

Consequential Epidemiology

Presented at

The UC Berkeley Center for Infectious Diseases and Emergency Readiness (CIDER) Summit
Santa Ana, CA

June 24, 2010

Jeffrey D. Gunzenhauser, MD, MPH

David E. Dassey, MD, MPH

Los Angeles County Department of Public Health



Disclosure

- I have no actual or potential conflicts of interest to disclose in relation to this presentation.



Objectives

1. Define “consequential epidemiology” and understand how this concept extends the work of epidemiology
2. Describe at list three historical examples in public health in which the concept of “consequential epidemiology” was or was not applied
3. List at least three reasons while consequential epidemiology is becoming increasingly more important
4. Describe at least three challenges or barriers to becoming an effective consequential epidemiologist



Epidemiology

The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems.

Source: John M. Last. A Dictionary of Epidemiology 2nd Ed.



Uses of Epidemiology

- Historical study
- Community diagnosis
- Working of health services
- Individual risks and chances
- Completing the clinical picture
- Identification of syndromes
- Search for causes
- Evaluation of presenting symptoms and signs
- Clinical decision analysis

Source: John M. Last. Public health and human ecology. Appleton and Lange, 1987.



The Goal of Public Health

- To improve and protect the public's health
- To assure the conditions in which people can be healthy
- To redefine the socially unacceptable



The Mandate to Do

Knowing is not enough;
we must apply.

Willing is not enough;
we must do.



-- Johann Wolfgang von Goethe

Surveillance

“Surveillance, when applied to a disease, means the continued watchfulness over the distribution and trends of incidence through the systematic collection, consolidation and evaluation of morbidity and mortality reports and other relevant data.”

... plus timely and regular dissemination to those who “need to know”

Source: Langmuir AD. The surveillance of communicable disease of national importance. *New Eng J Med* 1963;268:182-192.



Consequential Epidemiology

- Term was first coined by Bill Foege in 1983
 - Wade Hampton Frost lecture at APHA annual meeting
- Key ideas:
 - Epidemiology is a tool to *CHANGE* the world (ie, not simply to *study* the world)
 - Public health is inherently and inescapably political
 - Science divorced from its political context is stillborn
 - Denial of these ideas is self-delusional and a failure of responsibility

Source: Marks JS. Epidemiology, public health, and public policy. Preventing Chronic Disease 2009;6:1-4.



Essential Elements of Consequential Epidemiology

- Epidemiology provides the foundation to develop actionable information for public health practice
- Epidemiologic studies must be continuously designed and analyzed to address the high priority needs of public health
- CE moves beyond analysis and reporting to assuring that information needed for high-priority decisions is generated and used
- The scope of CE includes the responsibility to assure that results are applied



Justification for Connection to Activism

- Increasing economic pressure to use scarce health resources effectively and efficiently
- Increasing accountability of all sectors of society (health care, government, academia)
- Increasing evidence base of “what works” and continuing evidence that it’s not being applied
- Elevated awareness that public health has a big potential to improve health for all
- Growing impatience with analysis paralysis



Consequential Epidemiology

Lessons From The Past

Source: John M. Last. Public health and human ecology. Appleton and Lange, 1987.



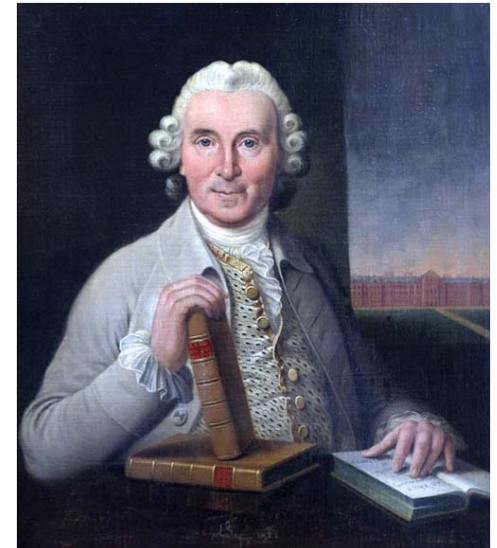
Ten Great Public Health Achievements: United States 1900-1999

1. Vaccination
2. Motor-vehicle safety
3. Safer workplaces
4. Control of infectious diseases
5. Decline in deaths from coronary heart disease and stroke
6. Safer and healthier foods
7. Healthier mothers and babies
8. Family planning
9. Fluoridation of drinking water
10. Recognition of tobacco use as a health hazard

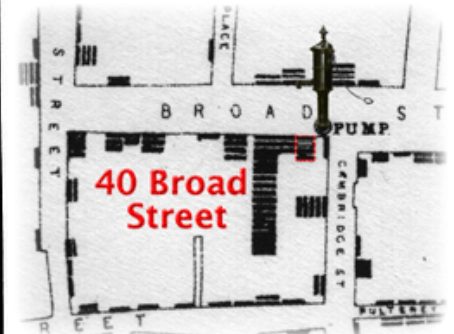
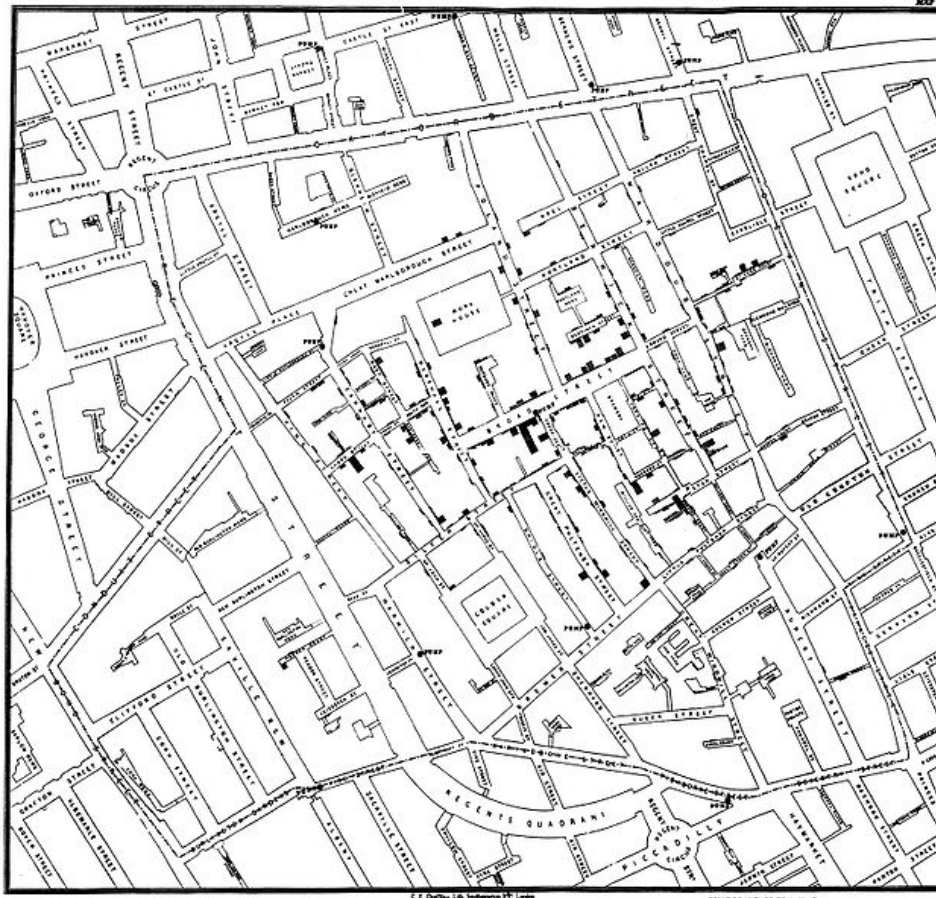


