Asthma Prevalence Increasing Globally

One of the most common diseases worldwide

- 300 million sufferers globally
- Most common chronic disease in children

Prevalence increasing among all age groups

- 50% increase every decade - most striking among children

Highest prevalence in developed countries

Associated with an increase in atopic sensitization and parallel rise in other allergic disorders (e.g. rhinitis)

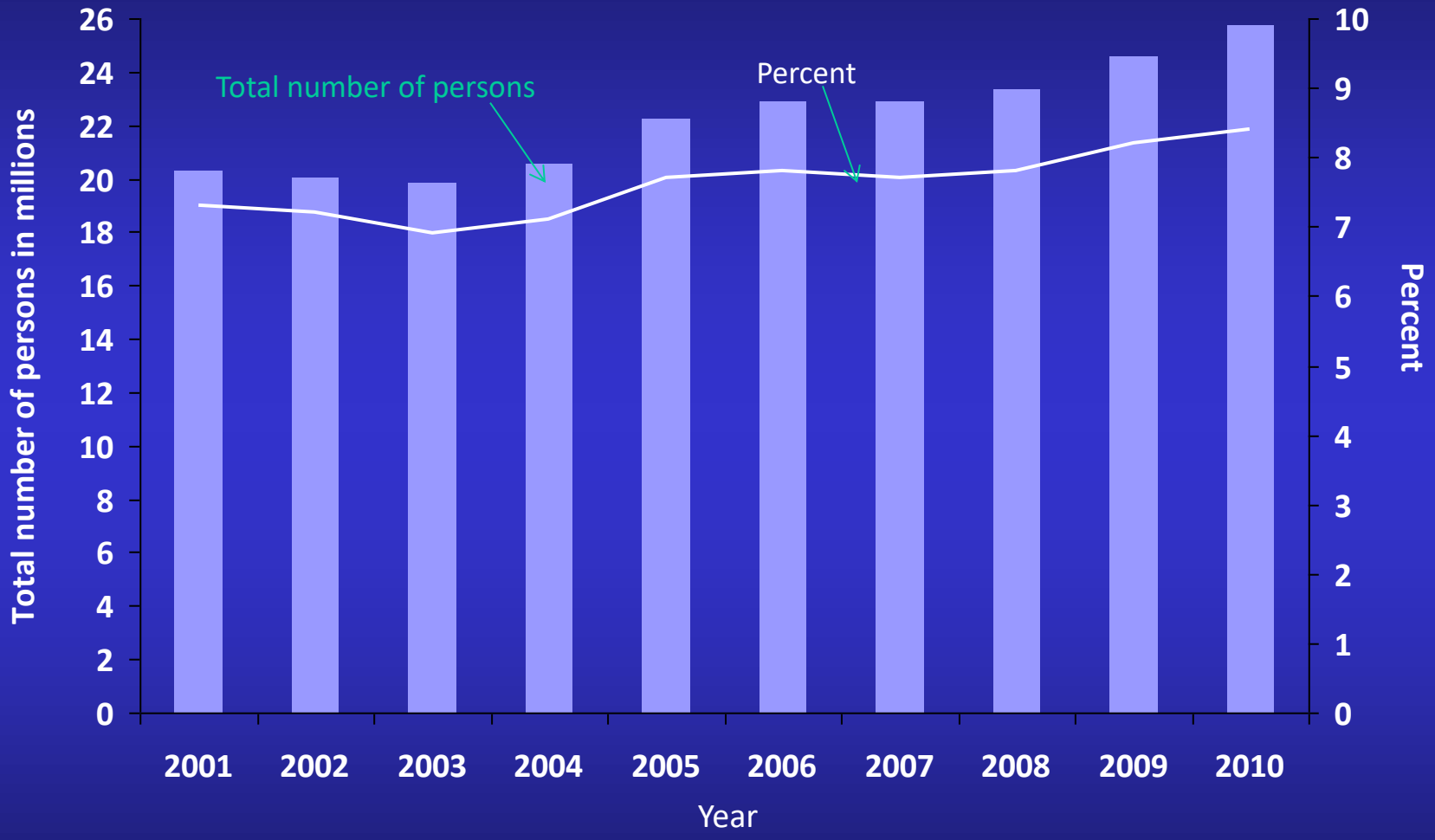
Braman SS The global burden of asthma. Chest. 2006

