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Introduction:
Asthma hospitalizations are particularly useful in understanding the asthma burden for a population and targeting or evaluating asthma intervention efforts. They are extremely severe events that increase the risk of asthma mortality. Additionally, asthma hospitalizations are considered preventable - people with asthma can stay out of the hospital if their disease is managed well. The following chapter provides an in depth review of asthma hospitalizations in Michigan, highlighting the observed disparities and trends.

Key Findings:
- The annual asthma hospitalization rate in Michigan, all ages, is 16.6 per 10,000. (2004-2006)
- The rate of asthma hospitalizations for black persons is at least four times the rate for white persons, regardless of age group.
- The degree of disparity in asthma hospitalization rates between black persons and white persons has remained unchanged over recent years.
- Between 2000 and 2006, rates of asthma hospitalization for adults age 35-64 years and adults age 65 years and older are significantly increasing.
- In 2006, the average length of stay for an asthma hospitalization was 3.3 days. This has been significantly increasing over recent years.
- Michigan counties with rates of asthma hospitalization significantly higher than the rate for the state as a whole are Bay, Ingham, Saginaw, and Wayne Counties. Genesee County, with a historically high asthma burden, is no longer significantly higher than the state rate for asthma hospitalizations.

Key Recommendations:
- Michigan should develop projects aimed to understand the reasons for the dramatic racial and geographic disparities in asthma hospitalization rates. This knowledge could be used to develop programs that effectively address these disparities.
- Michigan should focus efforts to reduce the asthma burden to those communities or populations with the highest asthma hospitalization rates.

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 Sources:
Michigan Inpatient Database
Population Estimates
Michigan Department of Community Health
Healthcare Cost and Utilization Project (HCUP)
Agency for Healthcare Research and Quality

Methods:

An asthma hospitalization is defined as a inpatient stay with a primary discharge diagnosis of asthma (ICD-9-CM=493.XX). These data represent the number of hospitalizations for asthma, not the number of persons with a hospitalization for asthma.

Age-adjusted asthma hospitalization rates are calculated using the direct standardization method and presented per 10,000 population. Rates are age-adjusted, using the 2000 US standard population, so that valid comparisons can be made between populations of different age distributions. 95% confidence intervals accompany all hospitalization rates. In addition to asthma hospitalization rates, the average length of stay for an asthma hospitalization is included in this report.

Hospitalization rates for demographic units with a small number of events (20 or less) or a small population size (less than 5,000) are not calculated due to statistical instability. Additionally, counts less than 5 are not presented to protect the identity of those who have been hospitalized.

Asthma hospitalization rates are calculated for various subgroups, including county of residence, age, race, sex, and month of admission, to identify disparities and patterns. 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)

Overall monotonic trend in asthma hospitalization rates between 2000 and 2006 is statistically evaluated using the Spearman Correlation Coefficient and its accompanying Rank Correlation Test. A p-value of <0.05 for this test is considered statistically significant. (SPSS 15.0 for Windows, SPSS Inc.)

The data source for these analyses is the Michigan Inpatient Database, which includes virtually all acute hospital discharges that occur in Michigan during the study period. Analyses presented in this report are inclusive of nonresidents of Michigan who were hospitalized in Michigan, unless otherwise noted.

List of Figures:

Suggested Citation:
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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)**.

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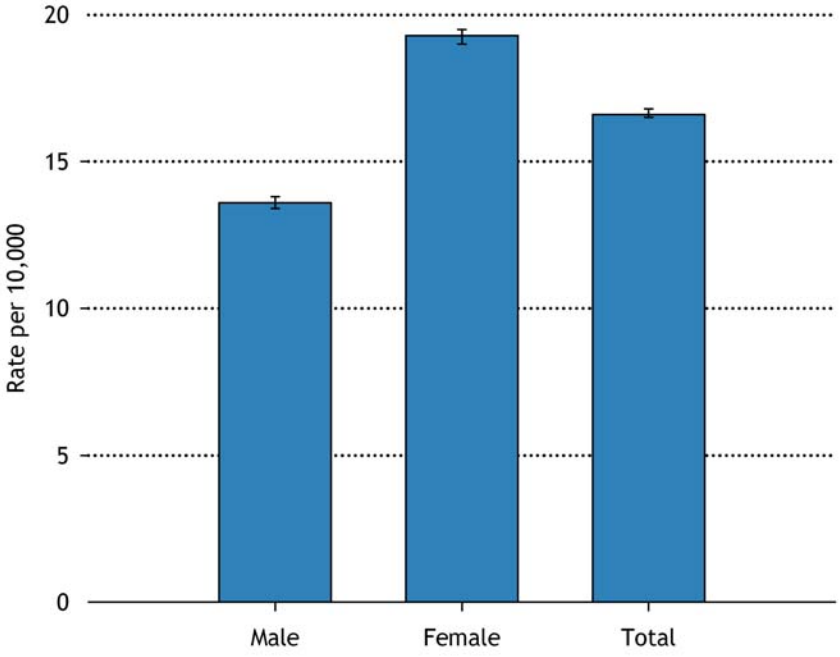
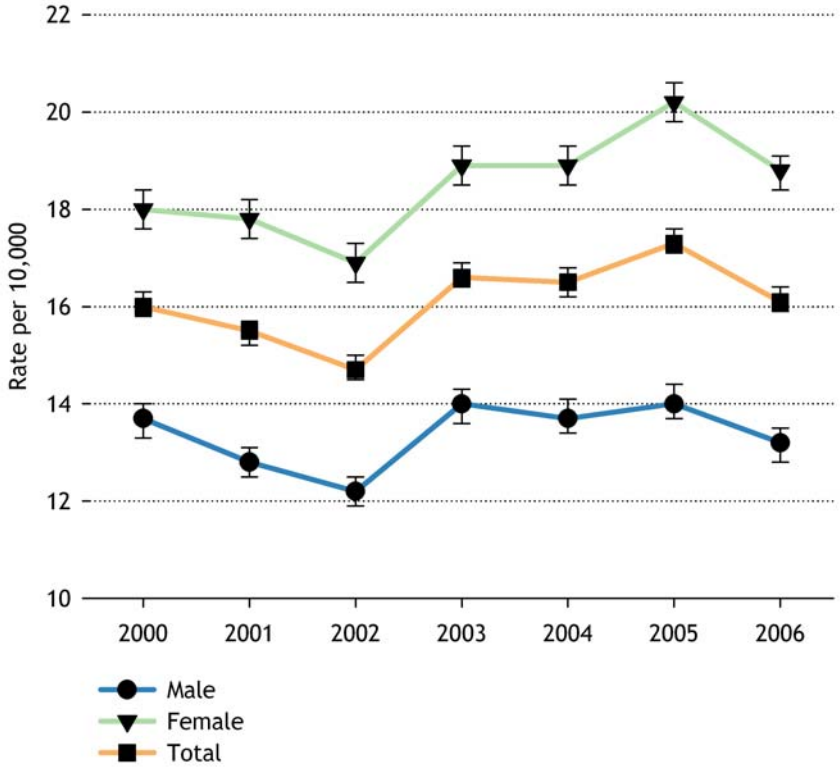
1. Rate[1,2] of Asthma Hospitalization[3] by Sex, Michigan, 2004-2006



- The average number of hospitalizations due to asthma per year in Michigan is 16,743.
- The asthma hospitalization rate in Michigan is 16.6 per 10,000.
- The average charge for an asthma hospitalization in Michigan is $11,671.[4]
- The asthma hospitalization rate for females is significantly higher than that for males—19.3 per 10,000 versus 13.6 per 10,000, respectively.
- In 2006, the average charge for an asthma hospitalization for females is $13,042 and for males is $9,409.[4]

2. Annual Rate[1,2] of Asthma Hospitalization[3] by Sex, Michigan, 2000-2006

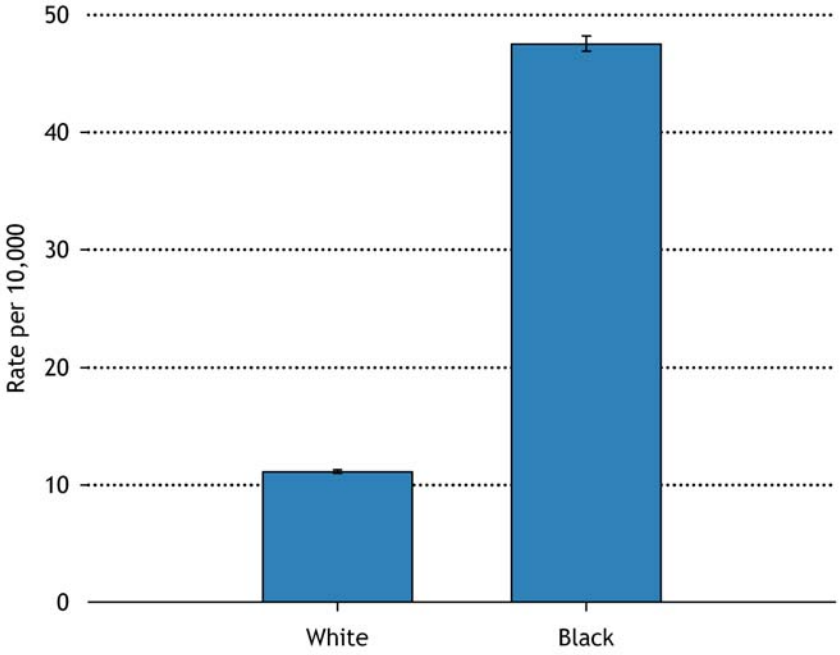


- Between 2000 and 2006, the rates of asthma hospitalization for the total population in Michigan are consistent over time, with no distinguishable trend. ($p>0.05$)[5]
- Between 2000 and 2006, the rates of asthma hospitalization for both males and females in Michigan are consistent over time. ($p>0.05$ for each)[5]
- Since 2001, the average charge for an asthma hospitalization has steadily increased, from $7,001 in 2001 to $11,671 in 2006.[4]

Data Notes:

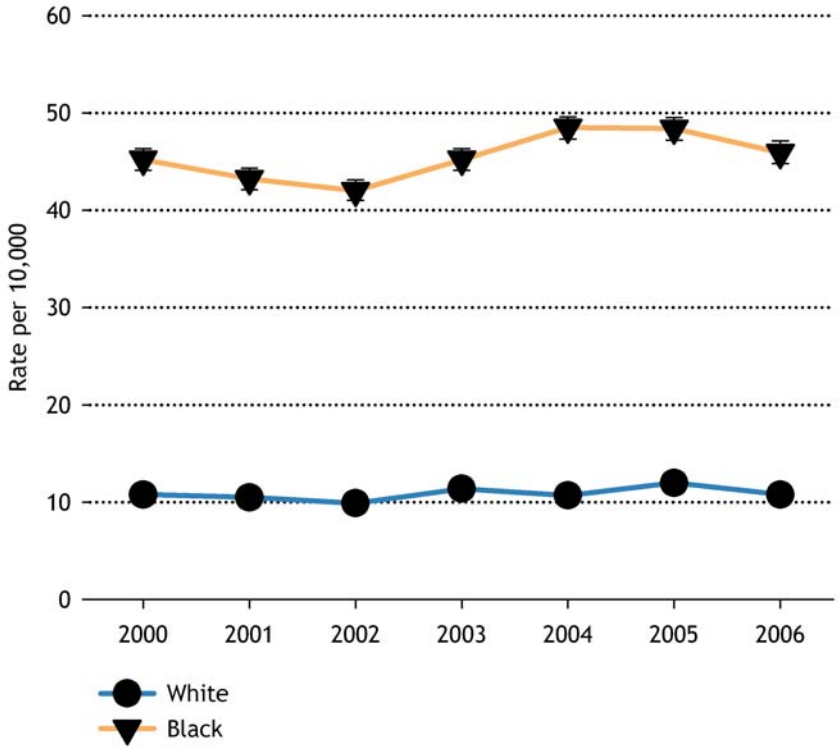
1. Sources:
   Michigan Inpatient Database, MDCH.
   Population Data, MDCH: 2005 Michigan population for 3-year rates; corresponding annual Michigan population data for annual rates.
2. Age-adjusted to the 2000 US Standard Population.
3. Asthma as primary diagnosis, ICD-9-CM:493.xx.
4. Source: Healthcare Cost and Utilization Project (HCUP), AHRQ, 2006.
5. Spearman's correlation and rank correlation test.

3. Rate[1,2] of Asthma Hospitalization[3] by Race[4], Michigan, 2004-2006



- In Michigan, the average number of hospitalizations due to asthma per year for white persons is 9,355, and for black persons is 6,966.
- However, the asthma hospitalization rate for white persons in Michigan is 11.1 per 10,000. The rate for black persons in Michigan is 47.5 per 10,000.
- The asthma hospitalization rate for black persons is 4.3 times higher than that for white persons—a statistically significant difference.
- In 2006, the average charge for an asthma hospitalization for white persons is $10,549 and for black persons is $11,922.[5]

4. Annual Rate[1,2] of Asthma Hospitalization[3] by Race[4], Michigan, 2000-2006

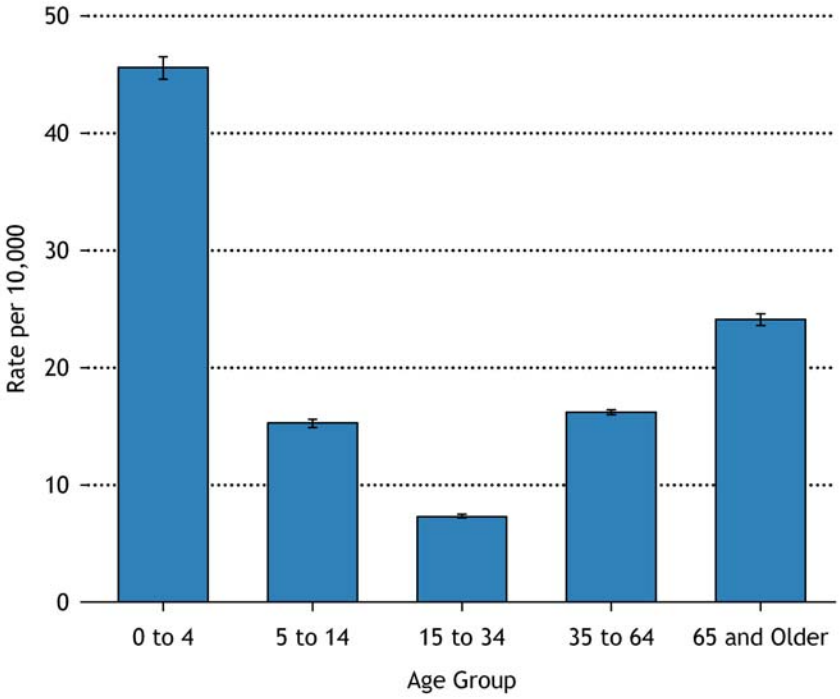


- Between 2000 and 2006, the rates of asthma hospitalization for white and black persons in Michigan are not significantly changing. ($p>0.05$ for each)[6]

