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University of Michigan **School of Public Health**

Public Health Domain of Informatics

HMP 668 – Sept 25, 2013

At the outset:

- Public Health aims at improving the health of populations, not focusing on individuals
- Public Health is fundamentally a problem based discipline, whose goals are a moving target
- PH Informatics is playing an increasingly central role in the delivery of public health practices

Public Health Informatics is the systematic application of information and computer science and technology to public health practice, research and learning.

Information science encompasses the analysis of the structure, properties, and organization of information, information storage and retrieval, information system and database architecture and design, library science, project management, and organizational issues such as change management and business process reengineering.



University of Michigan School of Public Health

What is Public Health?

Thanks to Prof. Ken Warner for
permitting the use of his slides
on what is Public Health

What does the *public* think “public health” means?

- Disaster response (e.g., post 9/11)
- Health care for the poor
- Behavior nannies (e.g., NYC’s limiting size of soft drinks)
- Restaurant inspections for cockroaches, etc.

Definition:

Public health is the set of activities a society undertakes to monitor and improve the health of its collective membership.

Distinguishing features of public health:

1. Focus on preventing disease & injury
2. “Patient” is entire community, *not* individuals
3. “Provider” is society, *not* individual professionals

How does public health differ from other health professions?

All other health professions (medicine, nursing, dentistry, pharmacy, allied health, social work) typically involve:

- *An individual provider*
- *An individual patient*
- *Emphasis on treating illness or disability*

Example of the difference

Example of health care:

Dentist treats dental caries in an individual patient.

Example of public health:

Government fluoridates the water supply, making fluoridated water available to all members of the community. Prevents dental caries.

Why is public health so important?

Factors that could avoid premature mortality

- Lifestyle (behavior) 50%
- Environment 20%
- Human biology (genetics) 20%
- Additional medical care 10%

Source: Adapted from CDC, 1979; IOM, 1988; and PHS, 1993

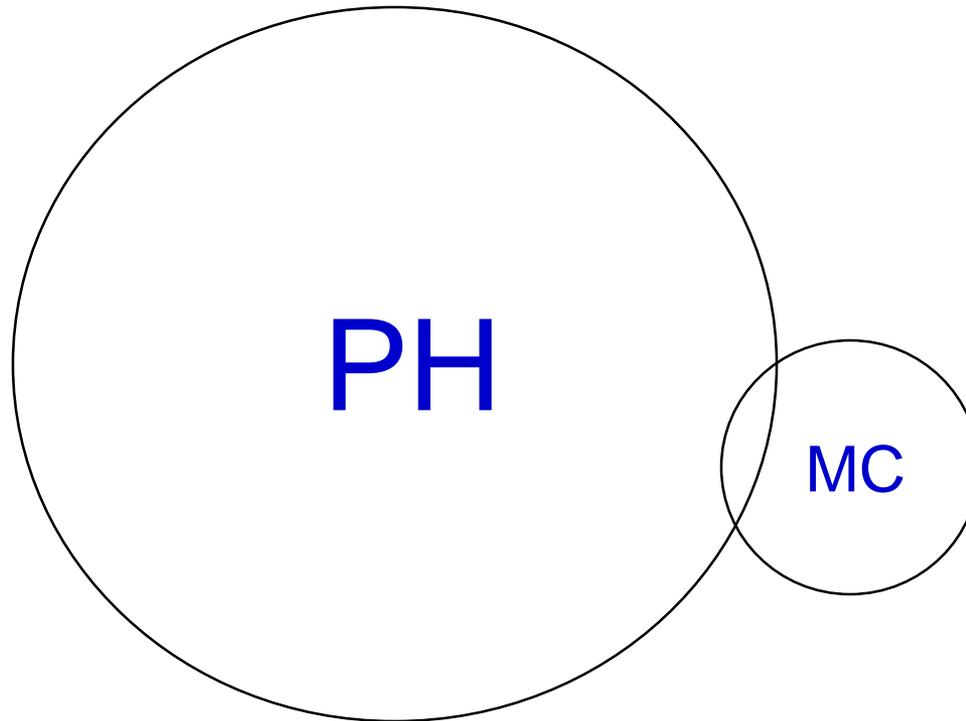
Why is public health so important?