Asthma's Impact in United States

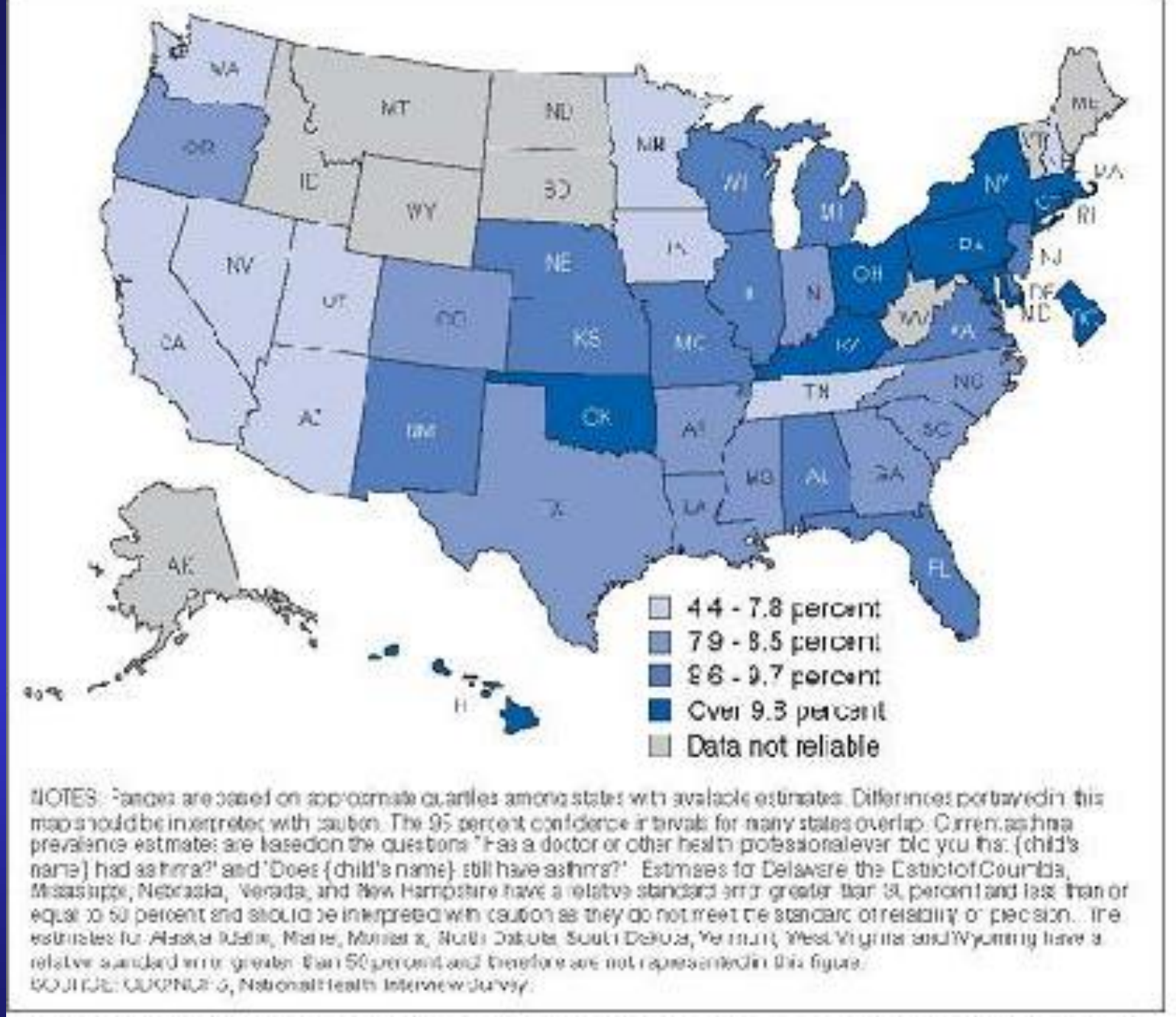
- 26 million currently diagnosed (2010)
- 10.4 million outpatient visits
- 1.8 million ER visits
- 465,000 hospitalizations
- 3500 deaths
- Total cost $12.7 billion

