


Resources that may matter:  
Changes in local health  
department expenditures  
and impact on state health  
measures

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THE **FUTURE**  
OF PUBLIC HEALTH



## Background

**“Performance measurement in the public health system must be able to measure inputs, processes, outputs, and outcomes in ways that allow for changes (emphasis added) in one to be linked with another”**

**B. Turnock, 1997**



## Research Question

**Are changes in Local Health Department characteristics - inputs, outputs, processes - associated with improvements in health outcomes at the state level?**



## The Literature

### LHDs/Local Public Health Systems and Health Outcomes:

1. Schenck *et al* , 1995
2. Kennedy, 2003
3. Honore' *et al*, 2004
4. Kanarek *et al*, 2006
5. Mays and Smith, in press 2010



## Previous Work

**Keeneland 2009: Changes in LHD inputs with changes in health measures, 1997-2005. Erwin *et al*, In Press, AJP**

**Main Findings:**

- **An increase in Expenditures per capita was associated with a decrease in Infectious Disease cases**
- **An increase in FTEs per capita was associated with a decrease in CVD mortality**



## Methods

- **Extended timeframe of previous work to include NACCHO Profile data from 1993, 1997, and 2005**
- **Inputs (main independent variable): LHD Expenditures, aggregated to the state level (NACCHO)**
- **Outcomes (dependent variables): state-level health measures (America's Health Rankings)**



## Methods

**Model: Fixed Effects Model (FEM)**

$$y_{it} = \beta_0 + X_{it}\beta + Z_{i\gamma} + \alpha_i + u_{it},$$

**Advantages: Reduces bias from omitted variables that are time-invariant**

**Limitation: Cannot assess the effect of variables that have little within-group variation.**

State	Year	ID	$\bar{x}ID$	ID- $\bar{x}ID$	ExCap	$\bar{x}ExCap$	ExCap- $\bar{x}ExCap$
MN	1993	21	15	6	35	39	-4
MN	1997	14	15	-1	37	39	-2
MN	2005	10	15	-5	45	39	6
TN	1993	73	52	21	27	36	-9
TN	1997	62	52	10	33	36	-3
TN	2005	21	52	-31	48	36	12



# Methods

## Dependent variables

- Smoking Prevalence
- Obesity Prevalence
- Infectious Diseases
- Infant Mortality
- Cardiovascular Deaths
- Cancer Deaths
- Years of Potential Life Lost



# Methods

## Control Variables

- High school graduation
- Health insurance
- Poverty
- Racial composition
- Age structure (percent of the population over age 65 years)
- State population

# Results

## *Changes in State Health Measures with changes in Expenditures per Capita*

Dependent Variable	Coefficient	Std. Err.	t	p	95% Conf.	
					Interval	
Smoking	0.0126735	0.015531	0.82	0.417	-0.01833	0.043673
Obesity	-0.0116001	0.026512	-0.44	0.663	-0.06452	0.041317
ID	-0.3057602	0.093191	-3.28	0.002	-0.49177	-0.11975
CVD	-0.153379	0.206441	-0.74	0.46	-0.56544	0.25868
Cancer	-0.0367254	0.052566	-0.7	0.487	-0.14165	0.068197
YPLL	-12.58516	4.602592	-2.73	0.008	-21.772	-3.39835



## Discussion

### Main Findings:

#### Expenditures and Infectious Diseases

- Consistent with cross-sectional studies
- Consistent with Mays and Smith (in press)
- Consistent with Erwin *et al* (in press)
- Strong supporting evidence for a pathway that goes through a change in LHD outputs/processes



## Discussion

### Main Findings:

#### Expenditures and Premature Mortality

- Extends previous findings related to changes in LHD inputs and changes in Infant Mortality, and mortality from CVDz, Diabetes, and Cancer (Mays and Smith)
- Logical, though not proven, pathways through LHDs for impacting the leading causes of death – CVDz, Cancer, Stroke, COPD, Accidents, Diabetes – through a focus on prevention



## Limitations

- **Remaining bias from unmeasured, time-variant variables**
- **Endogeneity**
- **No Consideration of Federal and State Public Health spending not included in LHD ExpCap**
- **Absence of findings related to IMR; Smoking and Obesity; CVD and Cancer**

# Limitations

**The Black Box remains:**

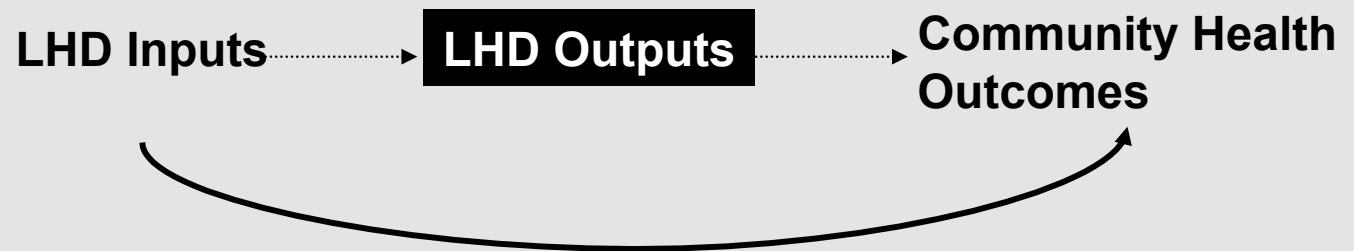
**LHD Inputs**

**Community Health  
Outcomes**



# Limitations

The Black Box remains:





# References

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