Contribution to life expectancy gain

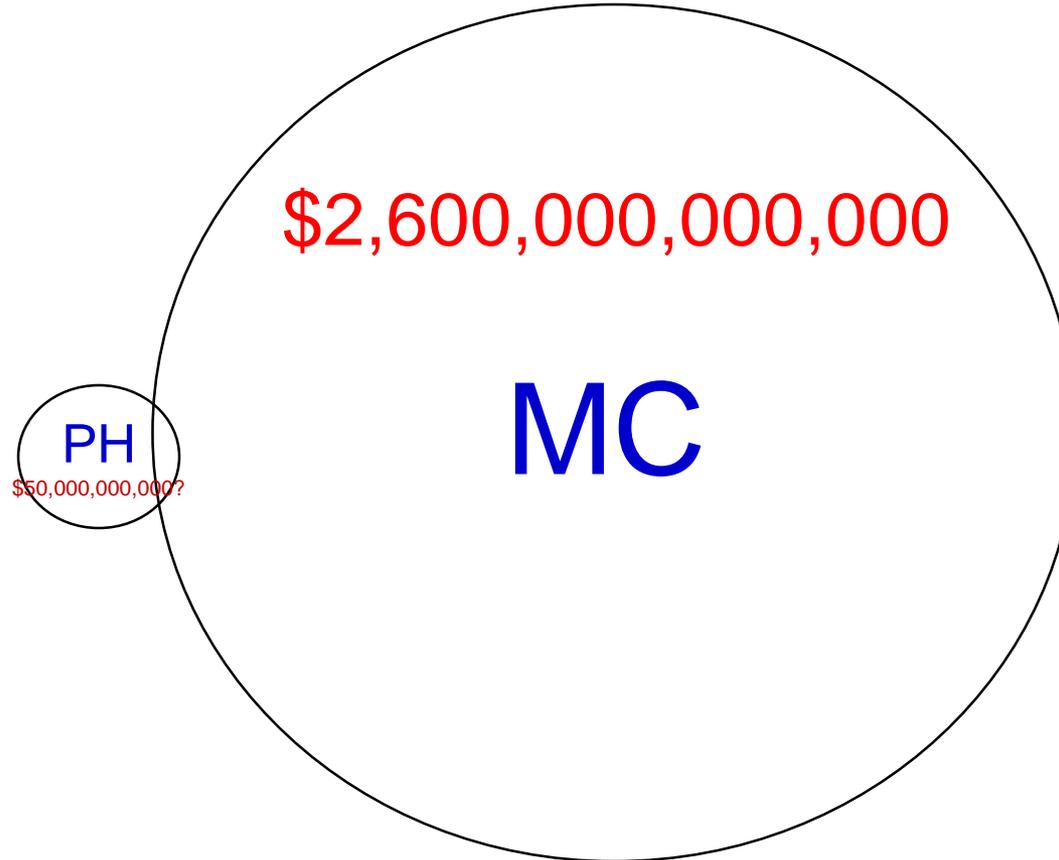
- Of 30-year gain in life expectancy in U.S. during 20th century...
 - *5 years attributable to medical care system*
 - *25 years from public health improvements in*
 - Sanitation
 - Nutrition
 - Housing
 - Job safety

Bunker et al., Milbank, 1994

Relationship between public health (PH) and the medical care system (MC): Impact on premature mortality



Relationship between PH and MC in the U.S.: Expenditures



Why the PH/MC imbalance?

- Market systems (economic interests) cater to services for individuals; PH is often a public good (or relevant due to externalities)
- Interest group politics; often contentious issues
- What people want
 - *Current trauma vs. abstract future benefit*
 - *Identifiable vs. “statistical” lives*
- “Invisibility” of PH

Benefits and costs of health promotion programs

Benefits: abstract, deferred

Costs: tangible, immediate

Mission of public health

“Fulfilling society's interest in assuring conditions in which people can be healthy.”

“[The] aim [of public health] is to generate organized community effort to address the public interest in health by applying scientific and technical knowledge to prevent disease and promote health.”

Source: IOM, *Future of Public Health*, 1988

Core functions of public health

1. Assessment of the health of the population
2. Development of public health policies
3. Assurance of the availability of needed services

1. Assessment of the public's health

Requires:

1. Data collection
2. Statistical and epidemiologic analysis
3. Dissemination of findings

2. Development of public health policies

Requires:

1. Use of a scientific knowledge base
2. Appreciation and use of the political process

3. Assurance of the availability of needed services

Relies on:

1. Encouraging appropriate actions by other entities (public or private)
2. Requiring such actions through law or regulation
3. Directly providing services

10 essential public health services

1. Monitor health status to identify community health problems
2. Diagnose and investigate health problems and health hazards in the community
3. Inform, educate, and empower people about health issues
4. Mobilize community partnerships to identify and solve health problems
5. Develop policies and plans that support individual and community health efforts

10 essential public health services

6. Enforce laws and regulations that protect health and ensure safety
7. Link people with needed personal health services and assure the provision of health care when otherwise unavailable
8. Ensure a competent public health and personal health care workforce
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services
10. Research for new insights and innovative solutions to health problems

Why are public health issues often contentious?

1. Restrictions on individual liberty
2. Debate over individual responsibility
("blame the victim")
3. Economic interests
4. Morality issues in public health measures
5. Politics in science

What is public health?

- Under-appreciated (“invisible”), under-funded, under-practiced
- Difficult
- Politically challenging
- Requires expert mix of science and politics
- Last but not least: PH is *important*

A list of Public Health Opportunities and Challenges

- Changing demographics
- Changing economic conditions – health inequalities
- Infectious diseases
- Globalization

A list of Public Health Opportunities and Challenges

- Substance abuse
- Violence
- Information technology
- Scientific revolution – genome project
- Accidents

Informatics in Public Health

- Immunization Registries
 - Immunization information systems (IIS) are confidential, population-based, computerized databases that record all immunization doses administered by participating providers to persons residing within a given geopolitical area.

Informatics in Public Health

- Real Time Surveillance

- Public health surveillance is the ongoing systematic collection, analysis, and interpretation of data, closely integrated with the timely dissemination of these data to those responsible for preventing and controlling disease and injury.

e.g. [Google Flu Trends](#)

Informatics in Public Health

- Situation Awareness
 - It's the perception of environmental elements with respect to time and/or space, the comprehension of their meaning, and the projection of their status after some variable has changed, such as time, or some other variable, such as a predetermined event.

- Applications of Informatics in Public Health
 - Real Time Surveillance
 - GIS
 - Immunization Registries
 - Standards
 - Situational awareness
 - Resource Management

Potential areas for Public Health Informatics:

- Communication among geographically dispersed health workers and consumers
- Enhancing policy analysis and the delivery of public-health services by strengthening and streamlining data collection
- Support of primary and secondary prevention via electronic health records and improved laboratory systems
- Data collection for research studies, such as drug and vaccine trials
- Environmental health interventions, such as biosurveillance, road safety and geographic information systems applications

Some Areas of Challenge for PH Informatics

Developing coherent, integrated national public health information systems

Developing closer integration between public health and clinical care

Addressing pervasive concerns about the impact of information technology on confidentiality and privacy