Source: CDC Center for Health Statistics

Current Asthma Prevalence: United States, 2001-2010



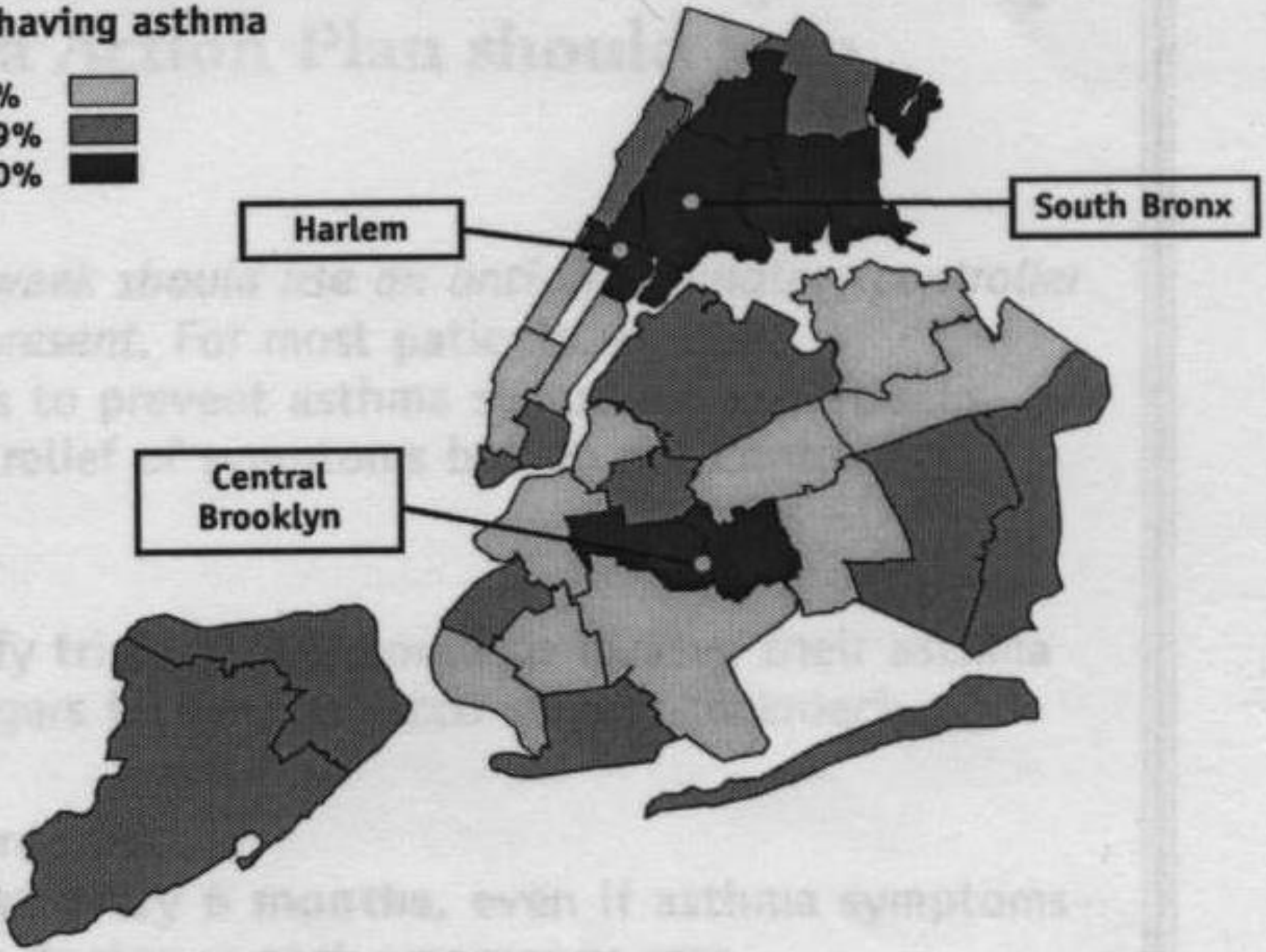
One in 12 people (about 26 million, or 8% of the U.S. population) had asthma in 2010, compared with 1 in 14 (about 20 million, or 7%) in 2001.



