# Oregon Environmental Public Health Tracking Program

## Asthma Report 2000 – 2011

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## Introduction to Oregon Tracking

Environmental Public Health Tracking is the ongoing collection, integration, analysis, interpretation and dissemination of data from environmental hazard monitoring, human exposure and health effects surveillance.

The Centers for Disease Control and Prevention (CDC) funded the Oregon Environmental Public Health Tracking Program (Oregon Tracking) with the following goals:

- Build a sustainable national environmental public health tracking network.
- Enhance environmental public health tracking work force and infrastructure.
- Disseminate information to guide policy and improve public health.
- Foster collaboration among health and environmental programs.

Oregon Tracking is a Web-based network of standardized electronic health and environmental data. Oregon is one of 22 grantees funded by the CDC to participate in a collaborative network development process and implement state/city networks that are components of the National Tracking Network.

## Rationale for tracking asthma

Asthma is a chronic lung disease that causes shortness of breath, coughing and wheezing. Asthma is one of the most common serious chronic conditions affecting children in the United States. In Oregon approximately 10% of adults and children have asthma.[1] Asthma symptoms occur when a person is exposed to a trigger such as tobacco smoke, animal fur or feathers, cockroaches, mold or mildew, poor outdoor air quality and pollen.[2] During an asthma episode or attack the airways carrying oxygen in and out of the lungs become irritated and swollen. Asthma is a serious illness - a severe attack can be fatal, especially in young children and older adults. However, most problems associated with asthma, including emergency room visits and hospitalizations, can be avoided if asthma symptoms are well-managed. Effective self-management includes control of exposure to factors that trigger attacks and use of asthma medications (including "rescue medications") according to a medical provider's recommendations.

No one knows what causes asthma. It is thought to be an immune response problem. Asthma is not contagious. A child is more likely to have asthma if a parent has asthma, if the child was born prematurely or if there is a smoker in the home.

During childhood more boys than girls have asthma; however, in adulthood, more women than men have asthma. Although asthma develops at all ages, it often starts in childhood and is more common in children than among adults. Half of the people with asthma developed it in childhood, usually before the age of 10. There are large racial, income and geographic disparities in asthma outcomes.[2] Once people have asthma it doesn't go away, although it may get better at times. There is no cure for asthma, but there are ways to control it and live a healthy, active life.

Most Oregon adults who have asthma (65%) say they understand how to self-manage the disease.[1] Among parents of children with asthma, over 70% say that their children know what to do during an asthma attack or episode. Nearly all adults and children have been shown how to use their inhaler (97.7% and 91.4% respectively). However, of Oregonians with private health insurance, 17.5% are overusing their inhaled rescue medications. In the Medicaid and CHIP population, 35.7% are overusing their inhaled rescue medications. Furthermore, few children (34.4%) and adults (23.8%) have an asthma action plan or have taken an asthma self-management course or class (14.3% and 6.6% respectively).

According to the Oregon Asthma Program, more than a quarter of adults with asthma report asthma caused them to miss at least one day of work or usual activities during the last 12 months. About the same number report asthma caused them to miss at least one night of sleep during the last 30 days.[1] Among children ages 5 to 17, asthma is one the leading cause of school absences.[3]

Asthma disparities exist in Oregon and throughout the United States. Those with no high school diploma are more likely to have asthma. There is a strong correlation between asthma and income level. Oregonians from a household with an annual income of less than $15,000 consistently report higher percentages of asthma than all other income levels.[1] Nationally, a higher percentage of people below the federal poverty level report having asthma than those above the federal poverty level.[2]

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[1] *Oregon Asthma Program (2010). The Burden of Asthma in Oregon: 2010. Available online at http://public.health.oregon.gov/DiseasesConditions/ChronicDisease/Asthma/Documents/burden/or_asthma2010.pdf*

[2] *Centers for Disease Control and Prevention (2013). Available online at http://www.cdc.gov/asthma*

[3] *Centers for Disease Control and Prevention (2013). Available online at http://www.cdc.gov/HealthyYouth/asthma/*

Hospitalizations are the most direct measure of the burden of asthma on the health care system in Oregon. However, the medical claims data used to track asthma hospitalizations and medications do not contain information on patients' education, family income, home environment or asthma self-management. Without this information it is difficult to identify associations between asthma hospitalizations and outdoor air quality. Furthermore, outdoor air quality data are not available for every county, as monitors are placed only in areas where air quality is a concern. In the absence of those data, this report presents descriptive analyses of asthma hospitalizations in Oregon, but does not try to draw associations between hospitalizations and other factors.

