

# Public Goods and Externalities: A Research Agenda for Public Health Economics

Vilma G. Carande-Kulis, Thomas E. Getzen, and Stephen B. Thacker

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Among the many roles a government plays in our daily lives, protecting the public's health is one of the most conspicuous. The government provides goods and services such as registration of births and deaths, public health surveillance of disease and injury, outbreak investigations, research and education, health insurance for the poor and elderly, enforcement of laws and regulations, evaluation of health promotion programs, and assurance of a competent healthy workforce. In the past, economics in public health has almost exclusively focused on efficiency of programs through the use of cost-effectiveness or net present value measures clustered under the rubric of "economic evaluation." Efficiency measures are useful at the programmatic level. However, lack of full employment and market failures including public goods and the impact of consumers and producers actions not reflected in the markets (externalities) not only compromise efficiency but also generate health inequities. We propose an expansion of the scope of existing health economics research in an area characterized as public health economics—the study of the economic role of government in public health, particularly, but not exclusively, in supplying public goods and addressing externalities.

**KEY WORDS:** economic evaluation, health economics, public health

Some 50 years ago, Selma Mushkin proposed a definition of health economics.<sup>1</sup> Since then, this definition has been shaped and refined by economists, epidemiologists, physicians, politicians, and the public. *Health economics* is broadly defined as the study of the supply and demand of healthcare resources and the impact of healthcare on a population.<sup>2</sup> The economics of

public health functions, such as providing coverage to some sectors of the population through Medicare and Medicaid, is dealt with extensively in health economics research. Analytical tools have been applied for estimating the economic impact of diseases and injuries, and addressing the cost, cost-effectiveness, and cost-benefit of interventions to prevent disease and promote health.<sup>3-12</sup> Less attention, however, has been placed on the economics of public health functions (Table 1) such as monitoring health status; diagnosing and investigating community health problems; informing, educating, and empowering people about health issues; developing policies and plans that support individual and community health efforts; enforcing laws and regulations that protect health and ensure safety; providing tax breaks, subsidies, and penalties to modify unhealthy behaviors; and funding research to attain new insights and innovative solutions to population health problems.<sup>13</sup>

## ● Securing Health Through Individual and Collective Actions

Health determines the amount of time one is alive and the efficiency with which the time is spent in producing

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The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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**TABLE 1 ● The 10 essential public health services\*****Public health services**

## Assessment

1. Monitor health status to identify community health problems
2. Diagnose and investigate health problems and health hazards in the community

## Policy development

1. Inform, educate, and empower people about health issues
2. Mobilize community partnerships to identify and solve health problems
3. Develop policies and plans that support individual and community health efforts

## Assurance

1. Enforce laws and regulations that protect health and ensure safety
2. Link people to needed personal health services and assure the provision of healthcare when otherwise unavailable
3. Assure a competent public health and personal healthcare workforce
4. Evaluate effectiveness, accessibility, and quality of personal and population-based health services

## Serving all functions

Research for new insights and innovative solutions to health problems

\*Public Health Functions Steering Committee.<sup>13</sup>

income and satisfaction.<sup>14</sup> The demand of goods and services in the health sector is known as derived demand because it is a consequence of the population's demand for health.<sup>15</sup> The demand and supply of healthcare and health protection goods and services rest on individual and collective actions involving both the private and public sectors. For example, the healthcare industry that provides hospitals, physician practices, laboratories, clinics, and nursing homes is mostly private, but with a much higher degree of regulation and public oversight than other market sectors such as the entertainment industry or professional sports. Many determinants of individual health depend largely on collective actions. Collective actions involve the use of public funds, legislation, and public sector policies, and are needed because of the existence of market failures. Public goods, externalities, and varying time preferences for preventive services versus curative services compromise the efficiency in resource allocation and the equity in health.

## ● When All Else Fails

Ideally, the best way to run the economy is to let individuals work, play, and consume what they want without restrictions. The interaction of supply and demand in the market naturally leads to equilibrium in which marginal benefits equal marginal costs. The prices that arise from the exchange in the market direct individuals

to work at jobs where their skills provide the most value to society, to find efficient means of production, to limit the consumption of goods that are most scarce, and to save and invest for the future. Under ideal conditions, the entire economy functions without any central control or direction from the government. However, perfect market conditions, such as fully informed consumers and producers, costless transactions, and free market entry and exit, are useful for modeling and policy simulations but do not occur in the real world.

