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Estimating Return on Investment: Approaches and Methods

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Estimating Return on Investment: Approaches and Methods

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Why ROI?

- Do outcomes achieved by public health interventions justify their costs?
- Where should new investments be directed to achieve their greatest impact?

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Related questions of value…

- How much health can we produce through public health investments?
- Can public health investments help "bend the curve" to contain medical costs?

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ROI Uncertainty and Controversy

THE WALL STREET JOURNAL.
WSJ.com

JUNE 12, 2009

Prevention Efforts Provide No Panacea on Health Costs

By JANET ADAMY

Preventing Chronic Disease: An Important Investment, But Don't Count On Cost Savings

An overwhelming percentage of preventive interventions add more to medical costs than they save.

HEALTH AFFAIRS - *Volume 28, Number 1*

by Louise B. Russell

Prevention for a Healthier America:

INVESTMENTS IN DISEASE PREVENTION YIELD SIGNIFICANT SAVINGS, STRONGER COMMUNITIES

Trust for America's Health
WWW.HEALTHYAMERICANS.ORG

Why the Focus on Costs?

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2012 Institute of Medicine Recommendations

- Identify the components and costs of a minimum package of public health services
  - Foundational capabilities
  - Basic programs
- Allow greater flexibility in how states and localities use federal public health funds
- Implement a national chart of accounts for tracking spending levels and flow of funds
- Expand research on costs and effects of public health delivery

Institute of Medicine. For the Public's Health: Investing in a Healthier Future. Washington, DC: National Academies Press; 2012.

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Challenges in demonstrating ROI in public health

- Time lag between costs and benefits
- Distribution of costs and benefits: *concentrated* costs but *diffuse* benefits
- Measurement of costs and benefits requires good information systems
- Attribution of benefits: the counterfactual

ROI Key Ingredients

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Investments

- Costs of implementing public health interventions
- Who's investments?

Returns

- Valuation of the outputs and outcomes attributable to public health interventions
- Who realizes returns?
- Over what time frames?
- Compared to what?

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Managing ROI Expectations

- **Cost savings** – a high bar
- **Cost effectiveness** – value for dollars spent
  - Compared to status quo
  - Compared to other possible investments
  - Compared to doing nothing

…Key concept: opportunity costs

Estimating ROI in public health: Key Considerations

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Perspective

- Federal, state, health system, or societal?

Time Horizon

- How long can you wait to realize returns?

Types of Interventions

- Primary, secondary or tertiary prevention
- Cross-cutting infrastructure

Estimating ROI in public health: Key Considerations - Costs

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Direct costs

- Cost of implementing intervention/infrastructure
- Cost savings attributable to the intervention

Indirect costs

- Economic value of productivity gains/losses or time savings/costs attributable to the intervention

Estimating ROI in public health: Key Considerations - Benefits

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Efficiency gains (captured in cost measures)

- Reduced labor costs
- Reduced material costs

Productivity gains (captured in output measures)

- Services delivered
- Cases detected
- Time in process

Revenue gains (captured in financial measures)

Health gains (captured in outcome measures)

- Deaths averted
- Cases prevented
- Quality-adjusted life years gained

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Estimating ROI in public health: Key Considerations

Break even

- How long does it take to recoup investment?

Maintenance/Persistence

- How long do the benefits last?
- Recurring costs?

Achieving ROI in public health: Key Considerations

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- **Economies of scale**: many public health interventions can be delivered more efficiently across larger populations
- **Economies of scope**: efficiencies can be realized by using the same infrastructure to deliver an array of related programs and services

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Estimating ROI in public health: Types of Analyses

- Macro-level analysis
- Infrastructure-level analysis
- Program-level analysis
- Process-level analysis

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Estimating ROI in public health: Macro-level Analysis

Trust for America's Health
WWW.HEALTHYAMERICANS.ORG

NATIONAL RETURN ON INVESTMENT OF $10 PER PERSON (Net Savings in 2004 dollars)			
	1-2 Years	5 Years	10-20 Years
U.S. Total	$2,848,000,000	$16,543,000,000	$18,451,000,000
ROI	0.96:1	5.6:1	6.2:1

