**Contributors:**
Elizabeth Wasilevich, MPH
Sarah Lyon-Callo, MA, MS
Michigan Department of Community Health
Kevin Dombkowski, DrPH
University of Michigan

**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.

**Key Findings:**

- The prevalence of persistent asthma among children in Medicaid is increasing over time.
- Rates of asthma emergency department visits are increasing over time among children in Medicaid.
- Black children in Medicaid experience the greatest burden in asthma prevalence and rates of asthma emergency department visits compared to other children in Medicaid.
- Recent data suggests that only 30% of children with persistent asthma are filling prescriptions for inhaled corticosteroids - the preferred, first-line medication to manage asthma. This measure has been dramatically decreasing from 2001-2005.
- The goals of asthma therapy are not being met for the pediatric Medicaid population in Michigan, especially for black children and those living in urban areas.

**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.

**The Asthma Initiative of Michigan (AIM)**

AIM is a collaborative effort involving multiple partners from public and private sectors across the state and is committed to reducing the burden of asthma documented in this report. For information about AIM's priorities and interventions, please review the strategic plan for the initiative: *Asthma in Michigan 2010: A Blueprint for Action.* (http://www.getasthmahelp.org/reports.asp)

**Data Source:**

Michigan Data Warehouse, Michigan Department of Community Health

**Methods:**

From the Michigan Medicaid beneficiary and administrative claims data (2001-2005), the study population is identified by the following parameters within each year: children 18 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: Persistent asthma is defined according to HEDIS® specifications: in the year of the prevalence measurement year having (1) ≥ 4 asthma medication dispensing events OR (2) ≥ 1 emergency department visits for asthma OR (3) ≥ 1 hospitalization for asthma OR (4) ≥ 4 outpatient visits for asthma and ≥ 2 asthma medication dispensing events. (National Committee for Quality Assurance. Use of Appropriate Medications for People with Asthma. *HEDIS® 2003, Volume 2: Technical Specifications*. Washington, DC; 2003) Prevalence of persistent asthma is the proportion of beneficiaries in the study population who meet the definition of persistent asthma above.
- Rate of asthma emergency department visits: An asthma emergency department visit is defined as a visit occurring in a hospital emergency department with a primary diagnosis of asthma (ICD-9-CM=493.XX). These data represent the number of emergency department visits for asthma, not the number of persons visiting the emergency department for asthma. The number of asthma emergency department visits divided by the number of beneficiaries generates this measure.

Children with utilization consistent with persistent asthma, as defined above, form annual study populations upon which indicators of asthma management are measured within that year, including:

- Proportion with an outpatient visit: The proportion of children with persistent asthma in Medicaid with one or more annual asthma outpatient visits. (ICD-9-CM=493.XX)
- Proportion with an emergency department visit: The proportion of children in Medicaid with persistent asthma who have had one or more annual asthma emergency department visits. (ICD-9-CM=493.XX)

**Methods Continued:**

- Emergency department reliance: The proportion of all ambulatory asthma visits (ICD-9-CM=493.XX, outpatient and emergency department) among children in Medicaid with persistent asthma that occur in the emergency department. It estimates the reliance on the emergency department for primary care.
- Short-acting β-agonist overuse: The proportion of children with persistent asthma in Medicaid who have filled thirteen or more prescriptions for short-acting β-agonists in a year - an indicator of overuse of this medication.
- Proportion using a long term control medication*: The proportion of children with persistent asthma in Medicaid who have filled one or more prescriptions for a long-term controller medication in a year.
- Proportion using an inhaled corticosteroid medication*: The proportion of children with persistent asthma in Medicaid who have filled one or more prescriptions for a inhaled corticosteroid medication in a year - inhaled corticosteroids are the preferred, first-line medication recommended for persons with persistent asthma.

Both geographic (urban/rural, county) and demographic (age, race, sex) subpopulation analysis are conducted to identify disparities. 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:**

Wasilevich EA, Lyon-Callo S, and Dombkowski K. "Asthma Burden for Children in Medicaid.", Epidemiology of Asthma in Michigan. Bureau of Epidemiology, Michigan Department of Community Health, 2007.

Michigan Department of Community Health
MDCH
Jennifer M. Granholm, Governor
Janet Olszewski, Director

For more information about the Asthma Initiative of Michigan, visit: **www.getasthmahelp.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.

*This measure is computed differently than the NCQA HEDIS® measure "Use of Appropriate Medications for People with Asthma." Therefore, results in this report should not be compared to data strictly applying the specifications of the NCQA HEDIS® measure.

**List of Figures:**

Among all children (≤18 yrs) in Medicaid:

Prevalence of Persistent Asthma, 2001-2005
1. Total
2. By Sex
3. By Race
4. By Urban/Rural Residence
5. By County of Residence (2005)

Rate of Asthma Emergency Department Visits, 2001-2005
6. Total
7. By Sex
8. By Race
9. By Urban/Rural Residence
10. By County of Residence (2005)

Among children (≤18 yrs) in Medicaid with claims evidence consistent with persistent asthma:

Proportion with an outpatient visit, 2001-2005
11. Total
12. By Sex
13. By Race
14. By Urban/Rural Residence
15. By County of Residence (2005)

Proportion with an emergency department visit, 2001-2005
16. Total
17. By Sex
18. By Race
19. By Urban/Rural Residence
20. By County of Residence (2005)

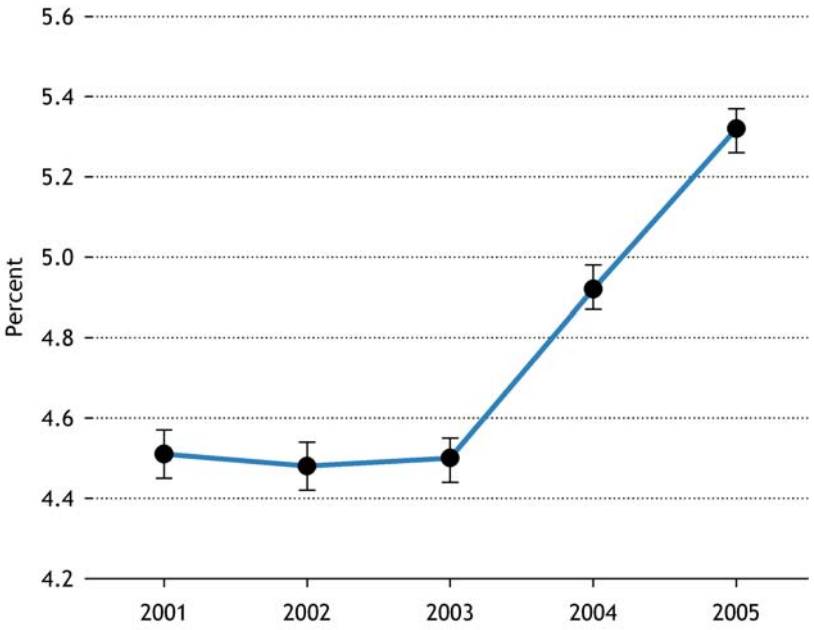
Emergency department reliance, 2001-2005
21. Total
22. By Sex
23. By Race
24. By Urban/Rural Residence
25. By County of Residence (2005)

Short-acting β-agonist overuse, 2001-2005
26. Total
27. By Sex
28. By Race
29. By Urban/Rural Residence
30. By County of Residence (2005)

Proportion using a long term control and an inhaled corticosteroid medication, 2001-2005
31. Total

Proportion using an inhaled corticosteroid medication, 2001-2005
32. By Sex
33. By Race
34. By Urban/Rural Residence
35. By County of Residence (2005)

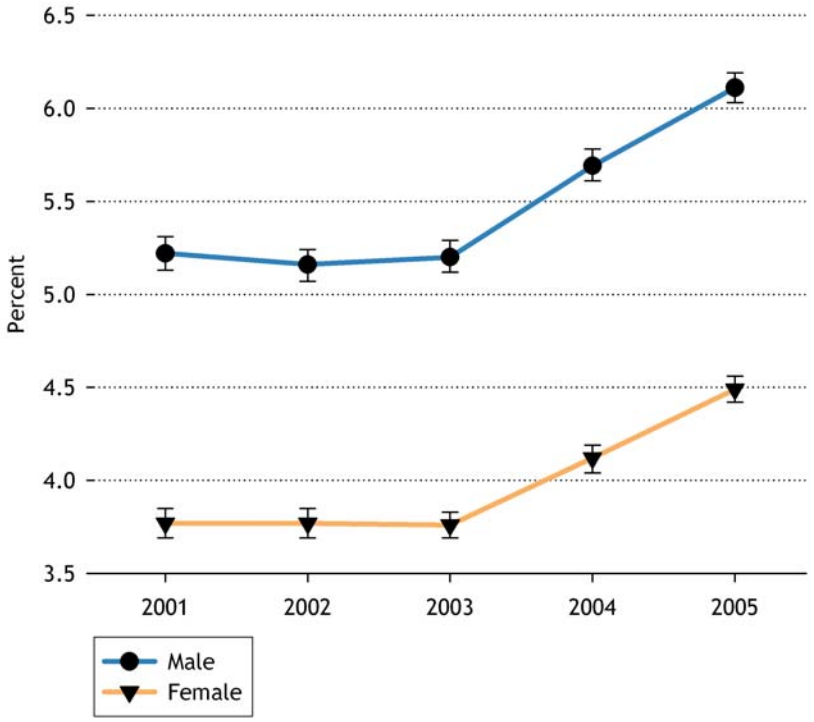
## 1. Prevalence[1] of Persistent Asthma[2], Children (≤18 years), Medicaid[3], Michigan, 2001-2005




For all analyses presented in this chapter, the Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

- About 34,600 children in Medicaid have health care utilization consistent with persistent asthma.
- The prevalence of persistent asthma was higher in 2004 and 2005 then preceding years among children enrolled in Medicaid.

## 2. Prevalence[1] of Persistent Asthma[2] by Sex, Children (≤18 years), Medicaid[3], Michigan, 2001-2005

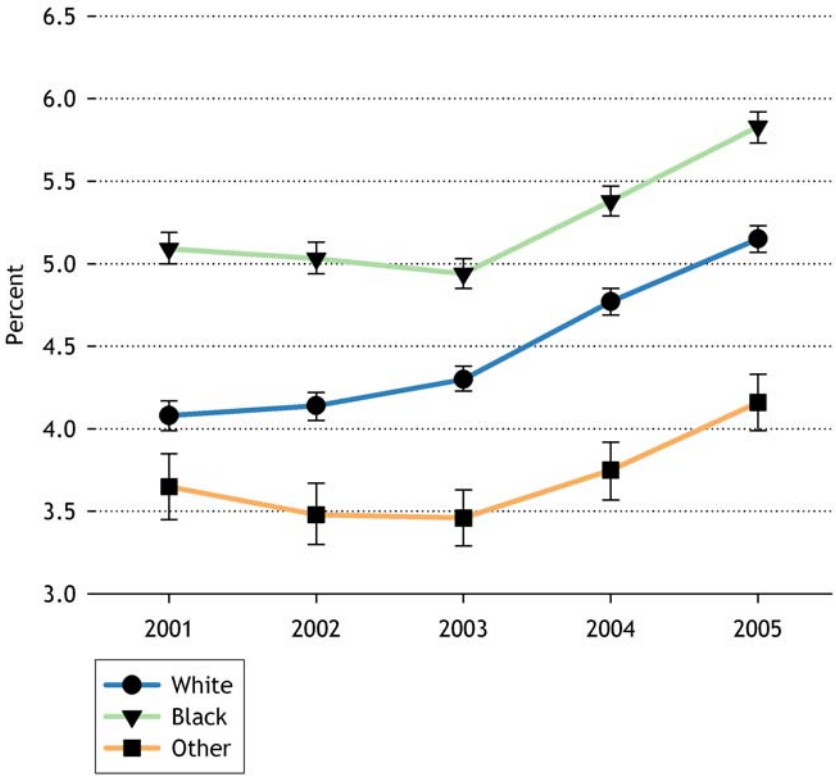



- About 20,400 of male children and 14,200 female children in Medicaid have health care utilization consistent with persistent asthma.
- The prevalence of persistent asthma for male children in Medicaid is consistently about 40% higher compared to female children in Medicaid.
- The prevalence of persistent asthma for both male and female children enrolled in Medicaid was higher in 2004 and 2005 then preceding years.

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

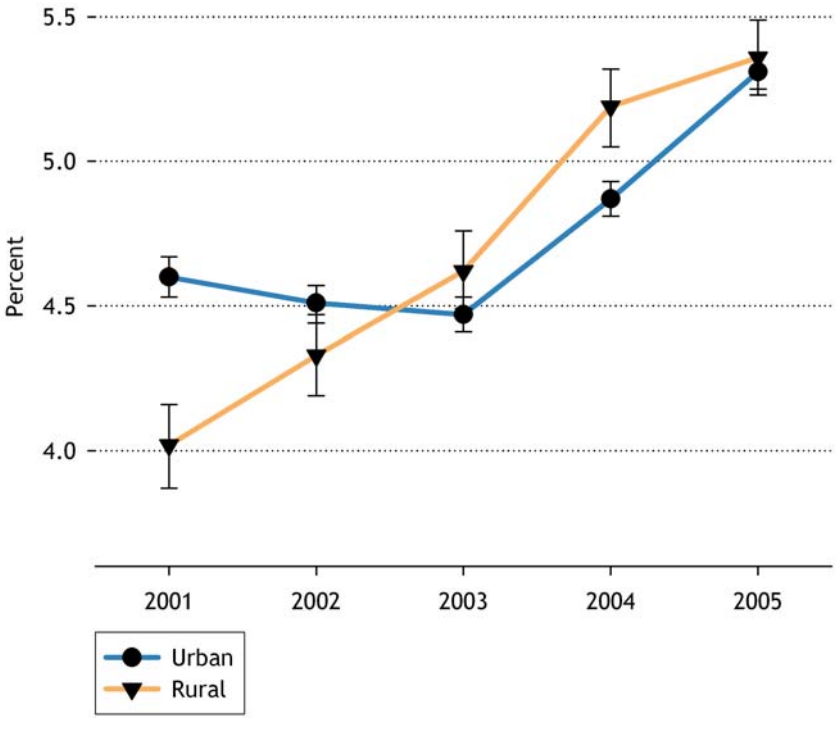
### 3. Prevalence[1] of Persistent Asthma[2] by Race, Children (≤18 years), Medicaid[4], Michigan, 2001-2005

- About 17,200 white children, 15,000 black children in Medicaid have health care utilization consistent with persistent asthma.
- The highest prevalence of persistent asthma is observed for black children in Medicaid - it is 10% to 25% higher compared to whites.
- The prevalence of persistent asthma was higher in 2004 and 2005 then preceding years among children enrolled in Medicaid, regardless of race. For whites, there is a significant overall increase from 2001 to 2005. ($p<0.05$)[5]



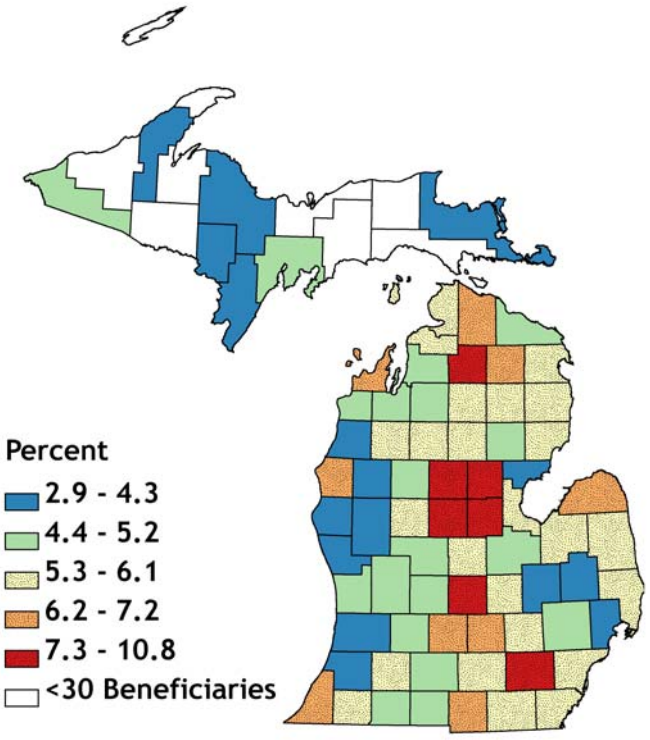

### 4. Prevalence[1] of Persistent Asthma[2] by Urban/Rural Residence[3], Children (≤18 years), Medicaid[4], Michigan, 2001-2005

- About 28,600 of children with urban residence and 6,000 children with rural in Medicaid have health care utilization consistent with persistent asthma.
- The prevalence of persistent asthma is significantly increasing among children enrolled in Medicaid with rural residence. (For rural, $p<0.05$)[5]
- In 2005, the prevalence of persistent asthma for children of both urban and rural residence is about the same. Across 2001-2005, the prevalence in rural areas has caught up with urban areas.