Imperfect market conditions justify government intervention to protect the public's health. Whether it is war, earthquake, hurricane, epidemic, or an economic catastrophe, the burden falls on the government when no private organization is up to the task. As the ultimate bulwark, the government must stand and deliver, even if there is little that human power can do but stand, watch, mitigate the losses, and hopefully reduce the chance of recurrence. In economics, such standby response capability was characterized as "option demand" by Weisbrod in 1964.<sup>16</sup> Persons are willing to pay something for an air bag that never gets triggered, a burn unit they never expect to use, and control of a virus that they hope will never infect them. Although some limited-option demand (eg, air bags and vaccinations) can be provided privately, most (eg, bioterrorism response capability, financial collapse assistance, and earthquake or hurricane warnings) cannot.

## ● Public Goods and Public Health

A "public good" is a good or service that does not lend itself to market allocation because it costs nothing for an additional individual to enjoy its benefits, and it is generally difficult or impossible to exclude individuals from consuming it.<sup>17</sup> The institutional and technical capacity to respond to disease outbreaks and prevention research are examples of public goods. A fundamental problem with public goods is the difficulty of motivating people to pay for them. Vaccines, for example, are developed through publicly funded research; produced by private companies; purchased and distributed both privately and by federal, state, and local governments; and administered at a subsidized cost to the consumer.

Public economics, as a well-established subdiscipline of economics, has built a substantial body of theory and empirical research in the supply of public goods and construction of social welfare functions. For example, public economics addresses methods of rationing publicly provided goods that have clear applications to challenges currently faced by public health. User fees, uniform provision, and queuing are methods used

for rationing. User fees are charges to those who benefit from a publicly provided good or service as in the case of toll roads or airport taxes. Uniform provision is exemplified by the government supplying the same quantity of the good to everyone, as in the case of education—although some individuals would like to have more and some less. Queuing as a method of rationing occurs when, rather than charging individuals money for access to the publicly provided good or service, the government requires that the public pay a cost in waiting time. In public health, queuing was used to ration vaccines in the presence of shortages as in the 2004-05 influenza season, when the government, rather than charging individuals money, recommended that certain groups at lower risk of contracting the disease, and developing complications, pay a cost in waiting time to get immunized.

### ● Externalities in Public Health

Externalities are actions taken by consumers or producers that affect other consumers or producers, for which producers do not pay or consumers are not compensated. The actions of business dumping pollutants in the Hudson River or power plants releasing toxic substance into the air without suffering the full consequences of their actions are examples of externalities affecting fishermen, consumers of safe water, and children with asthma. While some externalities are beneficial (eg, herd immunity created when the population gets vaccinated), many are not. The lack of community design to support walking, the use of public transportation and shorter commutes, technologies (video games, television, computers) that encourage sedentary behaviors, and the proliferation of junk food restaurants are examples of public or private actions that create externalities. These externalities affect the quantity and quality of leisure and work time, raise out-of-pocket healthcare expenses for individuals, healthcare costs for employers, health insurance premiums for consumers, and ultimately affect the overall financial performance of corporations.

Taxation, financial disincentives, and property rights legislation are some mechanisms used to “internalize” harmful externalities into the marketplace. The use of excise taxes on cigarettes to promote smoking cessation and the legislation to encourage seat-belt use to prevent motor-vehicle injuries are examples of how externalities can be dealt with in public health. Still, the usefulness of taxes, legislation, and financial incentives to deal with other public health concerns such as cardiovascular diseases, obesity, or diabetes remains relatively unexplored.

### ● Attitudes Toward Risk and Varying Time Preferences

Varying time preferences for consumption, a combination of moral hazard\* and externality, affect how individuals make choices about the timing of healthy behaviors and adoption of preventive strategies. People with different time preferences will respond differently to preventive interventions. Persons with high discount rates for consumption would rather consume today, no matter what the health consequences, than postpone gratification and enjoy a prolonged life expectancy or quality of life later. The availability of drugs and treatments for conditions that manifest themselves later in life can affect people’s willingness to defer utility from healthy lifestyle choices. Attitude toward risk and varying time preferences for health and consumption are in part the reason for laws and fiscal policies aimed at creating disincentives for unhealthy or unsafe behaviors.