Source: Trust for America's Health, 2009

Estimating ROI in public health: Program-level Analysis

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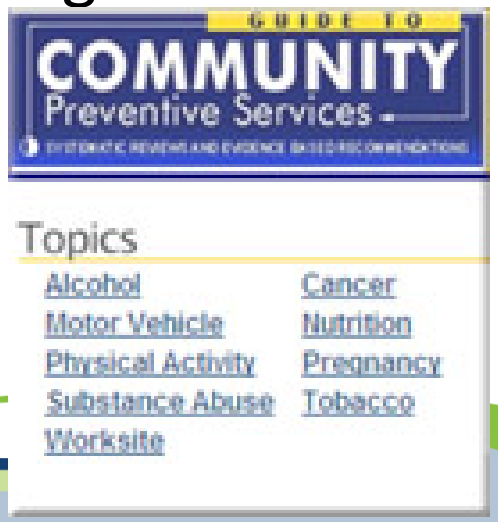
- Smoking cessation interventions cost an estimated $2,587 for each life-year gained
- $1 spent on STD and pregnancy prevention produces $2.65 in medical cost savings
- $1 spent on preconception care for diabetic women produces $5.19 in medical cost savings
- $1 spent on childhood immunization produces $6.30 in medical cost savings



Source: Centers for Disease Control and Prevention 2008

Estimating ROI in public health: Program-level Analysis

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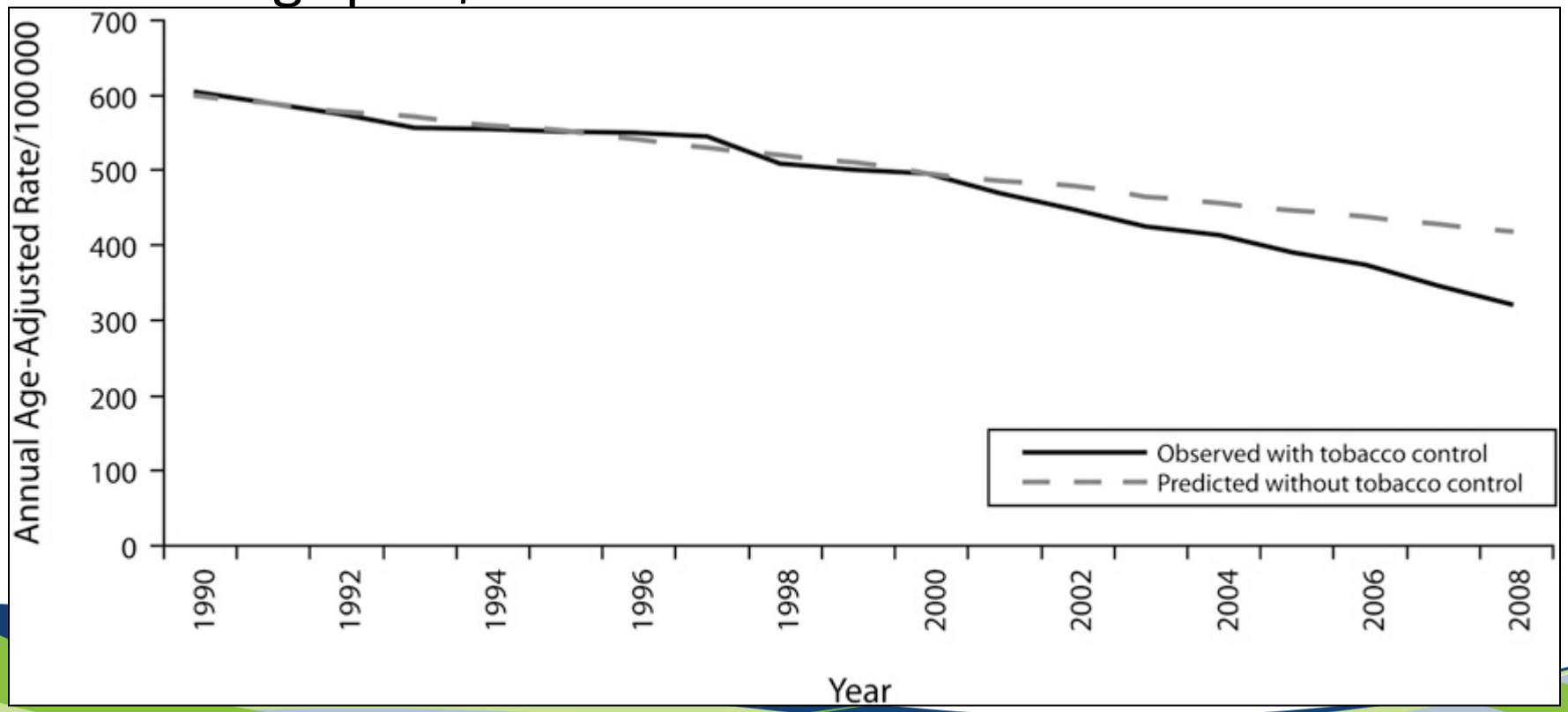
- Washington State Comprehensive Tobacco Prevention and Control Program: $5 in health care savings per $1 investment



