway	00184	Martins Location
03782	Sunapee	03575	North Conway	03575	Bretton Woods
03784	West Lebanon	03589	North Conway	03589	Mount Washington
03561	Littleton	03812	North Conway	03812	Bartlett
03574	Bethlehem	03813	North Conway	03813	Center Conway
03580	Franconia	03817	North Conway	03817	Chocorua
03585	Lisbon	03818	North Conway	03818	Conway
03586	Sugar Hill	03832	North Conway	03832	Eaton Center
03595	Twin Mountain	03838	North Conway	03838	Glen
03598	Whitefield	03845	North Conway	03845	Intervale
03032	Auburn	03846	North Conway	03846	Jackson
03034	Candia	03847	North Conway	03847	Kearsarge
03036	Chester	03849	North Conway	03849	Madison
03037	Deerfield	03860	North Conway	03860	North Conway
03040	East Candia	03875	North Conway	03875	Silver Lake
03045	Goffstown	03890	North Conway	03890	West Ossipee
03053	Londonderry	03043	Peterborough	03043	Francestown
03070	New Boston	03047	Peterborough	03047	Greenfield

New Hampshire Health Service Area			New Hampshire Health Service Area		
	Zip Code	Zip Name		Zip Code	Zip Name
Peterborough	03071	New Ipswich	Wolfeboro	03896	Wolfeboro Falls
Peterborough	03084	Temple	Wolfeboro	03897	Wonalancet
Peterborough	03440	Antrim	Woodsville	03238	Glenclyff
Peterborough	03442	Bennington	Woodsville	03740	Bath
Peterborough	03444	Dublin	Woodsville	03771	Monroe
Peterborough	03449	Hancock	Woodsville	03774	North Haverhill
Peterborough	03452	Jaffrey	Woodsville	03780	Pike
Peterborough	03458	Peterborough	Woodsville	03785	Woodsville
Peterborough	03461	Rindge			
Peterborough	03468	West Peterborough			
Plymouth	03215	Waterville Valley			
Plymouth	03217	Ashland			
Plymouth	03222	Bristol			
Plymouth	03223	Campton			
Plymouth	03232	East Hebron			
Plymouth	03241	Hebron			
Plymouth	03245	Holderness			
Plymouth	03251	Lincoln			
Plymouth	03262	North Woodstock			
Plymouth	03264	Plymouth			
Plymouth	03266	Rumney			
Plymouth	03274	Stinson Lake			
Plymouth	03279	Warren			
Plymouth	03282	Wentworth			
Plymouth	03293	Woodstock			
Portsmouth	03801	Portsmouth			
Portsmouth	03802	Portsmouth			
Portsmouth	03803	Portsmouth			
Portsmouth	03804	Portsmouth			
Portsmouth	03840	Greenland			
Portsmouth	03843	Hampton			
Portsmouth	03854	New Castle			
Portsmouth	03862	North Hampton			
Portsmouth	03870	Rye			
Portsmouth	03871	Rye Beach			
Rochester	03815	Center Strafford			
Rochester	03835	Farmington			
Rochester	03839	Rochester			
Rochester	03851	Milton			
Rochester	03852	Milton Mills			
Rochester	03855	New Durham			
Rochester	03866	Rochester			
Rochester	03867	Rochester			
Rochester	03868	Rochester			
Rochester	03884	Strafford			
Rochester	03887	Union			
Wolfeboro	03809	Alton			
Wolfeboro	03810	Alton Bay			
Wolfeboro	03814	Center Ossipee			
Wolfeboro	03816	Center Tufonboro			
Wolfeboro	03830	East Wakefield			
Wolfeboro	03836	Freedom			
Wolfeboro	03850	Melvin Village			
Wolfeboro	03853	Mirror Lake			
Wolfeboro	03864	Ossipee			
Wolfeboro	03872	Sanbornville			
Wolfeboro	03882	Effingham			
Wolfeboro	03886	Tamworth			
Wolfeboro	03894	Wolfeboro			