## Asthma indicators and measures

Oregon Tracking monitors asthma hospitalizations throughout Oregon. The following asthma indicators and measures are discussed in this report:

| *Indicator* | *Measures* |
|---|---|
| A. Asthma Hospitalizations | A1. Number of hospitalizations |
| | A2. Number by month |
| | A3. Crude rate |
| | A4. Age-specific rates |
| | A5. Age-adjusted rate |

Hospitalization data come from the Hospital Discharge Dataset, which is provided by the Oregon Association of Hospitals and Health Systems. The Hospital Discharge Dataset provides information on hospital discharges from all general hospitals in Oregon except two U.S. Veterans Administration hospitals and the Oregon State Hospital, which provides long-term psychiatric treatment for people with severe and persistent mental illness.

An asthma hospitalization is defined as having a primary diagnosis with an International Classification Disease 9th Revision Clinical Modification (ICD-9-CM) code of 493. People who are not Oregon residents are excluded from analysis. Rates are calculated using U.S. Census Bureau annual population estimates; age adjustments are based on the age distribution of the 2000 U.S. standard population.

Multiple hospitalizations for the same individual at different times in the year are included in the data because the measures are based on events rather than on individuals. Transfers from one hospital to another that occurred on the same day or the day following the admission have been removed from these data.

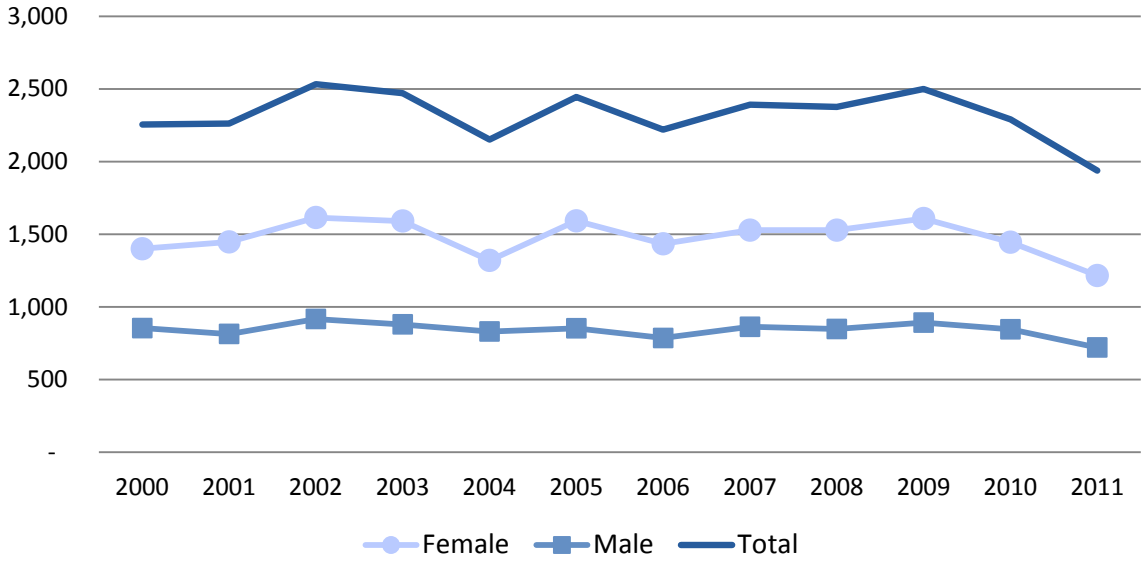
Data are available only for patients who were discharged on or before December 31 of the most recent year for which data exist. Admissions that resulted in discharges in the subsequent year are not captured in the data. This may lead to understatement of the number of hospitalizations in the most recent year, especially for December.