**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Urban/Rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.
5. Spearman's rank correlation test

## 5. Prevalence[1] of Persistent Asthma[2] by County of Residence, Children (≤18 years), Medicaid[3], Michigan, 2005

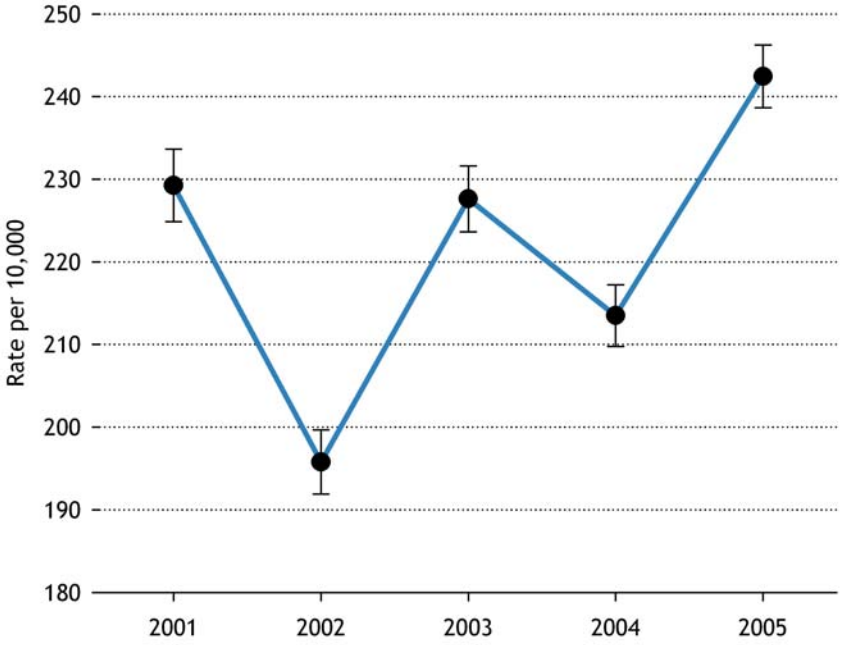



- The distribution of persistent asthma prevalence for children in Medicaid varies across Michigan.
- Counties with the highest prevalence of persistent asthma for children in Medicaid are:
  - Clare
  - Clinton
  - Gladwin
  - Isabella
  - Midland
  - Otsego
  - Washtenaw

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

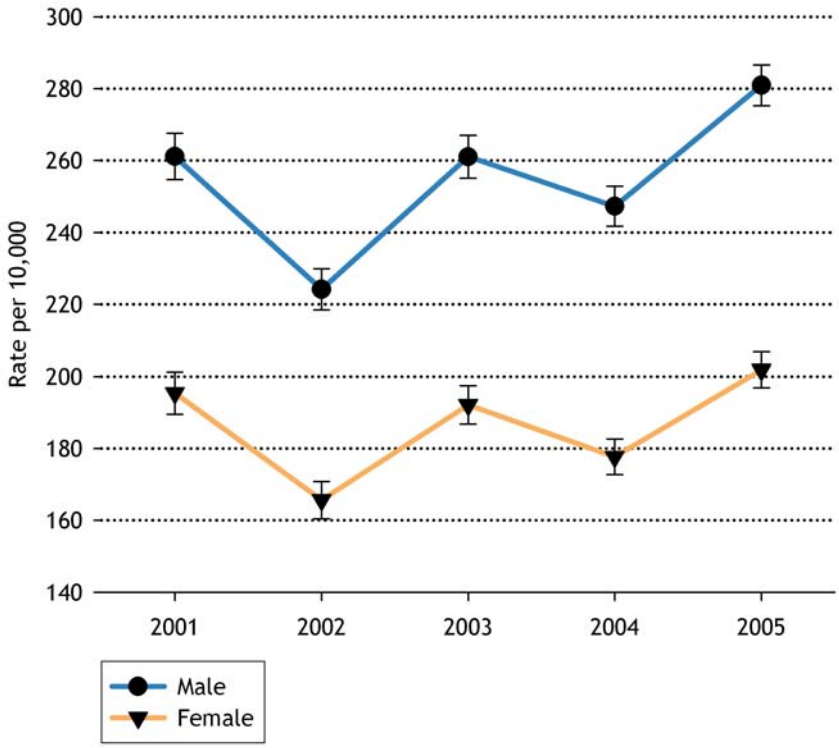
## 6. Rate[1] of Asthma Emergency Department Visits[2], Children (≤18 years), Medicaid[3], Michigan, 2001-2005

- In 2005, the total number of asthma emergency department visits for children in Medicaid was about 16,100. The rate was 242.5 per 10,000.
- Despite fluctuations over time, there is an overall increasing trend in asthma emergency department visits for children in Medicaid.



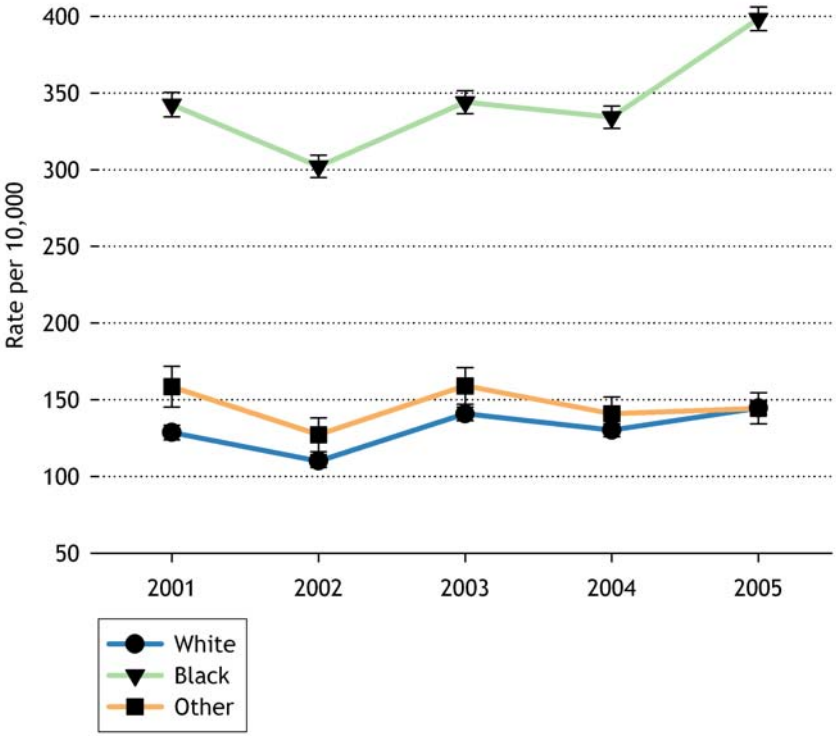

## 7. Rate[1] of Asthma Emergency Department Visits[2] by Sex, Children (≤18 years), Medicaid[3], Michigan, 2001-2005

- The rate of asthma emergency department visits is about 35% higher for male children compared to female children in Medicaid. This difference is consistent over time.
- The overall increasing trend in asthma emergency department visits is observed for both male and female children in Medicaid.



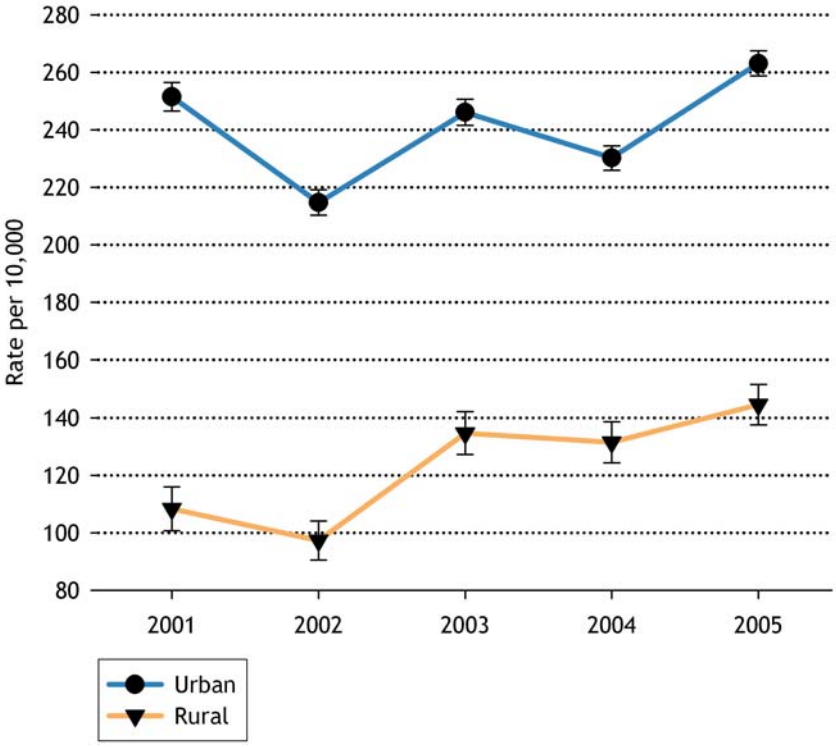

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Asthma as primary diagnosis, ICD-9-CM: 493.xx
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

## 8. Rate[1] of Asthma Emergency Department Visits[2] by Race, Children (≤18 years), Medicaid[4], Michigan, 2001-2005




- The rate of asthma emergency department visits is highest for black children in Medicaid - over two times higher than the rate for white children in Medicaid.
- Rates among white children and those of other races are not significantly different from each other, but significantly less than the rate for black children.
- An overall increasing trend in asthma emergency department visits is observed for black children in Medicaid. Rates among white children and those of other races are generally consistent over time.

## 9. Rate[1] of Asthma Emergency Department Visits[2] by Urban/Rural Residence[3], Children (≤18 years), Medicaid[4], Michigan, 2001-2005



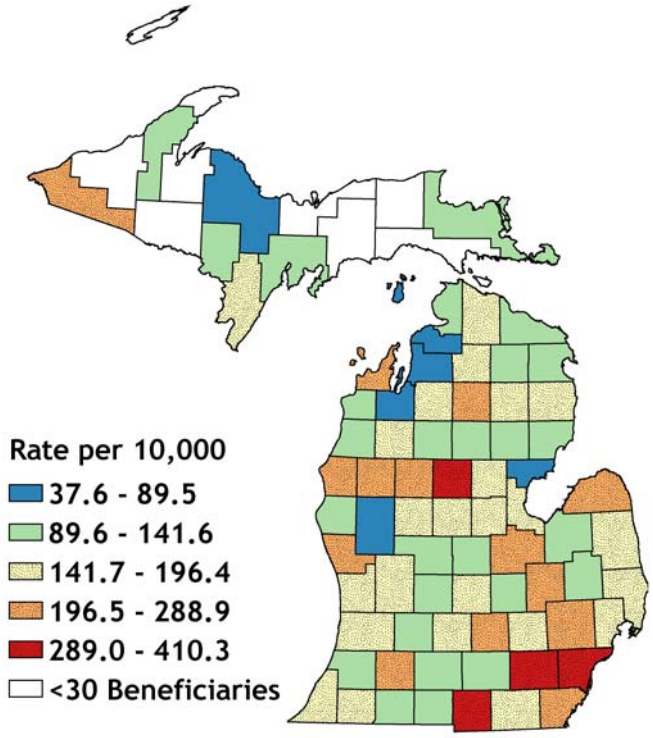

- The rate of asthma emergency department visits is about 80% higher for children with urban residence compared to children with rural residence in Medicaid. This difference is consistent over time.
- In general, an increasing trend in asthma emergency department visits is observed for children in Medicaid with both urban and rural residence.

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Asthma as primary diagnosis, ICD-9-CM: 493.xx
3. Urban/Rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

**10. Rate[1] of Asthma Emergency Department Visits[2] by County of Residence, Children (≤18 years), Medicaid[3], Michigan, 2005**

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

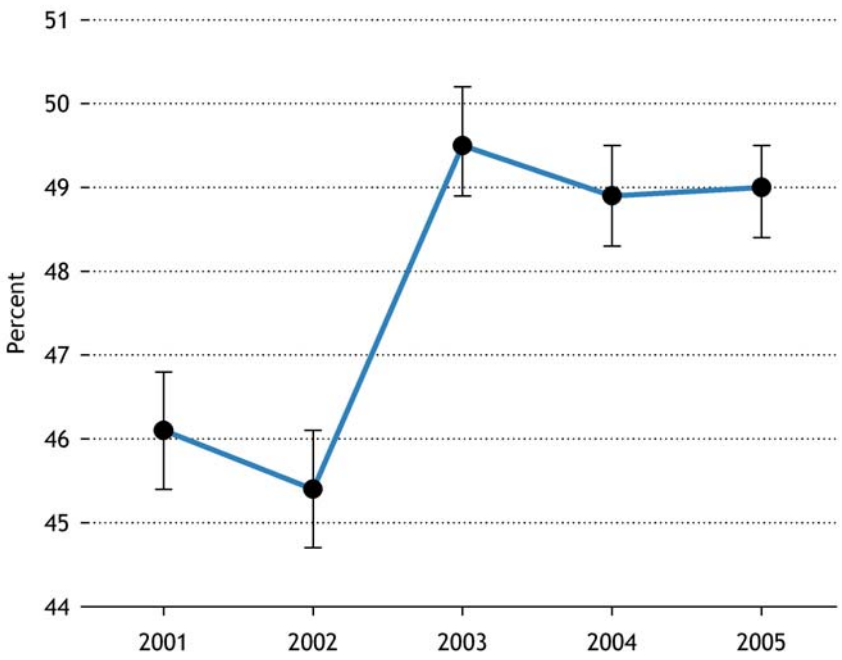
  Clare
  Hillsdale
  Washtenaw
  Wayne




**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Asthma as primary diagnosis, ICD-9-CM: 493.xx
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

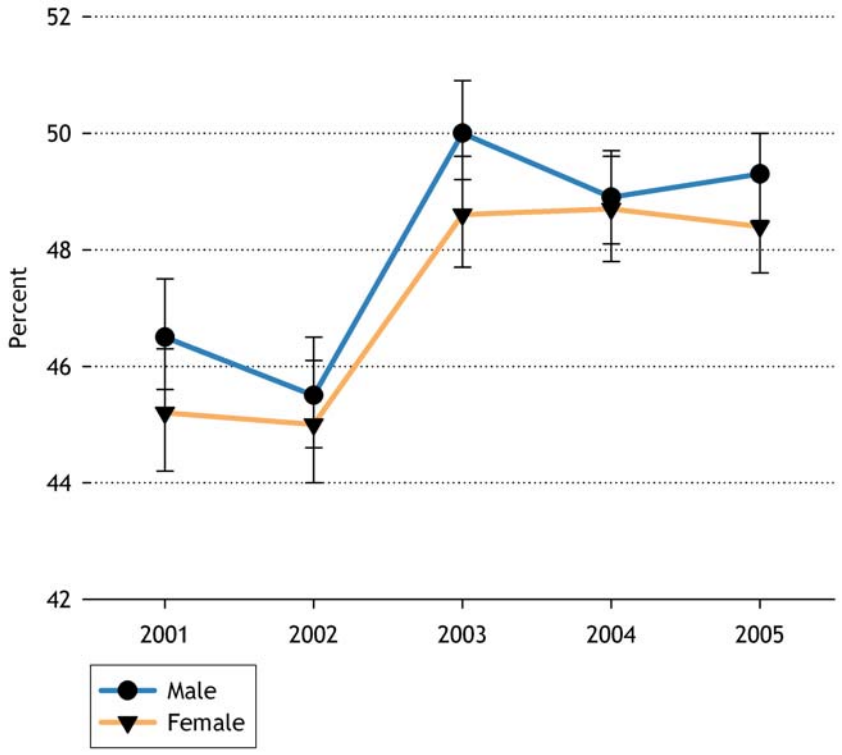
## 11. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Outpatient Visits for Asthma[3], Medicaid[4], Michigan, 2001-2005

- Only 50% of children in Medicaid with persistent asthma have had at least one outpatient visit for asthma during a given year.
- 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 with persistent asthma in Medicaid with one or more outpatient visits for asthma remained constant from 2003 to 2005, but was higher than that from 2001 to 2002.



