

**Contributors:**

Erika Garcia, MA  
Sarah Lyon-Callo, MA, MS  
Michigan Department of Community Health

**Introduction:**

Indicators of asthma burden and management can be measured with Medicaid claims data and compared to the goals of therapy, as outlined by the national guidelines. This capability is unparalleled by other common data sources for asthma surveillance. The Michigan asthma surveillance system has harnessed the potential of this dataset to better understand the asthma burden and management for this special population.

The following chapter highlights trends in a variety of indicators, pointing to the ongoing disparities in severe asthma outcomes and disease management. Emergency department, hospitalizations, out-patient visits, and asthma medications are presented from 2005-2010.

**Data Source:**

Michigan Data Warehouse, Michigan Department of Community Health

**Key Recommendations:**

- Continue to evaluate trends in these indicators over time for this population.
- In light of these data, Michigan should strengthen current efforts to reduce asthma burden and improve asthma management by targeting interventions to the pediatric Medicaid population.

**Key Findings:**

Among All Children in Medicaid:

- The prevalence of persistent asthma among children in the Michigan Medicaid program increased 7.7%, from 5.1% in 2005 to 5.5% in 2010.
- The rate of asthma hospitalizations decreased 41.1%, from 38.8 per 10,000 in 2005 to 22.9 per 10,000 in 2010.
- Between 2005 and 2010, the rate of asthma emergency department visits remained statistical constant with a 2010 rate of 202.3 per 10,000.
- In 2010, higher asthma prevalence were experienced by black children compared to white children (6.2% vs. 5.3%), male compared to female children (6.4% vs. 4.6%), and children with rural residences compared to children with urban residences (5.8% vs. 5.5%).

**Key Findings Continued:**

- In general, asthma health disparities for children in Medicaid improved between 2005 and 2010, but some sizable differences still exist.
  - The rate of asthma emergency department visits was 1.42 times higher for male children when compared to female children, 3.19 times higher for black children when compared to white children, and 2.04 times higher for urban residents when compared to rural residents.
  - The rate of asthma hospitalizations was 1.56 times higher for male children when compared to female children, 3.06 times higher for black children when compared to white children, and 2.10 times higher for urban residents when compared to rural residents.

Among All Children in Medicaid with Persistent Asthma:

- All measures of health care utilization improved between 2005 and 2010.
  - Among children with persistent asthma, there was a 6.6% increase in the proportion with 2+ outpatient visits, a 5.7% decrease in the proportion with 1+ emergency department visits, a 9.5% decrease in emergency department reliance for primary care, a 43.2% decrease in the proportion with 1+ hospitalizations, and a 13.8% increase in spirometry.
- The asthma drug therapy indicators showed mixed changes between 2005 and 2010.
  - Among children with persistent asthma there was a 3.2% increase in the proportion with 1+ inhaled corticosteroid. In contrast, there was a 8.7% worsening in the proportion with 2+ oral corticosteroids.
  - The indicators for overuse of short acting beta agonists (SABA) and 1+ long-term control remained statistically constant.
- With one exception, male-female asthma disparities were unobserved in 2010 among children with persistent asthma.
  - Male children were 7.6% more likely than female children to have 2+ oral corticosteroids (2010).
- Most black-white asthma disparities among children with persistent asthma improved between 2005 and 2010, but many sizable differences still exist.
  - Black children compared to white children were 2.39 times more likely to have 1+ emergency department visit for asthma, 3.46 times more likely to have 2+ emergency department visits for asthma, 2.13 times more likely to rely on the emergency department for outpatient care, and

### Key Findings Continued:

- 2.40 times more likely to have a hospitalization (2010).
- Black children compared to white children were 8.5% less likely to have had 2+ outpatient visits, and 15.2% less likely to have had a long-term control prescription (2010).
- There were no statistical black-white differences on SABA overuse, 1+ inhaled corticosteroid, 2+ oral corticosteroids, and spirometry (2010).
- In general, urban-rural asthma disparities among children with persistent asthma improved or remained constant between 2005 and 2010, but some sizable differences still exist.
  - Urban residents when compared to rural residents were 1.96 times more likely to have had 1+ emergency department visits for asthma, 2.80 times more likely to have had 2+ emergency department visits for asthma, 1.60 times more likely to rely on the emergency department for outpatient care, and 2.08 times more likely to have had a hospitalization (2010).
  - Urban residents when compared to rural residents were 10% less likely to have had a long-term control medication, 19% more likely to have had 2+ oral corticosteroid, but 9% more likely to have had an inhaled corticosteroid (2010).
  - The proportion with 2+ outpatient visits improved for urban residents but worsened for rural residents, thus creating a slight urban-rural health disparity which did not previously exist (2005-2010). Urban residents were 16.9% more likely to have had 2+ outpatient visits when compared to rural residents in 2010.

### Methods:

From the Michigan Medicaid beneficiary and administrative claims data (2005-2010), the study population is identified by the following parameters within each year: children 17 years and younger, continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance. Within this population, the following indicators of total asthma burden were measured:

- Persistent asthma prevalence: in the year of the prevalence measurement year having (1)  $\geq 4$  asthma medication dispensing events OR (2)  $\geq 1$  emergency department visits where asthma was the primary diagnosis OR (3)  $\geq 1$  hospitalization where asthma was the primary diagnosis OR (4)  $\geq 4$  outpatient

### Methods Continued:

- visits where asthma was mentioned along with 2 asthma medication dispensing events.
- Prevalence of persistent asthma is the proportion of beneficiaries in the study population who meet the definition of persistent asthma above.
- Michigan's persistent asthma definition pulls from the National Committee for Quality Assurance 2009 HEDIS® indicator for Use of Appropriate Medications or People with Asthma. The same ICD-9-CM diagnosis codes, CPT, revenue, and NDC were used to define the study population, events, and dispensing events for asthma medications. However, the Michigan measurement does differ from the HEDIS® indicator thereby these report results are not strictly comparable.
- This report makes use of the most recent coding schema and improvements in the Michigan data warehouse and should not be compared with previously published 2001-2005 calculations. In particular: (a) Emergency department and hospitalizations are now counted only if asthma was the primary mention on a hospital claim as opposed to asthma as any mention regardless of facility type; (b) the age criteria changed from  $\leq 18$  to  $\leq 17$  for study inclusion, and; (c) revenue codes were used to classify institutional claims and procedure codes were used to classify professional claims.
- This report is sectioned into two components differing by population with calculations age adjusted to the 2000 US Standard Population. The two sections are: (a) indicators among all children in Medicaid and (b) indicators among children with persistent asthma in Medicaid.
- Asthma emergency department visits and hospitalizations events are defined as a visit occurring in a hospital with a primary diagnosis of asthma (ICD-9-CM=493.xx). These data represent the number of visits for asthma, not the number of persons with a particular type of event.
- Emergency department reliance is an indicator of outpatient utilization for asthma within an emergency department as opposed to in an outpatient setting. For those with at least one asthma outpatient or asthma emergency department visit, this indicator is calculated by dividing the total number of asthma emergency department visits by the sum of asthma emergency department visits plus asthma outpatient visits [EDcount/(EDcount + OPcount)].
- Urban/rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
- Both geographic (urban/rural, county) and demographic (age, race, sex) subpopulation analyses are conducted to identify differences. Confidence intervals were calculated to determine significance differences between groups and ratios are presented.

**Methods Continued:**

- Prevalence ratios and rates ratios are used to illustrate the disparity in asthma between different subpopulations. For example, the rate ratio comparing emergency department rates between black children and white children in 2010 is calculated by dividing the rate for black children (363.3) by the rate for white children (113.8) for a rate ratio of 3.19. A rate ratio of 1.0 indicates rates are the same. A rate ratio of 3.19 indicates that the rate among black children is more than 3 times the rate for white children. Prevalence ratios are calculated the same way except using proportions instead of rates.
- Maps generated using geographic information system (GIS) tools are used for visual display of the data and to identify areas of high burden (ArcGIS™, Environmental Systems Research Institute).

**Suggested Citation:**

Garcia, E and Lyon-Callo S. "Asthma Burden for Children in Medicaid." *Epidemiology of Asthma in Michigan*. Bureau of Epidemiology, Michigan Department of Community Health, 2012.

**Additional Information:**

For more information about the Asthma Initiative of Michigan go to [www.getastmahelp.org](http://www.getastmahelp.org) or call **1.866.EZLUNGS (1.866.395.8647)**.

This surveillance publication was supported by Cooperative Agreement Number U59/CCU517742-07 from the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the CDC.

**List of Figures**

State Level Data, Michigan, 2005 vs. 2010 ..... Page 5

Any Asthma vs. Persistent Asthma Among All Children in Medicaid..... Page 6

Prevalence of Persistent Asthma Among All Children in Medicaid ..... Page 7

Emergency Department Rate Among All Children in Medicaid ..... Page 10

Hospitalization Rate Among All Children in Medicaid ..... Page 13

Had 2+ Outpatient Visit Among Children in Medicaid with Persistent Asthma ..... Page 16

Had 1+ Asthma Emergency Department Visits Among Children in Medicaid with Persistent Asthma ..... Page 19

Had 2+ Asthma Emergency Department Visits Among Children in Medicaid with Persistent Asthma ..... Page 21

Emergency Department Reliance For Primary Care Among Children in Medicaid with Persistent Asthma ..... Page 25

Had 1+ Asthma Hospitalizations Among Children in Medicaid with Persistent Asthma..... Page 28

Short-Acting  $\beta$ -agonist Overuse Among Children in Medicaid with Persistent Asthma ..... Page 31

Had 1+ Long-term Control vs. Had 1+ Inhaled Corticosteroid Among Children in Medicaid  
 with Persistent Asthma..... Page 34

Had 1+ Inhaled Corticosteroid Medication Among Children in Medicaid with Persistent Asthma ..... Page 35

Had 1+ Long-Term Control Medication Among Children in Medicaid with Persistent Asthma..... Page 38

Had 2+ Oral Corticosteroid Medication Among Children in Medicaid with Persistent Asthma ..... Page 41

Had 1+ Spirometry Among Children in Medicaid with Persistent Asthma ..... Page 44

Managed Care and Fee-for-Service Enrollment Among Children in Medicaid with Persistent Asthma..... Page 47

Male-Female Asthma Disparities, State Level Data, Michigan, 2005 vs. 2010 ..... Page 48

Black-White Asthma Disparities, State Level Data, Michigan, 2005 vs. 2010 ..... Page 49

Urban-Rural Asthma Disparities, State Level Data, Michigan, 2005 vs. 2010 ..... Page 50

State Level Data, Michigan, 2005 to 2010..... Page 51

County Level Data Among All Children in Medicaid, Michigan, 2010..... Page 53

County Level Data Among Children in Medicaid with Persistent Asthma, Michigan, 2010..... Page 55

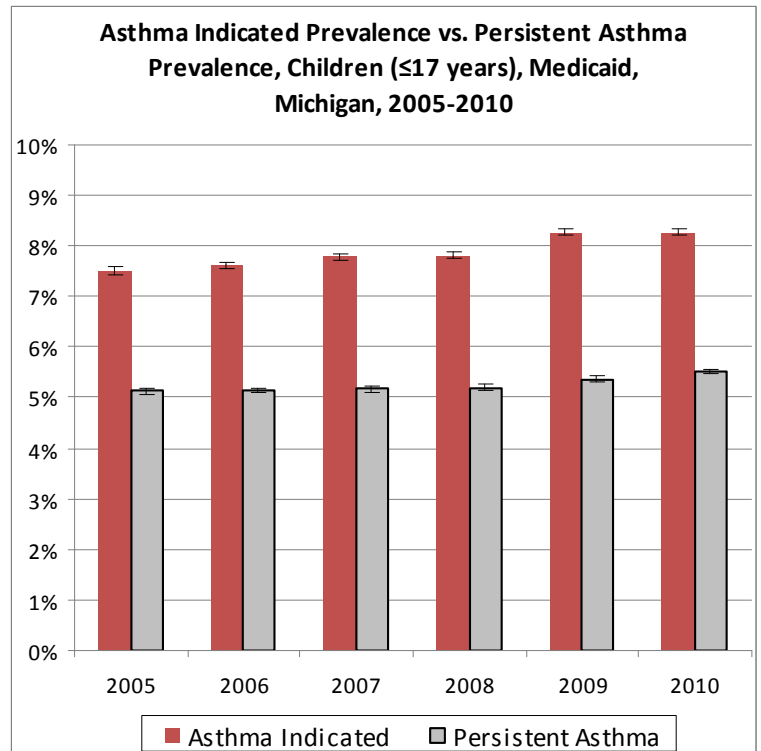
**Epidemiology of Asthma in Michigan  
Asthma Burden for Children in Medicaid**

Measures	2005	2010	% Change
<u>Among All Children in Medicaid</u>			
Persistent Asthma (%)	5.1 (5.1 - 5.2)	5.5 (5.5 - 5.6)	7.7
Emergency Department Rate Per 10,000	203.4 (200.0 - 206.9)	202.3 (199.1 - 205.6)	-
Hospitalization Rate Per 10,000	38.8 (37.3 - 40.3)	22.9 (21.8 - 24.0)	-41.1
<u>Among All Children in Medicaid with Persistent Asthma</u>			
Had 2+ Outpatient Visits (%)	26.9 (26.3 - 27.5)	28.7 (28.1 - 29.2)	6.6
Had 1+ Emergency Department Visit (%)	29.5 (28.9 - 30.1)	27.8 (27.3 - 28.4)	-5.7
Had 2+ Emergency Department (%)	6.5 (6.2 - 6.7)	6.0 (5.7 - 6.2)	-
Emergency Department Reliance For Primary Care (%)	31.8 (31.0 - 32.5)	28.7 (28.1 - 29.4)	-9.5
Had 1+ Hospitalizations (%)	6.4 (6.1 - 6.6)	3.6 (3.4 - 3.8)	-43.2
SABA Overuse (%)	12.8 (12.4 - 13.3)	13.0 (12.6 - 13.4)	-
Had 1+ Inhaled Corticosteriod (%)	65.2 (64.3 - 66.1)	67.3 (66.5 - 68.1)	3.2
Had 1+ Long Term Controller (%)	78.6 (77.7 - 79.6)	78.3 (77.5 - 79.2)	-
Had 2+ Oral Corticosteriod (%)	18.5 (18.0 - 18.9)	20.1 (19.7 - 20.5)	8.7
Had 1+ Spirometry (%)	10.0 (9.6 - 10.3)	11.4 (11.0 - 11.7)	13.8

Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

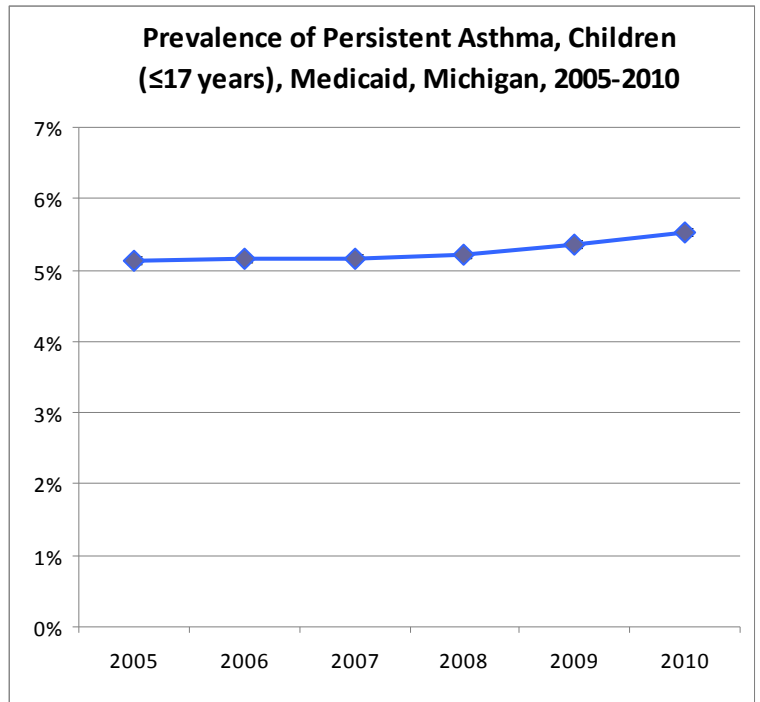
- Claims analysis algorithms are used to identify study populations within administrative datasets but are not confirmation of the disease. The asthma algorithm used in this report has the potential to undercount the number of children with asthma in Michigan Medicaid.
- *Asthma Indicated*: defined as at least one hospitalization OR at least one emergency department visit OR four dispensing events for asthma medications OR at least one outpatient visit.
- *Persistent Asthma*: defined as at least one hospitalization OR at least one emergency department visit OR four dispensing events for asthma medications OR four or more outpatient visit with 2 asthma dispensing events.
- The true 2010 asthma prevalence is likely between the *Asthma Indicated* prevalence of 8.3% and the *Persistent Asthma* prevalence of 5.5%.



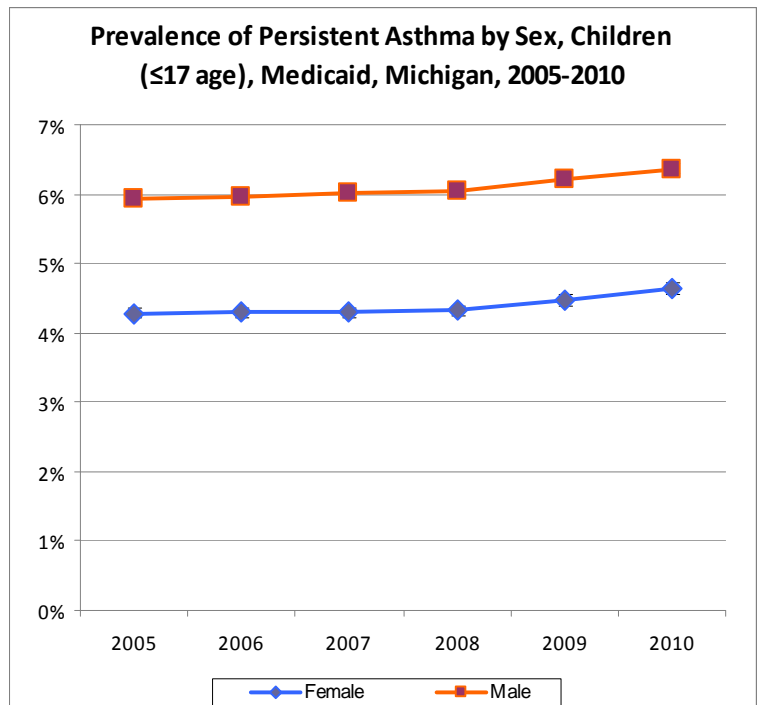
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- In 2010, about 39,700 children in the Michigan Medicaid program have health care utilization consistent with persistent asthma.
- The prevalence of persistent asthma among children in Medicaid increased from 5.1% in 2005 to 5.5% in 2010. This represents a 7.7% increase between 2005 and 2010.



- In 2010, about 23,500 male children and 16,159 female children in Medicaid have health care utilization consistent with persistent asthma.
- Between 2005 and 2010, the prevalence of persistent asthma children enrolled in Medicaid increased by 7.1% for male children and 8.5% for female children (males: 5.9% to 6.4%, females: 4.3% to 4.6%, respectively).
- Between 2005 and 2010, the prevalence of persistent asthma for male children is consistently about 40% higher compared to female children in Medicaid (prevalence ratio=1.39 and 1.37, respectively).

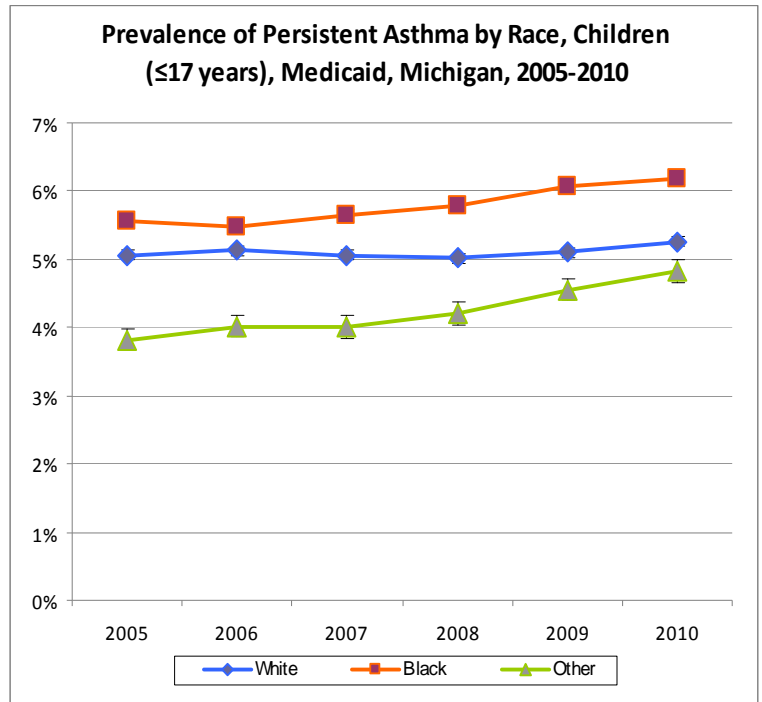


Data Notes: Source is the MDCH Data Warehouse

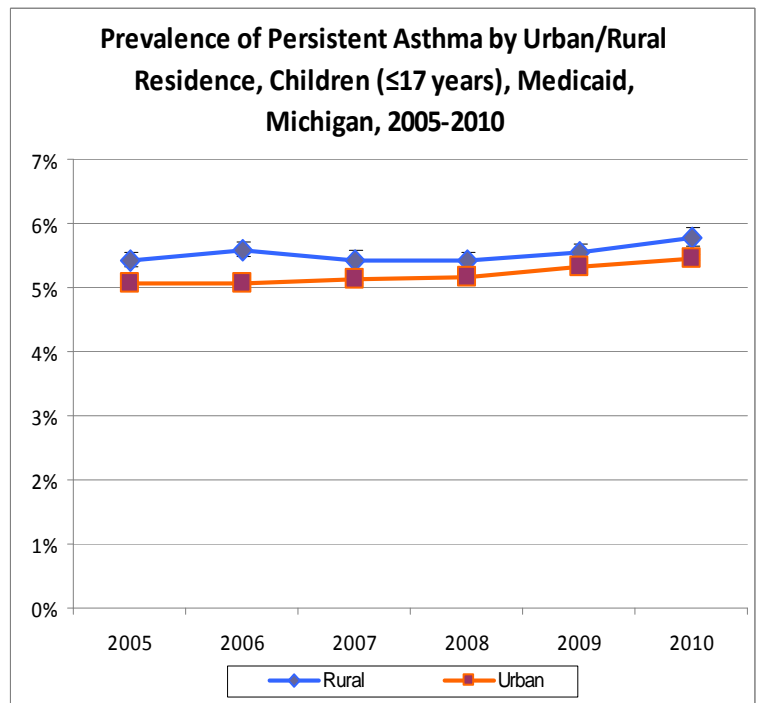
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.



- In 2010, about 20,700 white children, 15,000 black children, and 4,100 children of other races have health care utilization consistent with persistent asthma in Medicaid.
- Between 2005 and 2010, the prevalence of persistent asthma for children enrolled in Medicaid increased by 11.3% for black children, 4.0% for white children, and 26.2% for children of other races (blacks: 5.6% to 6.2%, whites: 5.1% to 5.3%, other: 3.8% to 4.8%, respectively).
- Black children were 9.9% more likely to have persistent asthma in 2005 when compared to white children. This disparity increased to 17.5% in 2010.



- About 32,500 of children with urban residence and 7,200 children with rural residence in Medicaid have health care utilization consistent with persistent asthma.
- Between 2005 and 2010, the prevalence of persistent asthma increased 6.5% for rural residents and 8.0% for urban residents (rural: 5.4% to 5.8%, urban: 5.1% to 5.5%, respectively).
- Rural residents were 6.8% more likely to have persistent asthma in 2005 compared to urban residents. This disparity decreased to 5.5% in 2010.



Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

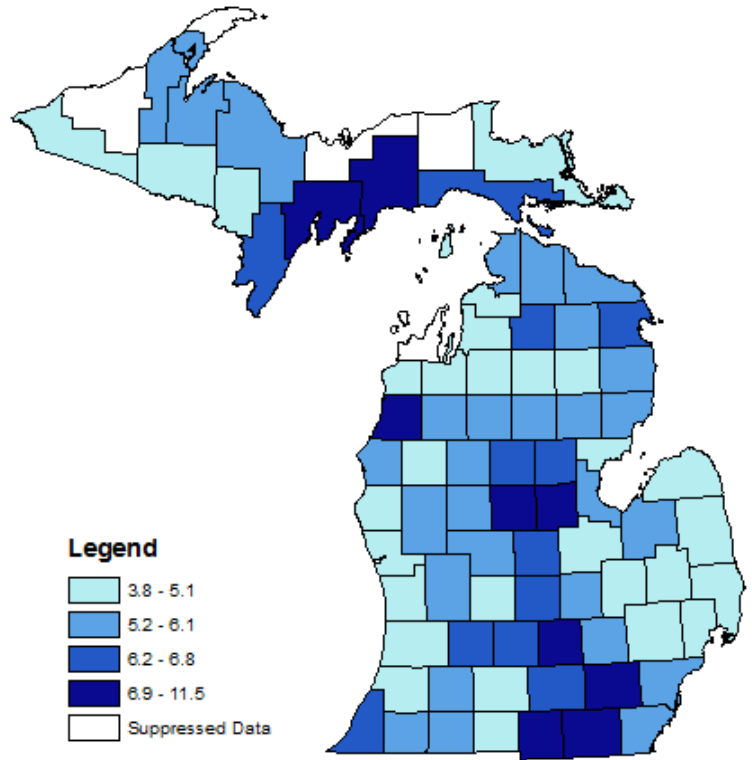


- Counties with the highest prevalence of persistent asthma for children in Medicaid are:

HILLSDALE	[11.5% (10.4 - 12.6)]
ISABELLA	[9.0% (8.0 - 10.1)]
DELTA	[8.4% (7.3 - 9.6)]
WASHTENAW	[7.8% (7.3 - 8.3)]
SCHOOLCRAFT	[7.5% (5.2 - 9.7)]
LENAWEE	[7.2% (6.5 - 7.8)]
INGHAM	[7.0% (6.6 - 7.4)]
MIDLAND	[7.0% (6.2 - 7.8)]
MANISTEE	[6.9% (5.6 - 8.2)]

Except for Schoolcraft, all listed counties had prevalences than the state prevalence of 5.5% (5.5 - 5.6).

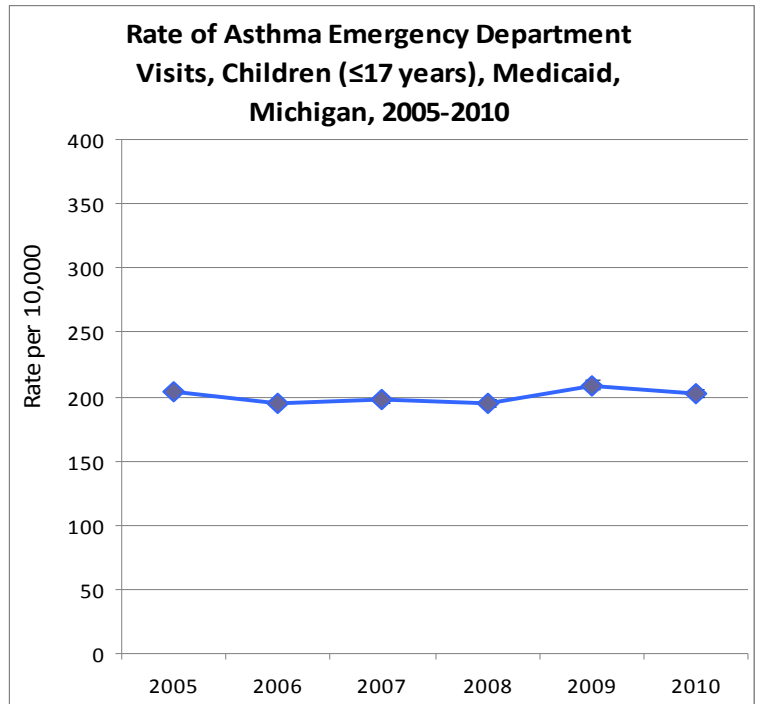
Prevalence of Persistent Asthma by County of Residence, Children (≤17 years), Medicaid, Michigan, 2010



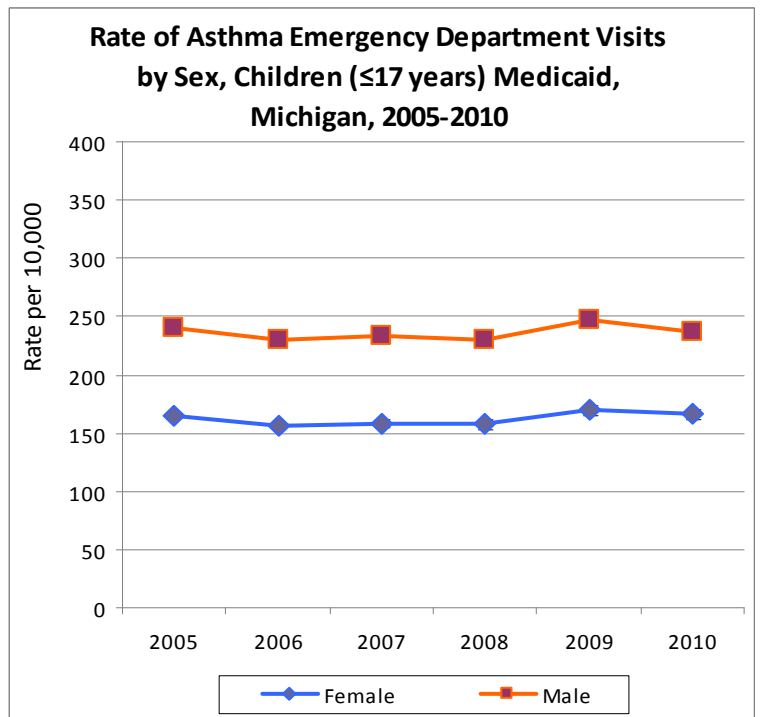
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- In 2010, the total number of asthma emergency department visits for children in Medicaid is 14,970, resulting in a rate of 202.3 per 10,000.
- The overall rate of asthma emergency department visits for children in Medicaid has remained statistically constant since 2005.



