Asthma Among Minnesota Health Care Program Beneficiaries

A JOINT REPORT FROM THE MINNESOTA DEPARTMENT OF HEALTH AND THE MINNESOTA DEPARTMENT OF HUMAN SERVICES

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Contents

Executive Summary

Asthma is a chronic respiratory disease that impacts people of all ages. It is important to understand the burden of asthma among enrollees in Minnesota's public health care programs because people with low incomes are more likely to have asthma and to experience worse asthma symptoms.

This report provides updated data on the burden of asthma in the public health care programs overseen by the Minnesota Department of Human Services (DHS), collectively known as Minnesota Health Care Programs (MHCP).

Key Findings

Asthma Prevalence

- The prevalence of asthma was highest among beneficiaries in the Family & Children Managed Care program. In 2014, prevalence ranged from 4.3% of continuously enrolled beneficiaries, using a narrower "persistent asthma" definition, to 8.7% using a broader "any asthma" definition. These percentages correspond to 13,973 and 28,132 beneficiaries respectively.
- Among continuously enrolled beneficiaries in the Family & Children Fee-for-Service program in 2014, asthma prevalence ranged from 3.3% using the "persistent asthma" definition to 7.0% using the "any asthma" definition. These percentages correspond to 3,659 and 7,867 beneficiaries respectively.
- Among continuously enrolled beneficiaries in MinnesotaCare in 2014, asthma prevalence was 3.7% using the "persistent asthma" definition and 6.5% using the "any asthma" definition. These percentages correspond to 564 and 1,005 beneficiaries respectively.
- Asthma prevalence was highest in the Twin Cities metropolitan area in the Family & Children Managed Care program, ranging from 4.6% to 9.8% of continuously enrolled beneficiaries.
- Both having asthma and experiencing uncontrolled asthma were more common among beneficiaries with the lowest incomes.

Quality of Care

- MinnesotaCare beneficiaries with asthma were more likely than beneficiaries in the other health care programs to have been prescribed and filled the appropriate ratio of long-term controller and quick reliever medication for asthma.
- MinnesotaCare beneficiaries were also more likely to remain on asthma controller medication.

Health Care Utilization and Costs of Care

- Asthma hospitalization rates and associated costs decreased over 2012-2014.
- Asthma-related emergency department visit rates were relatively stable over 2012-2014; however, associated costs increased over this period.

The findings in this report point to the need for increased attention to guidelines-based care for asthma, especially among beneficiaries in the Family & Children Managed Care program. They also point to the need for increased attention to patients with uncontrolled asthma; and increased attention to upstream factors that might impact a patient's ability to manage asthma, such as household income and access to medical care.

Introduction

Asthma is a chronic respiratory disease that is characterized by episodes of breathlessness. It is one of the most common chronic diseases in the U.S. impacting more than 6.3 million Americans. Asthma can range from a relatively mild condition to quite severe, and is associated with missed school days, missed work days, disrupted sleep, and activity limitations. Asthma cannot be cured, but in most cases it can be managed with appropriate medication, regular visits to a health care provider and avoidance of asthma triggers such as pollen or secondhand smoke.

This report provides updated data on the burden of asthma in the public health care programs overseen by the Minnesota Department of Human Services (DHS), collectively known as Minnesota Health Care Programs (MHCP). Medical Assistance is Minnesota's Medicaid program, providing medical care and prescription medications for residents with low incomes and those with disabilities. Medical Assistance coverage is provided through two payment mechanisms: managed care (Family & Children Managed Care) and fee-for-service (Family & Children Fee-for-Service). MinnesotaCare is a prepaid program that provides health insurance for Minnesotans with low and moderate incomes who do not qualify for other health insurance coverage. With the implementation of the Affordable Care Act and subsequent expansion of Medicaid, the number of enrollees in MinnesotaCare declined significantly in 2014 as many enrollees were moved into Family & Children Managed Care.

This report examines asthma prevalence, quality of care, health care utilization (emergency department (ED) visits and hospitalizations for asthma) and costs of asthma care. It is important to understand the burden of asthma among public health care program beneficiaries because individuals with the lowest incomes are generally at higher risk for having asthma and experiencing worsening asthma symptoms.[1, 2] Asthma, being a chronic disease, requires continuous monitoring and management; a lack of which can greatly reduce the affected individual's quality of life, and can even be life-threatening. Inadequately controlled asthma may lead to over-utilization of emergency services and inpatient hospitalizations which typically result in greater health care spending than routine medical care. Examining health care cost can help inform policy decisions that promote improved asthma management.

Methods

All analyses were conducted using administrative claims data extracted from the Minnesota DHS data warehouse by DHS researchers in the division of Health Research and Quality.

This report focuses on the years 2011 to 2014. While more recent data are available, the report focuses on these earlier years because of the major medical diagnosis coding system change from International Classification of Disease-Clinical Modification (ICD-CM)-9 to ICD-CM-10 that happened in October 2015. This change makes it necessary for new, separate trending moving forward.

The analyses in this report were limited to individuals enrolled for 11 or more months in any of the major programs in the year.

All analyses in this report are based on calendar years, not fiscal years.

Measures of Asthma Prevalence

Asthma prevalence refers to the proportion of people in a population who have asthma at a given time. Because there is no gold standard definition for identifying asthma patients in administrative claims data, two different definitions were used to provide a range of estimates of asthma prevalence: "Any Asthma" and "Persistent Asthma".[3, 4] A recent study reports a high concordance between reported asthma diagnosis and Medicaid claims data for children.[5]

"Any Asthma" Definition

Meeting one or more of the following criteria during the year:

- At least one ED visit with a principal diagnosis of asthma
- At least one hospitalization with a principal diagnosis of asthma
- At least four asthma medications filled (cannot solely be leukotriene modifiers)
- At least one office visit with a principal or secondary diagnosis of asthma

"Persistent Asthma" Definition

Meeting one or more of the following criteria during the year:

- At least one ED visit with a principal diagnosis of asthma
- At least one hospitalization with a principal diagnosis of asthma
- At least four asthma medications filled (cannot solely be leukotriene modifiers)
- At least four office visits for asthma with a principal or secondary diagnosis of asthma and two or more asthma medications filled.

The two definitions differ only in the criteria related to office visits and medications for asthma. For example, if a beneficiary's only asthma-related claims were for office visits and prescription fills, they would fall into the Persistent Asthma category if they had 4 or more office visits in combination with least 2 prescription fills for asthma medications, and into the Any Asthma category if they had at least one office visit and fewer than 2 prescription fills.

The **"Any Asthma"** definition represents a broader definition of asthma. Because it casts a broad net, it may erroneously classify some people as having asthma who don't really have the condition.

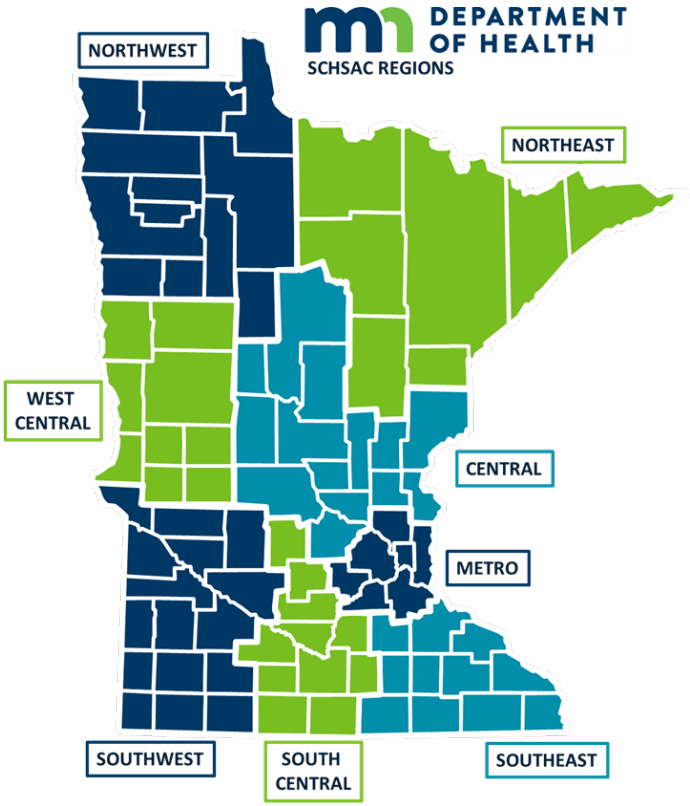
The **"Persistent Asthma"** definition is a narrower definition of asthma in that it more accurately identifies people with asthma. However, because it is more restrictive, this definition may miss individuals with mild asthma.

Asthma prevalence was calculated as the percentage of continuously enrolled beneficiaries meeting one of the asthma definitions in the year.

All measures of asthma prevalence are presented by program (Family & Children Managed Care, Family & Children Fee-For-Service and MinnesotaCare), age group, sex, race/ethnicity and

region of residence. The regions used in this report correspond to the Minnesota Department of Health (MDH) State Community Health Services Advisory Committee (SCHSAC) regions shown in the map below.

MDH State Community Health Services Advisory Committee Regions



Measures of Quality of Care

To assess quality of care among patients with asthma, we used three of the Healthcare Effectiveness Data and Information Set (HEDIS) measures for asthma developed by the National Committee for Quality Assurance (NCQA).[6] The HEDIS asthma measures require an even narrower definition of asthma prevalence than the "Persistent Asthma" definition listed above to ensure that only patients requiring use of daily controller medication are included.

Asthma Medication Ratio

There are two main types of medication for asthma: long-term controller medication and quick-relief medication. **Controller medication** is used every day, regardless of symptoms, to control inflammation in the airways. Examples include inhaled corticosteroids (ICSs), leukotriene modifiers, long-acting beta-agonists and theophylline. **Quick-relief medication** is used to open up the airways when symptoms get worse. It is also used before exercising by people who have exercise-induced asthma. Quick-relievers include short-acting beta-agonists (SABAs) and

anticholinergics. When asthma is well-controlled, SABAs should only be needed less than 3 days per week for treatment of symptoms (does not include use prior to exercise).

The Asthma Medication Ratio measure assesses the extent to which beneficiaries with persistent asthma have been prescribed and are filling prescriptions for the appropriate ratio of long-term controller to quick-reliever asthma medication. [7]

> *Definition: The percentage of beneficiaries ages 5-64 who were identified as having persistent asthma and had a ratio of controller medications to total asthma medications (controller + reliever) of 0.50 or greater during the year*
>
> When the appropriate ratio of controllers to relievers are prescribed and/or dispensed, the ratio of controllers to total medication (AMR) will be 0.5. *Example: AMR = 2/(2 + 2) = 0.5, 3/(3 + 1) = 0.75*
>
> When no controllers have been prescribed and/or dispensed, the AMR will be zero. *Example: AMR = 0/(0 + 2) = 0*
>
> When more relievers than controllers have been prescribed and/or dispensed, AMR will be <0.5 and >0. *Example: AMR = 2/(2 + 4) = 0.3*

Medication Management for People with Asthma

The Medication Management measure has two submeasures to assess the degree to which beneficiaries with persistent asthma adhere to asthma controller medications over time.