Source: Dilley et al., AJPH 2011

Mortality reductions attributable to local public health spending, 1993-2008

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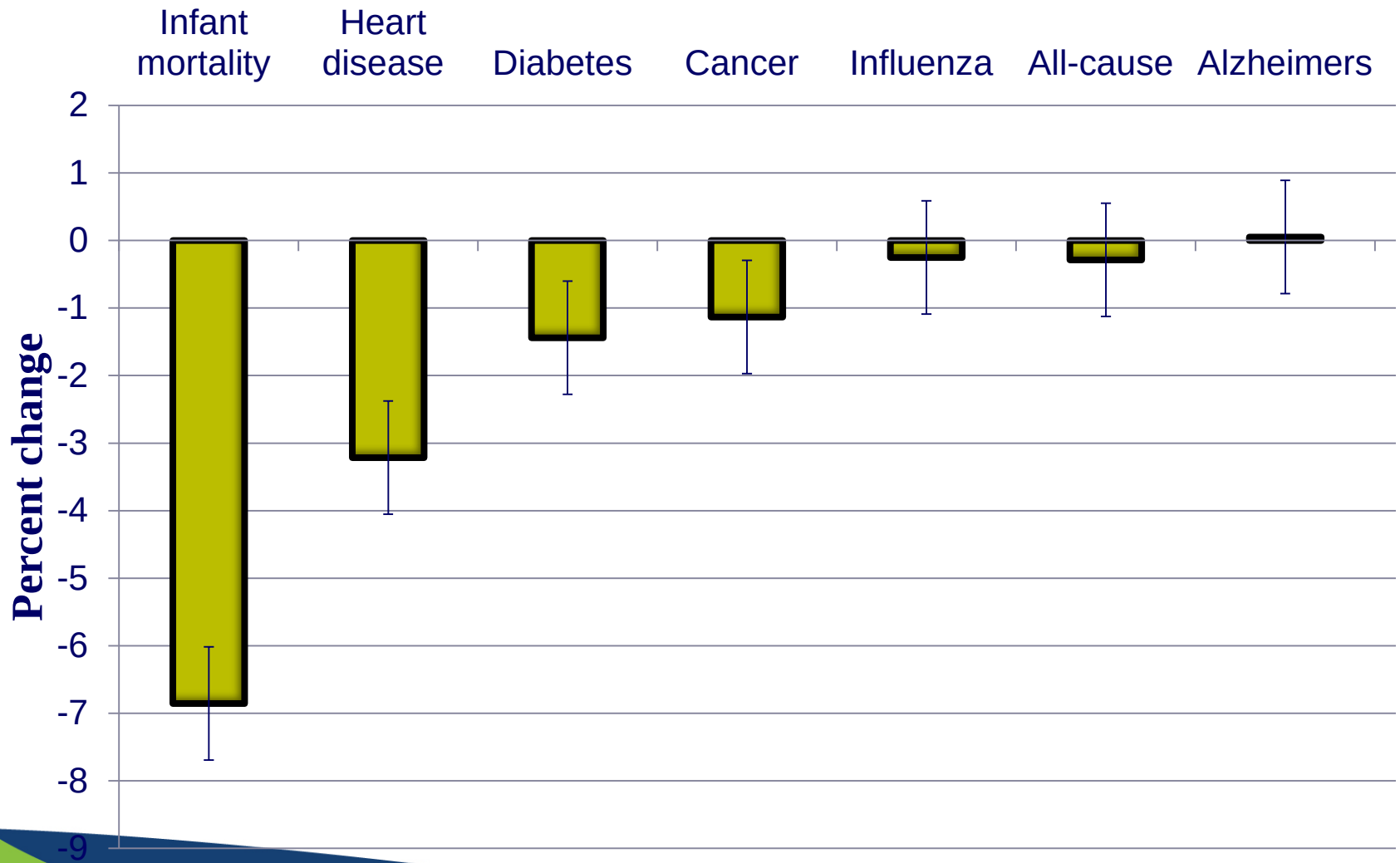