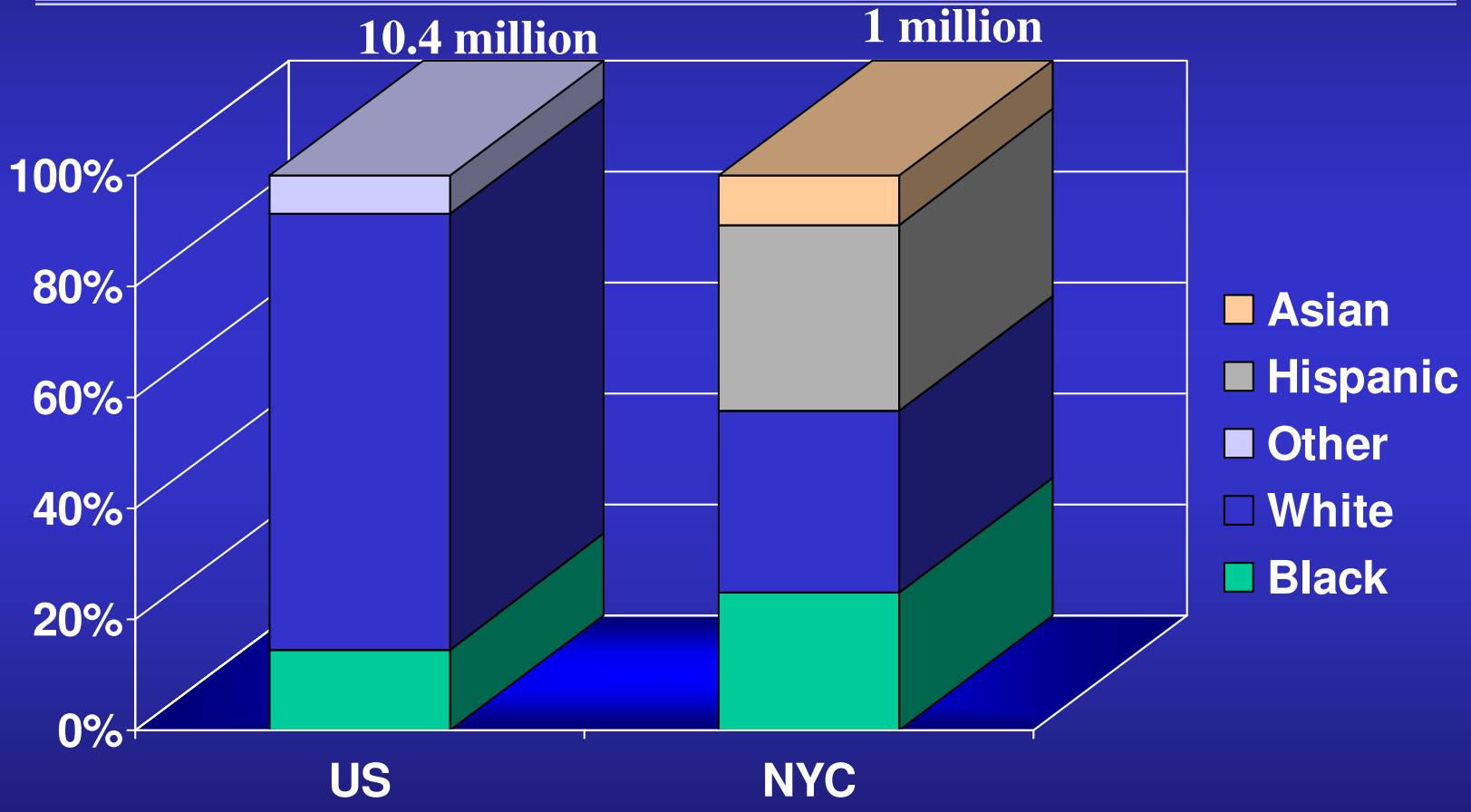
NOTES: Ranges are based on approximate quartiles among states with available estimates. Differences portrayed in this map should be interpreted with caution. The 95 percent confidence intervals for many states overlap. Current asthma prevalence estimates are based on the questions "Has a doctor or other health professional ever told you that {child's name} had asthma?" and "Does {child's name} still have asthma?" Estimates for Delaware, the District of Columbia, Mississippi, Nebraska, Nevada, and New Hampshire have a relative standard error greater than 30 percent and less than or equal to 50 percent and should be interpreted with caution as they do not meet the standard of reliability or precision. The estimates for Alaska, Idaho, Maine, Montana, North Dakota, South Dakota, Vermont, West Virginia, and Wyoming have a relative standard error greater than 50 percent and therefore are not represented in this figure.

SOURCE: CDC/NCHS, National Health Interview Survey.