Successes of Epidemiology: James Lind and Scurvy on the High Seas

- In 1740-1744, a British naval squadron of seven ships and nearly 2000 men lead by Commodore George Anson left Plymouth, circumnavigating the globe, returned to England with one ship and 145 men after losing most the crews to scurvy.
- In 1747, James Lind carried out a pioneering epidemiologic investigation on scurvy among sailors on long voyages, leading some 50 years later to adoption of lemon or lime juice as a routine nutrition supplement for British sailors.

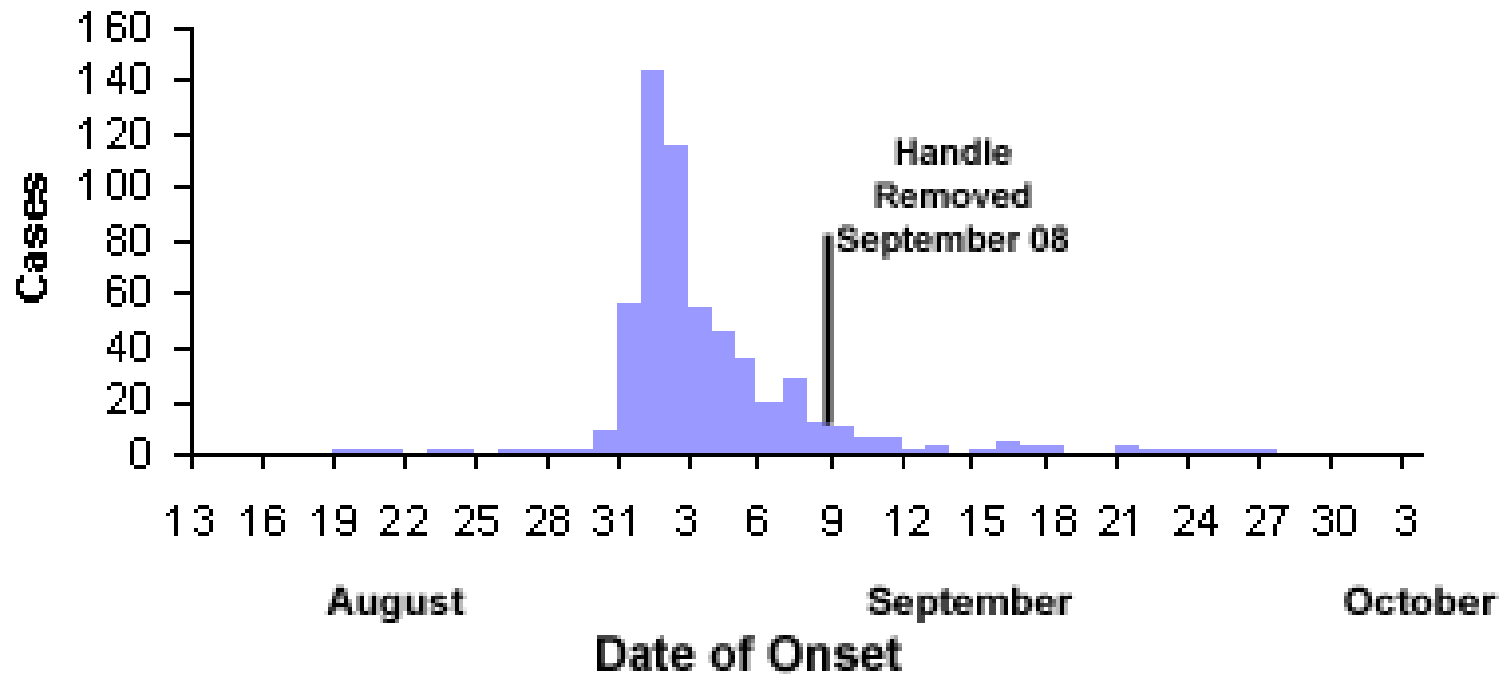


Successes of Epidemiology: John Snow and the Pump Handle