Data Notes:

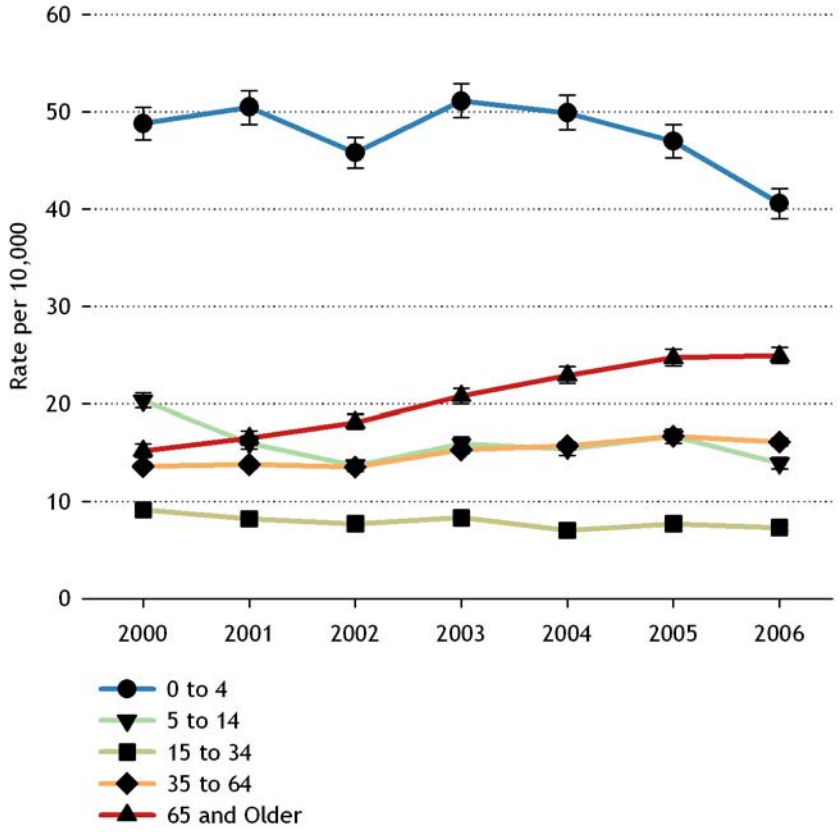
1. Sources:
   Michigan Inpatient Database, MDCH.
   Population Data, MDCH: 2005 Michigan population for 3-year rates; corresponding annual Michigan population data for annual rates.
2. Age-adjusted to the 2000 US Standard Population.
3. Asthma as primary diagnosis, ICD-9-CM:493.xx.
4. Where information regarding race is missing from the record, race is imputed based on the 1990 Census (2000-2002) or on the hospitalized population for that year (2003-2006).
5. Source: Healthcare Cost and Utilization Project (HCUP), AHRQ, 2006.
6. Spearman's correlation and rank correlation test.

5. Rate of Asthma Hospitalization[1] by Age Group, Michigan, 2004-2006



- The highest age-specific asthma hospitalization rate in Michigan is for children, 0-4 years. (45.6 per 10,000)
- The lowest age-specific asthma hospitalization rate in Michigan is for young adults, 15-34 years. (7.3 per 10,000)
- Asthma hospitalization rates increase with age group after age group 15-34 years.
- The pattern in asthma hospitalization rates by age group is not similarly observed for asthma mortality rates, where rates increase with age. Children 0-4 years have the lowest asthma mortality rates and adults 65 years and older have the highest rates. (Data not shown.)

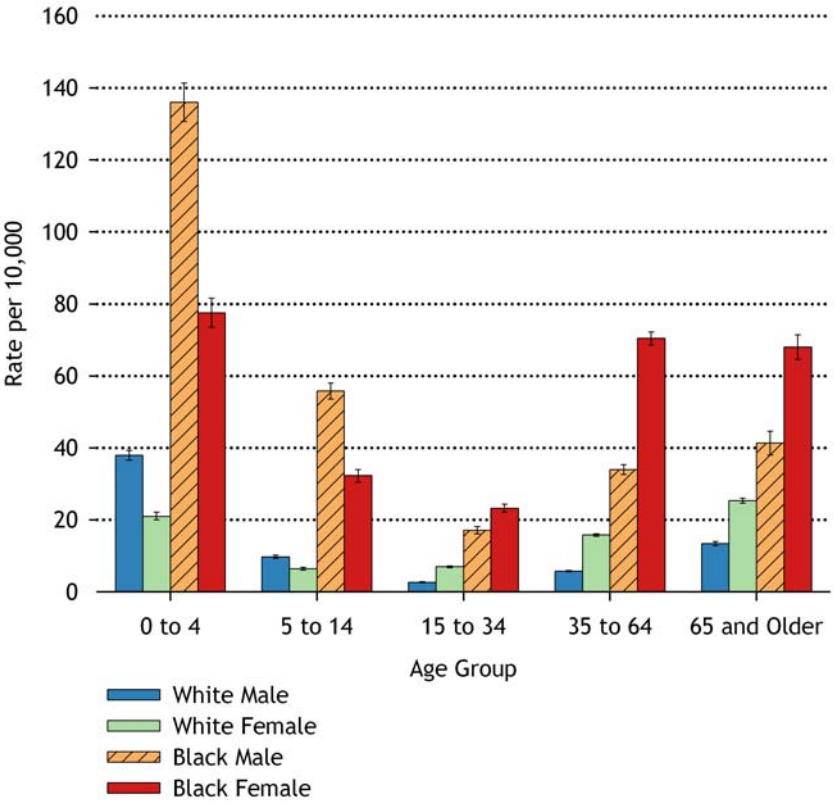
6. Annual Rate of Asthma Hospitalization[1] by Age Group, Michigan, 2000-2006



- Between 2000 and 2006, the rates of asthma hospitalization for age groups less than 35 years in Michigan are not demonstrating a significant overall trend. ($p>0.05$ for each)[2]
- Between 2000 and 2006, the rates of asthma hospitalization for adults age 35-64 years and age 65 years and older in Michigan are significantly increasing. ($p<0.05$ for each)[2]

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
Population Data, MDCH: 2005 Michigan population for 3-year rates; corresponding annual Michigan population data for annual rates.
1. Asthma as primary diagnosis, ICD-9-CM:493.xx.
2. Spearman's correlation and rank correlation test.

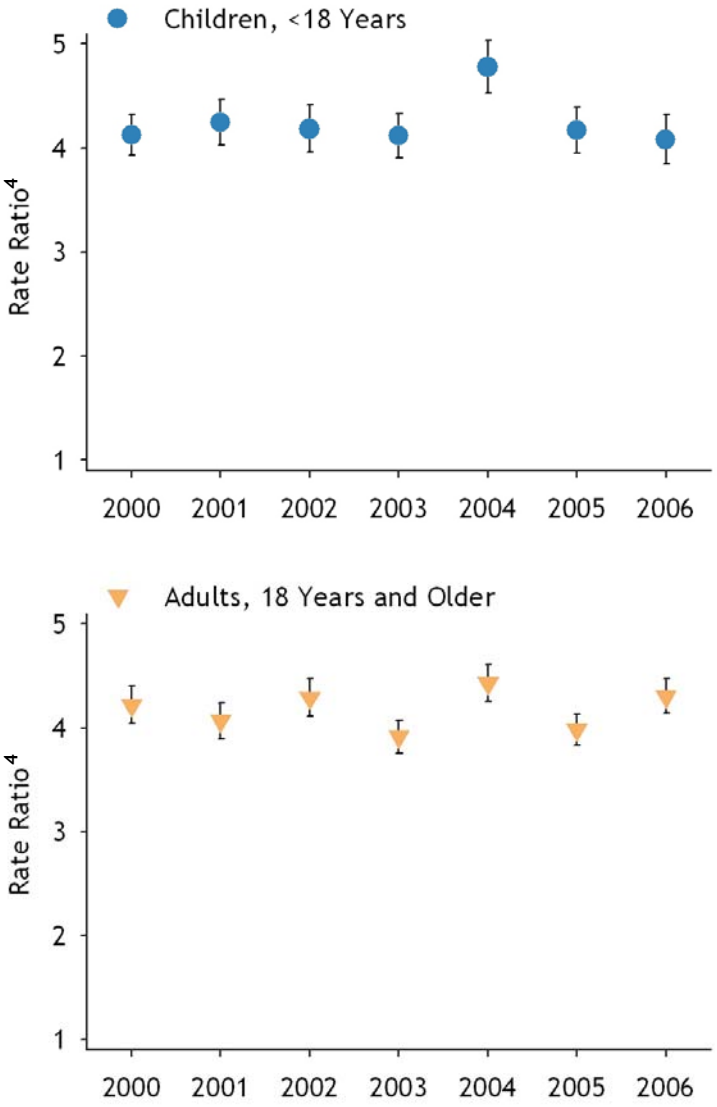
7. Rate of Asthma Hospitalization[1] by Age and Sex-Race[2] Groups, Michigan, 2004-2006



- For children 0-14 years, male children have higher asthma hospitalization rates than female children, regardless of race.
- For persons 15 years and older, females have higher asthma hospitalization rates than males, regardless of race.
- Black persons have the highest asthma hospitalization rates, regardless of age group or sex.

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Asthma as primary diagnosis, ICD-9-CM:493.xx.
2. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.

8. Ratio of Asthma Hospitalization[1] Rates[2] Comparing Black[3] versus White[3], by Age Group and Year, Michigan, 2000-2006

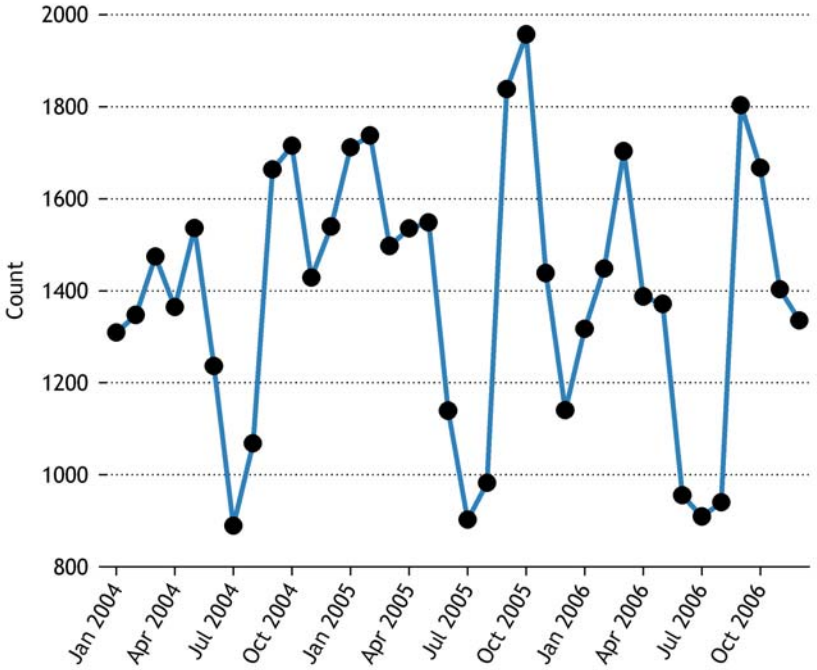


- The rate of asthma hospitalizations for black persons is at least four times the rate for white persons, regardless of age group.
- The degree of disparity in asthma hospitalization rates between black persons and white persons has remained unchanged over recent years.

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
Annual Population Data, MDCH.

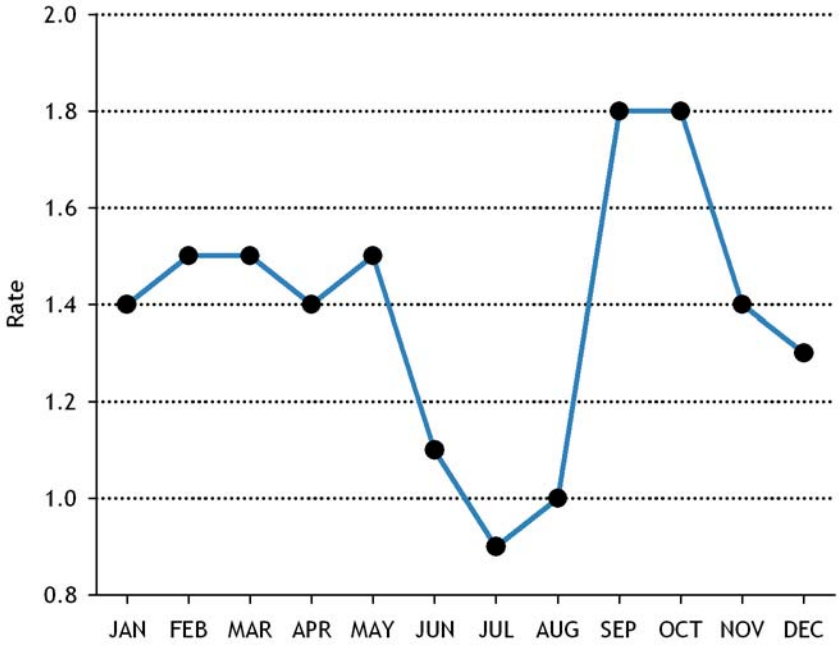
1. Asthma as primary diagnosis, ICD-9-CM:493.xx.
2. Age-adjusted to the 2000 US Standard Population.
3. Where information regarding race is missing from the record, race is imputed based on the 1990 Census (2000-2002) or on the hospitalized population for that year (2003-2006).
4. The presented rate ratios are calculated by dividing the asthma hospitalization rate for black persons by that for white persons. A rate ratio whose 95% confidence interval does not include the value of 1.0 indicates a statistically significant relationship between race and asthma hospitalization.

9. Count of Asthma Hospitalizations[1] by Month of Admission, Michigan, 2004-2006



- The fewest number of asthma hospitalizations occur during the summer months. Asthma hospitalizations are most frequent during the fall months.

