

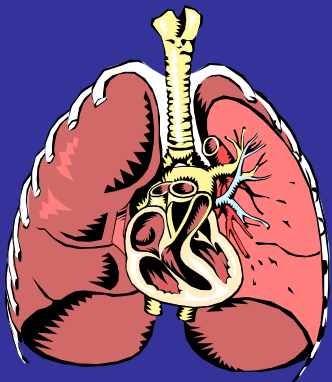
# Epidemiology of Asthma

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# Morbidity and Mortality

- Chronic lower respiratory conditions, 3rd leading cause of death, Nevada 2010
- Require lengthy hospitalizations
  - Asthma, chronic bronchitis, emphysema, COPD

Sources: [www.cdc.gov/faststats](http://www.cdc.gov/faststats), Nevada State Health Division

# Prevalence of Common Cardiovascular and Lung Diseases, U.S., 2007–2011

Disease	(Number of Persons)
• Cardiovascular Diseases*	83,600,000
• Hypertension**	77,900,000
• Coronary Heart Disease	15,400,000
• Asthma‡	39,500,000
• COPD§	12,700,000

\* Includes hypertension, CHD, stroke, or heart failure for ages 20 years and older.

\*\* Hypertension is defined as systolic blood pressure  $\geq 140$  mmHg, or diastolic blood pressure  $\geq 90$  mmHg, or being on antihypertensive medication, or being told twice of having hypertension.

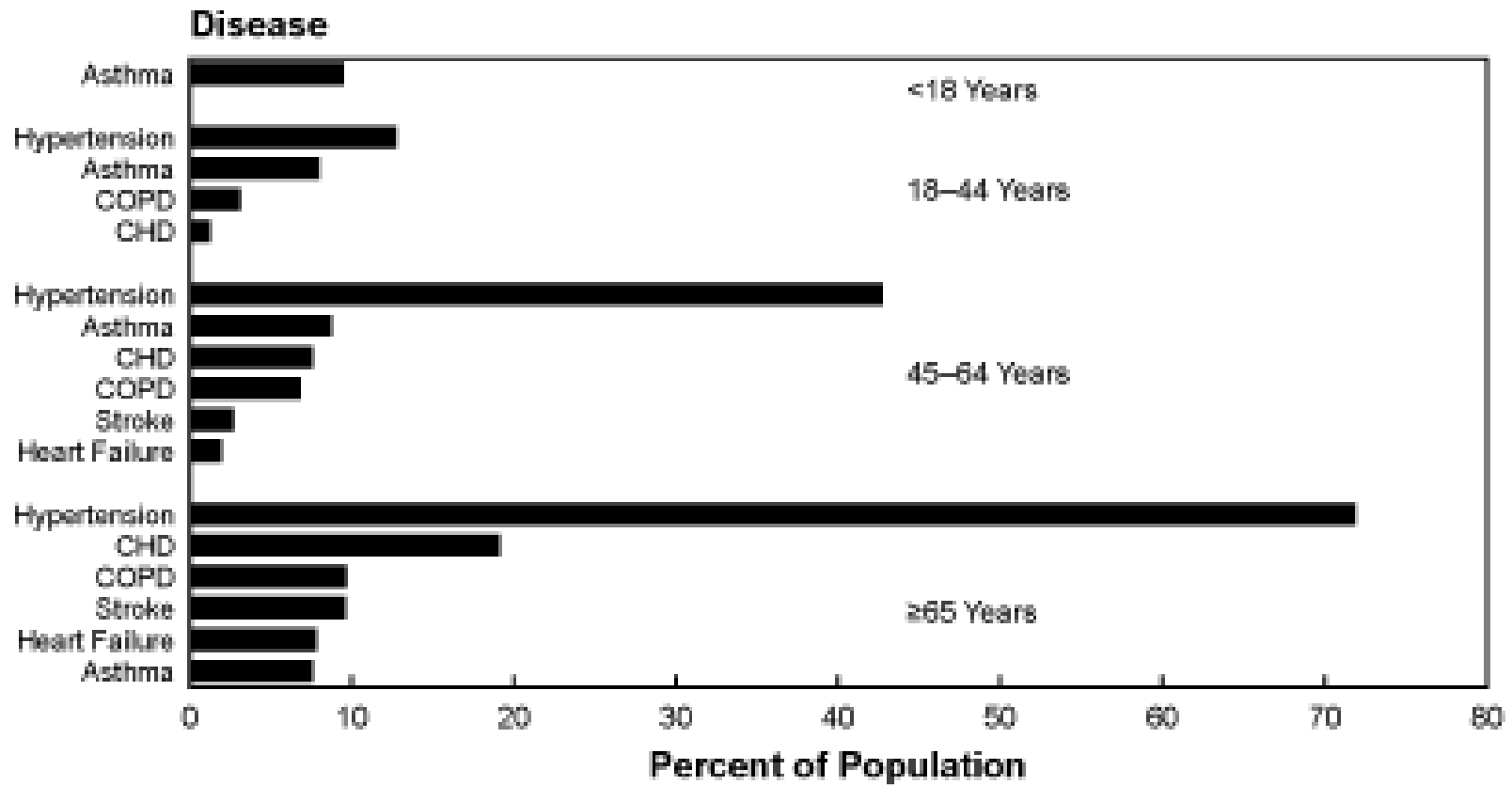
† Range from 650,000 to 1,300,000 for ages 18 years and older (Am Heart J 2004;147:425–439).

‡ 25,900,000 still have asthma and of those, 13,200,000 have had an attack in the past 12 months, for all ages.

§ An estimated 12,700,000 diagnosed (2011) and 12,000,000 undiagnosed (2006), for ages 18 years and older.

Sources: National Health and Nutrition Examination Survey (NHANES) 2007–2010, NCHS and National Health Interview Survey (NHIS) 2011, NCHS.

# Prevalence of Common Cardiovascular and Lung Diseases by Age, U.S., 2007–2011

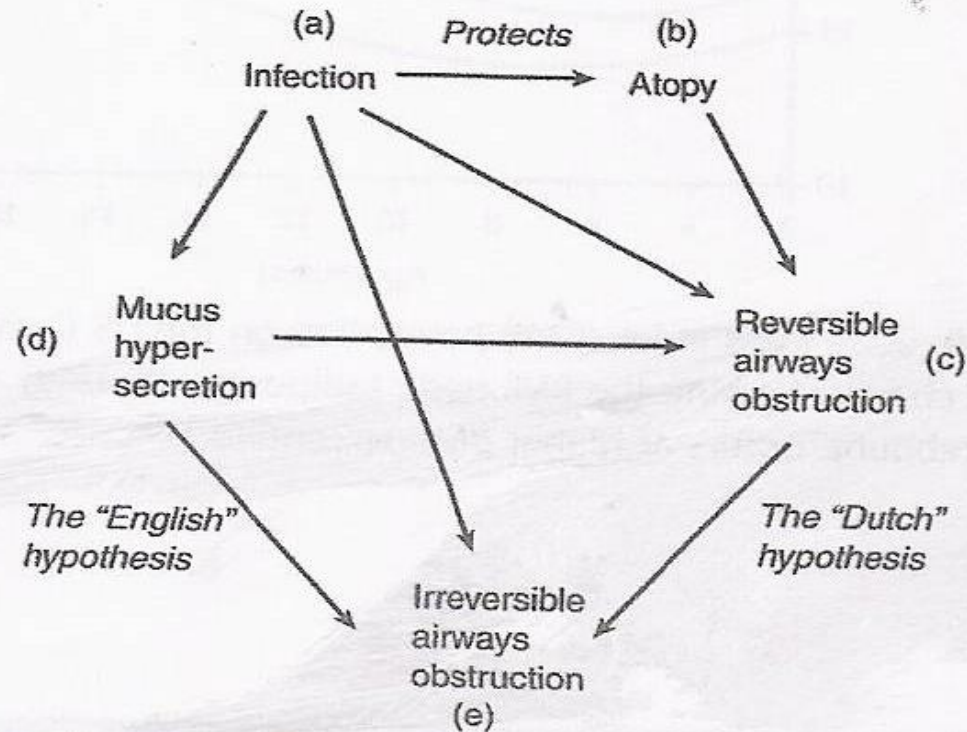


Source: NHIS and NHANES, NCHS.