Definitions:

1. *Medication Management for People with Asthma-50 (MMA-50)*: The percentage of beneficiaries ages 5-64 who were identified as having persistent asthma and were dispensed appropriate medications who remained on asthma controller medication for at least 50% of their treatment period
2. *Medication Management for People with Asthma-75 (MMA-75)*: The percentage of beneficiaries ages 5-64 who were identified as having persistent asthma and were dispensed appropriate medications who remained on asthma controller medication for at least 75% of their treatment period

Hospitalization and Emergency Department Utilization and Costs of Care

Health claims data of beneficiaries enrolled in Minnesota Health Care Programs were used to determine asthma-related health care utilization and associated cost-of-care in 2012, 2013 and 2014. Two types of health care utilization, namely hospitalizations and ED visits where asthma was the principal diagnosis, are reported.

Measured outcomes for hospitalizations and ED visits include: 1) total count of medical visits, 2) health care utilization rates among beneficiaries with asthma, and 3) associated costs. ED visits that resulted in hospitalizations were only included with hospitalization measures to avoid over-reporting of utilization and cost. Results are organized at pay system (i.e., fee-for-service

(Family & Children Fee-For-Service) and managed care (Family & Children Managed Care and MinnesotaCare)) and year (2012, 2013 and 2014) levels.

Caveats: Cost calculations only include facility-related costs, which make up the largest share of reported health care costs. Patient-paid costs such as spend down or costs paid by third parties such as other health insurers (not reportable to the Minnesota Department of Human Services) are not accounted for in the cost calculations. Therefore, reported costs may be under-reported.

Results

Continuous Enrollment

Table 1 lists the number of beneficiaries who were continuously enrolled in MHCP each year by year and program. Increases in the Family & Children-Managed Care enrollment after 2012 are due to Medicaid expansion as a result of the Affordable Care Act. There was a corresponding drop in enrollment in MinnesotaCare between 2013 and 2014 as many beneficiaries were moved to Family & Children-Managed Care as part of the expansion in Medicaid. Enrollment in Family & Children-Fee-For-Service declined after 2011.

Table 1. Number and percentage of continuously enrolled beneficiaries by program and year

	2011	2012	2013	2014
Family & Children Managed Care	98,505 (31.2%)	84,373 (25.5%)	103,742 (31.9%)	165,522 (29.2%)
Family & Children Fee-For-Service	97,958 (43.1%)	72,112 (37.2%)	69,525 (35.5%)	74,012 (31.5%)
MinnesotaCare	53,629 (45.4%)	48,567 (43.2%)	57,797 (45.7%)	7,106 (15.9%)
Total	**216,177**	**229,193**	**237,248**	**325,015**

Source: Minnesota Department of Human Services Data Warehouse

Asthma Prevalence

"Any Asthma"

In 2014, 8.7% of beneficiaries in Family & Children Managed Care, 7.0% in Family & Children Fee-For-Service beneficiaries and 6.5% in MinnesotaCare met the definition of "Any Asthma" (Table 2). The prevalence of "Any Asthma" in Family & Children Managed Care rose slightly between 2011 and 2012 and then declined between 2013 and 2014. In Family & Children Fee-For-Service, prevalence increased slightly from 2011 to 2012 and then declined through 2014. In MinnesotaCare, asthma prevalence was relatively stable across 2011-2013, then declined.

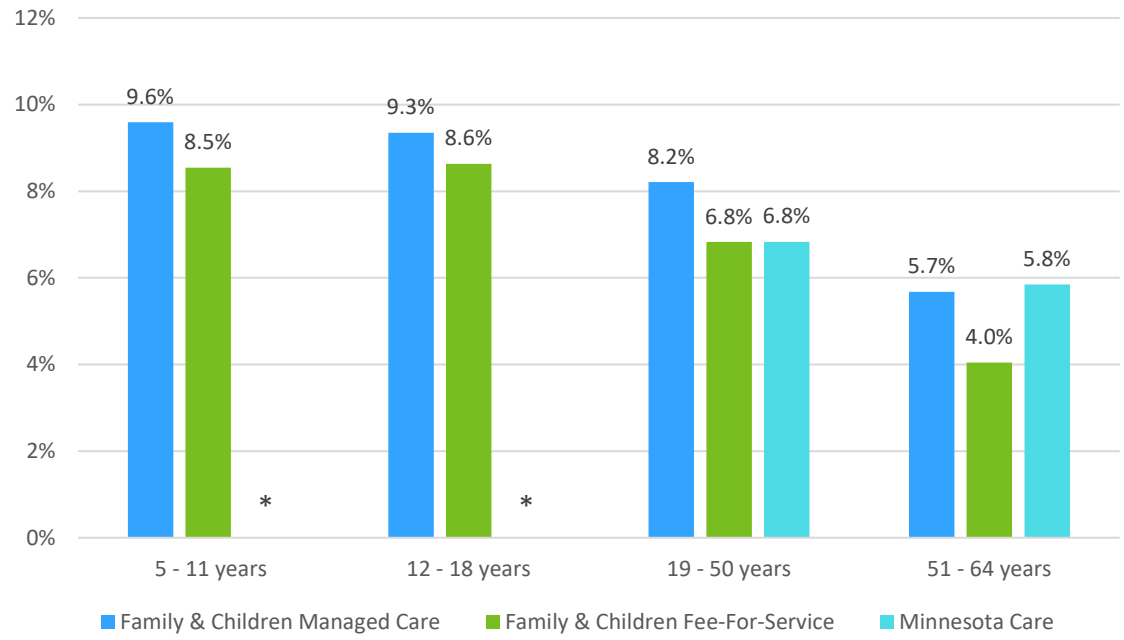
Table 2. Number and percentage of beneficiaries meeting "Any Asthma" definition by program and year

	2011	2012	2013	2014
Family & Children Managed Care	19,483 (9.0%)	21,215 (9.3%)	21,947 (9.3%)	28,132 (8.7%)
Family & Children Fee-For-Service	8,426 (7.1%)	6,763 (7.3%)	6,475 (7.2%)	7,867 (7.0%)
MinnesotaCare	4,561 (7.1%)	4,648 (7.2%)	4,646 (7.0%)	1,005 (6.5%)

Source: Minnesota Department of Human Services Data Warehouse

In 2014 in both the Family & Children Managed Care and Family & Children Fee-For-Service programs, the prevalence of "Any Asthma" was highest among children ages 5-18 (Figure 1). Due to the small numbers of children enrolled in MinnesotaCare in 2014, the rates for ages 0-18 are not reported. Asthma prevalence was lowest among beneficiaries ages 51-64 in all 3 programs.

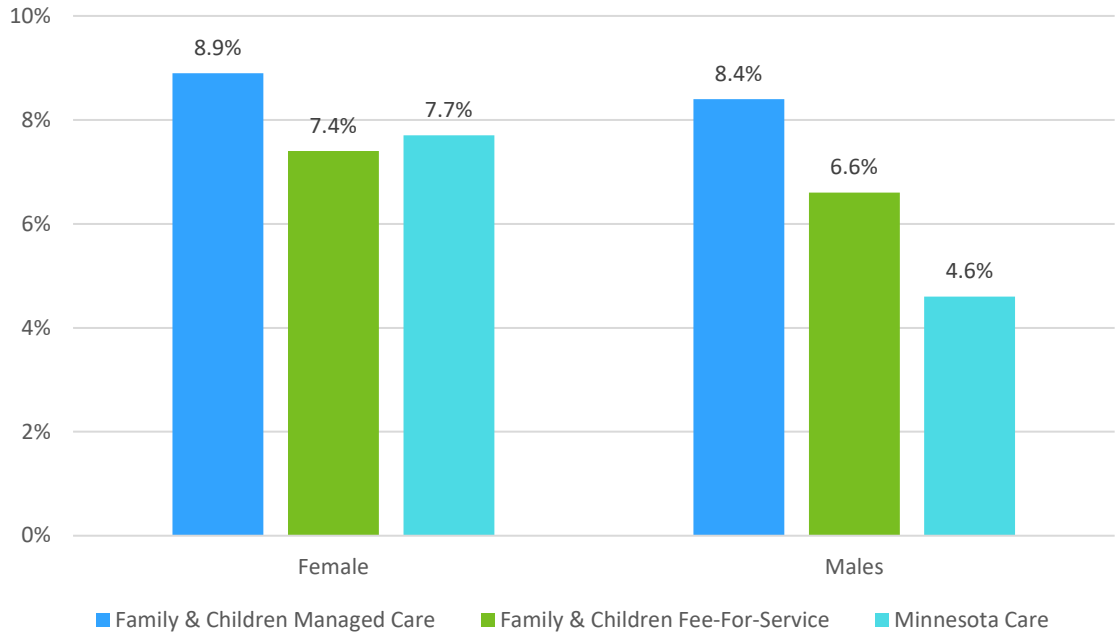
Figure 1. Percentage of beneficiaries meeting "Any Asthma" definition by program and age group, 2014



Source: Minnesota Department of Human Services Data Warehouse
*Not reported.

In 2014, asthma prevalence was higher among females than males in all 3 programs (Figure 2). Asthma prevalence was 70% higher in females than males in MinnesotaCare. This difference is due to the fact that the majority of MinnesotaCare beneficiaries are adults and that among adults, asthma is more prevalent in women than men.