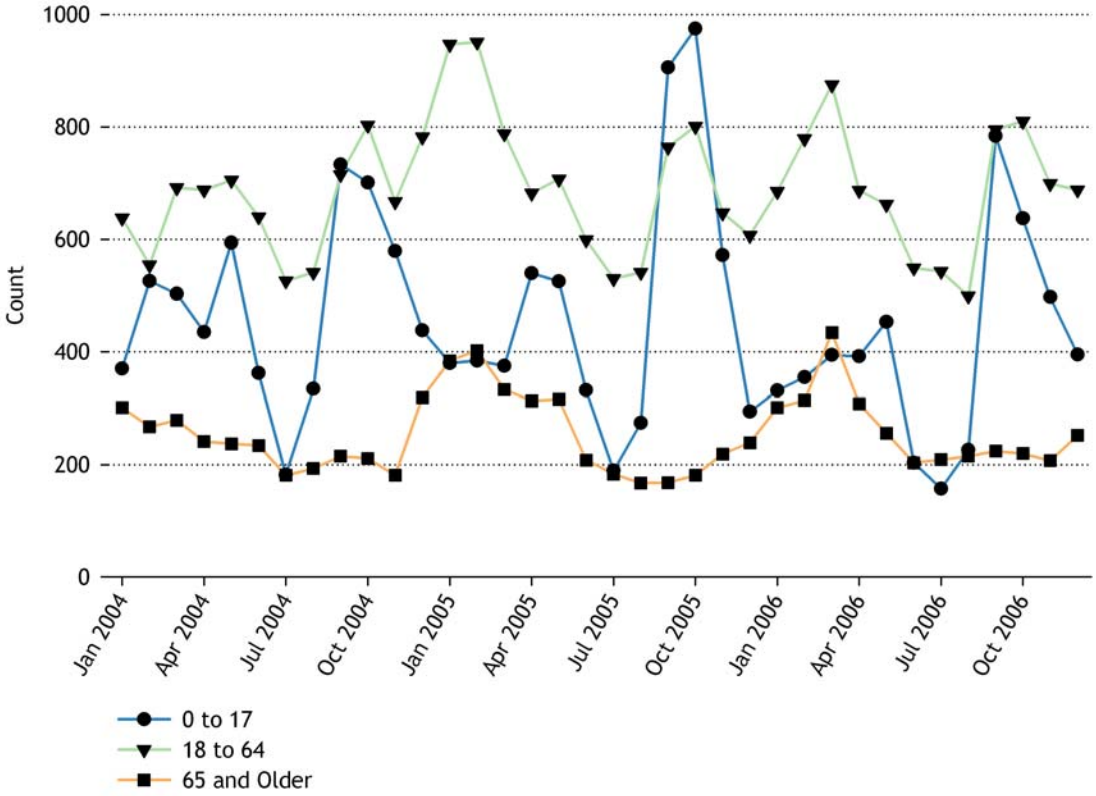
10. Rate[2] of Asthma Hospitalization[1] by Month of Admission, Michigan, 2004-2006



- The highest asthma hospitalization rates occur in September and October. The lowest rates occur during July and August.

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Asthma as primary diagnosis, ICD-9-CM:493.xx.
2. Age-adjusted to the 2000 US Standard Population.

11. Count of Asthma Hospitalizations[1] by Month of Admission and Age Group, Michigan, 2004-2006



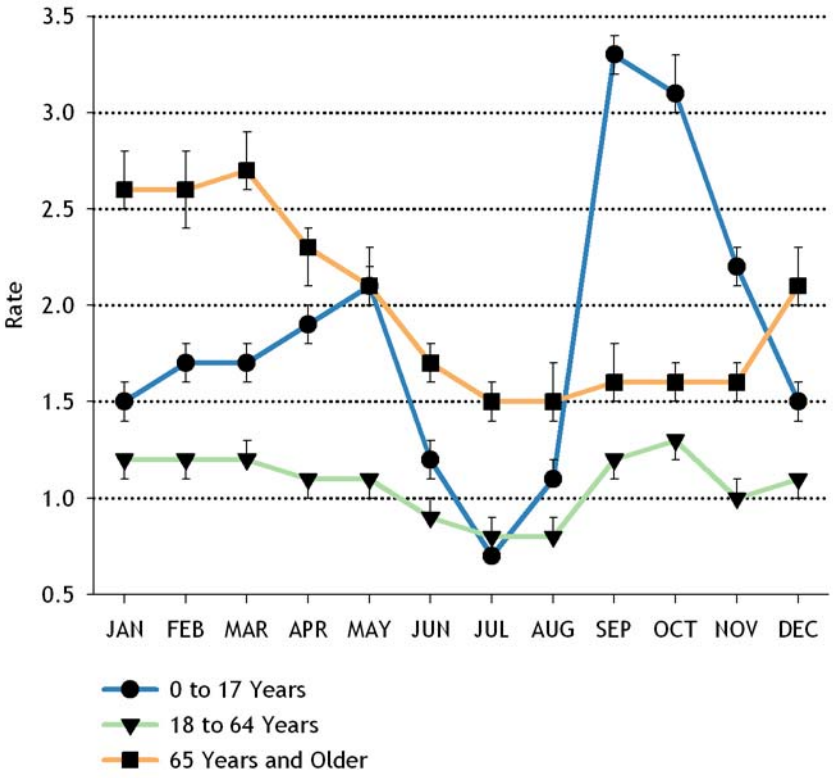
- The most pronounced seasonal variation in the number of asthma hospitalizations is observed for children less than 18 years ( ). In this age group, there are dramatically high peaks during the fall months and smaller peaks during the month of April. The number of hospitalizations is the lowest during the month of July.

- For adults age 18 through 64 years ( ), there are peaks in the number of asthma hospitalizations during the months of October and January/February.

- Hospitalization counts are generally lowest among adults age 65 years and older. This age group experiences a peak in asthma hospitalizations during January through March. ( )

Data Notes:
Source: Michigan Inpatient Database, MDCH.
1. Asthma as primary diagnosis, ICD-9-CM:493.xx.

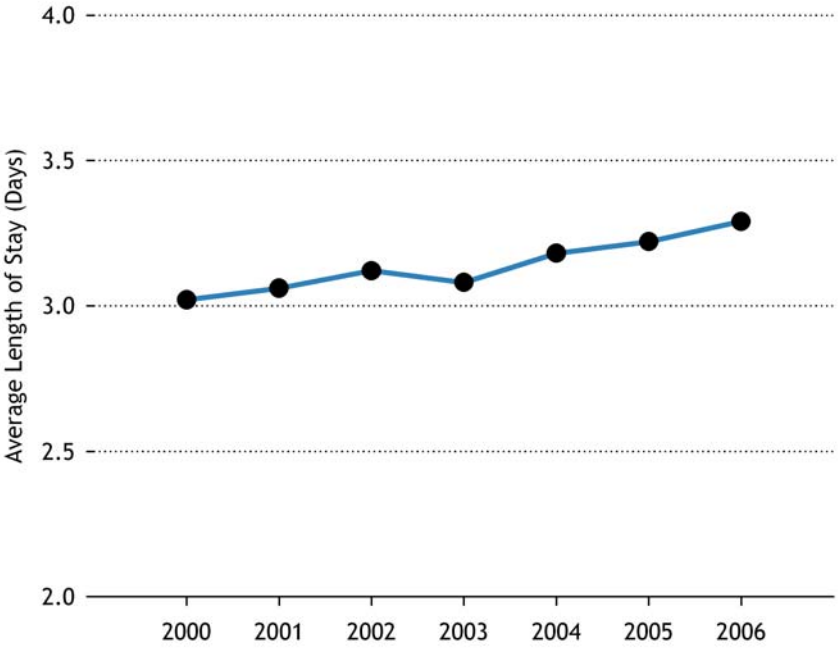
12. Rate[1] of Asthma Hospitalization[2] by Month of Admission and Age Group, Michigan, 2004-2006



- For children less than 18 years, peaks in the rate of asthma hospitalization occur during May and September. The lowest asthma hospitalization rate for this age group is observed during July.
- For adults age 18 to 64 years, the highest asthma hospitalization rate occurs during October and the lowest rate occurs during July/August.
- For adults age 65 years and older, the highest asthma hospitalization rate is observed during March. This age group does not demonstrate a peak in the rate of asthma hospitalizations during the fall months.

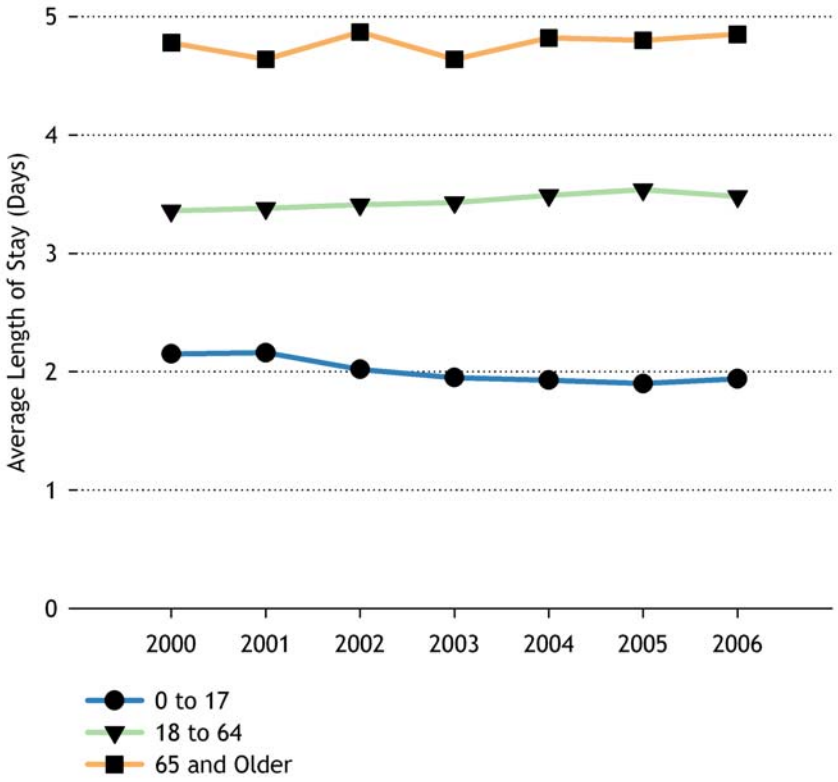
Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
2. Asthma as primary diagnosis, ICD-9-CM:493.xx.

13. Average Length of Stay for an Asthma Hospitalization[1], Michigan, 2000-2006



- In 2006, the average length of stay for an asthma hospitalization was 3.3 days.
- Between 2000 and 2006, the average length of stay for an asthma hospitalization is significantly increasing. ($p<0.05$)[2]
- For asthma-related hospital stays in 2006, there were an additional 5,451 hospital days compared to asthma-related hospital stays in 2000.

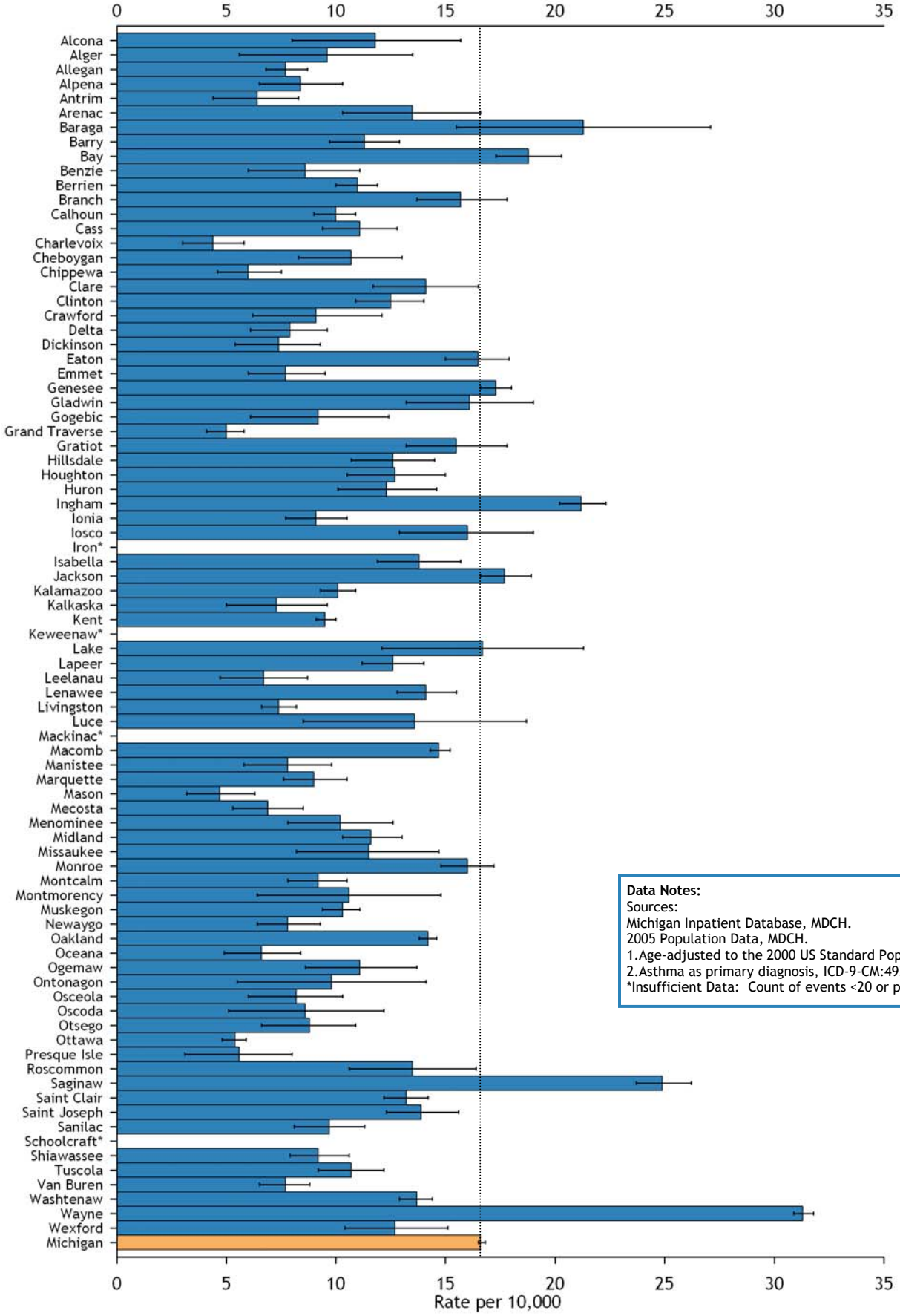
14. Average Length of Stay for an Asthma Hospitalization[1] by Age Group, Michigan, 2000-2006



- Average length of stay for an asthma hospitalization increases with age group. In 2006, the average length of stay ranged from 1.9 days for children less than 18 years and 4.9 days for adults 65 years an older.
- Between 2000 and 2006, the average length of stay for an asthma hospitalization is significantly decreasing for children less than 18 years. ($p<0.05$)[2]
- Between 2000 and 2006, the average length of stay for an asthma hospitalization is significantly increasing for adults age 18 to 64 years. ($p<0.05$)[2]