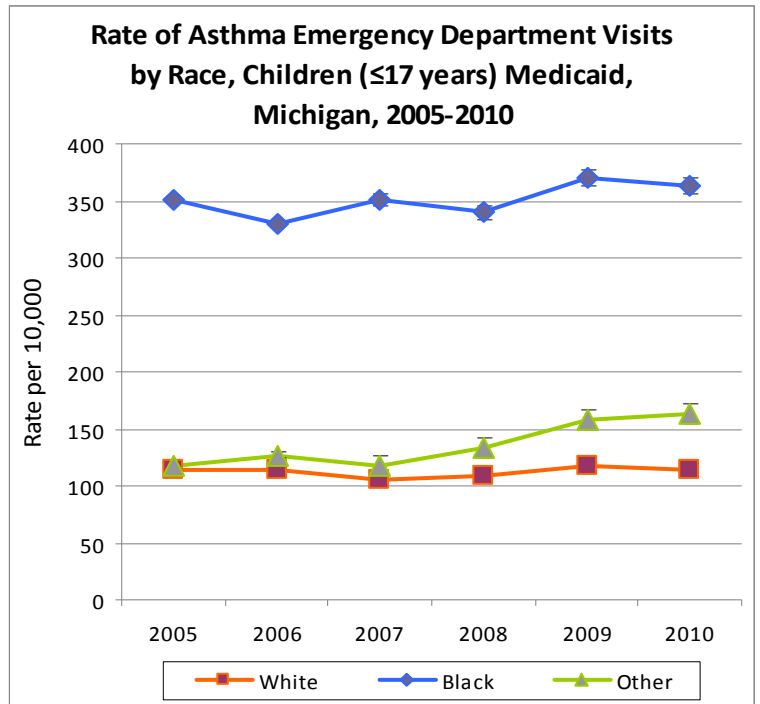
- Between 2005 and 2010, the rate in asthma emergency department visits for both male and female children in Medicaid remained statistically constant with a 2010 rate of 236.4 per 10,000 for males and 166.5 per 10,000 for females.
- Between 2005 and 2010, the rate of asthma emergency department visits for male children in Medicaid was about 45% higher when compared to female children in Medicaid (rate ratio=1.46 and 1.42, respectively).



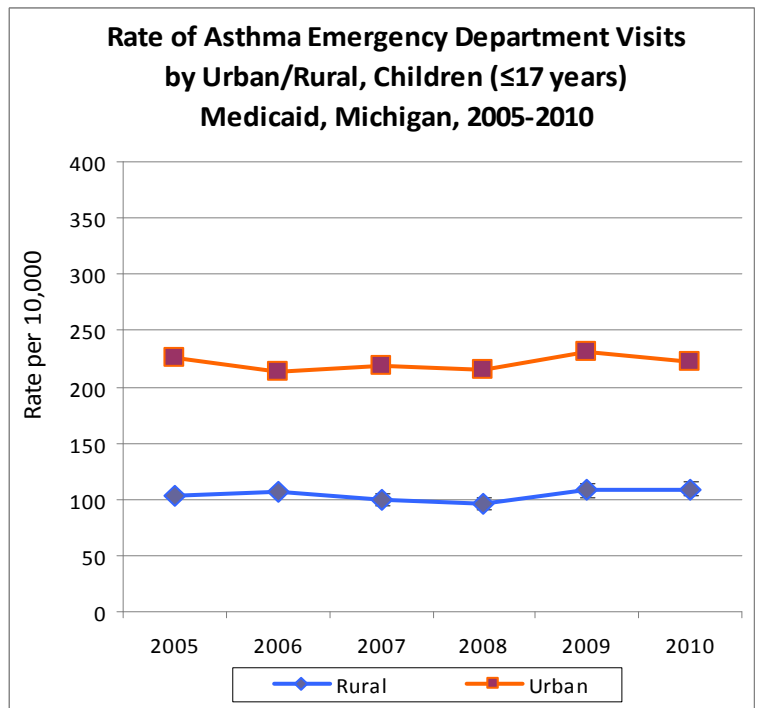
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- The rate of asthma emergency department visits for black and white children in Medicaid are both statistically constant from 2005 and 2010, with the rate increasing 39.7% for children of other races (black: 363.3 per 10,000, white: 113.8 per 10,000, other: 163.4 per 10,000 in 2010).
- Between 2005 and 2010, the rate of asthma emergency department visits is over three times higher for black children when compared to white children (rate ratio: 3.09 and 3.19, respectively)



- The trend in asthma emergency department visits for children with urban or rural residencies is statistically constant from 2005 and 2010, with a 2010 rate of 222.0 per 10,000 for urban residents and 108.9 per 10,000 for rural residents.
- Between 2005 and 2010, the rates of asthma emergency department visits for children with urban residents is over two times higher than the rate for children with rural residence (rate ratio=2.17 and 2.04, respectively).



Data Notes: Source is the MDCH Data Warehouse

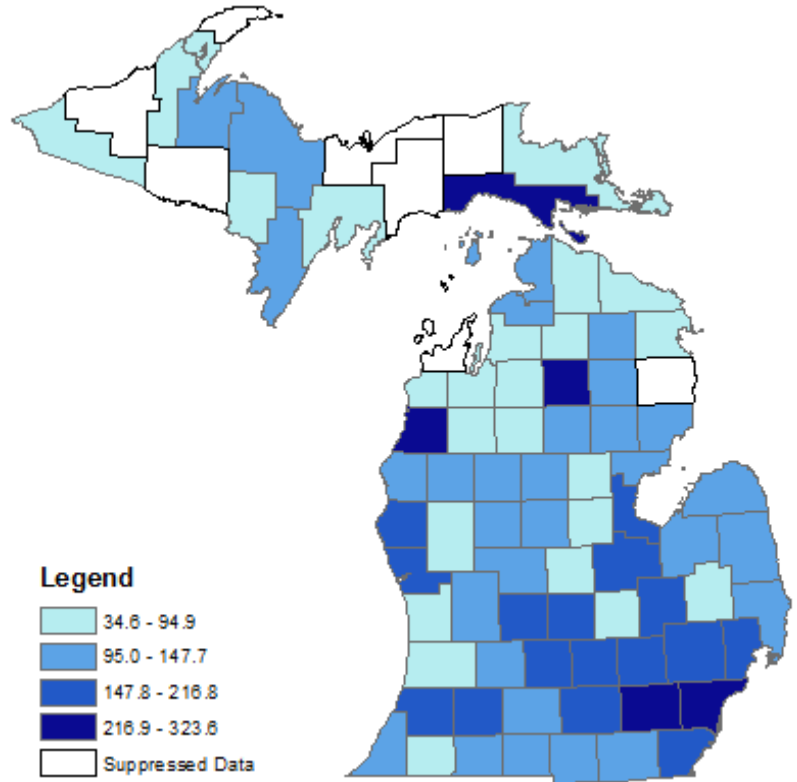
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Counties with the highest asthma emergency department visit rates per 10,000 for children in Medicaid are:

WAYNE	[323.6 (315.9 - 331.4)]
MACKINAC	[301.6 (165.3 - 437.9)]
WASHTENAW	[287.9 (260.2 - 315.6)]
MANISTEE	[246.6 (168.8 - 324.5)]
CRAWFORD	[232.7 (139.4 - 326.1)]

Only Wayne and Washtenaw have rates significantly higher than the state rate of 202.3 per 10,000 (199.1 - 205.6). This indicates the importance of these two counties in driving the state emergency department rate for the Medicaid population.

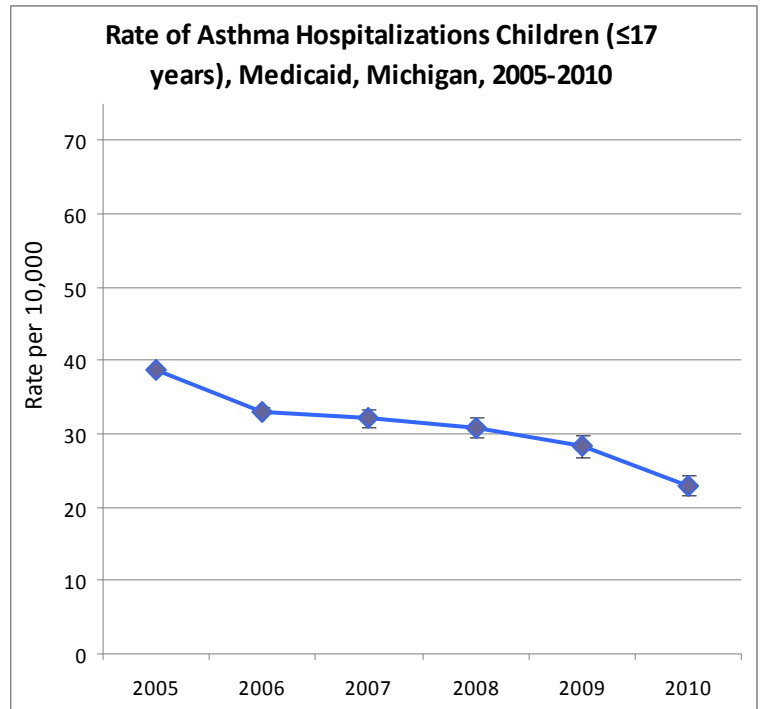
Rate of Asthma Emergency Department Visits per 10,000, by County of Residence, Children (≤17 years), Medicaid, Michigan, 2010



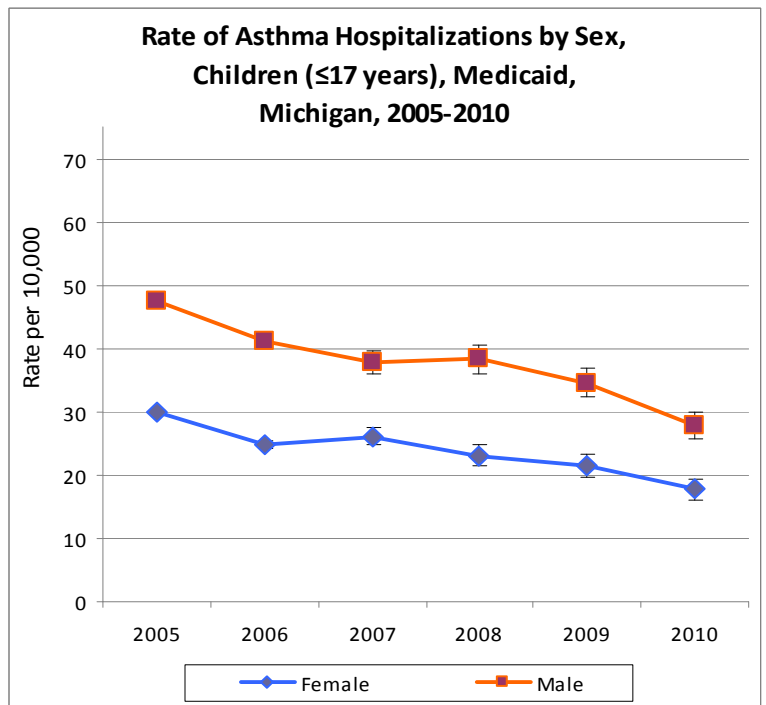
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- In 2010, the total number of asthma hospitalizations for children in Medicaid is 1,740.
- The 2010 asthma hospitalizations rate for children in Medicaid decreased from 38.8 per 10,000 in 2005 to 22.9 per 10,000 in 2010. This represents a 41.1% decrease between 2005 and 2010.



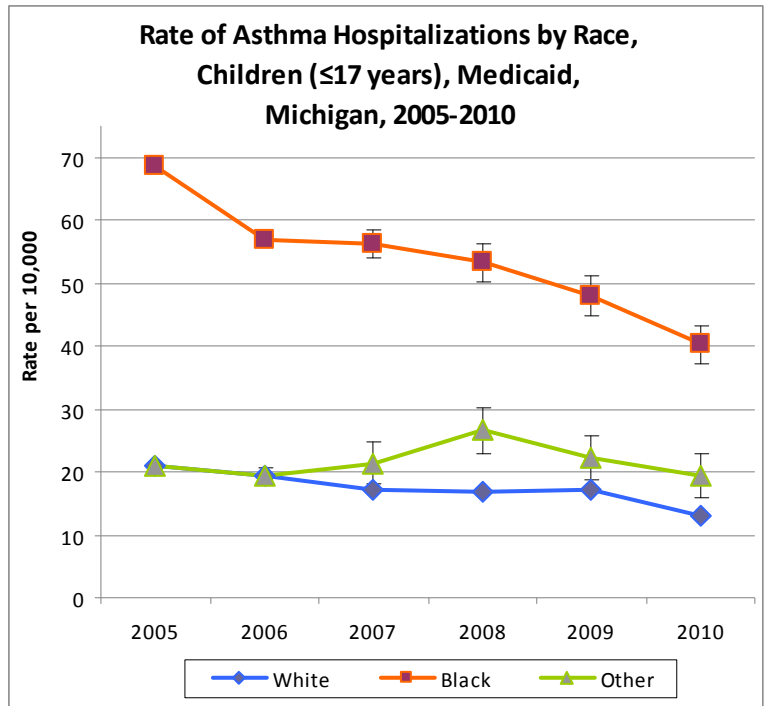
- Between 2005 and 2010, the asthma hospitalizations rate decreased 41.4% for male children and 40.6% for female children enrolled in Medicaid (males: 47.3% to 27.8%, females 29.9% to 17.8%, respectively).
- Between 2005 and 2010, the asthma hospitalizations rate for children in Medicaid is about 56% higher for male children when compared to female children (rate ratio=1.58 and 1.56, respectively).



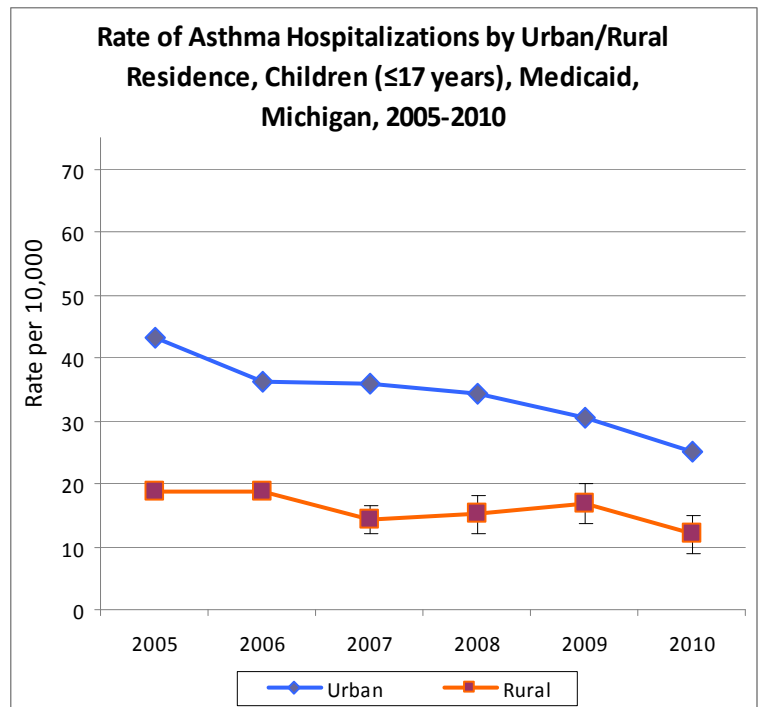
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Between 2005 and 2010, the asthma hospitalization rate in Medicaid decreased 41.3% for black children, 37.7% for white children, and remained statistically constant for children of other races (black: 68.6 to 40.3, whites 21.1 to 13.1, other: 21.0 to 19.4 per 10,000, respectively)
- Between 2005 and 2010, the asthma hospitalization rate for black children in Medicaid is over three times the rate for white children (rate ratio= 3.25 and 3.06, respectively).



- Between 2005 and 2010, the asthma hospitalization rate in Medicaid decreased 41.8% for urban residents and 35.7% for rural residents (urban: 43.3 to 25.2 per 10,000; rural: 18.6 to 12.0 per 10,000).
- Between 2005 and 2010, asthma hospitalization rate is over two times higher for urban residents when compared to rural residents (rate ratio=2.33 and 2.10, respectively).



Data Notes: Source is the MDCH Data Warehouse

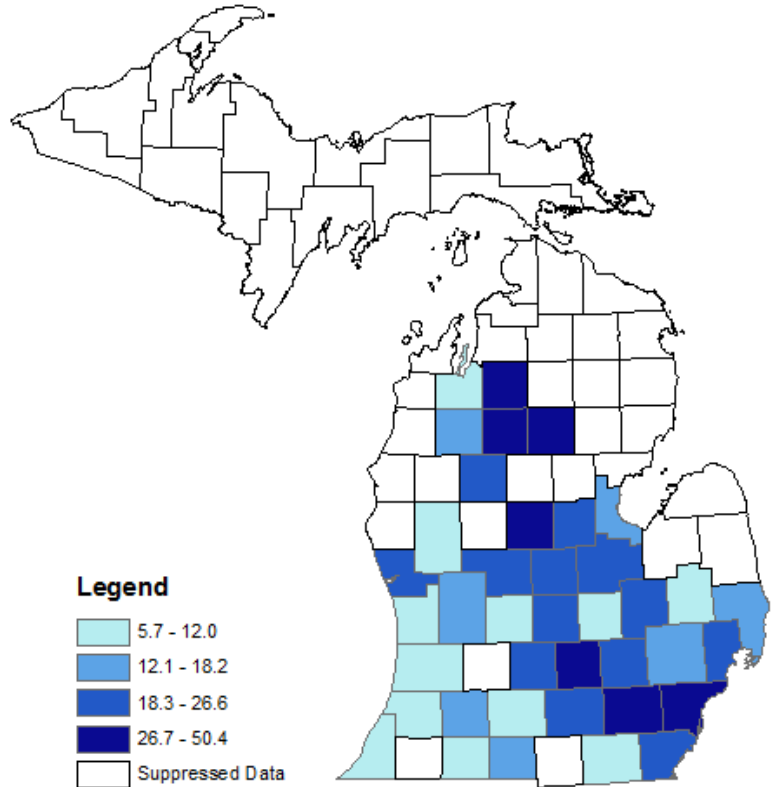
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

Rate of Hospitalizations per 10,000, by County of Residence, Children ( $\leq 17$  years), Medicaid, Michigan, 2010

- Counties with the highest asthma hospitalization rates per 10,000 for children in Medicaid are:

WASHTENAW	[50.4 (38.8 - 61.9)]
WAYNE	[37.5 (34.8 - 40.1)]
ISABELLA	[36.4 (16.9 - 55.9)]
MISSAUKEE	[36.3 (4.5 - 68.2)]
ROSCOMMON	[35.6 (9.2 - 62)]
INGHAM	[32.5 (24.8 - 40.2)]
KALKASKA	[30.9 (3.6 - 58.2)]

Only Wayne and Washtenaw have rates significantly higher than the state rate of 22.9 per 10,000 (21.8 - 24.0). This indicates the importance of these two counties in driving the state hospitalization rate for the Medicaid population.

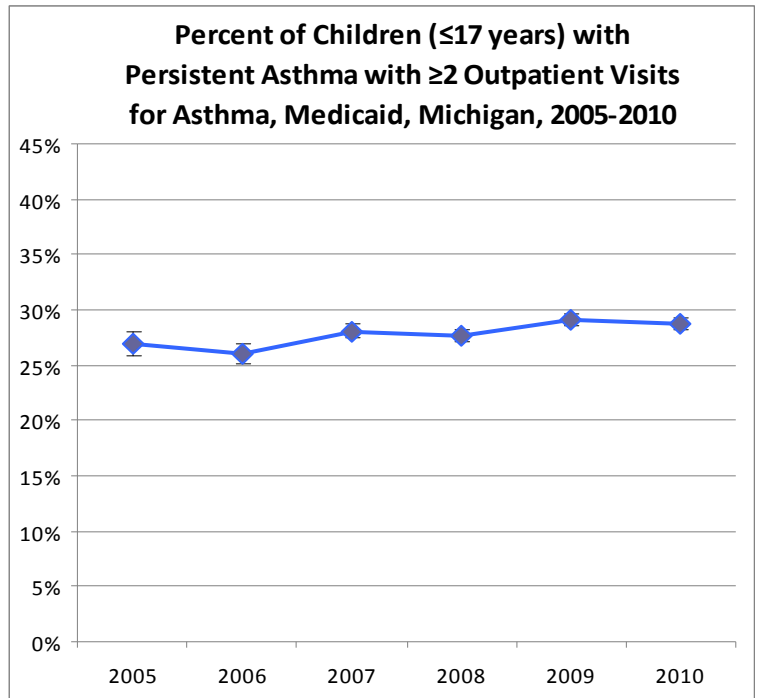


Data Notes: Source is the MDCH Data Warehouse

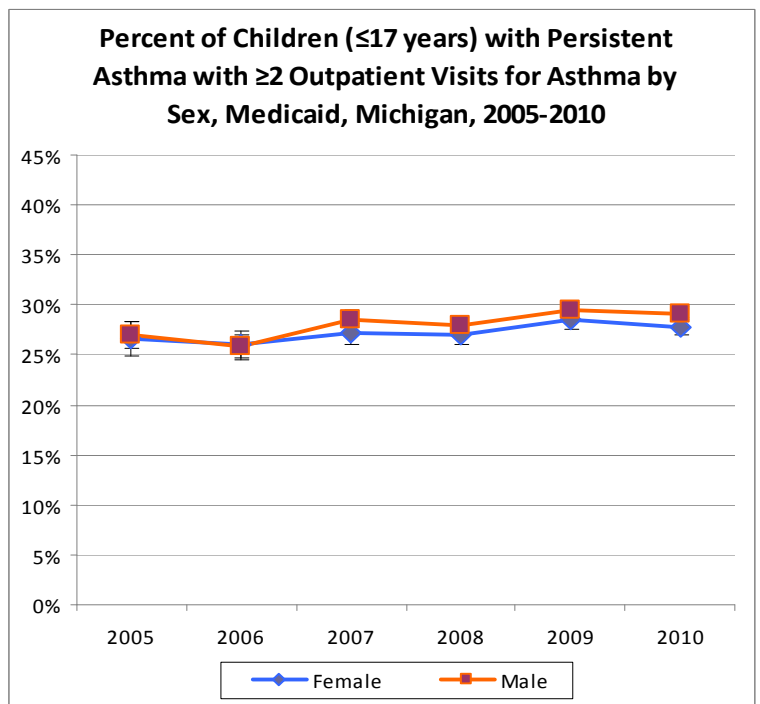
- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.



- According to national guidelines, persons with asthma should visit their primary care provider for routine asthma care at least twice a year.
- The proportion of children in Medicaid with persistent asthma with two or more outpatient visits increased from 26.9% in 2005 to 28.7% in 2010. This represents a 6.6% increase between 2005 and 2010.



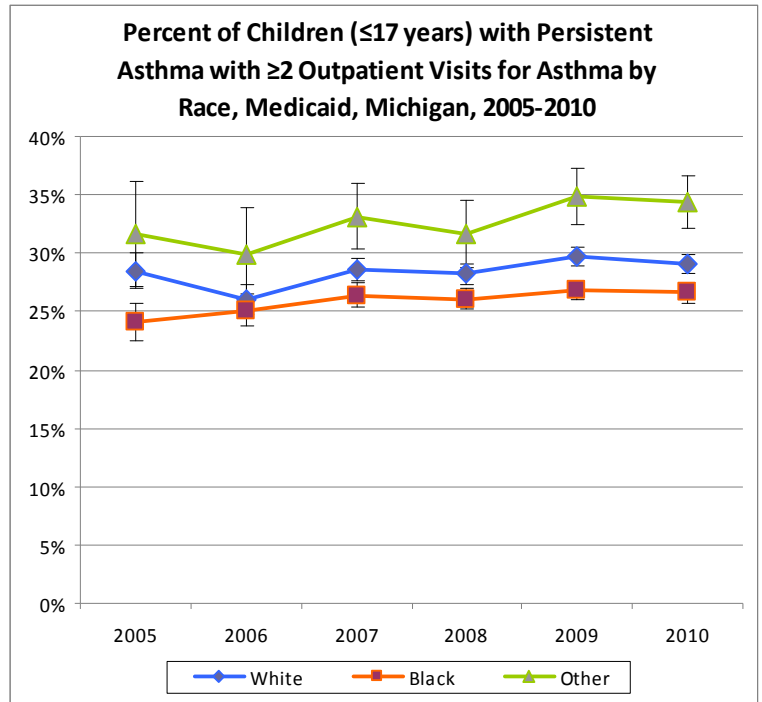
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with two or more outpatient visits for asthma did not differ by sex.
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with two or more outpatient visits for asthma increased 8.1% for males (27.0% to 29.2%). The prevalence remained statistically constant for females with a 2010 prevalence of 27.9%.



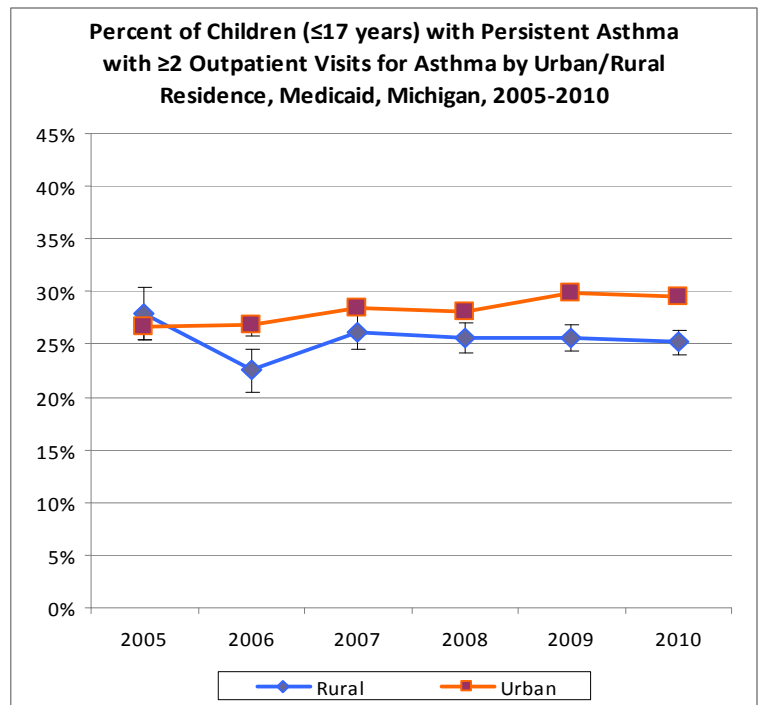
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Between 2005 and 2010, the proportion with two or more outpatient visits among those with persistent asthma increased 10.5% for black children (24.1% to 26.6%). The prevalences remained statistically constant for white children and children of other races (29.1% and 34.4% in 2010, respectively).
- Black children were 15.4% less likely to have two or more outpatient visits in 2005 when compared to white children. This disparity improved to 8.5% in 2010.



- Between 2005 and 2010, this indicator of outpatient care among children with persistent asthma improved 10.5% for urban residents while worsening 9.8% for rural residents (urban: 26.7% to 29.5%, rural: 27.9% to 25.2%, respectively).
- In 2010, urban residents when compared to rural residents were 16.9% more likely to have two or more outpatient visits. There was no urban-rural disparity on this measure in 2005.



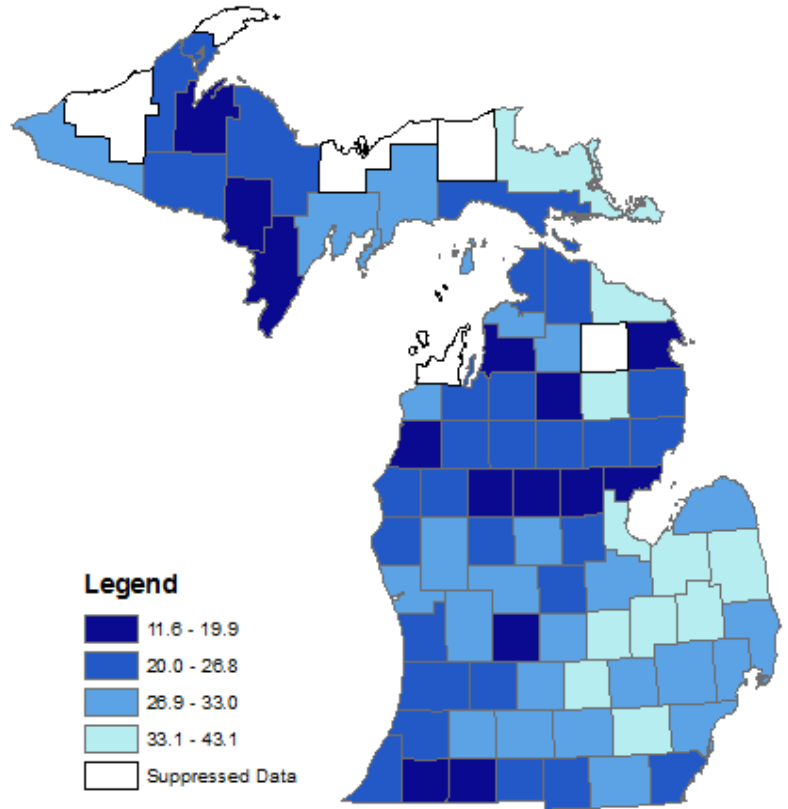
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 2$  Outpatient Visits for Asthma by County of Resi-

- Counties with the lowest proportion of children with persistent asthma having two or more outpatient visits for asthma in Medicaid are:

ARENAC	[11.6% (2.9 - 20.2)]
CRAWFORD	[14.7% (3.8 - 25.6)]
ALPENA	[15.3% (8.4 - 22.1)]
GLADWIN	[15.4% (8 - 22.8)]
ANTRIM	[16.2% (7.7 - 24.8)]
ST JOSEPH	[16.4% (11.7 - 21)]
CLARE	[16.5% (10.3 - 22.7)]
MANISTEE	[16.9% (9.2 - 24.6)]
OSCEOLA	[17.3% (8.6 - 26)]
CASS	[17.7% (12 - 23.4)]
MENOMINEE	[17.9% (8.6 - 27.3)]
DICKINSON	[18.1% (7.6 - 28.5)]
BARAGA	[18.3% (4.2 - 32.4)]
IONIA	[19.9% (13.4 - 26.4)]

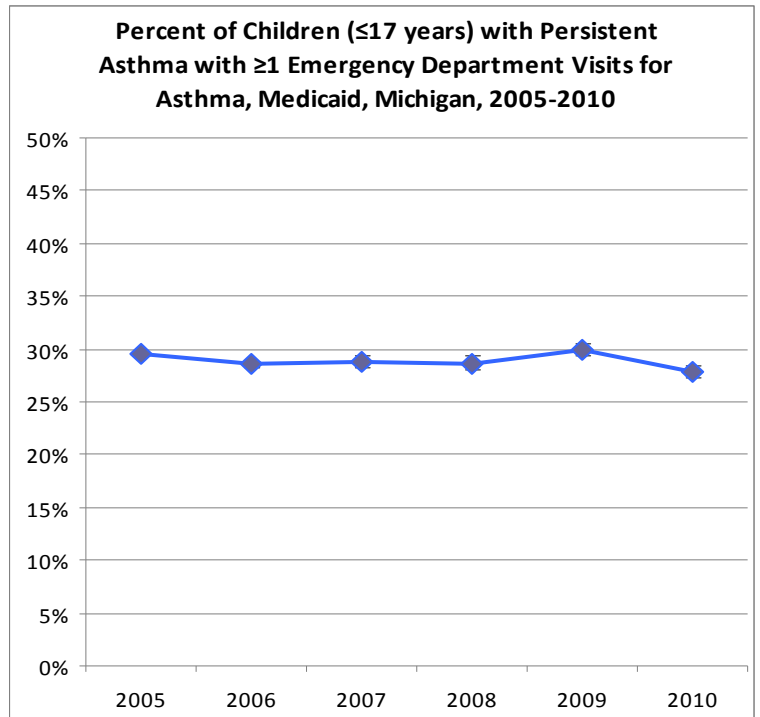


Except for Dickinson and Baraga counties, all listed counties had proportions statistically lower than the state proportion of 28.7% (27.3 - 28.4).