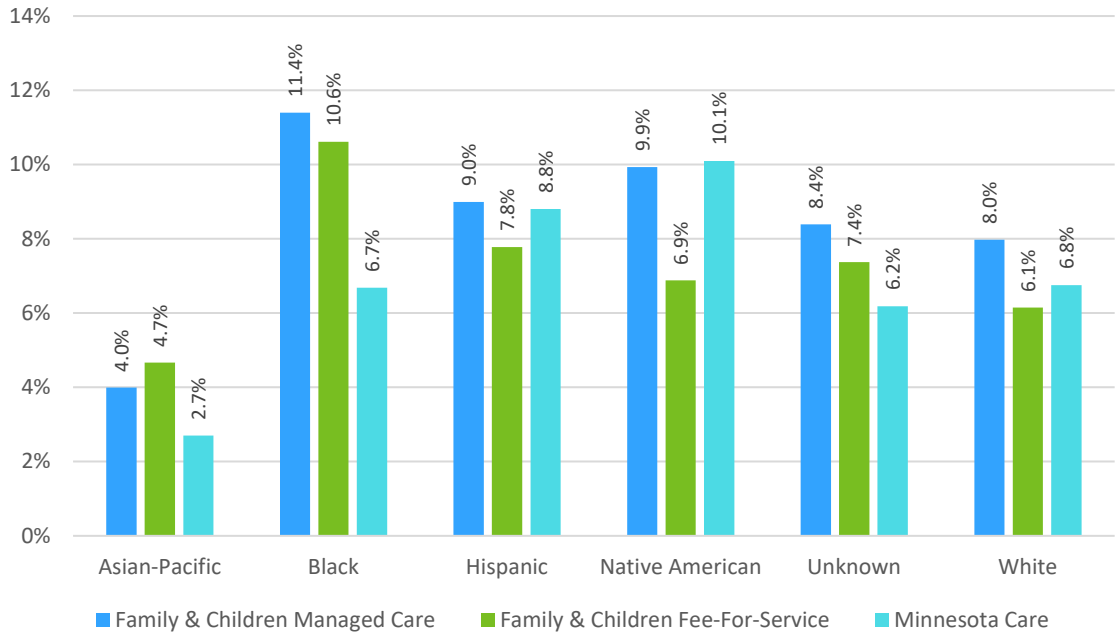
Figure 2. Percentage of beneficiaries meeting "Any Asthma" definition by program and sex, 2014



Source: Minnesota Department of Human Services Data Warehouse

In 2014, the prevalence of "Any Asthma" in Family & Children Managed Care and Family & Children Fee-For-Service was highest among Black beneficiaries (Figure 3). Among MinnesotaCare beneficiaries, asthma prevalence was highest among Native Americans. Note that because the overall number of beneficiaries in MinnesotaCare in 2014 was relatively small (less than 7,200), the percentages for some racial/ethnic groups presented in the graph below are based on relatively small numbers of beneficiaries. (See also Table 8 in Appendix.)

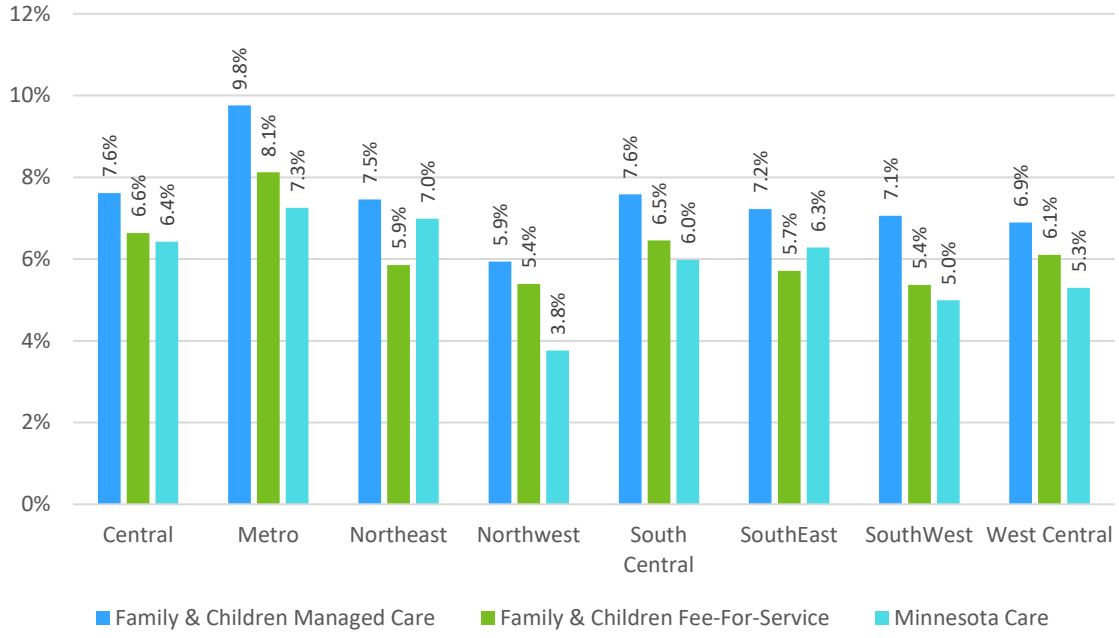
Figure 3. Percentage of beneficiaries meeting "Any Asthma" definition by program and race/ethnicity, 2014



Source: Minnesota Department of Human Services Data Warehouse

The percentage of beneficiaries with "Any Asthma" was highest in the Twin Cities metro area in all three programs (Figure 4).

Figure 4. Percentage of beneficiaries meeting "Any Asthma" definition by program and SCHSAC region, 2014



Source: Minnesota Department of Human Services Data Warehouse

"Persistent Asthma"

In 2014, 4.3% of beneficiaries in Family & Children Managed Care, 3.3% in Family & Children Fee-For-Service and 3.7% in MinnesotaCare met the definition of "Persistent Asthma" (Table 3). The prevalence of "Persistent Asthma" increased slightly in both the Family & Children Managed Care and Family & Children Fee-For-Service programs between 2011 and 2012 and then declined through 2014. Among MinnesotaCare beneficiaries, asthma prevalence decreased steadily over 2011-2014.

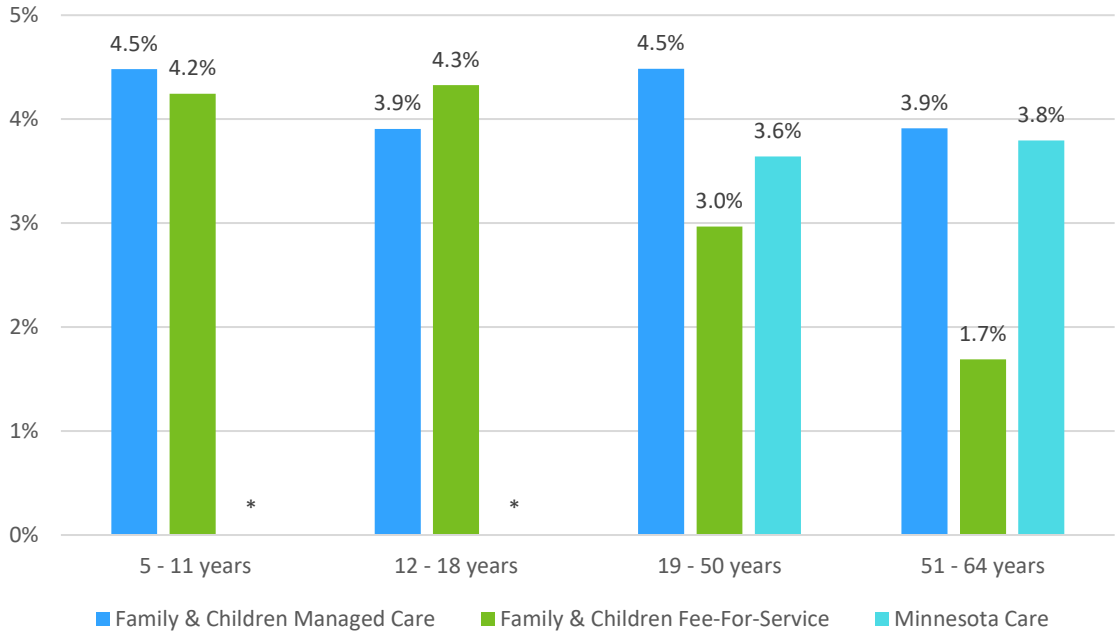
Table 3. Number of beneficiaries meeting "Persistent Asthma" definition by program and year

	2011	2012	2013	2014
Family & Children Managed Care	10,052 (4.6%)	11,043 (4.8%)	11,120 (4.7%)	13,973 (4.3%)
Family & Children Fee-For-Service	4,142 (3.5%)	3,329 (3.6%)	2,965 (3.3%)	3,659 (3.3%)
MinnesotaCare	2,707 (4.2%)	2,591 (4.0%)	2,501 (3.8%)	564 (3.7%)

Source: Minnesota Department of Human Services Data Warehouse

Among Family & Children Managed Care beneficiaries, the percentage meeting the definition of "Persistent Asthma" was highest among 5-11 and 19-50 year olds while in Family & Children Fee-For-Service, the highest rate was in 12-18 year olds (Figure 5). Due to the small number of children enrolled in MinnesotaCare in 2014, rates for ages 0-18 are not reported.

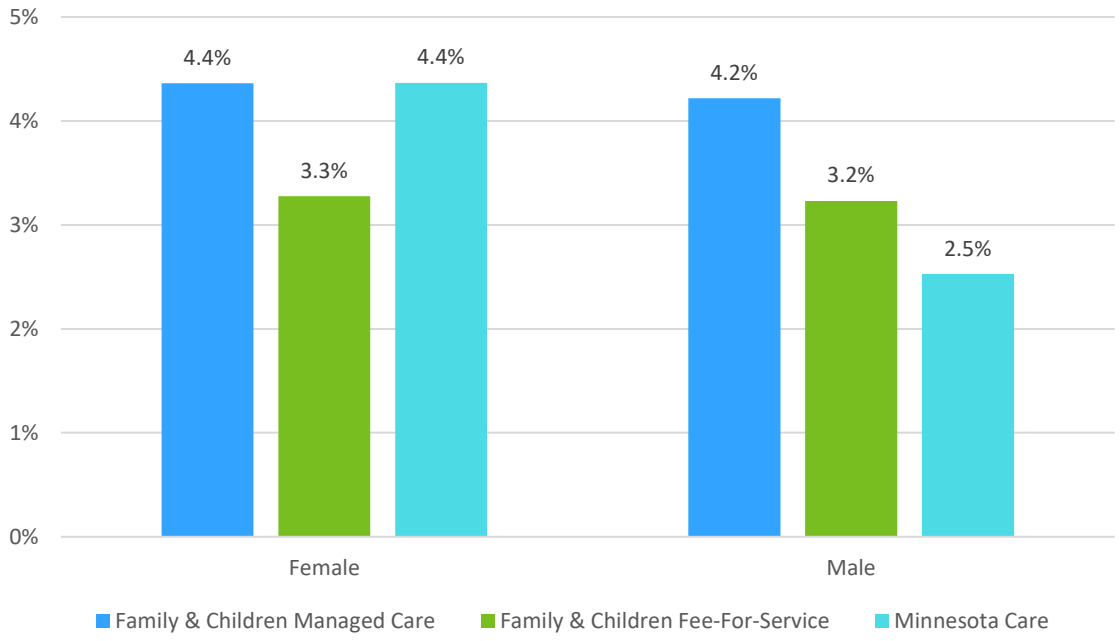
Figure 5. Percentage of beneficiaries meeting "Persistent Asthma" definition by program and age group, 2014



Source: Minnesota Department of Human Services Data Warehouse
**Not reported*

The percentage of females meeting the definition of "Persistent Asthma" was slightly higher than for males in all 3 programs (Figure 6). "Persistent Asthma" prevalence was nearly two times higher in females than males in MinnesotaCare. As with "Any Asthma", the bigger difference in MinnesotaCare can be explained by the fact that the majority of MinnesotaCare beneficiaries are adults and that among adults, asthma is more prevalent in women than men.