Records for persons living in Oregon may not be included if the hospitalization occurred out of state. Records for persons receiving care at home, in emergency rooms and outpatient settings are not included in these data. People treated for asthma by Veterans Affairs, Indian Health Services and institutions such as prisons are also not included in these data.

**A1 & A2. Asthma hospitalizations**

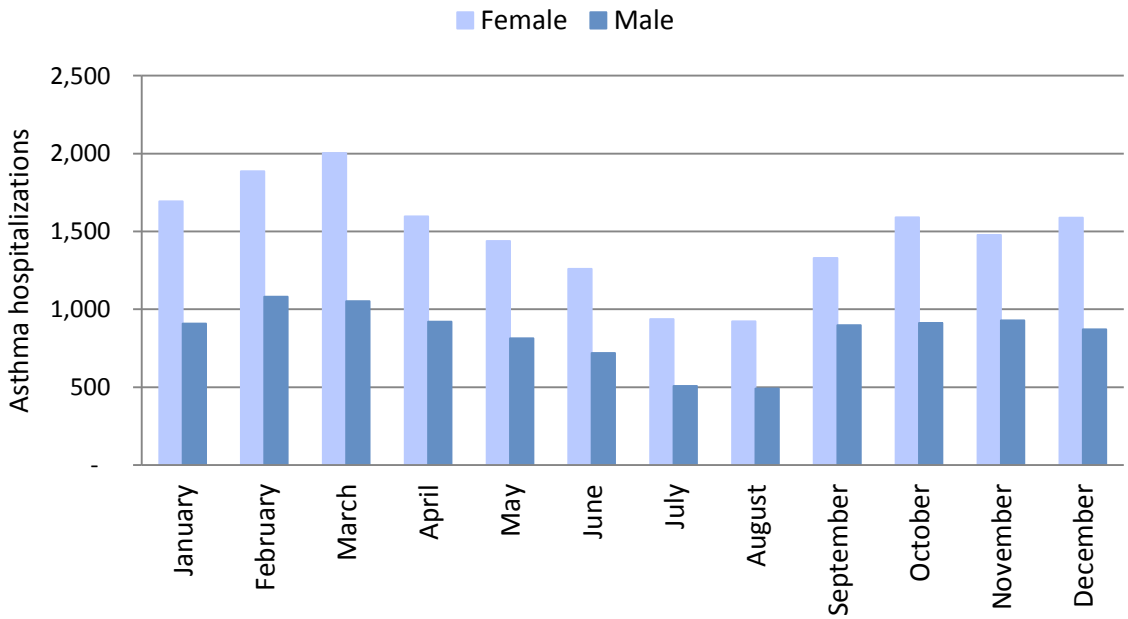
The annual number of asthma hospitalizations has been fairly consistent over time (Figure 1). Based on linear regression analysis, there is no statistically significant trend in hospitalizations between 2000 and 2011. More women than men are hospitalized for asthma. For both men and women there were fewer hospitalizations in 2011 than in any other year since 2000.

Figure 1. Measure A1: Number of asthma hospitalizations, Oregon 2000-2011




Consistent with national studies, asthma hospitalizations are least common in July and August and most frequent January through March (Figure 2). Large fall and spring peaks may be related to allergen exposure, changes in temperature and increased respiratory infections related to returning to school.

