Public Health: An Introduction and New Directions

Hurley Research Center
What is Public Health?

Public health is "the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals." (1920, C.E.A. Winslow)
Public Health is concerned with threats to the overall health of a community based on population health analysis. The population in question can be as small as a handful of people or as large as all the inhabitants of several continents (for instance, in the case of a pandemic).
Public Health targets interventions to **PREVENT** rather than treat a disease through surveillance of cases and the promotion of healthy behaviors. However, activities related to treating a disease may be vital to preventing it in others (such as during an outbreak of an infectious disease). Hand washing, vaccination programs and distribution of condoms are examples of public health measures.
History

Historians tell us Public Health began with human waste sanitation thousands of years ago. Later, clean water was brought into the ancient city of Rome by its famous aqueducts. Still other efforts by public health brought us ways to end widespread disease outbreaks, such as cholera and smallpox.
The dramatic achievements of Public Health in the 20th century have improved our quality of life: an increase in life expectancy, worldwide reduction in infant and child mortality, and the elimination or reduction of many communicable diseases.
Ten Great Public Health Achievements – United States, 1900-1999

– Vaccination
– Motor-vehicle safety
– Safer workplaces
– Control of infectious diseases
– Decline in deaths from coronary heart disease and stroke
– Safer and healthier foods
– Healthier mothers and babies
– Family planning
– Fluoridation of drinking water
– Recognition of tobacco use as a health hazard
Structure

• Most countries have their own government Public Health agencies—sometimes known as Ministries of Health—to respond to domestic health issues.

• In the United States, the front line of Public Health initiatives are state and local health departments. The United States Public Health Service (PHS), led by the Surgeon General of the United States, and the Centers for Disease Control and Prevention headquartered in Atlanta, are involved with several international health activities, in addition to their national duties.
Reflections

• Public Health plays an important role in disease prevention efforts in both the developing world and in developed countries, through local health systems and through international non-governmental organizations.

• There is a vast discrepancy in access to health care and Public Health initiatives between developed nations and developing nations.
• In the developing world, Public Health infrastructures are still forming. There may not be enough trained health workers or monetary resources to provide even a basic level of medical care and disease prevention. As a result, a large majority of disease and mortality in the developing world results from and contributes to extreme poverty.

• For example, many African governments spend less than USD$10 per person per year on health care, while, in the United States, the federal government spent approximately USD$4,500 per capita in 2000.
Public Health is typically divided into epidemiology, biostatistics and health education/promotion. Environmental, social, behavioral, and occupational health are other important subfields.
Epidemiology

- Epidemiology is the study of patterns of health and illness and associated factors at the population level.

- It is the cornerstone method of Public Health research, and helps inform evidence-based medicine for identifying risk factors for disease and determining optimal treatment approaches to clinical practice and for preventative medicine.
In the study of communicable and non-communicable diseases, epidemiologists are involved in outbreak investigation to study design, data collection, statistical analysis, documentation of results and submission for publication.
Biostatistics

- Biostatistics involves the theory and application of statistical science to analyze Public Health problems and to further biomedical research.

- Biostatistics designs and analytic methods enable health scientists and professionals in academia, government, pharmaceutical companies, medical research organizations and elsewhere to efficiently acquire knowledge and draw valid conclusions from their ever-expanding sources of information.
Health Education/Promotion

• Seeks to promote health and prevent and manage disease within populations.

• It focuses on social and behavioral factors associated with health status and behavior. To develop programs that promote health, prevent disease, and manage chronic illness.

• Research is conducted using multiple research designs and methods for the diverse purposes of examining basic research questions, evaluating interventions, applying research findings to program development, and involving the community.
Modern Public Health

As opposed to in the past—when Public Health focused mostly on communicable diseases and sanitation—modern Public Health incorporates a variety of general health determinants and focuses on health promotion and preventative action.
3 Stages of Prevention

- **Primary**  
  Objective: Disease avoidance

- **Secondary**  
  Objective: Early detection

- **Tertiary**  
  Objective: Minimize damage
Health is heavily influenced by a number of social factors and should therefore be approached from a **broad perspective**. A comprehensive Public Health approach should take into consideration ALL social determinants of health, non-communicable disease and lifestyle, in addition to the traditional elements of communicable diseases and sanitation.
Currently, in the field of Public Health, the World Medical Association is involved in pandemic control, tobacco control, the harmful use of alcohol, nutrition, obesity and physical inactivity, and multi-drug resistant tuberculosis.
Americans’ Views on Public Health

A 2010 analysis of national opinion polls by the Harvard School of Public Health...