Mays et al. Health Affairs, 2011

Medical Care Offsets Attributable to Local Public Health Spending, 1993-2008

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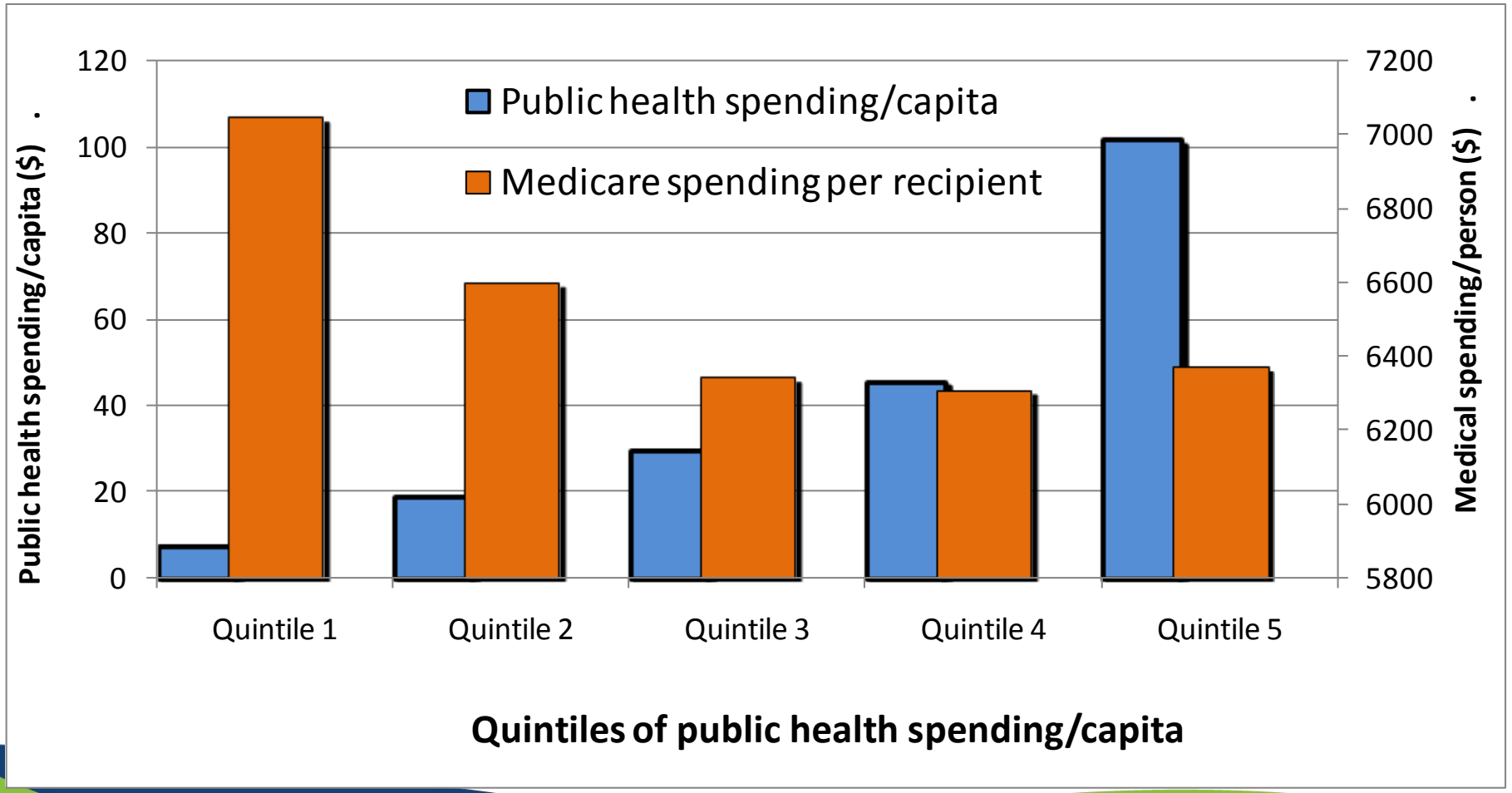
Medical Cost Offset = 0.088%



Mays et al. Health Services Research, 2009

Projected effects of new ACA public health spending

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- 1.2% increase in public health spending in average community over 10 years:

Public health cost	$7.2M
Medical cost offset	-$6.3M (Medicare only)
Deaths averted	175.8
Life years gained	1758
Net cost/LY	$546