# General CLD Symptoms

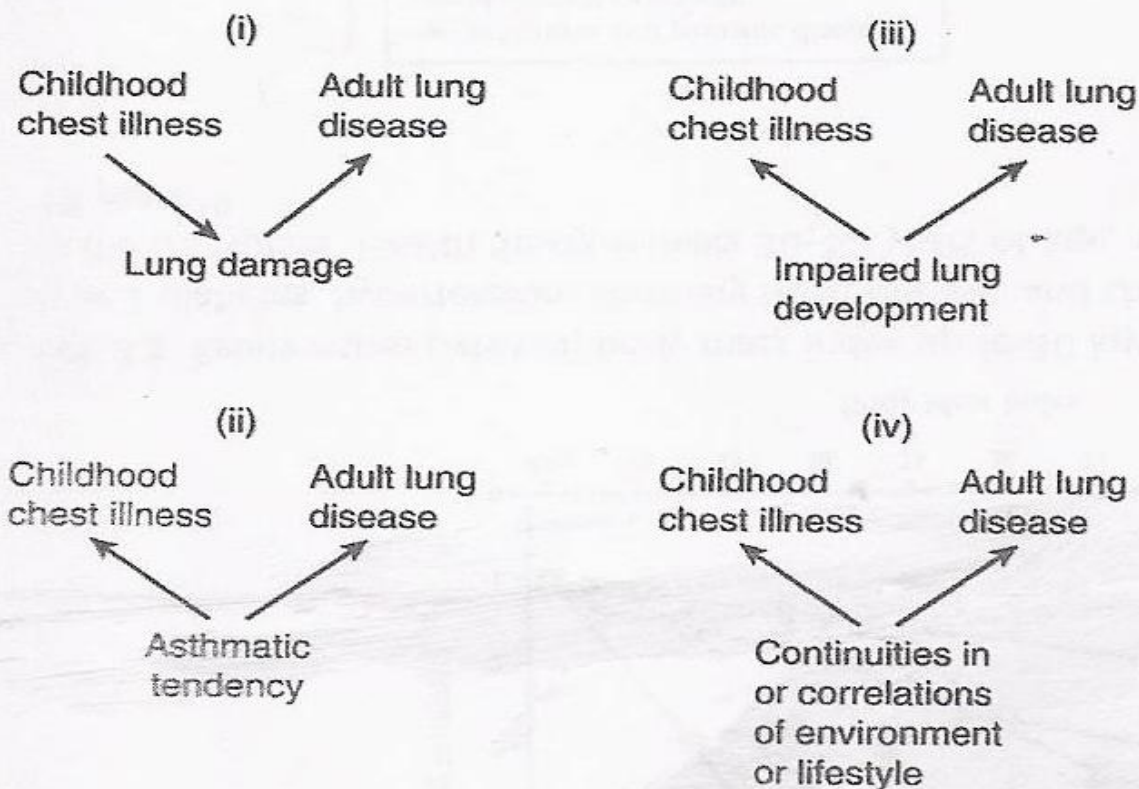
- Breathlessness (dyspnea)
  - Impaired respiratory tract clearance mechanism, excessive mucus production, reduced lung capacity
    - Contributes to more frequent viral and bacterial respiratory infections
  - Cough, excessive phlegm production, wheezing, coughing of blood

# Postulated relationships between different forms of respiratory and allergic diseases



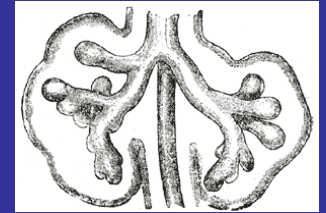
**Fig. 10.1** Postulated relationships between different forms of respiratory and allergic disease.

# Explanations for association of childhood chest illness and adult respiratory disease



**Fig. 10.3** Four possible explanations for the association of childhood chest illness and adult respiratory disease.

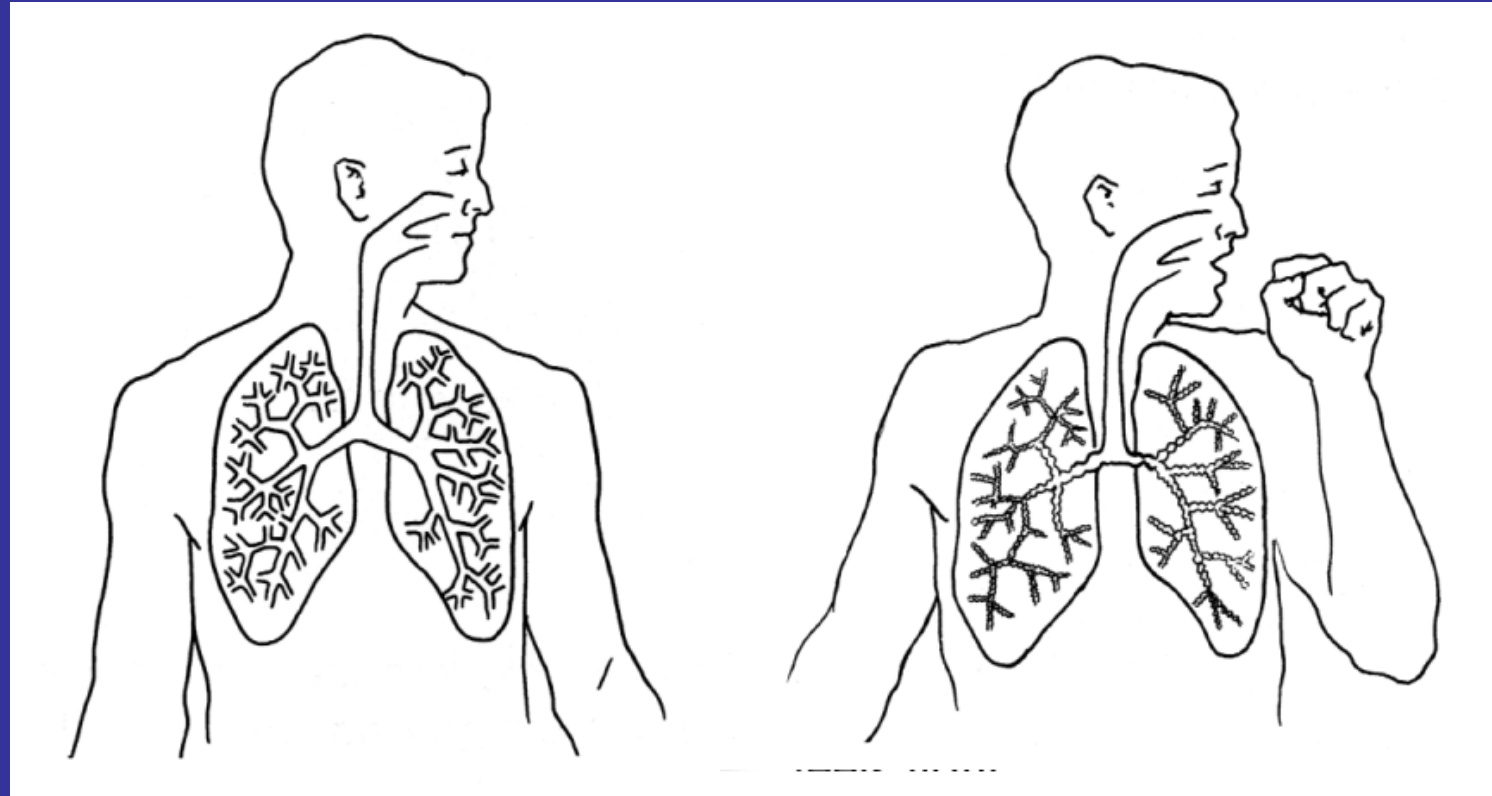
# What is Asthma?



- A chronic lung disease that is characterized by repeated episodes of wheezing, breathlessness, chest tightness, coughing (and nocturnal awakenings)
  - <http://www.cdc.gov/asthma/faqs.htm>
- Asthma is a reversible obstructive lung disease, caused by an increased reaction of the airways to various stimuli
  - <http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma>



# Pathology of Asthma



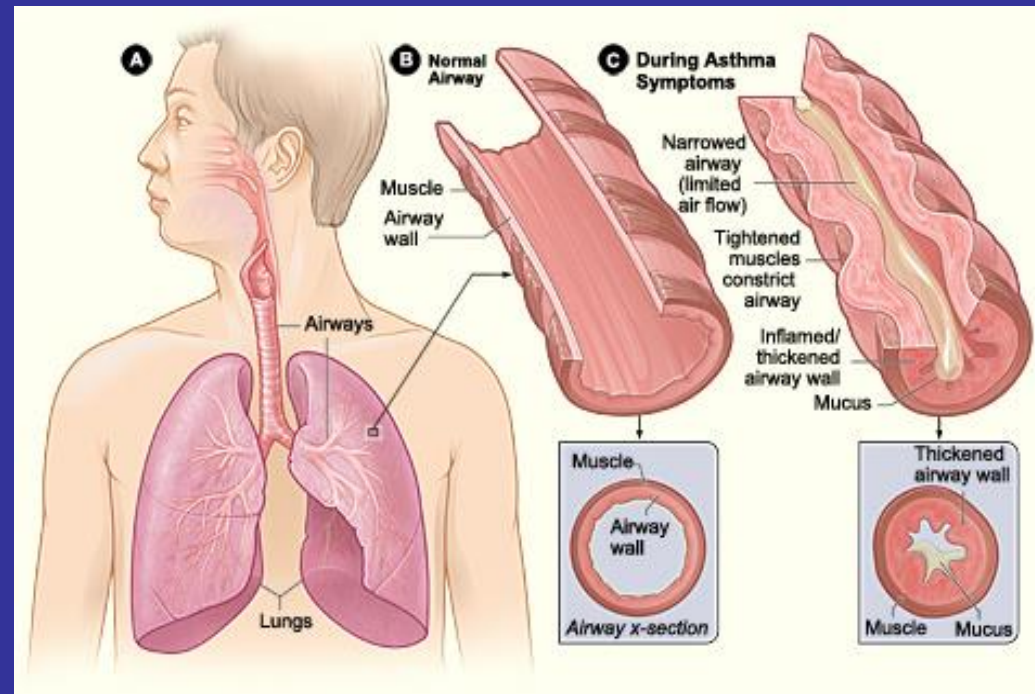
Normal Lungs

Asthma

Source: "What You and Your Family Can Do About Asthma" by the Global Initiative For Asthma  
Created and funded by NIH/NHLBI