Figure 1. Current asthma prevalence among children 0–17 years of age, by state, annual average for the period 2001–2005


Percent of children ever having asthma
4–13%
14–19%
20–30%
Harlem
South Bronx
Central Brooklyn

Distribution of Asthma by Race
US v. NYC



Hispanics and Asians represent 42% of NYC asthmatics v 7% for US

Population Disparities in Asthma

- Current asthma prevalence is higher among
  - **children than adults**
  - **boys than girls**
  - **women than men**
- Asthma morbidity and mortality is higher among
  - **African Americans than Caucasians**

Source: ***MMWR*** **2007;56(No. SS-8):1-54**

Epidemiology Of Asthma

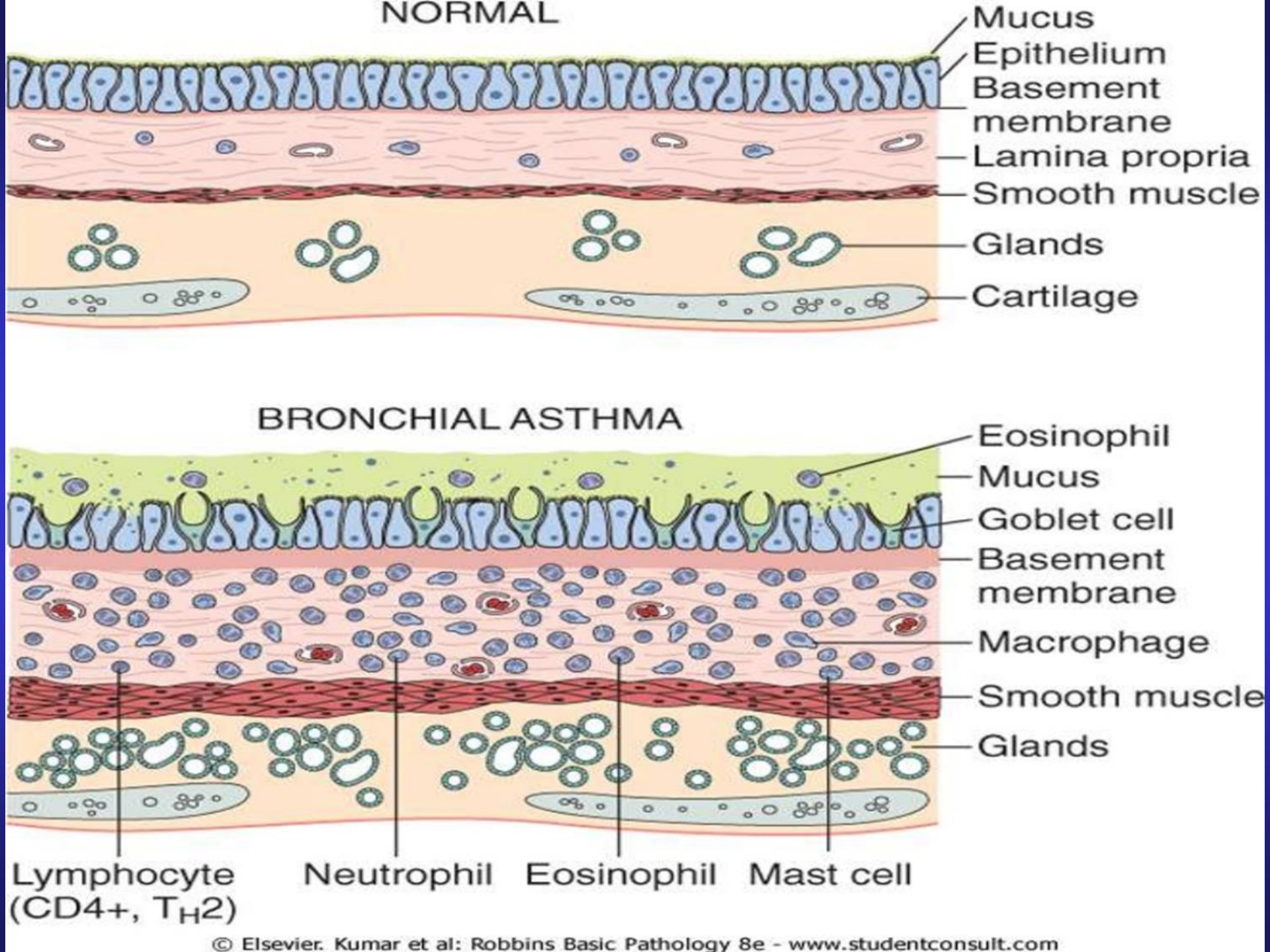
- 50% of asthmatics present after age 15
- 50%-75% who present in childhood become asymptomatic by adulthood
- 3% fatality rate (80% are over 30 years of age)