REFERENCES

- ¹ Health, United States, 2006. With Chartbook on Trends in the Health of Americans. National Center for Health Statistics. 2007 <http://www.cdc.gov/nchs/hus.htm> Accessed April 1, 2007.
- ² TL Petty. Scope of the COPD Problem in North American: Early Studies of Prevalence and NHANES III Data: Basis for Early Identification and Intervention. Chest. 2000;117:326-331. http://www.chestjournal.org/cgi/reprint/117/5_suppl_2/326S.pdf. Accessed April 1, 2007.
- ³ Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2005. National Center for Health Statistics. Vital Health Stat 10(232). 2006. http://www.cdc.gov/nchs/data/series/sr_10/sr10_232.pdf. Accessed April 15, 2007
- ⁴ 2005 Prevalence Data. Behavioral Risk Factor Surveillance System. National Center for Chronic Disease Prevention and Health Promotion. <http://www.cdc.gov/brfss> Accessed September 15, 2007.
- ⁵ Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. <http://apps.nccd.cdc.gov/brfss/Trends/TrendData.asp>. Accessed April 1, 2007.
- ⁶ Cigarette Smoking Among Adults – United States, 2002. MMWR 2004;53(20):427-431. <http://no-smoking.org/may04/05-27-04-4.html>. Accessed April 15, 2007.
- ⁷ Chronic Diseases: The Leading Causes of Death. New Hampshire. National Center for Chronic Disease Prevention and Health Promotion. http://www.cdc.gov/nccdphp/publications/factsheets/ChronicDisease/new_hampshire.htm. Accessed May 1, 2007.
- ⁸ Chronic Diseases: The Leading Causes of Death. New Hampshire. National Center for Chronic Disease Prevention and Health Promotion. http://www.cdc.gov/nccdphp/publications/factsheets/ChronicDisease/new_hampshire.htm. Accessed April 15, 2007.
- ⁹ Chronic Obstructive Pulmonary Disease (COPD) Fact Sheet. American Lung Association. August, 2006. <http://www.lungusa.org/site/pp.asp?c=dvLUK900E&b=35020>. Accessed May 1, 2007.
- ¹⁰ Medicaid HEDIS 2006 Means, Percentiles and Ratios. Commercial HEDIS 2006 Means, Percentiles and Ratios. National Committee for Quality Assurance. Updated April 23, 2007. <http://web.ncqa.org/Default.aspx?tabid=334>. Accessed May 1, 2007.
- ¹¹ 2005 Emergency Department Use in New Hampshire: A Comparison of the Medicaid and Commercially Insured Populations. 2007 NH CHIS Project. <http://www.dhhs.state.nh.us/DHHS/OMB/LIBRARY/Data-Statistical+Report/emergency-use.htm>. Accessed June 15, 2007.
- ¹² McLaughlin T, Leibman C, Patel P, Camargo CA. Risk of recurrent emergency department visits or hospitalizations in children with asthma receiving nebulized budesonide inhalation suspension compared with other asthma medications. Curr Med Res Opin. 2007 Apr 27. <http://www.ncbi.nlm.nih.gov/sites/entrez?>. Accessed August 1, 2007.
- ¹³ New Hampshire DHHS Health Management Program. <http://www.dhhs.state.nh.us/DHHS/OCOM/GraniteCare/Medicaid-disease-managment.htm>. Accessed August 1, 2007.
- ¹⁴ New Hampshire DHHS Enhanced Care Coordination Pilot Program. <http://www.dhhs.state.nh.us/DHHS/OCOM/GraniteCare/enhancedcare.htm>

¹⁵ Lix L, Yogendran M, Burchill C, et.al. Defining and Validating Chronic Diseases: An Administrative Data Approach. Manitoba Centre for Health Policy. July 2006.
<http://www.umanitoba.ca/centres/mchp/reports/pdfs/2005-2008/chronic.disease.pdf>
Accessed July, 2007.

¹⁶ HEDIS 2007, Technical Specifications, Volume 2. National Committee for Quality Assurance. 2006.
www.ncqa.org.

¹⁷ Children's Health Insurance Programs in New Hampshire. Access, Preventive, Care Management, Utilization, and Payments, State Fiscal Year 2006. January, 2006.
<http://www.dhhs.state.nh.us/DHHS/OMB/LIBRARY/Data-Statistical+Report/chip.htm>. Accessed January, 2008.

¹⁸ Breslow NE and Day NE. Statistical Methods in Cancer Research. Volume II – The Design and Analysis of Cohort Studies. World Health Organization. 1987.