Figure 2. Measure A2: Number of asthma hospitalizations by month, 2000-2011



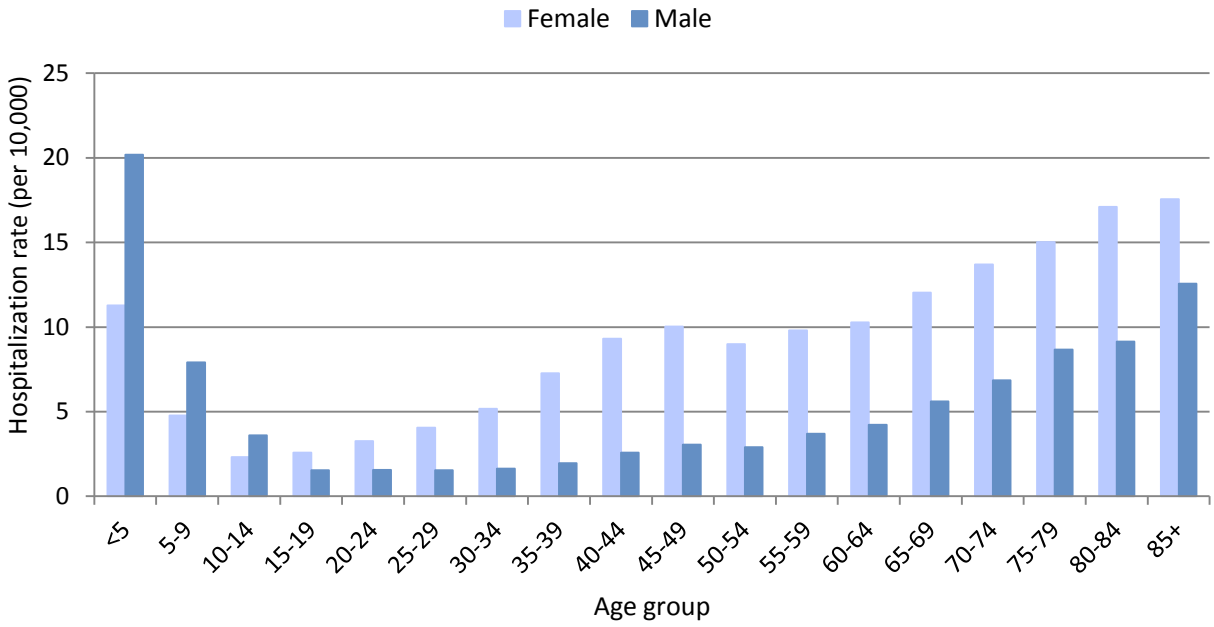
### A3. Crude asthma hospitalization rate

Statewide, the crude hospitalization rate shows a significant declining trend from 2000-2011 ($p < 0.05$). The crude hospitalization rate has also declined in Clatsop, Columbia, Douglas, Linn, Morrow, Tillamook, Washington and Yamhill Counties (all $p < 0.05$). Because the actual number of asthma hospitalizations is small in Oregon's less populated counties, many of the crude rate estimates are unreliable.

### A4. Age-specific asthma hospitalization rates

Asthma hospitalizations are most common for kids under the age of 5 and older adults. Among children under the age of 15, hospitalizations are more common for males. Over the age of 15 hospitalizations are more common for females (Figure 3). The rate of asthma hospitalizations is trending down for Oregonians ages <5, 10-14, 15-19, 35-39 and 70-74 ($p < 0.05$). Changes in hospitalization rates among other groups were not statistically significant, probably due to low numbers of cases.

Figure 3. Measure A4: Age-specific asthma hospitalization rates by sex, 2000-2011




### A5. Age-adjusted asthma hospitalization rate

Age-adjusted rates are best for comparing counties and describing trends, as they account for differences in the population distribution. Statewide, the age-adjusted asthma hospitalization rate declined from 2000-2011 ($p < 0.05$). Figure 4 shows the data and a linear trend line.

Figure 4. Measure A5: Age-adjusted asthma hospitalization rate per 10,000, 2000-2011