# The Disease Asthma

- Asthma is a chronic respiratory disease, characterized by inflammation and constriction of the airways
  - There is no cure for asthma, but it can be controlled



(Figure source: NHLBI, 2012)

# The Disease Asthma

## Physiologic Changes

- Airway hyperresponsiveness
- Airway inflammation
- Smooth muscle constriction
- Edema
- Mucus hypersecretion
- Airway remodeling

## Resulting Clinical Manifestations

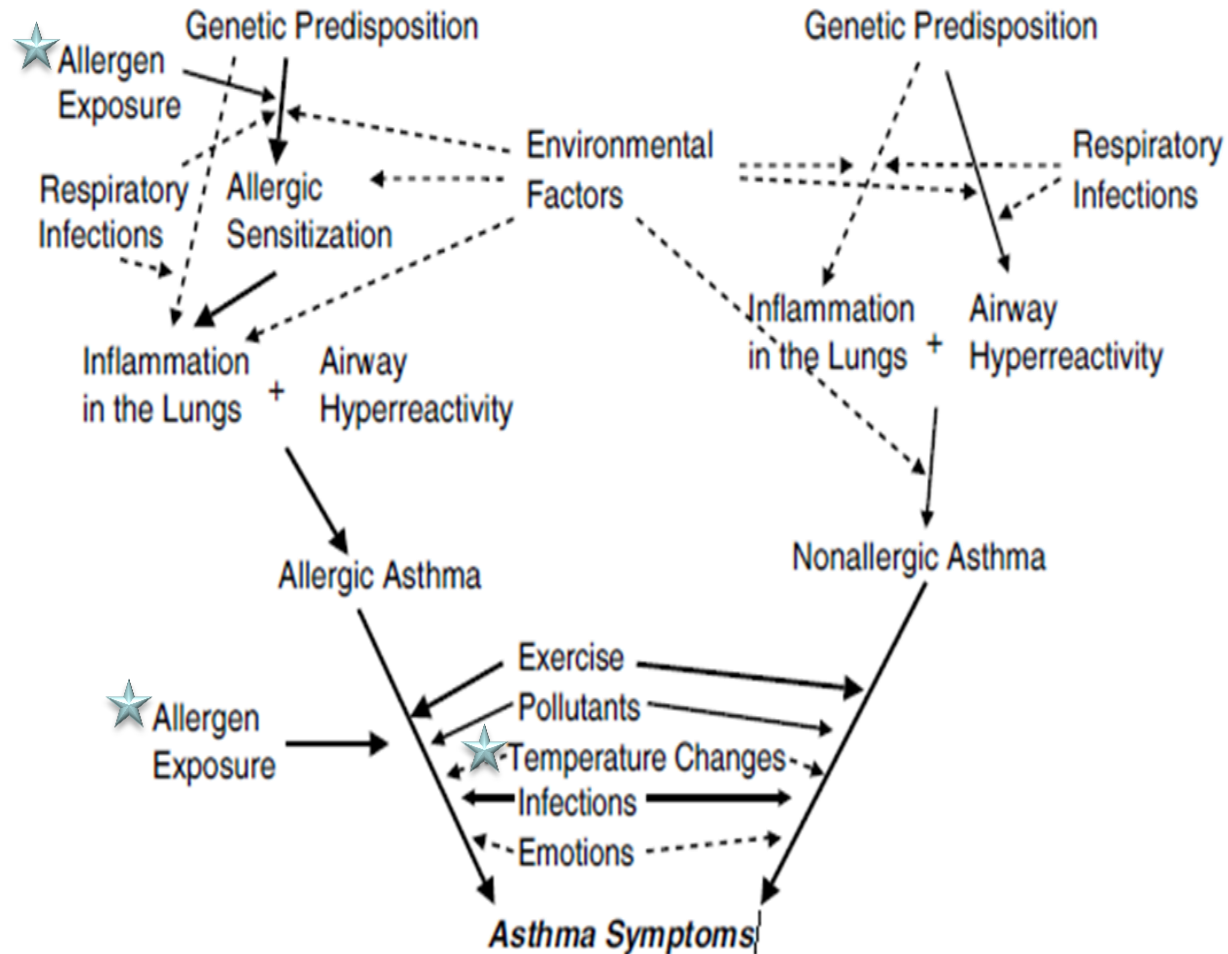
- Coughing
- Wheezing
- Chest tightness
- Shortness of breath (dyspnea)

# The Disease Asthma

- When asthma symptoms become acutely more intense or frequent, they are often referred to as asthma attacks
  - During an asthma attack, bronchospasms result in substantial airway obstruction
    - The obstruction is usually reversible with the use of quick-relief (“rescue”) medications
    - However, all asthma attacks are serious medical problems and may be fatal if untreated

# The Disease Asthma

- The pathogenesis of asthma is complex and a single cause has not been found
- A number of factors have also been found to contribute to the exacerbation of asthma in sensitive individuals = asthma triggers



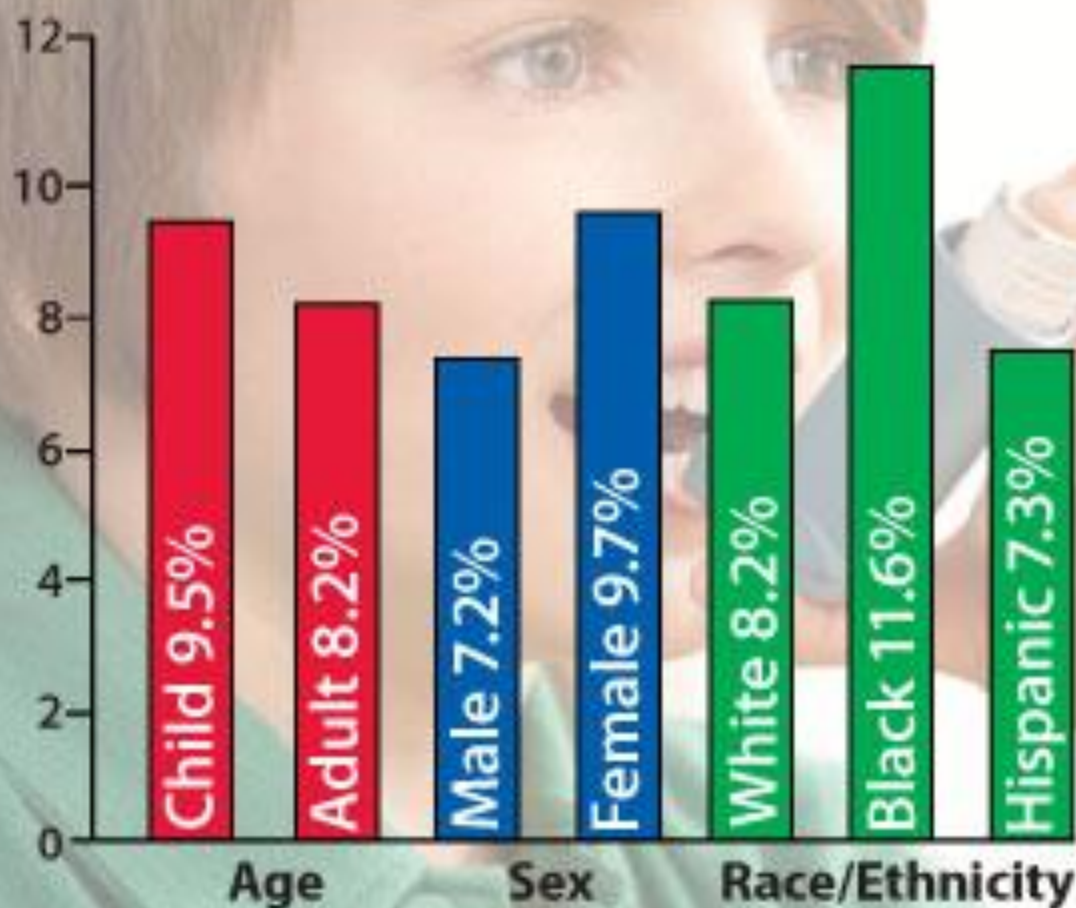
# Asthma Prevalence

- Approximately 1 in 11 US children currently experience asthma symptoms (~7 million children)
  - In 2011, 8.7 million children between the ages of 5 – 17 years old reported an asthma diagnosis at some point in their life
  - In 2010, Nevada's childhood asthma prevalence rate was 8.6% (higher than the national average)
    - In 2006, the prevalence rate in the Clark County School District was 9.1% (some schools up to to 21%!)
- From 2008 – 2010, children's asthma prevalence rates exceeded adult asthma prevalence rates by 23%