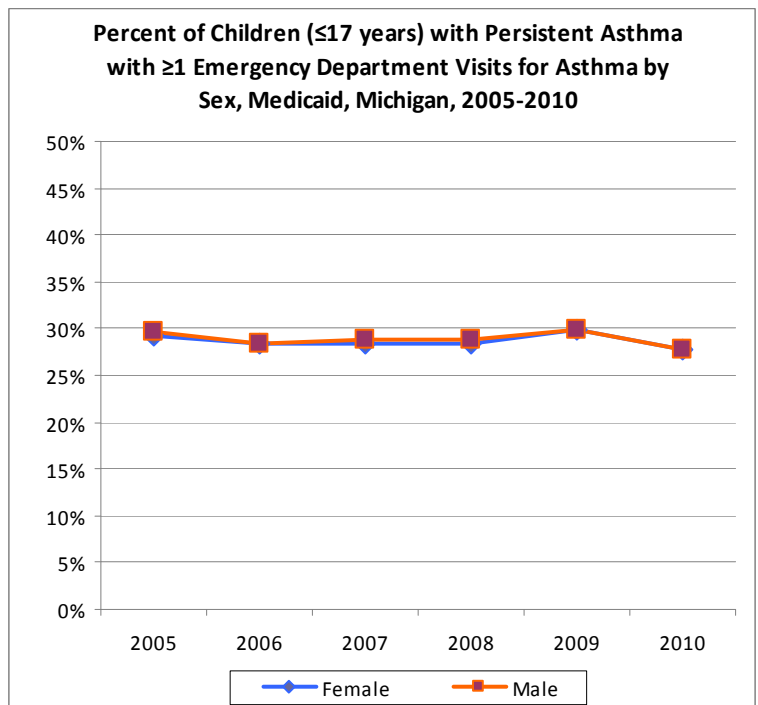
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- It is a goal of asthma therapy that persons with asthma experience no emergency department visits.
- The proportion of children with persistent asthma in Medicaid with at least one emergency department visit for asthma increased from 29.5% in 2005 to 27.8% in 2010. This represents a 5.7% improvement in this indicator.



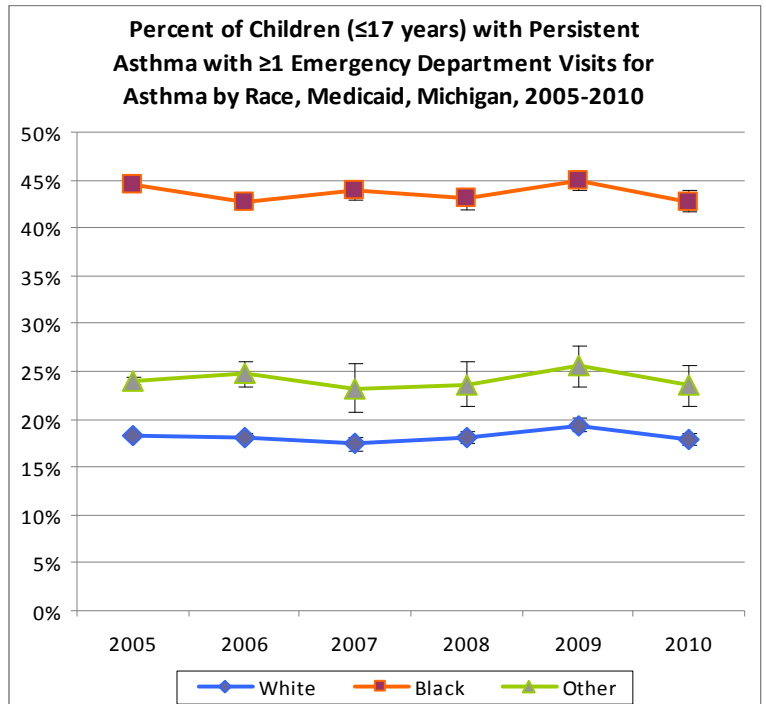
- Since 2005, the proportions of children in Medicaid with persistent asthma with at least one emergency department visit for asthma have not differ by sex.
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with at least one emergency department visit for asthma decreased 6.3% for males (29.6% to 27.8%). The prevalence remained statistically constant for females with a 2010 prevalence of 27.8%.



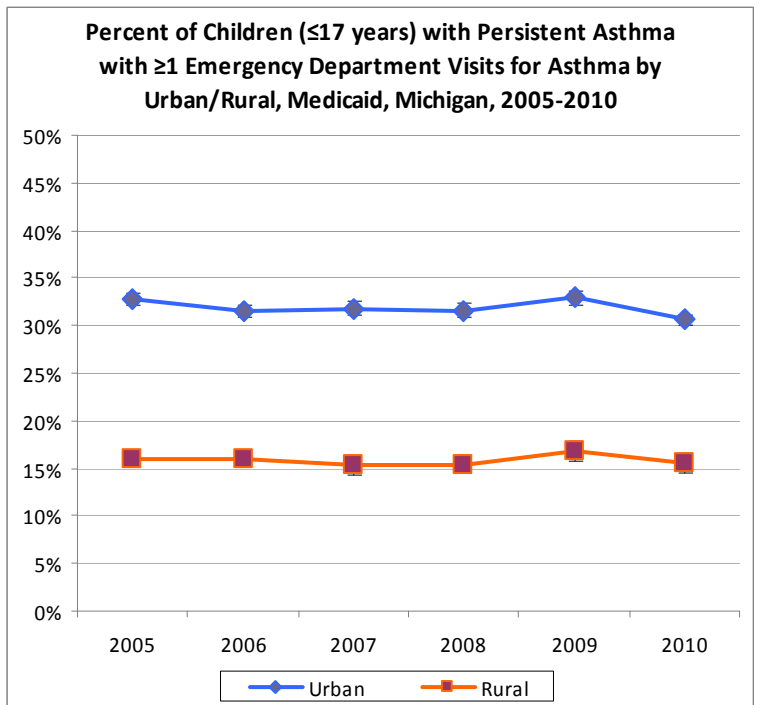
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Between 2005 to 2010, the proportion of children with persistent asthma with one or more asthma emergency department visits is statistically constant for blacks, whites, and children of other races (42.8%, 17.9%, and 23.5% in 2010, respectively).
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with at least one emergency department visit for asthma is about two and half times higher for black children when compared to white children (prevalence ratio=2.44 and 2.39, respectively).



- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with at least one emergency department visit for asthma decreased 6.6% for urban residents (32.7% to 30.6%). The prevalence remained statistically constant for rural residents with a 2010 prevalence of 15.6%.
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with at least one emergency department visit for asthma was about twice as high for urban residents when compared to rural residents (prevalence ratio=2.06 and 1.96, respectively).



Data Notes: Source is the MDCH Data Warehouse

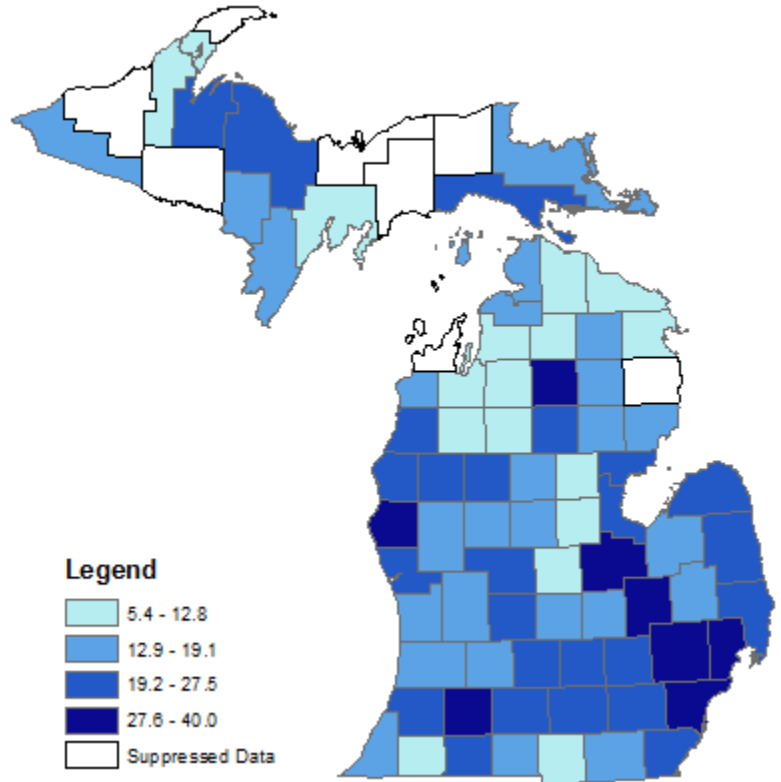
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Counties with the highest proportion of children with persistent asthma having one or more emergency department visits for asthma in Medicaid are:

WAYNE	[40% (38.9 - 41.1)]
CRAWFORD	[37.9% (20.6 - 55.2)]
MACOMB	[32.4% (30 - 34.9)]
KALAMAZOO	[31.5% (27.8 - 35.2)]
OCEANA	[31.2% (20.4 - 41.9)]
SAGINAW	[31% (27.4 - 34.7)]
OAKLAND	[29.7% (27.5 - 31.9)]
GENESEE	[28.5% (26.1 - 30.8)]

Wayne and Macomb are the only two counties with proportions significantly higher than the state proportion [27.7% (27.3 - 28.4)]. Forty-three counties had proportions significantly lower than the state proportion, indicating the importance of these two counties in driving the state proportion.

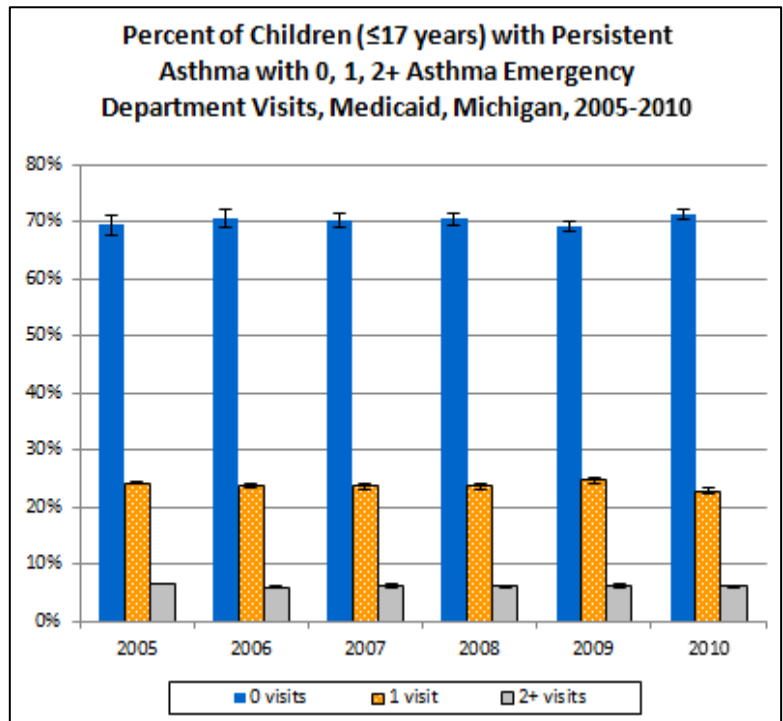
Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 1$  Emergency Department Visits for Asthma by County of Residence, Medicaid, Michigan, 2010



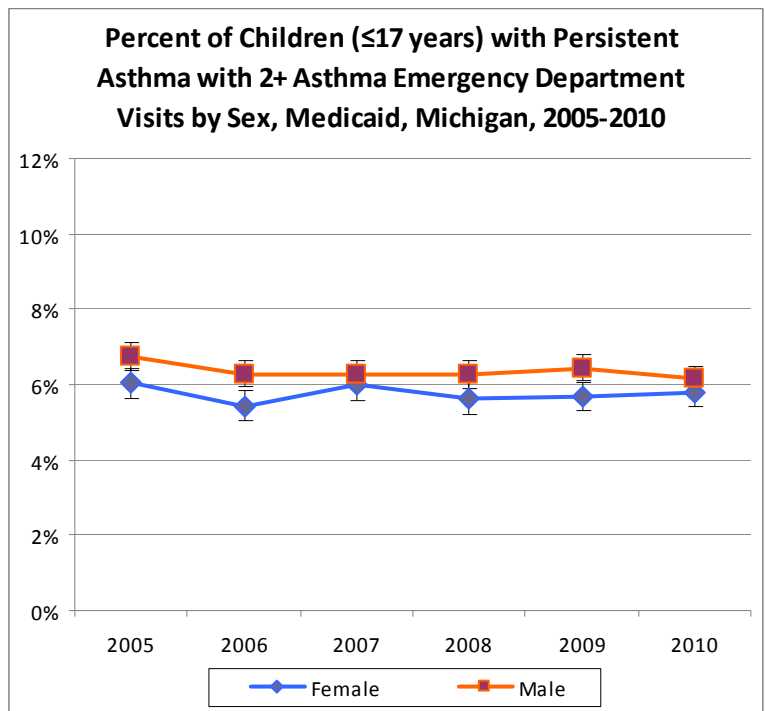
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Frequent emergency department visits for asthma is an indicator of risk. Children with two or more emergency department visits per year are considered a high-risk population and important to consider for case management.
- In 2010, 7.4% of children in Medicaid with persistent asthma had no emergency department visits, 22.6% had one emergency department visit, and 6.0% had two or more emergency department visits. This trend has remained constant since 2005.



- The proportion of children in Medicaid with persistent asthma with two or more emergency department visits did not differ by sex.
- In 2010, 6.1% of male children and 5.8% of female children in Medicaid with persistent asthma with two or more emergency department visits. These prevalences are statistically constant for both since 2005.

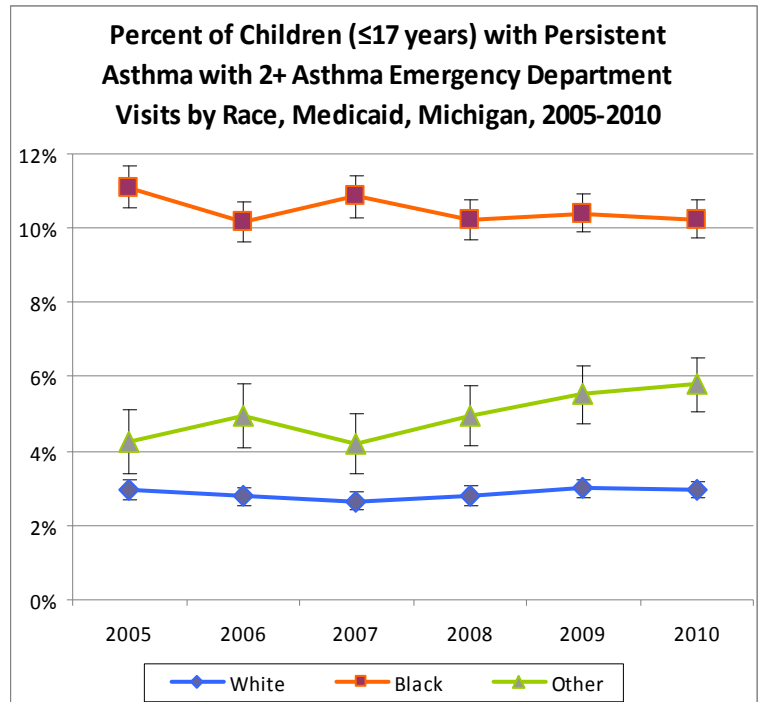


Data Notes: Source is the MDCH Data Warehouse

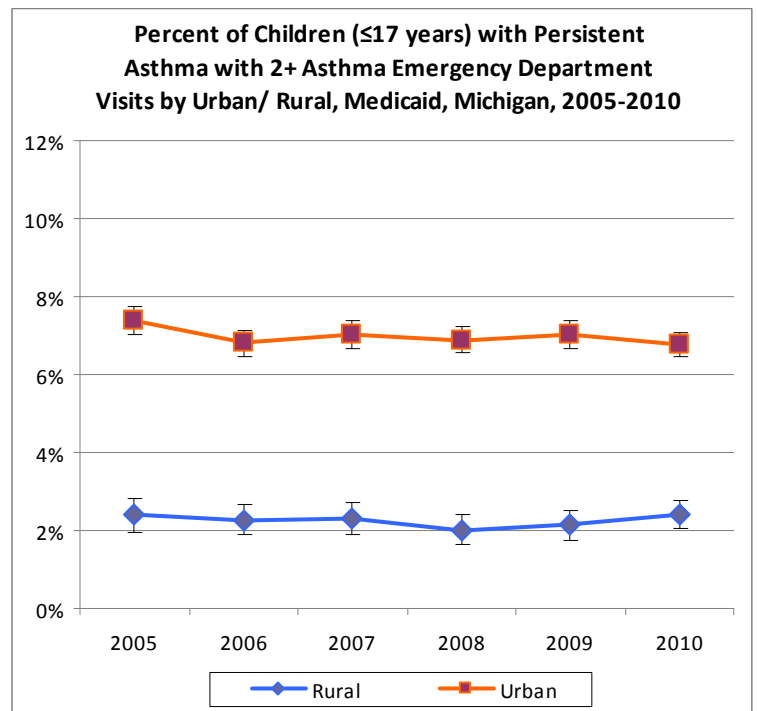
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.



- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with two or more emergency department visits is statistically constant for blacks, whites, and children of other races (10.2%, 3.0%, and 5.8% in 2010, respectively).
- Between 2005 and 2010, the proportion of children with persistent asthma in Medicaid with two or more emergency department visits is about three and a half times higher for black children when compared to white children (prevalence ratio=3.76 and 3.46, respectively).



- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with two or more emergency department visits is statistically constant for rural residents with a 2010 rate of 2.4%. This indicator improved 8.4% for urban residents (7.4% to 6.8%, respectively).
- Between 2005 and 2010, the proportion of children with persistent asthma who had two or more asthma emergency department visits per year is about three times higher for urban residents when compared to rural residents (prevalence ratio=3.10 and 2.80, respectively).



Data Notes: Source is the MDCH Data Warehouse

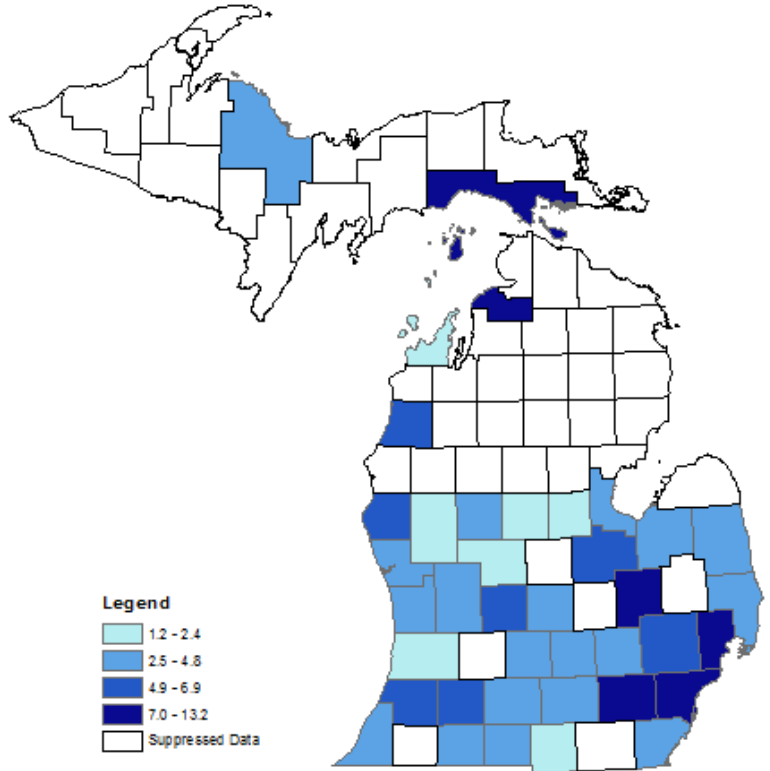
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Counties with the highest proportion of children with persistent asthma with 2+ asthma emergency department visits in Medicaid are:

MACKINAC	[13.2% (1.6-24.7)]
WAYNE	[9.6% (9.1-10.2)]
MACOMB	[7.8% (6.6-9.0)]
CHARLEVOIX	[7.2% (1.4-13.0)]
WASHTENAW	[7.0% (5.4-8.6)]
GENESEE	[7.0% (5.8-8.1)]

Wayne and Macomb are the only counties with proportions higher than the state proportion of 6.0% (5.7 - 6.2).

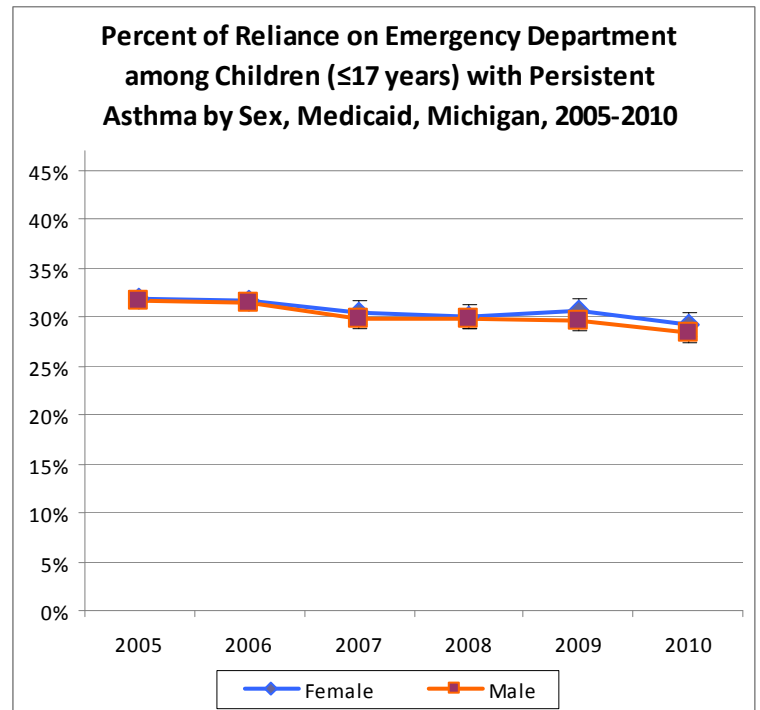
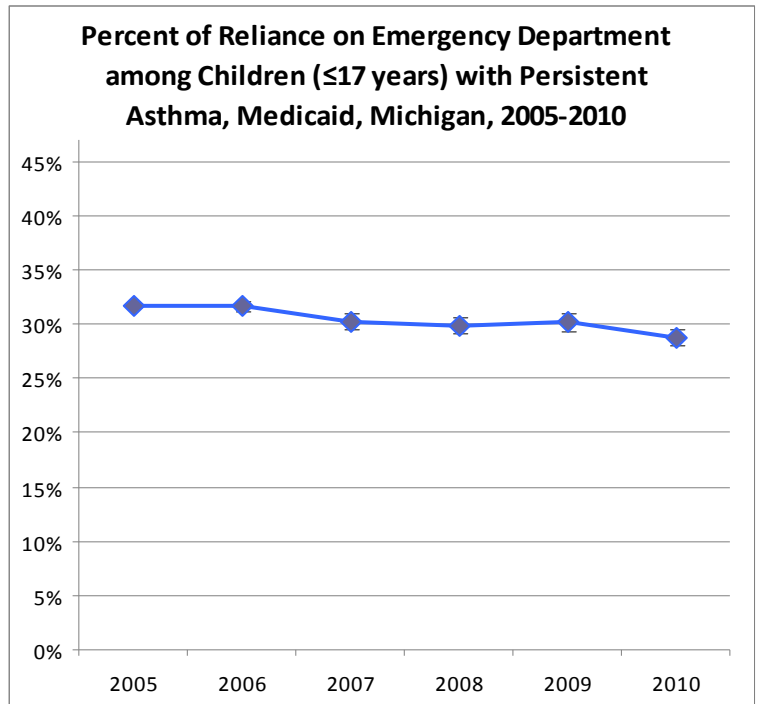
Percent of Children ( $\leq 17$  years) with Persistent Asthma with 2+ Asthma Emergency Department Visits by County, Medicaid, Michigan, 2010



Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

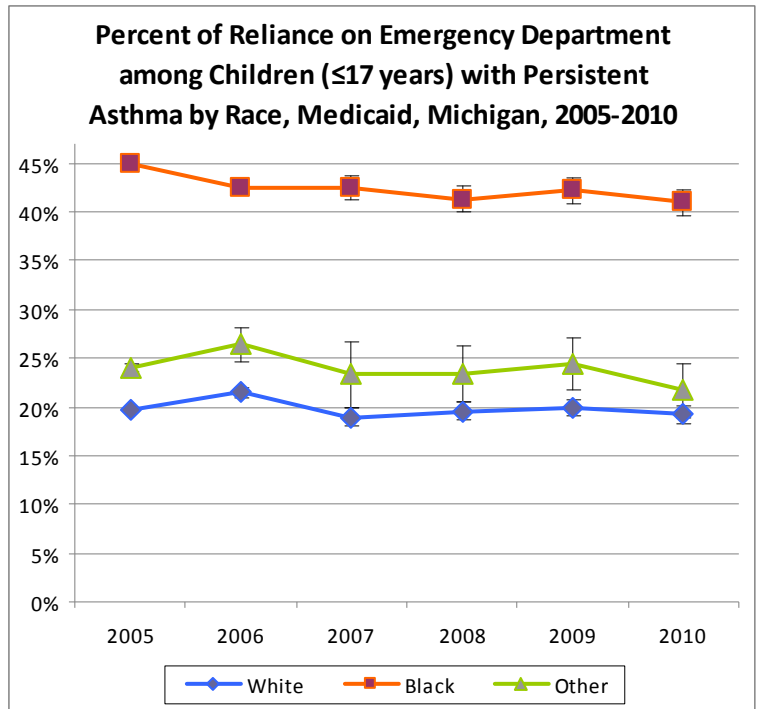
- Emergency department reliance is an indicator of primary care utilization within an hospital setting as opposed to a doctor's office.
- For those with at least one outpatient or emergency department visit, this indicator is calculated by dividing the total number of emergency department visits by the sum of emergency department visits plus outpatient visits [EDcount / (EDcount + OP-count)].
- Emergency department reliance among children in Medicaid with persistent asthma decreased from 31.8% in 2005 to 28.7% in 2010. This represents a 9.5% improvement in this indicator.
- From 2005 to 2010, emergency department reliance for children in Medicaid with persistent asthma decreased 10.2% for males and 8.3% for females (males: 31.6% to 28.4%, females: 31.8% to 29.2%, respectively).



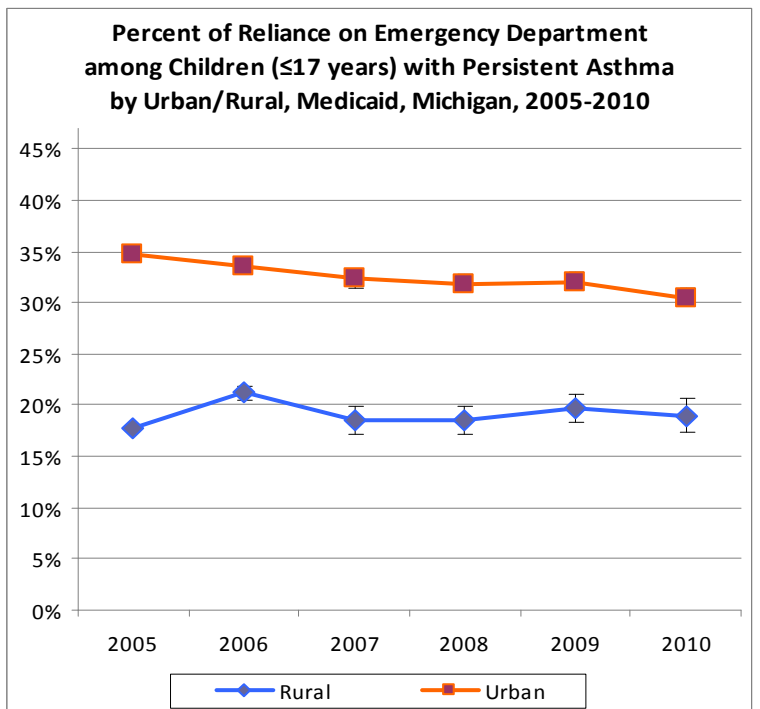
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Between 2005 and 2010, emergency department reliance for children in Medicaid with persistent asthma decreased 8.8% for black children (44.9% to 40.9%). This proportion remained statistically constant for white children and children of other races (19.2% and 21.7% in 2010, respectively).
- Between 2005 and 2010, emergency department reliance for children in Medicaid with persistent asthma was more than twice as high for black children when compared to white children (prevalence ratio: 2.27 and 2.13, respectively).



- From 2005 to 2010, emergency department reliance for children in Medicaid with persistent asthma decreased 12.0% for urban residents (34.6% to 30.5%). The proportion remained statistically constant for rural residents with a 2010 proportion of 19.0%.
- In 2010, urban residents with persistent asthma in Medicaid were 60.0% more likely to rely on emergency departments for primary care when compared to rural residents. This urban-rural disparity has improved since the 2005 prevalence ratio of 1.96.