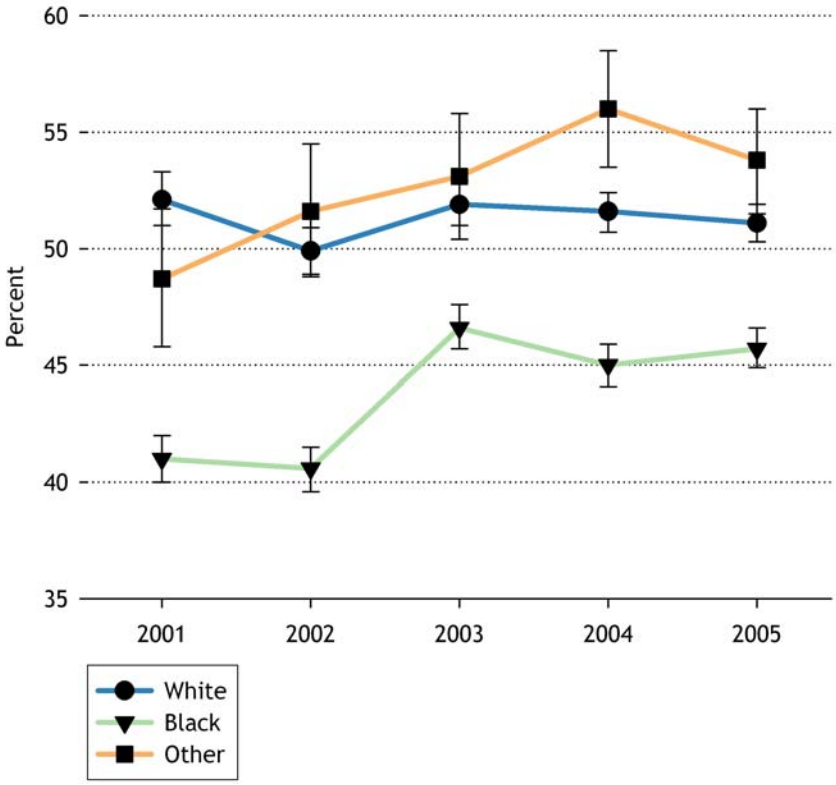

## 12. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Outpatient Visits for Asthma[3] by Sex, Medicaid[4], Michigan, 2001-2005

- The proportion of children in Medicaid with persistent asthma with at least one outpatient visit for asthma does not differ significantly by sex.
- The proportion of children with persistent asthma in Medicaid with one or more outpatient visits for asthma remained constant from 2003 to 2005, but was higher than that from 2001 to 2002, regardless of sex.



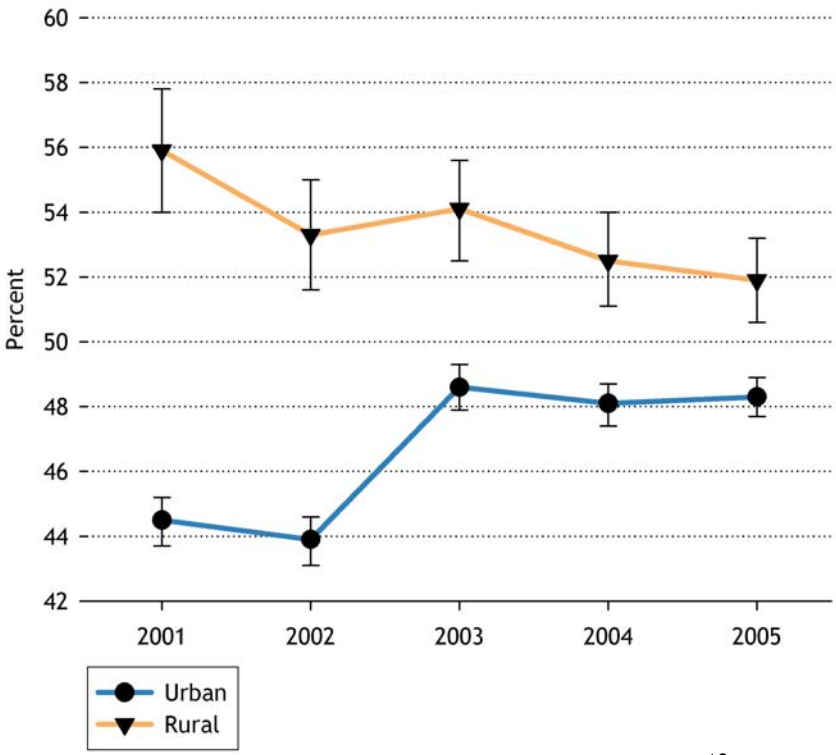

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Asthma as primary diagnosis, ICD-9-CM: 493.xx
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

## 13. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Outpatient Visits for Asthma[3] by Race, Medicaid[5], Michigan, 2001-2005




- The proportion with at least one outpatient visit for asthma for white children and those of other races are not significantly different from each other, but significantly higher than the rate for black children.
- Only 45% of black children in Medicaid with persistent asthma have had at least one outpatient visit for asthma during a given year.
- The proportion of black children with persistent asthma in Medicaid with one or more outpatient visits for asthma remained constant from 2003 to 2005, but was higher than that from 2001 to 2002.

## 14. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Outpatient Visits for Asthma[3] by Urban/Rural Residence[4], Medicaid[5], Michigan, 2001-2005



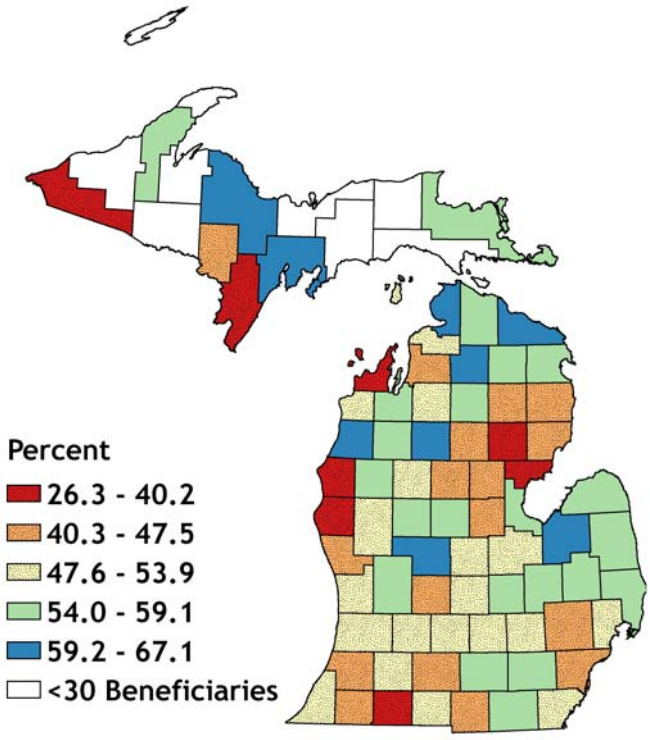

- The proportion of children with an urban residence in Medicaid with persistent asthma with at least one outpatient visit for asthma is significantly lower than that for those with a rural residence.
- Children in Medicaid with persistent asthma and a rural residence have experienced a steady decrease between 2001 and 2005 in the proportion with one or more outpatient visits for asthma. ($p<0.05$)[6]

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Asthma as primary diagnosis, ICD-9-CM: 493.xx
4. Urban/Rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
5. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.
6. Spearman's rank correlation test.

**15. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Outpatient Visits for Asthma[3] by County of Residence, Medicaid[4], Michigan, 2005**

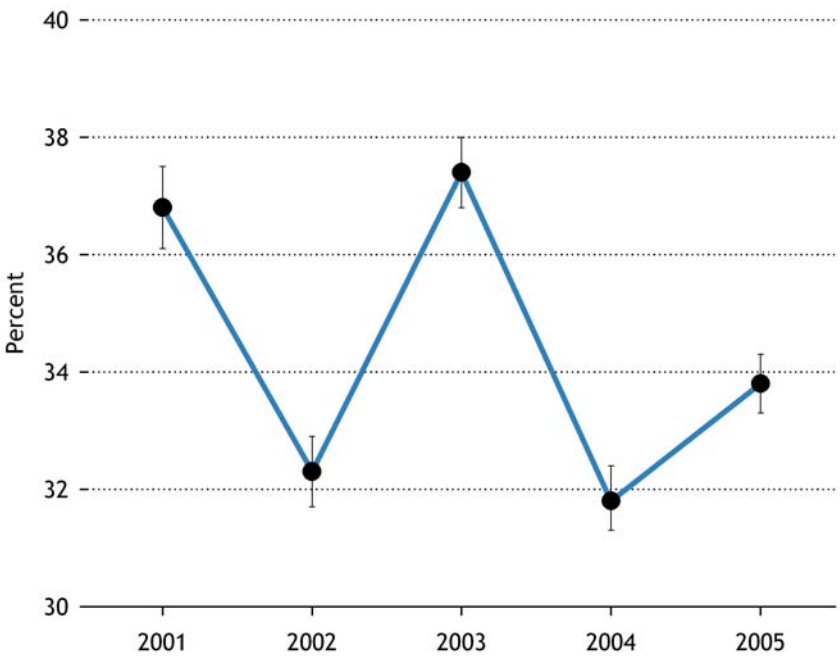
- Counties with the lowest proportion of children with persistent asthma having one or more outpatient visits for ashtma in Medicaid are:

  Arenac
  Gogebic
  Leelanau
  Mason
  Menominee
  Oceana
  Ogemaw
  St. Joseph



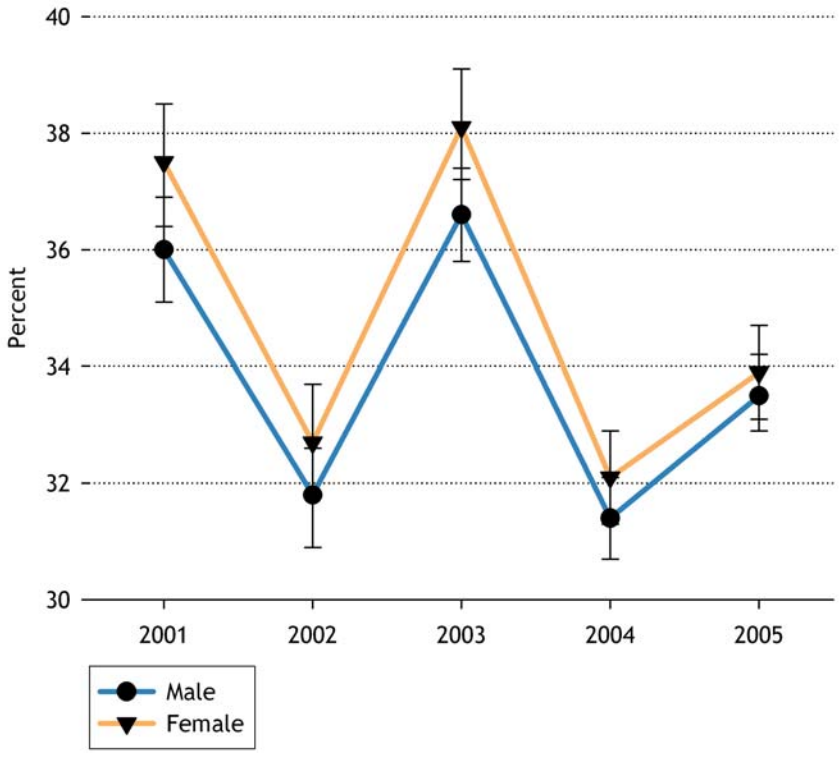

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Asthma as primary diagnosis, ICD-9-CM: 493.xx
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

## 16. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Emergency Department Visits for Asthma[3], Medicaid[4], Michigan, 2001-2005




- Over 30% of children in Medicaid with persistent asthma have had at least one emergency department visit for asthma during a given year.
- It is a goal of asthma therapy that persons with asthma experience minimal or no emergency department visits.
- Between 2001 and 2005, the proportion of children with persistent asthma in Medicaid with one or more asthma emergency department visits varied between 32% and 38%, with no apparent trend.

## 17. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Emergency Department Visits for Asthma[3] by Sex, Medicaid[4], Michigan, 2001-2005

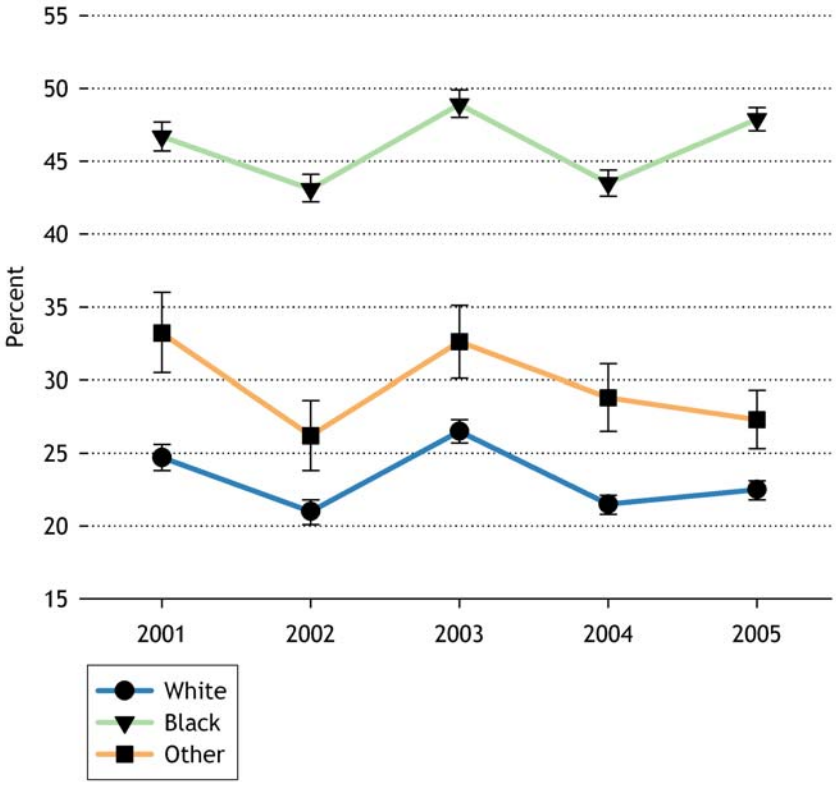



- The proportion of children in Medicaid with persistent asthma with at least one emergency department visit for asthma does not differ significantly by sex.
- Between 2001 and 2005, there is no apparent trend in the proportion of children with persistent asthma with one or more asthma emergency department visits by sex.