# High Risk Groups

- Asthma
  - African-Americans and Puerto Ricans
  - Younger ages (5-10 years)
    - Males, death rates
  - Residing in urban areas, inner city
  - Northeastern and Western U.S regions

## Current Asthma Prevalence Percents by Age, Sex, and Race/Ethnicity, United States, 2011

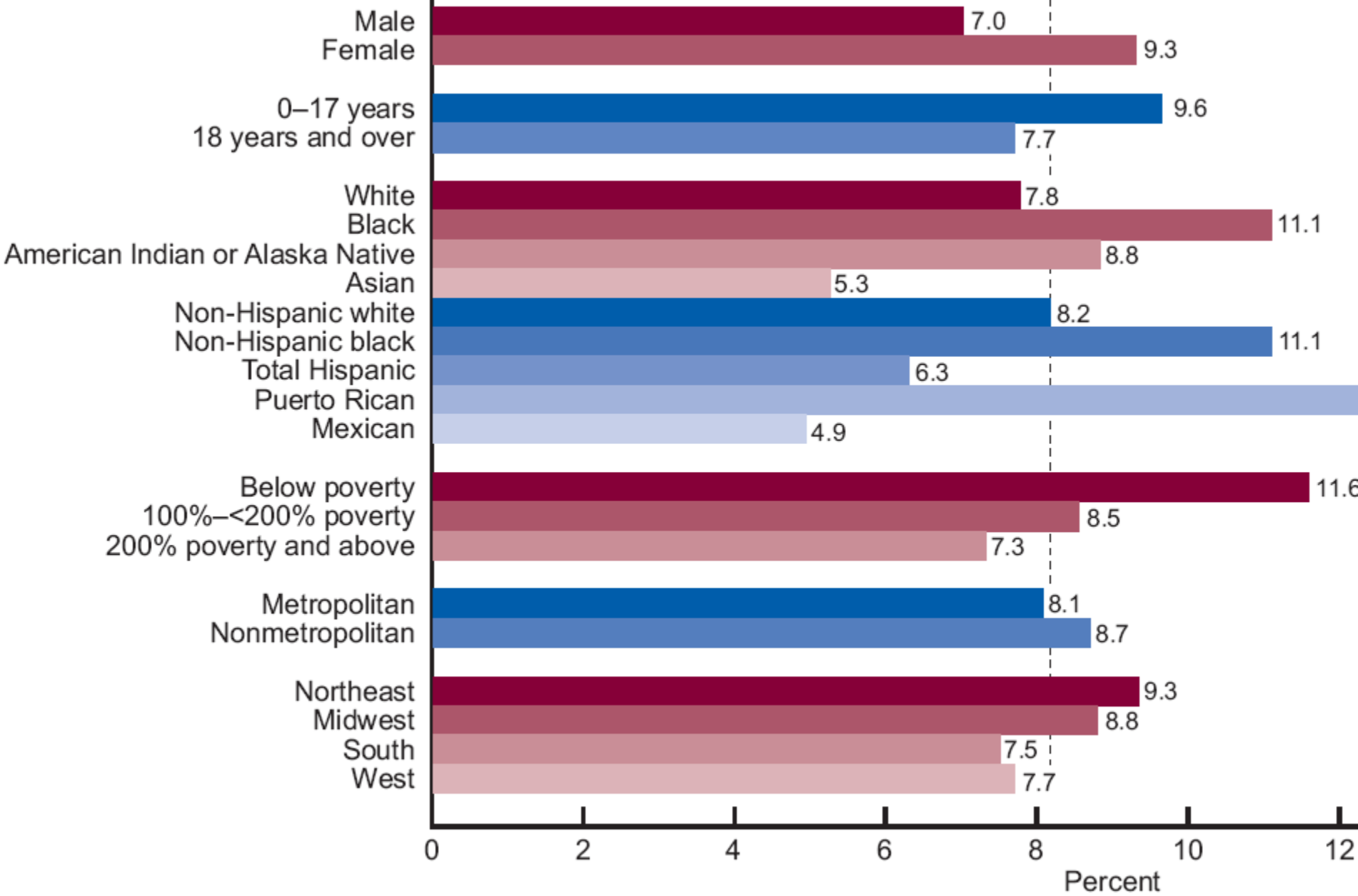


Source: National Health Interview Survey, National Center for Health Statistics, Centers for Disease Control and Prevention

CS117996-A



Total current asthma prevalence



NOTE: Estimates (except age-group-specific estimates) are age-adjusted to the year 2000 U.S. standard population.  
SOURCE: CDC/NCHS, National Health Interview Survey.

# Asthma Morbidity

- Asthma is a major cause of disability in the US, particularly for children
  - Morbidity is largely caused by airway remodeling and lung function declines
    - Lung function declines are greater in asthmatic versus non-asthmatic children and occurs more rapidly in asthmatic adults
  - Asthma can negatively affect quality of life and is a leading cause of activity limitations in children
    - Nearly 60% of asthmatic children are forced to limit regular, daily activities due to asthma

# Morbidity

- The prevalence and severity of asthma has increased over the last two decades.
- In 2010, estimated lifetime prevalence of asthma for adults in Nevada was 14.5% and estimated current prevalence 9.2%

Source: Bloom, B. and Cohen, R.A. Summary Health Statistics for U.S. Children:  
National Health Interview Survey, National Center for Health Statistics.  
Vital Health Statistics

## Nationwide Asthma Morbidity

- Number of noninstitutionalized adults who currently have asthma: 18.9 million (8.2%)

Source: Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2011, table 3, 4 Adobe PDF file [PDF - 1.3 MB]

- Number of children who currently have asthma: 7.1 million (9.5%)

Source: Summary Health Statistics for U.S. Children: National Health Interview Survey, 2011, table 1 Adobe PDF file [PDF - 711 KB]

# Asthma Health Care Utilization

- In 2010, there were 10.6 million ambulatory care visits for asthma
  - Visits have increased with overall prevalence
- In 2009, nearly 1 in 5 asthmatic children went to the emergency department (ED) for their asthma
  - Asthmatic children are more likely to be seen in EDs than asthmatic adults
- In 2009, there were nearly 480,000 hospital admissions in the US for asthmatic children and adults

# Ambulatory care

- Number of visits to hospital outpatient departments with asthma as primary diagnosis: 1.3 million

Source: National Hospital Ambulatory Medical Care Survey: 2010 Outpatient Department Summary Tables, table 11 Adobe PDF file [PDF - 330 KB]

- Number of visits to emergency departments with asthma as primary diagnosis: 1.8 million

Source: National Hospital Ambulatory Medical Care Survey: 2010 Emergency Department Summary Tables, table 12 Adobe PDF file [PDF - 481 KB]

# Hospital Inpatient Care

- Number of discharges with asthma as first-listed diagnosis: 439,000
- Average length of stay: 3.6 days

Source: National Hospital Discharge Survey: 2010 table, Average length of stay and days of care – Number and rate of discharges by first-listed diagnostic categories Adobe PDF file [PDF - 58 KB]