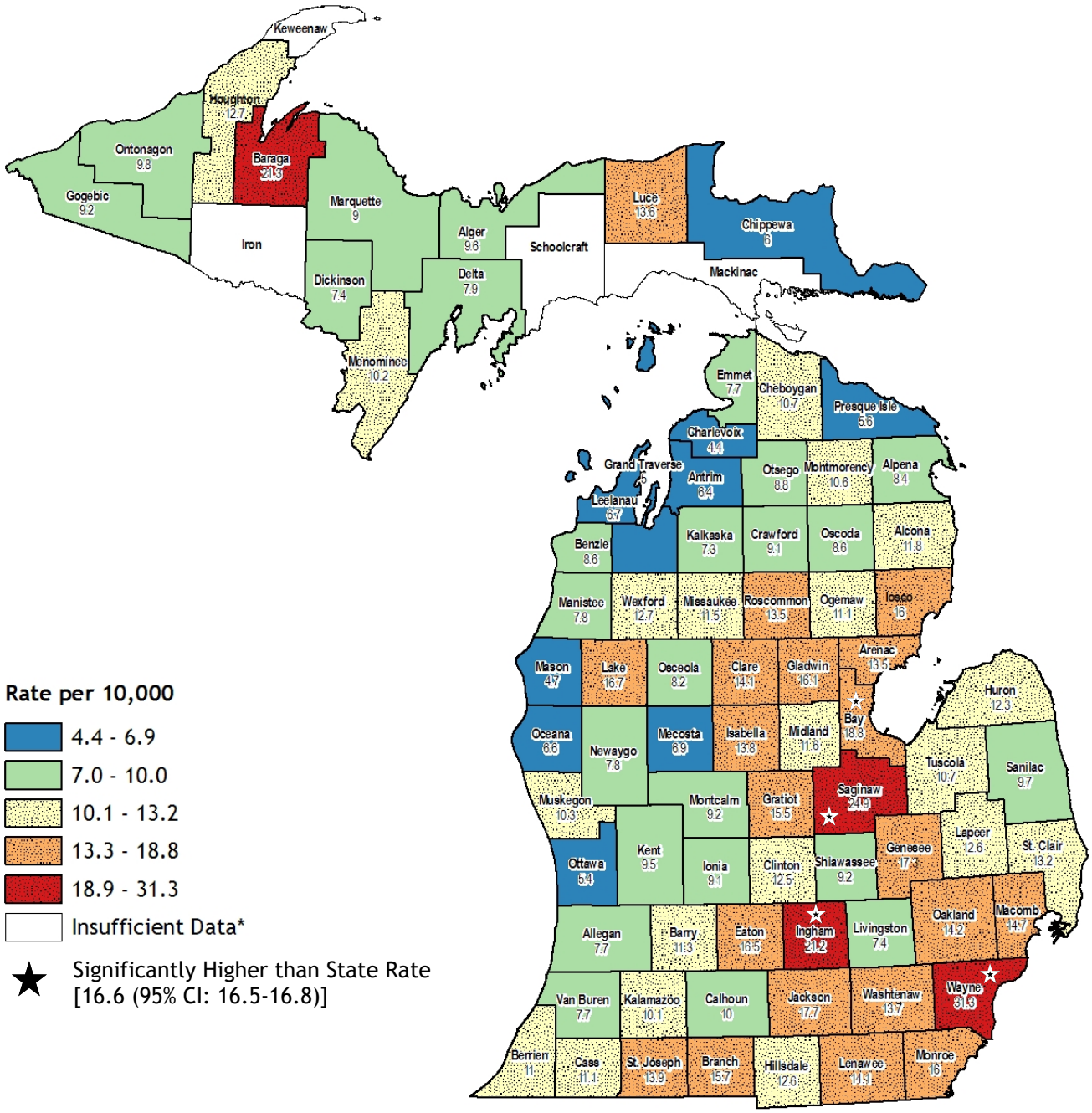
Data Notes:
Source: Michigan Inpatient Database, MDCH.
1. Asthma as primary diagnosis, ICD-9-CM:493.xx.
2. Spearman's correlation and rank correlation test.

15. Rates[1] of Asthma Hospitalization[2] by County of Residence, Michigan, 2004-2006



Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1.Age-adjusted to the 2000 US Standard Population.
2.Asthma as primary diagnosis, ICD-9-CM:493.xx.
*Insufficient Data: Count of events <20 or population <5,000.

16. Rates[1] of Asthma Hospitalization[2] by County of Residence, Michigan, 2004-2006

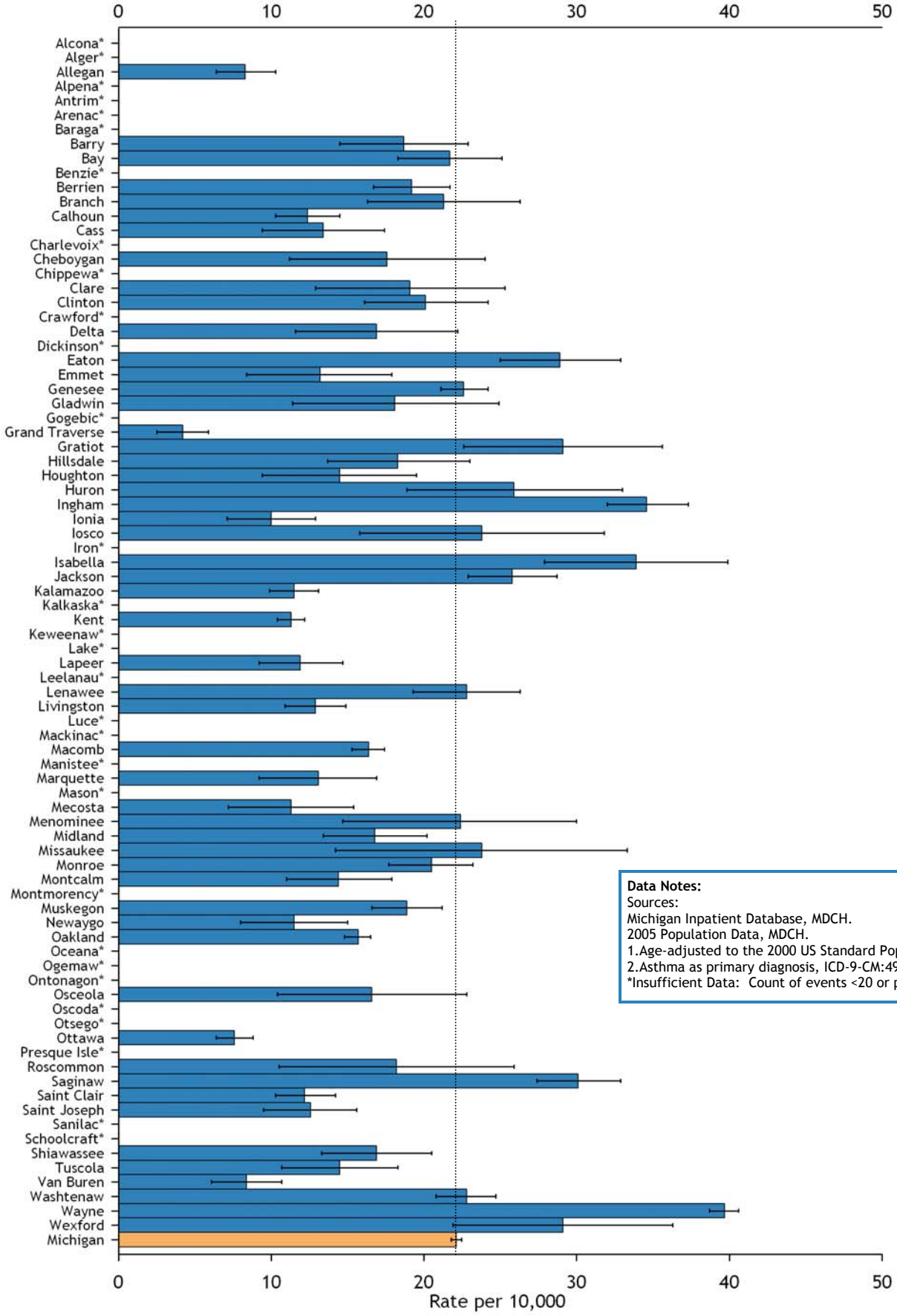


- Michigan counties with rates of asthma hospitalization significantly higher than the rate for the state as a whole [16.6 per 10,000 (95% CI: 16.5-16.8)] are:

  Bay County
  Ingham County
  Saginaw County
  Wayne County

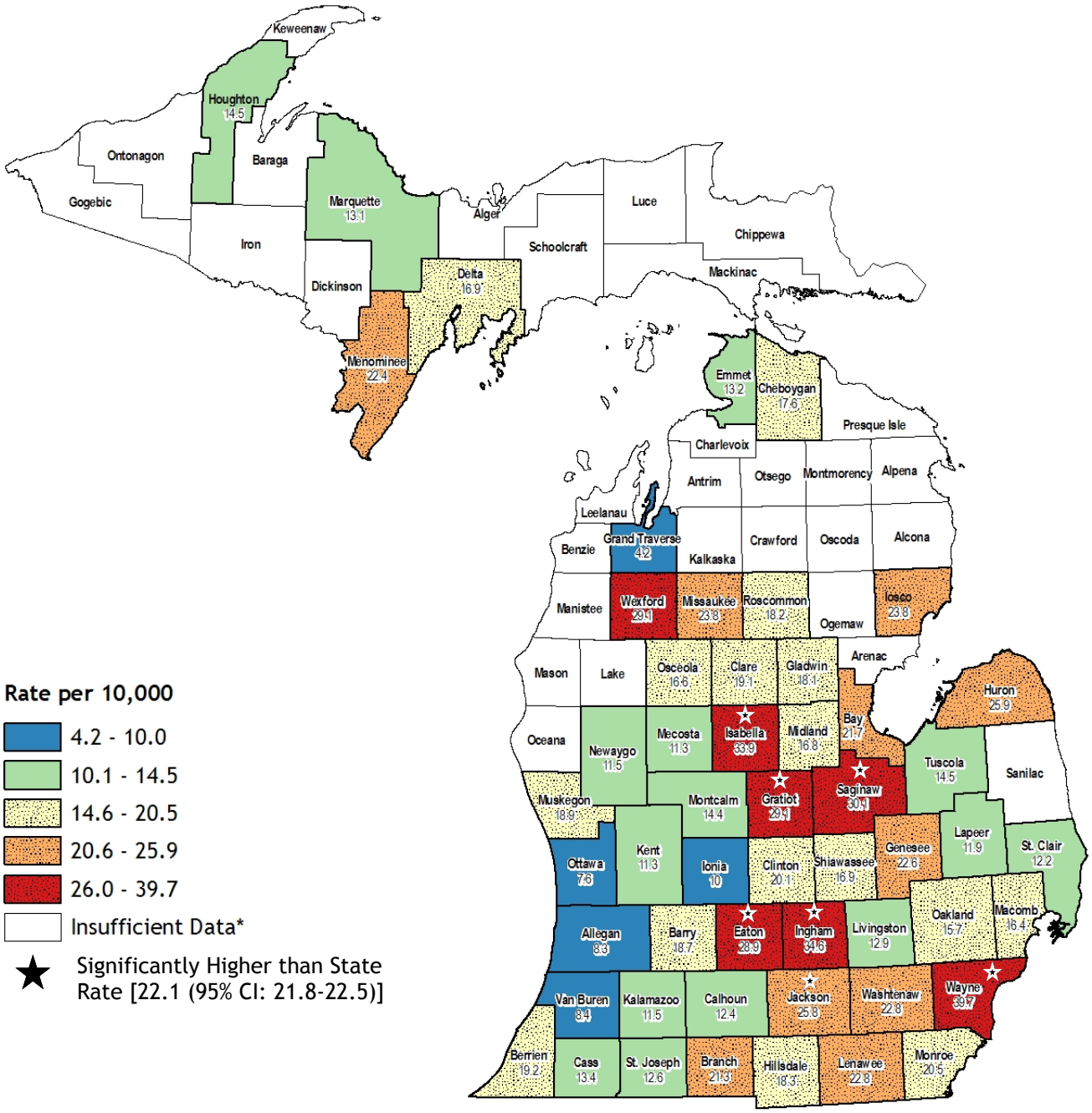
Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1.Age-adjusted to the 2000 US Standard Population
2.Asthma as primary diagnosis, ICD-9-CM:493.xx.
*Insufficient Data: Count of events <20 or population <5,000.

17. Rates[1] of Asthma Hospitalization[2] by County of Residence, Michigan, Age <18 Years, 2004-2006



Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1.Age-adjusted to the 2000 US Standard Population
2.Asthma as primary diagnosis, ICD-9-CM:493.xx.
*Insufficient Data: Count of events <20 or population <5,000.