Manifestation of market failures may hinder the impact of public investments in public health research and translation. The public’s reservation to pay for goods and services that are perceived to be the responsibility of the government, the existence of externalities, and varying time preferences for preventive care versus curative care may affect the effectiveness and health equity of population-based interventions. Maximum health impact and the elimination of health disparities are two important objectives in public health. If these objectives are going to be achieved, factors that may be working against achieving them need to be known. Economic theories developed to understand human behavior in regards to the markets can be applied to understanding human behavior response to public health interventions. For that, we propose to broaden the health economics research agenda by delving into the public economics aspects of securing the public’s health. This new subset of health economics research can be characterized as *public health economics*. Public health economics focuses on the study of the economic role of government in public health; particularly, but not exclusively, in supplying public health goods and services and addressing positive or negative externalities derived from implementing public health programs.

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\*Moral hazard refers to the situation in which consumers alter their behavior regarding the use of healthcare because they are provided health insurance. Moral hazard arises because of the availability of treatment, and the externality arises because insurers bear part of the cost of treatment.

**TABLE 2 ● Proposed areas of research in public health economics**

Order*	Area of study	Scope
1	The Public Health Sector	Provision of public health goods and services by the public and private sectors. Public health infrastructure. Varying time preference for health
2	Decision Support and Policy Analysis	Allocation of resources, efficiency and political decision making. Supply and demand imbalances. Perceptions and the demand for prevention. Individual and social choice
3	Information	Information as a public good. Asymmetry, moral hazard, adverse selection, and signaling. Development of networks and databases
4	Regulation	Direct and indirect role of government. Rewards, penalties, and consumer behavior. Quality control: air, water, pharmaceuticals. Financing for rules implementation
5	Distribution and Equity	Subsidies, fines, and taxes. Compensating payments and corrective actions. Socioeconomic determinants of health. Measures of health inequalities
6	Catastrophe and Risk Management	Emergency response. Solvency and reserve capabilities. Risk reduction. Provider of last resort. Financing of preparedness and response
7	The Macroeconomics of Population Health	Demography, productivity, births and deaths, and intergenerational transfers. National health accounts and gross domestic product. Financing global public health. Trade, immigration, and disease

\*The order for the proposed research areas does not imply that they need to develop consecutively.

## ● A Research Agenda for Public Health Economics

We propose that public health economics focus on the seven research areas: (1) the public health sector, (2) decision support and policy analysis, (3) information, (4) regulation, (5) distribution and equity, (6) catastrophe and risk management, and (7) the macroeconomics of population health (Table 2). The study of the public health sector from an economic perspective looks at public health functions as “production processes” of public health goods and services in which the public health sector is the supplier and the public at large is the consumer. The economic reasons for governmental intervention are analyzed. The spillover effects of externalities are studied. The impact of individuals’ varying time preferences and attitudes toward risk on the adoption of preventive and health promotion behaviors is explored.

The area of decision support and policy analysis is included because where markets and individual behavior are not or cannot be used to make choices, alternative methods to guide the allocation of resources and services must be developed. Efficiency research focuses on measures of efficiency such as cost-effectiveness and cost-benefit analyses. Another type of research, which has received less attention, is the allocation of resources based, not on efficiency, but rather on political actions. Decisions on the demand and supply of public goods are made through political, not market, institutions. The conditions under which public health programs do not improve efficiency, but are instead conducted because of political, ethical, and other considerations need to be addressed. Reaching Native

Americans or isolated communities with diabetes may not be as efficient in economic terms as reaching large urban, English- or Spanish-speaking populations. Still, equity, not economic efficiency, drives the decisions to implement these types of programs.

