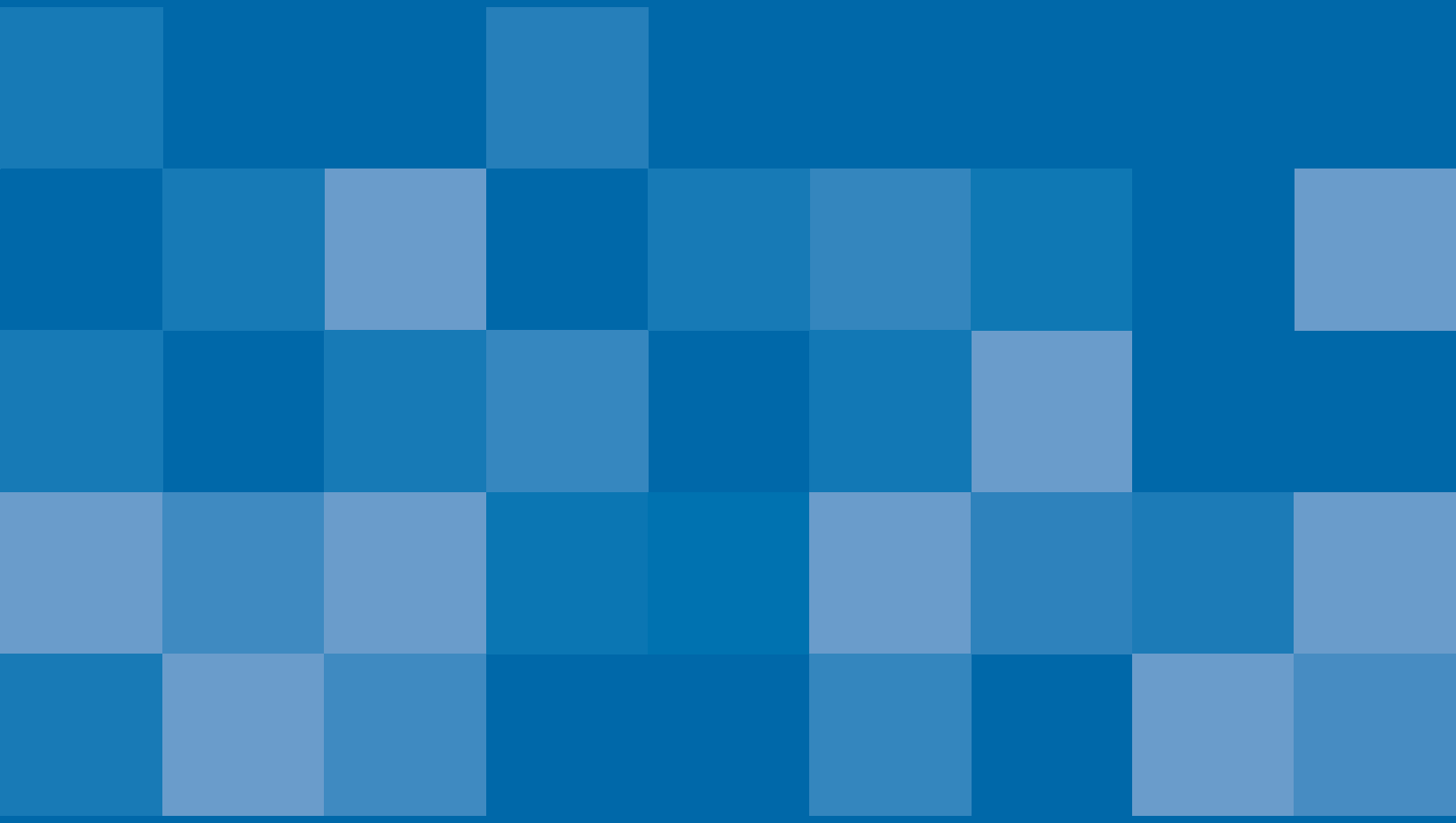
The Return on Investment of Public Health System Spending



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Summary

Improving the public's health through prevention of disease is a strategy that makes good clinical and conceptual sense. But does it also make economic sense? What do we know about what we spend on public health, the health outcomes arising from those investments, and the resulting financial impacts? This review focuses on these questions as they relate not just to individual public health programs, but to the public health system writ large.

Available evidence has demonstrated that spending on the public health system can sometimes result in important population health gains. Research suggests that these health gains can translate into resulting financial impacts beyond what was originally invested. Emerging research also suggests that population health improvements may be obtainable through investment in related social services sectors, although, as with the public health system, the magnitude of the return on investment remains unclear.