18. Rates[1] of Asthma Hospitalization[2] by County of Residence, Michigan, Age <18 Years, 2004-2006

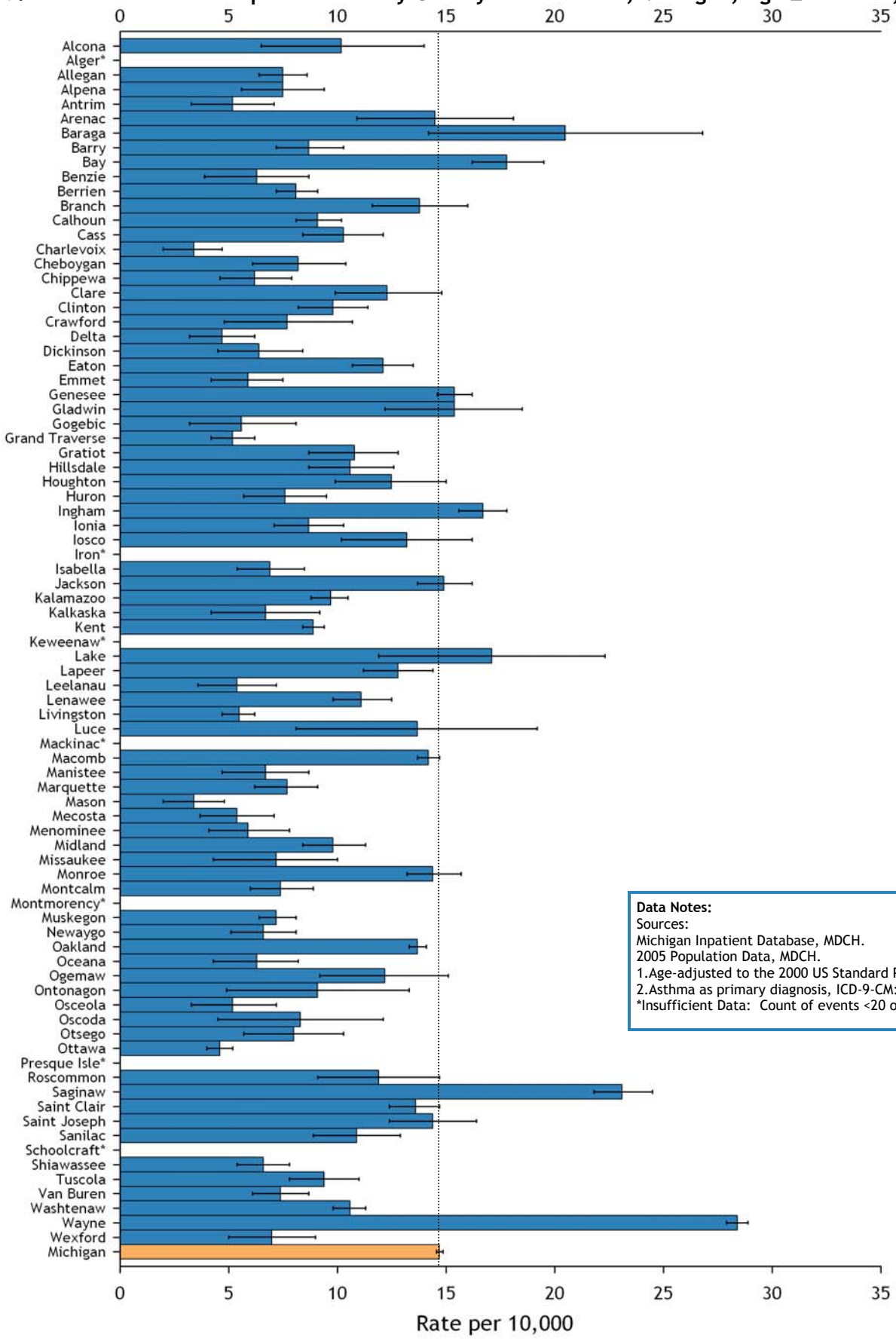


- Michigan counties with rates of asthma hospitalization for children that are significantly higher than the rate for the state as a whole [22.1 per 10,000 (95% CI: 21.8-22.5)] are:

  Eaton County
  Gratiot County
  Ingham County
  Isabella County
  Jackson County
  Saginaw County
  Wayne County

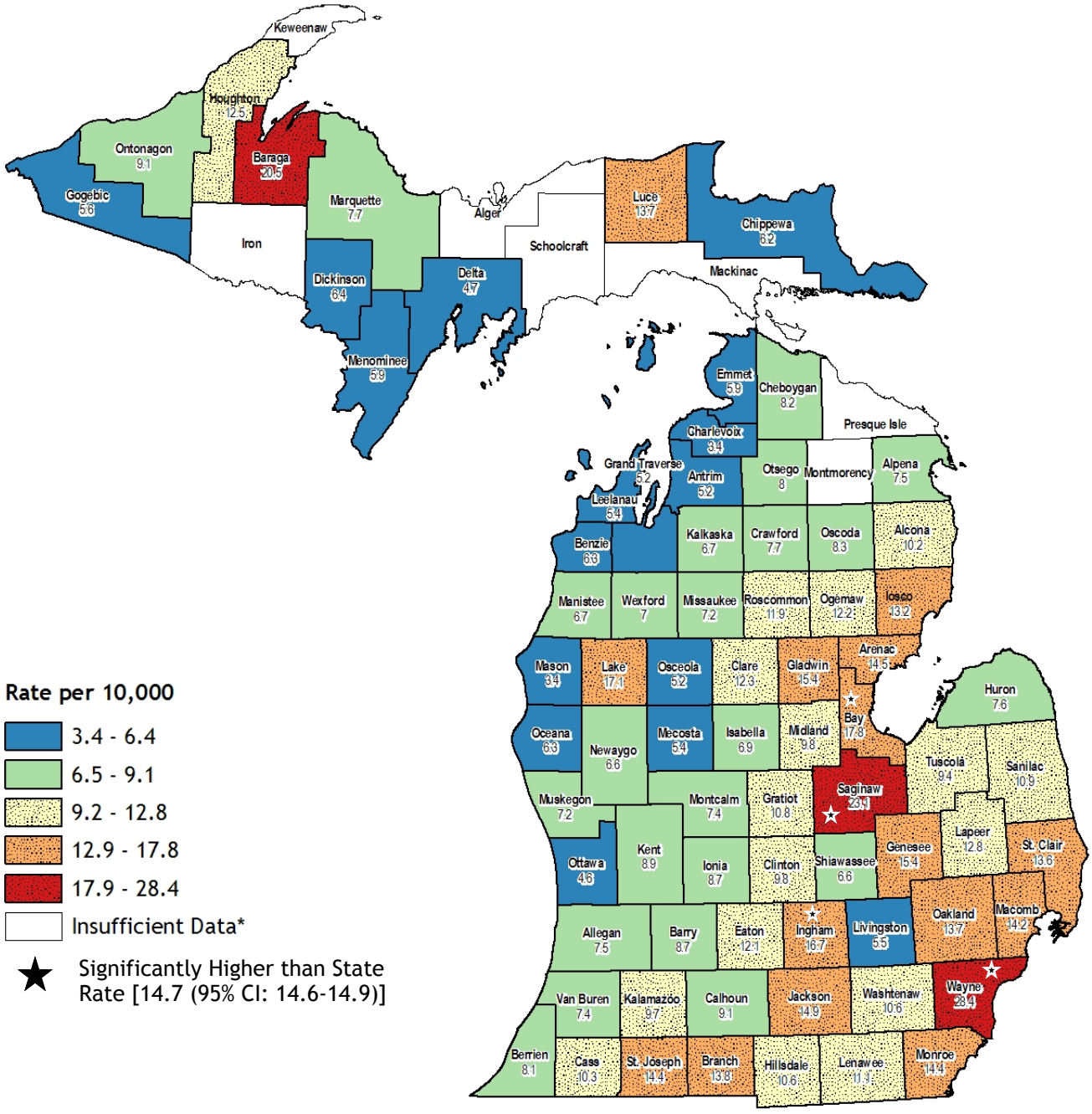
Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1.Age-adjusted to the 2000 US Standard Population
2.Asthma as primary diagnosis, ICD-9-CM:493.xx.
*Insufficient Data: Count of events <20 or population <5,000.

19. Rates[1] of Asthma Hospitalization[2] by County of Residence, Michigan, Age ≥18 Years, 2004-2006



Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1.Age-adjusted to the 2000 US Standard Population.
2.Asthma as primary diagnosis, ICD-9-CM:493.xx.
*Insufficient Data: Count of events <20 or population <5,000.

20. Rates[1] of Asthma Hospitalization[2] by County of Residence, Michigan, Age ≥18 Years, 2004-2006

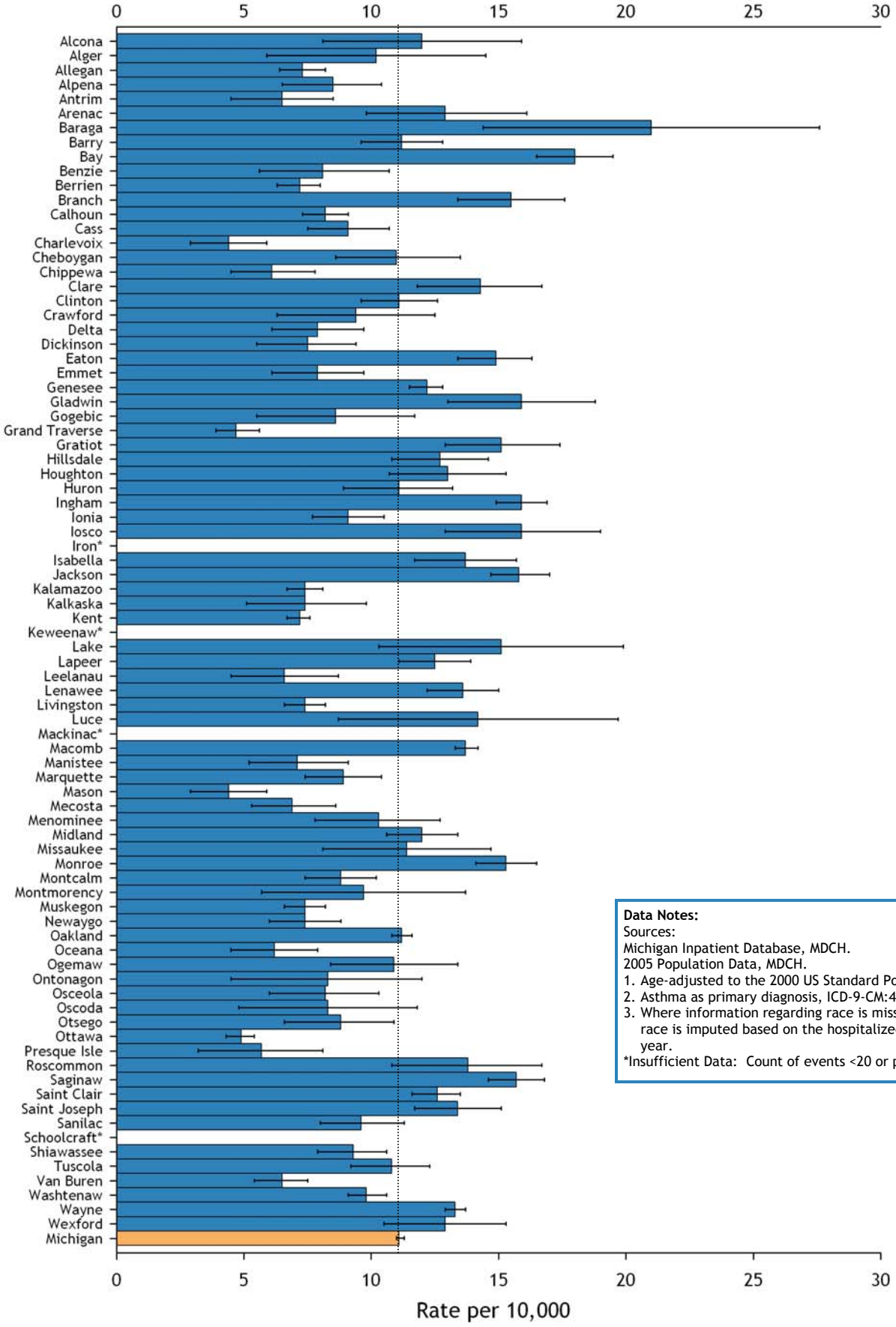


- Michigan counties with rates of asthma hospitalization for adults that are significantly higher than the rate for the state as a whole [14.7 per 10,000 (95% CI: 14.6-14.9)] are:

  Bay County
  Ingham County
  Saginaw County
  Wayne County

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1.Age-adjusted to the 2000 US Standard Population.
2.Asthma as primary diagnosis, ICD-9-CM:493.xx.

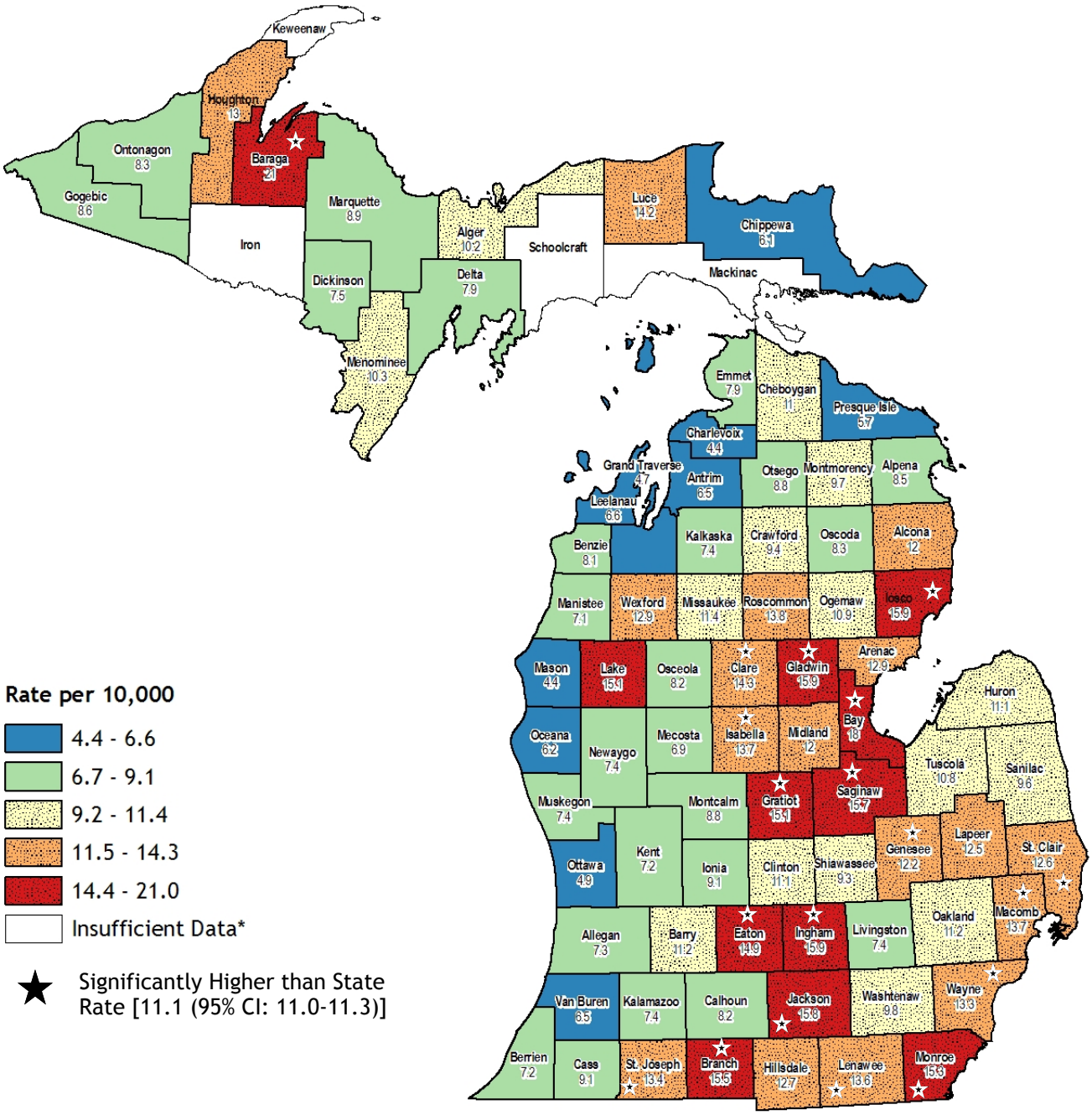
21. Rates[1] of Asthma Hospitalization[2] by County of Residence for White Persons[3], Michigan, 2004-2006



Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
2. Asthma as primary diagnosis, ICD-9-CM:493.xx.
3. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.

*Insufficient Data: Count of events <20 or population <5,000.