# Asthma Mortality

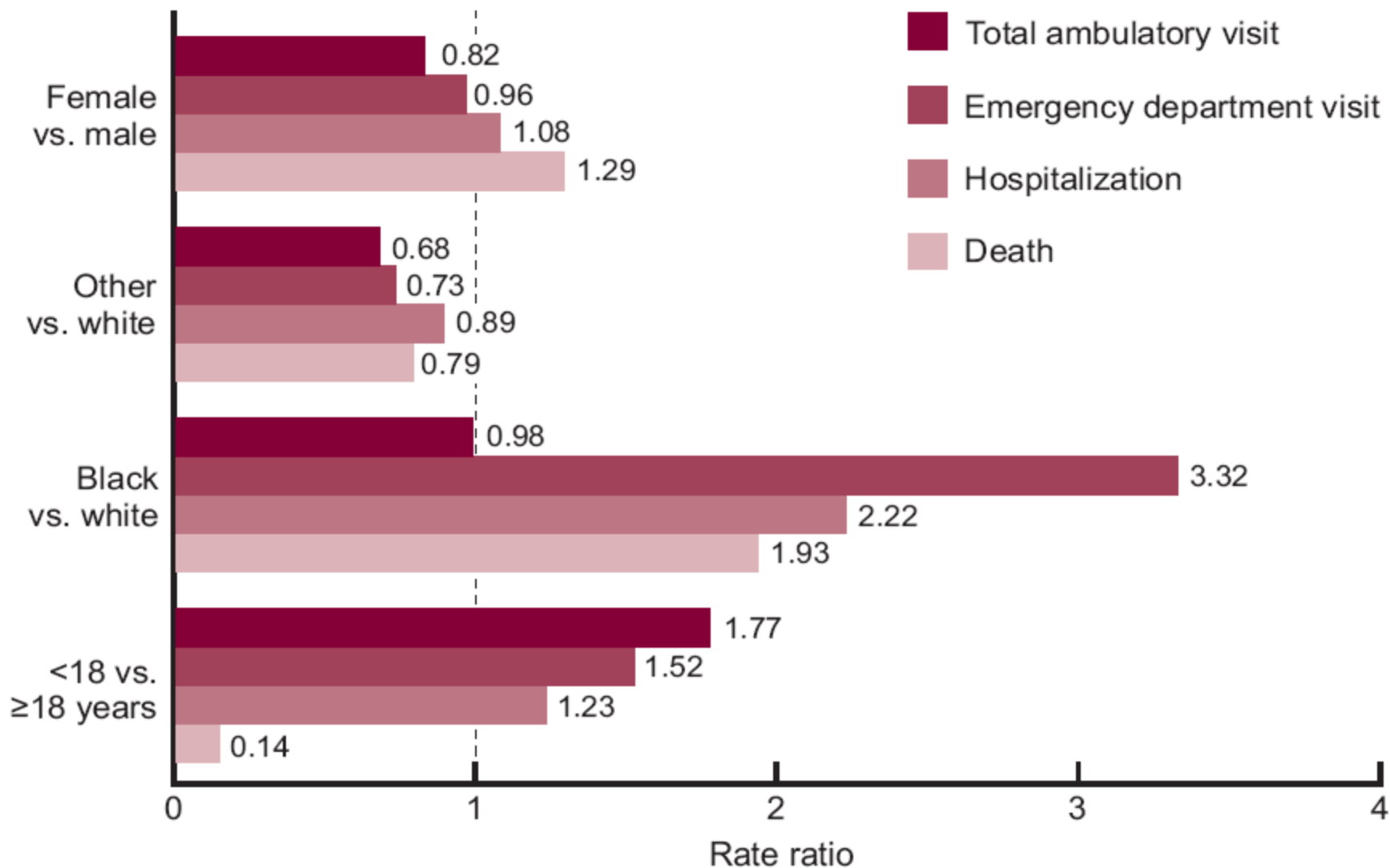
- For the period from 2007 – 2009, the total asthma mortality rate in the United States was approximately 150 deaths per one million asthmatics
  - In 2005, the mortality rate for children with asthma was 2.3 deaths per one million asthmatic children
  - The risk of asthma death remains the highest for children with:
    - Uncontrolled disease
    - A previous life-threatening attack
    - Frequent hospitalization and intubation
    - Non-Hispanic black children with asthma have 5x the mortality risk
- Nearly 3,500 deaths are attributed to asthma annually, representing approximately nine asthma-related deaths per day in the United States



# Mortality

- Number of deaths: 3,404
- Deaths per 100,000 population: 1.1

Source: [Deaths: Final Data for 2010, tables 10, 11 \[PDF - 3.1 MB\]](#)



NOTE: A rate ratio of 1.0 (dashed line) indicates equal rates between the groups being compared.

SOURCES: CDC/NCHS, National Ambulatory Medical Care Survey, National Hospital Ambulatory Medical Care Survey, National Hospital Discharge Survey, Mortality component of the National Vital Statistics System, and National Health Interview Survey (population with current asthma).

# Asthma

- Asthma can happen at any stage of life
- Nationally, asthma annually accounts for millions of lost school and work days

Source: [www.cdc.gov/asthma](http://www.cdc.gov/asthma), American Lung Association

# Asthma

- Two categories
  - Atopic, allergic (extrinsic)
    - Abnormal amounts of IgE in response to environmental allergens
    - More prevalent (~90%)
  - Nonatopic, non-allergic (intrinsic)

# Risk Factors for Development of Asthma: Genetic Characteristics

## Atopy

- The body's predisposition to develop an antibody called immunoglobulin E (IgE) in response to exposure to environmental allergens
- Can be measured in the blood

# Economic Impact of Asthma

- There are direct and indirect economic burdens imposed by asthma
- Direct:
  - From 2002 – 2007 the average cost of asthma-related medical expenses was \$3,300 per asthmatic
- Indirect:
  - Missed school days
    - In 2008, an estimated 14.4 million school days were missed due to asthma
      - Average of 4 missed school days per asthmatic child
    - Between 50 – 60% of asthmatics miss at least 1 school day/year
    - Missed school days are associated with higher rates of grade retention, as well as poor performance in class and on standardized tests;

# Asthma

- The annual direct health care cost of asthma is approximately \$50.1 billion;
- Indirect costs (e.g. lost productivity) add another \$5.9 billion, for a total of \$56.0 billion dollars.

Source: American Lung Association, 2011

# Economic Impact of Asthma

## – Missed work days

- In 2008, 14.2 million missed work days were attributed to asthma
  - An average of 5 missed work days
- Nearly 1/3 of adults miss work annually due to asthma

**The burden of asthma costs the United States approximately \$56 billion annually**



# School and Work Days Missed

- Children 5-17 years
  - 10.5 million
- Adults 18 years and over, employed
  - 14.2 million
- Adults 18 years and over, unemployed
  - 22.0 million

Source – National Health Statistics Reports, #32, January 12, 2011

# Asthma

- Asthma is the third-ranking cause of hospitalization among children under the age 15
- It is also the first-ranking cause of hospitalizations among all chronic conditions

# Asthma

- An estimated 200,000 to one million children with asthma have their condition worsened by exposure to secondhand smoke
- 19 percent of children with asthma have chronic activity limitation

# Asthma and Absenteeism

- Students with asthma miss significantly more school compared to those without asthma
  - Taras et al. 2005, Moonie et al. 2005, Silverstein 2001
- Nevada students with asthma have been shown to have a two fold risk of grade retention compared to those without asthma or even those with a different chronic condition
  - Source: Moonie S, Cross CL, Guillermo C, Gupta T. Grade Retention Risk among Children with Asthma and other Chronic Health Conditions in a Large Urban School District. *Postgraduate Medicine*, Vol.122(5), 110-115, 2010

# The Relationship Between School Absence, Academic Performance, and Asthma Status

**Moonie S**, Sterling D, Figgs LW,  
Castro M. (***Journal of School Health***)  
March 2008, Vol .78 No. 3

Cited over 55 times !

Award Winning Paper - National Recognition:

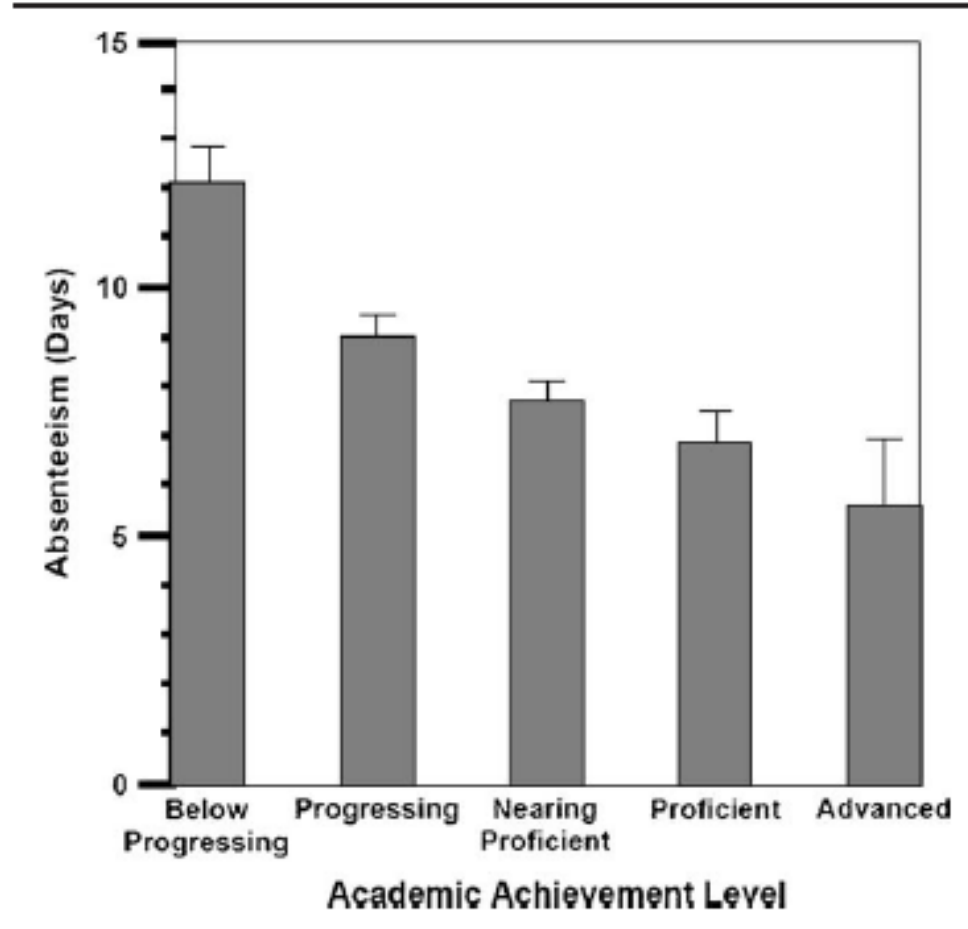
American School Health Association and American Academy of Pediatrics

