

“Breathing is truly a strange phenomenon of life, caught midway between the conscious and unconscious and peculiarly sensitive to both.”

Dickenson Richards, M.D.
Columbia University College of Physicians and Surgeons
Nobel Laureate in Medicine, 1956

Roses are red,
Violets are blue;
Without your lungs,
Your blood would be, too

Goals and objectives for the pulmonary section:

I

- Understand important categories and causes of lung disease in the United States and around the world
- Understand lung mechanics in health and disease
 - Lung mechanics determination efficiency of ventilation
 - Work of breathing
 - Compliance
 - $\Delta V/\Delta P$
 - Resistance
 - $P_{\text{alv}} - P_{\text{mouth}} / \text{flow}$
 - PEEP and Auto-PEEP

Goals and objectives for the pulmonary section:

II

- Understand gas exchange in health and disease
 - Alveolar air equation and calculation of alveolar-arterial (A-a) gradient
 - $P_{\text{a}O_2} = P_{\text{a}O_2} - (P_{\text{a}CO_2}/R)$
 - Oxygen delivery to tissues
 - Oxyhemoglobin dissociation curve
 - $DO_2 = CO \times CaO_2$
 - $CaO_2 = (Hgb) \times 1.39 \times \% \text{sat} + (pO_2 \times .0036)$
 - Mechanisms of hypoxemia
 - Shunt
 - Does not correct with oxygen breathing
 - V/Q mismatch
 - Corrects with oxygen breathing
 - Exacerbated by exercise
 - Alveolar hypoventilation
 - Normal A-a gradient
 - Corrects with oxygen breathing
 - Diffusion limitation
 - Corrects with oxygen breathing
 - Exacerbated by exercise

Goals and objectives for the pulmonary section:

III

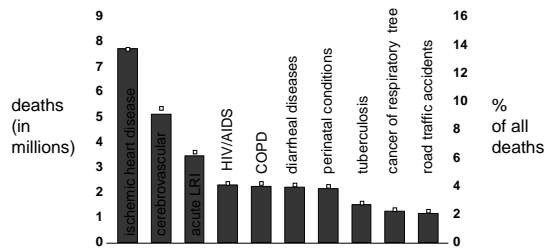
- Understand symptoms and signs of pulmonary disease
 - Symptoms
 - Dyspnea
 - Onset
 - Severity
 - Triggers
 - Progression
 - Signs
 - Wheezing
 - Crackles (rales and rhonchi)
 - Diminished breath sound
 - Hyperresonant breath sounds
- Understand use of diagnostic testing in pulmonary disease
 - Pulmonary function testing
 - Restrictive and obstructive physiology
 - Arterial blood gas analysis
 - Chest radiograph
 - Lung pathology
 - Major types and patterns of injury and abnormality

Goals and objectives for the pulmonary section:

IV

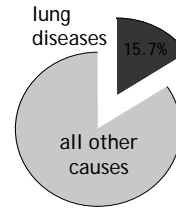
- Understand treatment approaches to patients with lung diseases
 - Symptomatic treatments
 - Oxygen therapy
 - Bronchodilators
 - Mechanical ventilation and PEEP
 - Disease specific treatments
 - Understand cellular and molecular basis of treatments for specific diseases
 - Steroids
 - Other immunosuppressives
 - Antibiotics
 - Anti-neoplastics
 - Pulmonary vasodilators

Leading causes of global mortality



WHO, World Health Report, 2004

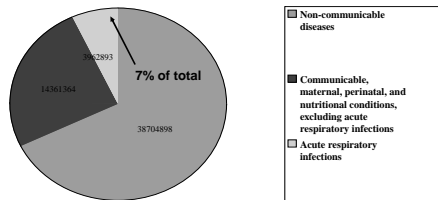
Impact of respiratory illness on global mortality



respiratory illnesses account for 8.43 million deaths per year, or 15.7% of total deaths in WHO member nations

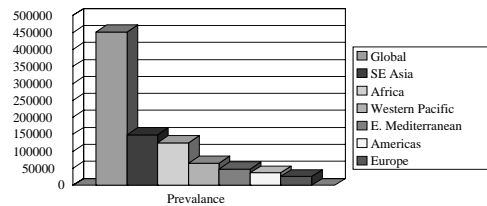
WHO, World Health Report, 2004

Global deaths due to acute respiratory infections



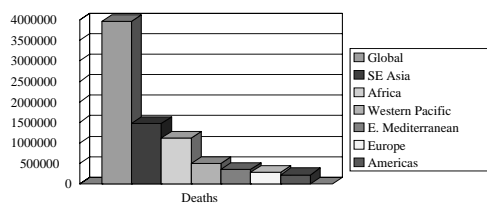
Source: WHO Global Disease Burden Report