Our nation's state and local public health systems have traditionally been funded by federal, state, and local governments and separately from the health care sector. Yet the health care sector is becoming increasingly responsible for keeping populations healthy, giving rise to synergistic opportunities between the traditionally siloed sectors. The existing evidence suggests that public health system expenditures can have a positive return on investment (ROI). Particularly as stakeholders look to drive innovation toward better quality and less cost, there is a need to disentangle investments into population health and understand which yield a positive return on investment.

Background

The Affordable Care Act aims to make preventive care and services more widely available in pursuit of improved population health.[5] To this end, a great deal of attention has been paid to the benefits of clinical preventive services and the extent to which these services are cost effective or cost saving.[8] Yet improvements in population health through disease prevention and health promotion also accrue as a result of other efforts. Specifically, our nation's public health system is an often overlooked contributor to population health outcomes.

Public health programs aim to promote health and, by extension, reduce the burden of disease in a community (in comparison with clinical preventive services, which also aim to reduce the burden of disease but are aimed at individuals instead of populations). Public health programs tend to be funded by a combination of federal, state, and local governmental public health agencies. Collectively these public health programs constitute a public health system. A field known as Public Health Systems Research (PHSR) generates evidence on the impacts that public health systems have on the public's health.

The past twenty years has seen an emergence of a body of research regarding the organization and financing of our public health system and the delivery of public health services within communities.[11] This research synthesis includes a scan and analysis of that literature to shed light on whether public health spending has a measurable impact on the public's health. It also looks ahead to uncover whether there is evidence that spending for other related 'upstream' social services has a measurable impact.

Funding for the Public Health System

Federal, state, and local agencies spend approximately $250 per person per year on the public health system,[12] whereas more than $10,000 is spent on health care per person per year.[13] Public health spending has been falling as proportion of total health spending since approximately 2000 and falling in inflation-adjusted terms since the Great Recession.[12] These declines have resulted in cuts to the public health workforce and to public health program portfolios.[14,15]

- **Clinical Preventive Services:** Services that prevent and/or detect illnesses and diseases in earlier stages.[1]
- **Public Health:** Work that promotes and protects the health of people and the communities where they live, learn, work, and play.[3]
- **Public Health Systems:** All public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction.[6]
- **Public Health Systems Research:** A field of study that examines the organization, financing, and delivery of public health services within communities and the impact of these services on public health.[9]

State and local public health agencies have traditionally received large amounts of funding through both tax revenues and block grants. This combination of funding sources can be problematic when tying expenditures to outputs and outcomes. That is, when the public health system succeeds in preventing disease, savings that accrue are not likely to be reflected on the budgets of governmental public health agencies (i.e. private health insurers or the Centers for Medicaid and Medicare Services may witness the gain).

Another challenge is that governmental public health activities are not always highly visible to the populations served. Health promotion activities can occur at the population level so those served may not in fact recognize themselves as beneficiaries. Likewise, the statistical lives saved due to successful disease prevention are not easily attributable to individuals within a population. Thus, while governmental agencies may be supported by taxpayers at large, building the political will to invest in public health, and especially public health departments, at optimal levels can be challenging to build and sustain. This has been

termed public health's "wrong pocket" problem.[16] Why would one entity pay today for services that are expected to benefit a different entity years from now?

While linking public health and health care spending to improved health outcomes can be tricky, the body of evidence supporting prevention is strong. For example, we know that investment in tobacco cessation can save $2-3 for every $1 invested[17] and that childhood vaccinations can save $5-11 for every $1 invested.[18] To address a broader range of services, and actors providing them, PHSR takes a system-level view of the myriad public health programs offered in a community. Findings from this field allow the merits of investments in public health to be compared, as a field, to other community priorities such as health care, social services, or education.

In contrast to clinical preventive services, the impacts of which are often assessed using cost effectiveness approaches,[8] many public health systems researchers have focused on the "return on investment" (ROI) of public health spending.[19] Challenges to translating the public health system's health impacts in financial terms include:

- **DATA:** Many robust data sources track the trillions of dollars per year spent on health care in the U.S. But because of the multitude of agencies, funding streams, and accounting systems employed across the public health system, it can be challenging to determine how much was actually spent on public health across a community.[20] Without a thorough understanding of what is invested, reliably determining the ROI of public health system spending is not feasible.