1995 Definition of NHLBI

- Asthma is a chronic **inflammatory** disorder of the airways in which many cells play a role especially mast cells, eosinophils and T lymphocytes. In susceptible individuals, this inflammation causes symptoms which are associated with widespread but **variable airflow obstruction** that is often reversible either spontaneously or with treatment and causes an increase in airway **hyperresponsiveness** to a variety of stimuli

Risk Factors for Developing Asthma

- Strong factors
  - family history of atopy (3x)
  - house dust mites,cat dander,cockroaches,alternaria
- Weak factors
  - male,low birth weight,prematurity, parental smokers, high salt diet
- The role of infection on Th1 v Th2 cells



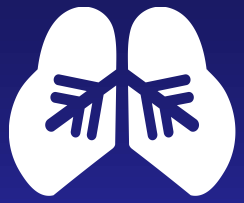
Mechanisms of Airway Obstruction

- Bronchial smooth muscle contraction
- Airway inflammation and mucosal edema
- Increased and abnormally viscous mucus

Bronchoconstriction

Before

10 Minutes After Challenge



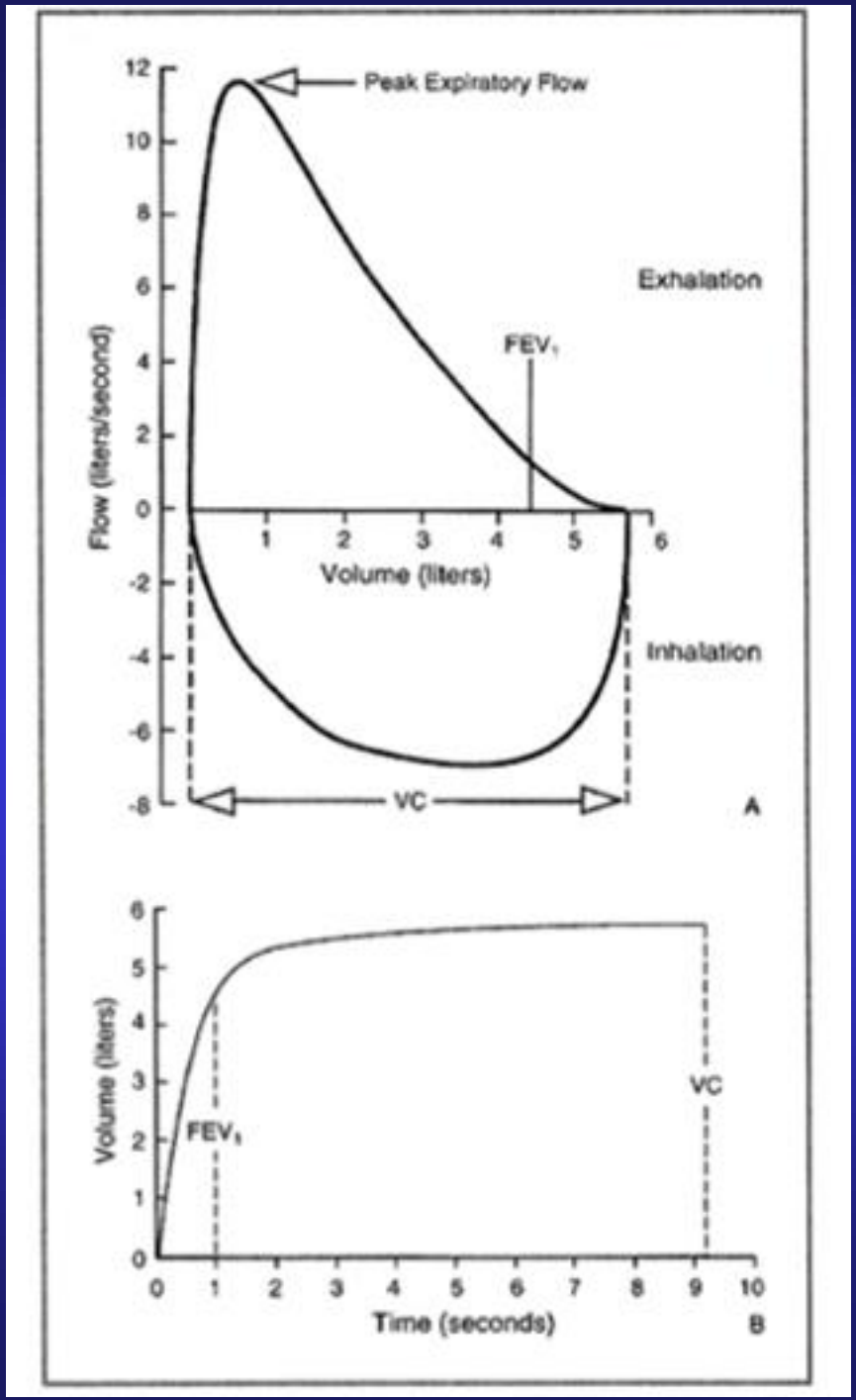
Initial Assessment and Diagnosis of Asthma