Successes of Epidemiology: John Snow and the Pump Handle

**Cases of Cholera
by Date of Onset**



Successes of Epidemiology: The Reyes Syndrome Story

REYE'S SYNDROME IN THE UNITED STATES FROM 1981 THROUGH 1997

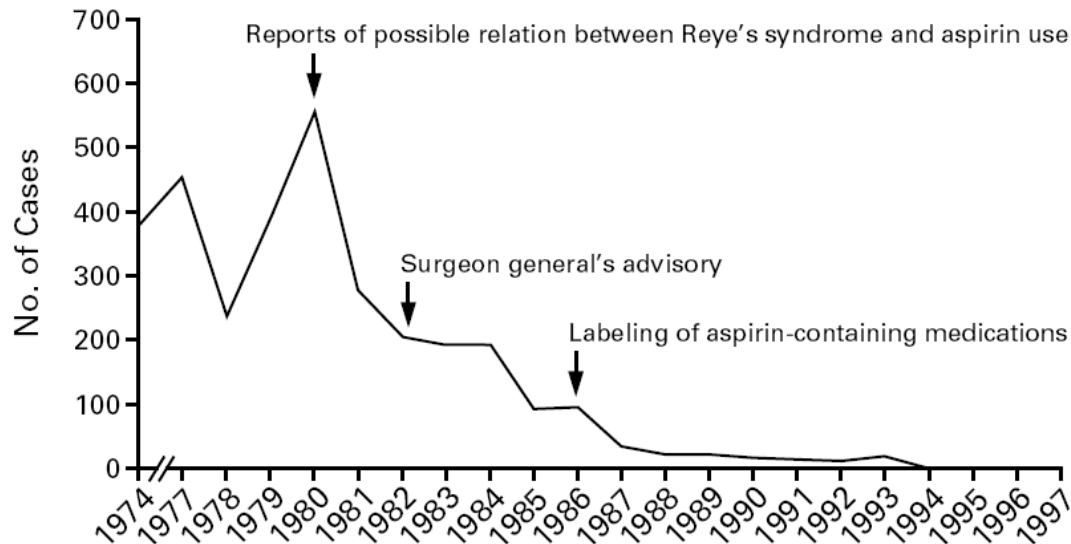
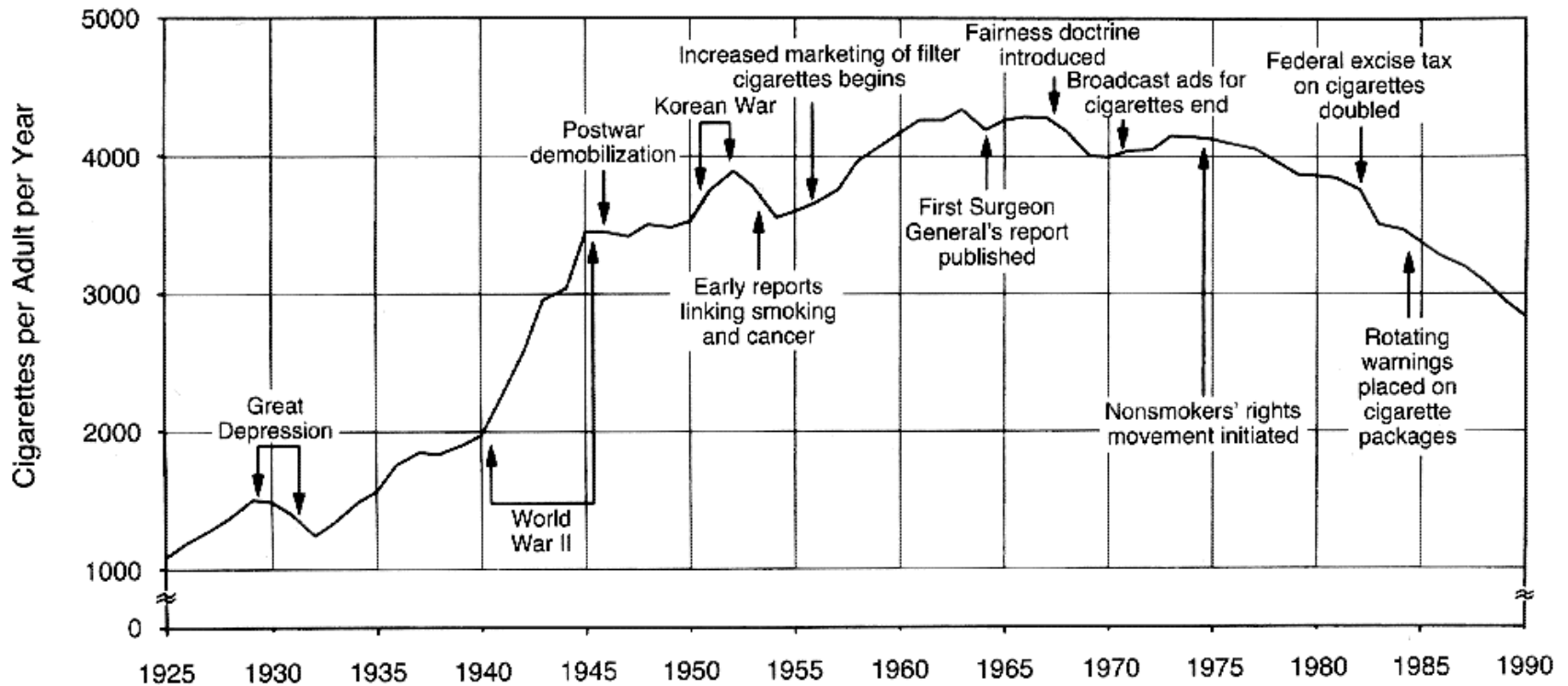


Figure 1. Number of Reported Cases of Reye's Syndrome in Relation to the Timing of Public Announcements of the Epidemiologic Association of Reye's Syndrome with Aspirin Ingestion and the Labeling of Aspirin-Containing Medications.

Source: Belay ED, et al. Reye's syndrome in the United States from 1981 through 1997. NEJM 1999;340:1377-82.