Council on School Health - 1/13 selected across the Nation as a top read

# Asthma

- Children with asthma are at risk for decreased academic functioning:
  - Acute exacerbations
  - Excessive, brief periods of absenteeism
  - Iatrogenic effects of meds (oral steroids)
  - Poor medical management of disease
  - Stress associated with having a chronic illness

Figure 2. Mean Absence Days and Academic Achievement Level. The X-Axis Represents Academic Achievement Level. The Y-Axis Represents Total Days Absent. The Bars Represent the Mean Days Absent (Crude/Unadjusted) and Upper 95% Confidence Intervals for Each Test Level of Achievement



**Moonie S, Sterling D, Figgs LW, Castro M. (*Journal of School Health*)** March 2008, Vol .78 No. 3

Table 2. Test Scores by Asthma Severity Level

Test Scores*	Mild Intermittent Asthma		Persistent Asthma <sup>†</sup>	
	N (%)	Days Absent, Mean (95% CI) <sup>‡</sup>	Test Scores	Days Absent, Mean (95% CI) <sup>‡</sup>
Scored Below Nearing Proficiency 97 (55)	27 (46)	10.6 (6.6-14.6)	70 (60)	13.3 (10.9-15.8)
Scored Nearing Proficiency and Above 78 (45)	32 (54)	4.9 (2.5-7.3)	46 (40)	9.6 (7.7-11.6)
Total (all scores) 175 (100)	59 (45)	7.8 (5.3-10.1)	116 (55)	12.1 (10.3-13.8)

CI, confidence intervals.

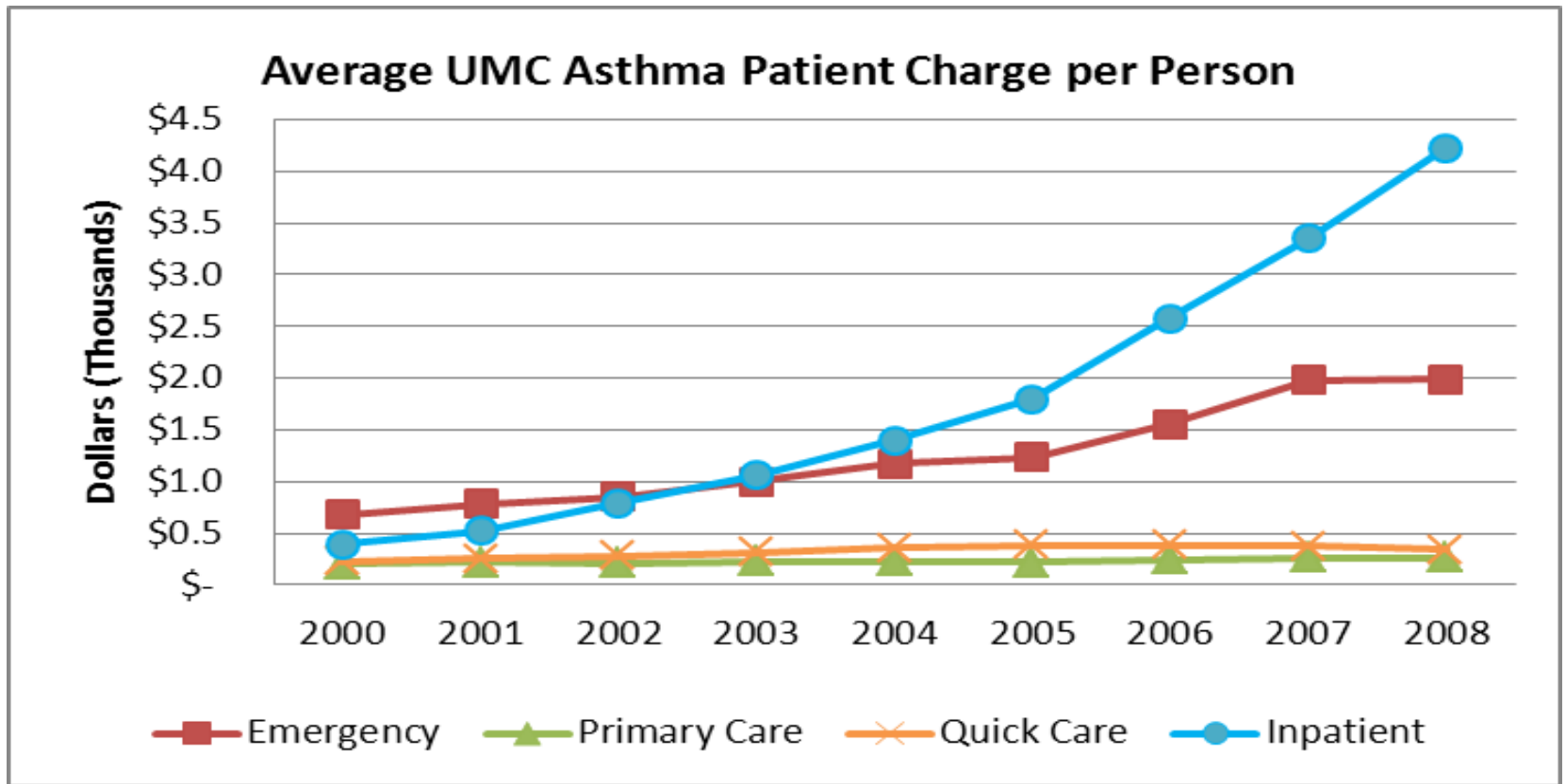
\*Results are presented by 3 different test score category groupings: those who scored Below Nearing Proficiency exclusively, those scored Nearing Proficiency and Above exclusively, and those who scored in all the categories combined.

<sup>†</sup>Persistent asthma includes mild, moderate, and severe persistent asthma by National Asthma Education and Prevention Program criteria (28).

<sup>‡</sup>Rates adjusted by SES, grade level, school attended, gender, and enrollment time.

**Moonie S, Sterling D, Figgs LW, Castro M. (*Journal of School Health*)  
March 2008, Vol .78 No. 3**





Source: AAAAI Conference 2011 -Trends in Asthma Healthcare Utilization in Southern Nevada, Part II - J. S. Seggev<sup>1</sup>, **S. Moonie**<sup>2</sup>, C. J. Guillermo<sup>2</sup>;  
<sup>1</sup>Joram S. Seggev, MD, CHTD., Las Vegas, NV, <sup>2</sup>University of Nevada, Las Vegas, Las Vegas, NV.

# Background

- The *Guidelines for Diagnosis and Treatment of Asthma* were developed in 1991 (NAEPP) to improve asthma care in the U.S.
  - Updates in 2002 and 2007
  - Guess who served on the expert panel in 2007?

# Clinical Management of Asthma

## Expert Panel Report 3 (EPR3)

National Asthma Education and Prevention Program

National Heart, Lung, and Blood Institute, 2007



# Highlights of major changes in EPR-3

**New focus on monitoring asthma control as the goal for asthma therapy and distinguishing between classifying asthma severity and monitoring asthma control.**

- Severity: the intrinsic intensity of the disease process. Assess asthma severity to initiate therapy.
- Control: the degree to which the manifestations of asthma are minimized by therapeutic interventions and the goals of therapy are met. Assess and monitor asthma control to adjust therapy.

**New focus on impairment and risk as the two key domains of severity and control, and multiple measures for assessment.** The domains represent different manifestations of asthma, they may not correlate with each other, and they may respond differentially to treatment.

- Impairment: frequency and intensity of symptoms and functional limitations the patient is experiencing currently or has recently experienced.
- Risk: the likelihood of either asthma exacerbations, progressive decline in lung function (or, for children, lung growth), or risk of adverse effects from medication.