22. Rates[1] of Asthma Hospitalization[2] by County of Residence for White Persons[3], Michigan, 2004-2006

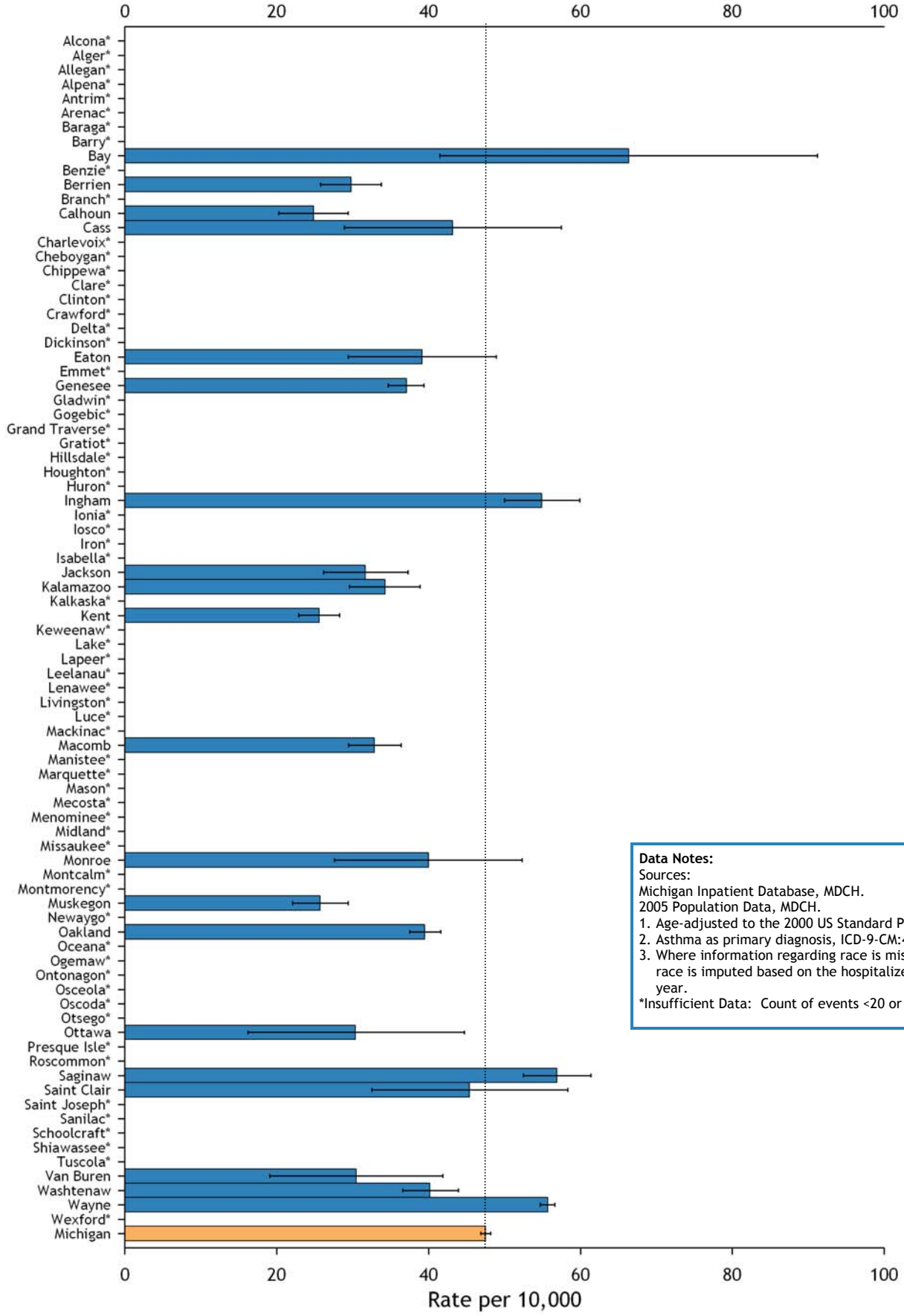


- Michigan counties with rates of asthma hospitalization for white persons that are significantly higher than the rate for the state as a whole [11.1 per 10,000 (95% CI: 11.0-11.3)] are:

Baraga County
Bay County
Branch County
Clare County
Eaton County
Genesee County
Gladwin County
Gratiot County
Ingham County
Iosco County
Isabella County
Jackson County
Lenawee County
Macomb County
Monroe County
Saginaw County
St. Clair County
St. Joseph County
Wayne County

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
2. Asthma as primary diagnosis, ICD-9-CM:493.xx.
3. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.
*Insufficient Data: Count of events <20 or population <5,000.

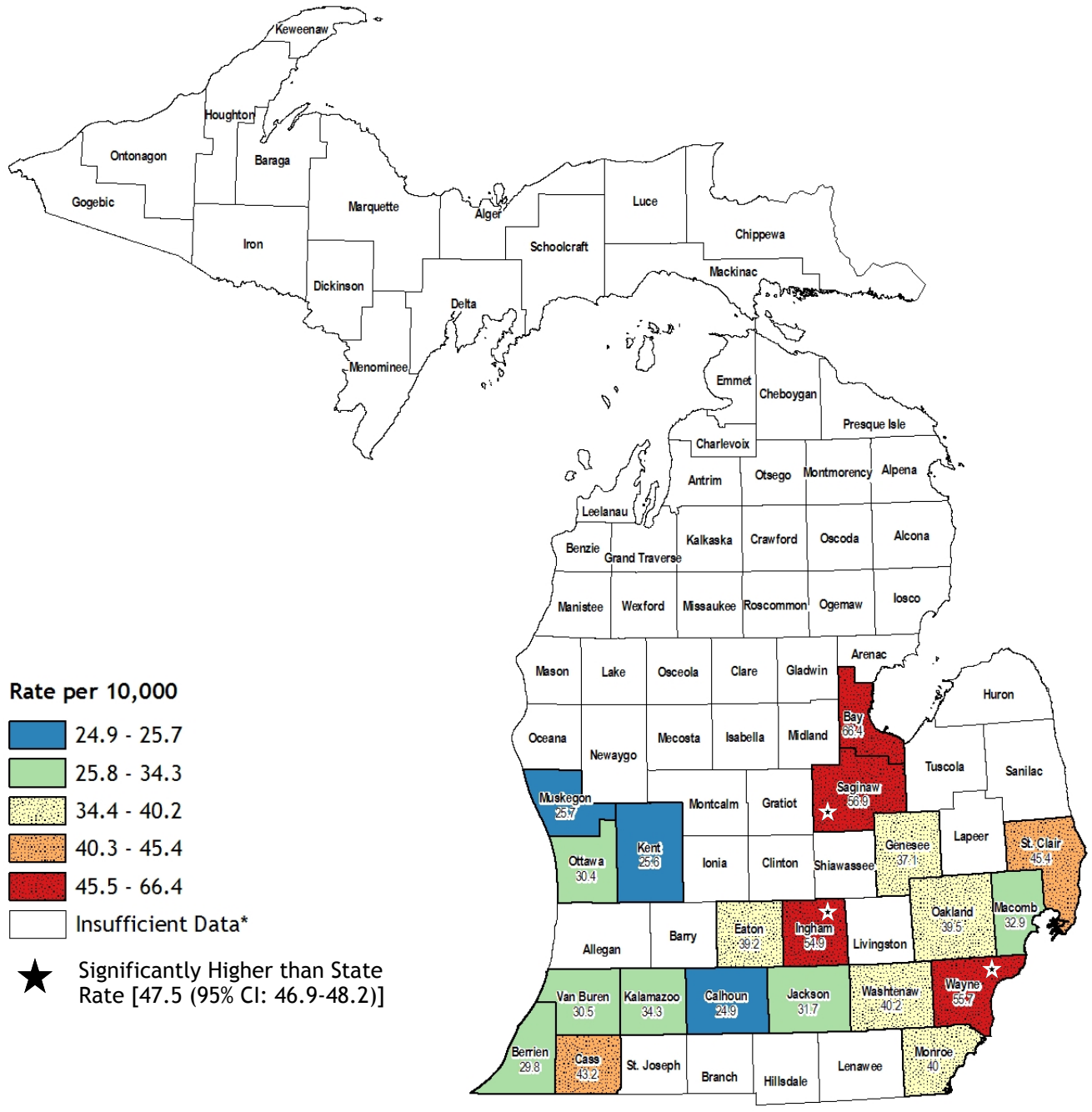
23. Rates[1] of Asthma Hospitalization[2] by County of Residence for Black Persons[3], Michigan, 2004-2006



Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
2. Asthma as primary diagnosis, ICD-9-CM:493.xx.
3. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.

*Insufficient Data: Count of events <20 or population <5,000.

24. Rates[1] of Asthma Hospitalization[2] by County of Residence for Black Persons[3], Michigan, 2004-2006

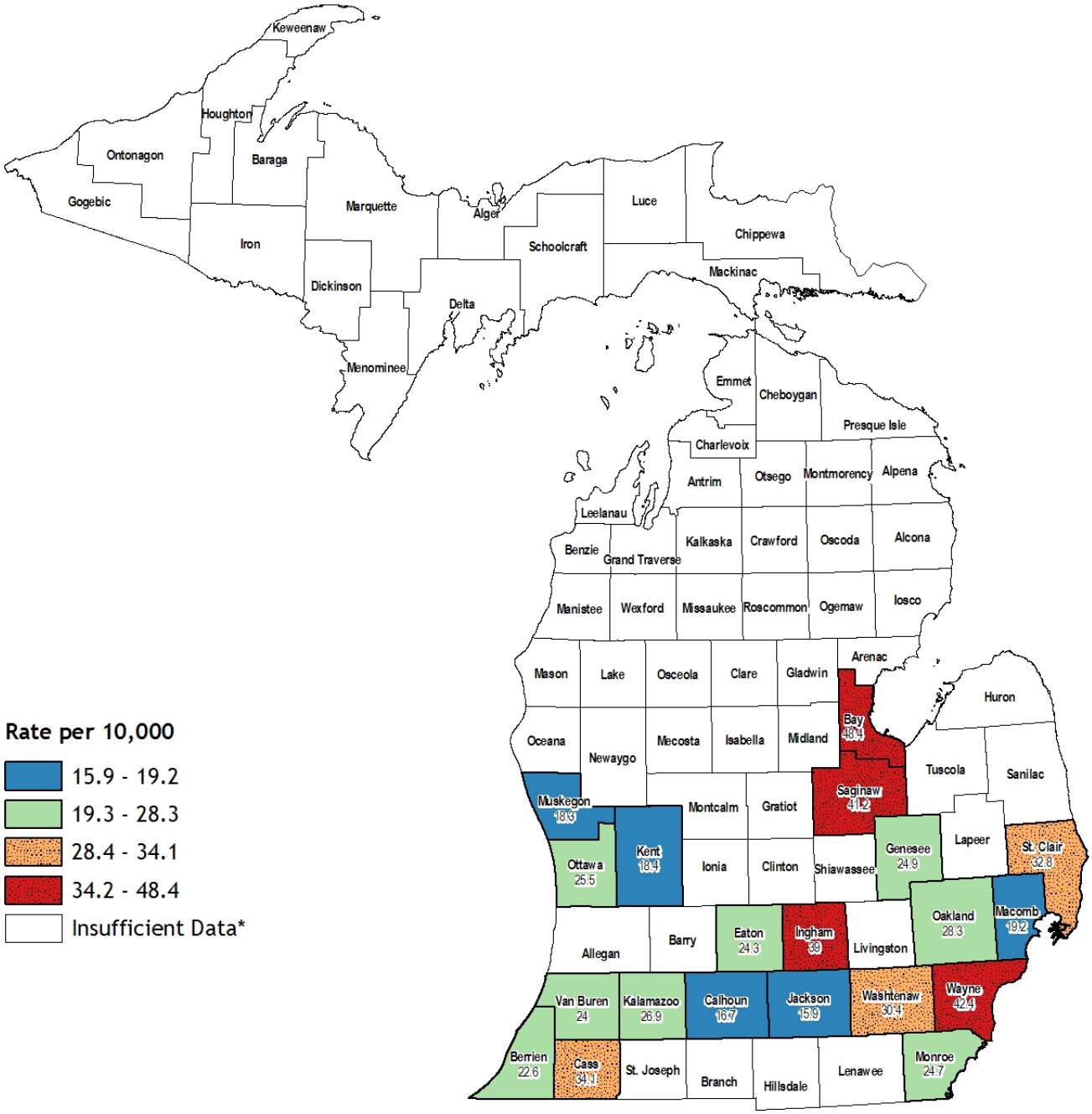


- Michigan counties with rates of asthma hospitalization for black persons that are significantly higher than the rate for the state as a whole [47.5 per 10,000 (95% CI: 46.9-48.2)] are:

  Ingham County
  Saginaw County
  Wayne County

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
2. Asthma as primary diagnosis, ICD-9-CM:493.xx.
3. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.
*Insufficient Data: Count of events <20 or population <5,000.

25. Difference in Rates[1] of Asthma Hospitalization[2] for Black Persons[3] Versus White Persons[3] by County of Residence, Michigan, 2004-2006



- The difference in rates of asthma hospitalization for black persons versus white persons demonstrates a dramatic disparity for all counties with sufficient data for the comparison. Depending on county of residence, there are between 15.9 and 48.4 additional asthma hospitalizations per 10,000 people per year for black persons compared to white persons.

Data Notes:
Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
2. Asthma as primary diagnosis, ICD-9-CM:493.xx.
3. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.
*Insufficient Data: Count of events <20 or population <5,000.

Rate of Asthma Hospitalizations[1] (per 10,000), Michigan, 2004-2006

			Count	Rate
Total[2] [Figure 1]			50,228	16.6 (16.5—16.8)
Sex[2] [Figure 1]	Male		19,863	13.6 (13.4—13.8)
	Female		30,365	19.3 (19.0—19.5)
Race[2,3] [Figure 3]	White		28,064	11.1 (11.0—11.3)
	Black		20,898	47.5 (46.9—48.2)
Age [Figure 5]	0-4 Years		8,888	45.6 (44.6—46.5)
	5-14 Years		6,490	15.3 (14.9—15.6)
	15-34 Years		6,039	7.3 (7.2—7.5)
	35-64 Years		19,696	16.2 (16.0—16.4)
	≥65 Years		9,115	24.1 (23.6—24.6)
Age & Sex-Race[3] [Figure 7]	0-4 Years	White Male	2,948	37.9 (36.6—39.3)
		White Female	1,550	21.0 (20.0—22.1)
		Black Male	2,534	136.0 (130.7—141.3)
		Black Female	1,393	77.5 (73.5—81.6)
	5-14 Years	White Male	1,643	9.7 (9.3—10.2)
		White Female	1,025	6.4 (6.0—6.8)
		Black Male	2,318	55.8 (53.5—58.0)
		Black Female	1,303	32.3 (30.5—34.0)
	15-34 Years	White Male	884	2.6 (2.5—2.8)
		White Female	2,209	7.0 (6.7—7.2)
		Black Male	1,151	17.1 (16.1—18.1)
		Black Female	1,632	23.2 (22.1—24.3)
	35-64 Years	White Male	2,900	5.7 (5.5—5.9)
		White Female	8,094	15.8 (15.4—16.1)
		Black Male	2,422	34.0 (32.6—35.3)
		Black Female	5,989	70.4 (68.6—72.2)
	≥65 Years	White Male	1,877	13.4 (12.8—14.0)
		White Female	4,934	25.3 (24.6—26.0)
		Black Male	600	41.3 (38.0—44.6)
		Black Female	1,556	68.0 (64.6—71.4)

Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Asthma as primary diagnosis, ICD-9-CM: 493.xx.
2. Age-adjusted to the 2000 US Standard Population.
3. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.