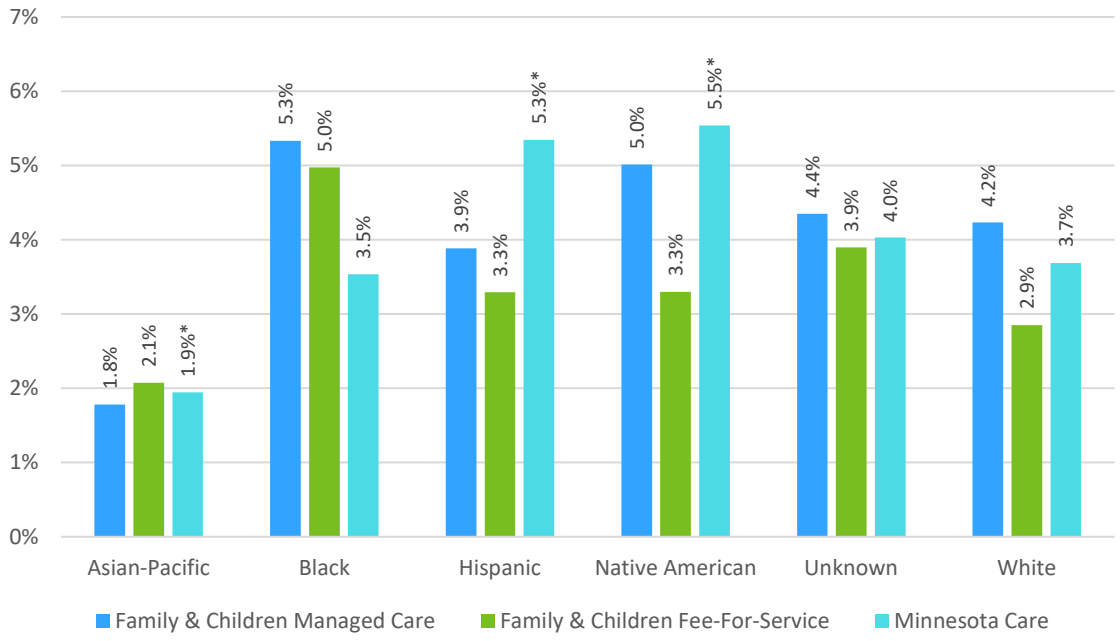
Figure 6. Percentage of beneficiaries meeting "Persistent Asthma" definition by program and sex, 2014



Source: Minnesota Department of Human Services Data Warehouse

In 2014, in both Family & Children Managed Care and Family & Children Fee-For-Service, asthma prevalence was highest among Black beneficiaries (Figure 7). Among MinnesotaCare beneficiaries, prevalence was highest among Native Americans and Hispanics. Note, however, that the number of beneficiaries in these groups in MinnesotaCare in 2014 was relatively small. (See also Table 9 in Appendix.)

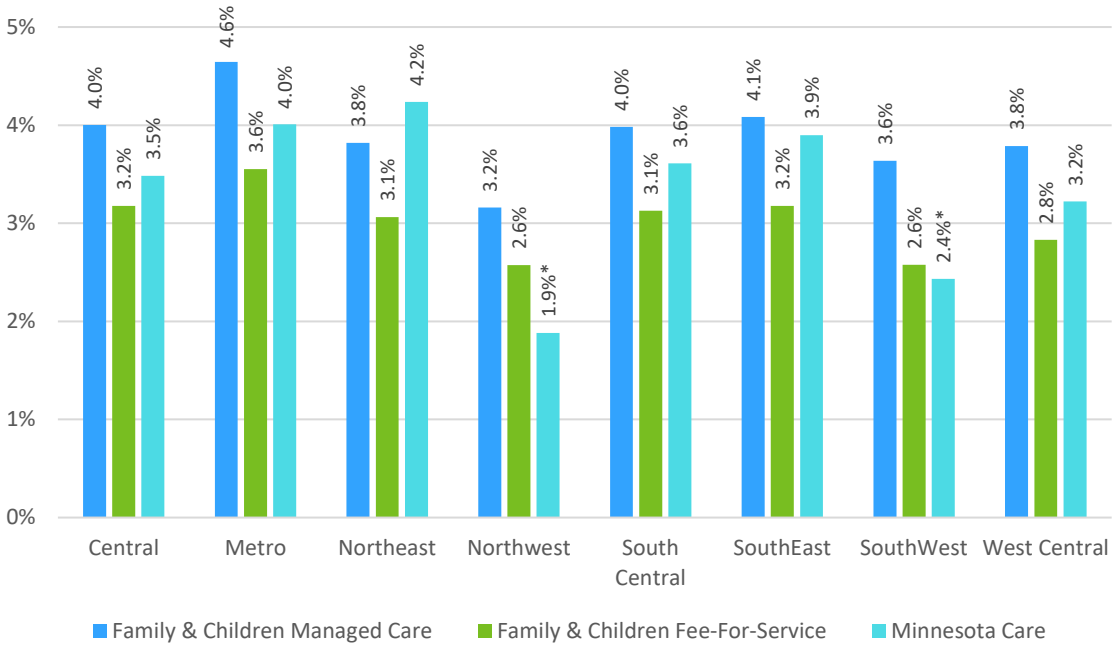
Figure 7. Percentage of beneficiaries meeting "Persistent Asthma" definition by program and race/ethnicity, 2014



Source: Minnesota Department of Human Services Data Warehouse
**less than 20 beneficiaries met criteria*

In Family & Children Managed Care, the percentage of beneficiaries meeting the definition of "Persistent Asthma" ranged from 3.2% in the Northwest region to 4.6% in the Twin Cities Metro area (Figure 8). Among Family & Children Fee-For-Service beneficiaries, prevalence ranged from 2.6% in the Northwest and Southwest to 3.6% in the Metro. Among beneficiaries in MinnesotaCare, the prevalence of "Persistent Asthma" ranged from 3.2% in West Central to 4.2% in the Northeast region.

Figure 8. Percentage of beneficiaries meeting "Persistent Asthma" definition by program and SCHSAC region, 2014



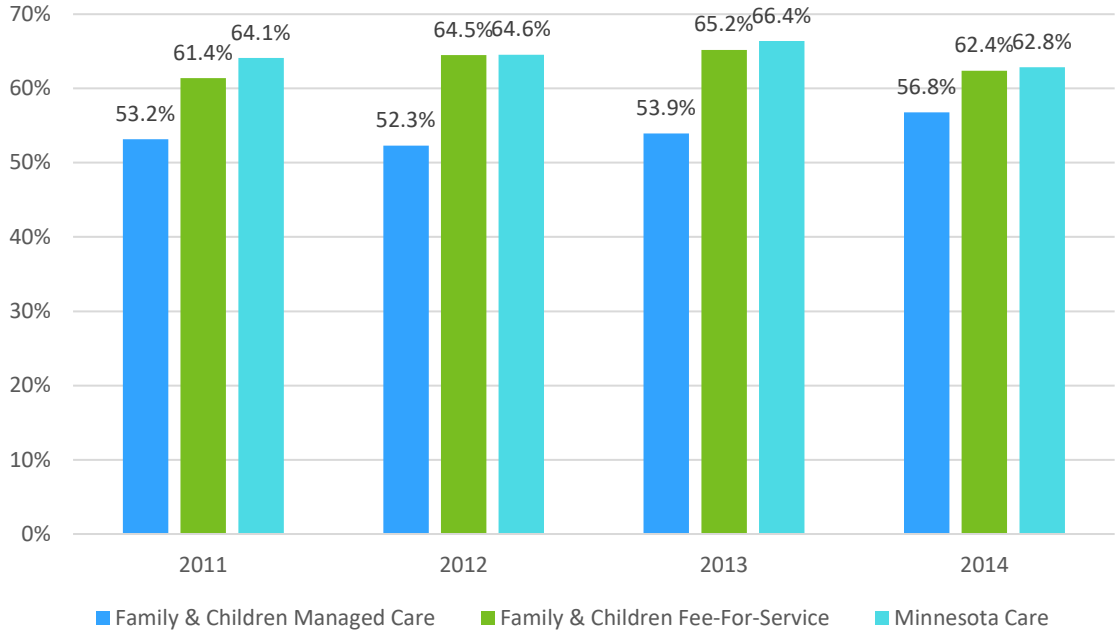
Source: Minnesota Department of Human Services Data Warehouse
**less than 20 beneficiaries met criteria*

Quality of Care

Asthma Medication Ratio (AMR)

In 2014, 62.8% of beneficiaries with asthma in MinnesotaCare, 62.4% in Family & Children Fee-For-Service and 56.8% in Family & Children Managed Care had an asthma medication ratio of 0.5 or greater. (Figure 9). Over 2011-2014, there was an overall increase in the AMR in Family & Children Managed Care. In both Family & Children Fee-For-Service and MinnesotaCare, there was a steady increase over 2011-2013 followed by a decline in 2014.

Figure 9. Percentage of beneficiaries who had an asthma medication ratio of 0.5 or greater, by program and year

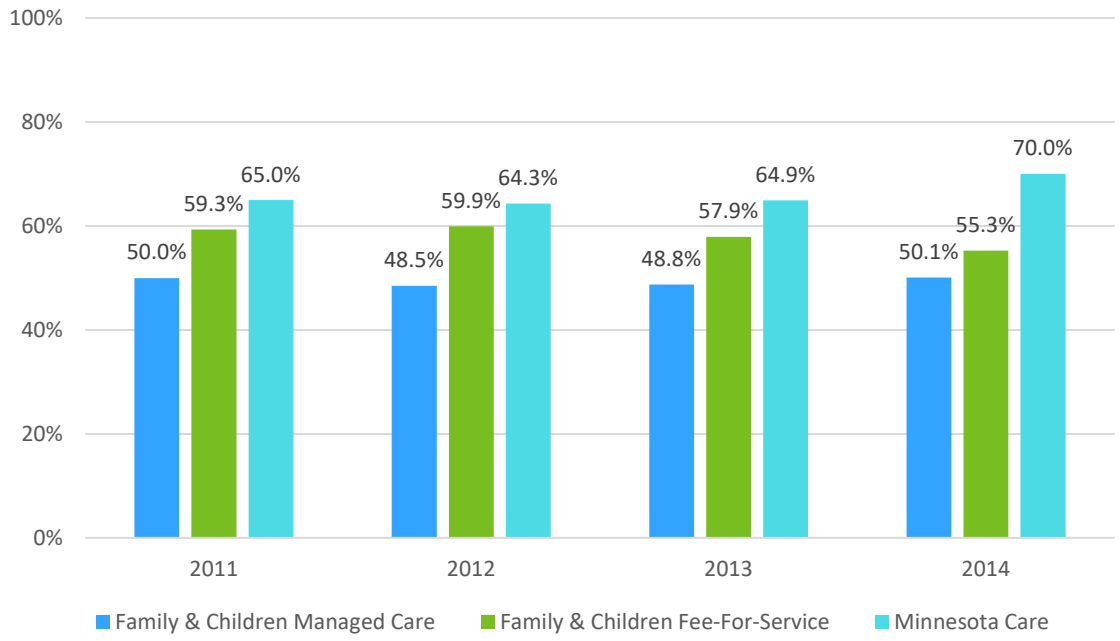


Source: Minnesota Department of Human Services Data Warehouse

Medical Management for People with Asthma (MMA)

In 2014, 70.0% of beneficiaries with asthma in MinnesotaCare, 55.3% in Family & Children Fee-For-Service and 50.1% of those in Family & Children Managed Care were on asthma controller medication for 50% or more of the measurement period (Figure 10). Over 2011-2014, rates for the Family & Children Managed Care program were relatively stable, while rates for the Fee-For-Service program experienced an overall decline. Rates in the MinnesotaCare were relatively stable between 2011 and 2013 followed by an increase in 2014.