**Modifications in the stepwise approach to managing asthma long term.**

- Treatment recommendations are presented for three age groups (0–4 years of age, 5–11 years of age, and youths  $\geq 12$  years of age and adults). The course of the disease may change over time; the relevance of different measures of impairment or risk and the potential short- and long-term impact of medications may be age related; and varied levels of scientific evidence are available for these three age groups.
- The stepwise approach expands to six steps to simplify the actions within each step. Previous guidelines had several progressive actions within different steps; these are now separated into different steps.
- Medications have been repositioned within the six steps of care.
  - Inhaled corticosteroids (ICSs) continue as preferred long-term control therapy for all ages.
  - Combination of long-acting beta<sub>2</sub>-agonist (LABA) and ICS is presented as an equally preferred option, with increasing the dose of ICS in step 3 care, in patients 5 years of age or older. This approach balances the established beneficial effects of combination therapy in older children and adults with the increased risk for severe exacerbations, although uncommon, associated with daily use of LABA.
  - Omalizumab is recommended for consideration for youths  $\geq 12$  years of age who have allergies or for adults who require step 5 or 6 care (severe asthma). Clinicians who administer omalizumab should be prepared and equipped to identify and treat anaphylaxis that may occur.

## **New emphasis on multifaceted approaches to patient education and to the control of environmental factors or comorbid conditions that affect asthma.**

- Patient education for a partnership is encouraged in expanded settings.
  - Patient education should occur at all points of care: clinic settings (offering separate self-management programs as well as integrating education into every patient visit), Emergency Departments (EDs) and hospitals, pharmacies, schools and other community settings, and patients' homes.
  - Provider education should encourage clinician and health care systems support of the partnership (e.g., through interactive continuing medical education, communication skills training, clinical pathways, and information system supports for clinical decisionmaking).
- Environmental control includes several strategies:
  - Multifaceted approaches to reduce exposures are necessary; single interventions are generally ineffective.
  - Consideration of subcutaneous immunotherapy for patients who have allergies at steps 2–4 of care (mild or moderate persistent asthma) when there is a clear relationship between symptoms and exposure to an allergen to which the patient is sensitive. Clinicians should be prepared to treat anaphylaxis that may occur.
  - Potential benefits to asthma control by treating comorbid conditions that affect asthma.

## **Modifications to treatment strategies for managing asthma exacerbations. These changes:**

- Simplify the classification of severity of exacerbations. For the urgent or emergency care setting: <40 percent predicted forced expiratory volume in 1 second (FEV<sub>1</sub>) or peak expiratory flow (PEF) indicates severe exacerbation and potential benefit from use of adjunctive therapies; ≥70 percent predicted FEV<sub>1</sub> or PEF is a goal for discharge from the emergency care setting.
- Encourage development of prehospital protocols for emergency medical services to allow administration of albuterol, oxygen, and, with medical oversight, anticholinergics and oral systemic corticosteroids.
- Modify recommendations on medications:
  - Add levalbuterol.
  - Add magnesium sulfate or heliox for severe exacerbations unresponsive to initial treatments.
  - Emphasize use of oral corticosteroids. Doubling the dose of ICS for home management is not effective.
  - Emphasize that anticholinergics are used in emergency care, not hospital care.
  - Add consideration of initiating ICS at discharge.

# Barriers to Implementation

- Lack of familiarity with guidelines
- Lack of awareness
- Lack of self-efficacy
- Lack of agreement
- Outcome expectancy
- Lack of training
- Ability to overcome inertia of previous practice

(Clark 1999, Cabana 1999, 2000)

# NHLBI Guidelines

- Despite appropriate assessment of asthma severity, physicians are undertreating patients with severe asthma
  - **Source:** Mooney SA, Strunk RC, Crocker S, Curtis V, Schechtman K, Castro M. *Journal of Asthma* - 42 (4) 2005

# Community Asthma Program Improves Appropriate Prescribing in Moderate to Severe Asthma

- **Moonie SA**, Strunk RC, Crocker S, Curtis V, Schechtman K, Castro M. *Journal of Asthma* - 42 (4) 2005



# Study Design

- Prospective, observational study
- 723 children and adults with asthma
- 2 primary care urban clinics in St. Louis

# Study Aims

The study evaluated outcomes due to CAP in two primary care practices by determining:

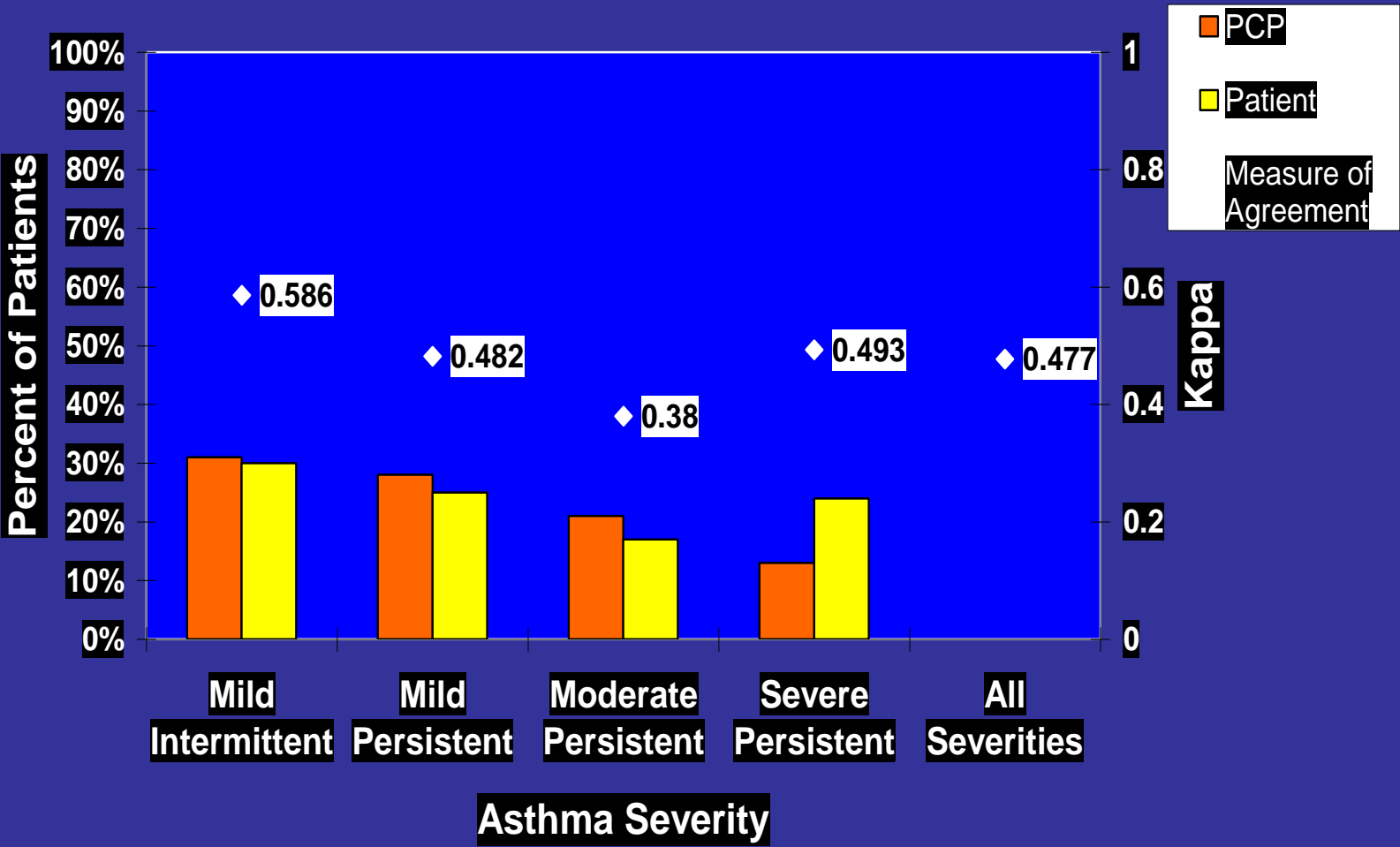
1. the correlation between patient self-reported and primary care physician (PCP) classified asthma severity
2. physician adherence with the NAEPP prescription guidelines based upon patient reported asthma severity
3. the effect of asthma severity on patient reported absenteeism from work/school

# Results

Logistic regression revealed:

Patient self-reported and PCP classified asthma severity level were both significant predictors of appropriateness of treatment prescribed to the patient

The odds of being appropriately prescribed based upon the NAEPP recommendations progressively decreased as asthma severity increased



## Appropriately Medicated Patients by Asthma Severity

Severity Category (patient self-report) N (%)	Appropriately Medicated		
	Yes N (%)	No N (%)	aOR (95% CI)
Mild Intermittent 271 (32)	243 (90)	28 (10)	*
Mild Persistent 216 (26)	171 (79)	45 (21)	0.67 (0.56-0.80)
Moderate 148 (17)	106 (72)	42 (28)	0.45 (0.32-0.65)
Severe 211 (25)	143 (68)	68 (32)	0.30 (0.18-0.52)