Data Notes: Source is the MDCH Data Warehouse

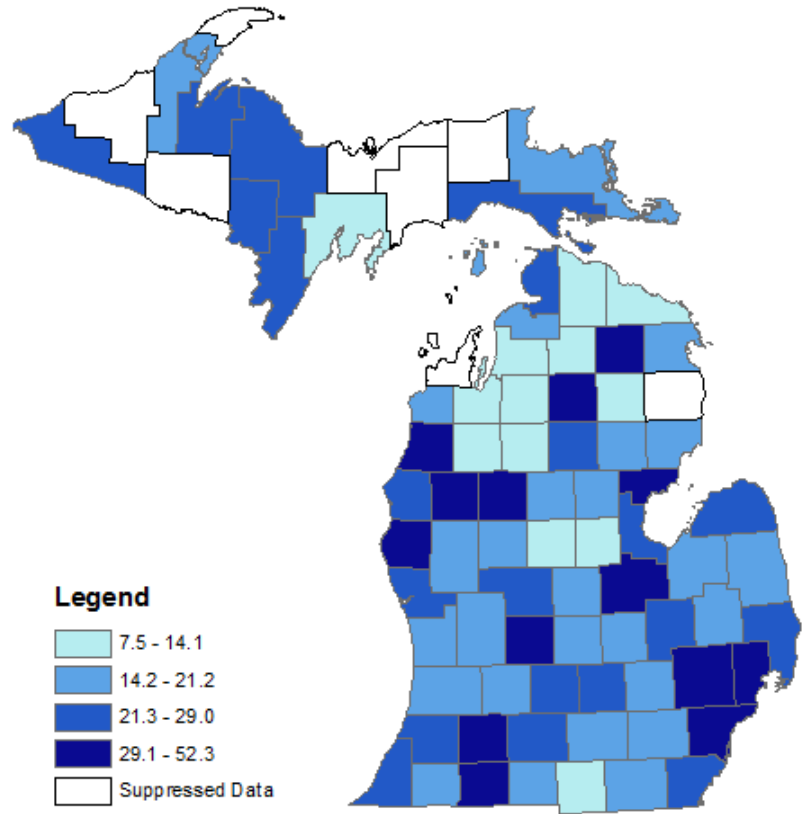
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Counties with the highest prevalence of reliance on the emergency departments among children with persistent asthma in Medicaid are:

CRAWFORD	[52.3%	(25.6 - 78.9)]
OCEANA	[41.1%	(26.1 - 56.2)]
WAYNE	[38.8%	(37.5 - 40.1)]
ARENAC	[38.4%	(15.0 - 61.9)]
LAKE	[38.3%	(8.1 - 68.5)]
MANISTEE	[35.8%	(19.8 - 51.8)]
ST JOSEPH	[32.0%	(22.0 - 42.1)]
SAGINAW	[31.9%	(27.4 - 36.3)]
OSCEOLA	[31.7%	(15.4 - 48.0)]
MACOMB	[31.6%	(28.6 - 34.6)]
MONTMORENCY	[31.1%	(4.5 - 57.6)]
KALAMAZOO	[30.9%	(26.5 - 35.4)]
IONIA	[30.9%	(20.3 - 41.4)]
OAKLAND	[30.6%	(27.8 - 33.3)]

Counties with a prevalence higher than the state prevalence of 28.7% (28.1 - 29.4) are Crawford, Oceana, Wayne, St. Joseph, Saginaw, Macomb, Kalamazoo, Ionia, and Oakland.

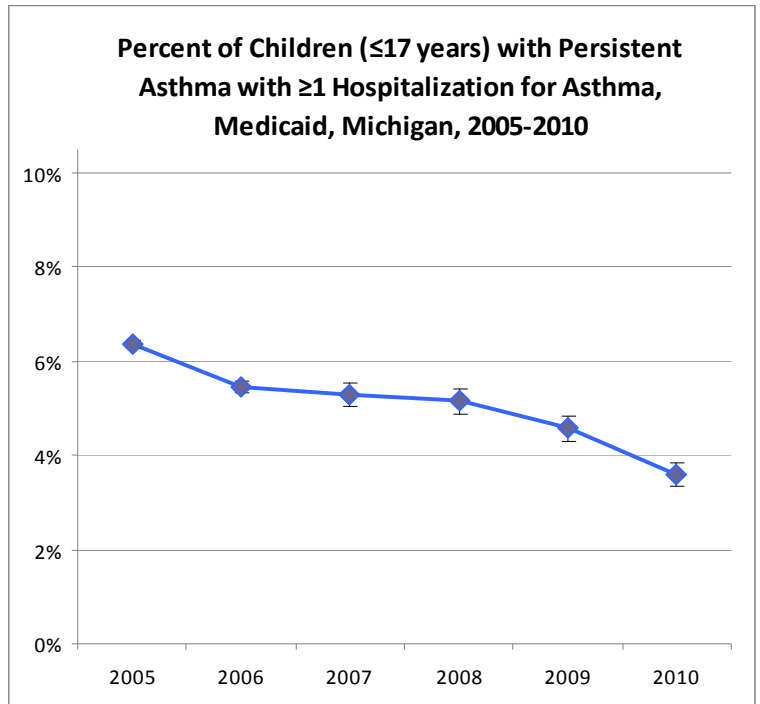
Percent of Reliance on Emergency Department among Children ( $\leq 17$  years) with Persistent Asthma by County of Residence, Medicaid, Michigan, 2010



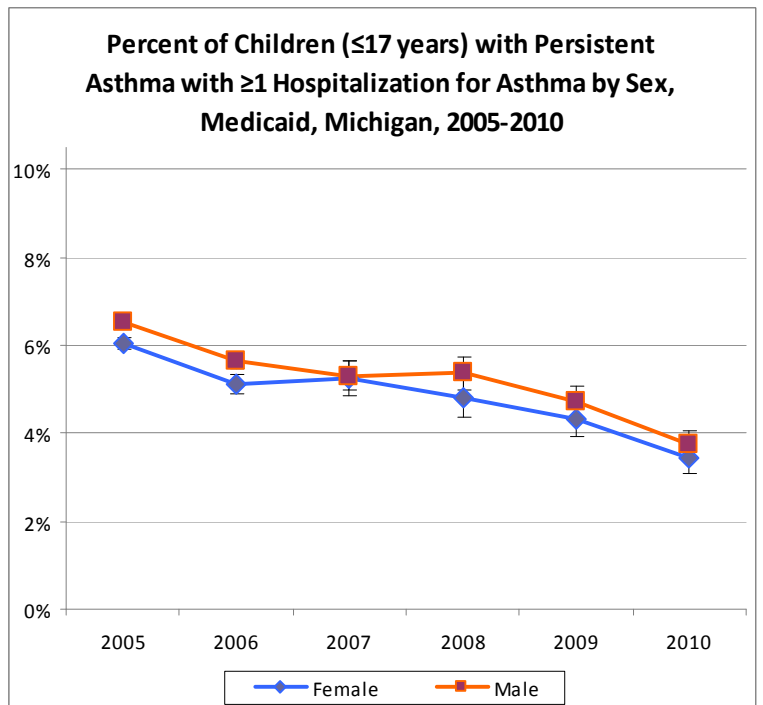
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- A goal of asthma therapy is that persons with asthma experience minimal or no hospitalizations.
- The proportion of children in Medicaid with persistent asthma with at least one asthma hospitalization decreased from 6.4% in 2005 to 3.6% in 2010. This represents a 43.2% improvement in this indicator.



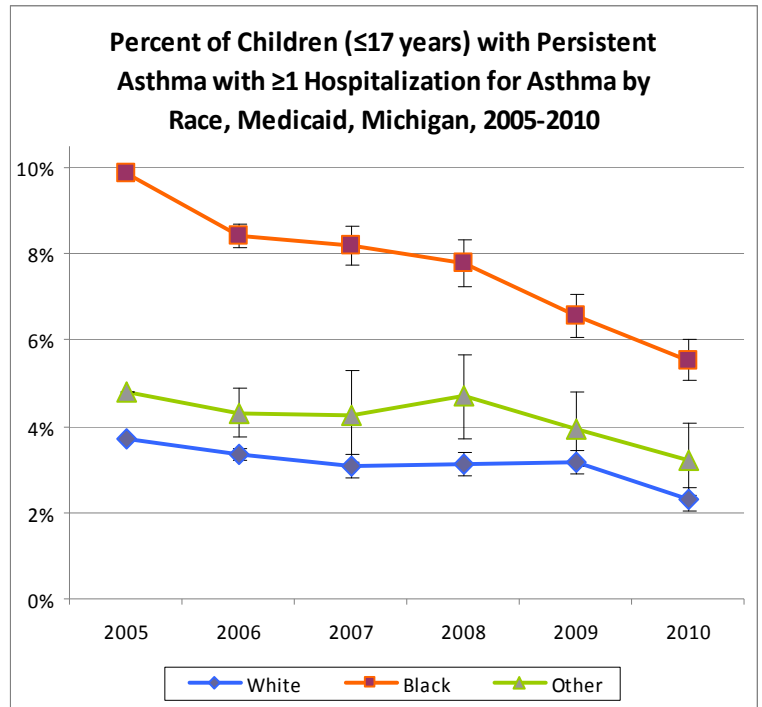
- The proportion of children in Medicaid with persistent asthma with at least one hospitalization for asthma did not differ significantly by sex.
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with at least one hospitalization for asthma decreased 42.7% for males and 43.2% for females (males: 6.5% to 3.7%, females: 6.1% to 3.4%, respectively).



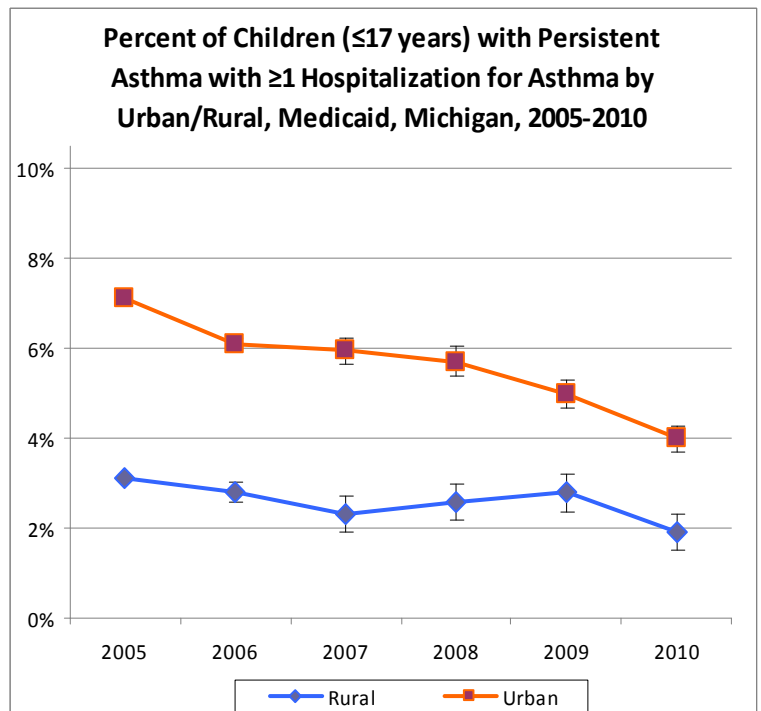
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Between 2005 to 2010, the proportion of children with persistent asthma with one or more asthma hospitalization decreased 44.1% for black children, 37.9% for white children, and 32.5% for children of other races (blacks: 9.9% to 5.5%, whites: 3.7% to 2.3%, other: 4.8% to 3.2%, respectively)
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with at least one hospitalization for asthma is about two and a half times higher for black children when compared to white children (prevalence ratio: 2.67 and 2.40, respectively).



- Between 2005 to 2010, the proportion of children with persistent asthma with one or more asthma hospitalization decreased 44.0% for urban residents and 38.5% for rural residents (urban: 7.1% to 4.0%, rural: 3.1% to 1.9%, respectively).
- Between 2005 to 2010, the proportion of children in Medicaid with persistent asthma with at least one hospitalization for asthma is over twice as high for urban residents when compared to rural residents (prevalence ratio: 2.29 and 2.08, respectively).



Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

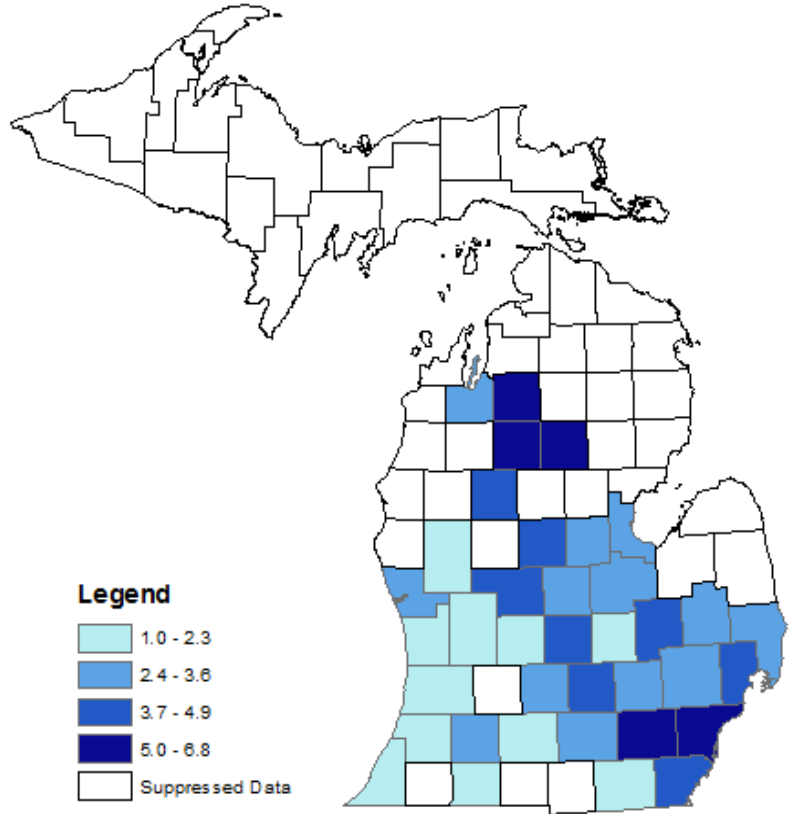


- Counties with the highest proportion of children in Medicaid with persistent asthma with one or more asthma hospitalizations are:

KALKASKA	[6.8% (0.8 - 12.9)]
MISSAUKEE	[5.8% (0.7 - 10.9)]
WASHTENAW	[5.6% (4.2 - 7)]
ROSCOMMON	[5.5% (0.6 - 10.4)]
WAYNE	[5.3% (4.9 - 5.8)]

Washtenaw and Wayne are the only two counties with a proportion significantly higher than the state prevalence [3.6% (93.4-3.8)] are counties.

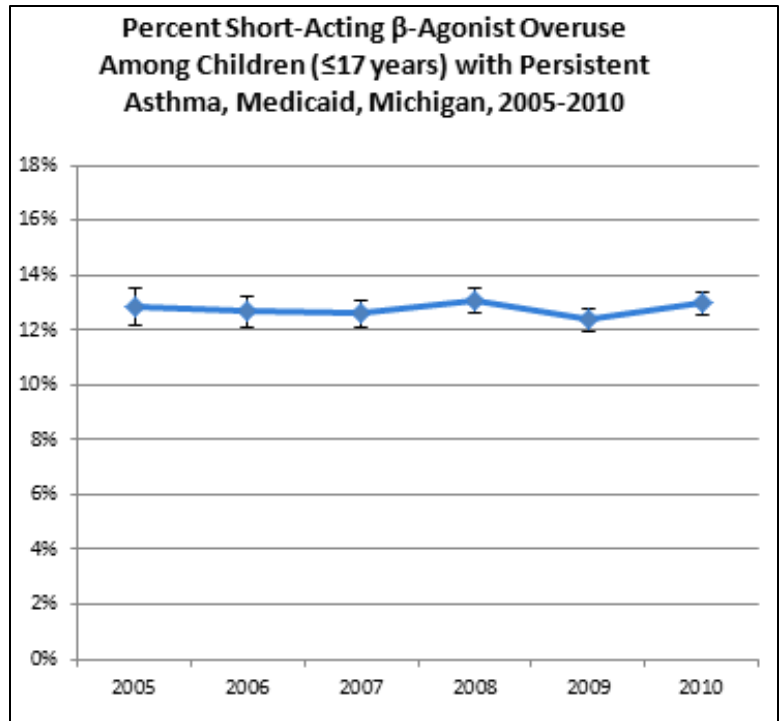
25. Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 1$  Hospitalizations for Asthma by County of Residence, Medicaid, Michigan, 2010



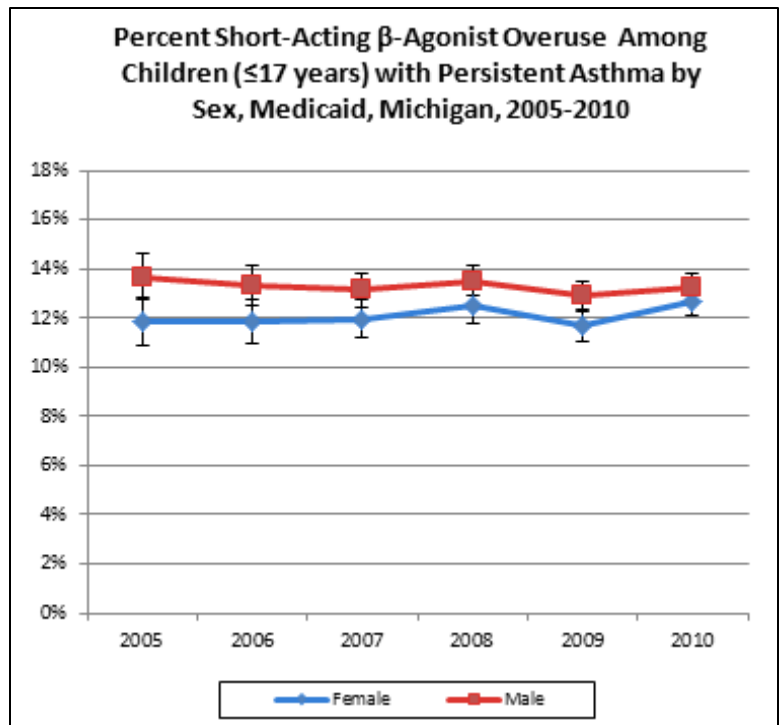
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- The proportion of children with persistent asthma in Medicaid with Short Acting  $\beta$ -agonist (SABA) medication overuse is statistically constant between 2005 and 2010, with a 2010 proportion of 13.0%.



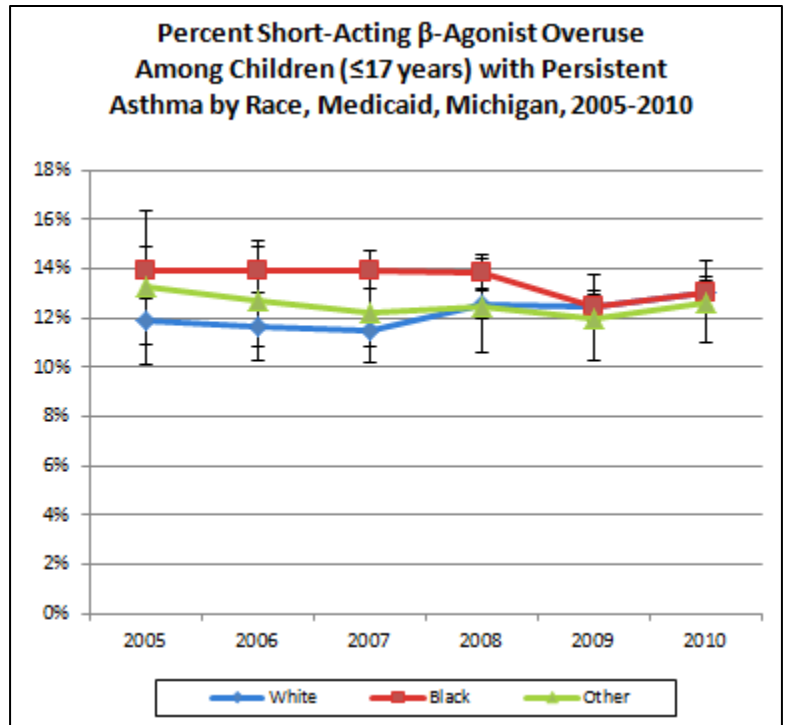
- The 2010 prevalence of SABA overuse among children in Medicaid with persistent asthma is statistically constant to the 2005 prevalence.
- In 2010, the prevalence of SABA overuse is not significantly different by sex with prevalences of 13.2% for male children and 12.7% for female children.



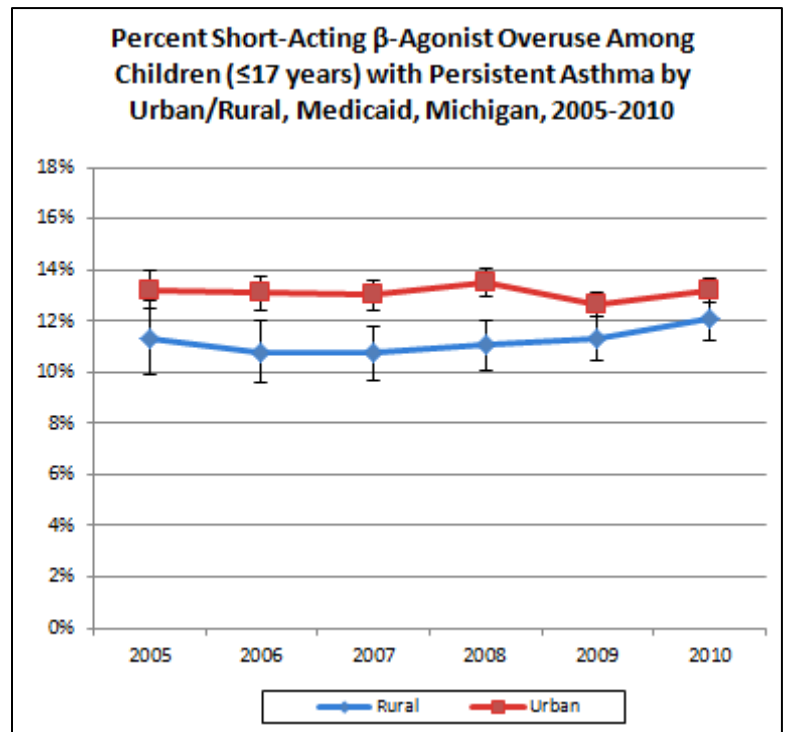
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- In 2010, the prevalence of SABA overuse is not significantly different by race with proportions of 13.0% for blacks, 13.0% for whites, and 12.6% for children of other races.
- Between 2005 and 2010, SABA overuse remained constant for black children and children of other races while increasing 9.5% for white children (11.9% to 13.0%).
- In 2005, black children when compared to white children were 17.2% more likely to have SABA overuse among children in Medicaid with persistent asthma. This black-white disparity disappeared in 2008 when the proportions became statistically equal.



- In 2010, the prevalence of SABA overuse among children in Medicaid with persistent asthma did not differ for urban residents when compared to rural residents (13.2% vs. 12.1%, respectively).
- Urban residents had a significantly higher prevalence of SABA overuse than rural residents from 2005 to 2008 but not in 2009 and 2010.



Data Notes: Source is the MDCH Data Warehouse

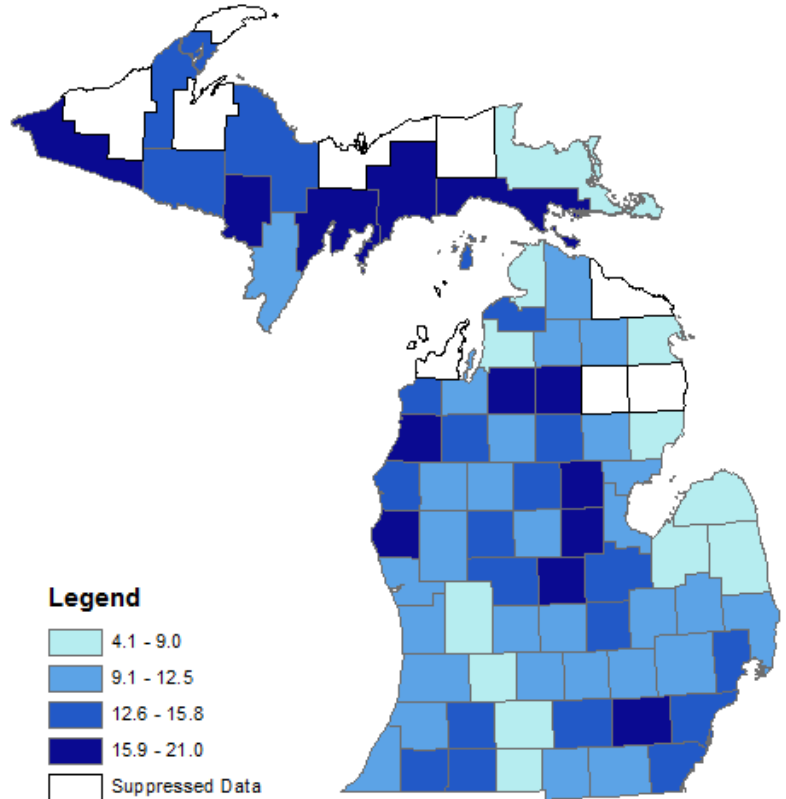
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Counties with the highest percent of SABA overuse among children with persistent asthma in Medicaid are:

OCEANA	[21.0% (12.3 - 29.6)]
KALKASKA	[20.6% (10.1 - 31.2)]
GOGEBIC	[19.0% (6.2 - 31.8)]
MANISTEE	[18.9% (10.7 - 27.0)]
GLADWIN	[18.6% (10.3 - 26.8)]
DICKINSON	[18.4% (6.4 - 30.3)]
MACKINAC	[18.4% (4.7 - 32.2)]
SCHOOLCRAFT	[18.3% (4.2 - 32.3)]
CRAWFORD	[18.0% (5.5 - 30.5)]
DELTA	[16.7% (10.9 - 22.6)]
MIDLAND	[16.7% (10.8 - 22.5)]
GRATIOT	[16.4% (10.4 - 22.3)]
WASHTENAW	[16.2% (13.6 - 18.9)]

Except for Washtenaw, all listed counties are not statistically different from the state prevalence of 13.0% (12.6 - 13.4).

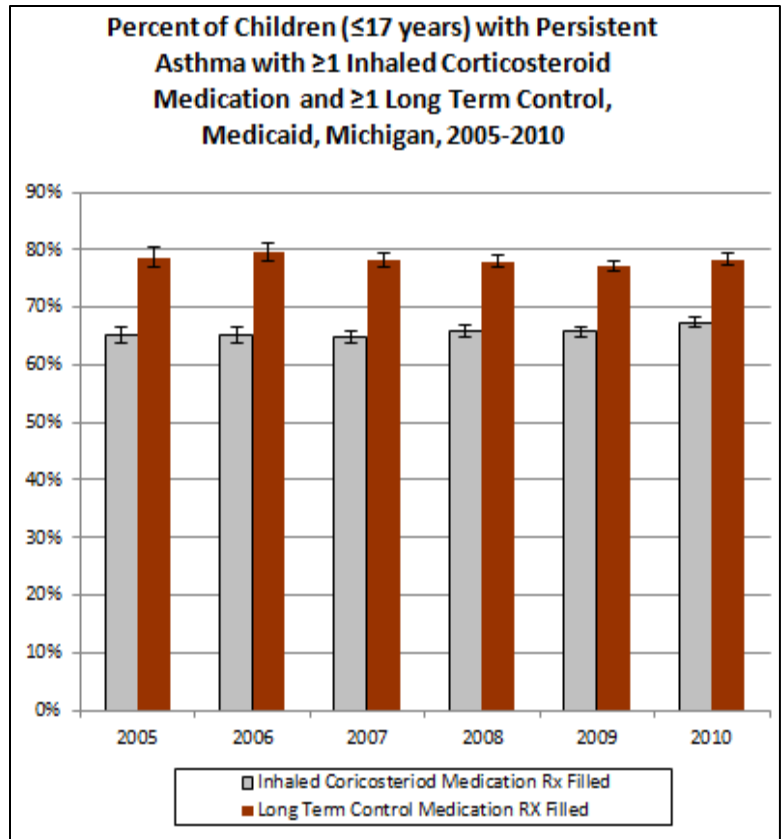
Percent of Short-Acting  $\beta$ -Agonist Overuse among Children ( $\leq 17$  years) with Persistent Asthma by County of Residence, Medicaid, Michigan, 2010



Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

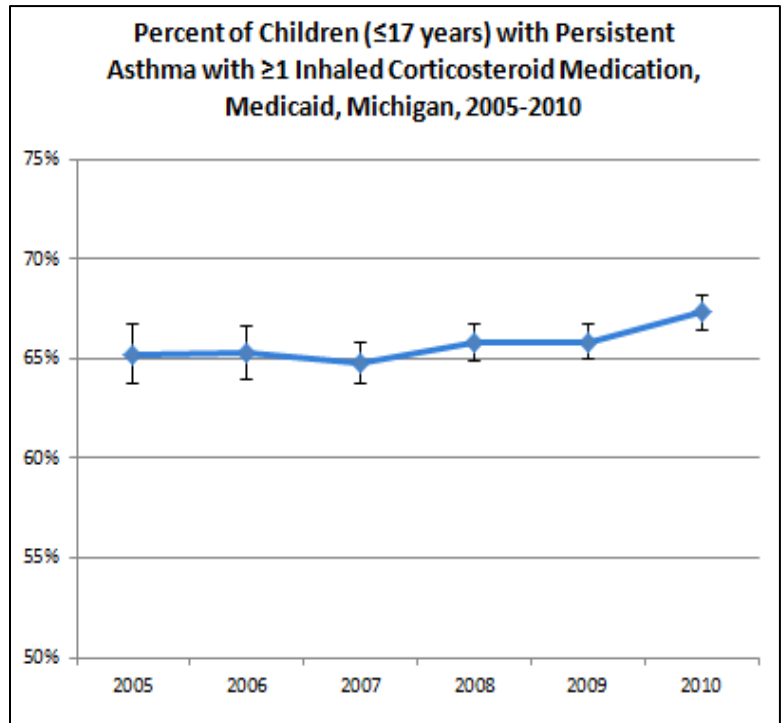
- Long-term control (LTC) medications prevent future attacks whereas inhaled corticosteroid (ICS) medications are the preferred first-line drug therapy for those with persistent asthma.
- Among children with persistent asthma in Medicaid, the prevalence of  $\geq 1$  ICS increased from 65.2% in 2005 to 67.3% in 2010. This represents a 3.2% increase in this indicator.
- Between 2005 and 2010, the prevalence of  $\geq 1$  LTC among children with persistent asthma is statistically constant, with a 2010 rate of 78.3%.