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Asthma as primary diagnosis, ICD-9-CM: 493.xx
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

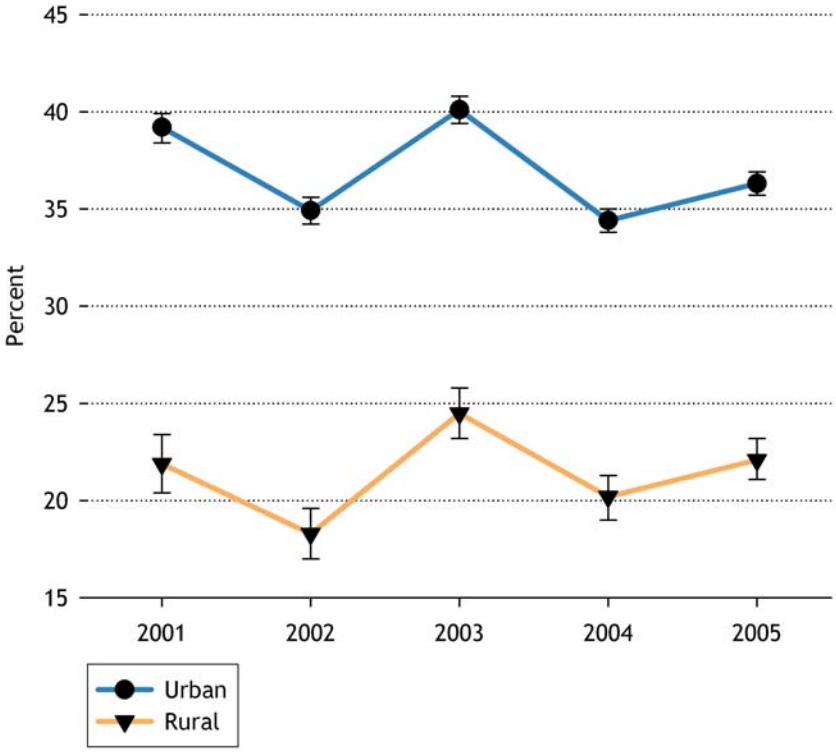
**18. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Emergency Department Visits for Asthma[3] by Race, Medicaid[5], Michigan, 2001-2005**

- The proportion of children in Medicaid with persistent asthma with at least one emergency department visit for asthma is significantly highest for black children.
- Between 2001 and 2005, there is no apparent trend in the proportion of children with persistent asthma with one or more asthma emergency department visits by race.



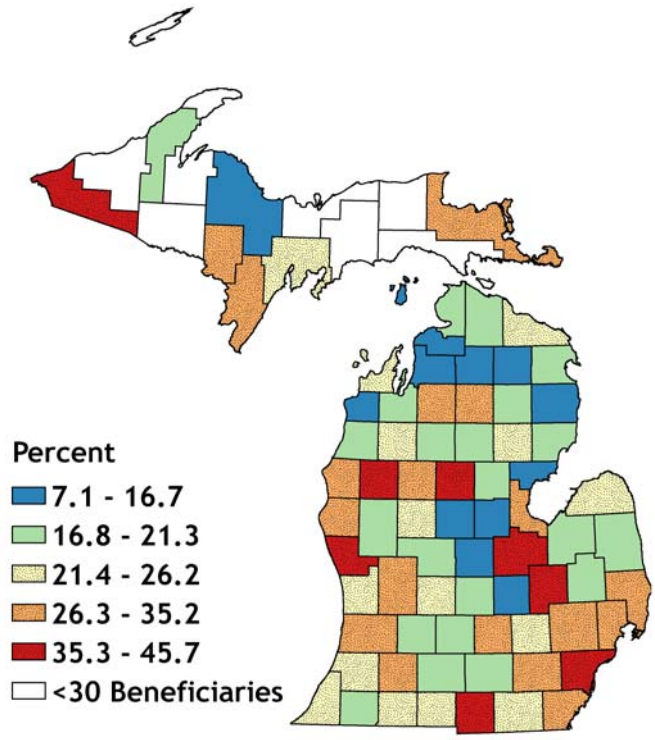

**19. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Emergency Department Visits for Asthma[3] by Urban/ Rural Residence[4], Medicaid[5], Michigan, 2001-2005**

- The proportion of children in Medicaid with persistent asthma with at least one emergency department visit for asthma is significantly higher for those with an urban residence compared to those with rural residence.
- Between 2001 and 2005, there is no apparent trend in the proportion of children with persistent asthma with one or more asthma emergency department visits by urban/rural residence.




**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Asthma as primary diagnosis, ICD-9-CM: 493.xx
4. Urban/Rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
5. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

**20. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Emergency Department Visits for Asthma[3] by County of Residence, Medicaid[4], Michigan, 2005**



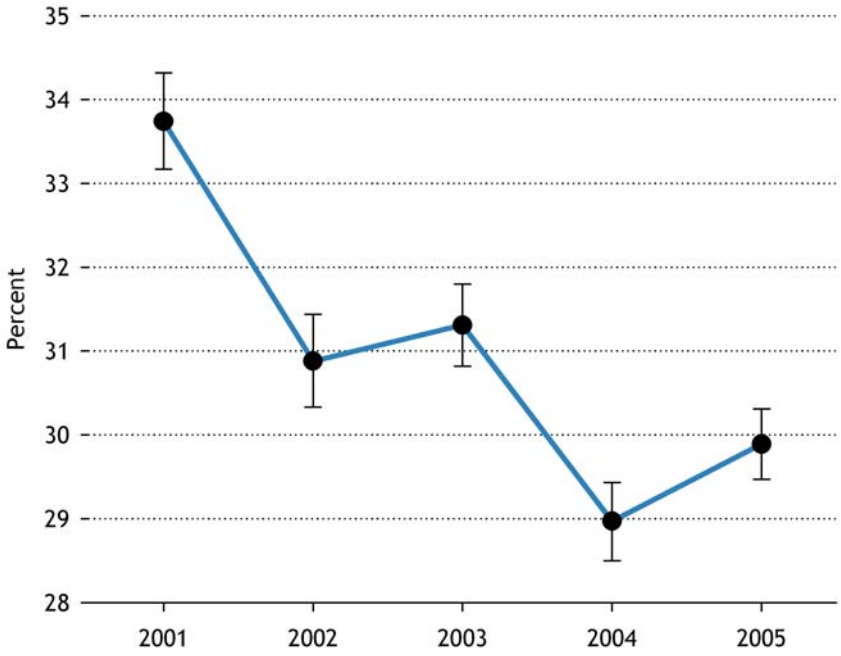

- Counties with the highest proportion of children with persistent asthma having one or more emergency department visits for ashtma in Medicaid are:

  Clare
  Genesee
  Gogebic
  Hillsdale
  Lake
  Muskegon
  Saginaw
  Wayne

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Asthma as primary diagnosis, ICD-9-CM: 493.xx
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

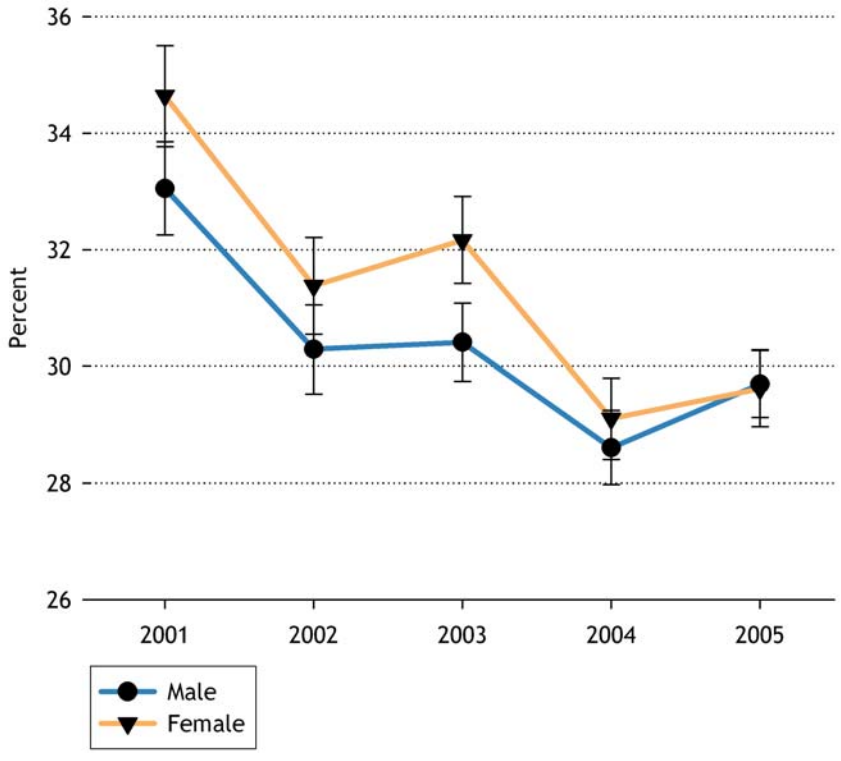
## 21. Percent of Reliance on Emergency Department[1] among Children (≤18 years) with Persistent Asthma[2], Medicaid[3], Michigan, 2001-2005

- The proportion of outpatient visits for asthma that occur in the emergency department for children in Medicaid with persistent asthma is about 30%. (2005)
- From 2001 to 2005, there has been an overall decrease in emergency department reliance for children with persistent asthma in Medicaid.



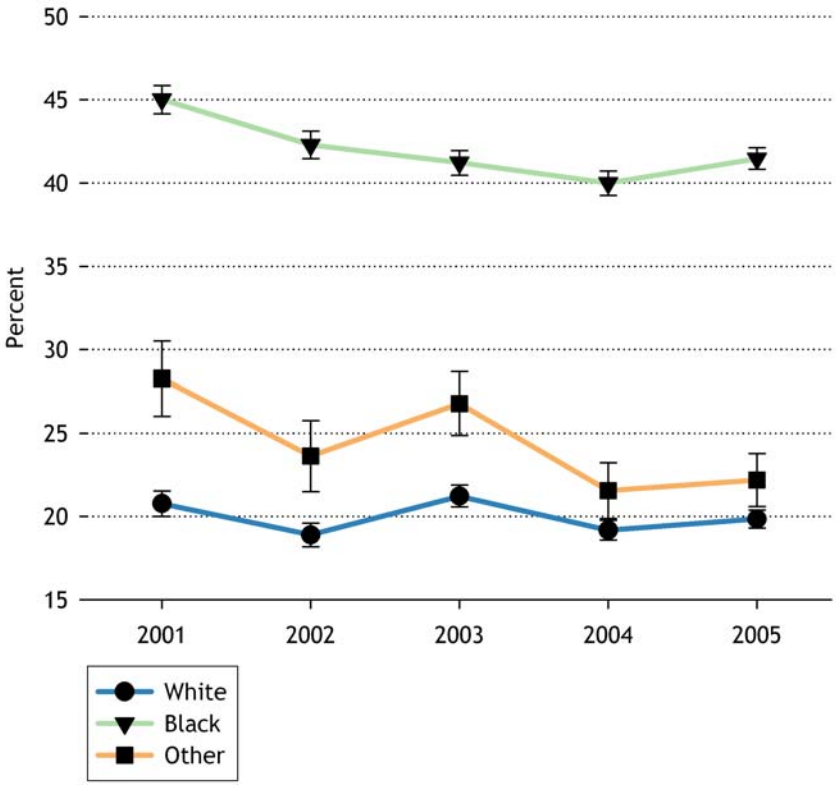

## 22. Percent of Reliance on Emergency Department[1] among Children (≤18 years) with Persistent Asthma[2] by Sex, Medicaid[3], Michigan, 2001-2005

- The proportion of outpatient visits for asthma that occur in the emergency department for children in Medicaid with persistent asthma is not significantly different by sex.
- The general decrease in emergency department reliance for children with persistent in Medicaid is similar by sex.



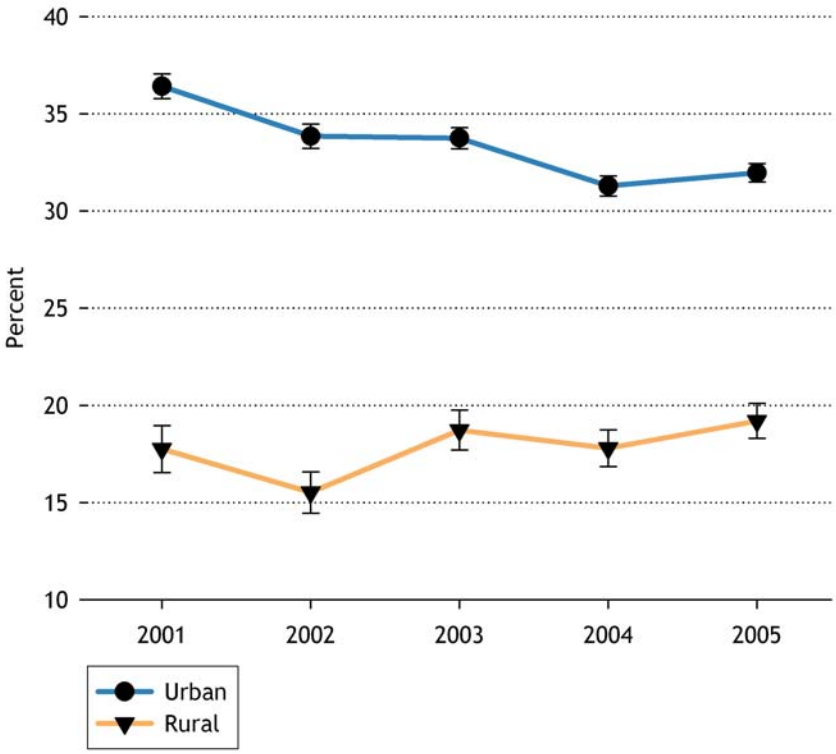

**Data Notes:**
Source: Data Warehouse, MDCH
1. Proportion of all outpatient visits for asthma that are emergency department visits (Asthma as primary diagnosis, ICD-9-CM: 493.xx), age-adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

## 23. Percent of Reliance on Emergency Department[1] among Children (≤18 years) with Persistent Asthma[2] by Race, Medicaid[4], Michigan, 2001-2005




- The proportion of outpatient visits for asthma that occur in the emergency department for children in Medicaid with persistent asthma is significantly higher among black children compared to children of other races.
- Emergency department reliance is twice as high among black children compared to white children with persistent asthma in Medicaid.
- Emergency department reliance is not changing significantly over time, regardless of race.

## 24. Percent of Reliance on Emergency Department[1] among Children (≤18 years) with Persistent Asthma[2] by Urban/Rural Residence[3], Medicaid[4], Michigan, 2001-2005




- The proportion of outpatient visits for asthma that occur in the emergency department for children in Medicaid with persistent asthma is significantly higher among children with a urban residence compared to rural.
- Emergency department reliance is decreasing for children with an urban residence ($p<0.05$)[5], but remaining generally unchanged for those with a rural residence.

