Research Brief

THE NORTH CAROLINA Institute *for* Public Health

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Measuring Outcomes for NC Local Health Departments: Preliminary Results

Return on investment is a term we have heard a lot in the news recently, particularly as it relates to public spending. But what does the term "return on investment" mean in the field of public health? A team at the University of North Carolina at Chapel Hill is conducting research to help answer this question. The two-year study is examining the association between investments in local public health and community health outcomes in North Carolina. This report provides the context and initial findings from the first year of the study.

A primer on return on investment

The term "return on investment" (ROI) originates from the world of corporate finance. When used in that context, it refers to the benefit, usually profits or earnings achieved, from an investment. While profits or earnings are not the goal of public health, the ROI concept can be applied to public health to determine whether the benefits of an investment justify the costs or to compare benefits of different investments. There are several accepted approaches for evaluating economic efficiency in public health. Using a hypothetical community breast cancer screening program as an example, we describe each approach and illustrate how it might be used.

- ***Cost benefit analysis (CBA)*** answers the question of whether the benefits of an intervention are greater than the costs. A community breast cancer screening program might use CBA to assess whether the benefits of the screening program, measured in terms of reduced treatments costs due to earlier detection, are greater than the costs of the screening program. A key feature of CBA is that both costs and benefits are expressed in dollar amounts. If the benefit is a savings in treatment costs, a dollar value is assigned to each benefit accrued and all benefits are summed, and compared to the program costs, to complete a CBA.
- ***Cost effectiveness analysis (CEA)*** establishes the cost of each outcome of interest. In CEA, benefits are not converted to dollars but rather expressed in program appropriate units. The community breast cancer screening program might use CEA to describe the cost per woman screened or the cost per cancer case detected by the program.
- ***Cost utility analysis (CUA)*** is used to assess the effects of an intervention taking preferences into account. CUA might be used to compare two different programs using a non-monetary outcome such as quality adjusted life years (QALYs). CUA could be used to evaluate whether the money spent for the community breast cancer screening program was the best way to achieve a goal of increasing quality adjusted life years. QALYs and costs of different interventions, such as smoking cessation and breast cancer screening, could be compared in a CUA.

This study examines the relationship between spending by local health departments (LHD) in North Carolina and a number of community health measures of morbidity and mortality. The preliminary results show wide variation in LHD expenditures across North Carolina.

While each of these approaches answers a slightly different question, they have common data needs. For all of these economic evaluations, information about the costs and information about the expected benefits is necessary. Costs are usually measured in monetary terms, but may also be captured as staffing or other infrastructure necessary to implement the intervention. Benefits can be measured in monetary terms (such as dollars saved by prevention) or in terms of health or disease outcomes. These examples are considered direct costs and benefits. In addition to direct costs and benefits, indirect costs and benefits, such as productivity costs should also be considered, along with time frames and appropriate comparisons – all of which complicate public health ROI calculations.

Despite the difficulties of estimating return on investment for public health, it is becoming increasingly important to undertake such studies. Public health funding has diminished significantly due to the economic downturn as many states and communities have struggled to keep basic services in place. These cuts may have come at a high price. Recent studies have shown links between public health spending and improved community health outcomes as varied as infant mortality, cancer mortality and infectious disease morbidity. (1, 2) In this study, we are examining the relationship between spending by local health departments in North Carolina and a number of community health measures of morbidity and mortality.

Study methods

Measuring costs

In this study, we used total local health department (LHD) expenditures as a measure of the cost of public health services. The data on expenditures are derived from responses to the National Association of County and City Health Officials (NACCHO) *National Profile of Local Health Departments*. All LHDs in the country are invited by NACCHO to participate in periodic surveys to characterize LHD funding sources, staffing, programs and services. Our study uses data from the 2005 and 2008 profiles of North Carolina LHDs, with the goal of examining at how LHD expenditures changed as we approached the economic recession. To account for the differing population sizes served by LHDs, we are measuring expenditures on a per capita basis.

Measuring benefits

Benefits are measured by calculating cause-specific mortality and morbidity rates within the service delivery areas associated with each NC LHD. The mortality measures we will examine include: infant mortality and cause-specific mortality from heart disease, diabetes, cancer, and influenza. Mortality rates come from aggregated mortality files produced by Centers for Disease Control and Prevention. To measure morbidity, we will examine hospitalization rates for heart disease, diabetes, cancer, influenza using public and private insurance claims. In addition, we will measure rates of food borne illnesses, vaccine preventable diseases, sexually transmitted diseases and cancer screening by examining insurance claims for services for any of these conditions provided in any setting, including physician offices, outpatient clinics and hospitals. These morbidity measures will leverage a newly created data resource, unique to NC, called ICISS (Integrated Cancer Information and Surveillance System). ICISS data include health insurance claims for North Carolinians covered under Medicare, Medicaid, a very large commercial insurer and the State Employees Health Plan.

Study design and population

This study uses a retrospective design. The recent economic recession provided the context for a "natural experiment" assessing the effect of public health spending reductions on public health outcomes. The LHDs in NC (n=85) constitute the study population. Eighty LHDs in NC participated in both the 2005 and 2008 NACCHO profile surveys.

Preliminary results

Variation in expenditures

In 2005, the average annual total expenditure for NC LHDs was $74 per capita. In 2008, the average annual total expenditure per capita increased to $87. Data from both years demonstrated a great deal of variability in spending across counties. In 2008, the lowest per capita amount was $35 and the highest was $218 (See Table 1 on next page).