Annual Number of Asthma Hospitalizations[1] , Michigan, 2000-2006

		2000	2001	2002	2003	2004	2005	2006
Total		15,878	15,363	14,696	16,572	16,567	17,423	16,238
Sex	Male	6,741	6,271	5,971	6,788	6,669	6,841	6,353
	Female	9,137	9,092	8,725	9,784	9,898	10,582	9,885
Race[2]	White	8,773	8,541	8,133	9,367	8,933	10,015	9,116
	Black	6,888	6,518	6,279	6,788	7,142	7,125	6,631
Age	0-4 Years	3,256	3,341	3,039	3,312	3,245	3,055	2,588
	5-14 Years	3,006	2,363	2,002	2,311	2,209	2,363	1,918
	15-34 Years	2,500	2,253	2,104	2,269	1,935	2,116	1,988
	35-64 Years	5,263	5,383	5,317	6,112	6,319	6,776	6,601
	≥65 Years	1,853	2,023	2,234	2,568	2,859	3,113	3,143
Age-Race[2]	0-17 Years, White	3,277	2,905	2,572	2,841	2,524	2,765	2,295
	0-17 Years, Black	3,316	3,032	2,653	2,907	2,962	2,824	2,268
	≥18 Years, Black	5,496	5,636	5,561	6,526	6,409	7,250	6,821
	≥18 Years, Black	3,572	3,486	3,626	3,881	4,180	4,301	4,363

Annual Rate of Asthma Hospitalization[1] (per 10,000), Michigan, 2000-2006

		2000	2001	2002	2003	2004	2005	2006
Total[3] [Figure 2]		16.0 (15.8-16.3)	15.5 (15.2-15.7)	14.7 (14.5-15.0)	16.6 (16.4-16.9)	16.5 (16.2-16.8)	17.3 (17.1-17.6)	16.1 (15.9-16.4)
Sex[3] [Figure 2]	Male	13.7 (13.4-14.0)	12.8 (12.5-13.1)	12.2 (11.9-12.5)	14.0 (13.6-14.3)	13.7 (13.4-14.1)	14.0 (13.7-14.4)	13.2 (12.8-13.5)
	Female	18.0 (17.6-18.4)	17.8 (17.4-18.2)	16.9 (16.5-17.3)	18.9 (18.5-19.3)	18.9 (18.5-19.3)	20.2 (19.8-20.6)	18.8 (18.4-19.1)
Race[2,3] [Figure 4]	White	10.8 (10.6-11.0)	10.5 (10.2-10.7)	9.9 (9.7-10.1)	11.4 (11.1-11.6)	10.7 (10.5-10.9)	12.0 (11.7-12.2)	10.8 (10.6-11.1)
	Black	45.2 (44.1-46.3)	43.2 (42.1-44.3)	42.0 (41.0-43.1)	45.2 (44.1-46.3)	48.5 (47.3-49.6)	48.4 (47.2-49.5)	45.9 (44.8-47.1)
Age [Figure 6]	0-4 Years	48.8 (47.1-50.5)	50.5 (48.7-52.2)	45.8 (44.2-47.4)	51.1 (49.4-52.9)	49.9 (48.2-51.7)	47.0 (45.3-48.7)	40.6 (39.0-42.1)
	5-14 Years	20.3 (19.6-21.1)	16.0 (15.4-16.7)	13.7 (13.1-14.2)	15.9 (15.3-16.6)	15.4 (14.7-16.0)	16.7 (16.0-17.4)	13.9 (13.3-14.5)
	15-34 Years	9.1 (8.8-9.5)	8.2 (7.9-8.6)	7.7 (7.4-8.0)	8.3 (7.9-8.6)	7.0 (6.7-7.4)	7.7 (7.4-8.0)	7.3 (7.0-7.6)
	35-64 Years	13.6 (13.3-14.0)	13.8 (13.4-14.1)	13.5 (13.1-13.8)	15.3 (14.9-15.7)	15.7 (15.3-16.1)	16.7 (16.3-17.1)	16.1 (15.7-16.5)
	≥65 Years	15.2 (14.5-15.9)	16.5 (15.8-17.2)	18.1 (17.4-18.9)	20.8 (20.0-21.6)	22.9 (22.1-23.8)	24.7 (23.9-25.6)	24.9 (24.1-25.8)
Age -Race[2,3]	0-17 Years, White	16.6 (16.0-17.2)	14.9 (14.3-15.4)	13.2 (12.7-13.7)	14.9 (14.3-15.4)	13.2 (12.7-13.7)	14.5 (14.0-15.1)	12.2 (11.7-12.7)
	0-17 Years, Black	68.4 (66.1-70.7)	63.0 (60.8-65.3)	55.1 (53.0-57.2)	61.2 (58.9-63.4)	63.2 (60.9-65.4)	60.5 (58.3-62.7)	49.9 (47.8-51.9)
	≥18 Years, White	8.8 (8.6-9.0)	8.9 (8.7-9.2)	8.7 (8.5-9.0)	10.1 (9.9-10.4)	9.8 (9.6-10.0)	11.1 (10.8-11.3)	10.4 (10.1-10.6)
	≥18 Years, Black	37.1 (35.9-38.3)	36.3. (35.1-37.5)	37.5 (36.2-38.7)	39.7 (38.4-41.0)	43.4 (42.1-44.7)	44.1 (42.8-45.4)	44.6 (43.20-45.9)

Annual Rate[3] Ratios of Asthma Hospitalization[1,2] (per 10,000) for Black Persons versus White Persons by Age Group, Michigan, 2000-2006 [Figure 8]

	2000	2001	2002	2003	2004	2005	2006
0-17 Years	4.1 (3.9-4.3)	4.2 (4.0-4.5)	4.2 (4.0-4.4)	4.1 (3.9-4.3)	4.8 (4.5-5.0)	4.2 (4.0-4.4)	4.1 (3.8-4.3)
≥18 Years	4.2 (4.0-4.4)	4.1 (3.9-4.2)	4.3 (4.1-4.5)	3.9 (3.8-4.1)	4.4 (4.3-4.6)	4.0 (3.8-4.1)	4.3 (4.1-4.5)

Sources:
Michigan Inpatient Database, MDCH.
Annual Population Data, MDCH.

1. Asthma as primary diagnosis, ICD-9-CM: 493.xx.
2. Where information regarding race is missing from the record, race is imputed based on the 1990 Census (2000-2002) or on the hospitalized population for that year (2003-2006).
3. Age-adjusted to the 2000 US Standard Population.

Annual Count of Asthma Hospitalizations[1] by Month of Admission, Michigan, 2004-2006

	Total [Figure 9]			<18 Years [Figure 11]			18-64 Years [Figure 11]			≥65 Years [Figure 11]		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
January	1,309	1,711	1,317	370	380	331	638	947	685	301	384	301
February	1,347	1,737	1,448	526	384	355	554	951	779	267	402	314
March	1,474	1,497	1,703	503	375	394	692	788	875	279	333	434
April	1,364	1,535	1,387	435	540	392	688	682	687	241	313	308
May	1,536	1,548	1,371	594	525	453	705	707	662	237	316	256
June	1,236	1,139	955	362	332	203	640	599	549	234	208	203
July	889	902	909	182	189	157	526	530	543	181	183	209
August	1,068	982	940	334	274	226	541	541	499	193	167	215
September	1,663	1,838	1,803	733	906	784	715	764	795	215	168	224
October	1,715	1,957	1,667	701	975	637	803	801	810	211	181	220
November	1,428	1,438	1,403	579	572	497	667	647	699	181	219	207
December	1,539	1,140	1,335	438	294	395	782	607	688	319	239	252

Rate[2] of Asthma Hospitalization[1] (per 10,000) by Month of Admission, Michigan, 2004-2006

	Total [Figure 10]		<18 Years [Figure 12]		18-64 Years [Figure 12]		≥65 Years [Figure 12]	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
January	4,337	1.4 (1.4-1.5)	1,081	1.5 (1.4-1.6)	2,270	1.2 (1.1-1.2)	986	2.6 (2.5-2.8)
February	4,532	1.5 (1.4-1.5)	1,265	1.7 (1.6-1.8)	2,284	1.2 (1.1-1.2)	983	2.6 (2.4-2.8)
March	4,673	1.5 (1.5-1.6)	1,272	1.7 (1.6-1.8)	2,355	1.2 (1.2-1.3)	1,046	2.7 (2.6-2.9)
April	4,286	1.4 (1.4-1.5)	1,367	1.9 (1.8-2.0)	2,057	1.1 (1.0-1.1)	862	2.3 (2.1-2.4)
May	4,455	1.5 (1.4-1.5)	1,572	2.1 (2-2.2.0)	2,074	1.1 (1.0-1.1)	809	2.1 (2.0-2.3)
June	3,330	1.1 (1.1-1.1)	897	1.2 (1.1-1.3)	1,788	0.9 (0.9-1.0)	645	1.7 (1.6-1.8)
July	2,700	0.9 (0.9-0.9)	528	0.7 (0.7-0.8)	1,599	0.8 (0.8-0.9)	573	1.5 (1.4-1.6)
August	2,990	1.0 (1.0-1.0)	834	1.1 (1.1-1.2)	1,581	0.8 (0.8-0.9)	575	1.5 (1.4-1.7)
September	5,304	1.8 (1.7-1.8)	2,423	3.3 (3.2-3.4)	2,274	1.2 (1.1-1.2)	607	1.6 (1.5-1.8)
October	5,339	1.8 (1.7-1.8)	2,313	3.1 (3.0-3.3)	2,414	1.3 (1.2-1.3)	612	1.6 (1.5-1.7)
November	4,268	1.4 (1.4-1.5)	1,648	2.2 (2.1-2.3)	2,013	1.0 (1.0-1.1)	607	1.6 (1.5-1.7)
December	4,014	1.3 (1.3-1.4)	1,127	1.5 (1.4-1.6)	2,077	1.1 (1.0-1.1)	810	2.1 (2.0-2.3)

Average Length of Stay for Asthma Hospitalization[1] (per 10,000), Michigan, 2000-2006

		2000	2001	2002	2003	2004	2005	2006
Total [Figure 13]		3.02	3.06	3.12	3.08	3.18	3.22	3.29
Age [Figure 14]	<18 Years	2.15	2.16	2.02	1.95	1.93	1.90	1.94
	18-64 Years	3.36	3.38	3.41	3.43	3.49	3.54	3.48
	≥65 Years	4.78	4.64	4.87	4.64	4.82	4.80	4.85

Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Asthma as primary diagnosis, ICD-9-CM: 493.xx.
2. Age-adjusted to the 2000 US Standard Population.

Rate[1] of Asthma Hospitalization[2] (per 10,000) by County of Residence and Age Group, Michigan, 2004-2006

	Total [Figures 15 & 16]		<18 Years [Figures 17 & 18]		≥18 Years [Figures 19 & 20]	
County	Count	Rate	Count	Rate	Count	Rate
Alcona	44	11.8 (8.0-15.7)	10	*	34	10.2 (6.5-14.0)
Alger	25	9.6 (5.6-13.5)	7	*	18	*
Allegan	255	7.7 (6.8-8.7)	70	8.3 (6.4-10.3)	185	7.5 (6.4-8.6)
Alpena	82	8.4 (6.5-10.3)	19	*	63	7.5 (5.6-9.4)
Antrim	44	6.4 (4.4-8.3)	13	*	31	5.2 (3.3-7.1)
Arenac	75	13.5 (10.3-16.6)	10	*	65	14.5 (10.9-18.1)
Baraga	54	21.3 (15.5-27.1)	12	*	42	20.5 (14.2-26.8)
Barry	197	11.3 (9.7-12.9)	77	18.7 (14.5-22.9)	120	8.7 (7.2-10.3)
Bay	619	18.8 (17.3-20.3)	156	21.7 (18.3-25.1)	463	17.8 (16.2-19.5)
Benzie	45	8.6 (6.0-11.1)	17	*	28	6.3 (3.9-8.7)
Berrien	533	11.0 (10.0-11.9)	229	19.2 (16.7-21.7)	304	8.1 (7.2-9.1)
Branch	223	15.7 (13.7-17.8)	69	21.3 (16.3-26.3)	154	13.8 (11.6-16.0)
Calhoun	421	10.0 (9.0-10.9)	131	12.4 (10.3-14.5)	290	9.1 (8.1-10.2)
Cass	167	11.1 (9.4-12.8)	44	13.4 (9.4-17.4)	123	10.3 (8.4-12.1)
Charlevoix	38	4.4 (3.0-5.8)	13	*	25	3.4 (2.0-4.7)
Cheboygan	87	10.7 (8.3-13.0)	29	17.6 (11.2-24.0)	58	8.2 (6.1-10.4)
Chippewa	69	6.0 (4.6-7.5)	12	*	57	6.2 (4.6-7.9)
Clare	141	14.1 (11.7-16.5)	37	19.1 (12.9-25.3)	104	12.3 (9.9-14.8)
Clinton	248	12.5 (10.9-14.0)	96	20.1 (16.1-24.2)	152	9.8 (8.2-11.4)
Crawford	39	9.1 (6.2-12.1)	11	*	28	7.7 (4.8-10.7)
Delta	79	7.9 (6.1-9.6)	40	16.9 (11.6-22.2)	39	4.7 (3.2-6.2)
Dickinson	64	7.4 (5.4-9.3)	16	*	48	6.4 (4.5-8.4)
Eaton	513	16.5 (15.0-17.9)	208	28.9 (25.0-32.9)	305	12.1 (10.7-13.5)
Emmet	80	7.7 (6.0-9.5)	29	13.2 (8.4-17.9)	51	5.9 (4.2-7.5)
Genesee	2,314	17.3 (16.6-18.0)	790	22.6 (21.1-24.2)	1,524	15.4 (14.6-16.2)
Gladwin	129	16.1 (13.2-19.0)	28	18.1 (11.4-24.9)	101	15.4 (12.2-18.5)
Gogebic	37	9.2 (6.1-12.4)	15	*	22	5.6 (3.2-8.1)
Grand Traverse	129	5.0 (4.1-5.8)	23	4.2 (2.5-5.9)	106	5.2 (4.2-6.2)
Gratiot	182	15.5 (13.2-17.8)	77	29.1 (22.6-35.6)	105	10.8 (8.7-12.8)
Hillsdale	175	12.6 (10.7-14.5)	59	18.3 (13.7-23.0)	116	10.6 (8.7-12.6)
Houghton	133	12.7 (10.5-15.0)	31	14.5 (9.4-19.5)	102	12.5 (9.9-15.0)
Huron	122	12.3 (10.1-14.6)	53	25.9 (18.9-33.0)	69	7.6 (5.7-9.5)
Ingham	1,610	21.2 (20.2-22.3)	672	34.6 (32.0-37.3)	938	16.7 (15.6-17.8)
Ionia	165	9.1 (7.7-10.5)	46	10.0 (7.1-12.9)	119	8.7 (7.1-10.3)
Iosco	124	16.0 (12.9-19.0)	35	23.8 (15.8-31.8)	89	13.2 (10.2-16.2)
Iron	19	*	5	*	14	*
Isabella	205	13.8 (11.9-15.7)	123	33.9 (27.9-39.9)	82	6.9 (5.4-8.5)
Jackson	865	17.7 (16.6-18.9)	301	25.8 (22.9-28.7)	564	14.9 (13.7-16.2)
Kalamazoo	700	10.1 (9.3-10.9)	196	11.5 (9.9-13.1)	504	9.7 (8.8-10.5)
Kalkaska	39	7.3 (5.0-9.6)	11	*	28	6.7 (4.2-9.2)
Kent	1,698	9.5 (9.1-10.0)	569	11.3 (10.4-12.2)	1,129	8.9 (8.4-9.4)
Keweenaw	6	*	§	*	5	*

Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
2. Asthma as primary diagnosis, ICD-9-CM: 493.xx.
§Number of events >0 but <5.
*Number of events ≤20 or population <5,000.