Mays et al. forthcoming 2012

Estimating ROI in public health:
Existing Tools

AHRQ Asthma ROI calculator

http://statesnapshots.ahrq.gov/asthma/Required.jsp

CDC Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC)

http://apps.nccd.cdc.gov/sammec/

CDC LeanWorks Obesity Cost Calculator

http://www.cdc.gov/leanworks/costcalculator/index.html

RWJF Diabetes Self-Management ROI Calculator

http://www.diabetesinitiative.org

HIMSS Electronic Health Record ROI

http://www.himss.org/ASP/ROI_Calc.asp

Estimating ROI in public health:
National Public Health Improvement Initiative

- Goal: Develop ROI approaches to assess value of improvements in public health capacity, infrastructure, administrative processes
- Near-term: capture effects on labor costs, time costs, productivity
- Longer-term: capture effects on program delivery (reach, effectiveness), population health

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Public Health
Prevent. Promote. Protect.

The Public Health ROI Calculator:

A B C D E F G H I J K L

PUBLIC HEALTH RETURN ON INVESTMENT TEMPLATE

Demonstration Version

October 29, 2012

Prepared for:

The Association of State and Territorial Health Officials

Prepared by:

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Supported by the U.S. Centers for Disease Control and Prevention's National Public Health Improvement Initiative

The Public Health ROI Calculator: Demonstration Version

- Requires data on:
  - Operating costs before and after implementation of your public health strategy
  - Revenues (if any) before and after implementation of your public health strategy
  - Measures of outputs/services before and after
  - Measures of health and economic outcomes (if available) before and after

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The Public Health ROI Calculator: Demonstration Version

- Potential streams of returns addressed by the calculator:
  - Changes in operating costs
  - Changes in output
  - Changes in time required to produce output
  - Changes in program delivery (reach)
  - Changes in health-related outcomes

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Key questions for cost analysis

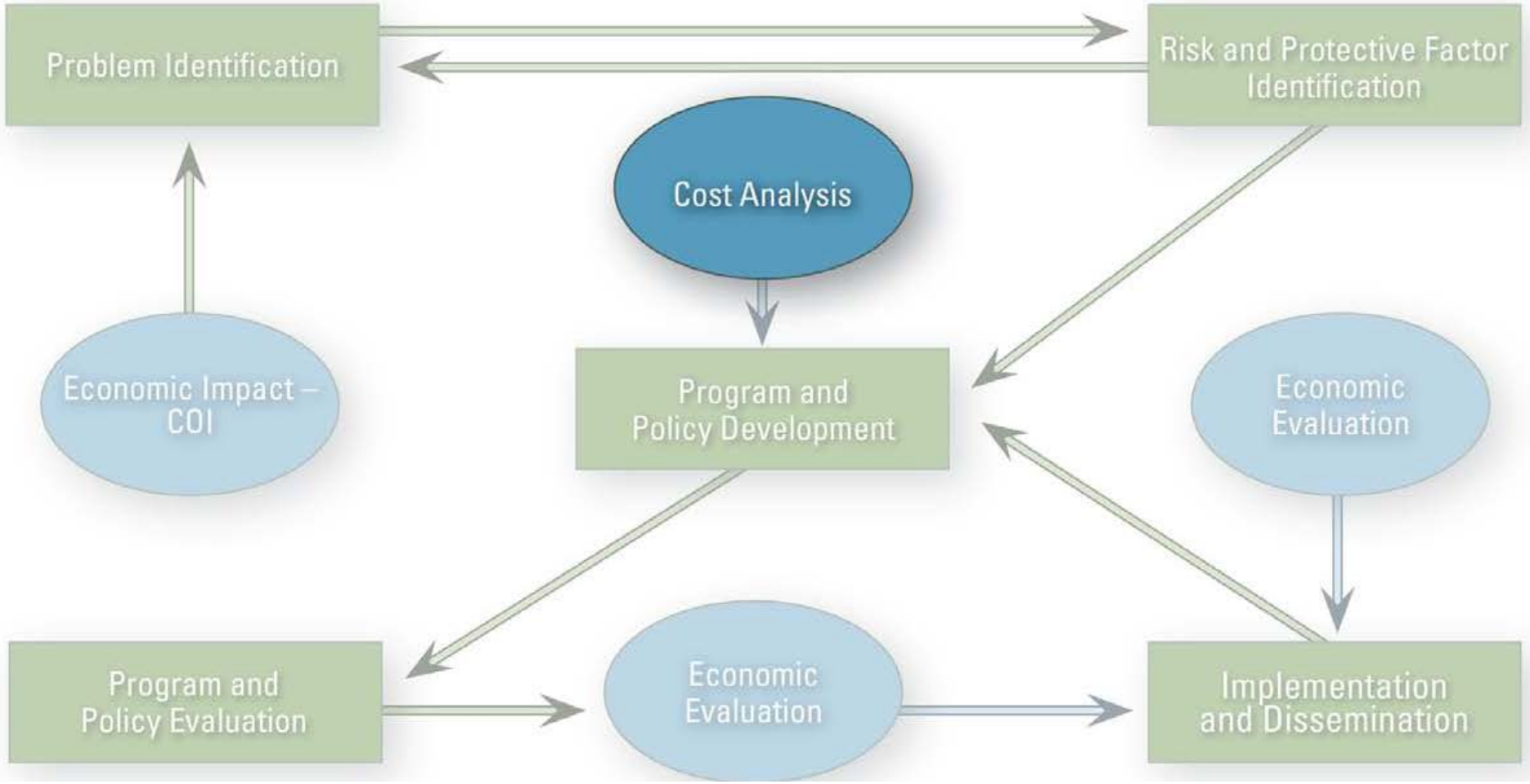
- What level of resources are required to deliver a given bundle of public health activities for a given population?
- How do delivery costs vary across communities and population groups?
- Where are the opportunities to realize efficiencies in delivery?