Successes of Epidemiology: The Decline of Smoking in the US



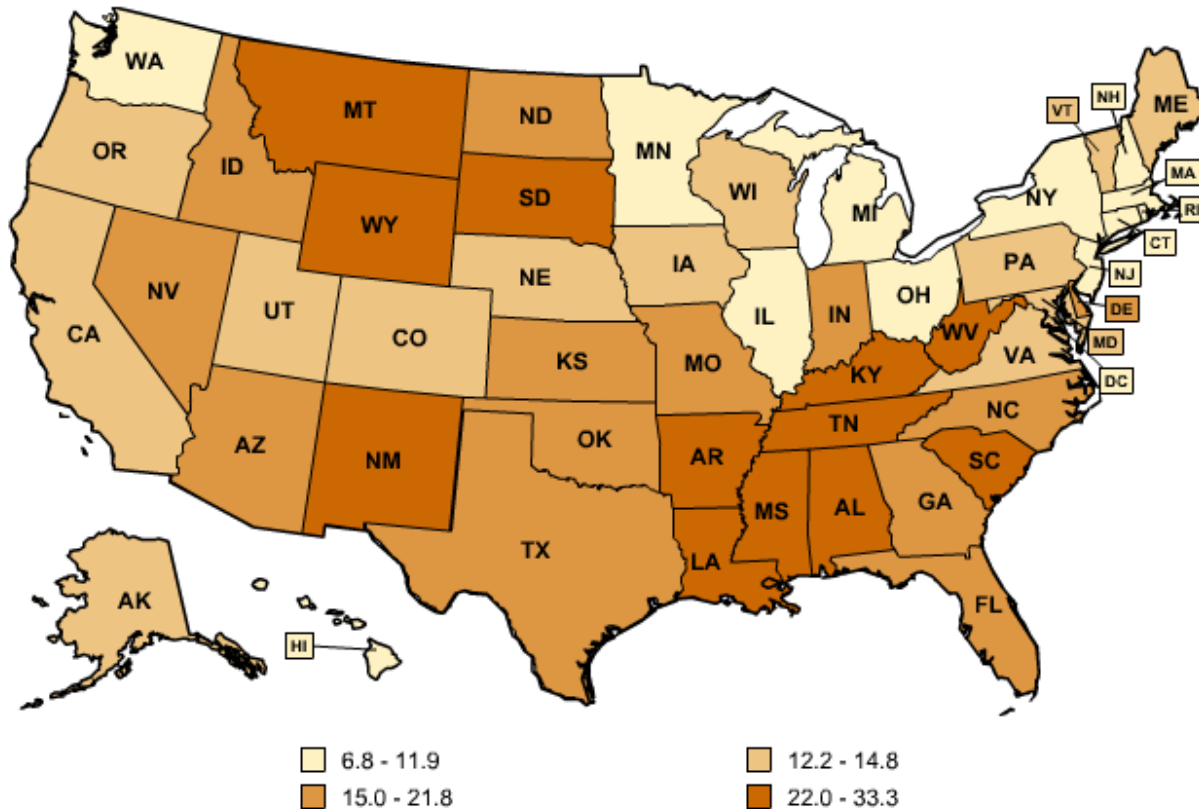
Per capita consumption of cigarettes among adults in the United States, 1925-1990.

Source: MacKenzie et al. The human costs of tobacco use. NEJM 1994;330:975-80.

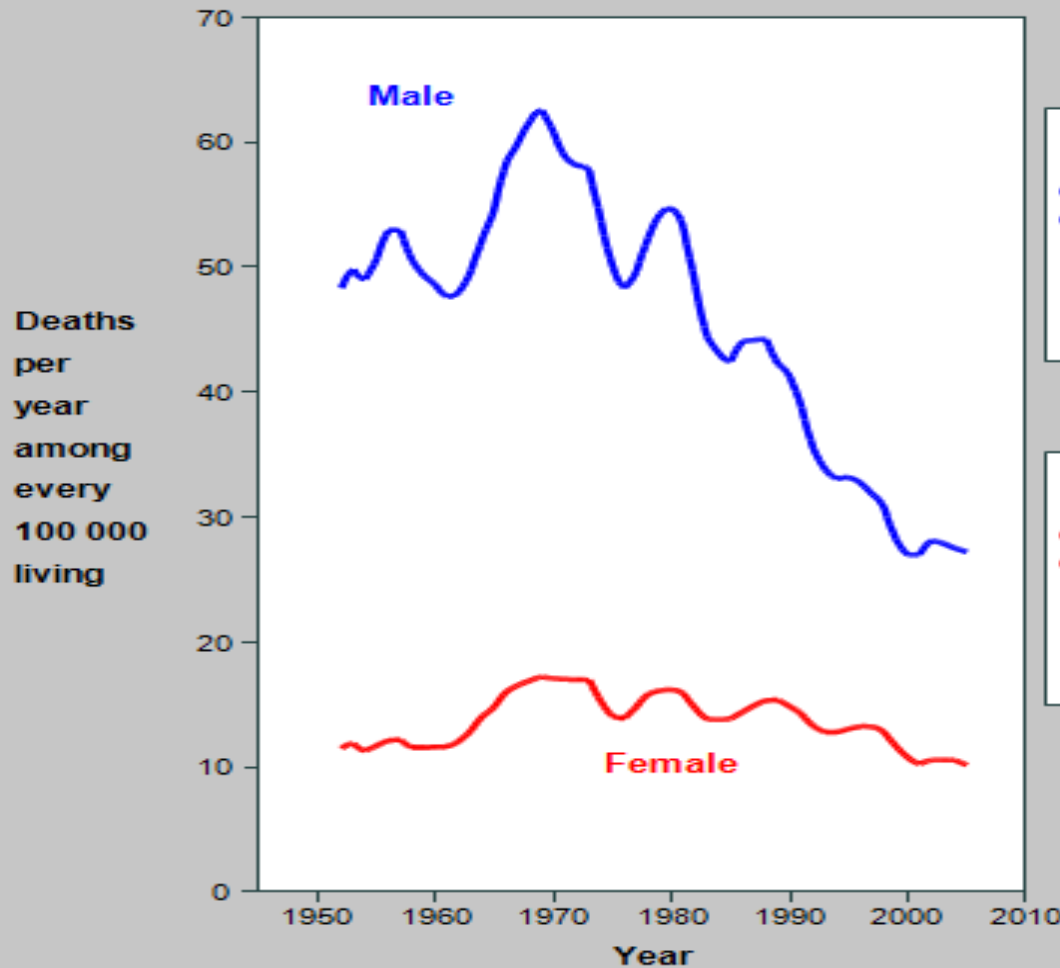


Successes of Epidemiology: Reduced Deaths on the Highway

Number of Deaths Due to Motor Vehicle Accidents per 100,000 Population, 2006



Mortality Trends for death by motor vehicle crash: 15-34 years of age, United States



Male deaths from this cause at ages 15-34 years in 2005:

- 11 561 (21% of deaths at this age)
- 27 out of every 100 000 males at this age, a rate which was:
 - not much different from in 2000
 - 46% less than in 1975 (rate: 50)
 - 46% less than in 1955 (rate: 51)

Female deaths from this cause at ages 15-34 years in 2005:

- 4052 (19% of deaths at this age)
- 10 out of every 100 000 females at this age, a rate which was:
 - 6% less than in 2000 (rate: 11)
 - 28% less than in 1975 (rate: 14)
 - 13% less than in 1955 (rate: 12)

Created: 2 Aug 2008, 7:24 pm
 Males & females, ages 15-34 years
 Motor vehicle road injury
 United States of America

www.MORTrends.org



Lessons from the Past

SUMMARY

- The practice of epidemiology has evolved when needed and extended beyond its roots in communicable disease control to all areas and aspects of public health practice
- Epidemiologic studies do not always provide the precise information needed for decision-making
- Actionable information provided by epidemiologic studies is not always followed
- The explosion of demand for epidemiologic information requires judicious use of limited resources based upon public health priorities
- Application of epidemiologic practice in the context of consequences is most likely to address all of these lessons



The Road Ahead for Consequential Epidemiology

Epidemiologic information is indispensable to all three domains of evidence-based public health practice:

- 1) identifying the highest priority health problems
- 2) defining and evaluating intervention strategies
- 3) evaluating how well interventions are implemented

Epidemiology must be extended to address new areas where information is needed to address health impacts

Epidemiologic information must be generated to develop information to support all essential services of public health

Epidemiologists must develop or collaborate with others who have the skills necessary to see the results to the end



Three domains of evidence-based public health practice.