- **METHODS:** Public health agency budget determinations may not be entirely divorced from the health outcomes in a community. If worsening outcomes spur policymakers to spend more on health, it may appear that more money causes poorer health. In contrast, improvements in community health might lead to increases in community wealth and therefore increases in spending on health. To the extent that health and spending are linked, disentangling the causal impact of public health spending on health outcomes is challenging. Without valid estimates of the health outcomes resulting from public health spending, determining the ROI of public health system spending is not feasible.

- **PERSPECTIVE:** As described above, the benefits stemming from public health investments do not necessarily accrue to the entities doing the spending. It is therefore important that researchers are purposeful and strategic when tallying public health system spending ROI. For example, an ROI study that counts all of the savings that accrue to private health insurers may not help to convince a state Medicaid director or health commissioner to invest more in the public health system. In order to have maximal impact, the perspective of the analysis (i.e., which costs and benefits are counted and included in the study) needs to be aligned with the study's intended audiences.

Evidence

A review of the PHSR literature focused on ROI and economic analysis was performed using PubMed. In addition, a manual search of publications resulting from the more than 50 financing and economics projects funded through the Robert Wood Johnson Foundation's Public Health Services and Systems Research program was also completed.[21] This review centers on 16 studies that are methodologically rigorous and have advanced our understanding of the value and impacts of investments in public health. While the importance of non-governmental contributions is critical, this evidence review focuses on the impacts and value of governmental spending.

Data Sources Used to Study PHSR ROI

- Primary or secondary cost data from individual states or counties
- National Association of County & City Health Officials' (NACCHO) Profile Survey
- Association of State & Territorial Health Officials (ASTHO) Profile Survey
- Public Health Activities and Service Tracking (PHAST) and Uniform Chart of Accounts
- U.S. Census Bureau's Census of Governments and State and Local Finance Snapshot

The evidence is nearly unanimous that **higher total public health spending is tied to better health outcomes**. On a national level, a study of health department expenditures from 1993 to 2005 found that a $10 per capita increase in local public health expenditures resulted in a 7.4 percent decrease in infectious disease morbidity and a 1.5 percent decrease in premature mortality at the county level.[2] A separate study focusing only on metropolitan areas employed a sophisticated statistical technique known as instrumental variables to enable researchers to test the causal effects of increases in public health spending. They calculated that a 10 percent increase in public health department expenditures was associated with subsequent declines in mortality rates of 1.1 to 6.9 percent over a 13 year period from 1993 to 2007.[22]

One especially relevant set of studies utilized a unique dataset of public health department expenditures in California. Researchers used instrumental variables to show that a $10 increase in per capita spending led to a 0.6 percent increase in the proportion of the population in very good or excellent health[4] and reduced all-

cause mortality by 9.1 per 100,000.[23] Researchers monetized these estimates to determine that every $1 invested in public health in California resulted in $67 to $88 of benefits to society.[24]

Research has also explored how increased spending translates into changes in population health outcomes. More granular findings show that investments in specific public health services are linked to improvements in related health outcomes. A study of maternal and child health public health programs found that increases in these programs' spending was associated with reductions in the incidence of low birthweight rates in Florida and Washington counties[25] and with reductions in health disparities.[26] A study of food safety-targeted public health expenditures in Washington and New York found that higher spending in this area led to fewer foodborne outbreaks and illnesses, with every $10 increase in expenditures leading to a decrease of approximately 0.4 cases of salmonella per 10,000 person years.[7] Other researchers have used different approaches in different settings to show that a $10 increase in overall public health spending can lead to reductions in county-level STD rates of between 3-6 percent.[10]

What Can $10 of Public Health Spending Buy?

- Decrease of 7.4 percent in infectious disease morbidity and a 1.5 percent decrease in premature mortality at the county level[2]
- Increase of 0.6 percent in the proportion of the population in very good or excellent health[4]
- Decrease of 0.4 cases of salmonella per 10,000 person years[7]
- Decrease of 3-6 percent of county-level STD rates[10]