Yearly prevalence (in 000s) of acute respiratory infections (ARI), by WHO region



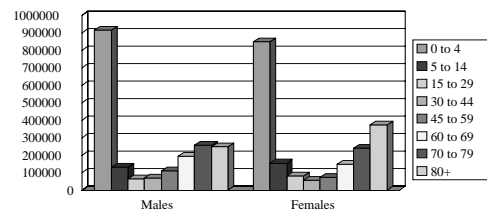
Source: WHO Global Disease Burden Report

Deaths due to ARI, by WHO region



Source: WHO Global Disease Burden Report

Deaths due to ARI, by age and sex, worldwide



Source: WHO Global Disease Burden Report

Cause of death among children less than 5 years of age

Cause of Death	Africa	Global
	percent	
Acute respiratory infection	16	18
Diarrheal disease	14	15
Malaria	22	10
Measles	8	5
HIV or AIDS	8	4
Neonatal deaths	13	23
Other causes	19	25
	number	
All causes	4.5 million	10.9 million

Source: NEJM, WHO

Serotypes of *S. pneumoniae* and *H. influenzae* in bacteremia-related isolates from Kenya

- S. pneumoniae* serotypes**
 - 1 (66 patients)**
 - 14 (39 patients)*
 - 6A (26 patients)
 - 6B (24 patients)*
 - 23F (21 patients)*
 - 18C (13 patients)*
 - 4 (11 patients)*
 - 3 (10 patients)
 - 19F (10 patients)*
- H. influenzae***
 - 113/136 (83%) type B

*Serotype included in commercially available 7-valent conjugate pneumococcal vaccine

**Serotype included in 9-valent conjugate pneumococcal vaccine

Overall, 298/398 (75%) isolates were of serotypes covered by vaccines

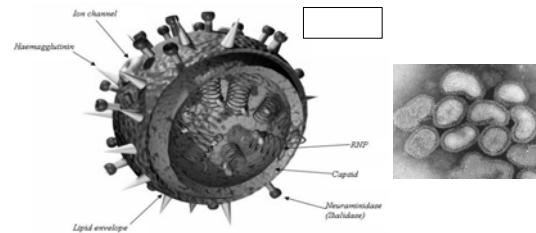
Berkley, JA. N Eng J Med 2005; 352: 38-47

Notice of Prevnar Price Increase

Effective 9/25/04, Wyeth Pharmaceuticals will charge \$326 for a 5 dose package (an increase of \$5 per dose) of Prevnar (CPT 90669 pneumococcal conjugate vaccine, for children under 5 years, for intramuscular use).

American Academy of Pediatrics website

Influenza



Influenza

- Roughly 20% of children and 5% of adults develop symptomatic influenza infections each year
- Infection is continuous in tropics, seasonal elsewhere
- Three types of influenza virus: A, B, C
- Only types A and B cause outbreaks
- Two major surface proteins:
 - Hemagglutinin: facilitates entry into host cells through sialic acid receptors
 - Neuraminidase: catalyzes cleavage of glycosidic linkages to sialic acid and assists in release of progeny virions from infected cells; drug target
- Influenza A:
 - 15 hemagglutinin subtypes
 - 9 neuraminidase subtypes

Natural hosts of influenza viruses

At present, only H1N1 and H3N2 are in circulation among humans



Pandemic influenza

- Caused by sudden appearance of a new subtype: antigenic shift
- 1918-1919
 - H1N1 "Spanish flu"
 - Arose in swine (?)
 - 20 million deaths in first year; 50 million deaths total
- 1957-1958
 - H2N2 "Asian flu"
 - Arose in fowl
 - Severe pandemic: 70,000 deaths in U.S.
- 1968-1969
 - H3N2 "Hong Kong flu"
 - Arose in fowl
 - Moderately severe: 34,000 deaths in the U.S.
- Future pandemics-
 - ?H5N1 ("Avian flu")
 - ? H7N7
 - Both are highly lethal, though little if any person-to-person transmission yet documented