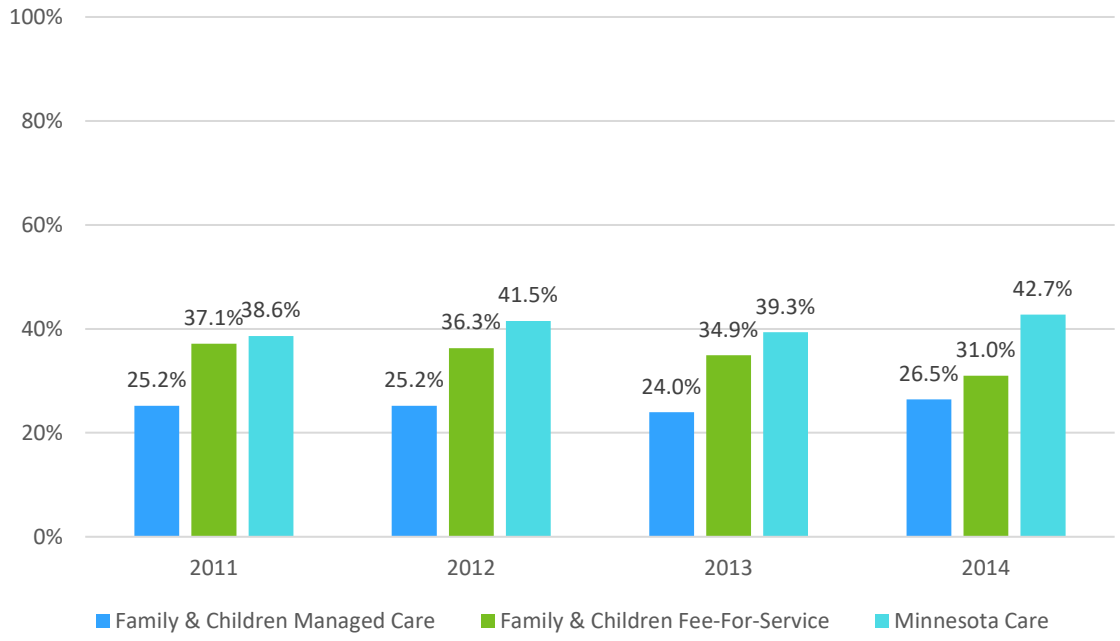
Figure 10. Percentage of beneficiaries who were on asthma controller medication for 50% or more of the measurement period



Source: Minnesota Department of Human Services Data Warehouse

In 2014, 42.7% of beneficiaries with asthma in MinnesotaCare, 31.0% in Family & Children Fee-For-Service and 26.5% in Family & Children Managed Care were on asthma controller medication for 75% or more of the measurement period (Figure 11). Rates for the Family & Children Managed Care and MinnesotaCare programs were relatively stable over 2011-2014. There was a steady decline in rates for Family & Children Fee-For-Service.

Figure 11. Percentage of beneficiaries who were on asthma controller medication for 75% or more of measurement period



Source: Minnesota Department of Human Services Data Warehouse

Asthma Hospitalizations and Emergency Department Visits and Costs of Care

Number and Cost of Hospitalizations

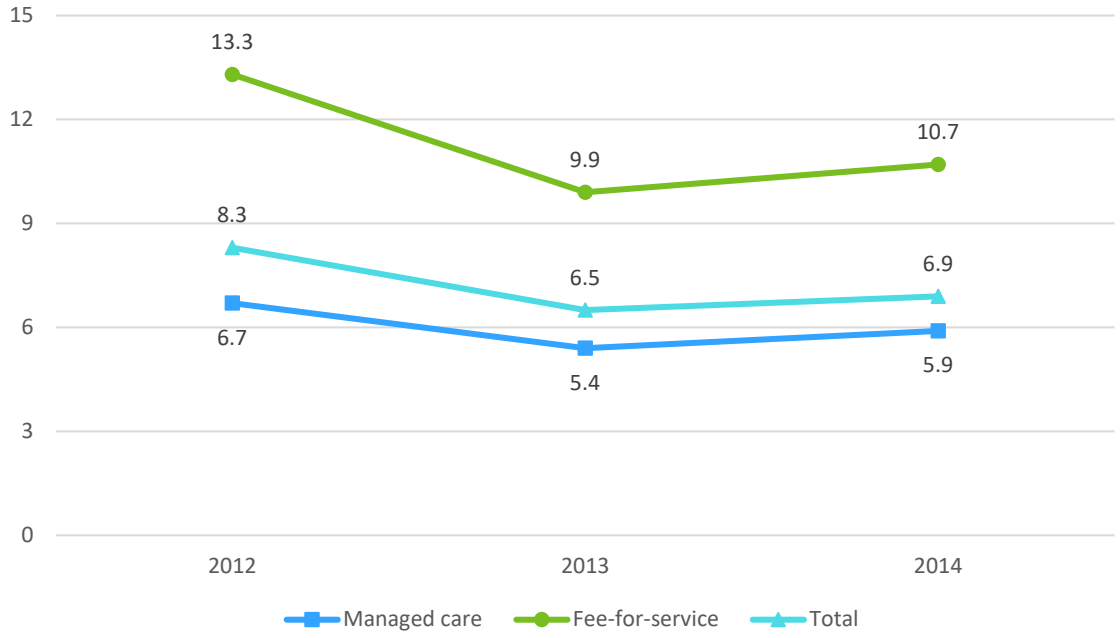
Between 2012 and 2014, there were on average, 373 hospitalizations with a principal diagnosis of asthma reported per year. Fee-for-service had a consistently lower share of asthma-related hospitalizations than managed care (Table 4). By contrast, in each year, the average number of asthma-related hospitalizations per 1,000 beneficiaries with confirmed asthma* was about twice as high in fee-for-service compared to managed care (Figure 12). For both pay systems, hospitalization rates decreased between 2012 and 2013 and rose slightly in 2014. The total hospitalization rate across years is driven by managed care rates.

Table 4. Number of asthma-related hospitalizations among MHCP beneficiaries with asthma and number of MHCP beneficiaries with asthma

	Number of Hospitalizations Related to Asthma			Number of Beneficiaries with Asthma*		
Pay System	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**
Managed care	241	202	275	36,034	37,355	46,534
Fee-for-service	155	115	131	11,643	11,613	12,209
Total	396	317	406	47,677	48,968	58,743

Source: Minnesota Department of Human Services Data Warehouse
**See technical appendix for details.*

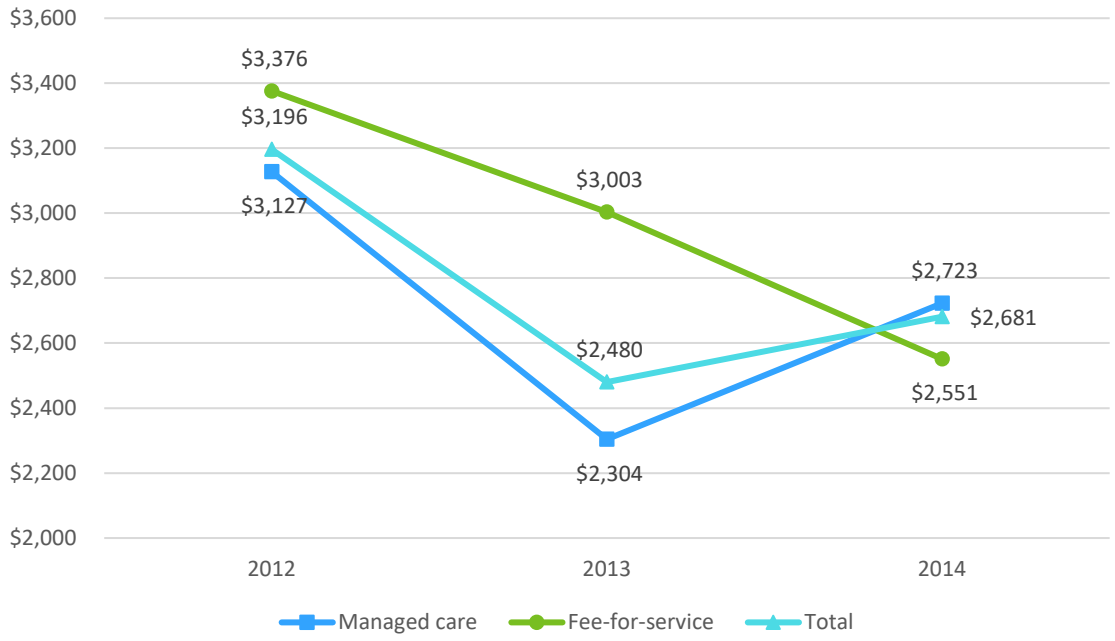
Figure 12. Number of asthma-related hospitalizations per 1,000 beneficiaries with asthma by pay system and year



Source: Minnesota Department of Human Services Data Warehouse

For both fee-for-service and managed care, asthma-related hospitalization costs per 1,000 member months decreased between 2012 and 2014 (Figure 13). During this period, the fee-for-service rate decreased by 24% and the managed care rate decreased by 13%. While fee-for-service experienced a steady rate decline through 2014, managed care experienced an increase between 2013 and 2014. In addition, while the fee-for-service rate was higher compared to the managed care rate in 2012 and 2013, in 2014 the managed care rate surpassed the fee-for-service rate. The gap in rates between fee-for-service and managed care was much smaller in 2012 and 2014 compared to 2013. In 2013 the gap was nearly 3 times greater ($250 compared to $700). The total rate during this time period was driven by managed care rates.