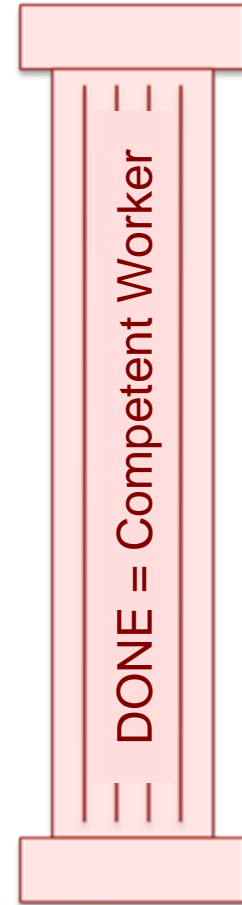
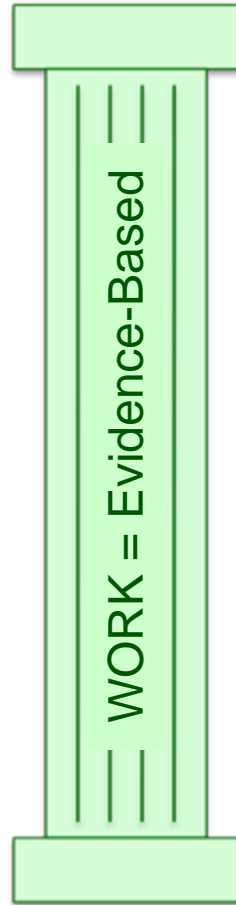
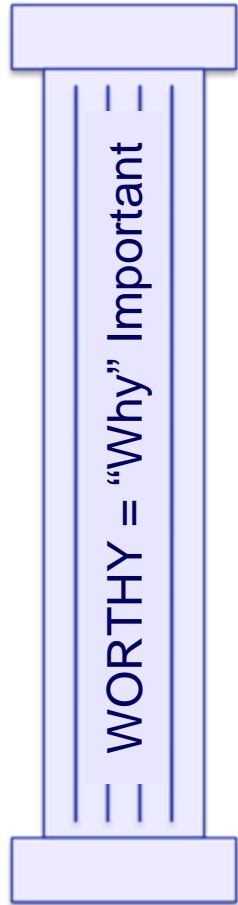
“Epidemiologic data is indispensable for prioritizing public health activities, defining intervention strategies, and evaluating them... It is our task to develop epidemiology that serves public health.”

-- Donato Greco, 2001

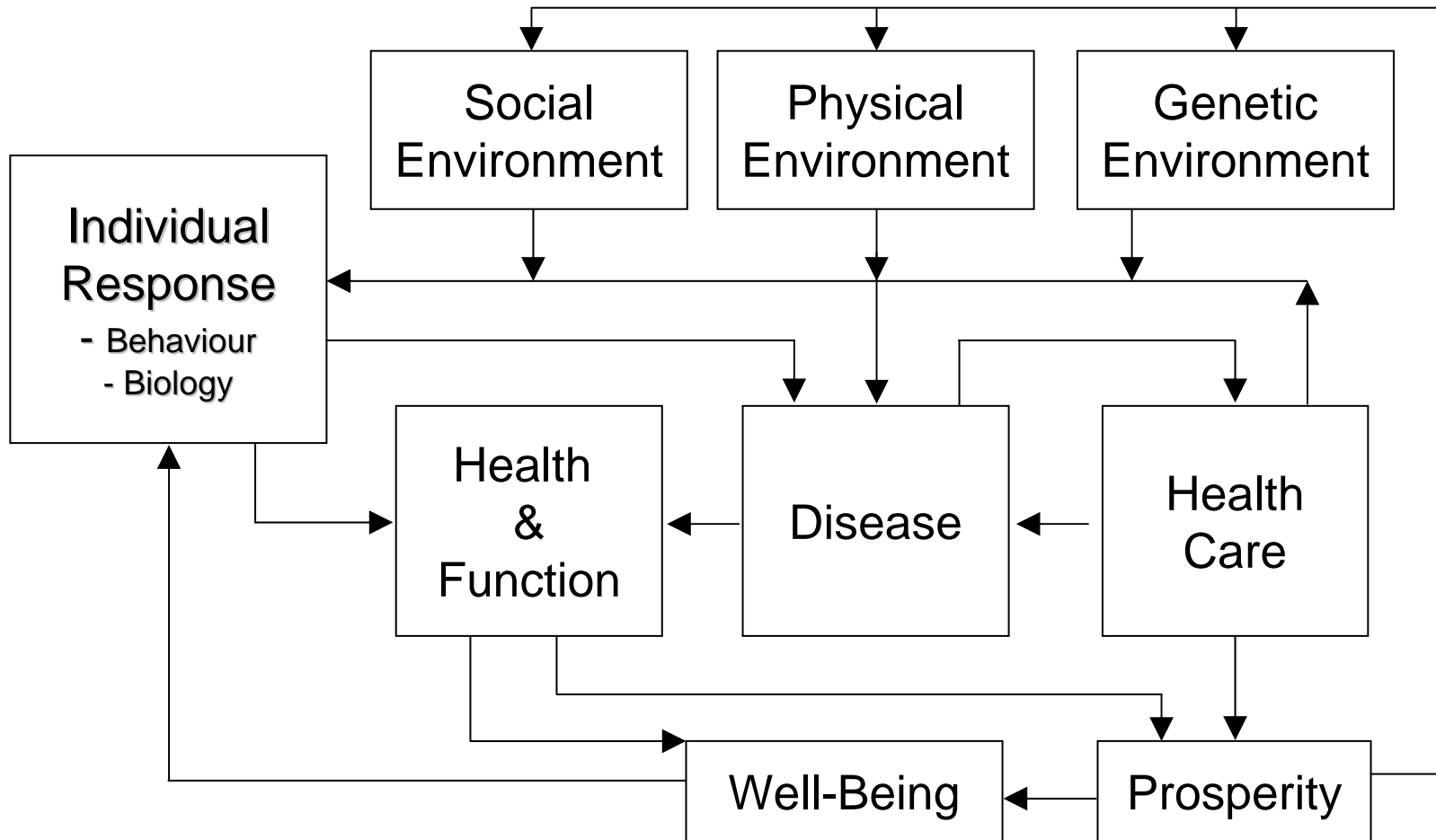


Quality Work

“Worthy Work Well Done”