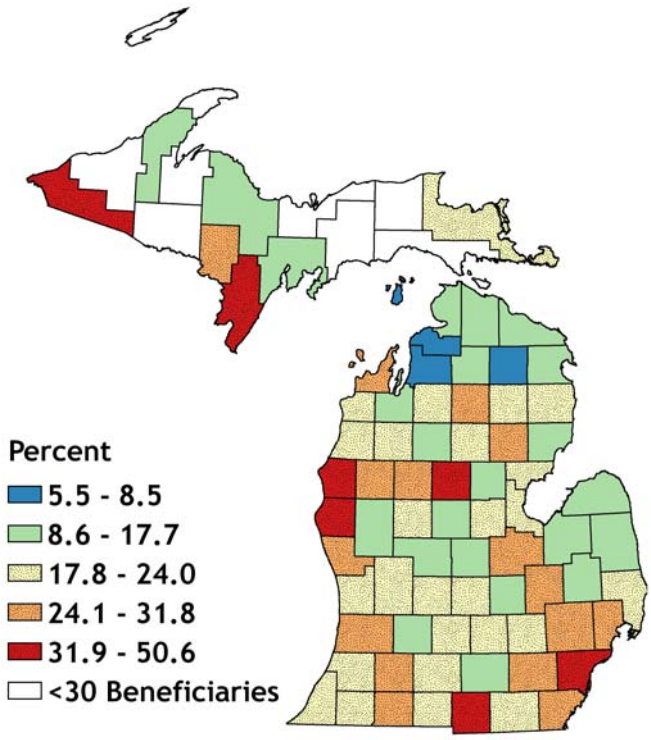
**Data Notes:**
Source: Data Warehouse, MDCH

1. Proportion of all outpatient visits for asthma that are emergency department visits (Asthma as primary diagnosis, ICD-9-CM: 493.xx), age-adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Urban/Rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.
5. Spearman's rank correlation test

**25. Percent of Reliance on Emergency Department[1] among Children (≤18 years) with Persistent Asthma[2] by County of Residence, Medicaid[3], Michigan, 2005**

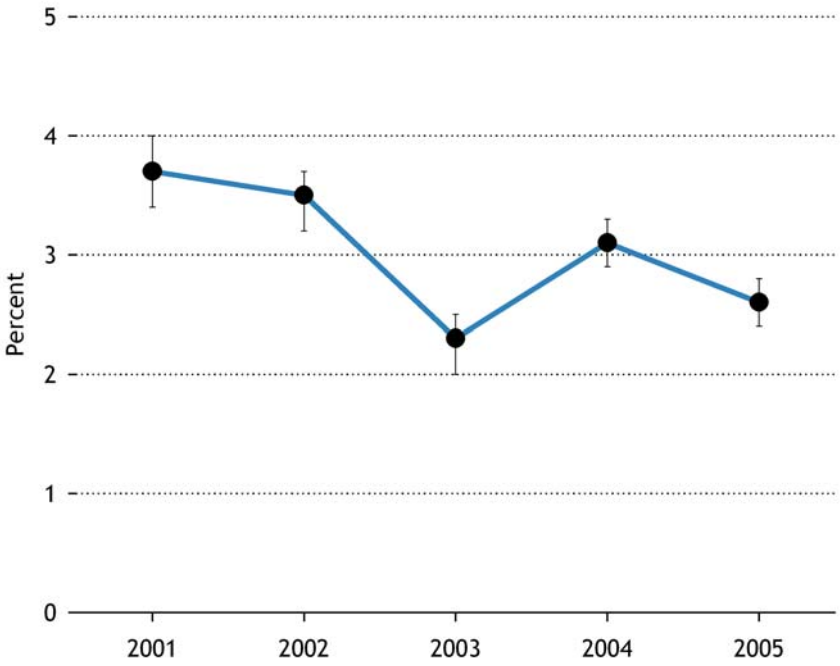
- Counties with the highest reliance on the emergency department among children with persistent asthma in Medicaid are:

  Clare
  Gogebic
  Hillsdale
  Mason
  Menominee
  Oceana
  Wayne



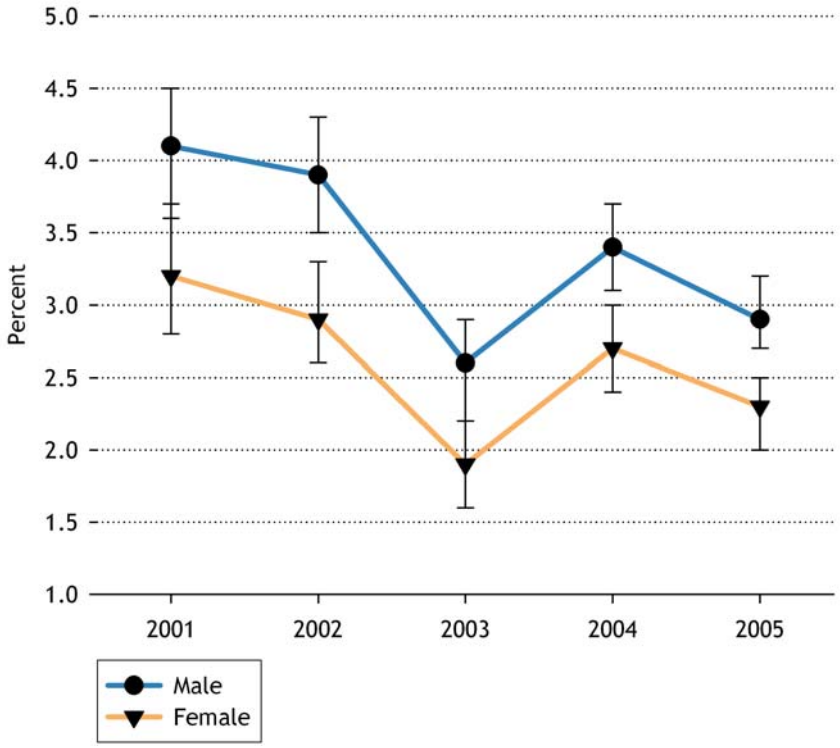

**Data Notes:**
Source: Data Warehouse, MDCH
1. Proportion of all outpatient visits for asthma that are emergency department visits (Asthma as primary diagnosis, ICD-9-CM: 493.xx), age-adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

## 26. Percent of Overuse of Short-Acting β-Agonist Medication[1] among Children (≤18 years) with Persistent Asthma[2], Medicaid[3], Michigan, 2001-2005




- It is a goal of asthma therapy that there be minimal use of Short Acting β-agonist medication – less than 1 canister per month.
- The prevalence of Short Acting β-agonist medication overuse among children in Medicaid with persistent asthma is 2.6%. (2005)
- From 2001 to 2005, there has been a overall decrease in Short Acting β-agonist medication overuse.

## 27. Percent of Overuse of Short-Acting β-Agonist Medication[1] among Children (≤18 years) with Persistent Asthma[2] by Sex, Medicaid[3], Michigan, 2001-2005

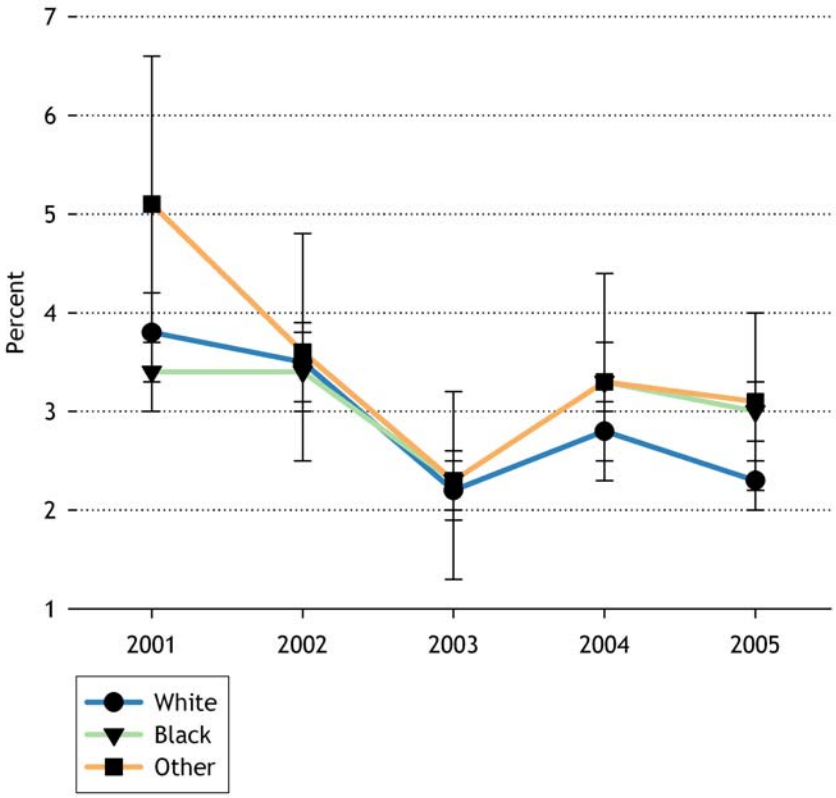



- The prevalence of Short Acting β-agonist medication overuse among children in Medicaid with persistent asthma is 30% higher for males compared to females.
- Short Acting β-agonist medication overuse is generally decreasing over time, regardless of sex.

**Data Notes:**
Source: Data Warehouse, MDCH
1. Proportion of children in Medicaid with persistent asthma who have claims for >12 Short-Acting β-Agonist medications during a given year; age-adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

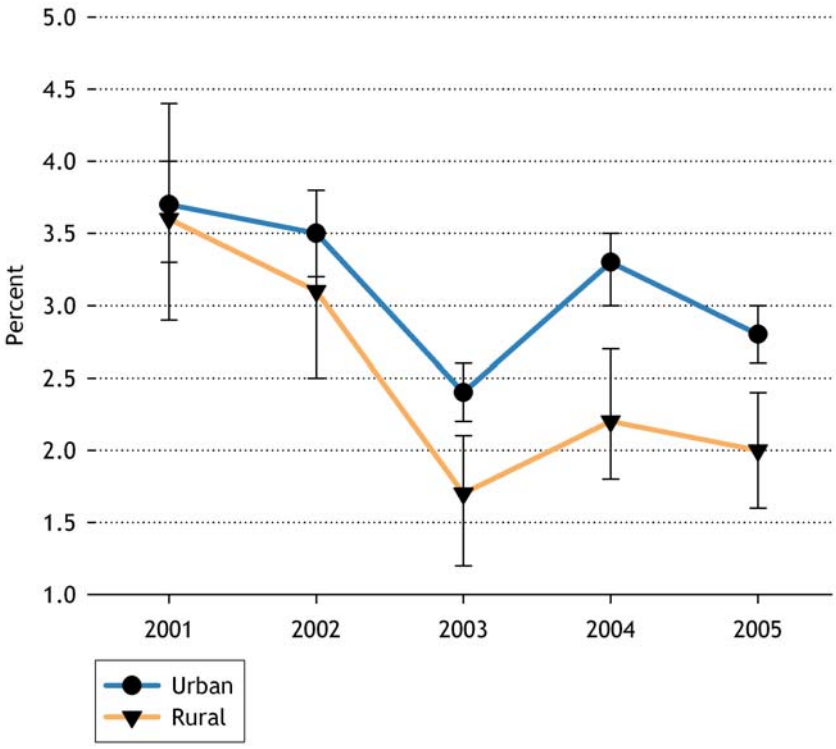
**28. Percent of Overuse of Short-Acting β-Agonist Medication[1] among Children (≤18 years) with Persistent Asthma[2] by Race, Medicaid[3], Michigan, 2001-2005**

- The prevalence of Short Acting β-agonist medication overuse among children in Medicaid with persistent asthma is not significantly different by race.
- Short Acting β-agonist medication overuse is generally decreasing over time, regardless of race.



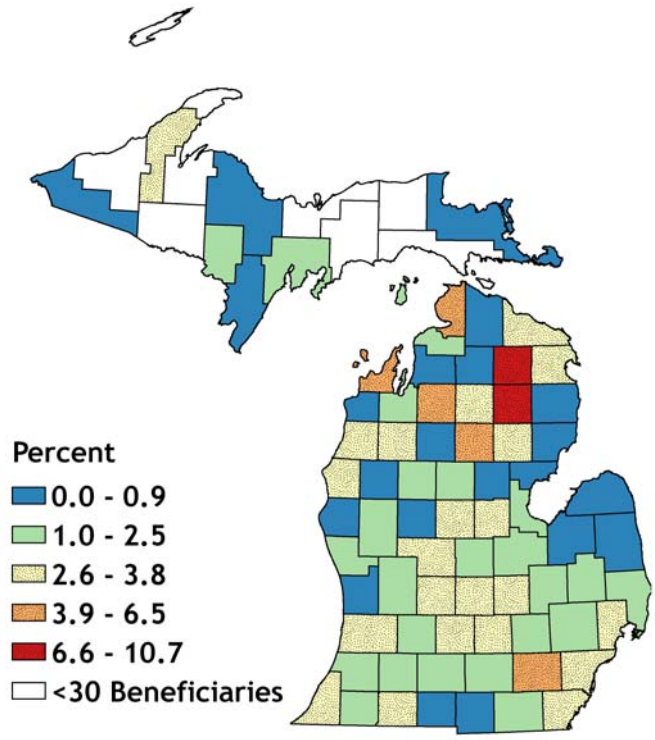

**29. Percent of Overuse of Short-Acting β-Agonist Medication[1] among Children (≤18 years) with Persistent Asthma[2] by Urban/Rural Residence[3], Medicaid[4], Michigan, 2001-2005**

- The prevalence of Short Acting β-agonist medication overuse among children in Medicaid with persistent asthma is about 40% higher for children with an urban residence compared to rural residence.
- Short Acting β-agonist medication overuse is generally decreasing over time, regardless of urban/ rural residence. However, the gap between this measure by urban/rural residence is increasing over time.




**Data Notes:**
Source: Data Warehouse, MDCH
1. Proportion of children in Medicaid with persistent asthma who have claims for >12 Short-Acting β-Agonist medications during a given year; age-adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Urban/Rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

## 30. Percent of Overuse of Short-Acting β-Agonist Medication[1] among Children (≤18 years) with Persistent Asthma[2] by County of Residence, Medicaid[3], Michigan, 2005



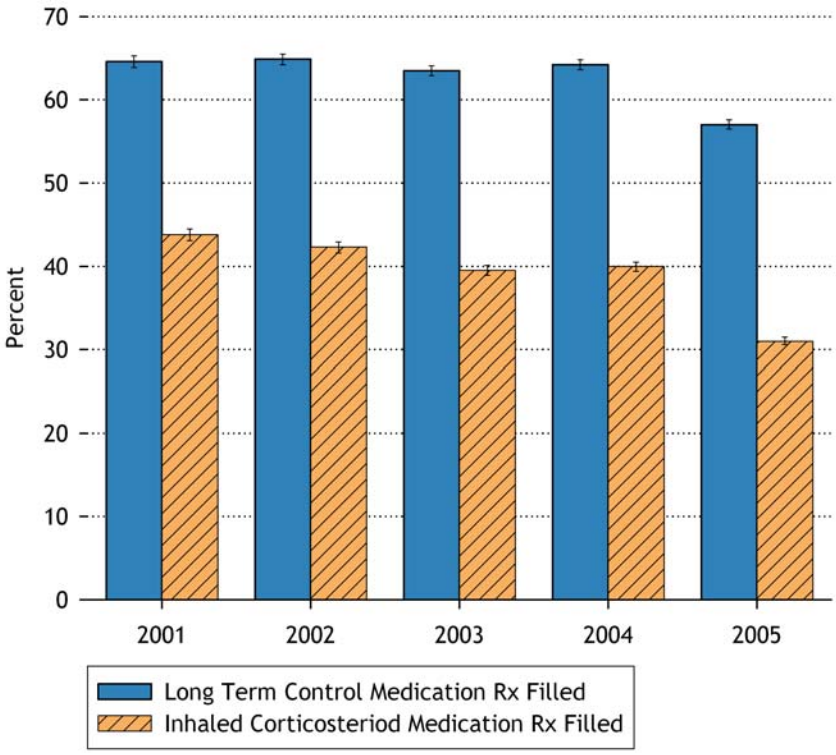

- Counties with the highest percent of Short Acting β-agonist medication overuse among children with persistent asthma in Medicaid are:

  Montmorency
  Oscoda

**Data Notes:**
Source: Data Warehouse, MDCH
1. Proportion of children in Medicaid with persistent asthma who have claims for >12 Short-Acting β-Agonist medications during a given year; age-adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

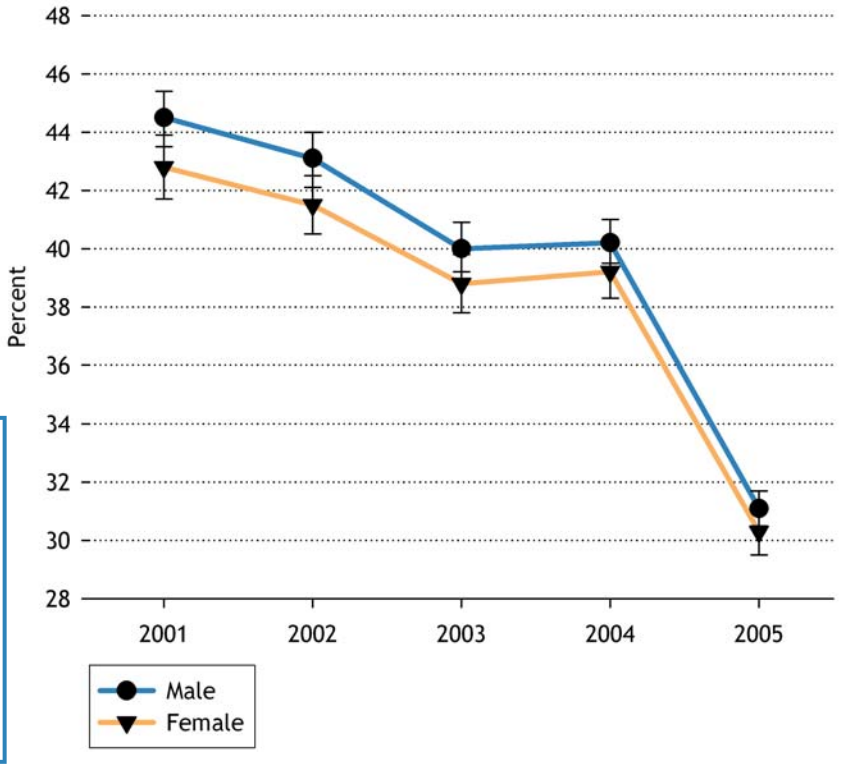
## 31. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Long Term Control and ≥1 Inhaled Corticosteroid Medication[3], Medicaid[4], Michigan, 2001-2005