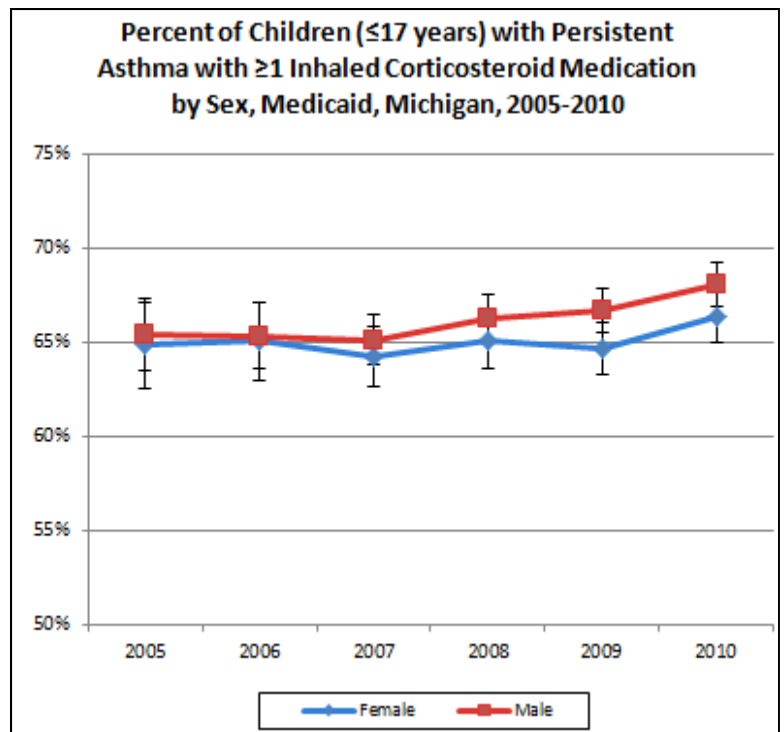
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Among children with persistent asthma in Medicaid, the prevalence of  $\geq 1$  inhaled corticosteroid (ICS) increased from 65.2% in 2005 to 67.3% in 2010. This represents a 3.2% increase in this indicator.



- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with  $\geq 1$  ICS increased 4.0% for males (65.4% to 68.0%). The prevalence remained statistically constant for females with a 2010 rate of 66.3%.
- In 2010, the proportion of children in Medicaid with persistent asthma with  $\geq 1$  ICS did not differ by sex.

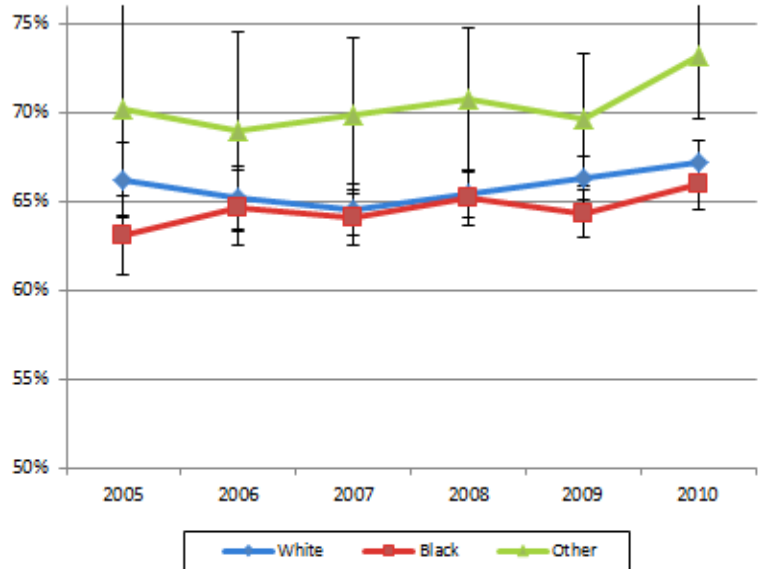


Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

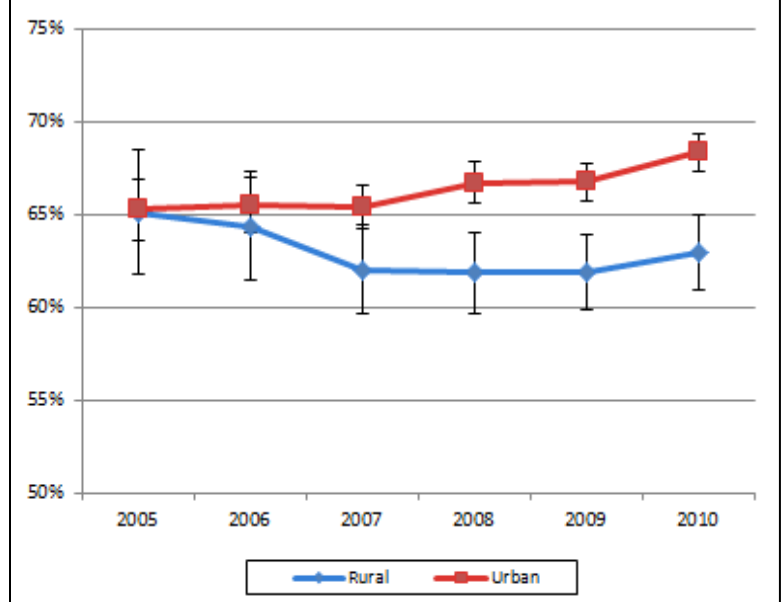
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with  $\geq 1$  ICS increased 4.5% for black children (63.1% to 65.9%). The proportion remained constant for white children and children of other races (67.1% and 73.1% in 2010, respectively).
- In 2005, black children were 4.7% less likely to have had at least one ICS when compared to white children with persistent asthma. This disparity disappeared in 2010 when the proportion became statistically equal.

Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 1$  Inhaled Corticosteroid Medication by Race, Medicaid, Michigan, 2005-2010



- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with  $\geq 1$  ICS increased 4.7% for urban residents (65.2% to 68.3%). The prevalence remained statistically constant for rural residents with a 2010 rate of 62.9%.
- In 2010, urban residents when compared to rural residents were 8.5% more likely to have had  $\geq 1$  ICS. There was no statistical urban-rural difference on this indicator in 2005 and 2006.

Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 1$  Inhaled Corticosteroid Medication by Urban/Rural, Medicaid, Michigan, 2005-2010



Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

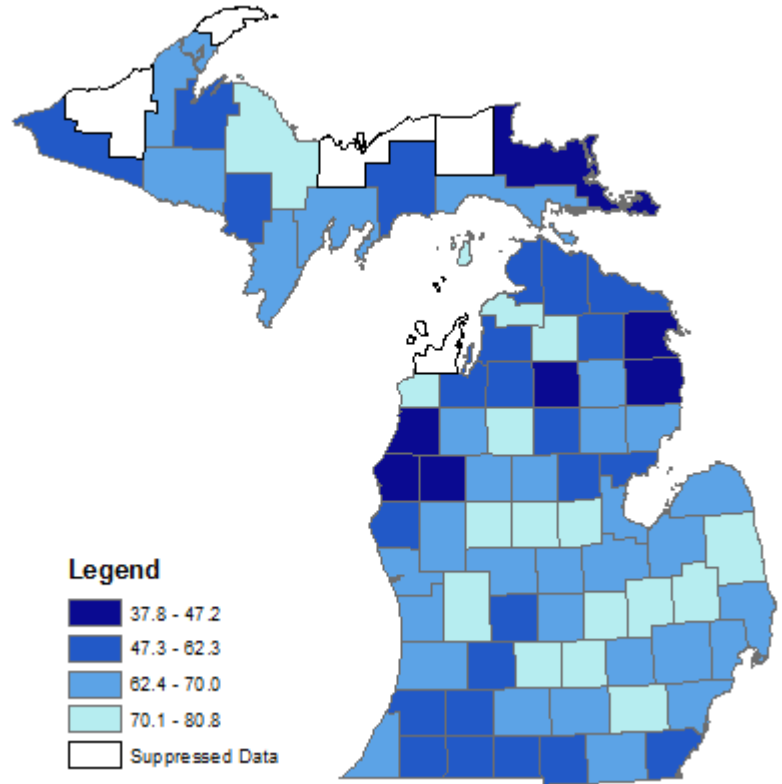


- Counties with the lowest percent of  $\geq 1$  ICS for children in Medicaid with persistent asthma in 2010 are:

ALPENA	[37.8% (26.3 - 49.3)]
MASON	[41.1% (29.1 - 53.2)]
MANISTEE	[43.3% (30.7 - 56.0)]
CRAWFORD	[45.2% (25.7 - 64.7)]
ALCONA	[46.5% (15.9 - 77.2)]
CHIPPEWA	[47.1% (33.9 - 60.2)]
LAKE	[47.2% (26.7 - 67.7)]

Except for Alcona and Lake, all listed counties had  $\geq 1$  ICS proportions lower than the state prevalence of 67.3% (66.5 - 68.1).

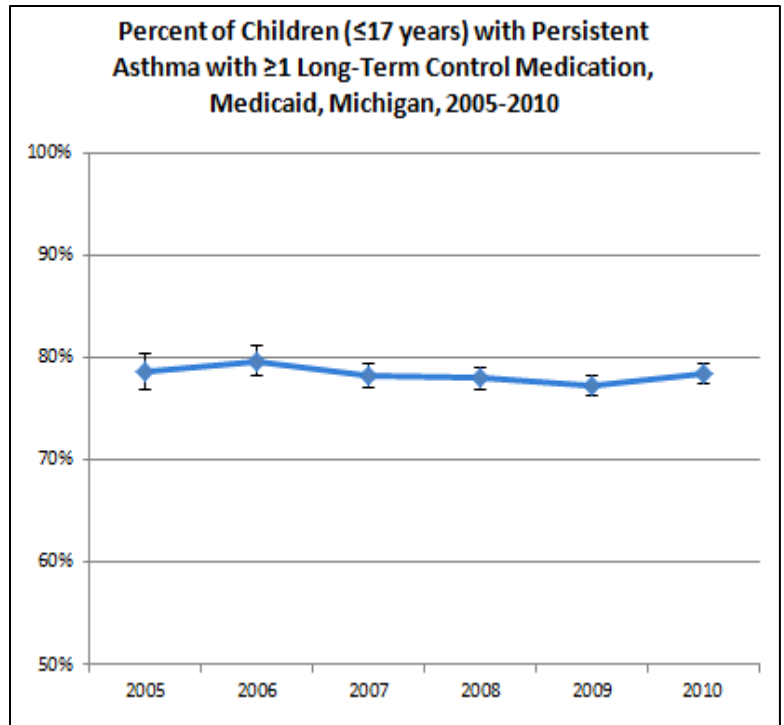
Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 1$  Inhaled Corticosteroid Medication by County of Residence, Medicaid, Michigan, 2010



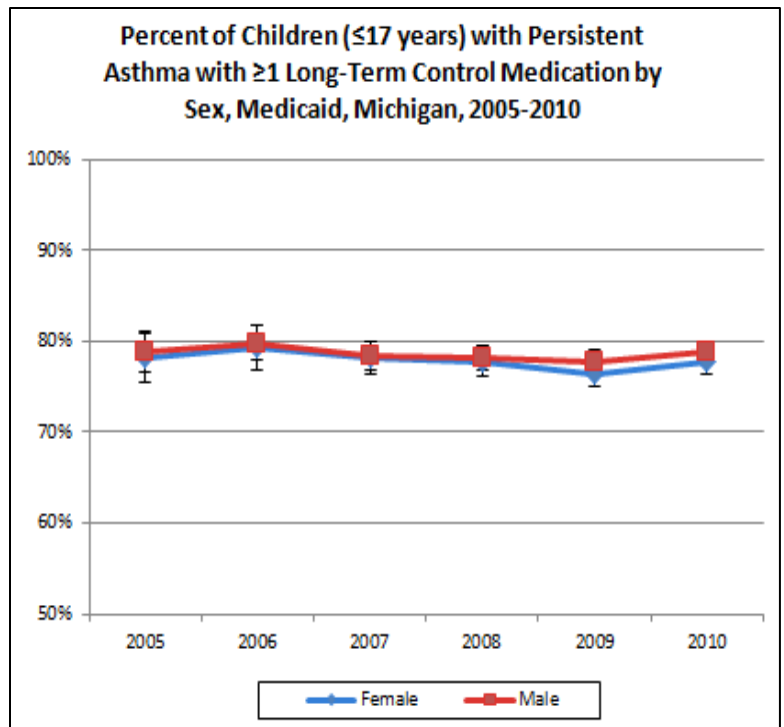
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- The overall prevalence for  $\geq 1$  LTC for children in Medicaid with persistent asthma has remained statistically constant since 2005. The 2010 proportion for  $\geq 1$  LTC is 78.6%.



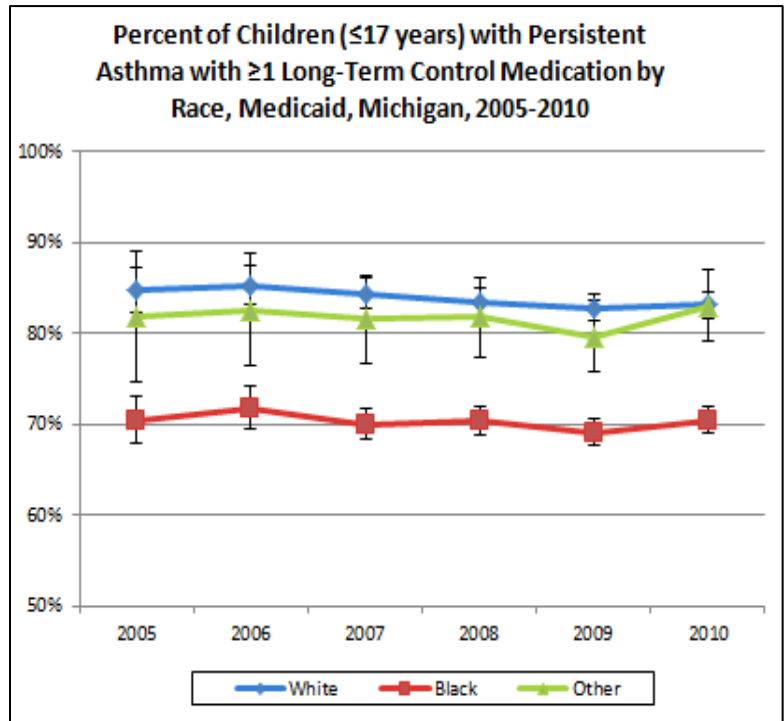
- Between 2005 and 2010, proportion of children in Medicaid with persistent asthma with  $\geq 1$  LTC did not differ significantly for males and females (78.8% and 77.7% in 2010, respectively).



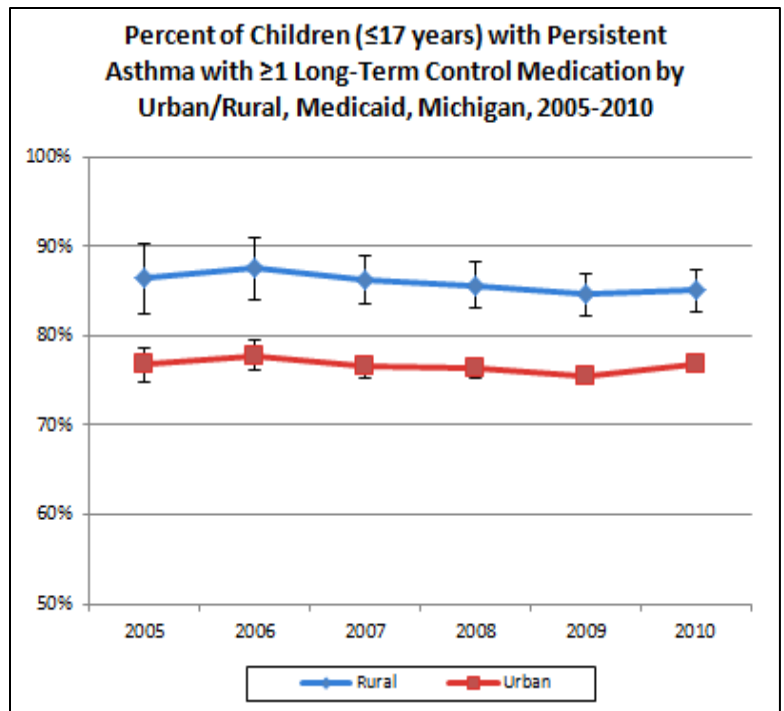
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Between 2005 and 2010, proportion of children in Medicaid with persistent asthma with  $\geq 1$  LTC is statistically constant for blacks, whites, and children of other races (70.4%, 83.1%, 83.0% in 2010, respectively).
- Between 2005 and 2010, black children when compared to white children were about 15% less likely to have had at least one LTC (prevalence ratio: 0.83 and 0.85, respectively).



- Between 2005 and 2010, proportion of children in Medicaid with persistent asthma with  $\geq 1$  LTC is statistically constant for urban and rural residents (76.9% and 85.0% in 2010, respectively).
- Between 2005 and 2010, urban residents when compared to rural residents were about 10% less likely to have had at least one LTC (prevalence ratio: 0.89 and 0.90, respectively).



Data Notes: Source is the MDCH Data Warehouse

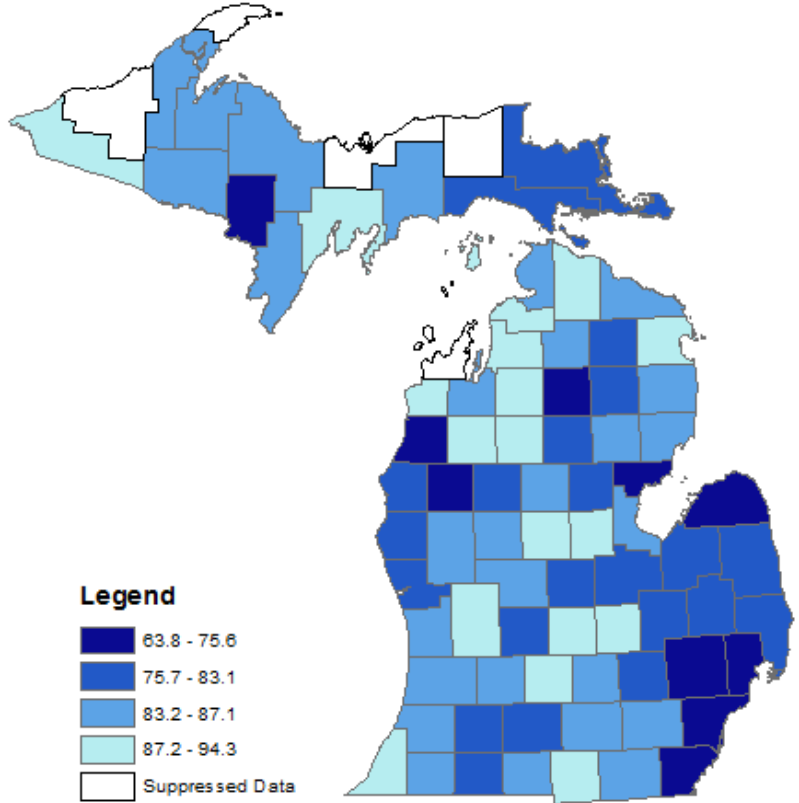
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Counties with the lowest percent of  $\geq 1$  LTC for children in Medicaid with persistent asthma are:

CRAWFORD	[63.8% (40.7 - 86.9)]
LAKE	[67.6% (42.9 - 92.3)]
WAYNE	[68.3% (66.8 - 69.8)]
DICKINSON	[69.6% (48.3 - 90.9)]
MACOMB	[69.9% (66.3 - 73.6)]
ARENAC	[72.8% (51.2 - 94.4)]
MANISTEE	[73.9% (57.6 - 90.2)]
HURON	[74.2% (56.6 - 91.8)]
MONROE	[75.2% (67.0 - 83.5)]
OAKLAND	[75.6% (72.0 - 79.1)]

Except for Wayne and Macomb, all listed counties had  $\geq 1$  LTC rates not statistically different from the state prevalence of 78.3% (77.5 - 79.2).

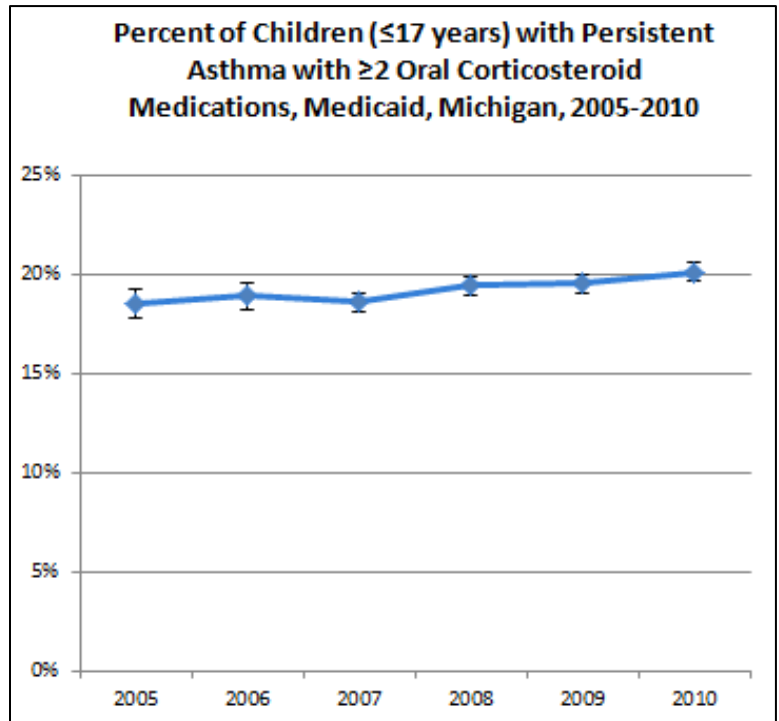
Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 1$  Long-Term Control Medication by County, Medicaid, Michigan, 2001-2010



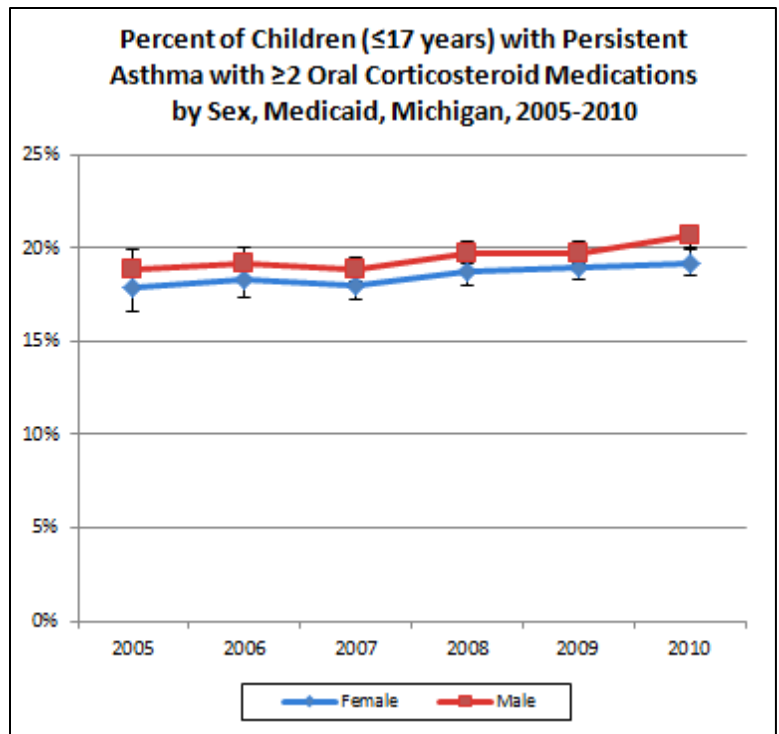
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Among children with persistent asthma in Medicaid, the prevalence of  $\geq 2$  oral corticosteroid (OCS) increased from 18.5% in 2005 to 20.1% in 2010. This represents a 8.7% increase in this indicator.



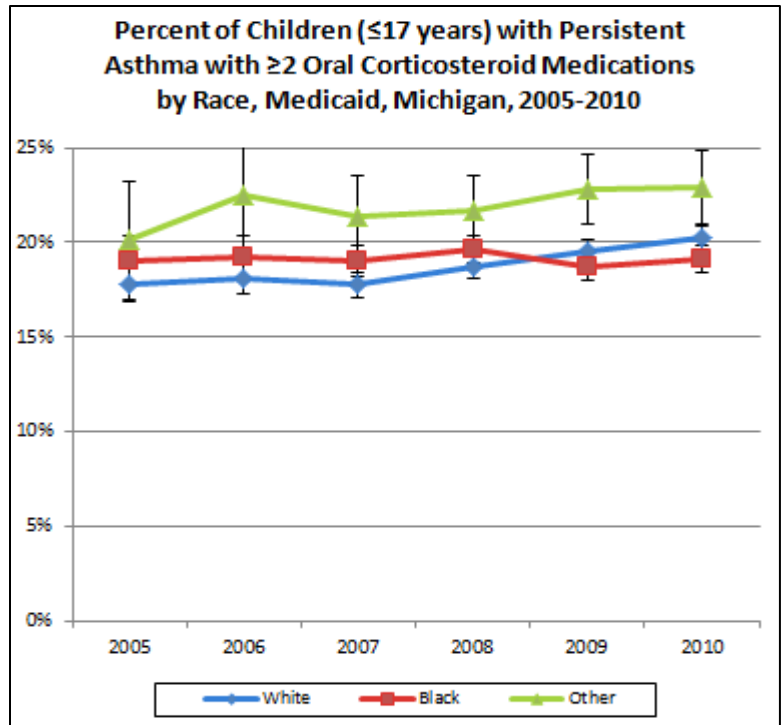
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with  $\geq 2$  OCS increased 9.3% (18.9% to 20.6%) for males. The proportion remained constant for female children with a 2010 rate of 19.2%.
- In 2010, male children in Medicaid with persistent asthma were 7.6% more likely to have had two or more OCS medications when compared to female children. There was no male-female difference on this indicator from 2005 to 2009.



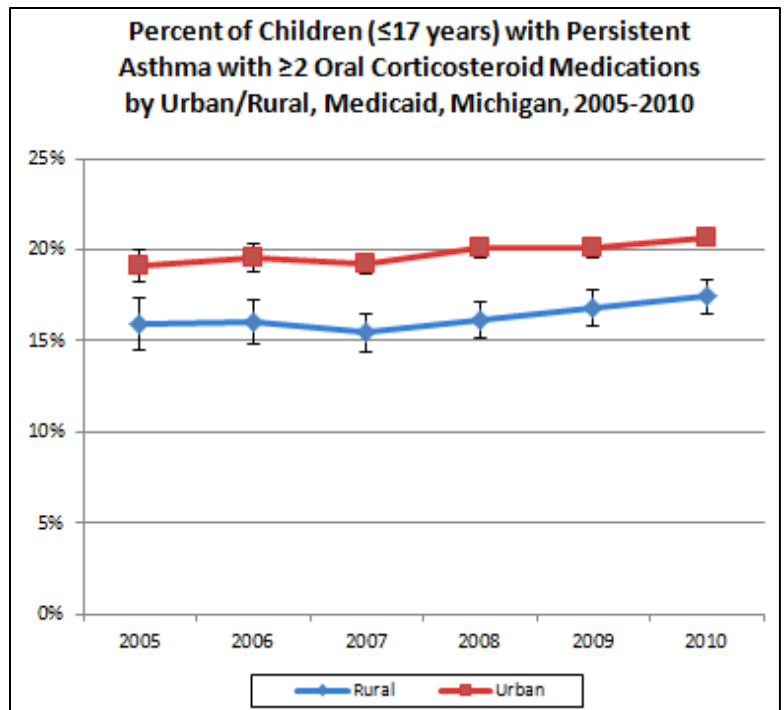
Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Between 2005 and 2010, the proportion with  $\geq 2$  OCS increased 13.4% (17.8% to 20.2%) for white children with persistent asthma while remaining constant for blacks and children of other races (19.1% and 22.9% in 2010, respectively).
- Between 2005 and 2010, there is no black-white difference in the proportion of children with  $\geq 2$  OCS.



- Between 2005 and 2010, the proportion with  $\geq 2$  OCS increased 8.3% (19.1% to 20.7%) for urban residents. The proportion remained constant for rural residents with a 2010 rate of 17.4%.
- Between 2005 and 2010, urban residents were about 20% more likely to have had two or more OCS medications when compared to rural residents (prevalence ratio: 1.20 and 1.19, respectively).



Data Notes: Source is the MDCH Data Warehouse

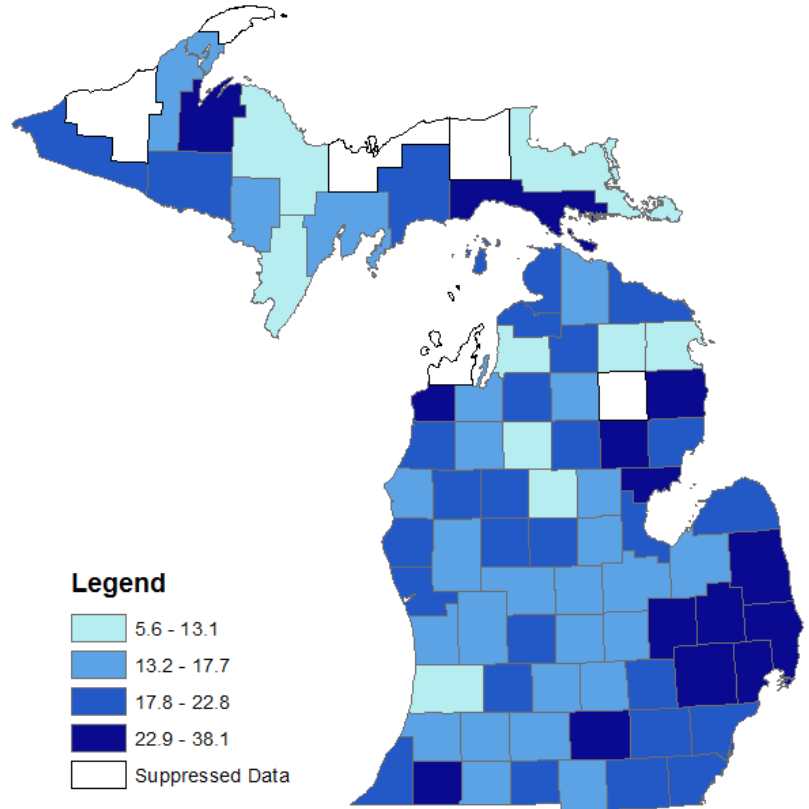
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 2$  Oral Corticosteroid Medications by County, Medicaid, Michigan, 2001-2010

- Counties with the highest percent of  $\geq 2$  OCS for children in Medicaid with persistent asthma are:

ARENAC	[38.1% (22.6 - 53.5)]
BARAGA	[30.4% (9.4 - 51.4)]
OGEMAW	[30.2% (20.0 - 40.4)]
MACKINAC	[25.8% (9.7 - 41.9)]
ALCONA	[25.8% (2.4 - 49.1)]
ST CLAIR	[24.1% (19.9 - 28.2)]
JACKSON	[24.0% (20.6 - 27.4)]
MACOMB	[23.9% (21.8 - 26.0)]
LAPEER	[23.6% (17.1 - 30.1)]
OAKLAND	[23.5% (21.5 - 25.4)]
GENESEE	[23.4% (21.3 - 25.5)]
BENZIE	[23.3% (10.0 - 36.5)]
CASS	[23.3% (16.5 - 30.0)]
SANILAC	[23.2% (16.0 - 30.4)]

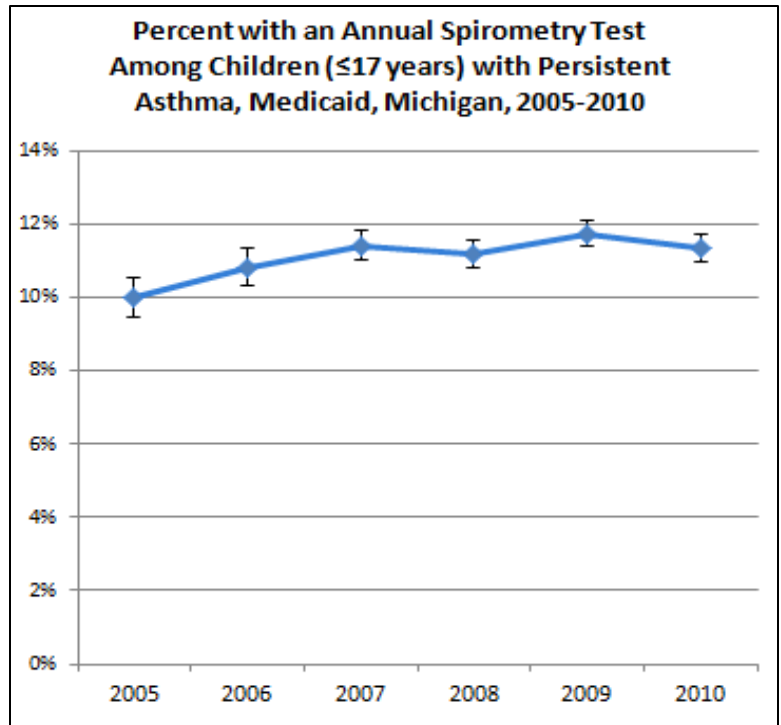
Arenac, Jackson, Macomb, Oakland, and Genesee are the only listed counties with  $\geq 2$  OCS proportions higher than the state prevalence of 20.1% (19.7 - 20.5).