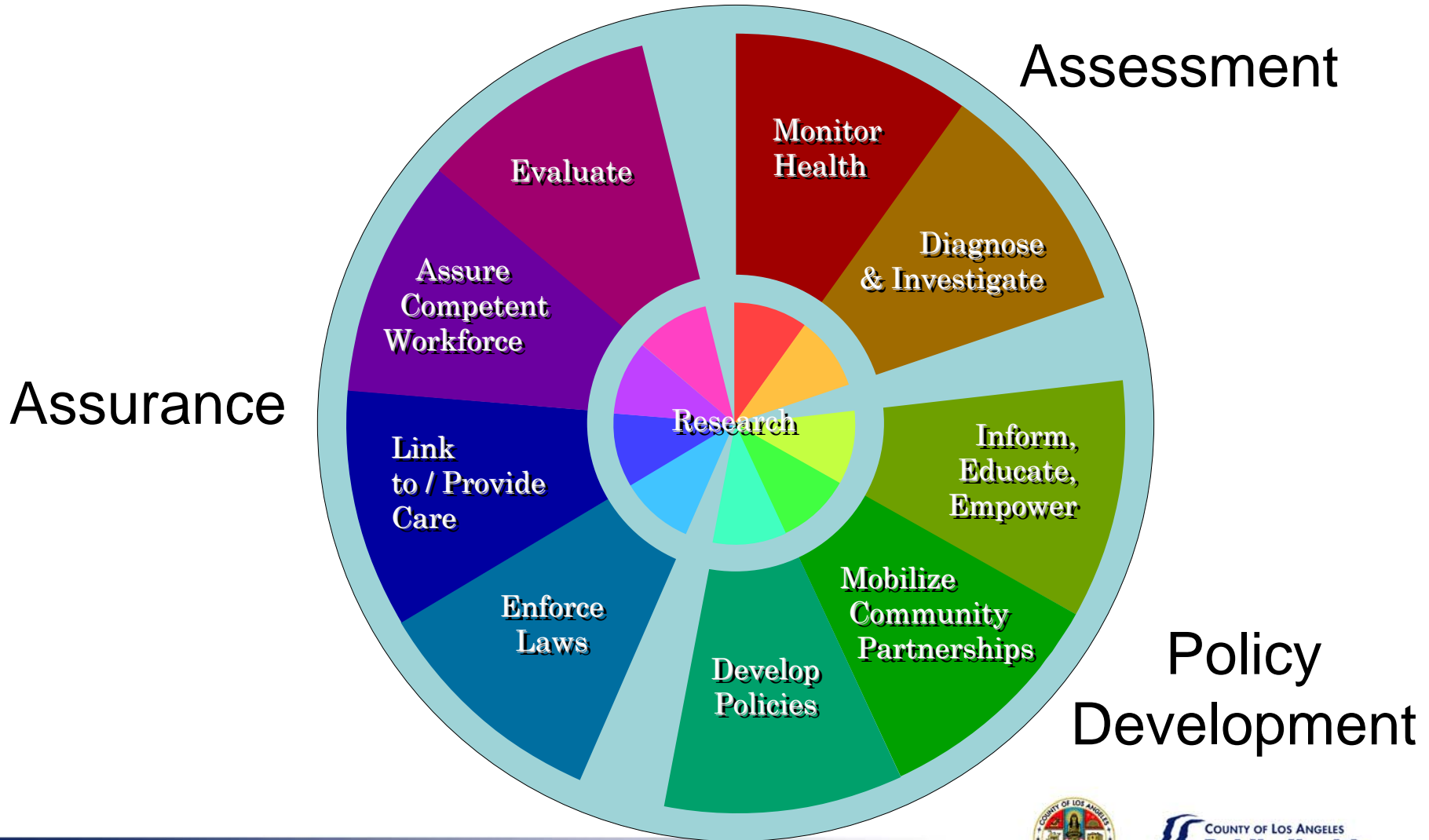
Feedback Loop for Human Well-being and Economic Costs



Source: Evans RG, Stoddart GL. Producing health, consuming health care. Soc Sci Med 1990; 31:1347-1363.



The Core Functions and Essential Services



Challenges

1. Extension of epidemiology into new areas will require new approaches, new terminology, new tools and an expansion of the outcomes of analysis
2. Translation of data into appropriate forms of information that is immediately actionable by others
3. Community, stakeholder, and decision-maker engagement is necessary to move beyond simple information-sharing toward empowering and persuading, and will require strategies to work with new partners and skills to communicate effectively
4. Expanded roles for epidemiology will require prioritization of effort
5. Assuring that actionable information is used

