



# How effective are public health departments at preventing mortality?



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## ABSTRACT

This study estimates the causal impact of variation in the expenditures of California county departments of public health on all-cause mortality rates and the associated value of lives saved. Since the activities of county departments of public health are likely to affect mortality rates with a lag, Koyck distributed lag models are estimated using the Lewbel instrumental variables estimator. The findings show that an additional \$10 per capita of public health expenditures reduces all-cause mortality by 9.1 deaths per 100,000. At current funding levels, the long-run annual number of lives saved by the presence of county departments of public health in California is estimated to be approximately 27,000 (26,937 lives, 95% confidence interval: [11,963, 41,911]). The annual value of these lives is estimated to be worth \$212.8 billion using inflation-adjusted standard U.S. government estimates of the value of a statistical life (\$7.9 million).

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## 1. Introduction

The field of public health focuses on the prevention of disease and the promotion of healthy behavior in populations. The focus of county departments of public health can be described by the 10 essential services of public health: (1) monitor health status to identify public problems; (2) investigate health problems and hazards (3) educate 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; (6) enforce health-related laws and regulations; (7) link people to needed

personal health services and assure the provision of health care when otherwise unavailable; (8) assure a competent health care workforce; (9) evaluate effectiveness, accessibility, and quality of personal and population-based health services; and (10) research for innovative solutions to health problems ([Centers for Disease Control and Prevention, 2011](#)). The specific types of activities performed by county departments of public health in California are listed in [Table 1](#). There is a large array of activities performed, some of which overlap with medical care. These activities constitute the relevant public health context within which the aggregate demand for health takes place. As such, this context will affect population preferences for health by design.

What is the impact of county public health systems on the population demand for health? To answer this question requires models that take into account the timing between the occurrence of public health activities and the population health outcomes resulting from these activities. Disease prevention and health promotion

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**Table 1**  
Activities of county departments of public health in California.

Activities of county departments of public health	Percent of departments providing
<b>Immunization</b>	
Adult immunizations	95
Childhood immunizations	95
<b>Screening for diseases/conditions</b>	
HIV/AIDS	86
Other STDs	82
Tuberculosis	95
Cancer	30
Cardiovascular disease	20
Diabetes	26
High blood pressure	39
Blood lead	58
<b>Treatment for communicable diseases</b>	
HIV/AIDS	36
Other STDs	80
Tuberculosis	84
<b>Maternal and child health (MCH)</b>	
Family planning	61
Prenatal care	30
Obstetrical care	18
Special Supplemental Nutrition Program for Women, Infants and Children (WIC)	73
MCH home visits	89
Early and Periodic Screening, Diagnosis, and Treatment (EPSDT)	50
Well Child Clinic	39
<b>Other health services</b>	
Comprehensive primary care	26
Home health care	2
Oral health	23
Behavioral/mental health services	27
Drug and alcohol abuse services	27
<b>Epidemiology and surveillance activities</b>	
Communicable/infectious disease	98
Chronic disease	64
Injury	64
Behavioral risk factors	51
Environmental health	75
Syndromic surveillance	66
Maternal and child health	93
<b>Population-based primary prevention activities</b>	
Injury	65
Unintended pregnancy	70
Chronic disease programs	67
Nutrition	88
Physical activity	60
Violence	36
Tobacco	88
Substance abuse	40
Mental illness	33
<b>Regulation, inspection and/or licensing activities</b>	
Mobile homes	5
Campgrounds & RVs	21
Solid waste disposal sites	60
Solid waste haulers	59
Septic systems	55
Hotels/motels	28
Schools/daycare	44
Children's camps	45
Cosmetology businesses	12
Body art (tattoos, piercing)	45
Swimming pools (public)	67
Tobacco retailers	53

**Table 1** (Continued)

Activities of county departments of public health	Percent of departments providing
Smoke-free ordinances	65
Lead inspection	61
Food processing	31
Milk processing	14
Public drinking water	60
Private drinking water	50
Food service establishments	70
Health-related facilities	35
Housing (inspections)	47
<b>Other environmental health activities</b>	
Indoor air quality	20
Food safety education	70
Radiation control	14
Vector control	47
Land use planning	45
Groundwater protection	55
Surface water protection	52
Hazmat response	44
Hazardous waste disposal	45
Pollution prevention	37
Air pollution	7
Noise pollution	19
Collection of unused pharmaceuticals	16
<b>Other activities</b>	
Emergency medical services	37
Animal control	25
Occupational safety and health	19
Veterinarian public health activities	20
Laboratory services	73
Outreach and enrollment for medical insurance (include Medicaid)	70
School-based clinics	28
School health	21
Asthma prevention and/or management	47
Correctional health	35
Vital records	86
Medical examiner's office	2

Source: 2010 National Profile of Local Health Departments.

activities performed in one year will often impact mortality, not merely for one year, but for many years into the future. In other words, the overall impact of the activities performed in any given year will cumulate over time. Thus, the effects of public health activities on population health outcomes may be underestimated (or not even detected) if this cumulative process is not taken into account.

Past research in this area has all occurred outside of the economic literature. Early examinations were cross-sectional and exploratory in nature (Schenck et al., 1995; Kennedy, 2003; Honoré et al., 2004; Kanarek et al., 2006), while more recent work has focused on panel data with studies including both fixed effects and instrumental variable designs (Grembowski et al., 2010; Erwin et al., 2011; Mays and Smith, 2011). However, no study to date has fully exploited available panel data to estimate the cumulative impact of public health expenditures on health. One way to estimate this cumulative impact is with dynamic panel models.

Dynamic panel models have been used in a related set of studies in the economic literature to estimate the impact of medical expenditures on mortality (Lichtenberg, 2004;

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