- Support for increased spending in preventing heart disease, cancer & arthritis (but NOT on detecting food borne illnesses, reducing tobacco use, reducing obesity, or improving minority health—all of which are considered important by public health experts).

- Do not believe that the system as a whole is working very well (although most report no contact).

- This is a partisan ‘divide’.
Public Health highlighted in current journal publications . . .

Addressing disparities in sudden cardiac arrest care and the underutilization of effective therapies. [Review]

“Sudden cardiac arrest (SCA) is the most common cause of death in the Unites States. Despite its major impact on public health, significant challenges exist at the patient, provider, public, and policy levels with respect to raising more widespread awareness and understanding of SCA risks, identifying patients at risk for SCA, addressing barriers to SCA care, and eliminating disparities in SCA care and outcomes. To address many of these challenges, the Duke Center for the Prevention of Sudden Cardiac Death at the Duke Clinical Research Institute (Durham, NC) held a think tank meeting—convening experts on this issue from clinical cardiology, cardiac electrophysiology, health policy and economics, the US Food and Drug Administration, the Centers for Medicare and Medicaid Services, the Agency for Health Care Research. Quality, and device and pharmaceutical manufacturers.”

The lingering consequences of sepsis: a hidden public health disaster?

“Sepsis, the syndrome of infection complicated by vital organ dysfunction, is a medical emergency that affects more than 750,000 patients in the United States each year and remains one of the world's leading causes of death. Without prompt resuscitation, antibiotics, and institution of life support, patients can quickly develop shock, multisystem organ failure, and death. It is not surprising, therefore, that the main goal of care and of research has been to reduce short-term mortality. Assuming a patient survives the initial insult, traditional medical wisdom holds that the crisis has been averted and the patient should do well. However, this conventional thinking is being seriously challenged.”

"A review of influenza is particularly relevant this year due to the ongoing novel H1N1 influenza pandemic. RECENT FINDINGS: Surveillance and clinical data including risk factors for infection and complications due to the current H1N1 pandemic are reviewed. New evidence on the safety of antiviral agents in children and studies on interventions to reduce community transmission of influenza are included. Influenza vaccine efficacy and improving immunization coverage have also been addressed by recent studies. SUMMARY: These studies from the early phase of the pandemic identify the population that are at high risk for complications, and affirm that active surveillance and prevention are important aspects of a public health response. Appropriate use of antiviral agents and improving influenza immunization coverage for all ages continue to be a challenge. Further studies are underway to improve the public health response, and the pandemic H1N1 strain is being incorporated into the 2010 seasonal influenza vaccine."

“Family planning is hailed as one of the great public health achievements of the last century, and worldwide acceptance has risen to three-fifths of exposed couples. In many countries, however, uptake of modern contraception is constrained by limited access and weak service delivery, and the burden of unintended pregnancy is still large. This review focuses on family planning's efficacy in preventing unintended pregnancies and their health burden. The authors first describe an epidemiologic framework for reproductive behavior and pregnancy intendedness and use it to guide the review of 21 recent, individual-level studies of pregnancy intentions, health outcomes, and contraception. They then review population-level studies of family planning's relation to reproductive, maternal, and newborn health benefits. Family planning is documented to prevent mother-child transmission of human immunodeficiency virus, contribute to birth spacing, lower infant mortality risk, and reduce the number of abortions, especially unsafe ones. It is also shown to significantly lower maternal mortality and maternal morbidity associated with unintended pregnancy.”

How is the field or science of Public Health relevant to the physicians at Hurley?
The **infant mortality rate** in the U.S. is 6.5, 7.4 in Michigan and 8.1 in Genesee County.

If we break down the county rate by RACE, we have a rate of 5.2 for Caucasian vs. **15.5** for African-American community members.

<table>
<thead>
<tr>
<th>Characteristics of Mother</th>
<th>Infant Deaths</th>
<th>Live Births</th>
<th>Infant Death Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of Mother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20</td>
<td>147</td>
<td>12,277</td>
<td>12.0 ±1.9</td>
</tr>
<tr>
<td>20 - 29</td>
<td>445</td>
<td>64,685</td>
<td>6.9 ±0.6</td>
</tr>
<tr>
<td>30 - 39</td>
<td>271</td>
<td>41,228</td>
<td>6.6 ±0.8</td>
</tr>
<tr>
<td>40 +</td>
<td>30</td>
<td>3,030</td>
<td>9.9 ±3.5</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>398</td>
<td>72,217</td>
<td>5.5 ±0.5</td>
</tr>
<tr>
<td>Unmarried</td>
<td>495</td>
<td>49,014</td>
<td>10.1 ±0.9</td>
</tr>
<tr>
<td>Level of Prenatal Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>481</td>
<td>81,659</td>
<td>5.9 ±0.5</td>
</tr>
<tr>
<td>Intermediate</td>
<td>182</td>
<td>25,892</td>
<td>7.0 ±1.0</td>
</tr>
<tr>
<td>Inadequate</td>
<td>186</td>
<td>10,030</td>
<td>18.5 ±2.6</td>
</tr>
</tbody>
</table>
Flint and Genesee County exceed both state and national prevalence rates on key health indicators.