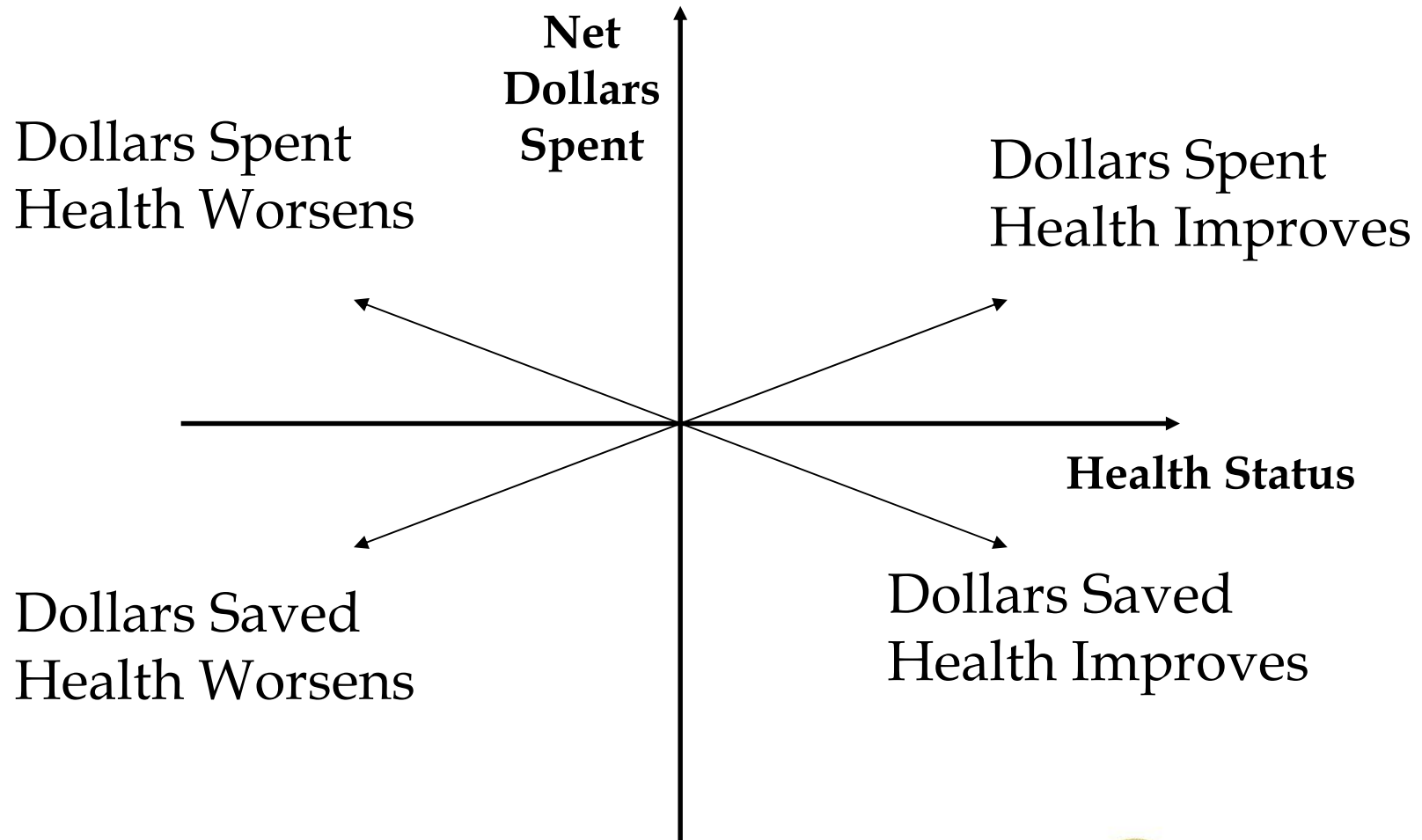


TERMINOLOGY

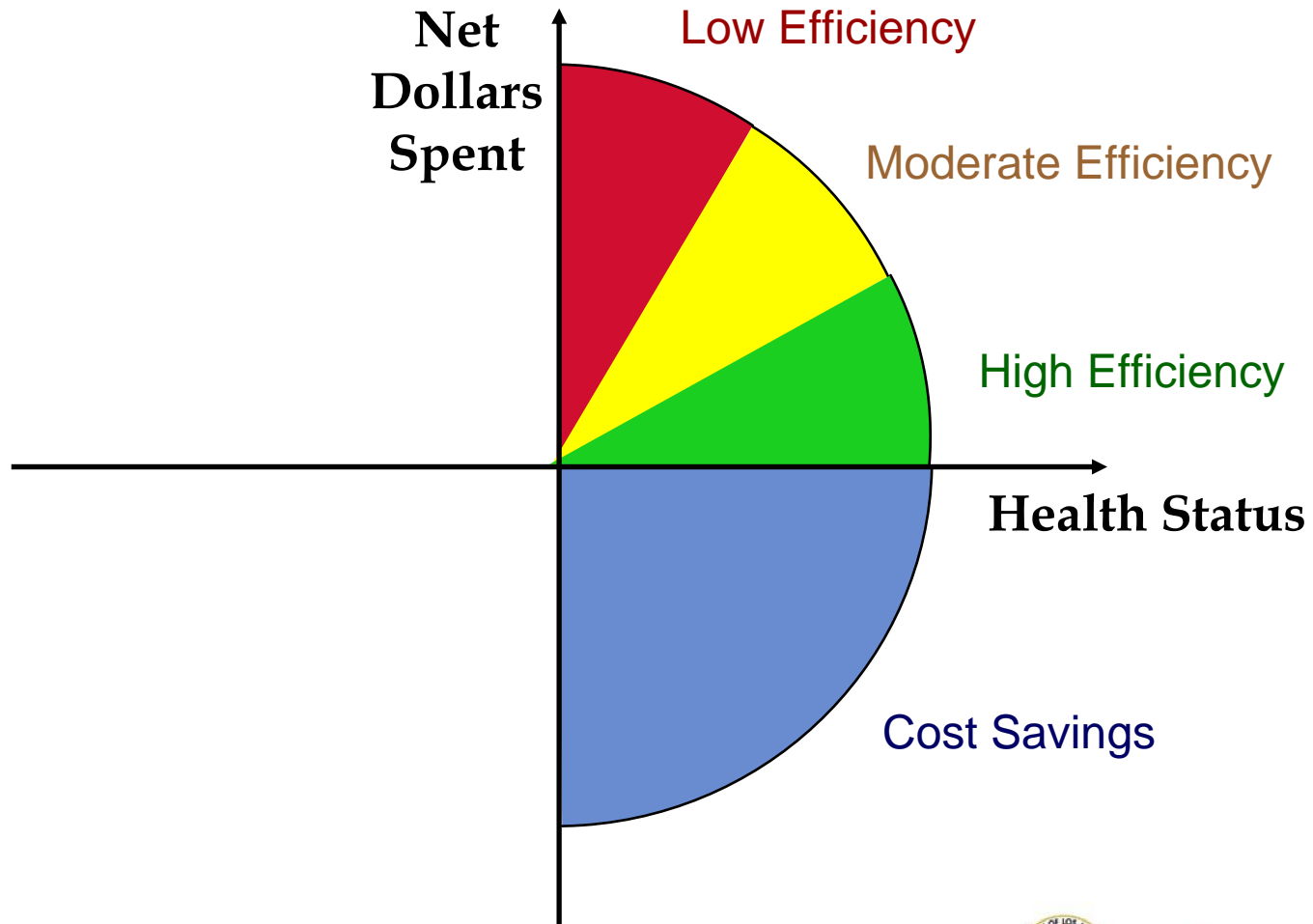
- **EQUITY** - A state in which race, gender, poverty, social status and geography are no longer factors in access, quality of care, and health outcomes.
- **EFFECTIVENESS** - Ability to produce a desired effect
- **EFFICIENCY** - The ratio of the effective or useful output to the total input in any system.