While some studies have found remarkably high returns on public health system spending, it may be plausible that the ROI of public health spending is not always quite so high. A 2018 study assessing the cumulative impacts of all health-related spending for things other than hospitals (i.e., public health plus community health programs, environmental work, etc.) found that a 10 percent increase in such spending was associated with a 0.006 percent decrease in all-cause mortality one year after the initial spending.[29] The magnitude of this effect was far smaller than other studies have calculated, perhaps due to the broader range of categories examined. On the whole, though, the evidence suggests that public health system spending does make a difference and can have positive ROI. Two large-scale reviews have found positive, if nuanced, relationships between spending and outcomes. Nine out of 10 studies examined in a 2015 systematic review of PHSR found that increases in spending are associated with improved population health outcomes, including reduced mortality.[27] Similarly, a 2017 systematic review of international studies found that spending for individual public health interventions, services, or policies had a median ROI of $14.30 per $1 invested. The study also noted that national-level, upstream interventions such as changes to tax policies and primary prevention programs tended to have the highest returns on investment.[28]

Reflecting the importance of factors outside of the public health system, an emerging body of research has uncovered **a positive relationship between social services expenditures and better health outcomes**. Having higher social services spending relative to health care spending has been linked with better health outcomes at the national[30,31] and state[32] levels. Increases in public health and certain types of social services spending such as housing and community development, K-12 education, and libraries has also been shown to lead to improvements in health outcomes at the county level.[33]

Discussion

The evidence regarding the ROI of public health spending suggests that public health spending can improve population health outcomes. In some instances, investments were found to yield returns to society that are greater than what was invested in the first place. However, the studies reviewed in this report suggest that the specific ROI may vary according to the type of public health program, the setting, health outcomes examined, data sources used, study methodologies, and analysis perspective used.

The evidence base for the ROI of public health spending has both strengths and limitations. Until recently, there had been only a limited number of relevant datasets that exist to track public health spending.[27] Recent efforts have **expanded the number of available data sources** to now include standardized national and state-level data and annualized spending totals.[22,23,25,33]

Correlation does not imply causation and, until recently, available evidence had tended to be of limited methodological rigor.[27,28,34] Use of instrumental variable and other **advanced econometric methods are increasingly commonly used** to determine the impacts and ROI of public health spending. This is an important advance given that these methods enable the generation of evidence that can draw causal links between spending, health impacts, and ROI. These methods strengthen the evidence base and as they become more ubiquitous our confidence in ROI estimates should continue to improve.

Virtually all studies used societal perspectives in their analyses, examining the ROI of public health spending to society at large rather than limiting analyses to only specific agencies or stakeholders. **Analyses focused on ROI to one specific payer or set of stakehold-**

ers are uncommon. Building stronger evidence that can be directed towards specific audiences regarding the benefits that would accrue to a specific stakeholder such as a county's health budget or total budget, a state Medicaid agency, or to CMS programs may further enhance the impact of public health ROI studies. Far more evidence is needed regarding payer-specific analyses given public health's wrong pocket challenge. One recent study explored the health care cost savings that may flow from the improved health of the community that sometimes accompanies public health spending.[35] Further evidence regarding not just the health care cost savings, but which agencies are expected to reap these savings may help guide policymakers towards optimal levels of investment in public health systems.

Much of our current evidence has focused on quantifying the impact that governmental public health system spending can have on population health. There is a need for additional evidence that incorporates a multi-sector perspective by also analyzing governmental expenditures for a range of other critically important social services. We currently have a limited understanding of the 'black box' that exists between upstream spending inputs and downstream health outcomes.[27,34]

Available evidence has demonstrated that each dollar invested in public health often returns more than one dollar in terms of health and financial benefits. So why is spending for public health declining? A recent IOM report lays out several relevant realities and challenges to garnering support for public health system funding commensurate with the system's demonstrated benefits:[36]

- Public health generally takes action before someone is sick; persons who avoid an illness are not identifiable and thus will never know that they themselves benefitted
- Benefits are often realized over the long-term, years or decades after investments are made, and
- Populations can differ in their priorities and principles, leading to disagreements over program approaches or merits of the program itself.

Looking forward, new evidence regarding the payer-specific ROI of public health spending could spur additional stakeholders to consider strategic investments in prevention efforts across the public health system. De-siloing block grant funding to state and local public health systems could theoretically better integrate public health programs, public health system, and other health-oriented stakeholders in a community. Value-based payments are likely to continue to push towards rewarding providers for keeping populations healthy.[37] To the extent that public health systems are effective at improving population health outcomes, partnerships with health insurance plans engaged in population health activity may be mutually beneficial. Evidence regarding the potential ROI of public health spending may pique the interest of new investors. Innovative approaches such as pay for success financing[38] and social impact bonds[39] are also beginning to receive attention as funding approaches for public health systems that align the costs and benefits of public health investments. ROI evidence can also be deployed to retain existing sources of funding to support our nation's public health system.

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