What's the big deal?

"Poor costing systems have disastrous consequences. It is a well-known management axiom that what is not measured cannot be **managed or improved**. Since providers misunderstand their costs, they are unable to **link cost to process improvements or outcomes**, preventing them from making good decisions….Poor cost measurement [leads] to huge **cross-subsidies across services**…Finally, poor measurement of costs and outcomes also means that effective and efficient providers **go unrewarded**."

– R.S. Kaplan and M.E. Porter, The big idea: how to solve the cost crisis in health care. *Harvard Business Review*; 2011.

CDC's Public Health Model for Prevention



First Principles

Estimating total economic costs of an activity

- Costs = value of resources used to produce activity
- Resources = people, facilities, equipment, supplies

…Key concept: opportunity costs

Financial Costs

- Expenditures for resources to implement the activity – based on market prices
- Often reflected in expenditure reports, invoices
- Convenient, sometimes incomplete, measures
- Examples:
  - Salaries for project personnel
  - Supply costs
  - Computer purchases
  - Cost of curriculum materials

Economic Costs

- Value of the lost benefit because the resource is not available for its next best use
- Examples:
  - Volunteer time
  - Donated space
- Shadow prices may be used when market price does not accurately reflect the value of the resource

Developing a cost classification system

- Perspective: who incurs cost
- Timeframe: over what period
- Type of resource
  - Labor, equipment, supplies, facilities, etc
- Activity domains/areas
  - Training, curriculum development, surveillance, recruitment, screening, **administration**
  - Pre-implementation vs. post-implementation
- “Direct” vs. “indirect” activities
- Capital vs. operating costs (& depreciation)

Developing a cost classification system

- Common resource categories
  - Noncontract labor
  - Contract services
  - Materials/supplies
  - Building/facilities
  - Donated labor and resources
  - Other resources not funded directly

Developing a cost classification system

Don’t overlook...

- Resources that are hard to measure or value
- Resources used in small amounts
- Resources procured without money
  - Volunteer time
  - Parent/caregiver time
  - Intervention recipient time
  - In-kind contributions/donated materials
  - Existing resources