- Determine that:
  - Patient has history or presence of episodic symptoms of airflow obstruction
  - Airflow obstruction is at least partially reversible
  - Alternative diagnoses are excluded

Clinical Features

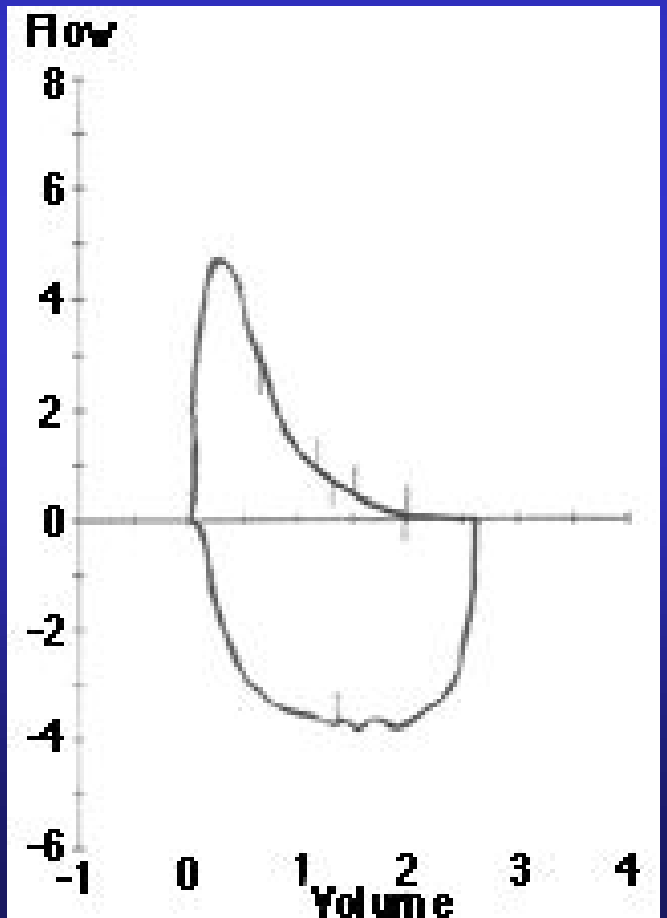
	Asthma	COPD	Heart Disease
– **wheeze**	**90**	**78**	**28**
– **tightness**	**90**	**75**	**45**
– **SOB**	**90**	**75**	**45**

– **Cough VariantAsthma** approximately 30 to 50% of patients with chronic cough have asthma, especially children