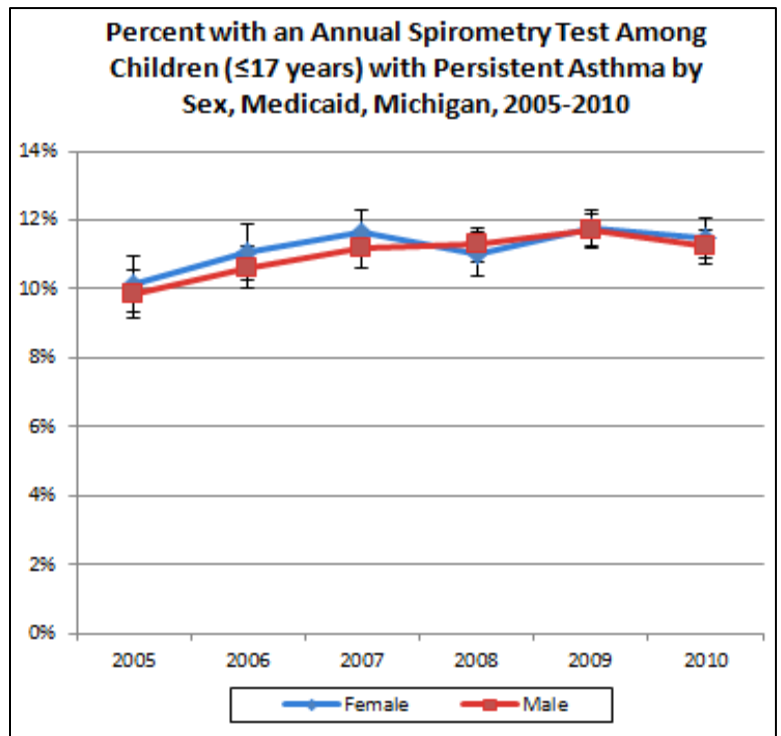
Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Spirometry is a pulmonary function test that measures lung capacity and a key diagnostic tool for assessing asthma. Spirometry is recommended at least every two years.
- The prevalence of an annual spirometry test among children in Medicaid with persistent asthma increased from 10.0% in 2005 to 11.4% in 2010. This represents a 13.8% increase in this indicator.



- Between 2005 and 2010, proportion of children in Medicaid with persistent asthma with an annual spirometry test increased 14.0% for male children and 13.3% female children (males: 9.9% to 11.2%, females: 10.1% to 11.5%, respectively).
- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with an annual spirometry test did not differ by sex.

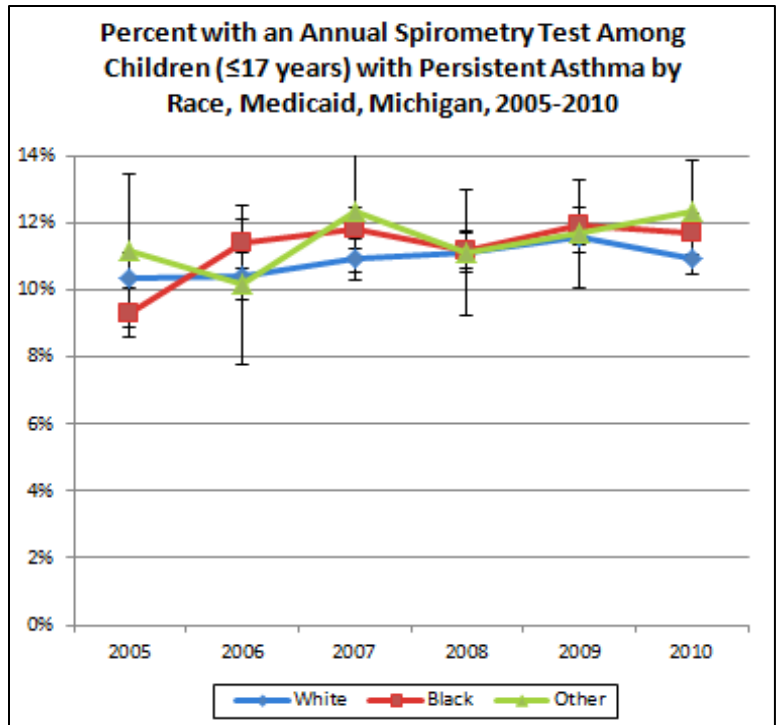


Data Notes: Source is the MDCH Data Warehouse

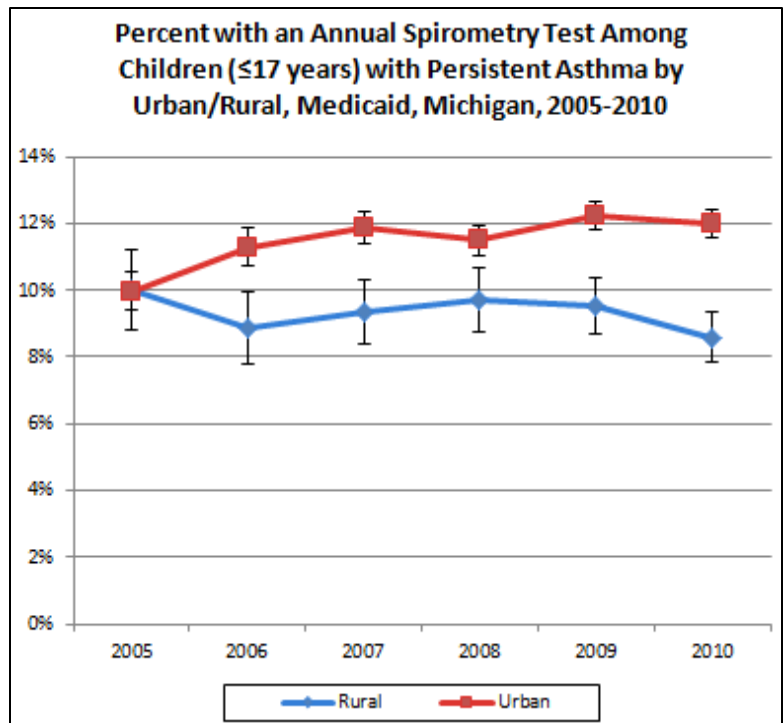
1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.



- Between 2005 and 2010, proportion of children in Medicaid with persistent asthma with an annual spirometry test increased 25.2% for blacks (9.3% to 11.7%). The proportion remained statistically constant for white children and children of other races (10.9% and 12.4% in 2010, respectively).



- Between 2005 and 2010, the proportion of children in Medicaid with persistent asthma with an annual spirometry test increased 20.2% for urban residents (10.0% to 12.0%). The proportion remained statistically constant for rural residents with a 2010 rate of 8.6%.
- Among children with persistent asthma in 2010, urban residents were 40% more likely to have had an annual spirometry test when compared rural residents.



Data Notes: Source is the MDCH Data Warehouse

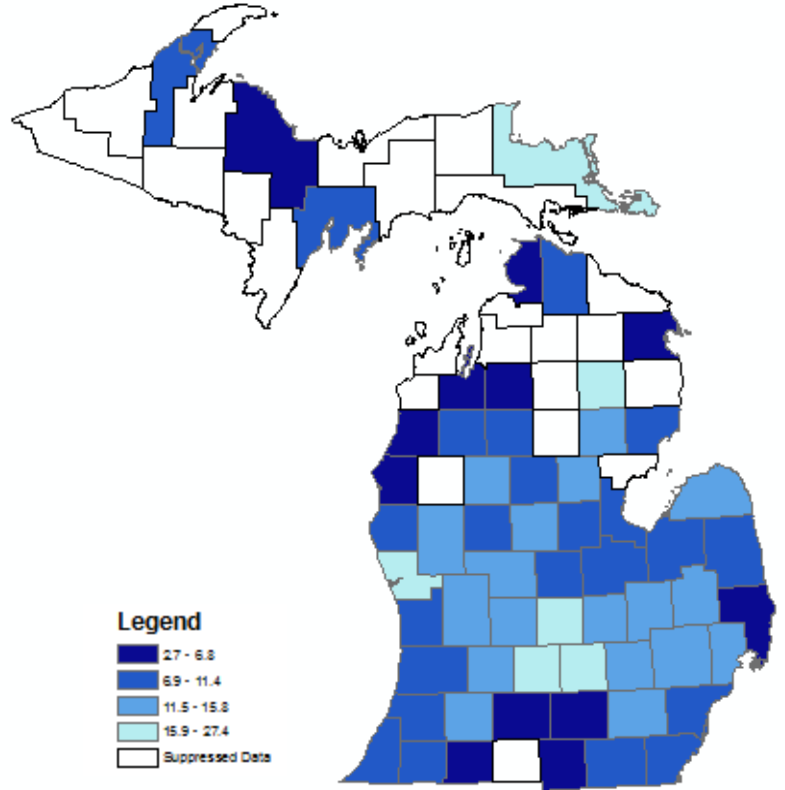
- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

Percent of Children ( $\leq 17$  years) with Persistent Asthma with  $\geq 1$  Spirometry Tests by County of Residence, Medicaid, Michigan, 2010

- Counties with the lowest proportion of annual spirometry testing among children in Medicaid with persistent asthma are:

KALKASKA	[6.8%	(0.8 - 12.8)]
CALHOUN	[6.6%	(4.5 - 8.8)]
MASON	[6.0%	(1.5 - 10.5)]
JACKSON	[6.0%	(4.1 - 7.8)]
ST. JOSEPH	[5.2%	(2.3 - 8.0)]
ST. CLAIR	[5.1%	(3.2 - 7.0)]
MANISTEE	[5.1%	(1.0 - 9.2)]
GRAND TRAVERSE	[4.2%	(1.2 - 7.2)]
ALPENA	[4.0 %	(0.8 - 7.3)]
MARQUETTE	[3.9%	(1.0 - 6.8)]
EMMET	[3.6%	(0.4 - 6.7)]
HILLSDALE	[2.7%	(0.7 - 4.7)]

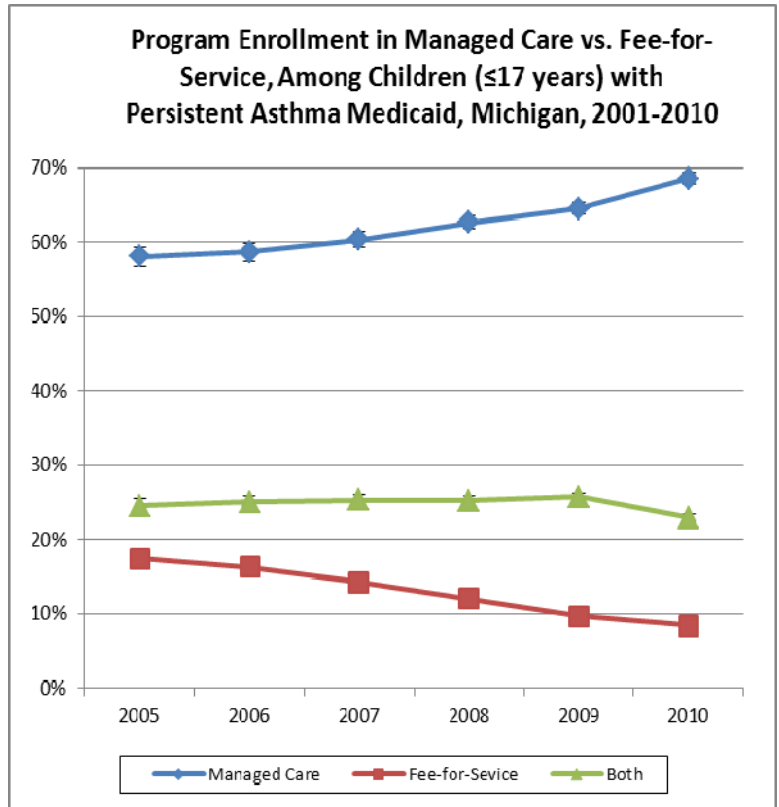
Except for Kalkaska, all listed counties had 2010 proportions lower than the state prevalence of 11.4% (11.0 - 11.7).



Data Notes: Source is the MDCH Data Warehouse

- Age-adjusted to the 2000 U.S. Standard Population
- See the Methods Section for the claims based definition of persistent asthma used in this report.
- Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

- Michigan Medicaid members are enrolled in either a fee-for-service or managed care payment arrangement and can change over time.
- In 2010, 69% of children in Medicaid with persistent asthma are enrolled in managed care, 8% are enrolled in a fee-for-service arrangement, and 23% experienced both types of payment structures during the calendar year.



Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### State Level Data - Male-Female Asthma Disparities, Michigan, 2005 vs. 2010

Measure	Male			Female			Male-Female Ratio	
	2005	2010	% Change 2005 to 2010	2005	2010	% Change 2005 to 2010	2005	2010
<b>Among All Children in Medicaid</b>								
Persistent Asthma (%)	5.9 (5.9 - 6.0)	6.4 (6.3 - 6.4)	7.1	4.3 (4.2 - 4.3)	4.6 (4.6 - 4.7)	8.5	1.39	1.37
ED Rate Per 10,000	240.4 (235.2 - 245.6)	236.4 (231.4 - 241.3)	-	164.7 (160.2 - 169.1)	166.5 (162.2 - 170.7)	-	1.46	1.42
Hospitalizations Per 10,000	47.3 (45.1 - 49.6)	27.8 (26.1 - 29.4)	-41.4	29.9 (28.0 - 31.8)	17.8 (16.4 - 19.1)	-40.6	1.58	1.56
<b>Among All Children in Medicaid with Persistent Asthma</b>								
Had 2+ Outpatient Visits (%)	27.0 (26.3 - 27.7)	29.2 (28.5 - 29.9)	8.1	26.7 (25.8 - 27.5)	27.9 (27.0 - 28.7)	-	-	-
Had 1+ ED Visit (%)	29.6 (28.9 - 30.4)	27.8 (27.1 - 28.5)	-6.3	29.2 (28.3 - 30.1)	27.8 (27.0 - 28.6)	-	-	-
Had 2+ ED Visits (%)	6.7 (6.4 - 7.1)	6.1 (5.8 - 6.5)	-	6 (5.6 - 6.4)	5.8 (5.4 - 6.1)	-	-	-
ED Reliance (%)	31.6 (30.6 - 32.6)	28.4 (27.5 - 29.2)	-10.2	31.8 (30.7 - 33.0)	29.2 (28.2 - 30.2)	-8.3	-	-
Had 1+ Hospitalization (%)	6.5 (6.2 - 6.9)	3.7 (3.5 - 4.0)	-42.7	6.1 (5.7 - 6.5)	3.4 (3.2 - 3.7)	-43.2	-	-
SABA Overuse (%)	13.7 (13.1 - 14.2)	13.2 (12.7 - 13.7)	-	11.9 (11.3 - 12.5)	12.7 (12.1 - 13.2)	-	1.15	-
Had 1+ Inhaled Corticosteroid (%)	65.4 (64.2 - 66.6)	68 (66.9 - 69.1)	4.0	64.8 (63.4 - 66.2)	66.3 (65.0 - 67.6)	-	-	-
Had 1+ Long Term Control (%)	78.9 (77.6 - 80.2)	78.8 (77.6 - 79.9)	-	78.2 (76.7 - 79.7)	77.7 (76.4 - 79.1)	-	-	-
Had 2+ Oral Corticosteroid (%)	18.9 (18.3 - 19.5)	20.6 (20.1 - 21.2)	9.3	17.8 (17.1 - 18.5)	19.2 (18.5 - 19.9)	-	-	1.08
Had Spirometry (%)	9.9 (9.4 - 10.3)	11.2 (10.8 - 11.7)	14.0	10.1 (9.6 - 10.7)	11.5 (10.9 - 12.0)	13.3	-	-

Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### State Level Data - Black-White Asthma Disparities, Michigan, 2005 vs. 2010

Measure	Black			White			Black-White Ratio	
	2005	2010	% Change 2005 to 2010	2005	2010	% Change 2005 to 2010	2005	2010
<b>Among All Children in Medicaid</b>								
Persistent Asthma (%)	5.6 (5.5 - 5.7)	6.2 (6.1 - 6.3)	11.3	5.1 (5.0 - 5.1)	5.3 (5.2 - 5.3)	4.0	1.10	1.18
ED Rate Per 10,000	351.6 (344.2 - 358.9)	363.3 (355.7 - 370.9)	-	113.9 (110.3 - 117.5)	113.8 (110.5 - 117.1)	-	3.09	3.19
Hospitalizations Per 10,000	68.6 (65.3 - 71.8)	40.3 (37.7 - 42.8)	-41.3	21.1 (19.6 - 22.6)	13.1 (12.1 - 14.2)	-37.7	3.25	3.06
<b>Among All Children in Medicaid with Persistent Asthma</b>								
Had 2+ Outpatient Visits (%)	24.1 (23.3 - 24.9)	26.6 (25.8 - 27.4)	10.5	28.5 (27.7 - 29.3)	29.1 (28.3 - 29.8)	-	0.85	0.91
Had 1+ ED Visit (%)	44.4 (43.3 - 45.5)	42.8 (41.7 - 43.8)	-	18.2 (17.6 - 18.9)	17.9 (17.3 - 18.5)	-	2.44	2.39
Had 2+ ED Visits (%)	11.1 (10.6 - 11.7)	10.2 (9.7 - 10.8)	-	3.0 (2.7 - 3.2)	3.0 (2.7 - 3.2)	-	3.76	3.46
ED Reliance (%)	44.9 (43.6 - 46.2)	40.9 (39.8 - 42.1)	-8.8	19.8 (18.9 - 20.7)	19.2 (18.4 - 20.0)	-	2.27	2.13
Had 1+ Hospitalization (%)	9.9 (9.4 - 10.4)	5.5 (5.2 - 5.9)	-44.1	3.7 (3.4 - 4.0)	2.3 (2.1 - 2.5)	-37.9	2.67	2.40
SABA Overuse (%)	13.9 (13.3 - 14.6)	13.0 (12.4 - 13.6)	-	11.9 (11.3 - 12.4)	13.0 (12.5 - 13.5)	9.5	1.17	-
Had 1+ Inhaled Corticosteroid (%)	63.1 (61.7 - 64.4)	65.9 (64.6 - 67.2)	4.5	66.2 (65.0 - 67.4)	67.1 (66.0 - 68.3)	-	0.95	-
Had 1+ Long Term Control (%)	70.5 (69.1 - 71.9)	70.4 (69.1 - 71.8)	-	84.7 (83.3 - 86.1)	83.1 (81.8 - 84.4)	-	0.83	0.85
Had 2+ Oral Corticosteroid (%)	19.1 (18.3 - 19.8)	19.1 (18.4 - 19.8)	-	17.8 (17.2 - 18.4)	20.2 (19.6 - 20.8)	13.4	-	-
Had Spirometry (%)	9.3 (8.8 - 9.8)	11.7 (11.1 - 12.2)	25.2	10.3 (9.8 - 10.9)	10.9 (10.5 - 11.4)	-	-	-

Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### State Level Data - Urban-Rural Asthma Disparities, Michigan, 2005 vs. 2010

Measure	Urban			Rural			Urban-Rural Ratio	
	2005	2010	% Change 2005 to 2010	2005	2010	% Change 2005 to 2010	2005	2010
<b>Among All Children in Medicaid</b>								
Persistent Asthma (%)	5.1 (5.0 - 5.1)	5.5 (5.4 - 5.5)	8.0	5.4 (5.3 - 5.6)	5.8 (5.6 - 5.9)	6.5	0.93	0.95
ED Rate Per 10,000	225.3 (221.2 - 229.3)	222.0 (218.2 - 225.7)	-	103.9 (98.1 - 109.7)	108.9 (103.1 - 114.7)	-	2.17	2.04
Hospitalizations Per 10,000	43.3 (41.6 - 45.0)	25.2 (23.9 - 26.4)	-41.8	18.6 (16.2 - 21.0)	12.0 (10.1 - 13.8)	-35.7	2.33	2.10
<b>Among All Children in Medicaid with Persistent Asthma</b>								
Had 2+ Outpatient Visits (%)	26.7 (26.0 - 27.3)	29.5 (28.9 - 30.0)	10.5	27.9 (26.6 - 29.2)	25.2 (24.0 - 26.4)	-9.8	-	1.17
Had 1+ ED Visit (%)	32.7 (32.0 - 33.4)	30.6 (30.0 - 31.2)	-6.6	15.9 (14.9 - 16.9)	15.6 (14.6 - 16.5)	-	2.06	1.96
Had 2+ ED Visits (%)	7.4 (7.1 - 7.7)	6.8 (6.5 - 7.1)	-8.5	2.4 (2.0 - 2.8)	2.4 (2.1 - 2.8)	-	3.10	2.80
ED Reliance (%)	34.6 (33.8 - 35.5)	30.5 (29.7 - 31.2)	-12.0	17.7 (16.3 - 19.0)	19.0 (17.6 - 20.4)	-	1.96	1.60
Had 1+ Hospitalization (%)	7.1 (6.8 - 7.4)	4.0 (3.8 - 4.2)	-44.0	3.1 (2.7 - 3.5)	1.9 (1.6 - 2.2)	-38.5	2.29	2.08
SABA Overuse (%)	13.2 (12.7 - 13.7)	13.2 (12.8 - 13.6)	-	11.3 (10.5 - 12.2)	12.1 (11.2 - 12.9)	-	1.16	-
Had 1+ Inhaled Corticosteroid (%)	65.2 (64.3 - 66.2)	68.3 (67.4 - 69.2)	4.7	65.1 (63.1 - 67.1)	62.9 (61.1 - 64.8)	-	-	1.09
Had 1+ Long Term Control (%)	76.8 (75.7 - 77.9)	76.9 (75.9 - 77.8)	-	86.4 (84.1 - 88.7)	85.0 (82.9 - 87.2)	-	0.89	0.90
Had 2+ Oral Corticosteroid (%)	19.1 (18.6 - 19.6)	20.7 (20.2 - 21.2)	8.3	15.9 (15.0 - 16.9)	17.4 (16.5 - 18.4)	-	1.20	1.19
Had Spirometry (%)	10.0 (9.6 - 10.4)	12.0 (11.6 - 12.4)	20.2	10.0 (9.2 - 10.8)	8.6 (7.9 - 9.3)	-	-	1.39

Data Notes: Source is the MDCH Data Warehouse

1. Age-adjusted to the 2000 U.S. Standard Population
2. See the Methods Section for the claims based definition of persistent asthma used in this report.
3. Medicaid population of children 17 years and younger is restricted to those with continuous Medicaid enrollment (11+ months), full Medicaid coverage, and no other insurance.

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### State Level Data, Michigan, 2005-2010