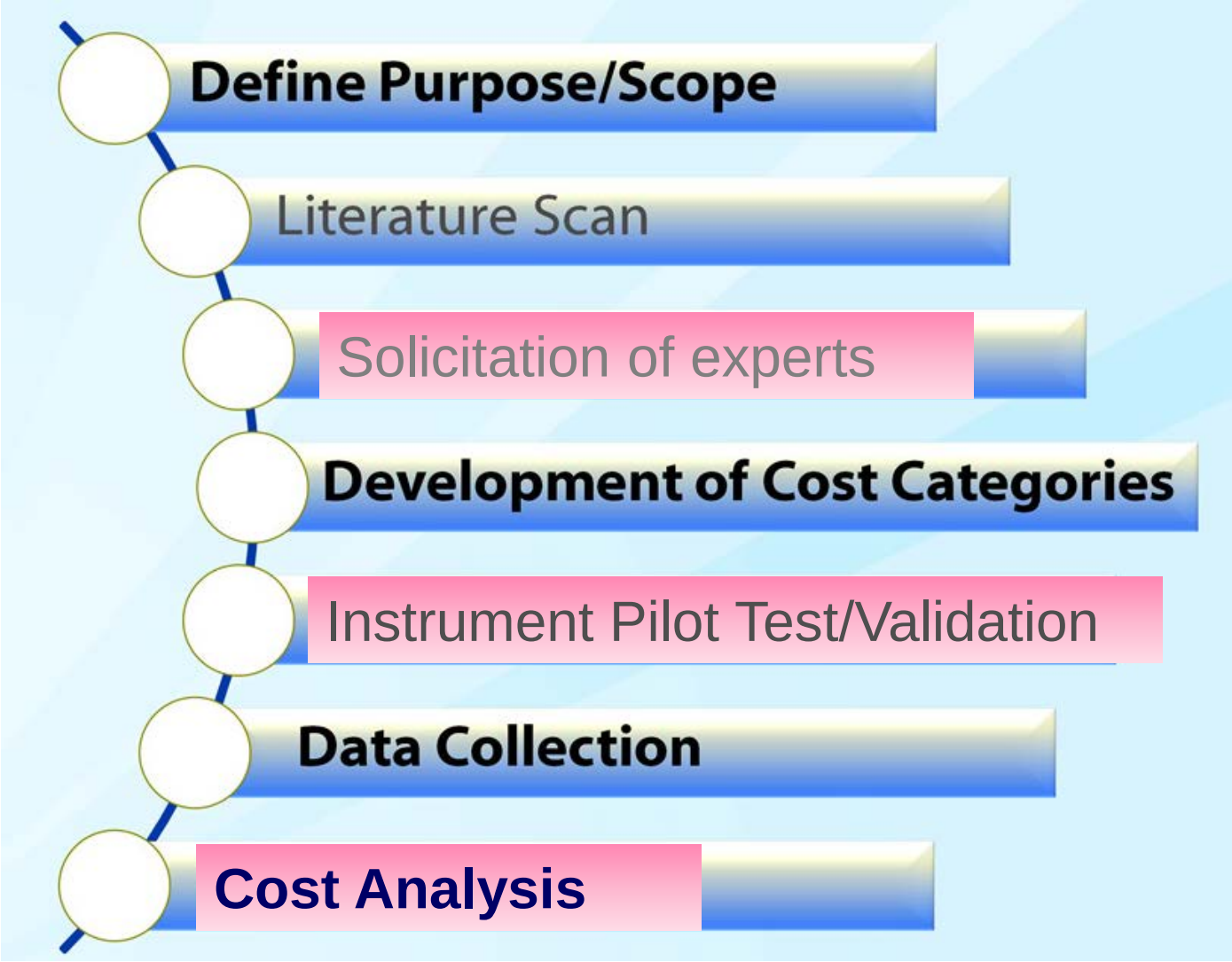
Developing a cost classification system

- Include measures of units of activity
  - Unit costs
- Fixed vs. variable costs
  - Variable costs vary with activity level
  - Fixed costs are constant despite volume of activity
  - Long term, all costs are variable

Developing a cost classification system

- Handling resources that are shared by multiple programs, activities, or organizations
- Cost allocation methods
  - Time
  - Intensity of use

Conducting a cost study



Conducting a cost study: focus

- Program/intervention
- Cross-cutting infrastructure (e.g. PHAB stds)
  - Assessment
  - Surveillance
  - Planning
  - Policy development
- Organization
- Industry/enterprise

Cost data collection methods

- Direct observation methods
- Time studies and time-and-motion methods
  - random moment time sampling
- Activity logs
- Analysis of administrative records
- Surveys
  - Program delivery staff
  - Program managers/directors
- Group process methods with vignettes

Examples: Survey methods

SPECIAL REPORT

The NEW ENGLAND JOURNAL of MEDICINE

Results and Policy Implications of the Resource-Based Relative-Value Study

William C. Hsiao, Ph.D., Peter Braun, M.D., Daniel Dunn, Ph.D., Edmund R. Becker, Ph.D., Margaret DeNicola, M.P.H., and Thomas R. Ketcham, M.P.H.