The study of various types of publicly provided information (research, disease and injury surveillance, effectiveness, and risks factors) looks at the impact of those types of information on the effectiveness of public health efforts. Asymmetric information problems, such as moral hazard, adverse selection, and signaling, affect public behavior. Although the effect of moral hazard in regards to insurance and its impact on the use of health-care services has been studied extensively, the effects of moral hazard on public behavior toward preventing illness and injury has not received enough attention. One of the few studies found in the literature addresses the effect of insurance in weakening the incentive to engage in activities toward preventing motor vehicle crashes.<sup>18</sup> Adverse selection occurs when unequal information in producers and consumers (called information asymmetry) can lead to undesirable results in the market sectors. One of the areas where adverse selection has been studied in regard to population health addresses the effect of marriage on physical and psychological health.<sup>19–22</sup>

Signaling occurs when a producer or consumer sends a signal with words or actions that will influence the other’s beliefs about the identity or attributes of the entity sending the signal. This signal produces a distortion of investments or allocation of resources for the sake of creating visible markets of attractiveness to transaction partners rather than actual value. The effects of signaling on obesity have been explored by

Philipson.<sup>23</sup> The author points out that signaling may work against efforts to combat obesity.

Regulation is used to correct market failures. Regulatory control is exercised by the government in public health areas where the threat to safety is compelling: water and air quality, deterring cigarette smoking, work safety laws, and traffic laws. The impact of regulation on other public health areas of concern such as obesity has not been studied in detail. A search of the literature yielded several publications in which authors discuss the potential role of government regulation on obesity.<sup>24–28</sup> Only one study, however, conducted a quantitative analysis of the impact of one government regulation mechanism, sales tax, on obesity.<sup>29</sup>

In regard to distribution and equity, reducing health disparities is a major public health goal. A public health economics agenda needs to address how the allocation of public health resources affects the health of disadvantaged populations. The use of weighted net benefits in public health decision-making guiding policy development needs to be examined. Important questions need to be addressed in regard to distribution and equity: who are the winners and losers from any proposed change; is collective compensation hypothetical or real; and does the impact of taxes match that of health benefits?

In dealing with catastrophe and risk management, and although emergency preparedness and response have been always essential public health functions, the events of September 11, 2001, and Hurricane Katrina in 2005 have led to both increased concerns and increased public investment in public health. Efficiency conditions of option demand in regard to emergency preparedness and response need to be studied. Examples of questions regarding the provision of public goods needing answers are: how much capacity is needed to respond to option demand; what characteristics this capacity should have to manage risk or respond to catastrophes in an effective and efficient manner?

Finally, the macroeconomics of public health is an area that could not be ignored in defining a public health research agenda. The impact of health resources on productivity, births and deaths, intergenerational transfers, social welfare, and savings need to be addressed. The development of “National Health Accounts” and the extension to satellite measures as practiced by both the Centers for Medicare and Medicaid Services and the Organization for Economic Cooperation and Development are important advances in the understanding of the macroeconomics of health. These mechanisms, however, do a poor job at disaggregating public health expenditures in a manner that can be useful in guiding resource allocation efforts. We need to have a better understanding of how public health

funds are allocated if we are going to do a better job in assessing return on investment of public health interventions. Moreover, the impact of public health programs on aggregate welfare, global financing, population flows, and trade are important elements of the research needed.

## ● Marching Forward

Economics does not need an introduction into public health. Public health agencies, such as the Centers for Disease Control and Prevention and the Centers for Medicare and Medicaid Services, have formed cadres of economists who track health expenditures, estimate the economic impact of disease and injury, and assess the cost-effectiveness of public health programs. At the same time, there is a need to broaden the scope regarding the type of issues that are tackled and the type of tools that have been applied when examining public health policy.

The dual expansion in scope of both health economics and public health will inform policy makers on how the public and private sectors can work more effectively in organizing efforts for protecting the public’s health; how the public sector can facilitate creating public goods in the form of social conditions such as availability of time, place and facilities for exercise, availability of good food choices, and social reinforcement of desirable healthy behaviors; how the private and public sectors can work together in creating or improving health information systems; or how to determine the role of institutional arrangements and incentives in organizing the access and compilation of data relevant for public health but created for other purposes in both the public and private sectors. These are some of the questions that go beyond estimating the additional cost per health outcome of implementing intervention A versus intervention B. It is time to move forward.

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