Strategies for controlling influenza

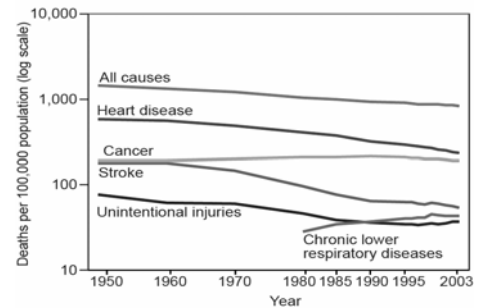
- Surveillance
- Vaccination
- Treatment

Leading causes of death in the U.S., 1980 and 1997

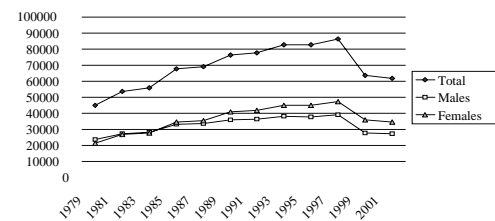
1980	1997
1. Heart disease	1. Heart disease
2. Cancer	2. Cancer
3. Cerebrovascular disease	3. Cerebrovascular disease
4. Unintentional injuries	4. COPD
5. COPD	5. Unintentional injuries
6. Pneumonia and influenza	6. Diabetes
7. Diabetes	7. Alzheimer's Disease
8. Chronic liver disease	8. Pneumonia and influenza
9. Atherosclerosis	9. Renal disease
10. Suicide	10. Sepsis

National Center for Health Statistics

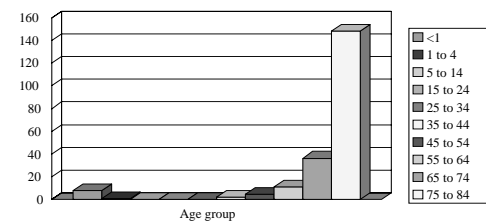
Leading causes of death for all ages



Deaths due to pneumonia and influenza, U.S., by year and sex



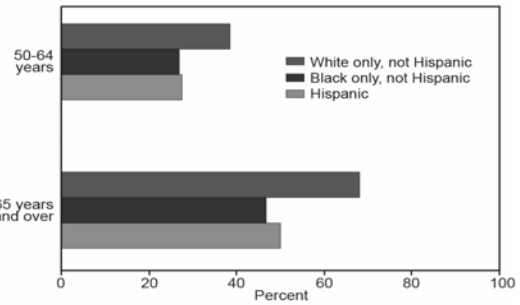
Age-specific mortality for ARI, US, 2001



Risk factors for community acquired pneumonia

- Advancing age
- Tobacco use
- Air pollution
- Underlying chronic disease
- Malnutrition
- Alcohol use
- Chronic obstructive pulmonary disease
- Others including immunodeficiency, treatment with immunosuppressive drugs, malignancy, etc.

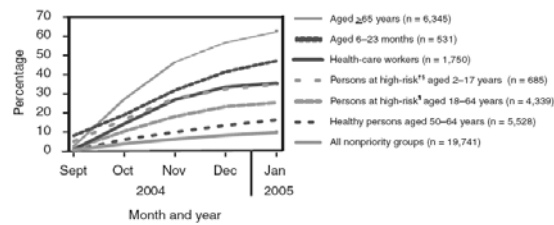
Influenza vaccination in past year, 2003-04



SOURCES: Centers for Disease Control and Prevention, National Center for Health Statistics, Health, United States, 2006, Figure 20. Data from the National Health Interview Survey.

Influenza vaccine coverage, United States, 2004-2005

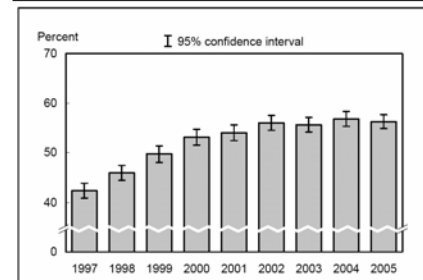
FIGURE. Monthly influenza vaccination coverage among selected priority populations, by month — Behavioral Risk Factor Surveillance System, United States, 2004-05 influenza season*



*Interviews were conducted during February 4-27, 2005.
 †Does not include persons in households with infants aged <6 months, out-of-home caregivers of infants aged <6 months, or others with rare, high-risk conditions.
 ‡Asthma; other lung, heart, or kidney problems; diabetes; weakened immune system; anemia; or aspirin therapy for chronic conditions.
 ‣Asthma; other lung, heart, or kidney problems; diabetes; weakened immune system; anemia; or pregnancy.