Figure 13. Cost per 1,000 member months associated with asthma-related hospitalizations, by pay system and year



Source: Minnesota Department of Human Services Data Warehouse

Number and Cost of Asthma-Related ED Visits

Annually from 2012 to 2014, on average, 4,927 ED visits with a principal diagnosis of asthma have been reported. In each year, fee-for-service had a lower share of asthma-related ED visits compared to managed care (Table 5).

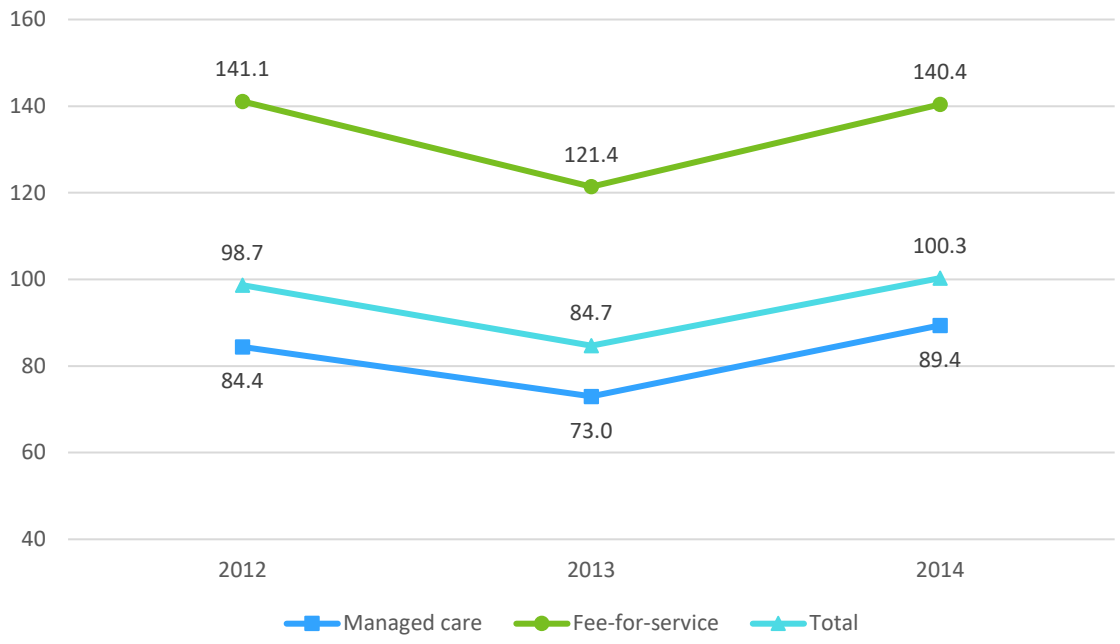
Table 5. Number of asthma-related emergency department visits among MHCP beneficiaries with asthma and number of MHCP beneficiaries with asthma

	Number of ED Visits Related to Asthma			Number of Beneficiaries with Asthma*		
Pay System	2012	2013	2014	2012	2013	2014
Managed care	3,019	2,709	4,143	35,758	37,132	46,330
Fee-for-service	1,699	1,448	1,762	12,040	11,926	12,548
Total	4,718	4,157	5,905	47,798	49,058	58,878

Source: Minnesota Department of Human Services Data Warehouse
**See technical appendix for details.*

By contrast, in each year, the average number of asthma-related ED visits per 1,000 beneficiaries with confirmed asthma was consistently higher (by about 50 visits) in fee-for-service compared to managed care (Figure 14). For both pay systems, ED visit rates decreased between 2012 and 2013 then increased between 2013 and 2014. The total ED visit rate across years is driven by managed care rates.

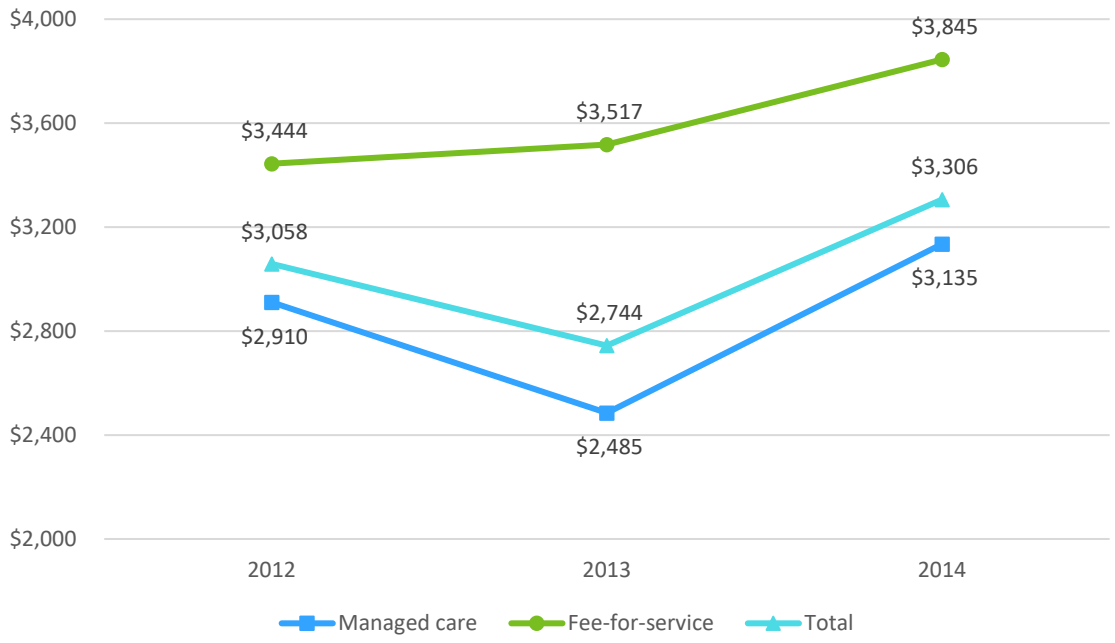
Figure 14. Number of asthma-related emergency department visits per 1,000 beneficiaries with asthma by pay system and year



Source: Minnesota Department of Human Services Data Warehouse

For both fee-for-service and managed care, asthma-related ED visit costs per 1,000 member months increased between 2012 and 2014 (Figure 15). During this period, the fee-for-service rate increased by 12% and the managed care rate increased by 8%. While fee-for-service experienced a steady rate increase through 2014, managed care experienced a decrease between 2012 and 2013 followed by an increase between 2013 and 2014. Fee-for-service rates were higher compared to managed care between 2012 and 2014. The rate gap in 2013 is approximately 2 times greater than the gaps in 2012 and 2014. The total rate during this time period was driven managed care cost rates.

Figure 15. Cost per 1,000 member months associated with asthma-related emergency department visits by pay system and by year



Source: Minnesota Department of Human Services Data Warehouse

Discussion

The national guidelines for asthma management outline four components of care that are required to achieve and maintain asthma control: (1) assessment and monitoring of asthma by a healthcare provider, (2) partnership between the patient/caregiver and the health care provider that includes providing asthma self-management education, (3) control of environmental triggers and comorbid conditions and (4) medications. On a population level, comprehensive asthma care starts with guidelines-based care for everyone who has asthma and more individualized care for those with poorly controlled asthma, as evidenced by ongoing symptoms. This individualized care can include intensive asthma self-management education which can take place both inside and outside of the clinic (e.g., at home or school) and home-based care to address asthma triggers in the home (such as mold, secondhand smoke and pests). Managing asthma includes seeing a health care provider at least 1-2 times a year, taking asthma medications as prescribed and decreasing or eliminating exposure to triggers at home, work or school.

Asthma Prevalence

The finding of the highest asthma prevalence in the program with lowest income eligibility requirements is consistent with previous research showing that asthma prevalence is highest among those with lowest incomes. This is also consistent with previous MDH reports on asthma among MHCP beneficiaries.[8]

Similarly, when the income eligibility requirements for a program change, the prevalence of asthma in that program may change. This may explain the small decrease in the prevalence of asthma in the Family & Children Managed Care program observed between 2013 and 2014 that occurred with the 2014 Medicaid expansion that raised the income level for eligibility (see Health Care Utilization and Costs of Care). It is also possible that this decline could be explained by the fact that the new beneficiaries that came with the expansion had not previously had health insurance and thus may have been less likely to have had any health care claims related to asthma.

It is important to note that the estimates of asthma prevalence included in this report apply only to the subset of MHCP beneficiaries who were continuously enrolled for 11 or more months in the year. This continuous enrollment criteria is necessary because the definition of asthma is based on claims for hospitalizations, ED visits or prescription medications occurring during the year. If an individual was only enrolled for a shorter time period, they would have a shorter period of eligibility for a claim and thus a lower likelihood of meeting the “Any” or “Persistent” asthma definitions, regardless of whether or not they truly had asthma.

The percentage of beneficiaries who were continuously enrolled in a program ranged from 16% in MinnesotaCare to 32% in Family & Children Fee-For-Service in 2014. The remarkably low percentage for MinnesotaCare in 2014 is due to the movement of beneficiaries between programs related to Medicaid expansion that year.

Quality of Care

MinnesotaCare beneficiaries scored higher on the Asthma Medication Ratio measure than beneficiaries in the Family & Children

Managed Care and Fee-For-Service programs. This means that they were more likely to have been prescribed and to have filled the appropriate ratio of long-term controller to quick reliever medication.

MinnesotaCare beneficiaries also scored higher on the Medication Management for People with Asthma (MMA) quality of care measures than beneficiaries of the other programs. While the MMA measures are consistent with the guidelines-based recommendation for use of long-term controller medications by most patient with asthma, there is some evidence that the MMA measures are not associated with improved outcomes (i.e., fewer asthma ED visits, hospitalizations and quick reliever medication use). [9]

These quality of care measures assess different aspects of appropriate medication use for asthma. Since these measures are based on claims data (i.e., payment for prescriptions filled), they are indicators of a combination of two factors: health care provider prescribing practices and patient/caregiver prescription-filling practices. Provider knowledge of the national guidelines for asthma management may be a barrier to the former while lack of transportation may be a barrier to the latter. The substantial differences in the quality of care scores between the Family & Children and MinnesotaCare programs point to income-related barriers to accessing asthma medication as a major driver.

Health Care Utilization and Costs of Care

Although the counts of asthma-related hospitalizations and ED visits were lower in fee-for-service compared to managed care, hospitalization and ED visit rates were higher in fee-for-service. The lower total number of beneficiaries in fee-for-service compared to managed care could be the reason for the difference in utilization counts. Although the number of beneficiaries are fewer, fee-for-service beneficiaries are usually in poorer health compared to managed care beneficiaries, which might explain the higher hospitalization and ED visit rates observed in fee-for-service.