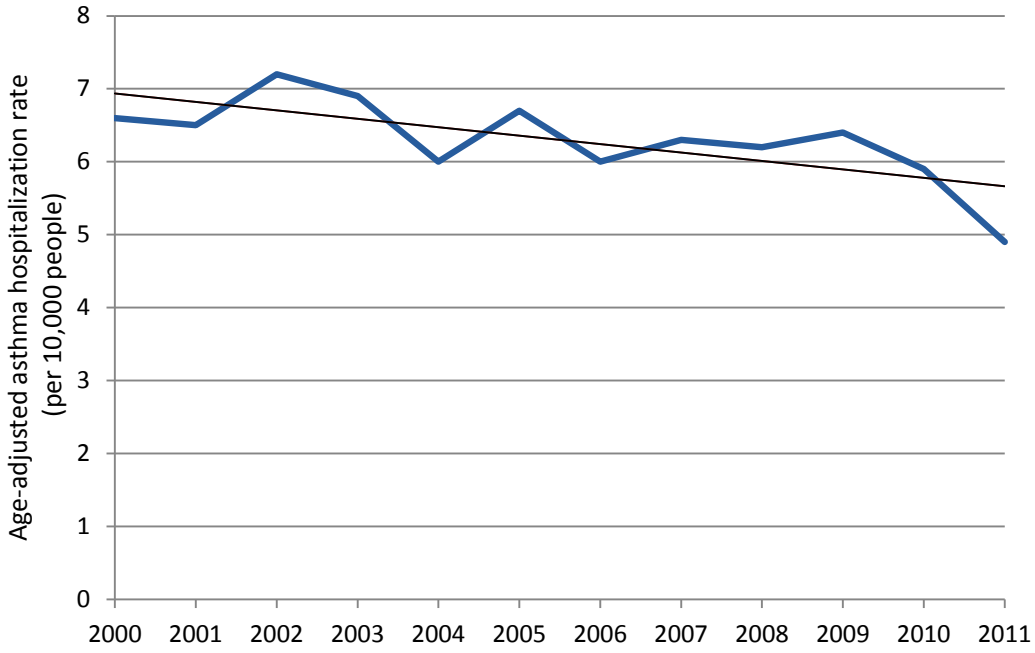
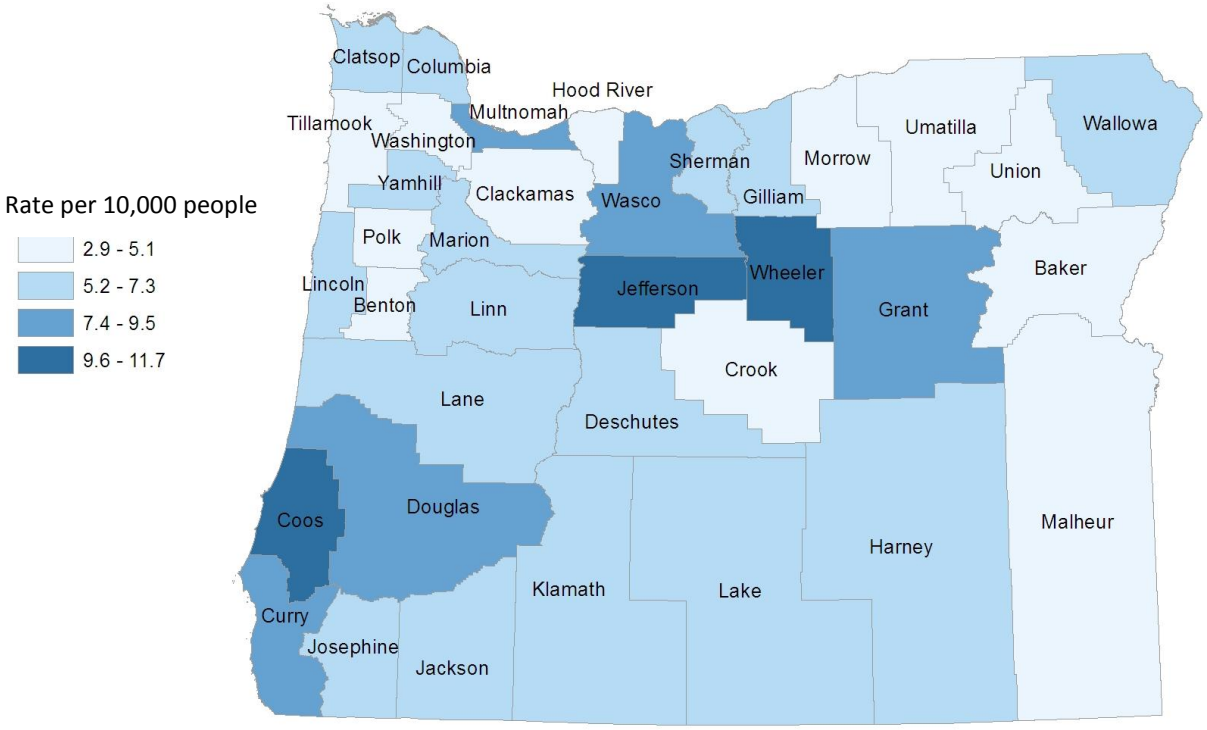



Figure 5 is a map of the age-adjusted asthma hospitalization rates for Oregon counties for the period 2007-2011. Counties are grouped using equal intervals. Rates vary throughout the state.