Measure	Year	Total	Female	Male	Black	Other	White	Rural	Urban
Among all children in Medicaid Persistent Asthma (%)	2005	5.1 (5.1-5.2)	4.3 (4.2-4.3)	5.9 (5.9-6.0)	5.6 (5.5-5.7)	3.8 (3.7-4.0)	5.1 (5.0-5.1)	5.4 (5.3-5.6)	5.1 (5.0-5.1)
	2006	5.1 (5.1-5.2)	4.3 (4.2-4.4)	6.0 (5.9-6.0)	5.5 (5.4-5.6)	4.0 (3.9-4.2)	5.1 (5.1-5.2)	5.6 (5.5-5.7)	5.0 (5.0-5.1)
	2007	5.2 (5.1-5.2)	4.3 (4.2-4.4)	6.0 (5.9-6.1)	5.7 (5.6-5.8)	4.0 (3.8-4.2)	5.1 (5.0-5.1)	5.4 (5.3-5.6)	5.1 (5.1-5.2)
	2008	5.2 (5.1-5.3)	4.3 (4.2-4.4)	6.0 (6.0-6.1)	5.8 (5.7-5.9)	4.2 (4.1-4.4)	5.0 (4.9-5.1)	5.4 (5.3-5.5)	5.2 (5.1-5.2)
	2009	5.4 (5.3-5.4)	4.5 (4.4-4.5)	6.2 (6.1-6.3)	6.1 (6.0-6.2)	4.6 (4.4-4.7)	5.1 (5.0-5.2)	5.6 (5.4-5.7)	5.3 (5.3-5.4)
	2010	5.5 (5.5-5.6)	4.6 (4.6-4.7)	6.4 (6.3-6.4)	6.2 (6.1-6.3)	4.8 (4.7-5.0)	5.3 (5.2-5.3)	5.8 (5.6-5.9)	5.5 (5.4-5.5)
ED Rate Per 10,000	2005	203.4 (200.0-206.9)	164.7 (160.2-169.1)	240.4 (235.2-245.6)	351.6 (344.2-358.9)	117.0 (108.0-126.0)	113.9 (110.3-117.5)	103.9 (98.1-109.7)	225.3 (221.2-229.3)
	2006	194.2 (190.8-197.5)	156.9 (152.6-161.2)	229.6 (224.5-234.6)	329.0 (321.9-336.1)	127.1 (118.0-136.1)	113.3 (109.7-116.8)	106.3 (100.4-112.2)	213.2 (209.4-217.1)
	2007	197.2 (193.8-200.6)	158.6 (154.2-163.0)	233.9 (228.7-239.1)	350.9 (343.4-358.3)	117.9 (109.2-126.7)	105.2 (101.8-108.7)	99.7 (93.9-105.6)	217.9 (213.9-221.8)
	2008	194.4 (191.0-197.8)	157.5 (153.1-161.9)	229.4 (224.2-234.5)	339.8 (332.3-347.2)	133.9 (125.1-142.6)	108.3 (104.7-111.8)	96.7 (90.9-102.5)	215.1 (211.2-219.1)
	2009	208.9 (205.5-212.3)	169.3 (164.8-173.7)	246.5 (241.3-251.7)	370.4 (362.7-378.1)	158.0 (148.8-167.1)	118.1 (114.6-121.6)	107.9 (102.0-113.8)	230.5 (226.6-234.4)
	2010	202.3 (199.1-205.6)	166.5 (162.2-170.7)	236.4 (231.4-241.3)	363.3 (355.7-370.9)	163.4 (154.8-172.1)	113.8 (110.5-117.1)	108.9 (103.1-114.7)	222.0 (218.2-225.7)
Hospitalizations Per 10,000	2005	38.8 (37.3-40.3)	29.9 (28.0-31.8)	47.3 (45.1-49.6)	68.6 (65.3-71.8)	21.0 (17.5-24.5)	21.1 (19.6-22.6)	18.6 (16.2-21.0)	43.3 (41.6-45.0)
	2006	33.1 (31.8-34.5)	24.8 (23.1-26.5)	41.0 (38.9-43.1)	56.8 (53.9-59.8)	19.4 (15.9-22.8)	19.2 (17.8-20.7)	18.6 (16.2-21.0)	36.3 (34.7-37.8)
	2007	32.1 (30.7-33.4)	26.1 (24.3-27.8)	37.8 (35.8-39.9)	56.3 (53.4-59.3)	21.4 (17.9-24.9)	17.3 (15.9-18.7)	14.4 (12.2-16.5)	35.8 (34.3-37.4)
	2008	30.9 (29.5-32.2)	23.1 (21.5-24.8)	38.3 (36.2-40.3)	53.3 (50.3-56.2)	26.6 (22.8-30.3)	16.7 (15.4-18.0)	15.1 (12.9-17.3)	34.2 (32.7-35.8)
	2009	28.2 (27.0-29.5)	21.5 (20.0-23.1)	34.6 (32.7-36.5)	48.0 (45.2-50.8)	22.3 (18.9-25.6)	17.0 (15.8-18.3)	16.9 (14.6-19.1)	30.7 (29.2-32.1)
	2010	22.9 (21.8-24.0)	17.8 (16.4-19.1)	27.8 (26.1-29.4)	40.3 (37.7-42.8)	19.4 (16.6-22.3)	13.1 (12.1-14.2)	12.0 (10.1-13.8)	25.2 (23.9-26.4)
Among children in Medicaid with Persistent Asthma Had 2+ Outpatient Visits (%)	2005	26.9 (26.3-27.5)	26.7 (25.8-27.5)	27.0 (26.3-27.7)	24.1 (23.3-24.9)	31.7 (29.3-34.1)	28.5 (27.7-29.3)	27.9 (26.6-29.2)	26.7 (26.0-27.3)
	2006	26.0 (25.4-26.5)	26.0 (25.2-26.9)	25.9 (25.2-26.6)	25.1 (24.3-26.0)	29.8 (27.6-32.1)	26.0 (25.3-26.8)	22.5 (21.4-23.7)	26.8 (26.2-27.4)
	2007	28.1 (27.5-28.6)	27.2 (26.3-28.0)	28.6 (27.8-29.4)	26.4 (25.6-27.3)	33.1 (30.8-35.5)	28.6 (27.8-29.4)	26.1 (24.8-27.4)	28.5 (27.9-29.2)
	2008	27.7 (27.1-28.2)	27.1 (26.2-27.9)	28.0 (27.2-28.7)	26.0 (25.2-26.9)	31.7 (29.5-33.8)	28.2 (27.4-29.0)	25.6 (24.3-26.9)	28.1 (27.5-28.8)
	2009	29.1 (28.5-29.6)	28.4 (27.6-29.3)	29.4 (28.7-30.2)	26.9 (26.0-27.7)	34.9 (32.9-37.0)	29.7 (28.9-30.5)	25.6 (24.4-26.8)	29.8 (29.2-30.5)
	2010	28.7 (28.1-29.2)	27.9 (27.0-28.7)	29.2 (28.5-29.9)	26.6 (25.8-27.4)	34.4 (32.5-36.3)	29.1 (28.3-29.8)	25.2 (24.0-26.4)	29.5 (28.9-30.0)
Had 1+ ED Visits (%)	2005	29.5 (28.9-30.1)	29.2 (28.3-30.1)	29.6 (28.9-30.4)	44.4 (43.3-45.5)	23.9 (21.8-26.0)	18.2 (17.6-18.9)	15.9 (14.9-16.9)	32.7 (32.0-33.4)
	2006	28.5 (27.9-29.1)	28.3 (27.4-29.2)	28.5 (27.7-29.2)	42.6 (41.5-43.7)	24.8 (22.7-26.9)	18.2 (17.5-18.8)	15.9 (14.9-16.9)	31.5 (30.8-32.2)
	2007	28.8 (28.2-29.4)	28.4 (27.5-29.3)	28.9 (28.1-29.7)	43.9 (42.8-45.0)	23.2 (21.2-25.2)	17.4 (16.8-18.1)	15.3 (14.3-16.3)	31.8 (31.1-32.5)
	2008	28.7 (28.1-29.3)	28.5 (27.6-29.4)	28.8 (28.0-29.5)	43.0 (41.9-44.1)	23.6 (21.8-25.5)	18.0 (17.4-18.7)	15.4 (14.4-16.4)	31.6 (30.9-32.3)
	2009	30.0 (29.4-30.5)	29.8 (28.9-30.7)	29.9 (29.2-30.7)	44.9 (43.8-46.0)	25.6 (23.8-27.3)	19.4 (18.7-20.0)	16.8 (15.8-17.8)	32.9 (32.2-33.5)
	2010	27.8 (27.3-28.4)	27.8 (27.0-28.6)	27.8 (27.1-28.5)	42.8 (41.7-43.8)	23.5 (22.0-25.1)	17.9 (17.3-18.5)	15.6 (14.6-16.5)	30.6 (30.0-31.2)
ED Reliance (%)	2005	31.8 (31.0-32.5)	31.8 (30.7-33.0)	31.6 (30.6-32.6)	44.9 (43.6-46.2)	24.0 (21.3-26.7)	19.8 (18.9-20.7)	17.7 (16.3-19.0)	34.6 (33.8-35.5)
	2006	31.6 (30.9-32.4)	31.6 (30.5-32.8)	31.5 (30.5-32.5)	42.5 (41.2-43.8)	26.4 (23.6-29.2)	21.5 (20.6-22.4)	21.2 (19.6-22.7)	33.6 (32.7-34.4)
	2007	30.2 (29.5-30.9)	30.5 (29.4-31.7)	29.9 (28.9-30.9)	42.4 (41.2-43.7)	23.4 (20.9-25.9)	18.9 (18.1-19.8)	18.5 (17.0-19.9)	32.3 (31.5-33.2)
	2008	29.9 (29.1-30.6)	30.0 (28.9-31.2)	29.8 (28.9-30.8)	41.3 (40.1-42.6)	23.3 (21.1-25.6)	19.6 (18.7-20.5)	18.5 (17.0-20.0)	31.9 (31.1-32.7)
	2009	30.1 (29.5-30.8)	30.7 (29.6-31.8)	29.7 (28.8-30.6)	42.2 (41.0-43.4)	24.4 (22.3-26.6)	19.9 (19.1-20.8)	19.6 (18.2-21.1)	32.0 (31.2-32.8)
	2010	28.7 (28.1-29.4)	29.2 (28.2-30.2)	28.4 (27.5-29.2)	40.9 (39.8-42.1)	21.7 (19.8-23.6)	19.2 (18.4-20.0)	19.0 (17.6-20.4)	30.5 (29.7-31.2)
Had 2+ ED Visits (%)	2005	6.5 (6.2-6.7)	6.0 (5.6-6.4)	6.7 (6.4-7.1)	11.1 (10.6-11.7)	4.3 (3.4-5.1)	3.0 (2.7-3.2)	2.4 (2.0-2.8)	7.4 (7.1-7.7)
	2006	5.9 (5.7-6.2)	5.4 (5.0-5.8)	6.3 (5.9-6.6)	10.2 (9.6-10.7)	4.9 (4.1-5.8)	2.8 (2.5-3.0)	2.3 (1.9-2.6)	6.8 (6.5-7.1)
	2007	6.2 (5.9-6.4)	6.0 (5.6-6.4)	6.3 (5.9-6.6)	10.8 (10.3-11.4)	4.2 (3.4-5.0)	2.6 (2.4-2.9)	2.3 (1.9-2.7)	7.0 (6.7-7.3)
	2008	6.0 (5.7-6.3)	5.6 (5.2-6.0)	6.3 (5.9-6.6)	10.2 (9.7-10.7)	4.9 (4.1-5.7)	2.8 (2.5-3.1)	2.0 (1.7-2.4)	6.9 (6.6-7.2)
	2009	6.1 (5.9-6.4)	5.7 (5.3-6.1)	6.4 (6.1-6.8)	10.4 (9.9-10.9)	5.5 (4.7-6.3)	3.0 (2.7-3.2)	2.1 (1.8-2.5)	7.0 (6.7-7.3)
	2010	6.0 (5.7-6.2)	5.8 (5.4-6.1)	6.1 (5.8-6.5)	10.2 (9.7-10.8)	5.8 (5.1-6.5)	3.0 (2.7-3.2)	2.4 (2.1-2.8)	6.8 (6.5-7.1)

Source: Data Warehouse, MDCH

**Epidemiology of Asthma in Michigan**  
**Chapter 9: Asthma Burden for Children in Medicaid**

**State Level Data, Michigan, 2005-2010**

Measure	Year	Total	Female	Male	Black	Other	White	Rural	Urban
Had 1+ Hospitalizations (%)	2005	6.4 (6.1-6.6)	6.1 (5.7-6.5)	6.5 (6.2-6.9)	9.9 (9.4-10.4)	4.8 (3.9-5.7)	3.7 (3.4-4.0)	3.1 (2.7-3.5)	7.1 (6.8-7.4)
	2006	5.4 (5.2-5.7)	5.1 (4.8-5.5)	5.7 (5.3-6.0)	8.4 (7.9-8.9)	4.3 (3.5-5.1)	3.3 (3.1-3.6)	2.8 (2.4-3.2)	6.1 (5.8-6.4)
	2007	5.3 (5.0-5.5)	5.3 (4.9-5.6)	5.3 (5.0-5.6)	8.2 (7.7-8.7)	4.2 (3.5-5.0)	3.1 (2.8-3.3)	2.3 (1.9-2.7)	5.9 (5.7-6.2)
	2008	5.1 (4.9-5.4)	4.8 (4.4-5.2)	5.4 (5.1-5.7)	7.8 (7.3-8.2)	4.7 (3.9-5.5)	3.1 (2.9-3.4)	2.6 (2.2-3.0)	5.7 (5.4-6.0)
	2009	4.6 (4.4-4.8)	4.3 (4.0-4.6)	4.7 (4.5-5.0)	6.6 (6.2-7.0)	3.9 (3.3-4.6)	3.2 (2.9-3.4)	2.8 (2.4-3.2)	5.0 (4.7-5.2)
	2010	3.6 (3.4-3.8)	3.4 (3.2-3.7)	3.7 (3.5-4.0)	5.5 (5.2-5.9)	3.2 (2.7-3.8)	2.3 (2.1-2.5)	1.9 (1.6-2.2)	4.0 (3.8-4.2)
SABA Overuse (%)	2005	12.8 (12.4-13.3)	11.9 (11.3-12.5)	13.7 (13.1-14.2)	13.9 (13.3-14.6)	13.2 (11.5-15)	11.9 (11.3-12.4)	11.3 (10.5-12.2)	13.2 (12.7-13.7)
	2006	12.7 (12.2-13.1)	11.9 (11.3-12.5)	13.3 (12.8-13.9)	13.9 (13.3-14.6)	12.7 (11-14.4)	11.6 (11.1-12.2)	10.8 (9.9-11.6)	13.1 (12.6-13.5)
	2007	12.6 (12.2-13.0)	12.0 (11.4-12.6)	13.1 (12.6-13.7)	13.9 (13.3-14.6)	12.2 (10.6-13.8)	11.5 (11.0-12.1)	10.7 (9.8-11.6)	13.0 (12.6-13.5)
	2008	13.1 (12.6-13.5)	12.5 (11.9-13.1)	13.5 (13.0-14.1)	13.8 (13.2-14.5)	12.5 (11.0-13.9)	12.5 (12.0-13.1)	11.1 (10.2-11.9)	13.5 (13.0-14.0)
	2009	12.4 (12.0-12.7)	11.7 (11.1-12.2)	12.9 (12.4-13.5)	12.4 (11.8-13.0)	12.0 (10.7-13.3)	12.4 (11.9-13.0)	11.3 (10.4-12.2)	12.6 (12.2-13.0)
	2010	13.0 (12.6-13.4)	12.7 (12.1-13.2)	13.2 (12.7-13.7)	13.0 (12.4-13.6)	12.6 (11.4-13.9)	13.0 (12.5-13.5)	12.1 (11.2-12.9)	13.2 (12.8-13.6)
Had 1+ Inhaled Corticosteroid (%)	2005	65.2 (64.3-66.1)	64.8 (63.4-66.2)	65.4 (64.2-66.6)	63.1 (61.7-64.4)	70.2 (66.5-73.9)	66.2 (65.0-67.4)	65.1 (63.1-67.1)	65.2 (64.3-66.2)
	2006	65.3 (64.4-66.1)	65.0 (63.7-66.4)	65.3 (64.1-66.5)	64.6 (63.3-66.0)	69.0 (65.4-72.5)	65.1 (63.9-66.3)	64.4 (62.4-66.3)	65.5 (64.5-66.5)
	2007	64.8 (63.9-65.6)	64.2 (62.8-65.6)	65.1 (63.9-66.3)	64.0 (62.7-65.4)	69.8 (66.3-73.2)	64.5 (63.3-65.7)	62.0 (60.0-64.0)	65.4 (64.4-66.3)
	2008	65.8 (64.9-66.7)	65.1 (63.7-66.4)	66.2 (65.0-67.4)	65.1 (63.8-66.5)	70.7 (67.5-74.0)	65.4 (64.1-66.6)	61.8 (59.8-63.8)	66.7 (65.7-67.7)
	2009	65.8 (65.0-66.7)	64.6 (63.3-65.9)	66.6 (65.5-67.8)	64.3 (63.0-65.6)	69.6 (66.6-72.5)	66.3 (65.1-67.4)	61.8 (59.9-63.8)	66.7 (65.8-67.7)
	2010	67.3 (66.5-68.1)	66.3 (65.0-67.6)	68.0 (66.9-69.1)	65.9 (64.6-67.2)	73.1 (70.4-75.9)	67.1 (66.0-68.3)	62.9 (61.1-64.8)	68.3 (67.4-69.2)
Had 1+ Long-Term Control (%)	2005	78.6 (77.7-79.6)	78.2 (76.7-79.7)	78.9 (77.6-80.2)	70.5 (69.1-71.9)	81.9 (77.9-85.9)	84.7 (83.3-86.1)	86.4 (84.1-88.7)	76.8 (75.7-77.9)
	2006	79.6 (78.7-80.6)	79.3 (77.8-80.8)	79.8 (78.5-81.1)	71.8 (70.4-73.2)	82.6 (78.7-86.5)	85.3 (83.9-86.7)	87.5 (85.1-89.8)	77.8 (76.7-78.8)
	2007	78.3 (77.3-79.2)	78.1 (76.6-79.6)	78.4 (77.1-79.7)	70.1 (68.6-71.5)	81.5 (77.8-85.3)	84.4 (83.0-85.8)	86.3 (83.9-88.6)	76.5 (75.4-77.5)
	2008	78.0 (77.0-79.0)	77.8 (76.3-79.3)	78.1 (76.9-79.4)	70.5 (69.1-71.9)	81.8 (78.3-85.3)	83.4 (81.9-84.8)	85.6 (83.3-88.0)	76.3 (75.2-77.4)
	2009	77.2 (76.2-78.1)	76.4 (75.0-77.8)	77.7 (76.5-78.9)	69.1 (67.7-70.5)	79.7 (76.5-82.9)	82.8 (81.5-84.2)	84.5 (82.3-86.8)	75.5 (74.5-76.5)
	2010	78.3 (77.5-79.2)	77.7 (76.4-79.1)	78.8 (77.6-79.9)	70.4 (69.1-71.8)	83.0 (80.1-86.0)	83.1 (81.8-84.4)	85.0 (82.9-87.2)	76.9 (75.9-77.8)
Had 2+ Oral Corticosteroid (%)	2005	18.5 (18.0-18.9)	17.8 (17.1-18.5)	18.9 (18.3-19.5)	19.1 (18.3-19.8)	20.1 (18.2-22.0)	17.8 (17.2-18.4)	15.9 (15.0-16.9)	19.1 (18.6-19.6)
	2006	18.9 (18.4-19.3)	18.3 (17.6-19.0)	19.2 (18.6-19.7)	19.2 (18.5-19.9)	22.5 (20.6-24.5)	18.1 (17.5-18.7)	16.0 (15.1-17.0)	19.5 (19.0-20.1)
	2007	18.5 (18.1-19.0)	18.0 (17.3-18.7)	18.8 (18.2-19.4)	19.0 (18.3-19.7)	21.3 (19.5-23.1)	17.7 (17.1-18.4)	15.4 (14.5-16.4)	19.2 (18.7-19.7)
	2008	19.4 (18.9-19.9)	18.7 (18.0-19.4)	19.7 (19.1-20.3)	19.6 (18.9-20.4)	21.7 (20.0-23.3)	18.7 (18.1-19.4)	16.1 (15.1-17.1)	20.1 (19.6-20.6)
	2009	19.5 (19.0-19.9)	19.0 (18.3-19.7)	19.7 (19.2-20.3)	18.7 (18.0-19.4)	22.8 (21.2-24.4)	19.5 (18.9-20.1)	16.8 (15.8-17.8)	20.1 (19.6-20.6)
	2010	20.1 (19.7-20.5)	19.2 (18.5-19.9)	20.6 (20.1-21.2)	19.1 (18.4-19.8)	22.9 (21.4-24.3)	20.2 (19.6-20.8)	17.4 (16.5-18.4)	20.7 (20.2-21.2)
Had Spirometry (%)	2005	10.0 (9.6-10.3)	10.1 (9.6-10.7)	9.9 (9.4-10.3)	9.3 (8.8-9.8)	11.2 (9.6-12.8)	10.3 (9.8-10.9)	10.0 (9.2-10.8)	10.0 (9.6-10.4)
	2006	10.8 (10.4-11.2)	11.1 (10.5-11.6)	10.6 (10.1-11.1)	11.4 (10.8-12.0)	10.2 (8.7-11.6)	10.4 (9.9-10.9)	8.9 (8.1-9.6)	11.3 (10.9-11.7)
	2007	11.4 (11.0-11.8)	11.7 (11.1-12.3)	11.2 (10.7-11.7)	11.8 (11.2-12.4)	12.3 (10.7-14.0)	10.9 (10.4-11.4)	9.3 (8.5-10.1)	11.9 (11.4-12.3)
	2008	11.2 (10.8-11.5)	11.0 (10.4-11.6)	11.3 (10.8-11.8)	11.2 (10.6-11.8)	11.1 (9.7-12.5)	11.1 (10.6-11.6)	9.7 (8.9-10.5)	11.5 (11.1-11.9)
	2009	11.7 (11.4-12.1)	11.8 (11.2-12.3)	11.7 (11.2-12.2)	11.9 (11.3-12.5)	11.7 (10.4-13.0)	11.6 (11.1-12.1)	9.5 (8.8-10.3)	12.2 (11.8-12.6)
	2010	11.4 (11.0-11.7)	11.5 (10.9-12.0)	11.2 (10.8-11.7)	11.7 (11.1-12.2)	12.4 (11.1-13.6)	10.9 (10.5-11.4)	8.6 (7.9-9.3)	12.0 (11.6-12.4)



## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### County Level Data - Among All Children in Medicaid, Michigan, 2010

County	Prevalence (%) of Persistent Asthma		Emergency Department Rate Per 10,000		Hospitalization Rate Per 10,000	
State Prevalence/Rate	5.5	(5.5 - 5.6)	202.3	(199.1 - 205.6)	22.9	(21.8 - 24.0)
ALCONA	5.9	(4.0 - 7.9)	*		*	
ALGER	-					
ALLEGAN	4.9	(4.4 - 5.5) ↓	92.0	(70.0 - 114.0) ↓	8.3	(1.5 - 15.0) ↓
ALPENA	6.5	(5.4 - 7.7)	86.7	(45.3 - 128.1) ↓	*	
ANTRIM	4.9	(3.9 - 5.9)	34.6	(6.8 - 62.4) ↓	*	
ARENAC	4.8	(3.6 - 6.0)	141.7	(76.2 - 207.2)	*	
BARAGA	5.6	(3.7 - 7.5)	138.3	(41.3 - 235.3)	*	
BARRY	6.8	(5.9 - 7.7) ↑	105.8	(70.2 - 141.4) ↓	*	
BAY	5.4	(4.9 - 5.9)	154.4	(126.2 - 182.7) ↓	15.5	(7.1 - 24.0)
BENZIE	5.0	(3.7 - 6.3)	88.3	(33.5 - 143.1) ↓	*	
BERRIEN	6.4	(5.9 - 6.8) ↑	147.7	(127.3 - 168.1) ↓	10.3	(5.0 - 15.5) ↓
BRANCH	4.9	(4.2 - 5.6)	101.3	(69.1 - 133.6) ↓	13.7	(2.7 - 24.7)
CALHOUN	5.0	(4.6 - 5.4) ↓	133.7	(113.0 - 154.4) ↓	9.8	(4.4 - 15.1) ↓
CASS	5.4	(4.7 - 6.2)	76.8	(49.6 - 104.1) ↓	*	
CHARLEVOIX	4.9	(3.8 - 6.0)	134.6	(78.2 - 191.0) ↓	*	
CHEBOYGAN	6.1	(5.0 - 7.1)	59.8	(27.2 - 92.5) ↓	*	
CHIPPEWA	4.8	(3.9 - 5.7)	94.2	(54.9 - 133.5) ↓	*	
CLARE	6.4	(5.5 - 7.4)	103.8	(65.8 - 141.7) ↓	*	
CLINTON	6.6	(5.6 - 7.6) ↑	157.1	(108.8 - 205.3)	19.4	(3.8 - 35.0)
CRAWFORD	4.7	(3.4 - 6.0)	232.7	(139.4 - 326.1)	*	
DELTA	8.4	(7.3 - 9.6) ↑	85.4	(47.7 - 123.1) ↓	*	
DICKINSON	4.2	(3.1 - 5.3) ↓	63.3	(21.7 - 104.9) ↓	*	
EATON	6.3	(5.6 - 7.0) ↓	165.9	(131.0 - 200.7)	21.8	(9.3 - 34.3)
EMMET	5.7	(4.7 - 6.7)	108.4	(65.9 - 151.0) ↓	*	
GENESEE	4.7	(4.5 - 4.9) ↓	181.4	(168.6 - 194.1) ↓	20.4	(16.2 - 24.6)
GLADWIN	6.5	(5.4 - 7.7)	79.8	(39.4 - 120.2) ↓	*	
GOGEBIC	4.8	(3.5 - 6.1)	91.6	(34.5 - 148.8) ↓	*	
GRAND TRAVERSE	3.8	(3.2 - 4.3) ↓	40.1	(22.8 - 57.5) ↓	11.1	(2.1 - 20.1) ↓
GRATIOT	6.7	(5.8 - 7.6) ↑	94.5	(60.3 - 128.8) ↓	26.6	(9.1 - 44.0)
HILLSDALE	11.5	(10.4 - 12.6) ↑	115.6	(80.9 - 150.4) ↓	*	
HOUGHTON	5.9	(4.8 - 6.9)	83.3	(42.1 - 124.5) ↓	*	
HURON	4.6	(3.7 - 5.5) ↓	136.7	(86.0 - 187.3) ↓	*	
INGHAM	7.0	(6.6 - 7.4) ↑	206.4	(185.6 - 227.1)	32.5	(24.8 - 40.2) ↑
IONIA	4.8	(4.2 - 5.5) ↓	169.4	(130.3 - 208.5)	12.0	(2.4 - 21.6) ↓
IOSCO	5.6	(4.6 - 6.7)	118.8	(71.3 - 166.4) ↓	*	
IRON	4.8	(3.2 - 6.4)	*		*	
ISABELLA	9.0	(8.0 - 10.1) ↑	136.7	(96.6 - 176.9) ↓	36.4	(16.9 - 55.9)
JACKSON	6.5	(6.0 - 7.0) ↑	156.2	(133.9 - 178.5) ↓	19.6	(12.0 - 27.1)
KALAMAZOO	5.5	(5.2 - 5.9)	216.8	(194.5 - 239.2)	18.2	(11.7 - 24.8)
KALKASKA	4.8	(3.7 - 5.8)	52.3	(17.9 - 86.8) ↓	30.9	(3.6 - 58.2)
KENT	5.5	(5.2 - 5.7)	127.5	(116.9 - 138.1) ↓	14.5	(11.0 - 17.9) ↓
KEWEENAW	-					
LAKE	4.3	(3.1 - 5.6)	113.9	(49.3 - 178.5) ↓	*	
LAPEER	3.9	(3.4 - 4.4) ↓	79.1	(55.7 - 102.6) ↓	8.5	(1.0 - 15.9) ↓

Source: Data Warehouse, Michigan Department of Community Health, (-) Beneficiaries <30, (\*) Fewer than 5 cases

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### County Level Data - Among All Children in Medicaid, Michigan, 2010

County	Prevalence (%) of Persistent Asthma			Emergency Department Rate Per 10,000		Hospitalization Rate Per 10,000	
State Prevalence/Rate	5.5	(5.5 - 5.6)		202.3	(199.1 - 205.6)	22.9	(21.8 - 24.0)
LEELANAU	-						
LENAWEE	7.2	(6.5 - 7.8) ↑		138.3	(109.0 - 167.6) ↓	11.4	(3.4 - 19.4) ↓
LIVINGSTON	5.8	(5.1 - 6.4)		165.9	(132.8 - 199.1) ↓	22.9	(10.9 - 34.9)
LUCE	-						
MACKINAC	6.4	(4.3 - 8.4)		301.6	(165.3 - 437.9)	*	
MACOMB	4.3	(4.2 - 4.5) ↓		191.8	(179.5 - 204.0)	19.8	(16.0 - 23.7) ↓
MANISTEE	6.9	(5.6 - 8.2) ↑		246.6	(168.8 - 324.5)	*	
MARQUETTE	5.3	(4.5 - 6.2)		113.1	(74.3 - 151.9) ↓	*	
MASON	5.5	(4.5 - 6.5)		116.2	(69.9 - 162.4) ↓	*	
MECOSTA	5.2	(4.4 - 6.0)		130.0	(88.3 - 171.7) ↓	*	
MENOMINEE	6.5	(5.1 - 8.0)		102.3	(46.4 - 158.3) ↓	*	
MIDLAND	7.0	(6.2 - 7.8) ↑		78.4	(51.8 - 105.0) ↓	19.3	(6.5 - 32.0)
MISSAUKEE	5.3	(4.0 - 6.7)		54.8	(14.1 - 95.5) ↓	36.3	(4.5 - 68.2)
MONROE	5.6	(5.1 - 6.2)		171.3	(142.3 - 200.2)	24.6	(14.3 - 35.0)
MONTCALM	6.0	(5.3 - 6.7)		145.7	(112.0 - 179.5) ↓	25.8	(11.6 - 40.0)
MONTMORENCY	5.8	(4.0 - 7.6)		110.0	(33.7 - 186.2) ↓	*	
MUSKEGON	5.1	(4.8 - 5.5) ↓		183.3	(162.5 - 204.2)	21.7	(14.7 - 28.7)
NEWAYGO	5.9	(5.1 - 6.6)		94.9	(65.6 - 124.2) ↓	11.8	(1.4 - 22.3) ↓
OAKLAND	4.7	(4.5 - 4.9) ↓		185.9	(174.1 - 197.6) ↓	17.2	(13.7 - 20.7) ↓
OCEANA	5.0	(4.1 - 5.8)		213.1	(155.0 - 271.1)	*	
OGEMAW	6.1	(5.0 - 7.3)		115.6	(67.2 - 163.9) ↓	*	
ONTONAGON	-						
OSCEOLA	5.2	(4.2 - 6.3)		122.6	(73.4 - 171.9) ↓	25.2	(3.1 - 47.4)
OSCODA	4.9	(3.2 - 6.6)		109.7	(28.3 - 191.2) ↓	*	
OTSEGO	6.5	(5.3 - 7.6)		71.8	(33.9 - 109.6) ↓	*	
OTTAWA	4.8	(4.4 - 5.2) ↓		90.0	(73.0 - 107.0) ↓	5.7	(1.4 - 10.0) ↓
PRESQUE ISLE	5.7	(4.1 - 7.4)		75.6	(15.0 - 136.2) ↓	*	
ROSCOMMON	5.8	(4.7 - 6.9)		128.6	(78.1 - 179.1) ↓	35.6	(9.2 - 62.0)
SAGINAW	5.1	(4.7 - 5.4) ↓		194.4	(174.3 - 214.5)	20.0	(13.7 - 26.3)
SANILAC	5.0	(4.3 - 5.8)		130.9	(92.6 - 169.2) ↓	*	
SCHOOLCRAFT	7.5	(5.2 - 9.7)		*		*	
SHIAWASSEE	5.4	(4.8 - 6.1)		73.7	(49.4 - 98.0) ↓	9.1	(1.1 - 17.1) ↓
ST CLAIR	4.6	(4.2 - 5.0) ↓		126.5	(106.1 - 146.8) ↓	14.9	(8.2 - 21.6) ↓
ST JOSEPH	5.6	(5.0 - 6.2)		144.3	(113.4 - 175.2) ↓	10.4	(1.9 - 18.9) ↓
TUSCOLA	5.2	(4.6 - 5.9)		114.2	(82.5 - 145.9) ↓	*	
VAN BUREN	5.0	(4.5 - 5.5) ↓		161.9	(132.7 - 191.1) ↓	11.9	(4.1 - 19.7) ↓
WASHTENAW	7.8	(7.3 - 8.3) ↑		287.9	(260.2 - 315.6) ↑	50.4	(38.8 - 61.9) ↑
WAYNE	5.8	(5.7 - 5.9) ↑		323.6	(315.9 - 331.4) ↑	37.5	(34.8 - 40.1) ↑
WEXFORD	5.6	(4.7 - 6.4)		71.3	(41.0 - 101.5) ↓	13.9	(1.7 - 26.0)

Source: Data Warehouse, Michigan Department of Community Health, (-) Beneficiaries <30, (\*) Fewer than 5 cases

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### County Level Data - Among Children in Medicaid with Persistent Asthma, Michigan, 2010