- Inhaled corticosteroid medication is the preferred, first-line medication for those with persistent asthma.
- 57% of children with persistent asthma in Medicaid have had ≥1 Long Term Control Medication prescription filled. (2005)
- 31% of children with persistent asthma in Medicaid have had ≥1 Inhaled Corticosteroid prescription filled. (2005)
- The prevalence of ≥1 Inhaled Corticosteroid prescription filled is significantly decreasing over time. ($p<0.05$)[5]



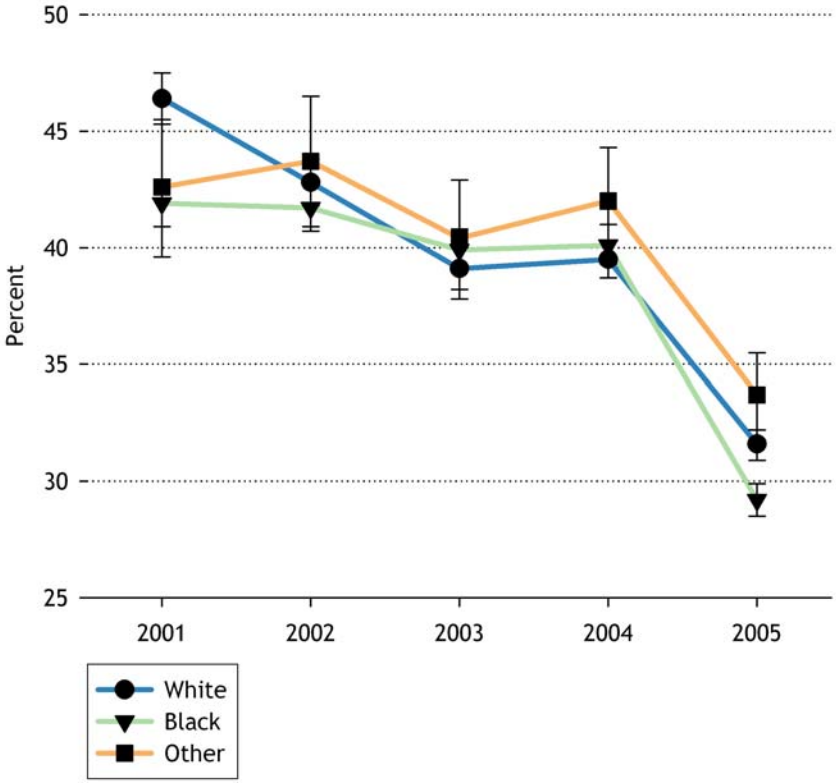

## 32. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Inhaled Corticosteroid Medication[3] by Sex, Medicaid[4], Michigan, 2001-2005

- The prevalence of ≥1 Inhaled Corticosteroid prescription filled for children in Medicaid with persistent asthma is not significantly different for males and females.
- The prevalence of ≥1 Inhaled Corticosteroid prescription filled is decreasing over time, regardless of sex. ($p<0.05$)[5]



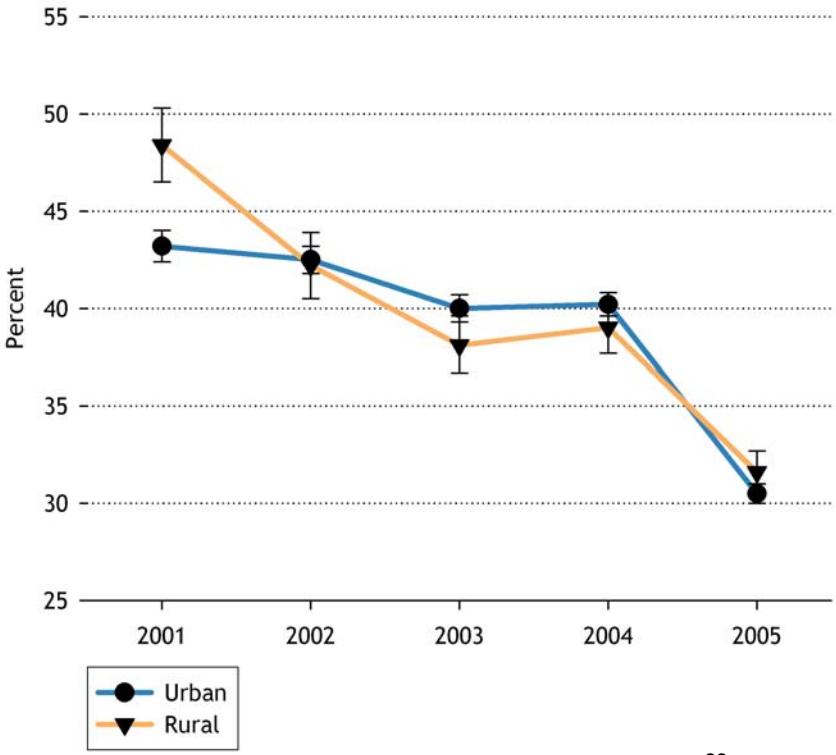

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.
4. Measure is computed differently than the NCQA HEDIS® measure "Use of Appropriate Medications for People with Asthma." Results should not be compared to data strictly applying the specifications of the NCQA HEDIS® measure.
5. Spearman's rank correlation test

**33. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Inhaled Corticosteroid Medication[3] by Race, Medicaid[5], Michigan, 2001-2005**




- The prevalence of ≥1 Inhaled Corticosteroid prescription filled for children in Medicaid with persistent asthma is not significantly lower for black children compared to other races.
- The prevalence of ≥1 Inhaled Corticosteroid prescription filled is decreasing over time, regardless of race. (Blacks and whites, $p<0.05$)[6]

**34. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Inhaled Corticosteroid Medication[3] by Urban/Rural Residence[4], Medicaid[5], Michigan, 2001-2005**



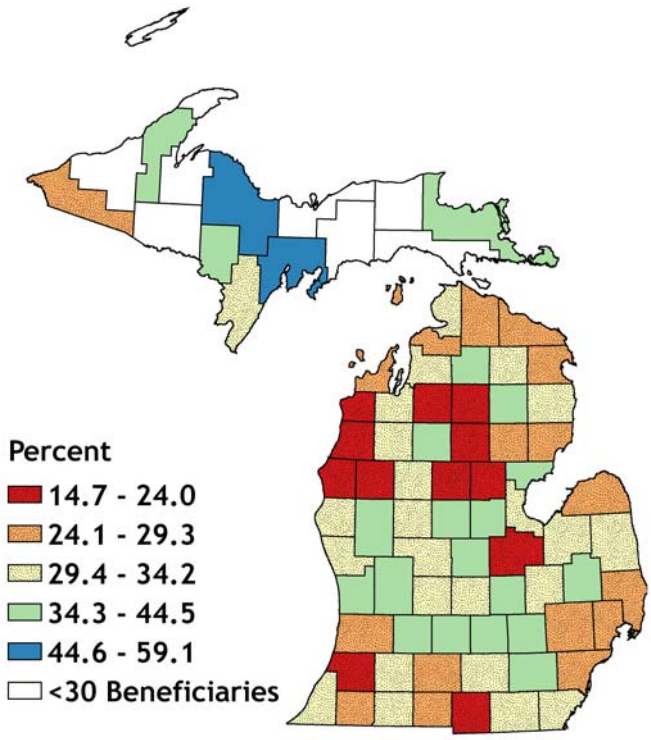

- The prevalence of ≥1 Inhaled Corticosteroid prescription filled for children in Medicaid with persistent asthma is not significantly different by urban/rural residence
- The prevalence of ≥1 Inhaled Corticosteroid prescription filled is decreasing over time, regardless of urban/rural residence. ($p<0.05$)[6]

**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Measure is computed differently than the NCQA HEDIS® measure "Use of Appropriate Medications for People with Asthma." Results should not be compared to data strictly applying the specifications of the NCQA HEDIS® measure.
4. Urban/Rural status determined by the intersection of county of residence and Michigan's Metropolitan Statistical Areas.
5. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.
6. Spearman's rank correlation test

**35. Percent[1] of Children (≤18 years) with Persistent Asthma[2] with ≥1 Inhaled Corticosteroid Medication[3] by County of Residence, Medicaid[4], Michigan, 2005**

- Counties with the lowest percent of ≥1 Inhaled Corticosteroid prescription filled for children in Medicaid with persistent asthma are:

  Benzie
  Clare
  Crawford
  Gladwin
  Hillsdale
  Kalkaska
  Lake
  Manistee
  Mason
  Roscommon
  Saginaw
  Van Buren




**Data Notes:**
Source: Data Warehouse, MDCH
1. Age-Adjusted to the 2000 US Standard Population
2. Based on annual NCQA HEDIS definition
3. Measure is computed differently than the NCQA HEDIS® measure "Use of Appropriate Medications for People with Asthma." Results should not be compared to data strictly applying the specifications of the NCQA HEDIS® measure.
4. Medicaid population of children ≤18 years is restricted to those who are continuously enrolled in Medicaid with full coverage and no other insurance.

## State Level Data, Michigan, 2001-2005

| | Measure | Year | Total | Male | Female | White | Black | Other | Urban | Rural |
|---|---|---|---|---|---|---|---|---|---|---|
| Among all children in Medicaid | Prevalence (%) [Figures 1-4] | 2001 | 4.5 (4.5-4.6) | 5.2 (5.1-5.3) | 3.8 (3.7-3.9) | 4.1 (4.0-4.2) | 5.1 (5.0-5.2) | 3.7 (3.5-3.9) | 4.6 (4.5-4.7) | 4.0 (3.9-4.2) |
| | | 2002 | 4.5 (4.4-4.5) | 5.2 (5.1-5.2) | 3.8 (3.7-3.9) | 4.1 (4.1-4.2) | 5.0 (4.9-5.1) | 3.5 (3.3-3.7) | 4.5 (4.4-4.6) | 4.3 (4.2-4.5) |
| | | 2003 | 4.5 (4.4-4.6) | 5.2 (5.1-5.3) | 3.8 (3.7-3.8) | 4.3 (4.2-4.4) | 4.9 (4.9-5.0) | 3.5 (3.3-3.6) | 4.5 (4.4-4.5) | 4.6 (4.5-4.8) |
| | | 2004 | 4.9 (4.9-5.0) | 5.7 (5.6-5.8) | 4.1 (4.0-4.2) | 4.8 (4.7-4.9) | 5.4 (5.3-5.5) | 3.8 (3.6-3.9) | 4.9 (4.8-4.9) | 5.2 (5.1-5.3) |
| | | 2005 | 5.3 (5.3-5.4) | 6.1 (6.0-6.2) | 4.5 (4.4-4.6) | 5.2 (5.1-5.2) | 5.8 (5.7-5.9) | 4.2 (4.0-4.3) | 5.3 (5.3-5.4) | 5.4 (5.2-5.5) |
| | Rate of Emergency Department Visits (per 10,000) [Figures 6-9] | 2001 | 229.3 (224.9-233.7) | 261.1 (254.7-267.6) | 195.4 (189.5-201.3) | 128.7 (123.9-133.6) | 342.5 (334.6-350.3) | 158.6 (145.3-171.8) | 251.5 (246.5-256.5) | 108.3 (100.7-116.0) |
| | | 2002 | 195.8 (191.9-199.7) | 224.2 (218.4-229.9) | 165.6 (160.5-170.8) | 110.1 (105.9-114.3) | 302.2 (294.9-309.5) | 127.2 (116.2-138.3) | 214.7 (210.2-219.1) | 97.3 (90.5-104.0) |
| | | 2003 | 227.6 (223.6-231.6) | 261.1 (255.1-267.0) | 192.2 (186.8-197.5) | 140.9 (136.4-145.3) | 343.9 (336.4-351.5) | 159.1 (147.2-171.0) | 246.1 (241.5-250.6) | 134.7 (127.2-142.2) |
| | | 2004 | 213.5 (209.8-217.3) | 247.3 (241.7-252.8) | 177.7 (172.7-182.6) | 130.2 (126.1-134.3) | 334.2 (327.0-341.5) | 141.0 (130.2-151.8) | 230.2 (226.0-234.5) | 131.5 (124.3-138.6) |
| | | 2005 | 242.5 (238.7-246.3) | 281.0 (275.3-286.6) | 201.8 (196.9-206.8) | 144.7 (140.6-148.8) | 398.4 (390.6-406.1) | 144.5 (134.3-154.6) | 263.1 (258.7-267.4) | 144.6 (137.5-151.6) |
| Among children in Medicaid with Persistent Asthma | Percent (%) with 1+ Outpatient Visits [Figures 11-14] | 2001 | 46.1 (45.4-46.8) | 46.5 (45.6-47.5) | 45.2 (44.2-46.3) | 52.1 (50.3-53.3) | 41.0 (40.0-42.0) | 48.7 (45.8-51.7) | 44.5 (43.7-45.2) | 55.9 (54.0-57.8) |
| | | 2002 | 45.4 (44.7-46.1) | 45.5 (44.6-46.5) | 45.0 (44.0-46.1) | 49.9 (50.7-50.9) | 40.6 (39.6-41.5) | 51.6 (48.8-54.5) | 43.9 (43.1-44.6) | 53.3 (51.6-55.0) |
| | | 2003 | 49.5 (48.9-50.2) | 50.0 (49.2-50.9) | 48.6 (47.7-49.6) | 51.9 (51.0-52.9) | 46.6 (45.7-47.6) | 53.1 (50.4-55.8) | 48.6 (47.9-49.3) | 54.1 (52.5-55.6) |
| | | 2004 | 48.9 (48.3-49.5) | 48.9 (48.1-49.7) | 48.7 (47.8-49.6) | 51.6 (48.9-52.4) | 45.0 (44.1-45.9) | 56.0 (53.5-58.5) | 48.1 (47.4-48.7) | 52.5 (51.1-54.0) |
| | | 2005 | 49.0 (48.4-49.5) | 49.3 (48.5-50.0) | 48.4 (47.6-49.3) | 51.1 (51.0-51.9) | 45.7 (44.9-46.6) | 53.8 (51.5-56.0) | 48.3 (47.7-48.9) | 51.9 (50.6-53.2) |
| | Percent (%) with 1+ ED Visits [Figures 16-19] | 2001 | 36.8 (36.1-37.5) | 36.0 (35.1-36.9) | 37.5 (36.4-38.5) | 24.7 (23.8-25.6) | 46.7 (45.7-47.7) | 33.2 (30.5-36.0) | 39.2 (38.4-39.9) | 21.9 (20.4-23.4) |
| | | 2002 | 32.3 (31.7-32.9) | 31.8 (30.9-32.6) | 32.7 (31.8-33.7) | 21.0 (20.1-21.8) | 43.1 (42.2-44.1) | 26.2 (23.8-28.6) | 34.9 (34.2-35.6) | 18.3 (17.0-19.6) |
| | | 2003 | 37.4 (36.8-38.0) | 36.6 (35.8-37.4) | 38.1 (37.2-39.1) | 26.5 (25.7-27.3) | 48.9 (48.0-49.9) | 32.6 (30.1-35.1) | 40.1 (39.4-40.8) | 24.5 (23.2-25.8) |
| | | 2004 | 31.8 (31.3-32.4) | 31.4 (30.7-32.1) | 32.1 (31.3-32.9) | 21.5 (20.8-22.1) | 43.5 (42.6-44.4) | 28.8 (26.5-31.1) | 34.4 (33.8-35.0) | 20.2 (19.0-21.3) |
| | | 2005 | 33.8 (33.3-34.3) | 33.5 (32.9-34.2) | 33.9 (33.1-34.7) | 22.5 (21.8-23.1) | 47.9 (47.1-48.7) | 27.3 (25.3-29.3) | 36.3 (35.7-36.9) | 22.1 (21.1-23.2) |
| | Percent (%) ED Reliance [Figures 21-24] | 2001 | 33.7 (33.2-34.3) | 33.1 (32.3-33.9) | 34.6 (33.8-35.5) | 20.8 (20.0-21.5) | 45.0 (44.2-45.9) | 28.3 (26.0-30.5) | 36.4 (35.8-37.1) | 17.8 (16.6-19.0) |
| | | 2002 | 30.9 (30.3-31.4) | 30.3 (29.5-31.1) | 31.4 (30.6-32.2) | 18.9 (18.2-19.6) | 42.3 (41.5-43.1) | 23.6 (21.5-25.8) | 33.8 (33.2-34.5) | 15.5 (14.5-16.6) |
| | | 2003 | 31.3 (30.8-31.8) | 30.4 (29.8-31.1) | 32.2 (31.4-32.9) | 21.2 (20.6-21.9) | 41.2 (40.5-42.0) | 26.8 (24.9-28.7) | 33.7 (33.2-34.3) | 18.7 (17.7-19.8) |
| | | 2004 | 29.0 (28.5-29.4) | 28.6 (28.0-29.3) | 29.1 (28.4-29.8) | 19.2 (18.6-19.8) | 40.0 (39.3-40.7) | 21.6 (19.9-23.2) | 31.3 (30.8-31.8) | 17.8 (16.9-18.8) |
| | | 2005 | 29.9 (29.5-30.3) | 29.7 (29.1-30.3) | 29.6 (29.0-30.3) | 19.9 (19.3-20.4) | 41.5 (40.8-42.1) | 22.2 (20.6-23.8) | 32.0 (31.5-32.4) | 19.2 (18.3-20.1) |
| | Percent (%) Overuse of Short-Acting β-Agonist Medication [Figures 26-29] | 2001 | 3.7 (3.4-4.0) | 4.1 (3.6-4.5) | 3.2 (2.8-3.7) | 3.8 (3.3-4.2) | 3.4 (3.0-3.8) | 5.1 (3.7-6.6) | 3.7 (3.3-4.0) | 3.6 (2.9-4.4) |
| | | 2002 | 3.5 (3.2-3.7) | 3.9 (3.5-4.3) | 2.9 (2.6-3.3) | 3.5 (3.1-3.9) | 3.4 (3.0-3.8) | 3.6 (2.5-4.8) | 3.5 (3.2-3.8) | 3.1 (2.5-3.8) |
| | | 2003 | 2.3 (2.0-2.5) | 2.6 (2.2-2.9) | 1.9 (1.6-2.2) | 2.2 (1.9-2.5) | 2.3 (3.0-2.6) | 2.3 (1.3-3.2) | 2.4 (2.2-2.6) | 1.7 (1.2-2.1) |
| | | 2004 | 3.1 (2.9-3.3) | 3.4 (3.1-3.7) | 2.7 (2.4-3.0) | 2.8 (2.5-3.1) | 3.3 (3.0-3.7) | 3.3 (2.3-4.4) | 3.3 (3.0-3.5) | 2.2 (1.8-2.7) |
| | | 2005 | 2.6 (2.4-2.8) | 2.9 (2.7-3.2) | 2.3 (2.0-2.5) | 2.3 (2.0-2.5) | 3.0 (2.7-3.3) | 3.1 (2.2-4.0) | 2.8 (2.6-3.0) | 2.0 (1.6-2.4) |
| | Percent (%) with 1+ Long Term Control Medication Rx * [Figures 31] | 2001 | 64.6 (63.9-65.3) | 65.4 (64.5-66.3) | 63.6 (62.6-64.7) | 68.3 (67.3-69.4) | 62.3 (61.3-63.3) | 60.8 (57.9-63.6) | 63.6 (62.9-64.3) | 71.1 (69.4-72.8) |
| | | 2002 | 64.9 (64.2-65.5) | 65.4 (64.5-66.3) | 64.1 (63.1-65.1) | 68.1 (67.1-69.0) | 61.9 (60.9-62.8) | 65.9 (63.2-68.7) | 63.9 (63.1-64.6) | 70.4 (68.8-71.9) |
| | | 2003 | 63.5 (62.9-64.1) | 64.1 (63.2-64.9) | 62.7 (61.7-63.6) | 68.1 (67.2-68.9) | 59.2 (58.3-60.1) | 62.5 (59.9-65.2) | 62.1 (61.4-62.8) | 70.7 (69.3-72.1) |
| | | 2004 | 64.2 (63.6-64.8) | 64.8 (64.0-65.5) | 63.4 (62.5-64.3) | 69.2 (68.4-70.0) | 58.6 (57.8-59.5) | 64.6 (62.1-67.1) | 62.3 (61.7-62.9) | 73.0 (71.7-74.2) |
| | | 2005 | 57.0 (56.5-57.6) | 57.8 (57.1-58.5) | 56.1 (55.2-56.9) | 64.7 (63.9-65.4) | 48.1 (47.3-48.9) | 59.0 (56.8-61.2) | 54.7 (54.1-55.3) | 68.2 (67.0-69.4) |
| | Percent (%) with 1+ Inhaled Corticosteroid Medication Rx* [Figures 32-34] | 2001 | 43.8 (43.1-44.5) | 44.5 (43.5-45.4) | 42.8 (41.7-43.9) | 46.4 (45.3-47.5) | 41.9 (40.9-42.9) | 42.6 (39.6-45.5) | 43.2 (42.4-44.0) | 48.4 (46.5-50.3) |
| | | 2002 | 42.3 (41.6-42.9) | 43.1 (42.1-44.0) | 41.5 (40.5-42.5) | 42.8 (41.8-43.8) | 41.7 (40.7-42.7) | 43.7 (40.9-46.5) | 42.5 (41.8-43.2) | 42.2 (40.5-43.9) |
| | | 2003 | 39.5 (38.9-40.1) | 40.0 (39.2-40.9) | 38.8 (37.8-39.8) | 39.1 (38.2-40.0) | 39.9 (39.0-40.8) | 40.4 (37.8-42.9) | 40.0 (39.3-40.7) | 38.1 (36.7-39.6) |
| | | 2004 | 40.0 (39.4-40.5) | 40.2 (39.5-41.0) | 39.2 (38.3-40.1) | 39.5 (38.7-40.3) | 40.1 (39.3-41.0) | 42.0 (39.6-44.3) | 40.2 (39.6-40.8) | 39.0 (37.7-40.3) |
| | | 2005 | 31.0 (30.6-31.5) | 31.1 (30.5-31.7) | 30.3 (29.5-31.0) | 31.6 (30.9-32.2) | 29.2 (28.5-29.9) | 33.7 (31.8-35.5) | 30.5 (30.0-31.0) | 31.6 (30.5-32.7) |