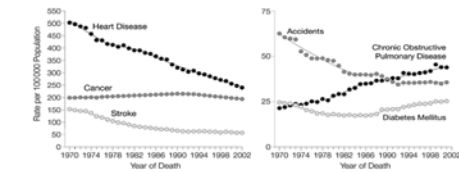
MMWR 2005; 54: 304-307

Pneumococcal vaccine coverage in persons > 65 years, U.S., 1997-2005



CDC, 2006

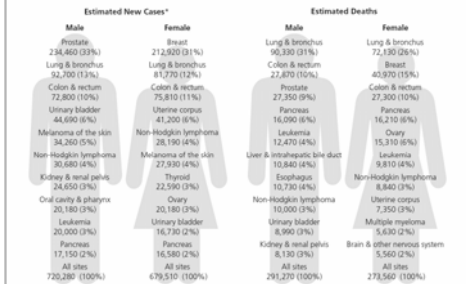
Trends in Age-Standardized Death Rates for the 6 Leading Causes of Death in the United States, 1970-2002



Jemal, A. et al. JAMA 2005;294:1255-1259.

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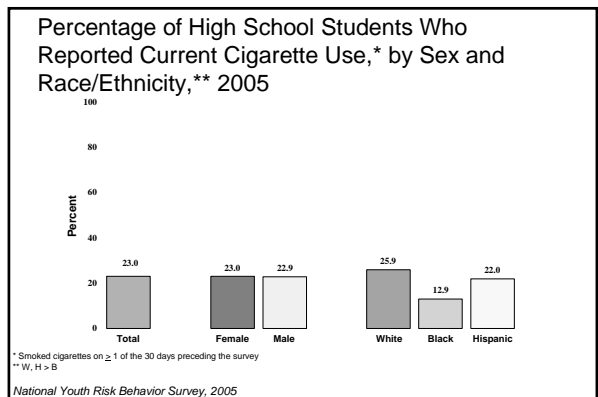
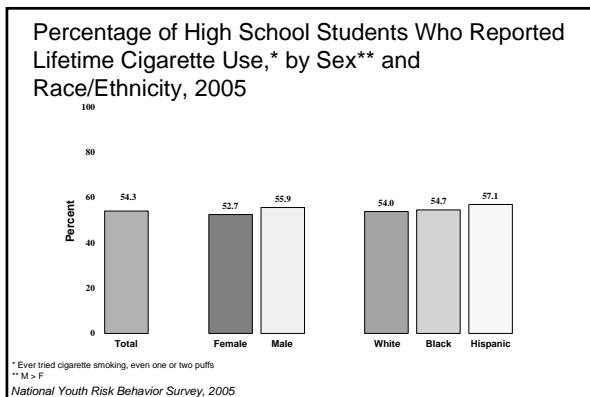
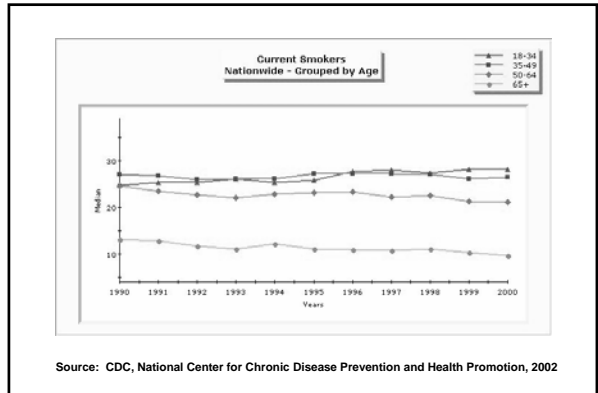
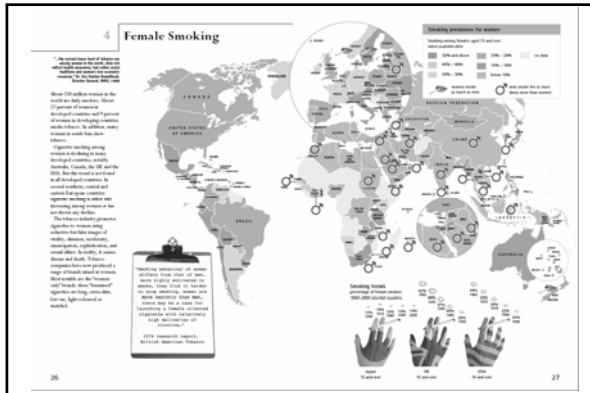
Leading Sites of New Cancer Cases and Deaths — 2006 Estimates



*Excludes basal and squamous cell skin cancers and in situ carcinoma except urinary bladder.
 Note: Percentages may not total 100% due to rounding.