<table>
<thead>
<tr>
<th>HEALTH AREA</th>
<th>FLINT DATA</th>
<th>COUNTY DATA</th>
<th>STATE DATA</th>
<th>U.S. DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>38.5%</td>
<td>36.4%</td>
<td>30.9%</td>
<td>26.9%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>16.0%</td>
<td>10.6%</td>
<td>9.4%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Tobacco</td>
<td>35.0%</td>
<td>21.6%</td>
<td>19.8%</td>
<td>17.9%</td>
</tr>
<tr>
<td>Binge Drinking</td>
<td>36.8%</td>
<td>16.2%</td>
<td>16.9%</td>
<td>15.8%</td>
</tr>
</tbody>
</table>
Example of Financial Impact

• Study using 2003-2005 data from Medical Expenditure Panel Survey

• Reducing prevalence of diabetes and high blood pressure by 5% would save U.S.
  – Short-term: ~$9 billion/year
  – Long-term: ~24.7 billion/year by reducing conditions related to these health problems

• More research needed – How much does it cost to prevent these diseases?

Projected NIH Funding 2011

1. Clinical Research $10,931 million
2. Genetics $7,676 million
3. Cancer $6,036 million
4. Biotechnology $5,911 million
5. **Prevention** $5,626 million
6. Neurosciences $5,605 million
7. Women's Health $3,930 million
8. Infectious Diseases $3,822 million
9. Brain Disorders $3,733 million
10. Behavioral and Social Sciences $3,668 million

**NIH Mission:**
To seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce the burdens of illness and disability.

- Bill & Melinda Gates Foundation
- The Robert Wood Johnson Foundation
- The California Endowment
- Greater Kansas City Community Foundation
- The Rockefeller Foundation
- The Colorado Trust
- The California Wellness Foundation
- The Susan Thompson Buffett Foundation
- The Duke Endowment
- The Kresge Foundation

Dollars Awarded (in millions)
Hurley’s Strategic Plan

Major Teaching Institution

Governance Leadership

Build Exceptional Medical Center

HMC

IMPROVE THE HEALTH OF OUR COMMUNITY
Hurley has served this community for more than 100 years. It is our responsibility to improve the health of its members. AND EACH OF US HAS A ROLE TO PLAY IN THIS PLAN.
What role will MEDICAL EDUCATION play?

Provide formal learning opportunities/experiences in which residents may . . .

- Participate in health screenings
- Provide public education offerings
- Work with community organizations that target public health goals
Residents have also participated in the **Windshield Tour**

And

volunteer for various community health events.
In the 2009-2010 academic year, a total of 18 residents from five of our training programs performed community service (with eight volunteering their time to multiple programs—and three serving as an organizer for at least one event).

- Women Take Heart Health Fair
- R.U.T.H. Journey to Good Health
- Family Fun & Field Day
- Mott College Sports Physicals
- Flint Science Fair
- North End Soup Kitchen
- Hamady High School Sports Physicals
- KEEP Health Fair
- Our Savior Lutheran Church Health Fair
- Special Olympics
- Eastside Mission

These experiences are important—but such opportunities could be broadened and enhanced!
What role will RESEARCH play?

• Program Evaluation

• Collaborative Grants

• Student Intern/Extern Opportunities
Program Evaluation

Skilled staff are available to assist with any phase of a project:

- Design/conceptualization
- Implementation
- Assessment
- Dissemination
We welcome the opportunity to collaborate with community partners on study proposals for submission to local, state and/or national funding organizations. Areas of particular interest for us include asthma, cancer, cardiac disease, diabetes, geriatrics, hypertension, infectious diseases, medical education, obesity, renal disease, sleep disorders, substance abuse, and trauma.
Student Intern/Exterm Opportunities

Examples of assistance and resources we can provide:

- Identifying project mentor
- Consultation on study design
- Training
- Providing office space
- Use of equipment
- Assistance with Hurley IRB
- Enrolling subjects
- Linking to other Hurley resources
For more information:

- HMC Research Center
  6 West – A Wing
  Phone (810) 262-6800
  Email: Nicolas Lecea
  nlecea1@hurleymc.com