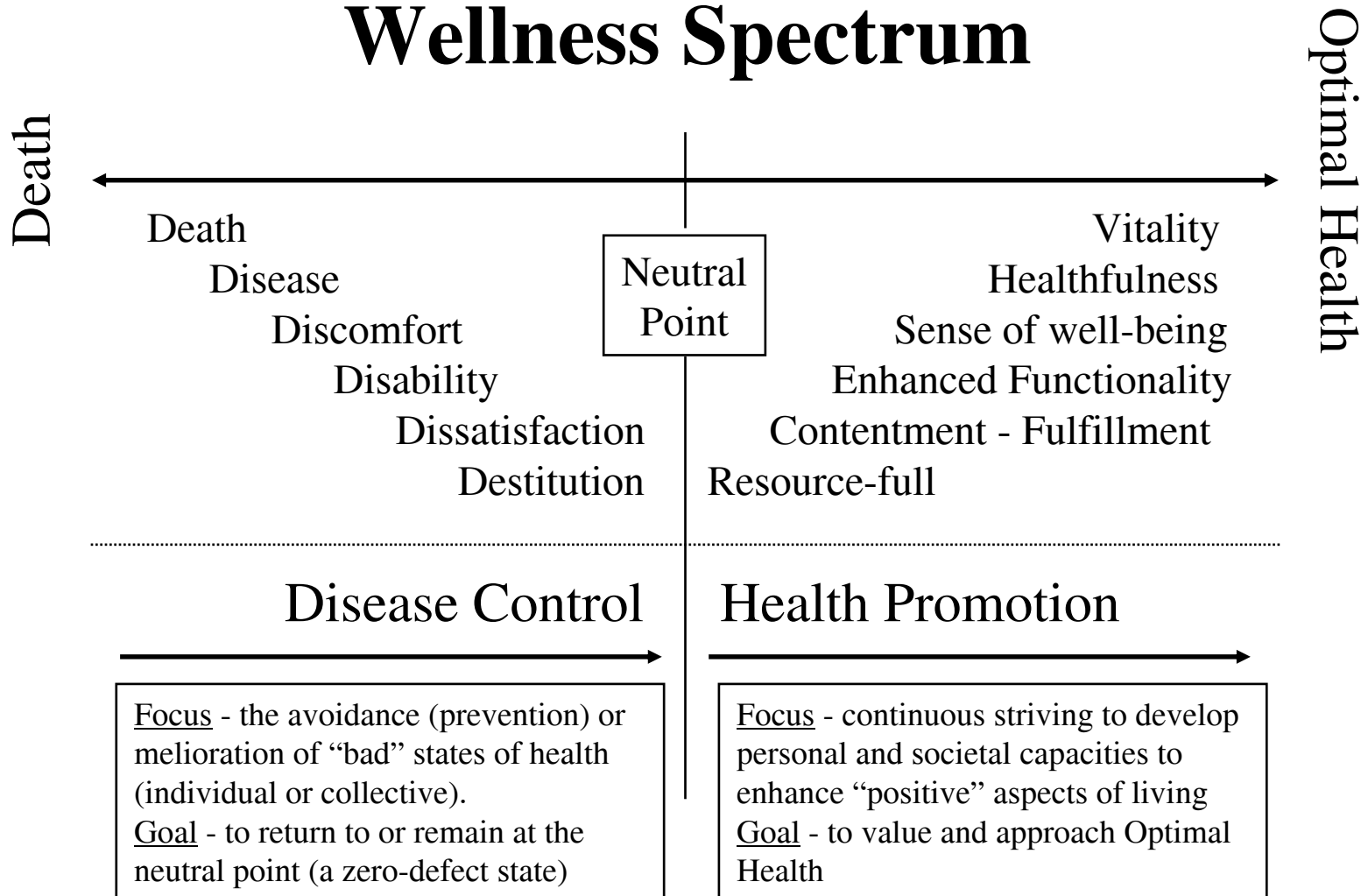
Health Economics Grid



Health Economics Grid



Wellness Spectrum



Gunzenhauser JD



The Prioritization Challenge

- Unlimited opportunities to do good work
- Eagerness of workers to apply skills
- Invitations and encouragements
- Multiple drivers of work:
 - Ethics
 - Law
 - Science
- Limited resources



Public Accountability

PUBLIC HEALTH must...

- Focus on health problems that are the highest priority for the community
- Select strategies that are both effective and acceptable
- Demonstrate that services delivered and work performed are of the highest quality



Domains for Prioritizing Public Health Problems

1. Magnitude of the Public Health Problem
(Quantitative)
2. Other Factors Related to the Importance of the Public Health Problem
(Qualitative)
3. Effectiveness of Interventions
4. Feasibility of Implementation of Interventions



The Partnership Challenge

- Optimize partnerships both within and outside of organizations and sectors
- Judicious use of different types of partnerships: Communicating, cooperating, coordinating, collaboration
- Skills are needed to convene, communicate, negotiate, and assure progress



Dissemination and Implementation based on Epidemiology Results

“Scientific understanding about any disease that is not widely applied to people in need is ultimately wasted. Similarly, widespread application of practices and policies that have no scientific evidence of effectiveness are just as futile.”

Source: Marks JS. Epidemiology, public health, and public policy. Preventing Chronic Disease 2009;6:1-4.



Summary

- Consequential epidemiology embraces the evolving scope of public health practice and assures the development of information most likely to improve the public's health
- A “systems approach” is needed to ensure that all elements are in place to link information with action
- Bridging the gap between the generation and use of actionable information is a key element of CE
- Epidemiologists will need to anticipate the need for information as well as develop resources to transform results into the form of information that can be used by a variety of stakeholders



Questions



Jeffrey D. Gunzenhauser, MD, MPH
(213) 989-7239
jgunzenhauser@ph.lacounty.gov