Source: Data Warehouse, MDCH
*Measure is computed differently than the NCQA HEDIS® measure "Use of Appropriate Medications for People with Asthma." Results should not be compared to data strictly applying the specifications of the NCQA HEDIS® measure.

## County Level Data - Among All Children in Medicaid, Michigan, 2005

| County | Prevalence (%) (Figure 5) | | Rate of Emergency Department Visits Rate per 10,000 (Figure 10) | |
|---|---|---|---|---|
| Alcona | 5.7 | (3.9-7.5) | 152.9 | (57.2-248.5) |
| Alger* | | | | |
| Allegan | 4.3 | (3.8-4.9) | 179.6 | (144.8-214.4) |
| Alpena | 5.3 | (4.3-6.3) | 107.6 | (61.3-154.0) |
| Antrim | 4.6 | (3.6-5.7) | 37.6 | (7.5-67.8) |
| Arenac | 4.2 | (3.1-5.3) | 86.0 | (34.8-137.1) |
| Baraga* | | | | |
| Barry | 5.2 | (4.4-6.1) | 115.5 | (76.0-155.0) |
| Bay | 5.4 | (4.9-6.0) | 183.7 | (151.1-216.4) |
| Benzie | 5.1 | (3.7-6.5) | 104.4 | (39.4-169.3) |
| Berrien | 6.3 | (5.9-6.8) | 174.7 | (151.4-197.9) |
| Branch | 4.6 | (3.9-5.4) | 118.2 | (78.6-157.8) |
| Calhoun | 4.7 | (4.3-5.1) | 118.2 | (98.2-138.2) |
| Cass | 5.8 | (5.0-6.7) | 144.1 | (103.3-185.0) |
| Charlevoix | 5.4 | (4.2-6.6) | 48.7 | (14.9-82.5) |
| Cheboygan | 7.1 | (6.0-8.2) | 144.7 | (93.5-195.9) |
| Chippewa | 2.9 | (2.2-3.6) | 105.6 | (63.5-147.6) |
| Clare | 8.2 | (7.1-9.2) | 410.3 | (333.1-487.5) |
| Clinton | 7.9 | (6.7-9.1) | 174.3 | (115.6-233.0) |
| Crawford | 5.6 | (4.2-7.0) | 251.7 | (154.4-349.1) |
| Delta | 4.6 | (3.8-5.5) | 128.1 | (83.1-173.0) |
| Dickinson | 3.8 | (2.7-4.8) | 125.0 | (65.2-184.8) |
| Eaton | 6.3 | (5.5-7.0) | 184.5 | (146.0-223.0) |
| Emmet | 5.7 | (4.6-6.7) | 131.0 | (79.8-182.3) |
| Genesee | 4.3 | (4.1-4.5) | 251.4 | (235.9-266.8) |
| Gladwin | 8.1 | (6.9-9.4) | 185.2 | (121.8-248.5) |
| Gogebic | 4.6 | (3.4-5.8) | 217.0 | (131.9-302.1) |
| Grand Traverse | 4.8 | (4.1-5.4) | 89.5 | (60.4-118.6) |
| Gratiot | 6.1 | (5.1-7.0) | 118.2 | (77.7-158.8) |
| Hillsdale | 6.3 | (5.4-7.1) | 331.4 | (266.8-396.0) |
| Houghton | 3.9 | (3.0-4.8) | 96.9 | (52.7-141.2) |
| Huron | 7.1 | (6.0-8.3) | 214.6 | (150.3-278.9) |
| Ingham | 7.2 | (6.8-7.6) | 288.9 | (264.0-313.7) |
| Ionia | 4.9 | (4.2-5.7) | 123.1 | (84.9-161.4) |
| Iosco | 5.5 | (4.5-6.5) | 131.0 | (82.3-179.7) |
| Iron* | | | | |
| Isabella | 10.8 | (9.7-12.0) | 196.4 | (146.5-246.3) |
| Jackson | 5.5 | (5.1-5.9) | 119.7 | (99.8-139.6) |
| Kalamazoo | 5.4 | (5.0-5.7) | 216.9 | (191.8-242.1) |
| Kalkaska | 5.0 | (3.9-6.1) | 150.4 | (88.6-212.2) |
| Kent | 5.0 | (4.8-5.2) | 186.5 | (172.7-200.3) |
| Keweenaw* | | | | |

Source: Data Warehouse, MDCH
* Beneficiaries <30

## County Level Data - Among All Children in Medicaid, Michigan, 2005

| County | Prevalence (Figure 5) | | Rate of Emergency Department Visits (Figure 10) | |
|---|---|---|---|---|
| Lake | 3.9 | (2.7-5.0) | 221.4 | (127.9-315.0) |
| Lapeer | 4.0 | (3.4-4.6) | 103.2 | (72.5-133.9) |
| Leelanau | 6.5 | (4.4-8.6) | 219.9 | (94.0-345.7) |
| Lenawee | 5.9 | (5.3-6.6) | 162.8 | (127.7-197.8) |
| Livingston | 5.6 | (4.9-6.4) | 149.3 | (109.1-189.4) |
| Luce* | | | | |
| Mackinac* | | | | |
| Macomb | 4.3 | (4.0-4.5) | 172.3 | (157.8-186.7) |
| Manistee | 3.7 | (2.7-4.7) | 109.4 | (55.6-163.2) |
| Marquette | 3.7 | (3.0-4.4) | 65.1 | (34.2-96.0) |
| Mason | 6.8 | (5.7-7.9) | 279.7 | (208.0-351.3) |
| Mecosta | 5.3 | (4.4-6.1) | 174.0 | (123.8-224.1) |
| Menominee | 3.9 | (2.8-5.0) | 156.2 | (86.6-225.8) |
| Midland | 8.2 | (7.4-9.1) | 170.7 | (131.4-210.0) |
| Missaukee | 6.1 | (4.6-7.6) | 140.2 | (66.4-214.0) |
| Monroe | 6.0 | (5.4-6.6) | 233.9 | (195.4-272.4) |
| Montcalm | 4.7 | (4.1-5.3) | 114.6 | (83.1-146.1) |
| Montmorency | 6.9 | (5.0-8.8) | 99.7 | (25.6-173.7) |
| Muskegon | 4.3 | (4.0-4.7) | 218.3 | (194.9-241.6) |
| Newaygo | 4.1 | (3.4-4.7) | 87.0 | (57.0-117.0) |
| Oakland | 5.0 | (4.8-5.3) | 212.5 | (197.6-227.4) |
| Oceana | 3.6 | (2.8-4.4) | 138.9 | (91.4-186.4) |
| Ogemaw | 5.1 | (4.1-6.1) | 119.0 | (67.7-170.2) |
| Ontonagon* | | | | |
| Osceola | 4.9 | (3.8-5.9) | 206.7 | (136.7-276.7) |
| Oscoda | 5.4 | (3.7-7.2) | 164.1 | (67.0-261.2) |
| Otsego | 8.5 | (7.1-9.8) | 165.9 | (103.1-228.8) |
| Ottawa | 4.7 | (4.2-5.2) | 159.6 | (132.0-187.3) |
| Presque Isle | 4.7 | (3.1-6.4) | 134.3 | (40.3-228.3) |
| Roscommon | 5.8 | (4.7-6.8) | 98.6 | (55.2-142.0) |
| Saginaw | 5.0 | (4.7-5.3) | 251.4 | (228.5-274.4) |
| St. Clair | 5.3 | (4.9-5.8) | 188.9 | (160.8-216.9) |
| St. Joseph | 4.9 | (4.2-5.5) | 134.8 | (100.4-169.2) |
| Sanilac | 5.5 | (4.7-6.3) | 145.3 | (101.8-188.8) |
| Schoolcraft* | | | | |
| Shiawassee | 6.0 | (5.3-6.7) | 107.1 | (74.8-139.3) |
| Tuscola | 5.3 | (4.5-6.0) | 141.6 | (102.7-180.4) |
| Van Buren | 4.3 | (3.8-4.8) | 116.4 | (89.3-143.4) |
| Washtenaw | 8.8 | (8.2-9.3) | 387.5 | (352.3-422.7) |
| Wayne | 5.5 | (5.4-5.6) | 357.9 | (349.8-366.1) |
| Wexford | 6.1 | (5.1-7.0) | 168.4 | (118.0-218.8) |