\* reference group \* p<.0001 rates adjusted for clinic, age and provider

## Appropriately Medicated Patients by Asthma Severity

Severity Category (PCP classified) N (%)	Appropriately Medicated		aOR (95% CI)
	Yes N (%)	No N (%)	
Mild Intermittent 295 (34)	277 (94)	18 (6)	*
Mild Persistent 253 (29)	199 (79)	54 (21)	0.48 (0.39-0.60)
Moderate 202 (23)	54 (69)	63 (31)	0.23 (0.15-0.36)
Severe 114 (13)	65 (57)	49 (43)	0.11 (0.06-0.21)

\* reference group \* p<.0001 rates adjusted for clinic, age and provider

## Odds of Being Appropriately Medicated with CAP

CAP Office Visit #	Patient Self Report Asthma Severity	
	Odds Ratio	95% CI
1	1.77	1.44 - 2.18*
2	2.77	1.96 - 3.91*
3	2.88	1.46 - 5.66*
4	3.50	0.98 - 12.46

\*P < 0.01

## Appropriateness of Prescribing Medications Over Time (Moderate and Severe Persistent Asthma Patients Only) <sup>a</sup>

Appropriately Medicated	Visit #1 n (%)	Visit #2 n (%)	Visit #3 n (%)	Visit #4 n (%)
No = 85 (28)	58 (30.9)	58 (30.9)	4 (13.8)	1 (9.1)
Yes = 224 (72)	130 (69.2)	59 (72.8)	25 (86.2)	10 (90.9)

<sup>a</sup>As classified by the primary care provider; Mantel Haenszel  $\chi^2 = 5.11$ ,  $p = 0.02$ ; Missing  $n = 24$  (7.8%)



# Conclusions

- Despite appropriate assessment of asthma severity, physicians are undertreating patients with severe asthma
- Use of CAP over time aided PCPs in appropriately medicating patients with moderate to severe asthma in accordance with guidelines



**Where do these allergen and irritant exposures generally occur?**

# Risk Factors for Development of Asthma: Environmental

*Clearing the Air:*

*Asthma and Indoor Air Exposures*

<http://www.iom.edu> (Publications)

Institute of Medicine, 2000

Committee on the Assessment of Asthma and Indoor Air

**Review of current evidence  
regarding indoor air exposures  
and asthma**

# Housing and Asthma Triggers

- Indoor environments allow for increased exposure to allergens and irritants
  - Higher indoor temperature; increased humidity; and excess harborage
  - On average, Americans spend up to 90% of their time indoors (more than 21 hours a day)
- At least 50% of asthmatics are sensitized to three or more allergens
- The homes of asthmatics also frequently contain greater allergen concentrations than the homes of non-asthmatics

# Housing and Asthma Triggers

## Common Household Allergens

- House dust mites (HDM)
  - Up to 85% of US homes may contain HDM allergens
- Domestic animals
  - More than 1/4 of US households keep cats as pets; nearly 1/3 of US households keep dogs as pets
- Cockroaches and other pests
  - Cockroach allergen may be present in more than 60% of US homes; mouse allergen in 82% of US homes
- Molds
  - Nearly 100% of US homes sampled during the National Survey of Lead and Allergens in Housing (NSLAH) had detectable levels of *Alternaria* spp.

## Common Household Irritants

- Environmental tobacco smoke (ETS)
  - More than 13.6 million households are home to smokers
  - More than 2.5 million households allow visitors to smoke inside their home
- Nitrogen dioxide and other Volatile Organic Compounds (VOCs)
  - Nearly 50% of US homes use gas-burning stoves or ovens
  - More than 300 VOCs have been measured indoors
  - Nearly 85% of US households use pesticides indoors

# Clearing the Air

## Indoor Air Exposures and Asthma Exacerbation

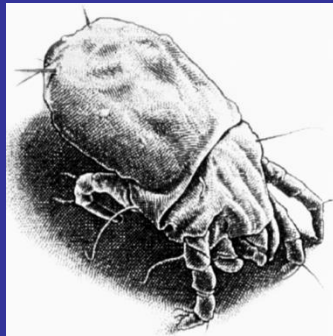
### Biological Agents

- **Sufficient evidence of a causal relationship**
  - Cat
  - Cockroach
  - House dust mite
- **Sufficient evidence of an association**
  - Dog
  - Fungi/Molds
  - Rhinovirus
- **Limited or Suggestive Evidence of an Association**
  - Domestic birds
  - Chlamydia and Mycoplasma pneumoniae
  - RSV

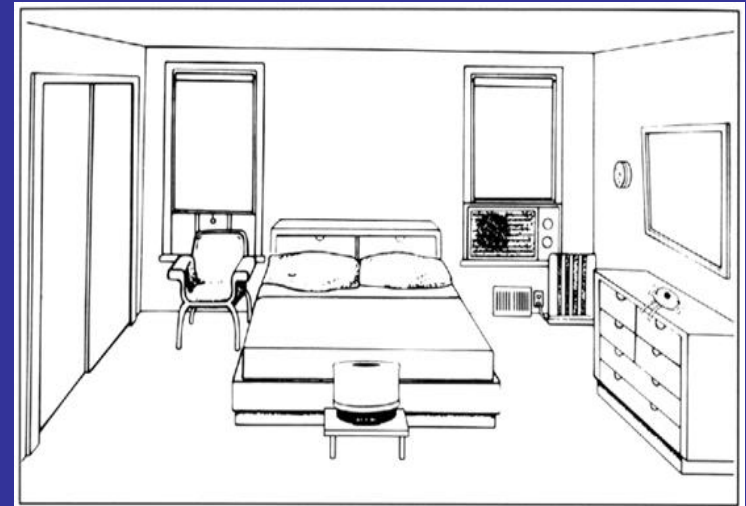
### Chemical Agents

- **Sufficient evidence of a causal relationship**
  - Environmental tobacco smoke (in preschool-aged children)
- **Sufficient evidence of an association**
  - NO<sub>2</sub>, NO<sub>x</sub> (high levels)
- **Limited or suggestive evidence of an association**
  - Environmental tobacco smoke (school-aged, older children and adults)
  - Formaldehyde
  - Fragrances

# Reducing Exposure to House Dust Mites



- Use bedding encasements
- Wash bed linens weekly
- Avoid down fillings
- Limit stuffed animals to those that can be washed
- Reduce humidity level



# Reducing Exposure to Environmental Tobacco Smoke



Evidence exists of a causal relationship between environmental tobacco smoke exposure and exacerbations of asthma.



# Reducing Exposure to Cockroaches



Remove as many water and food sources as possible to avoid cockroaches.

# Reducing Exposure to Pets



- People allergic to pets should not have them in the house.
- At a minimum, do not allow pets in the bedroom.

# Reducing Exposure to Mold



Eliminating mold may help control asthma exacerbations.



# Other Asthma Triggers



# A Public Health Response to Asthma: Summary

- **Asthma is complex and not yet preventable or curable.**
- **Asthma can be managed with medication, environmental changes, and behavior modifications.**
- **By working together, we can ensure that people with asthma enjoy a high quality of life.**

# Resources

- **National Asthma Education and Prevention Program**
  - <http://www.nhlbi.nih.gov/about/naepp/index.htm>
- **Asthma and Allergy Foundation of America**
  - <http://www.aafa.org>
- **American Lung Association**
  - <http://www.lungusa.org>
- **American Academy of Allergy, Asthma, and Immunology**
  - <http://www.aaaai.org>

# Resources

- **Allergy and Asthma Network, Mothers of Asthmatics. Inc.**
  - <http://www.aanma.org/>
- **American College of Allergy, Asthma, and Immunology**
  - <http://allergy.mcg.edu>
- **American College of Chest Physicians**
  - <http://www.chestnet.org>
- **American Thoracic Society**
  - <http://www.thoracic.org>

# Current Research

- Asthma and obesity pilot – UNSOM
  - Chief of Pediatrics - Sunrise
  - Chief of Allergy – Sunrise
  - Pediatric Cardiology – Children's Health Center



# Dr. Moonie's Research

- Cerdan N, Alpert P, **Moonie S**, Cyrkiel D, Rue S. Asthma Severity in School-Aged Children and Perceived Parental Quality of Life (J of Applied Research in Nursing, Vol.25, 131-137, 2012)
- Teramoto M, **Moonie S**. Physical Activity Participation among Adult Nevadans with Asthma: Is Physical Inactivity Associated with Asthma Prevalence? (*Journal of Asthma*, Vol. 48, 517-522, 2011)
- **Moonie S**, Cross CL, Guillermo C, Gupta T. Grade Retention Risk among Children with Asthma and other Chronic Health Conditions in a Large Urban School District. *Postgraduate Medicine*, Vol.122(5), 110-115, 2010

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