Rate[1] of Asthma Hospitalization[2] (per 10,000) by County of Residence and Age Group, Michigan, 2004-2006, Continued

	Total [Figures 15 & 16]		<18 Years [Figures 17 & 18]		≥18 Years [Figures 19 & 20]	
County	Count	Rate	Count	Rate	Count	Rate
Lake	55	16.7 (12.1-21.3)	10	*	45	17.1 (11.9-22.3)
Lapeer	331	12.6 (11.2-14.0)	75	11.9 (9.2-14.7)	256	12.8 (11.2-14.4)
Leelanau	49	6.7 (4.7-8.7)	12	*	37	5.4 (3.6-7.2)
Lenawee	418	14.1 (12.8-15.5)	160	22.8 (19.3-26.3)	258	11.1 (9.8-12.5)
Livingston	375	7.4 (6.6-8.2)	156	12.9 (10.9-14.9)	219	5.5 (4.7-6.2)
Luce	29	13.6 (8.5-18.7)	5	*	24	13.7 (8.1-19.2)
Mackinac	20	*	5	*	15	*
Macomb	3,728	14.7 (14.3-15.2)	944	16.4 (15.3-17.4)	2,784	14.2 (13.7-14.7)
Manistee	63	7.8 (5.8-9.8)	16	*	47	6.7 (4.7-8.7)
Marquette	162	9.0 (7.6-10.5)	45	13.1 (9.2-16.9)	117	7.7 (6.2-9.1)
Mason	39	4.7 (3.2-6.3)	15	*	24	3.4 (2.0-4.8)
Mecosta	72	6.9 (5.3-8.5)	29	11.3 (7.2-15.4)	43	5.4 (3.7-7.1)
Menominee	73	10.2 (7.8-12.6)	33	22.4 (14.7-30.0)	40	5.9 (4.1-7.8)
Midland	285	11.6 (10.3-13.0)	95	16.8 (13.4-20.2)	190	9.8 (8.4-11.3)
Missaukee	49	11.5 (8.2-14.7)	24	23.8 (14.2-33.3)	25	7.2 (4.3-10.0)
Monroe	709	16.0 (14.8-17.2)	215	20.5 (17.7-23.2)	494	14.4 (13.2-15.7)
Montcalm	173	9.2 (7.8-10.5)	67	14.4 (11.0-17.9)	106	7.4 (6.0-8.9)
Montmorency	29	10.6 (6.4-14.8)	13	*	16	*
Muskegon	532	10.3 (9.4-11.1)	251	18.9 (16.6-21.2)	281	7.2 (6.4-8.1)
Newaygo	117	7.8 (6.4-9.3)	42	11.5 (8.0-15.0)	75	6.6 (5.1-8.1)
Oakland	5,202	14.2 (13.8-14.6)	1,368	15.7 (14.8-16.5)	3,834	13.7 (13.3-14.1)
Oceana	57	6.6 (4.9-8.4)	16	*	41	6.3 (4.3-8.2)
Ogemaw	81	11.1 (8.6-13.7)	10	*	71	12.2 (9.2-15.1)
Ontonagon	25	9.8 (5.5-14.1)	§	*	21	9.1 (4.9-13.3)
Osceola	57	8.2 (6.0-10.3)	28	16.6 (10.4-22.8)	29	5.2 (3.3-7.2)
Oscoda	26	8.6 (5.1-12.2)	5	*	21	8.3 (4.5-12.1)
Otsego	66	8.8 (6.6-10.9)	18	*	48	8.0 (5.7-10.3)
Ottawa	399	5.4 (4.8-5.9)	150	7.6 (6.4-8.8)	249	4.6 (4.0-5.2)
Presque Isle	25	5.6 (3.1-8.0)	9	*	16	*
Roscommon	103	13.5 (10.6-16.4)	22	18.2 (10.5-25.9)	81	11.9 (9.1-14.7)
Saginaw	1,572	24.9 (23.7-26.2)	461	30.1 (27.4-32.9)	1,111	23.1 (21.8-24.5)
St. Clair	694	13.2 (12.2-14.2)	148	12.2 (10.3-14.2)	546	13.6 (12.4-14.7)
St. Joseph	272	13.9 (12.3-15.6)	64	12.6 (9.5-15.6)	208	14.4 (12.4-16.4)
Sanilac	141	9.7 (8.1-11.3)	19	*	122	10.9 (8.9-12.9)
Schoolcraft	12	*	§	*	10	*
Shiawassee	196	9.2 (7.9-10.6)	84	16.9 (13.3-20.5)	112	6.6 (5.4-7.8)
Tuscola	193	10.7 (9.2-12.2)	56	14.5 (10.7-18.3)	137	9.4 (7.8-11.0)
Van Buren	183	7.7 (6.5-8.8)	50	8.4 (6.1-10.7)	133	7.4 (6.1-8.7)
Washtenaw	1265	13.7 (12.9-14.4)	516	22.8 (20.8-24.7)	749	10.6 (9.8-11.3)
Wayne	18,920	31.3 (30.9-31.8)	6,488	39.7 (38.7-40.6)	12,432	28.4 (27.9-28.9)
Wexford	113	12.7 (10.4-15.1)	63	29.1 (21.9-36.3)	50	7.0 (5.0-9.0)
Michigan	50,228	16.6 (16.5-16.8)	16,327	22.1 (21.8-22.5)	33,901	14.7 (14.6-14.9)

Sources:
Michigan Inpatient Database, MDCH.
2005 Population Data, MDCH.
1. Age-adjusted to the 2000 US Standard Population.
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*Number of events ≤20 or population <5,000.

Rate[1] of Asthma Hospitalization[2] (per 10,000) by County of Residence and Race[3], Michigan, 2004-2006

	White [Figures 21 & 22]		Black [Figures 23 & 24]		Rate Difference [Figure 25]
County	Count	Rate	Count	Rate	Rate
Alcona	44	12.0 (8.1-15.9)	0	*	*
Alger	24	10.2 (5.9-14.5)	0	*	*
Allegan	235	7.3 (6.4-8.2)	9	*	*
Alpena	82	8.5 (6.5-10.4)	0	*	*
Antrim	44	6.5 (4.5-8.5)	0	*	*
Arenac	71	12.9 (9.8-16.1)	§	*	*
Baraga	42	21.0 (14.4-27.6)	0	*	*
Barry	192	11.2 (9.6-12.8)	§	*	*
Bay	579	18.0 (16.5-19.5)	31	66.4 (41.5-91.2)	48.4
Benzie	42	8.1 (5.6-10.7)	§	*	*
Berrien	290	7.2 (6.3-8.0)	233	29.8 (25.8-33.8)	22.6
Branch	214	15.5 (13.4-17.6)	7	*	*
Calhoun	299	8.2 (7.3-9.1)	119	24.9 (20.3-29.4)	16.7
Cass	127	9.1 (7.5-10.7)	38	43.2 (28.9-57.5)	34.1
Charlevoix	37	4.4 (2.9-5.9)	§	*	*
Cheboygan	87	11.0 (8.6-13.5)	0	*	*
Chippewa	58	6.1 (4.5-7.8)	0	*	*
Clare	141	14.3 (11.8-16.7)	0	*	*
Clinton	214	11.1 (9.6-12.6)	29	*	*
Crawford	39	9.4 (6.3-12.5)	0	*	*
Delta	76	7.9 (6.1-9.7)	§	*	*
Dickinson	64	7.5 (5.5-9.4)	0	*	*
Eaton	426	14.9 (13.4-16.3)	73	39.2 (29.4-48.9)	24.3
Emmet	78	7.9 (6.1-9.7)	0	*	*
Genesee	1,272	12.2 (11.5-12.8)	1,022	37.1 (34.7-39.4)	24.9
Gladwin	126	15.9 (13.0-18.8)	§	*	*
Gogebic	33	8.6 (5.5-11.7)	0	*	*
Grand Traverse	121	4.7 (3.9-5.6)	§	*	*
Gratiot	172	15.1 (12.9-17.4)	9	*	*
Hillsdale	174	12.7 (10.8-14.6)	0	*	*
Houghton	131	13.0 (10.7-15.3)	§	*	*
Huron	110	11.1 (8.9-13.2)	§	*	*
Ingham	989	15.9 (14.9-16.9)	563	54.9 (50.0-59.9)	39.0
Ionia	160	9.1 (7.7-10.5)	§	*	*
Iosco	121	15.9 (12.9-19.0)	§	*	*
Iron	19	*	0	*	*
Isabella	187	13.7 (11.7-15.7)	8	*	*
Jackson	708	15.8 (14.7-17.0)	137	31.7 (26.2-37.3)	15.9
Kalamazoo	446	7.4 (6.7-8.1)	245	34.3 (29.6-38.9)	26.9
Kalkaska	39	7.4 (5.1-9.8)	0	*	*
Kent	1,111	7.2 (6.7-7.6)	414	25.6 (22.9-28.3)	18.4
Keweenaw	5	*	0	*	*

Sources:
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3. Where information regarding race is missing from the record, race is imputed based on the hospitalized population for that year.
§Number of events >0 but <5.
*Number of events ≤20 or population <5,000.

Rate[1] of Asthma Hospitalization[2] (per 10,000) by County of Residence and Race[3], Michigan, 2004-2006, Continued

	White [Figures 21 & 22]		Black [Figures 23 & 24]		Rate Difference [Figure 25]
County	Count	Rate	Count	Rate	Rate
Lake	42	15.1 (10.3-19.9)	11	*	*
Lapeer	325	12.5 (11.1-13.9)	§	*	*
Leelanau	46	6.6 (4.5-8.7)	0	*	*
Lenawee	387	13.6 (12.2-15.0)	16	*	*
Livingston	367	7.4 (6.6-8.2)	6	*	*
Luce	28	14.2 (8.7-19.7)	0	*	*
Mackinac	19	*	0	*	*
Macomb	3,209	13.7 (13.3-14.2)	455	32.9 (29.5-36.4)	19.2
Manistee	58	7.1 (5.2-9.1)	0	*	*
Marquette	153	8.9 (7.4-10.4)	6	*	*
Mason	36	4.4 (2.9-5.9)	0	*	*
Mecosta	69	6.9 (5.3-8.6)	§	*	*
Menominee	71	10.3 (7.8-12.7)	0	*	*
Midland	284	12.0 (10.6-13.4)	§	*	*
Missaukee	48	11.4 (8.1-14.7)	0	*	*
Monroe	656	15.3 (14.1-16.5)	44	40.0 (27.6-52.3)	24.7
Montcalm	162	8.8 (7.4-10.2)	7	*	*
Montmorency	27	9.7 (5.7-13.7)	0	*	*
Muskegon	317	7.4 (6.6-8.2)	208	25.7 (22.1-29.4)	18.3
Newaygo	107	7.4 (6.0-8.8)	§	*	*
Oakland	3,446	11.2 (10.8-11.6)	1,606	39.5 (37.5-41.6)	28.3
Oceana	53	6.2 (4.5-7.9)	0	*	*
Ogemaw	79	10.9 (8.4-13.4)	§	*	*
Ontonagon	23	8.3 (4.5-12.0)	0	*	*
Osceola	56	8.2 (6.0-10.3)	0	*	*
Oscoda	25	8.3 (4.8-11.8)	0	*	*
Otsego	65	8.8 (6.6-10.9)	§	*	*
Ottawa	343	4.9 (4.3-5.4)	25	30.4 (16.2-44.7)	25.5
Presque Isle	25	5.7 (3.2-8.1)	0	*	*
Roscommon	103	13.8 (10.8-16.7)	0	*	*
Saginaw	816	15.7 (14.6-16.8)	695	56.9 (52.5-61.4)	41.2
St. Clair	635	12.6 (11.6-13.5)	52	45.4 (32.5-58.3)	32.8
St. Joseph	252	13.4 (11.7-15.1)	16	*	*
Sanilac	139	9.6 (8.0-11.3)	§	*	*
Schoolcraft	12	*	0	*	*
Shiawassee	194	9.3 (7.9-10.6)	§	*	*
Tuscola	190	10.8 (9.2-12.3)	§	*	*
Van Buren	146	6.5 (5.4-7.5)	31	30.5 (19.1-41.9)	24.0
Washtenaw	720	9.8 (9.1-10.6)	506	40.2 (36.6-43.9)	30.4
Wayne	4,485	13.3 (12.9-13.7)	14,129	55.7 (54.7-56.6)	42.4
Wexford	112	12.9 (10.5-15.3)	0	*	*
Michigan	28,064	11.1 (11.0-11.3)	20,898	47.5 (46.9-48.2)	36.4

Sources:
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