The noticeable 2013 decline in managed care utilization and cost rates could be due to MN state government requirements for managed care organizations (MCO) and/or individual MCO initiatives. For instance, the MN state government requires DHS to withhold a portion of each capitation payment paid to MCOs. DHS then gives back the withheld funds to the MCO based upon the MCO achieving certain quality goals, as defined in each DHS-MCO contract. Several quality goals relate to hospitalizations and ED visits. In addition, for 2013, many MCOs developed Performance Improvement Projects (PIPs) focused on increasing spirometry testing. A spirometer is a device used to measure lung function and is a key tool used in diagnosing asthma. Consequently, increased spirometry testing could have resulted in improved asthma management resulting in fewer and less costly managed care hospitalizations and ED visits.

The noticeable 2014 increase in managed care utilization and cost rates could be due to the Medicaid expansion under the Affordable Care Act (ACA). Starting January 1, 2014 Medicaid was expanded to include adults without children, parents and caretakers, and children 19 through 20 years of age with incomes up to 133 percent of the Federal Poverty Guideline (FPG); up from 75 percent of FPG for adults without children and up from 100 percent

of FPG for parents and caretaker, and children 19 through 20 years of age. Medicaid was also expanded to include children between the ages of 2 through 18 with income limits up to 275 percent of FPG; up from 150 percent of FPG.

For both hospitalizations and ED visits, the increase in costs seems to come from beneficiaries who were enrolled in an MHCP program in previous years but were not identified as having asthma until 2014. This group of beneficiaries fell into 4 categories. The first category, which represented the largest percent of beneficiaries for both hospitalizations and ED visits, included children between the ages of 6 and 17. The second category included children between the ages of 4 and 5. This group is unique in that an official asthma diagnosis usually does not happen until around age 5. Therefore, while these very young beneficiaries may have had continuous coverage prior to 2014, without being officially diagnosed with asthma until 2014, their breathing symptoms may have been less well managed in previous years. Consequently, hospitalizations and ED visits in 2014 for this group may have required more intensive, and therefore costly, medical care. The third category included adults who were eligible for an MHCP program for a reason other than being an adult without children. The fourth category, which represented the smallest percent of beneficiaries for both hospitalizations and ED visits, included adults without children. In the years before to the ACA expansion in 2014, beneficiaries in the first, third, and fourth categories may have experienced coverage gaps[1] because of income-based ineligibility. Coverage gaps may have resulted in limited access to medical care which may have resulted in less well managed asthma. As a result, hospitalizations and ED visits in 2014 for beneficiaries in these groups may have required more intensive, and therefore more costly, medical care.

Summary

Asthma continues to make a significant impact on Minnesotans covered by MHCP programs. Having asthma and experiencing uncontrolled asthma is more common among those with the lowest incomes, as is lower quality of care for asthma, driven by both medical and non-medical factors. While rates of asthma hospitalizations and the associated costs have been declining, ED visits for asthma and their associated costs have been increasing over time.

The findings in this report are important because they point to opportunities for improvements in asthma care for MHCP beneficiaries. Comprehensive asthma care requires increased attention to:

- Guidelines-based care for asthma, especially among beneficiaries in the Family & Children Managed Care program;
- Patients with uncontrolled asthma;
- And non-medical factors that might impact a patient's ability to manage asthma, such as access to primary care, access to transportation to medical appointments or to the pharmacy, housing quality, psychosocial stress and secondhand smoke in multifamily housing.

[1] The coverage gaps could also explain why these beneficiaries were not identified as having asthma in previous years using a claim-based methodology.

References

1. Hughes, H.K., et al., Pediatric Asthma Health Disparities: Race, Hardship, Housing, and Asthma in a National Survey. Acad Pediatr, 2017. 17(2): p. 127-134.
2. Beck, A.F., et al., Role of financial and social hardships in asthma racial disparities. Pediatrics, 2014. 133(3): p. 431-9.
3. Dombkowski, K.J., E.A. Wasilevich, and S.K. Lyon-Callo, Pediatric asthma surveillance using Medicaid claims. Public Health Rep, 2005. 120(5): p. 515-24.
4. Dombkowski, K.J., et al., Asthma surveillance using Medicaid administrative data: a call for a national framework. J Public Health Manag Pract, 2009. 15(6): p. 485-93.
5. Zablotsky, B. and L.I. Black, Concordance between survey reported childhood asthma and linked Medicaid administrative records. J Asthma, 2018. 17:1-11. doi: 10.1080/02770903.2018.1455854. [Epub ahead of print]
6. NCQA. HEDIS Measures of Care. [cited 2017 March 14, 2017]; Available from: http://www.ncqa.org/report-cards/health-plans/state-of-health-care-quality/2016-table-of-contents/sohc-hedis-measures-of-care.
7. National Heart, L., and Blood Institute, National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. 2007.
8. Minnesota Department of Health Asthma Program, Asthma Among Minnesota Health Care Program Enrollees, 2013.
9. Crans Yoon, A., et al., The HEDIS Medication Management for People with Asthma Measure is Not Related to Improved Asthma Outcomes. J Allergy Clin Immunol Pract, 2015. 3(4): p. 547-52.

Technical Appendix

Health Care Utilization and Costs of Care Analysis Technical Information

Reporting is restricted to 2012 to 2014 years for two reasons. First, the quality of managed care data drastically improved starting in 2012. Second, during 2015 DHS switched from the ICD-CM-9 coding system to the ICD-CM-10 coding system. Reporting 2012 to 2014 results allowed for consistency in data quality and coding standards.

Diagnosis code (International Classification of Disease-Clinical Modification version 9 (ICD-CM-9), pharmacy data, cost-of-care, and other data related to medical services and supplies were used to define asthma-related health care utilization.

Definitions

Asthma: A hospitalization or ED visit was considered asthma-related if asthma was listed as the principal diagnosis (ICD-CM-9 code=493XX). For the purpose of this report, only beneficiaries with confirmed asthma were included. A beneficiary in any MHCP was considered to have confirmed asthma if they satisfied the "Any Asthma" definition on page 6.

Hospitalizations: Hospitalizations were identified according to revenue code. Hospitalizations had either a room and board revenue code (010X – 017X) or care-type revenue code (019X, 020X, 021X).

ED visits: ED visits were identified according to a combination of revenue code (0450, 0451, 0452, 0456 and 0459) and place of service (hospital). In addition, only ED visits that did not result in hospitalizations were included in ED counts, to avoid over-counting.

Pay system: ED and Inpatient claims were either classified as fee-for-service or as managed care based on the source of the claims data. In brief, managed care pay system included claims submitted by one of the seven (Blue Plus, Medica, Hennepin Health, Itasca Medical Care, South Country Health Alliance, UCare, and Metropolitan Health Plan) health insurance organizations (contracted by DHS). All other claims were classified as fee-for-service. For this report, a beneficiary with an asthma-related hospitalization or ED visit was categorized into either fee-for-service or managed care system based on the health care claims data associated with that ED or hospital claim. For other beneficiaries with confirmed asthma, pay system was determined based on their enrollment data as of December of the year.

Data Tables

Table 6. Total Number of Beneficiaries by Program and Year

	2011	2012	2013	2014
Family & Children Managed Care	315,827	330,406	325,335	566,758
Family & Children Fee-For-Service	227,239	193,868	195,785	235,093
MinnesotaCare	118,097	112,376	126,580	44,652
Total	661,163	636,650	647,700	846,503

Source: Minnesota Department of Human Services Data Warehouse

Table 7. Number of Beneficiaries Meeting Continuous Enrollment Criteria by Socio-Demographic Characteristics, 2014

	Family & Children Managed Care	Family & Children Fee-For-Service	MinnesotaCare
Age Group			
5-11	96,601	24,248	45
12-18	74,534	22,213	24
19-50	124,857	43,366	10,161
51-64	29,023	22,655	5,114
Sex			
Female	183,195	56,555	9,645
Male	141,820	55,927	5,699
Race/Ethnicity			
Asian-Pacific Islander	26,201	5,641	926
Black	77,290	18,683	1,018
Hispanic	29,497	6,196	318
Native American	12,325	8,457	307
White	14,505	3,284	1,762
Unknown	165,197	70,221	11,013
Region			
Central	43,867	16,312	2,554
Metro	181,318	51,959	6,986
Northeast	21,705	8,950	1,345
Northwest	11,545	6,917	744
South Central	14,689	6,586	803
Southeast	24,885	10,297	1,257
Southwest	13,719	6,015	781

	Family & Children Managed Care	Family & Children Fee-For-Service	MinnesotaCare
West Central	13,281	5,443	869

Source: Minnesota Department of Human Services Data Warehouse

Table 8. Number and Percentage of Beneficiaries With "Any Asthma", 2014[1]

	Family & Children Managed Care		Family & Children Fee-For-Service		MinnesotaCare	
Age Group	#	%	#	%	#	%
5-11	9,266	9.6%	2,072	8.5%	7	0.2%[a]
12-18	6,967	9.3%	1,918	8.6%	5	0.2%[a]
19-50	10,251	8.2%	2,960	6.8%	694	6.8%
51-64	1,648	5.7%	917	4.0%	299	5.8%
Sex						
Female	16,290	8.9%	4,166	7.4%	742	7.7%
Male	11,842	8.4%	3,701	6.6%	263	4.6%
Race/Ethnicity						
Asian-Pacific Islander	1,047	4.0%	263	4.7%	25	2.7%
Black	8,811	11.4%	1,983	10.6%	68	6.7%
Hispanic	2,652	9.0%	482	7.8%	28	8.8%
Native American	1,224	9.9%	582	6.9%	31	10.1%
White	1,217	8.4%	242	7.4%	109	6.2%
Unknown	13,181	8.0%	4,315	6.1%	744	6.8%
Region						
Central	3,341	7.6%	1,082	6.6%	164	6.4%
Metro	17,690	9.8%	4,219	8.1%	507	7.3%
Northeast	1,619	7.5%	524	5.9%	94	7.0%
Northwest	686	5.9%	373	5.4%	28	3.8%
South Central	1,114	7.6%	425	6.5%	48	6.0%
Southeast	1,798	7.2%	588	5.7%	79	6.3%
Southwest	968	7.1%	323	5.4%	39	5.0%
West Central	916	6.9%	332	6.1%	46	5.3%

Source: Minnesota Department of Human Services Data Warehouse

[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.

[a]Percentage is based on numerator less than 20 and may be unreliable.