Figure 5. Measure A5: Age-adjusted asthma hospitalization rates, 2007-2011




NOTE: Asthma hospitalization rates are classified using equal intervals.

## Major limitations

Small numbers of hospitalizations in many counties lead to unreliable rates which limit trend analysis. Trend analysis results are based on only a few years of data and appear to be strongly influenced by lower rates in 2010 and 2011. Data from future years will indicate whether these recent decreases in hospitalizations persist. If so, they could indicate progress in improving outdoor air quality, reducing asthma triggers or enhancing self-management. Future studies could explore these associations when more data are available. For example, the 2010 Burden of Asthma report includes information on self-management up to 2008.

Measures analyzed for this report are based on hospitalizations only, not on other indicators of asthma burden such as medication use. Because rates of hospitalization are based on population size, they are more useful than raw numbers for comparing geographic areas or time periods. However, differences in rates over time or between counties may reflect evolving diagnostic techniques and not a change in the burden of asthma. Differences in rates by area may also be due to variations in sociodemographic characteristics and associated behaviors, such as cigarette smoking.

When comparing rates across counties, it is important to note that a variety of non-environmental factors, such as access to medical care, personal behaviors, health status and diet affect the likelihood of being hospitalized for asthma. These data are not included in the Hospital Discharge Dataset, which limits the utility of Oregon Tracking's estimates for studies of the causes of asthma.

## Summary

Based on analysis of indicators monitored by Oregon Tracking, asthma hospitalizations are on the decline in the state. Fewer asthma hospitalizations save money, reduce the burden on the health care system and signal an improvement in the lives of Oregonians with asthma.

Recent declines in asthma hospitalization may be associated with a number of different factors, including better control medications, environmental conditions and self-management behaviors. Adding survey and claims data on asthma medication use and tobacco use could help portal users understand trends and asthma burden. However, these data are not currently linked to the hospitalization data for individuals, so any conclusions would be based solely on ecological associations.

## Recommendations

Tracking indicators of indoor air quality, asthma self-management and triggers like smoking will aid in the interpretation of asthma hospitalization data. The National Tracking Program publishes state-level estimates of smoking trends. Oregon Tracking could support county-level estimates of smoking prevalence to align with measures of asthma and other health conditions.

## Reference links

Allergy & Asthma Network Mothers of Asthmatics (AANMA): *www.aanma.org/*

American Academy of Allergy, Asthma, and Immunology (AAAAI): *www.aaaai.org/*

American College of Allergy, Asthma & Immunology (ACAAI): *www.acaai.org/*

American Lung Association: *www.lungusa.org/*

Asthma and Allergy Foundation of America (AAFA): *www.aafa.org/*

Global Initiative for Asthma (GINA): *www.ginasthma.com/*

Oregon Department of Environmental Quality (DEQ), Air Quality Division: *www.oregon.gov/DEQ/AQ/index.shtml*

Oregon Department of Environmental Quality (DEQ). Air Quality Index (AQI): *www.deq.state.or.us/aqi/index.aspx*

Oregon Department of Human Services (DHS), Oregon Asthma Program: *oregon.gov/DHS/ph/asthma/index.shtml*

Oregon Department of Human Services (DHS), Oregon Environmental Public Health Tracking (EPHT): *oregon.gov/DHS/ph/epht/index.shtml*

Oregon Health & Science University (OHSU). Health topics, allergy and asthma: *www.ohsu.edu/xd/health/services/doernbecher/patients-families/topic-by-id.cfm?ContentTypeId=90&ContentId=P01708*

U.S. Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC), National Asthma Control Program (NACP): *www.cdc.gov/asthma/NACP.htm*

U.S. Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC), National Environmental Public Health Tracking (NEPHT) Program: *www.cdc.gov/nceh/tracking/default.htm*

U.S. Environmental Protection Agency (EPA). Asthma: *www.epa.gov/iaq/asthma/*

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