County	Prevalence (%) of 2+ Outpatient Visits		Prevalence (%) of 1+ ED Visits		ED Reliance for Primary Care (%)		Prevalence (%) or 2+ ED Visits		Prevalence (%) of 1+ Hospitalization	
State Prevalence	28.7	(27.3 - 29.2)	27.8	(27.3 - 28.4)	28.7	(28.1 - 29.4)	6.0	(5.7 - 6.2)	3.6	(3.4 - 3.8)
ALCONA	25.3	(2.5 - 48.0)	*		21.2	(0 - 57.2)	-		*	
ALGER	-		-				-		-	
ALLEGAN	22.1	(17.1 - 27.1) ↓	17.3	(12.9 - 21.7) ↓	20.9	(14.5 - 27.3) ↓	*		1.8	(0.3 - 3.2) ↓
ALPENA	15.3	(8.4 - 22.1) ↓	11.4	(5.3 - 17.6) ↓	18.2	(6.8 - 29.6)	*		*	
ANTRIM	16.2	(7.7 - 24.8) ↓	7.3	(1.4 - 13.1) ↓	7.5	(0 - 16.1) ↓	-		*	
ARENAC	11.6	(2.9 - 20.2) ↓	22.2	(10.4 - 34.0)	38.4	(15.0 - 61.9)	*		*	
BARAGA	18.3	(4.2 - 32.4)	21.8	(3.8 - 39.7)	23.4	(0 - 50.0)	*		*	
BARRY	23.2	(16.4 - 29.9)	15.1	(9.6 - 20.5) ↓	17.7	(9.4 - 26.0) ↓	*		*	
BAY	34.6	(28.6 - 40.6)	23.4	(18.4 - 28.3)	21.5	(15.7 - 27.3) ↓	3.3	(1.5 - 5.0) ↓	2.7	(1.2 - 4.1)
BENZIE	28.3	(13.8 - 42.7)	15.1	(3.5 - 26.7) ↓	19.8	(0 - 39.7)	*		*	
BERRIEN	25.0	(21.6 - 28.4)	18.9	(16.0 - 21.9) ↓	21.9	(17.8 - 26.1) ↓	4.0	(2.6 - 5.3) ↓	1.6	(0.8 - 2.4) ↓
BRANCH	26.1	(18.4 - 33.8)	15.9	(9.7 - 22.1) ↓	19.1	(8.9 - 29.4)	3.9	(1.0 - 6.8)	*	
CALHOUN	31.7	(27.1 - 36.3)	21.0	(17.3 - 24.8) ↓	21.8	(17.0 - 26.6) ↓	4.5	(2.8 - 6.2)	1.9	(0.8 - 3.0) ↓
CASS	17.7	(12.0 - 23.4) ↓	12.8	(7.9 - 17.7) ↓	18.9	(9.2 - 28.6)	*		*	
CHARLEVOIX	30.4	(18.4 - 42.4)	18.3	(9.0 - 27.5)	20.5	(6.8 - 34.2)	7.2	(1.4 - 13.0)	*	
CHEBOYGAN	24.0	(15.6 - 32.3)	8.7	(3.8 - 13.7) ↓	10.9	(3.2 - 18.6) ↓	*		*	
CHIPPEWA	40.9	(28.9 - 52.9)	17.3	(9.5 - 25.0) ↓	16.2	(6.7 - 25.8) ↓	*		*	
CLARE	16.5	(10.3 - 22.7) ↓	13.5	(7.8 - 19.2) ↓	19.0	(9.3 - 28.7)	*		*	
CLINTON	27.5	(19.7 - 35.4)	18.4	(11.7 - 25.1) ↓	19.9	(10.6 - 29.3)	4.1	(1.1 - 7.2)	4.0	(0.7 - 7.3)
CRAWFORD	14.7	(3.8 - 25.6) ↓	37.9	(20.6 - 55.2)	52.3	(25.6 - 78.9)	*		*	
DELTA	31.0	(23.2 - 38.8)	8.0	(4.1 - 11.9) ↓	9.5	(3.7 - 15.2) ↓	*		*	
DICKINSON	18.1	(7.6 - 28.5)	15.6	(4.9 - 26.2) ↓	25.4	(5.6 - 45.2)	-		*	
EATON	30.5	(24.4 - 36.6)	22.5	(17.1 - 27.8)	22.2	(15.8 - 28.6)	4.0	(1.8 - 6.2)	3.0	(1.1 - 4.9)
EMMET	20.9	(12.5 - 29.3)	18.1	(10.5 - 25.7) ↓	22.3	(10.5 - 34.1)	*		*	
GENESEE	37.1	(34.4 - 39.7) ↑	28.5	(26.1 - 30.8)	25.2	(22.6 - 27.9) ↓	7.0	(5.8 - 8.1) ↑	4.0	(3.1 - 4.8)
GLADWIN	15.4	(8.0 - 22.8) ↓	12.3	(5.9 - 18.6) ↓	18.6	(7.8 - 29.4)	-		*	
GOGEBIC	29.4	(13.8 - 44.9)	16.4	(4.5 - 28.3)	21.8	(4.7 - 38.9)	*		*	
GRAND TRAVERSE	21.6	(14.9 - 28.2)	10.2	(5.4 - 15.1) ↓	12.9	(5.4 - 20.4) ↓	*		3.6	(0.6 - 6.6)
GRATIOT	25.7	(18.6 - 32.9)	12.7	(7.7 - 17.7) ↓	16.1	(7.8 - 24.4) ↓	*		3.2	(0.8 - 5.6)
HILLSDALE	24.8	(19.6 - 30.0)	8.5	(5.2 - 11.8) ↓	11.1	(5.8 - 16.3) ↓	*		*	
HOUGHTON	24.1	(15.0 - 33.1)	12.5	(5.8 - 19.3) ↓	15.5	(5.5 - 25.5) ↓	*		*	
HURON	32.2	(20.5 - 43.9)	25.7	(15.3 - 36.1)	25.7	(13.5 - 37.9)	*		*	
INGHAM	33.9	(30.7 - 37.2) ↑	24.6	(21.8 - 27.4)	23.6	(20.1 - 27.0) ↓	4.6	(3.4 - 5.7) ↓	4.4	(3.3 - 5.5)
IONIA	19.9	(13.4 - 26.4) ↓	25.1	(18.1 - 32.2)	30.9	(20.3 - 41.4)	5.5	(2.2 - 8.7)	1.8	(0.2 - 3.4) ↓
IOSCO	24.0	(14.7 - 33.3)	16.9	(9.4 - 24.4) ↓	20.8	(9.4 - 32.2)	*		*	
IRON	24.1	(9.0 - 39.2)	*		6.1	(0 - 16.6) ↓	*		*	
ISABELLA	33.0	(26.4 - 39.6)	13.3	(8.8 - 17.8) ↓	14.0	(8.2 - 19.8) ↓	2.3	(0.6 - 4.0) ↓	4.1	(1.9 - 6.3)
JACKSON	27.5	(23.8 - 31.1)	21.0	(17.8 - 24.3) ↓	21.1	(16.9 - 25.3) ↓	3.0	(1.7 - 4.2) ↓	2.9	(1.8 - 4.1)
KALAMAZOO	27.6	(24.1 - 31.1)	31.5	(27.8 - 35.2)	30.9	(26.5 - 35.4)	6.6	(4.9 - 8.3)	3.0	(1.9 - 4.2)
KALKASKA	24.1	(13.2 - 35.0)	11.8	(4.0 - 19.5) ↓	10.0	(0.4 - 19.5) ↓	-		6.8	(0.8 - 12.9)
KENT	29.9	(27.7 - 32.1)	18.7	(17.0 - 20.5) ↓	18.6	(16.3 - 20.9) ↓	3.8	(3.0 - 4.5) ↓	2.2	(1.6 - 2.8) ↓
KEWEENAW	-		-		-		-		-	
LAKE	23.0	(8.4 - 37.7)	23.9	(9.7 - 38.1)	38.3	(8.1 - 68.5)	-		*	
LAPEER	36.1	(28.0 - 44.2)	18.6	(12.8 - 24.4) ↓	16.6	(10.0 - 23.1) ↓	*		2.5	(0.3 - 4.7)

Source: Data Warehouse, Michigan Department of Community Health, (-) Beneficiaries <30, (\*) Fewer than 5 cases

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### County Level Data - Among Children in Medicaid with Persistent Asthma, Michigan, 2010

County	Prevalence (%) of 2+ Outpatient Visits		Prevalence (%) of 1+ ED Visits		ED Reliance for Primary Care (%)		Prevalence (%) of 2+ ED Visits		Prevalence (%) of 1+ Hospitalization	
State Prevalence	28.7	(27.3 - 29.2)	27.8	(27.3 - 28.4)	28.7	(28.1 - 29.4)	6.0	(5.7 - 6.2)	3.6	(3.4 - 3.8)
LEELANAU	-		-		-		-		-	
LENAWEE	32.7	(27.4 - 38.1)	17.1	(12.9 - 21.3) ↓	16.4	(11.3 - 21.4) ↓			1.5	(0.5 - 2.6) ↓
LIVINGSTON	31.8	(25.7 - 37.9)	21.7	(16.5 - 27.0) ↓	19.8	(13.5 - 26.1) ↓	4.2	(2.0 - 6.4)	3.5	(1.5 - 5.5)
LUCE	-		-				-		-	
MACKINAC	24.7	(9.3 - 40.1)	20.7	(6.3 - 35.2)	21.8	(2.4 - 41.1)	*		*	
MACOMB	30.2	(27.8 - 32.5)	32.4	(30.0 - 34.9) ↑	31.6	(28.6 - 34.6)	7.8	(6.6 - 9.0) ↑	4.1	(3.2 - 4.9)
MANISTEE	16.9	(9.2 - 24.6) ↓	26.1	(15.9 - 36.2)	35.8	(19.8 - 51.8)	6.5	(1.7 - 11.3)	*	
MARQUETTE	25.3	(17.2 - 33.4)	20.1	(12.6 - 27.6)	22.4	(11.6 - 33.1)	*		*	
MASON	26.3	(16.8 - 35.9)	19.7	(11.3 - 28.0)	24.5	(11.8 - 37.2)	*		*	
MECOSTA	24.4	(16.4 - 32.4)	16.5	(9.8 - 23.3) ↓	21.2	(11.3 - 31.1)	3.9	(0.8 - 7.1)	*	
MENOMINEE	17.9	(8.6 - 27.3) ↓	14.7	(6.2 - 23.3) ↓	24.2	(7.0 - 41.3)	*		*	
MIDLAND	21.8	(16.2 - 27.4)	9.3	(5.6 - 12.9) ↓	14.1	(7.0 - 21.2) ↓	*		2.7	(0.9 - 4.6)
MISSAUKEE	22.3	(10.4 - 34.2)	7.3	(1.5 - 13.2) ↓	7.8	(0 - 15.8) ↓	*		5.8	(0.7 - 10.9)
MONROE	26.8	(22.0 - 31.7)	26.3	(21.4 - 31.3)	28.5	(22.0 - 34.9)	3.2	(1.5 - 4.8) ↓	4.0	(2.2 - 5.8)
MONTCALM	27.3	(21.1 - 33.5)	21.1	(15.5 - 26.6) ↓	22.6	(15.2 - 30.1)	2.4	(0.6 - 4.2) ↓	4.9	(2.1 - 7.6)
MONTMORENCY	*		14.9	(3.4 - 26.3) ↓	31.1	(4.5 - 57.6)	*		*	
MUSKEGON	30.5	(26.7 - 34.2)	27.2	(23.6 - 30.8)	29.0	(24.3 - 33.7)	4.8	(3.3 - 6.2)	3.4	(2.2 - 4.6)
NEWAYGO	28.7	(22.1 - 35.3)	13.5	(8.8 - 18.2) ↓	15.1	(7.9 - 22.3) ↓	2.4	(0.5 - 4.3) ↓	2.1	(0.2 - 3.9)
OAKLAND	30.1	(27.9 - 32.3)	29.7	(27.5 - 31.9)	30.6	(27.8 - 33.3)	6.4	(5.4 - 7.4)	3.2	(2.5 - 3.9)
OCEANA	24.7	(15.9 - 33.5)	31.2	(20.4 - 41.9)	41.1	(26.1 - 56.2)	5.8	(1.8 - 9.9)	*	
OGEMAW	26.1	(14.6 - 37.5)	14.4	(7.6 - 21.2) ↓	16.8	(6.7 - 26.9) ↓	*			
ONTONAGON	-		-				-		-	
OSCEOLA	17.3	(8.6 - 26.0) ↓	21.7	(12.6 - 30.7)	31.7	(15.4 - 48.0)	*		4.5	(0.5 - 8.4)
OSCODA	40.4	(14.5 - 66.4)	19.1	(1.9 - 36.3)	10.1	(0 - 25.3) ↓	*		*	
OTSEGO	32.0	(21.1 - 42.9)	5.4	(1.2 - 9.5) ↓	7.6	(0 - 15.4) ↓	*		*	
OTTAWA	22.2	(18.3 - 26.0) ↓	16.4	(12.9 - 19.9) ↓	20.1	(14 - 26.2) ↓	2.9	(1.5 - 4.3) ↓	1.0	(0.2 - 1.7) ↓
PRESQUE ISLE	43.1	(22.7 - 63.5)	11.1	(0.2 - 21.9) ↓	10.6	(0 - 24.4) ↓	*		*	
ROSCOMMON	23.9	(14.5 - 33.2)	20.0	(10.9 - 29.1)	25.0	(11.5 - 38.6)	*		5.5	(0.6 - 10.4)
SAGINAW	27.2	(23.8 - 30.5)	31.0	(27.4 - 34.7)	31.9	(27.4 - 36.3)	5.9	(4.3 - 7.5)	3.5	(2.3 - 4.8)
SANILAC	33.5	(24.8 - 42.3)	21.3	(14.4 - 28.3)	19.5	(11.1 - 28.0) ↓	3.5	(0.7 - 6.3)	*	
SCHOOLCRAFT	28.7	(13.3 - 44.1)	*		6.4	(0 - 16.9)	*		*	
SHIawassee	34.0	(27.0 - 41.0)	13.6	(9.0 - 18.2) ↓	16.0	(9.6 - 22.4) ↓	*		1.9	(0.2 - 3.5)
ST CLAIR	27.6	(23.1 - 32.0)	22.7	(18.6 - 26.7) ↓	25.1	(19.7 - 30.4)	3.5	(1.9 - 5.1) ↓	3.3	(1.8 - 4.8)
ST JOSEPH	16.4	(11.7 - 21.0) ↓	20.7	(15.5 - 25.9) ↓	32.0	(22.0 - 42.1)	3.6	(1.6 - 5.7) ↓	1.9	(0.2 - 3.6)
TUSCOLA	33.6	(26.2 - 40.9)	18.3	(12.5 - 24.0) ↓	18.9	(11.3 - 26.6) ↓	3.5	(1.1 - 6.0)	*	
VAN BUREN	23.8	(18.6 - 29.1)	24.1	(19 - 29.1)	28.2	(20.8 - 35.6)	5.7	(3.2 - 8.1)	2.3	(0.8 - 3.8)
WASHTENAW	35.8	(32.2 - 39.5) ↑	27.5	(24.3 - 30.6)	20.4	(17.0 - 23.8)	7.0	(5.4 - 8.6)	5.6	(4.2 - 7.0) ↑
WAYNE	27.9	(26.9 - 28.8)	40.0	(38.9 - 41.1) ↑	38.8	(37.5 - 40.1) ↑	9.6	(9.1 - 10.2) ↑	5.3	(4.9 - 5.8) ↑
WEXFORD	22.7	(15.2 - 30.3)	10.4	(5.2 - 15.6) ↓	11.3	(3.5 - 19.1) ↓	*		*	

Source: Data Warehouse, Michigan Department of Community Health, (-) Beneficiaries <30, (\*) Fewer than 5 cases

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### County Level Data - Among Children in Medicaid with Persistent Asthma, Michigan, 2010

County	Prevalence (%) of SABA Overuse		Prevalence (%) of 1+ Inhaled Corticosteroid		Prevalence (%) of 1+ Long-Term Control		Prevalence (%) of 2+ Oral Corticosteroid		Prevalence (%) of Spirometry	
State Prevalence	13.0	(12.6 - 13.4)	67.3	(66.5 - 68.1)	78.3	(77.5 - 79.2)	20.1	(19.7 - 20.5)	11.4	(11.0 - 11.7)
ALCONA	*		46.5	(15.9 - 77.2)	85.4	(48.2 - 100)	25.8	(2.4 - 49.1)	*	
ALGER	-		-		-		-		-	
ALLEGAN	12.0	(8.1 - 15.8)	65.0	(56.4 - 73.6)	84.6	(74.8 - 94.3)	12.7	(8.9 - 16.4) ↓	10.0	(6.5 - 13.4)
ALPENA	5.3	(1.6 - 9.0) ↓	37.8	(26.3 - 49.3) ↓	88.1	(70.8 - 100)	12.1	(5.5 - 18.6) ↓	4.0	(0.8 - 7.3) ↓
ANTRIM	7.7	(2.0 - 13.5)	59.9	(43.6 - 76.2)	90.8	(70.7 - 100)	7.1	(1.4 - 12.8) ↓	*	
ARENAC	11.8	(3.0 - 20.6)	62.2	(42.4 - 82.0)	72.8	(51.2 - 94.4)	38.1	(22.6 - 53.5) ↑	*	
BARAGA	*		59.8	(30.8 - 88.9)	83.7	(48.0 - 100)	30.4	(9.4 - 51.4)	*	
BARRY	8.1	(4.0 - 12.3) ↓	61.3	(50.4 - 72.3)	86.3	(73.3 - 99.2)	18.5	(12.3 - 24.7)	12.6	(7.6 - 17.7)
BAY	10.0	(6.5 - 13.6)	65.2	(57.0 - 73.5)	84.2	(74.8 - 93.5)	20.6	(16.4 - 24.9)	8.9	(5.7 - 12.1)
BENZIE	13.2	(2.3 - 24.2)	77.2	(52.7 - 100)	91.3	(65.1 - 100)	23.3	(10.0 - 36.5)	*	
BERRIEN	11.1	(8.7 - 13.5)	69.2	(63.5 - 74.9)	89.2	(82.7 - 95.8) ↑	18.4	(15.6 - 21.3)	11.0	(8.7 - 13.3)
BRANCH	6.6	(2.4 - 10.8) ↓	57.0	(45.3 - 68.8)	87.0	(72.5 - 100)	19.7	(13.4 - 26.0)	*	
CALHOUN	8.5	(6.1 - 11.0) ↓	68.0	(61.2 - 74.8)	82.8	(75.3 - 90.3)	17.1	(13.8 - 20.5)	6.6	(4.5 - 8.8) ↓
CASS	12.9	(7.8 - 17.9)	58.4	(47.8 - 69.0)	87.1	(74.3 - 100)	23.3	(16.5 - 30.0)	8.8	(4.8 - 12.8)
CHARLEVOIX	13.3	(5.4 - 21.2)	74.1	(55.4 - 92.8)	91.7	(71.0 - 100)	22.8	(12.5 - 33.0)	*	
CHEBOYGAN	11.9	(5.8 - 17.9)	54.7	(42.1 - 67.3)	90.1	(73.8 - 100)	15.9	(9.2 - 22.6)	7.6	(2.9 - 12.2)
CHIPPEWA	6.2	(1.2 - 11.3) ↓	47.1	(33.9 - 60.2) ↓	81.1	(63.9 - 98.3)	9.8	(4.2 - 15.4) ↓	20.4	(11.4 - 29.5)
CLARE	13.3	(7.5 - 19.0)	64.1	(52.0 - 76.3)	84.0	(70.1 - 97.9)	13.1	(7.5 - 18.8) ↓	7.6	(3.3 - 11.9)
CLINTON	12.5	(7.2 - 17.9)	63.7	(51.5 - 75.8)	90.8	(76.2 - 100)	15.4	(9.2 - 21.5)	20.5	(14.0 - 26.9) ↑
CRAWFORD	18.0	(5.5 - 30.5)	45.2	(25.7 - 64.7) ↓	63.8	(40.7 - 86.9)	17.5	(6.0 - 29.0)	*	
DELTA	16.7	(10.9 - 22.6)	63.7	(52.5 - 74.8)	88.8	(75.7 - 100)	17.5	(11.7 - 23.4)	11.4	(6.6 - 16.2)
DICKINSON	18.4	(6.4 - 30.3)	58.1	(38.6 - 77.5)	69.6	(48.3 - 90.9)	15.6	(5.7 - 25.6)	*	
EATON	12.1	(8.1 - 16.1)	73.4	(63.8 - 82.9)	88.5	(78.0 - 99.0)	15.7	(11.4 - 20.0)	20.8	(15.6 - 25.9) ↑
EMMET	5.5	(1.3 - 9.7) ↓	58.3	(44.9 - 71.7)	84.7	(68.5 - 100)	20.0	(11.9 - 28.0)	*	
GENESEE	12.2	(10.6 - 13.8)	70.7	(67.0 - 74.4)	81.2	(77.2 - 85.2)	23.4	(21.3 - 25.5) ↑	15.2	(13.4 - 16.9) ↑
GLADWIN	18.6	(10.3 - 26.8)	53.2	(40.2 - 66.1) ↓	82.3	(65.9 - 98.7)	16.8	(9.8 - 23.9)	14.9	(7.2 - 22.7)
GOGEBIC	19.0	(6.2 - 31.8)	57.7	(35.8 - 79.7)	89.5	(62.2 - 100)	19.3	(6.7 - 31.8)	*	
GRAND TRAVERSE	11.3	(6.4 - 16.3)	60.5	(49.1 - 71.9)	86.1	(72.5 - 99.7)	14.8	(8.9 - 20.7)	4.2	(1.2 - 7.2) ↓
GRATIOT	16.4	(10.4 - 22.3)	69.8	(57.9 - 81.7)	82.5	(69.4 - 95.5)	17.7	(12.2 - 23.2)	9.2	(4.6 - 13.8)
HILLSDALE	9.6	(5.6 - 13.6)	58.8	(50.7 - 67.0)	93.0	(82.7 - 100)	13.7	(9.8 - 17.7) ↓	2.7	(0.7 - 4.7) ↓
HOUGHTON	13.3	(6.4 - 20.2)	65.3	(50.5 - 80.1)	85.0	(68.3 - 100)	17.6	(9.8 - 25.3)	10.1	(4.3 - 16.0)
HURON	8.1	(2.4 - 13.7)	65.3	(48.8 - 81.8)	74.2	(56.6 - 91.8)	21.1	(11.7 - 30.4)	14.7	(6.9 - 22.5)
INGHAM	12.2	(10.1 - 14.2)	74.0	(69.1 - 78.9) ↑	86.9	(81.6 - 92.2) ↑	16.1	(14.0 - 18.3) ↓	23.9	(21.0 - 26.7) ↑
IONIA	12.0	(6.8 - 17.2)	62.3	(50.7 - 73.9)	80.6	(67.5 - 93.7)	21.5	(14.9 - 28.2)	13.1	(7.5 - 18.8)
IOSCO	6.9	(2.1 - 11.7) ↓	67.3	(51.3 - 83.3)	84.1	(66.5 - 100)	22.3	(13.2 - 31.4)	10.2	(4.6 - 15.8)
IRON	15.3	(2.9 - 27.7)	63.1	(36.9 - 89.4)	86.8	(55.7 - 100)	19.3	(5.7 - 32.9)	*	
ISABELLA	11.5	(7.5 - 15.6)	77.8	(67.6 - 88.0)	90.6	(79.5 - 100) ↑	19.2	(14.4 - 24.0)	14.8	(10.1 - 19.6)
JACKSON	13.2	(10.5 - 15.9)	67.5	(61.7 - 73.3)	84.8	(78.3 - 91.4)	24.0	(20.6 - 27.4) ↑	6.0	(4.1 - 7.8) ↓
KALAMAZOO	13.1	(10.6 - 15.5)	62.1	(56.9 - 67.4)	77.5	(71.6 - 83.3)	16.3	(13.7 - 19.0) ↓	13.4	(10.9 - 15.9)
KALKASKA	20.6	(10.1 - 31.2)	61.4	(43.7 - 79.1)	88.3	(66.9 - 100)	19.2	(9.5 - 29.0)	*	
KENT	9.0	(7.8 - 10.3) ↓	80.8	(77.1 - 84.5) ↑	89.6	(85.7 - 93.5)	16.6	(15.0 - 18.2) ↓	14.3	(12.7 - 15.9) ↑
KEWEENAW	-		-		-		-		-	
LAKE	12.1	(1.8 - 22.5)	47.2	(26.7 - 67.7)	67.6	(42.9 - 92.3)	19.8	(6.3 - 33.4)	*	
LAPEER	12.2	(7.4 - 17.0)	73.1	(61.5 - 84.6)	82.7	(70.5 - 95.0)	23.6	(17.1 - 30.1)	14.0	(9.2 - 18.8)

Source: Data Warehouse, Michigan Department of Community Health, (-) Beneficiaries <30, (\*) Fewer than 5 cases

## Epidemiology of Asthma in Michigan Asthma Burden for Children in Medicaid

### County Level Data - Among Children in Medicaid with Persistent Asthma, Michigan, 2010

County	Prevalence (%) of SABA Overuse		Prevalence (%) of 1+ Inhaled Corticosteroid		Prevalence (%) of 1+ Long-Term Control		Prevalence (%) of 2+ Oral Corticosteroid		Prevalence (%) of Spirometry	
State Prevalence	13.0	(12.6 - 13.4)	67.3	(66.5 - 68.1)	78.3	(77.5 - 79.2)	20.1	(19.7 - 20.5)	11.4	(11.0 - 11.7)
LEELANAU	-		-		-		-		-	
LENAWEE	9.7	(6.5 - 12.9)	64.9	(57.1 - 72.6)	85.6	(76.7 - 94.5)	20.7	(16.6 - 24.9)	10.9	(7.6 - 14.2)
LIVINGSTON	9.4	(5.9 - 12.8)	68.9	(59.8 - 78.0)	81.7	(71.8 - 91.5)	18.5	(13.8 - 23.2)	15.6	(11.3 - 19.9)
LUCE	-		-		-		-		-	
MACKINAC	18.4	(4.7 - 32.2)	64.6	(39.1 - 90.1)	83.1	(54.1 - 100)	25.8	(9.7 - 41.9)	*	
MACOMB	14.6	(12.8 - 16.3)	63.6	(60.1 - 67.1)	69.9	(66.3 - 73.6) ↓	23.9	(21.8 - 26.0) ↑	12.6	(11.0 - 14.2)
MANISTEE	18.9	(10.7 - 27.0)	43.3	(30.7 - 56.0) ↓	73.9	(57.6 - 90.2)	22.6	(13.2 - 31.9)	5.1	(1.0 - 9.2) ↓
MARQUETTE	14.4	(8.3 - 20.5)	73.9	(60.1 - 87.8)	85.1	(70.3 - 99.9)	12.4	(6.5 - 18.3) ↓	3.9	(1.0 - 6.8) ↓
MASON	13.3	(6.5 - 20.2)	41.1	(29.1 - 53.2) ↓	79.2	(62.7 - 95.7)	16.5	(8.8 - 24.2)	6.0	(1.5 - 10.5)
MECOSTA	13.2	(7.2 - 19.2)	71.5	(57.6 - 85.4)	85.0	(69.8 - 100)	20.3	(13.2 - 27.3)	9.2	(3.9 - 14.5)
MENOMINEE	12.2	(4.1 - 20.3)	68.9	(50.3 - 87.5)	83.6	(63.3 - 100)	5.6	(0.7 - 10.6) ↓	*	
MIDLAND	16.7	(10.8 - 22.5)	74.8	(64.3 - 85.2)	90.8	(79.2 - 100) ↑	14.2	(9.9 - 18.5) ↓	8.1	(4.9 - 11.4)
MISSAUKEE	10.2	(1.1 - 19.3)	77.1	(54.9 - 99.2)	94.3	(69.7 - 100)	12.2	(4.6 - 19.8)	*	
MONROE	15.8	(11.5 - 20.0)	59.9	(52.5 - 67.3)	75.2	(67.0 - 83.5)	18.3	(14.3 - 22.2)	10.0	(6.8 - 13.3)
MONTCALM	12.8	(8.3 - 17.2)	63.7	(54.3 - 73.1)	86.1	(75.1 - 97.1)	14.5	(10.2 - 18.8) ↓	12.8	(8.3 - 17.2) ↑
MONTMORENCY	10.1	(1.1 - 19.1)	55.4	(27.1 - 83.6)	82.8	(49.4 - 100)	10.5	(0.8 - 20.2)	*	
MUSKEGON	11.2	(8.9 - 13.6)	69.2	(63.5 - 75.0)	81.4	(75.1 - 87.6)	18.6	(15.8 - 21.5)	19.6	(16.5 - 22.8) ↑
NEWAYGO	10.3	(6.0 - 14.6)	64.3	(54.2 - 74.3)	84.7	(73.1 - 96.3)	14.2	(9.5 - 18.8) ↓	13.7	(8.8 - 18.6)
OAKLAND	12.5	(11.0 - 14.0)	69.7	(66.3 - 73.1)	75.6	(72.0 - 79.1)	23.5	(21.5 - 25.4) ↑	14.3	(12.8 - 15.9) ↑
OCEANA	21.0	(12.3 - 29.6)	61.6	(47.8 - 75.4)	79.9	(64.1 - 95.6)	22.0	(13.1 - 30.9)	7.4	(2.8 - 12.0)
OGEMAW	11.8	(3.9 - 19.7)	62.7	(46.5 - 78.9)	84.1	(65.0 - 100)	30.2	(20.0 - 40.4)	13.1	(3.9 - 22.2)
ONTONAGON	-		-		-		-		-	
OSCEOLA	11.3	(4.1 - 18.4)	65.4	(49.1 - 81.6)	79.9	(62.0 - 97.8)	20.0	(11.0 - 29.0)	15.8	(7.4 - 24.3)
OSCODA	*		64.0	(34.4 - 93.7)	82.4	(49.1 - 100)	*		27.4	(5.5 - 49.4)
OTSEGO	12.4	(4.9 - 19.8)	75.5	(59.3 - 91.8)	87.1	(69.7 - 100)	18.5	(10.6 - 26.3)	*	
OTTAWA	11.0	(8.0 - 14.1)	68.5	(61.5 - 75.6)	87.1	(78.9 - 95.2)	14.5	(11.3 - 17.6) ↓	11.2	(8.3 - 14.2)
PRESQUE ISLE	*		56.7	(32.5 - 81.0)	83.9	(55.4 - 100)	18.0	(6.9 - 29.2)	*	
ROSCOMMON	15.7	(8.3 - 23.2)	56.4	(41.8 - 71.0)	80.8	(63.4 - 98.2)	18.1	(9.4 - 26.8)	*	
SAGINAW	14.0	(11.5 - 16.5)	66.3	(61.0 - 71.5)	76.8	(71.1 - 82.5)	16.2	(13.6 - 18.8) ↓	11.3	(9.1 - 13.5)
SANILAC	4.1	(1.0 - 7.2) ↓	71.0	(58.3 - 83.7)	82.4	(68.8 - 96.1)	23.2	(16 - 30.4)	10.3	(5.6 - 14.9)
SCHOOLCRAFT	18.3	(4.2 - 32.3)	62.0	(38.3 - 85.8)	87.1	(58.1 - 100)	20.7	(6.9 - 34.6)	*	
SHIAWASSEE	13.5	(8.9 - 18.2)	71.9	(61.6 - 82.2)	87.9	(76.5 - 99.3)	13.6	(9.1 - 18.1) ↓	15.1	(10.4 - 19.8)
ST CLAIR	10.3	(7.5 - 13.0)	69.3	(62.3 - 76.4)	81.5	(73.9 - 89.1)	24.1	(19.9 - 28.2)	5.1	(3.2 - 7.0) ↓
ST JOSEPH	15.0	(10.3 - 19.7)	58.2	(49.5 - 67.0)	82.4	(72.0 - 92.8)	15.0	(10.9 - 19.2) ↓	5.2	(2.3 - 8.0) ↓
TUSCOLA	6.3	(2.9 - 9.7) ↓	67.7	(56.8 - 78.7)	81.0	(69.0 - 92.9)	16.8	(11.5 - 22.0)	7.3	(3.6 - 10.9) ↓
VAN BUREN	10.2	(6.8 - 13.7)	56.6	(48.4 - 64.9) ↓	83.4	(73.5 - 93.3)	17.7	(13.3 - 22.0)	8.2	(4.8 - 11.6)
WASHTENAW	16.2	(13.6 - 18.9) ↑	78.1	(72.5 - 83.7) ↑	86.3	(80.5 - 92.2) ↑	19.8	(17.2 - 22.4)	12.7	(10.4 - 15.1)
WAYNE	14.9	(14.2 - 15.7) ↑	65.7	(64.2 - 67.2)	68.3	(66.8 - 69.8) ↓	22.3	(21.4 - 23.1) ↑	9.4	(8.8 - 10.0) ↓
WEXFORD	14.5	(7.7 - 21.2)	70.0	(56.8 - 83.2)	89.0	(74.0 - 100)	15.7	(9.5 - 21.9)	9.7	(4.4 - 15.0)

Source: Data Warehouse, Michigan Department of Community Health, (-) Beneficiaries <30, (\*) Fewer than 5 cases