Source: Data Warehouse, MDCH
* Beneficiaries <30

## County Level Data - Among Children in Medicaid with Persistent Asthma, Michigan, 2005

| County | Percent (%) with 1+ Outpatient Visits (Figure 15) | | Percent (%) with 1+ Emergency Dept. Visits (Figure 20) | | Percent (%) ED Reliance (Figure 25) | | Percent (%) Overuse of Short-Acting β-Agonist Medication (Figure 30) | | Percent (%) with 1+ Inhaled Corticosteroid Medication Rx** (Figure 35) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Alcona | 46.6 | (31.9-61.4) | 14.9 | (2.7-27.1) | 18.1 | (5.2-31.1) | 0.0 | | 31.3 | (16.0-46.6) |
| Alger* | | | | | | | | | | |
| Allegan | 51.3 | (44.7-57.9) | 31.5 | (25.5-37.5) | 26.6 | (21.9-31.2) | 3.7 | (0.9-6.4) | 26.2 | (21.1-31.2) |
| Alpena | 55.5 | (45.6-65.5) | 19.3 | (11.1-27.4) | 15.0 | (8.7-21.4) | 3.1 | (-0.4-6.6) | 29.0 | (20.2-37.9) |
| Antrim | 47.1 | (36.0-58.3) | 7.1 | (1.4-12.8) | 5.5 | (0.2-10.8) | 0.0 | | 30.9 | (22.0-39.9) |
| Arenac | 35.0 | (21.9-48.2) | 16.4 | (6.2-26.6) | 18.8 | (-0.8-38.4) | 0.0 | | 35.8 | (24.1-47.5) |
| Baraga* | | | | | | | | | | |
| Barry | 53.9 | (45.3-62.4) | 18.9 | (12.3-25.4) | 17.0 | (10.9-23.1) | 2.2 | (-0.4-4.8) | 34.9 | (27.6-42.1) |
| Bay | 57.8 | (52.6-63.0) | 28.0 | (23.4-32.7) | 19.6 | (16.1-23.1) | 1.8 | (0.2-3.4) | 30.7 | (26.5-34.8) |
| Benzie | 53.0 | (38.5-67.6) | 16.6 | (5.2-28.0) | 18.5 | (3.4-33.6) | 0.0 | | 22.2 | (9.4-35.0) |
| Berrien | 50.1 | (46.4-53.7) | 22.4 | (19.3-25.4) | 21.8 | (19.0-24.7) | 2.8 | (1.4-4.1) | 32.2 | (29.4-35.0) |
| Branch | 50.8 | (41.9-59.6) | 24.7 | (17.1-32.4) | 19.6 | (12.7-26.6) | 0.0 | | 25.6 | (19.3-32.0) |
| Calhoun | 47.5 | (43.0-52.0) | 21.0 | (17.4-24.6) | 21.4 | (17.8-25.0) | 2.0 | (0.6-3.5) | 28.8 | (25.1-32.4) |
| Cass | 45.3 | (37.9-52.8) | 18.8 | (13.1-24.4) | 21.0 | (14.9-27.1) | 2.2 | (0.0-4.3) | 25.7 | (20.1-31.2) |
| Charlevoix | 51.2 | (39.7-62.8) | 9.4 | (2.9-16.0) | 7.1 | (1.4-12.8) | 1.8 | (-0.7-4.3) | 29.0 | (19.1-39.0) |
| Cheboygan | 57.7 | (50.0-65.3) | 17.2 | (11.1-23.3) | 17.3 | (11.4-23.3) | 0.6 | (-0.6-1.9) | 26.8 | (20.7-32.9) |
| Chippewa | 57.8 | (45.2-70.4) | 28.2 | (17.3-39.1) | 22.7 | (13.6-31.9) | 0.0 | | 35.0 | (22.4-47.6) |
| Clare | 46.1 | (38.9-53.2) | 36.1 | (29.3-42.8) | 35.1 | (29.1-41.1) | 2.3 | (-0.1-4.6) | 22.2 | (17.2-27.2) |
| Clinton | 52.4 | (44.6-60.3) | 20.1 | (14.0-26.3) | 18.7 | (13.3-24.1) | 2.8 | (0.0-5.6) | 32.5 | (25.9-39.1) |
| Crawford | 56.6 | (43.4-69.8) | 32.8 | (20.0-45.6) | 26.7 | (17.8-35.5) | 3.1 | (-1.2-7.3) | 19.5 | (9.1-30.0) |
| Delta | 60.7 | (51.3-70.1) | 23.5 | (15.7-31.3) | 15.8 | (10.3-21.2) | 1.9 | (-0.7-4.5) | 59.1 | (49.8-68.5) |
| Dickinson | 43.8 | (30.2-57.4) | 34.3 | (21.5-47.2) | 28.7 | (16.9-40.4) | 1.9 | (-1.8-5.6) | 44.5 | (31.5-57.5) |
| Eaton | 50.5 | (44.6-56.4) | 21.2 | (16.2-26.1) | 19.5 | (15.2-23.8) | 3.0 | (0.5-5.5) | 37.0 | (31.6-42.3) |
| Emmet | 62.4 | (52.9-72.0) | 17.4 | (9.9-24.8) | 15.2 | (9.3-21.1) | 6.5 | (1.2-11.7) | 32.6 | (26.3-38.9) |
| Genesee | 58.2 | (55.9-60.6) | 41.9 | (39.6-44.3) | 29.1 | (27.5-30.7) | 1.7 | (1.0-2.3) | 33.8 | (31.7-35.9) |
| Gladwin | 46.3 | (38.0-54.6) | 21.3 | (14.5-28.1) | 17.2 | (11.5-23.0) | 0.5 | (-0.5-1.6) | 16.9 | (10.9-22.9) |
| Gogebic | 26.3 | (15.6-36.9) | 43.7 | (28.1-59.2) | 50.6 | (31.6-69.7) | 0.0 | | 27.8 | (16.5-39.1) |
| Grand Traverse | 54.8 | (47.7-61.8) | 18.2 | (12.7-23.7) | 14.7 | (9.9-19.5) | 1.8 | (0.1-3.6) | 30.7 | (24.6-36.7) |
| Gratiot | 51.5 | (42.8-60.2) | 16.5 | (10.4-22.6) | 12.8 | (6.5-19.1) | 2.4 | (-0.2-5.0) | 37.2 | (30.2-44.2) |
| Hillsdale | 46.1 | (38.2-54.0) | 37.3 | (29.7-44.9) | 35.4 | (28.6-42.1) | 0.7 | (-0.3-1.8) | 21.6 | (16.1-27.1) |
| Houghton | 55.7 | (44.0-67.4) | 18.8 | (9.8-27.7) | 14.8 | (8.5-21.1) | 3.1 | (-1.2-7.4) | 40.4 | (29.6-51.3) |
| Huron | 56.8 | (48.2-65.4) | 24.2 | (16.8-31.5) | 17.0 | (12.0-21.9) | 0.7 | (-0.7-2.1) | 28.6 | (21.8-35.4) |
| Ingham | 53.2 | (50.3-56.0) | 30.4 | (27.8-32.9) | 24.0 | (22.1-25.9) | 3.8 | (2.6-4.9) | 37.1 | (34.7-39.6) |
| Ionia | 45.7 | (38.2-53.2) | 21.6 | (15.3-27.9) | 21.9 | (15.6-28.2) | 2.8 | (0.1-5.5) | 31.2 | (24.6-37.9) |
| Iosco | 46.2 | (36.9-55.5) | 17.0 | (10.8-23.2) | 15.7 | (10.0-21.3) | 0.9 | (-0.9-2.6) | 28.9 | (21.3-36.5) |
| Iron* | | | | | | | | | | |
| Isabella | 56.6 | (50.1-63.2) | 14.8 | (10.1-19.5) | 13.1 | (9.0-17.3) | 2.8 | (0.7-4.9) | 39.1 | (34.1-44.2) |
| Jackson | 56.4 | (52.2-60.5) | 18.8 | (15.6-22.0) | 14.3 | (11.7-16.8) | 2.5 | (1.1-3.9) | 30.4 | (26.9-33.9) |
| Kalamazoo | 50.5 | (46.8-54.3) | 30.5 | (27.1-33.9) | 26.0 | (23.3-28.7) | 2.3 | (1.0-3.5) | 32.5 | (29.5-35.5) |
| Kalkaska | 50.5 | (38.7-62.3) | 29.3 | (19.3-39.3) | 20.3 | (12.7-27.8) | 4.5 | (-0.6-9.6) | 24.0 | (15.1-32.9) |
| Kent | 54.4 | (52.1-56.8) | 28.2 | (26.1-30.3) | 23.4 | (21.7-25.1) | 1.4 | (0.8-2.1) | 35.3 | (33.2-37.4) |
| Keweenaw* | | | | | | | | | | |

Source: Data Warehouse, MDCH
* Beneficiaries <30

**Measure is computed differently than the NCQA HEDIS® measure "Use of Appropriate Medications for People with Asthma." Results should not be compared to data strictly applying the specifications of the NCQA HEDIS® measure.

## County Level Data - Among Children in Medicaid with Persistent Asthma, Michigan, 2005

| County | Percent (%) with 1+ Outpatient Visits (Figure 15) | | Percent (%) with 1+ Emergency Dept. Visits (Figure 20) | | Percent (%) ED Reliance (Figure 25) | | Percent (%) Overuse of Short-Acting β-Agonist Medication (Figure 30) | | Percent (%) with 1+ Inhaled Corticosteroid Medication Rx** (Figure 35) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Lake | 56.2 | (40.3-72.1) | 41.4 | (27.1-55.7) | 28.7 | (18.6-38.8) | 0.0 | | 18.9 | (8.8-29.1) |
| Lapeer | 54.8 | (46.4-63.1) | 19.3 | (13.2-25.5) | 16.7 | (10.0-23.3) | 1.8 | (-0.3-4.0) | 36.7 | (30.9-42.4) |
| Leelanau | 37.9 | (21.2-54.5) | 24.4 | (9.0-39.7) | 29.1 | (12.2-45.9) | 4.7 | (-1.4-10.8) | 28.8 | (14.8-42.8) |
| Lenawee | 58.0 | (51.8-64.2) | 22.8 | (17.7-27.9) | 19.9 | (15.2-24.7) | 1.7 | (-0.3-3.8) | 33.0 | (28.1-37.9) |
| Livingston | 52.5 | (45.5-59.6) | 21.9 | (15.9-27.8) | 20.6 | (15.1-26.0) | 2.0 | (-0.3-4.2) | 37.6 | (31.1-44.0) |
| Luce* | | | | | | | | | | |
| Mackinac* | | | | | | | | | | |
| Macomb | 51.5 | (48.8-54.3) | 31.0 | (28.5-33.5) | 25.3 | (23.3-27.2) | 3.4 | (2.4-4.5) | 27.3 | (25.1-29.6) |
| Manistee | 63.1 | (49.2-77.0) | 19.2 | (7.6-30.7) | 21.2 | (11.6-30.7) | 3.6 | (-1.4-8.6) | 20.4 | (11.1-29.7) |
| Marquette | 67.1 | (58.2-75.9) | 16.5 | (9.1-23.9) | 12.7 | (7.1-18.4) | 0.0 | | 53.5 | (44.1-62.8) |
| Mason | 37.0 | (28.9-45.1) | 33.6 | (26.0-41.2) | 39.2 | (31.2-47.1) | 2.9 | (0.1-5.8) | 14.7 | (9.0-20.4) |
| Mecosta | 57.7 | (49.6-65.8) | 25.9 | (18.8-33.0) | 21.1 | (15.8-26.4) | 0.9 | (-0.9-2.7) | 32.4 | (25.7-39.1) |
| Menominee | 38.7 | (26.5-50.9) | 28.6 | (13.5-43.7) | 42.7 | (0.5-84.9) | 0.0 | | 33.4 | (18.0-48.9) |
| Midland | 42.5 | (37.1-48.0) | 16.7 | (12.4-20.9) | 21.1 | (16.5-25.6) | 2.9 | (0.9-5.0) | 34.9 | (30.5-39.4) |
| Missaukee | 62.0 | (48.2-75.9) | 20.3 | (9.1-31.4) | 16.3 | (7.0-25.6) | 0.0 | | 37.1 | (27.7-46.5) |
| Monroe | 52.1 | (47.1-57.2) | 30.7 | (26.0-35.5) | 25.0 | (21.3-28.6) | 3.4 | (1.5-5.4) | 30.1 | (25.8-34.3) |
| Montcalm | 60.9 | (53.7-68.1) | 19.9 | (14.2-25.6) | 13.9 | (10.1-17.8) | 3.3 | (0.7-5.8) | 33.7 | (27.7-39.6) |
| Montmorency | 58.1 | (42.8-73.4) | 12.7 | (3.4-22.0) | 8.5 | (1.7-15.3) | 7.8 | (-1.1-16.8) | 30.3 | (19.3-41.2) |
| Muskegon | 47.4 | (43.5-51.3) | 38.0 | (34.3-41.8) | 31.8 | (28.8-34.8) | 1.5 | (0.5-2.5) | 30.2 | (26.9-33.6) |
| Newaygo | 51.1 | (42.9-59.2) | 18.4 | (12.1-24.7) | 16.2 | (9.4-23.0) | 1.4 | (-0.5-3.2) | 39.3 | (31.7-47.0) |
| Oakland | 47.5 | (45.1-49.9) | 32.3 | (30.0-34.5) | 30.4 | (28.4-32.3) | 2.1 | (1.4-2.9) | 28.3 | (26.4-30.2) |
| Oceana | 35.0 | (24.5-45.6) | 32.0 | (22.0-42.0) | 35.1 | (23.9-46.4) | 0.0 | | 34.2 | (24.8-43.5) |
| Ogemaw | 40.2 | (30.2-50.3) | 21.5 | (13.1-29.9) | 27.8 | (18.0-37.6) | 3.5 | (-0.4-7.3) | 26.7 | (19.1-34.3) |
| Ontonagon* | | | | | | | | | | |
| Osceola | 51.2 | (39.8-62.7) | 35.2 | (24.0-46.5) | 27.1 | (18.3-35.9) | 2.2 | (-2.1-6.6) | 31.2 | (21.2-41.1) |
| Oscoda | 46.3 | (28.6-63.9) | 20.9 | (6.8-34.9) | 20.6 | (6.4-34.8) | 10.7 | (-0.4-21.7) | 35.5 | (18.5-52.4) |
| Otsego | 62.8 | (53.6-72.0) | 16.2 | (9.0-23.4) | 14.0 | (8.7-19.4) | 0.6 | (-0.5-1.7) | 36.8 | (28.9-44.7) |
| Ottawa | 51.3 | (46.1-56.5) | 26.2 | (21.6-30.8) | 23.8 | (19.9-27.6) | 0.8 | (-0.3-1.9) | 39.2 | (34.4-44.0) |
| Presque Isle | 60.0 | (43.1-76.9) | 23.1 | (7.9-38.4) | 17.7 | (4.9-30.6) | 2.8 | (-2.7-8.4) | 28.8 | (12.1-45.5) |
| Roscommon | 44.1 | (35.3-52.9) | 18.4 | (11.3-25.5) | 18.6 | (7.6-29.6) | 4.5 | (0.4-8.7) | 19.1 | (12.2-26.0) |
| Saginaw | 51.4 | (48.2-54.6) | 37.0 | (33.9-40.1) | 31.4 | (29.0-33.8) | 2.0 | (1.1-2.9) | 23.7 | (21.2-26.1) |
| St. Clair | 59.1 | (54.6-63.6) | 29.1 | (25.0-33.2) | 21.5 | (18.3-24.6) | 1.5 | (0.3-2.7) | 29.3 | (25.7-32.9) |
| St. Joseph | 35.1 | (28.7-41.6) | 25.9 | (19.8-32.0) | 27.1 | (20.7-33.4) | 3.2 | (0.6-5.7) | 32.0 | (26.0-38.0) |
| Sanilac | 57.5 | (49.5-65.5) | 20.8 | (14.3-27.3) | 15.0 | (10.6-19.3) | 0.0 | | 29.9 | (23.2-36.7) |
| Schoolcraft* | | | | | | | | | | |
| Shiawassee | 57.3 | (50.5-64.1) | 15.6 | (10.4-20.8) | 13.8 | (9.6-18.0) | 2.9 | (0.1-5.7) | 35.5 | (30.2-40.7) |
| Tuscola | 60.7 | (53.6-67.8) | 20.1 | (14.4-25.7) | 14.0 | (10.3-17.8) | 0.6 | (-0.6-1.8) | 30.9 | (25.3-36.4) |
| Van Buren | 43.8 | (37.8-49.7) | 23.4 | (18.4-28.4) | 21.2 | (16.8-25.5) | 2.3 | (0.5-4.2) | 23.3 | (18.5-28.1) |
| Washtenaw | 57.8 | (54.5-61.2) | 32.6 | (29.6-35.6) | 25.1 | (22.7-27.5) | 4.2 | (2.7-5.7) | 38.0 | (35.0-41.1) |
| Wayne | 41.9 | (41.0-42.9) | 45.7 | (44.7-46.6) | 43.1 | (42.3-43.9) | 3.4 | (3.0-3.7) | 28.7 | (27.9-29.5) |
| Wexford | 54.6 | (46.4-62.9) | 21.6 | (14.9-28.4) | 20.4 | (14.3-26.5) | 2.8 | (0.0-5.5) | 32.5 | (26.3-38.7) |

Source: Data Warehouse, MDCH
* Beneficiaries <30

**Measure is computed differently than the NCQA HEDIS® measure "Use of Appropriate Medications for People with Asthma." Results should not be compared to data strictly applying the specifications of the NCQA HEDIS® measure.