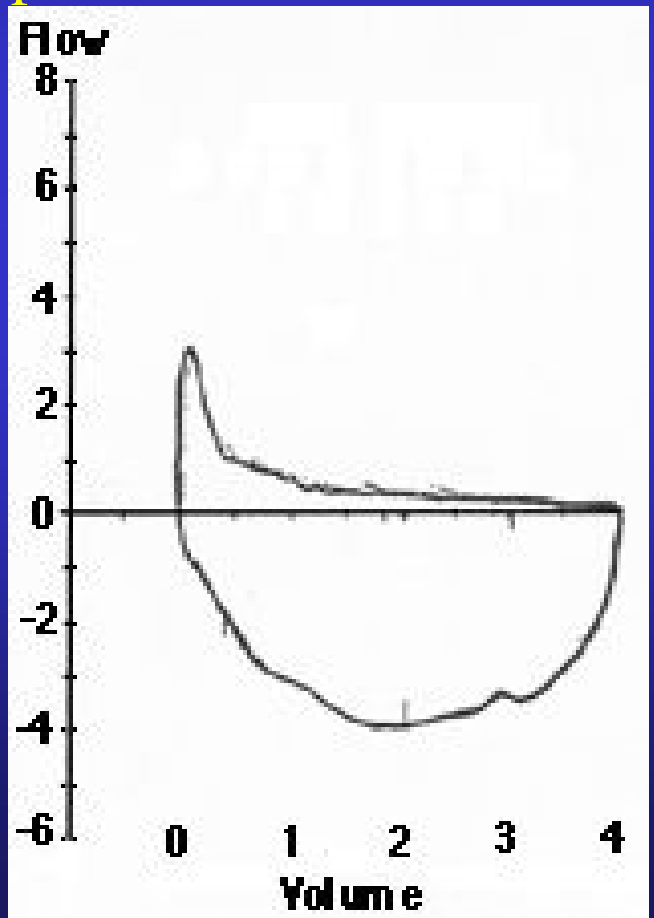

Peak Expiratory Flow
Exhalation
FEV1
Flow (liters/second)
12
10
8
6
4
2
0
-2
-4
-6
-8
1
2
3
4
5
6
Volume (liters)
Inhalation
VC
A
Volume (liters)
6
5
4
3
2
1
0
FEV1
VC
0
1
2
3
4
5
6
7
8
9
10
Time (seconds)
B

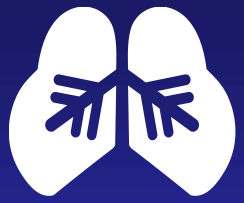
Mild and Severe Obstruction

$FEV_1/FVC<LLN$
FEV1> 70% predicted



$FEV_1/FVC<LLN$
FEV1=35%-50% predicted





Goals of Asthma Therapy

- Prevent chronic and troublesome symptoms
- Maintain (near-) “normal” pulmonary function
- Maintain normal activity levels (including exercise and other physical activity)

Control of Factors Contributing to Asthma Severity

- Assess exposure and sensitivity to:
  - Inhalant allergens (dust mites, cockroaches)
  - Occupational exposures (detect patterns)
  - Irritants:
    - Indoor air (including tobacco smoke)
    - Air pollution

Control of Factors Contributing to Asthma Severity
(continued)

- Assess contribution of other factors:
  - Rhinitis/sinusitis
  - Gastroesophageal reflux
  - Drugs (NSAIDs, beta-blockers)
  - Viral respiratory infections
  - Sulfite sensitivity

Overview of Asthma Medications (continued)

- As-needed: Quick Relief
  - Short-acting beta$_2$-agonists (albuterol eg Proventil)
  - Anticholinergics(atrovent)
  - Systemic corticosteroids(prednisone)

Overview of Asthma Medications

- Daily: Long-Term Control
  - Corticosteroids (inhaled and systemic, *Flovent*)
  - Long-acting beta$_2$-agonists(salmeterol)
  - Long acting anticholinergics(*Spiriva*)
  - Leukotrienemodifiers(montelukast, *singulaire*)
  - IgE antibodies (omalizumab, *Xolair*)
  - IL-5 antibodies (mepolizumab, *nucala*)

Components of Severity		Classification of Asthma Severity ≥ 12 years of age			
			Persistent		
		Intermittent	Mild	Moderate	Severe
Impairment **Normal FEV_1/FVC:** 8-19 yr 85% 20-39 yr 80% 40-59 yr 75% 60-80 yr 70%	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2 x/month	3-4 x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily, and not more than 1x on any day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	• Normal FEV_1 between exacerbations • FEV_1 > 80% predicted • FEV_1/FVC normal	• FEV_1 > 80% predicted • FEV_1/FVC normal	• FEV_1 > 60% but <80% predicted • FEV_1/FVC reduced 5%	• FEV_1 < 60% predicted • FEV_1/FVC reduced >5%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	>2/year		
		Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV_1.			
Recommended Step for Initiating Treatment		**Step 1**	**Step 2**	**Step 3** and consider short course of oral systemic corticosteriods	**Step 4 or 5** and consider short course of oral systemic corticosteriods
		In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Stepwise Approach to Asthma Management

Intermittent Asthma	Persistent Asthma: Daily Medication Consult with asthma specialist if step 4 care or higher