Table 9. Number and Percentage of Beneficiaries Meeting the Definition of Persistent Asthma, 2014[1]

	Family & Children Managed Care		Family & Children Fee-For-Service		MinnesotaCare	
Age Group	#	%	#	%	#	%
5-11	4,329	4.5%	1,029	4.2%	[a]	-
12-18	2,911	3.9%	961	4.3%	0	0%
19-50	5,598	4.5%	1,286	3.0%	370	3.6%
51-64	1,135	3.9%	383	1.7%	194	3.8%
Sex						
Female	7,990	4.4%	1,852	3.3%	421	4.4%
Male	5,983	4.2%	1,807	3.2%	144	2.5%
Race/Ethnicity						
Asian-Pacific Islander	467	1.8%	117	2.1%	18	1.9%[b]
Black	4,121	5.3%	929	5.0%	36	3.5%
Hispanic	1,146	3.9%	204	3.3%	17	5.3%[b]
Native American	618	5.0%	279	3.3%	17	5.5%[b]
White	631	4.4%	128	3.9%	71	4.0%
Unknown	6,990	4.2%	2,002	2.9%	406	3.7%
Region						
Central	1,755	4.0%	518	3.2%	89	3.5%
Metro	8,421	4.6%	1,846	3.6%	280	4.0%
Northeast	829	3.8%	274	3.1%	57	4.2%
Northwest	365	3.2%	178	2.6%	14	1.9%[b]
South Central	585	4.0%	206	3.1%	29	3.6%
Southeast	1,016	4.1%	327	3.2%	49	3.9%
Southwest	499	3.6%	155	2.6%	19	2.4%[b]
West Central	503	3.8%	154	2.8%	28	3.2%

Source: Minnesota Department of Human Services Data Warehouse

[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.

[a]Numerator is less than 5; percentage not reported.

[b]Percentage is based on numerator less than 20 and may be unreliable.

Table 10. Percentage of Beneficiaries With "Any Asthma" in Family & Children Managed Care by Sociodemographic Characteristics and Year[1]

Age Group	2011	2012	2013	2014
5-11 years	10.0%	10.2%	10.1%	9.6%
12-18 years	9.3%	9.6%	9.7%	9.3%

Age Group	2011	2012	2013	2014
19-50 years	8.3%	8.7%	8.8%	8.2%
51-64 years	5.8%	6.0%	5.9%	5.7%
Sex				
Female	9.1%	9.4%	9.4%	8.9%
Male	8.9%	9.1%	9.1%	8.4%
Race/Ethnicity				
Asian-Pacific Islander	3.6%	3.5%	3.7%	4.0%
Black	11.6%	12.2%	12.0%	11.4%
Hispanic	8.5%	9.2%	9.2%	9.0%
Native American	9.8%	9.9%	9.6%	9.9%
Unknown	8.5%	8.9%	9.2%	8.4%
White	8.5%	8.5%	8.6%	8.0%
Region				
Central	8.3%	8.5%	8.5%	7.6%
Metro	9.9%	10.4%	10.4%	9.8%
Northeast	7.8%	8.1%	7.7%	7.5%
Northwest	7.1%	6.2%	6.3%	5.9%
South Central	7.9%	7.6%	7.6%	7.6%
Southeast	8.0%	7.8%	7.8%	7.2%
Southwest	7.3%	7.1%	7.1%	7.1%
West Central	7.2%	7.1%	6.8%	6.9%

Source: Minnesota Department of Human Services Data Warehouse
[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.

Table 11. Percentage of Beneficiaries With "Any Asthma" in Family & Children Fee-For-Service by Socio-Demographic Characteristics and Year[1]

Age Group	2011	2012	2013	2014
5-11 years	9.8%	10.0%	9.4%	8.5%
12-18 years	9.1%	9.2%	9.5%	8.6%
19-50 years	7.3%	7.0%	6.9%	6.8%
51-64 years	4.6%	4.2%	4.2%	4.0%
Sex				
Female	8.2%	7.9%	7.7%	7.4%
Male	6.1%	6.7%	6.8%	6.6%

Age Group	2011	2012	2013	2014
Race/Ethnicity				
Asian-Pacific Islander	6.0%	5.4%	5.5%	4.7%
Black	11.4%	12.0%	12.0%	10.6%
Hispanic	7.1%	8.8%	8.1%	7.8%
Native American	6.8%	6.6%	6.4%	6.9%
Unknown	8.2%	9.2%	8.5%	7.4%
White	6.1%	6.2%	6.1%	6.1%
Region				
Central	6.8%	7.3%	7.0%	6.6%
Metro	8.3%	8.6%	8.6%	8.1%
Northeast	6.4%	6.2%	6.1%	5.9%
Northwest	5.1%	5.2%	4.9%	5.4%
South Central	6.0%	5.9%	5.8%	6.5%
Southeast	5.4%	5.2%	5.4%	5.7%
Southwest	5.1%	5.3%	5.3%	5.4%
West Central	6.2%	6.2%	5.8%	6.1%

Source: Minnesota Department of Human Services Data Warehouse
[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.

Table 12. Percentage of Beneficiaries With "Any Asthma" in MinnesotaCare by Socio-Demographic Characteristics and Year[1]

Age Group	2011	2012	2013	2014
5-11 years	8.8%	8.6%	8.1%	0.2%[a]
12-18 years	8.1%	8.4%	8.4%	*0.2%*[a]
19-50 years	6.9%	6.9%	6.7%	6.8%
51-64 years	5.6%	5.4%	5.6%	5.8%
Sex				
Female	7.6%	7.7%	7.4%	7.7%
Male	6.6%	6.5%	6.6%	4.6%
Race/Ethnicity				
Asian-Pacific Islander	4.6%	4.5%	5.0%	2.7%
Black	10.0%	9.2%	9.1%	6.7%
Hispanic	9.3%	9.2%	9.1%	8.8%
Native American	11.8%	10.3%	9.6%	10.1%

Age Group	2011	2012	2013	2014
Unknown	7.2%	7.3%	7.5%	6.2%
White	6.9%	7.0%	6.7%	6.8%
Region				
Central	6.8%	6.8%	6.6%	6.4%
Metro	8.0%	8.1%	8.1%	7.3%
Northeast	6.5%	7.0%	6.7%	7.0%
Northwest	5.2%	4.8%	4.8%	3.8%
South Central	6.7%	6.2%	6.2%	6.0%
Southeast	7.4%	6.8%	6.7%	6.3%
Southwest	6.2%	6.4%	5.2%	5.0%
West Central	5.9%	5.8%	5.1%	5.3%

Source: Minnesota Department of Human Services Data Warehouse
[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.
[a]Percentage is based on numerator less than 20 and may be unreliable.

Table 13. Percentage of Beneficiaries With "Persistent Asthma" in Family & Children Managed Care by Socio-Demographic Characteristics and Year[1]

Age Group	2011	2012	2013	2014
5-11 years	4.8%	4.9%	4.6%	4.5%
12-18 years	4.3%	4.5%	4.3%	3.9%
19-50 years	4.8%	5.0%	5.0%	4.5%
51-64 years	4.0%	4.2%	4.1%	3.9%
Sex				
Female	4.7%	4.9%	4.8%	4.4%
Male	4.5%	4.7%	4.6%	4.2%
Race/Ethnicity				
Asian-Pacific Islander	1.7%	1.7%	1.7%	1.8%
Black	5.6%	5.8%	5.7%	5.3%
Hispanic	3.9%	4.3%	4.1%	3.9%
Native American	5.2%	5.4%	5.1%	5.0%
Unknown	4.4%	4.4%	4.4%	4.4%
White	4.7%	4.9%	4.7%	4.2%
Region				
Central	4.5%	4.6%	4.4%	4.0%

Source: Minnesota Department of Human Services Data Warehouse
[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.

Table 14. Percentage of Beneficiaries Meeting the Definition of "Persistent Asthma" in Family & Children Fee-For-Service by Socio-Demographic Characteristics and Year[1]

Age Group	2011	2012	2013	2014
5-11 years	5.3%	5.6%	4.8%	4.2%
12-18 years	5.0%	4.9%	4.7%	4.3%
19-50 years	3.3%	3.1%	2.9%	3.0%
51-64 years	2.2%	1.9%	1.8%	1.7%
Sex				
Female	3.9%	3.7%	3.4%	3.3%
Male	3.1%	3.5%	3.2%	3.2%
Race/Ethnicity				
Asian-Pacific Islander	3.4%	2.8%	2.6%	2.1%
Black	6.0%	6.3%	5.7%	5.0%
Hispanic	3.9%	3.8%	3.4%	3.3%
Native American	3.4%	3.4%	3.3%	3.3%
Unknown	4.8%	5.0%	5.0%	3.9%
White	2.8%	2.9%	2.7%	2.9%
Region				
Central	3.5%	3.6%	3.3%	3.2%
Metro	4.0%	4.2%	3.8%	3.6%
Northeast	3.3%	3.3%	3.0%	3.1%
Northwest	2.5%	2.6%	2.6%	2.6%
South Central	2.9%	3.1%	3.0%	3.1%
Southeast	2.8%	2.7%	2.8%	3.2%

Age Group	2011	2012	2013	2014
Southwest	2.5%	2.5%	2.4%	2.6%
West Central	2.9%	3.3%	2.7%	2.8%

Source: Minnesota Department of Human Services Data Warehouse
[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.

Table 15. Percentage of Beneficiaries With "Persistent Asthma" in MinnesotaCare by Socio-Demographic Characteristics and Year[1]

Age Group	2011	2012	2013	2014
5-11 years	4.7%	4.3%	3.9%	[a]
12-18 years	4.2%	3.9%	3.7%	0%[b]
19-50 years	4.2%	3.9%	3.8%	3.6%
51-64 years	4.0%	3.9%	3.8%	3.8%
Sex				
Female	4.5%	4.2%	4.0%	4.4%
Male	3.9%	3.7%	3.5%	2.5%
Race/Ethnicity				
Asian-Pacific Islander	1.9%	2.0%	2.2%	1.9%[c]
Black	4.9%	4.4%	4.3%	3.5%
Hispanic	5.4%	4.1%	4.0%	5.3%[c]
Native American	7.0%	5.6%	5.1%	5.5%[c]
Unknown	4.5%	4.2%	3.9%	4.0%
White	4.2%	4.0%	3.8%	3.7%
Region				
Central	4.0%	4.0%	3.7%	3.5%
Metro	4.5%	4.1%	4.0%	4.0%
Northeast	4.3%	4.3%	4.0%	4.2%
Northwest	3.4%	3.2%	2.9%	1.9%[c]
South Central	4.3%	3.5%	3.6%	3.6%
Southeast	4.6%	4.3%	4.1%	3.9%
Southwest	4.1%	4.4%	3.0%	2.4%[c]
West Central	3.2%	3.3%	2.8%	3.2%

Source: Minnesota Department of Human Services Data Warehouse
[1]Eligible population (Denominator) may not be the same as that for other asthma measures in this report due to slight variations in eligibility criteria.
[a]Numerator is less than 5; percentage not reported.
[b]Denominator is less than 50.
[c]Percentage is based on numerator less than 20 and may be unreliable.