©2006, American Cancer Society, Inc., Surveillance Research

Source: American Cancer Society



Summary

It is important to know as much as possible about teenage smoking patterns and attitudes. Today's teenager is tomorrow's potential regular smoker, and the overwhelming majority of smokers first begin to smoke while still in their teens. In addition, the ten years following the teenage years is the period

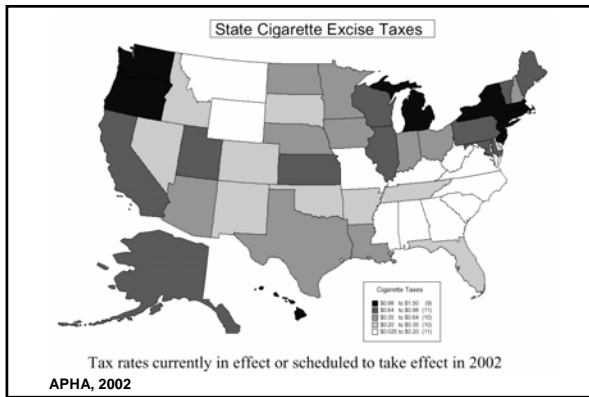
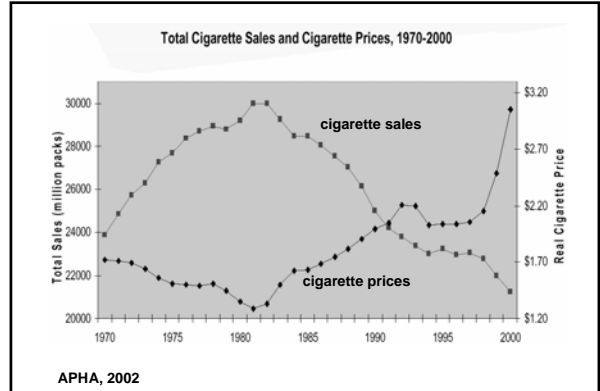
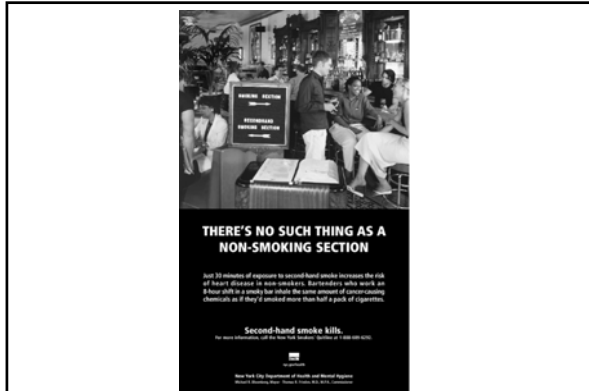
Because of our high share of the market among the youngest smokers, Philip Morris will suffer more than the other companies from the decline in the number of teenage smokers. For at least the next decade, however, the population trends will have a much more powerful influence, and in this regard we would appear to be the least vulnerable of all the companies, as will be discussed later in this report.

Philip Morris Co. memorandum, March 31, 1981

RJR
July 18, 1980

SUMMARY OF KEY FINDINGS (Continued)

- The overall incidence of youth cigarette use has declined since 1975, and this decline is most pronounced among the youngest smokers. The decline in youth smoking is most pronounced among the youngest smokers, and this decline is most pronounced among the youngest smokers.
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Smoke-Free Workplace Act of 2002 (NYC Local Law 47)

- Law took effect March 30, 2003
- Bans smoking in all indoor workplaces in New York City, including bars and restaurants of any size.
- Exemptions for 7 currently existing cigar bars.
- Exemptions for owner operated bars.
- Restaurants will be allowed to build completely enclosed, negative pressure ventilated smoking rooms into which no employee will be allowed until the last customer of the day has left. Clause sunsets after three years.
- New York State has adopted a similar law that covers the entire state

The New York Times

Legislators Pass Smoking Ban in New Jersey

By RICHARD LEZIN JONES and JOSH BENSON
Published: January 10, 2006

TRENTON, Jan. 9 - New Jersey lawmakers approved a far-reaching ban Monday on smoking in indoor public places that includes virtually all of the state's bars and restaurants but not the gambling areas of Atlantic City's 12 casinos.