Table 1. Variation in total public health expenditures by NC LHDs, 2008*

	Number of LHDs	Mean total expenditures	Range
No Data	7	---	---
< $57	20	$49	$35 -- $56
$57 - $79	20	$69	$57 -- $79
> $83 - $106	19	$93	$83 -- $106
>$113 - $218	19	$142	$113 -- $218

*Values represent expenditures per capita

Changes in expenditures

While the average per capita total expenditures increased between 2005 and 2008, not all LHDs experienced an increase. Ten LHDs experienced a decrease in expenditures between the two time periods, with a decrease of $21 per capita representing the largest decrease (Table 2).

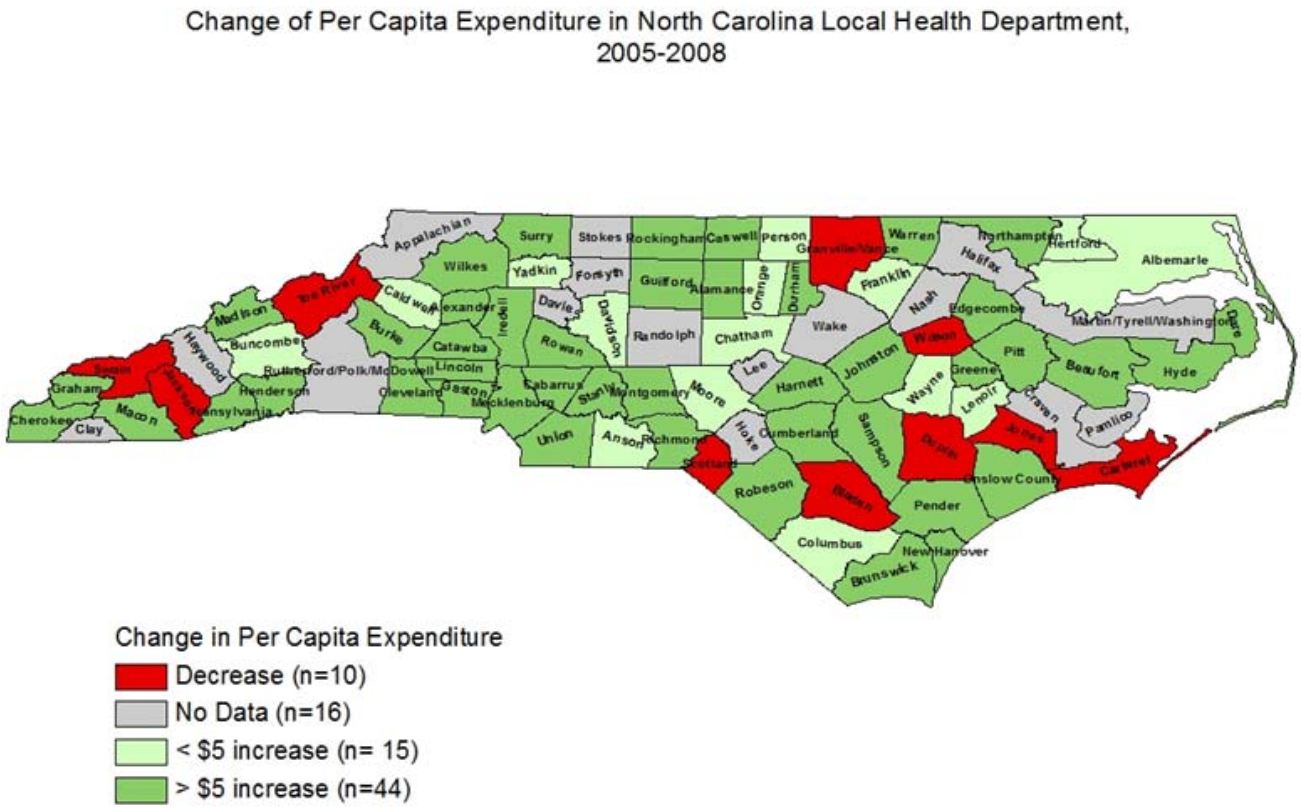
Table 2. Change in total public health expenditures by NC LHDs between 2005 and 2008*

	Number of LHDs	Mean change in expenditures	Range
No Data	16	---	---
Decrease	10	-$7.10	-$21.20 -- -$0.15
< $5 increase	15	$2.80	$0.10 -- $4.90
> $5 increase	44	$16.90	$5.50 -- $74.50

*Values represent expenditures per capita

LHDs experiencing a decline in expenditures were located in all regions of the state (See Figure 1 on next page). The LHDs with decreased expenditures all served rural areas of the NC.

Figure 1. Change in total public health expenditures by LHDs, by county, 2005-2008



Discussion

These analyses illustrate wide variation in LHD expenditures across North Carolina. It is unclear whether or not LHDs with higher expenditures should be expected to have better health outcomes. LHDs may have higher per capita expenditures if they serve more rural communities or a population with a greater underlying burden of disease. The cost of delivering public health services is influenced by a number of variables, including the demographic and health characteristics of the population and the presence (or lack) of other health services. These preliminary analyses have not yet taken these factors into account. Future analyses will adjust for these characteristics. In addition, we will continue to explore other measures of LHD expenditures, such as examining local funding separately from other sources of funding.

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