N Engl J Med 1988; 319:881-888 | September 29, 1988 | DOI: 10.1056/NEJM198809293191330

Three dimensions of work:

- Mental effort and judgment
- Technical skill and physical effort
- Stress

Examples: Survey methods

The JO

Results and Relative-Val

William C. Hsiao, Ph.D., Thomas R. Ketcham, M.

N Engl J Med 1988; 319

Table 4

Summary of Estimated Cost of Data Collection (in 1991 dollars)

Collection Method	Total Cost[a]	No. of Completes	Cost per Complete[b]	Cost per Rated Service[c]
Telephone	$105,000	1200	$87.50	$175.00
1-Round Mail	$65,500	1200	$54.58	$109.17
2-Round Mail	$80,000	1267[d]	$63.14	$133.33
Panel	$88,000	n/a	n/a	$146.67

[a]Total cost of data collection includes all field activities (e.g., interviewing, survey distribution, data reduction), supervision, management, and instrument/materials development.

[b]Cost per complete is derived by dividing the total cost of data collection by the number of completed cases. (This calculation is not applicable to the panel-rating methodology.)

[c]Cost per service is derived by dividing the total cost of data collection by the 600 rated services.

[d]667 completes for the first round and 600 completes for the second round.

Examples: Survey methods

SASCAP™
Substance Abuse Services Cost Analysis Program

- Surveys program managers
- Refers to expenditure records (not budgets)
- Explicit allocation of resources across multiple programs
- Available at:

http://www.rti.org/page.cfm?objectid=7E6095C8-AE6E-4568-874839C81FAD414B

Zarkin GA, Dunlap LJ, Homsi G. The substance abuse services cost analysis program (SASCAP): a new method for estimating drug treatment services costs, **Evaluation and Program Planning** 2004; 27(1): 35-43,

Examples: Survey methods

SASCAP™
Substance Abuse Services Cost Analysis Program

SASCAP™ Labor Module

Time Allocation Table for Non-Medical Direct Care Staff

1	2	3	Hours Spent in Average Week Providing Specified Patient Services										Hours Spent in Average Week Doing Administrative and Other Support Activities				
			4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Job Type	# of People	Total Hours Worked Per Week by All the People Indicated in Column 2	Initial Patient Assessment and/or Orientation	Initial Medical Services	Ongoing Medical Services Other Than Pharmacological Dosing	Methadone Dosing	Other Pharmacological Dosing	Individual, Couples, and Family Counseling	Group Counseling	Patient Educational Services Outside of Counseling	Case Management/Case Support	Patient-Specific Administrative	Any Other Patient Services	Quality Assurance	Program Evaluation	Staff Education	General Administrative	Any Other Activity
EXAMPLE: Social Worker (MSW/DSW)	2	60	20								20	20						
Non-Medical Direct Care Staff																		
Case Manager (certified)																		
Case Manager (non-certified)																		
Degreed Counselor (licensed or certified)																		
Degreed Counselor (non-licensed																		

Zarkin GA, Dunlap LJ, Homsi G. The substance abuse services cost analysis program (SASCAP): a new method for estimating drug treatment services costs, **Evaluation and Program Planning** 2004; 27(1): 35-43,

Analyzing costs

- Average vs. marginal costs?
- Compared to what?
  - Doing nothing
  - Status quo
  - Other settings, implementation strategies
  - Other activities/interventions
- Quantifying variation in costs
  - Scale and scope
  - Context

Analyzing costs: example

WISEWOMAN Cost Analysis

Steps:

1. Calculate total costs for 6-month period
2. Divide by # women screened in same period

WISEWOMAN Average Per Capita Costs	
Activity	*Per capita costs*
Outreach/follow-up	$22
Screening	
WISEWOMAN screening	$98
Annual prescriptions	$26
Additional office visits	$3
Total screening	$127
Intervention	$121
Total	**$270**

Cost-Effectiveness of WISEWOMAN, a Program Aimed at Reducing Heart Disease Risk among Low-Income Women. Eric A. Finkelstein, PhD, Olga Khavjou, MA, and Julie C. Will, PhD

Analyzing costs

- Identifying determinants of costs
  - cost function estimation
- Examining cost heterogeneity and efficiency
  - Stochastic frontier analysis
  - Data envelopment analysis

Analyzing costs

Explaining the efficiency of local health departments in the U.S.: an exploratory analysis

Kankana Mukherjee · Rexford E. Santerre · Ning Jackie Zhang

Health Care Manag Sci (2010) 13:378–387
DOI 10.1007/s10729-010-9136-5

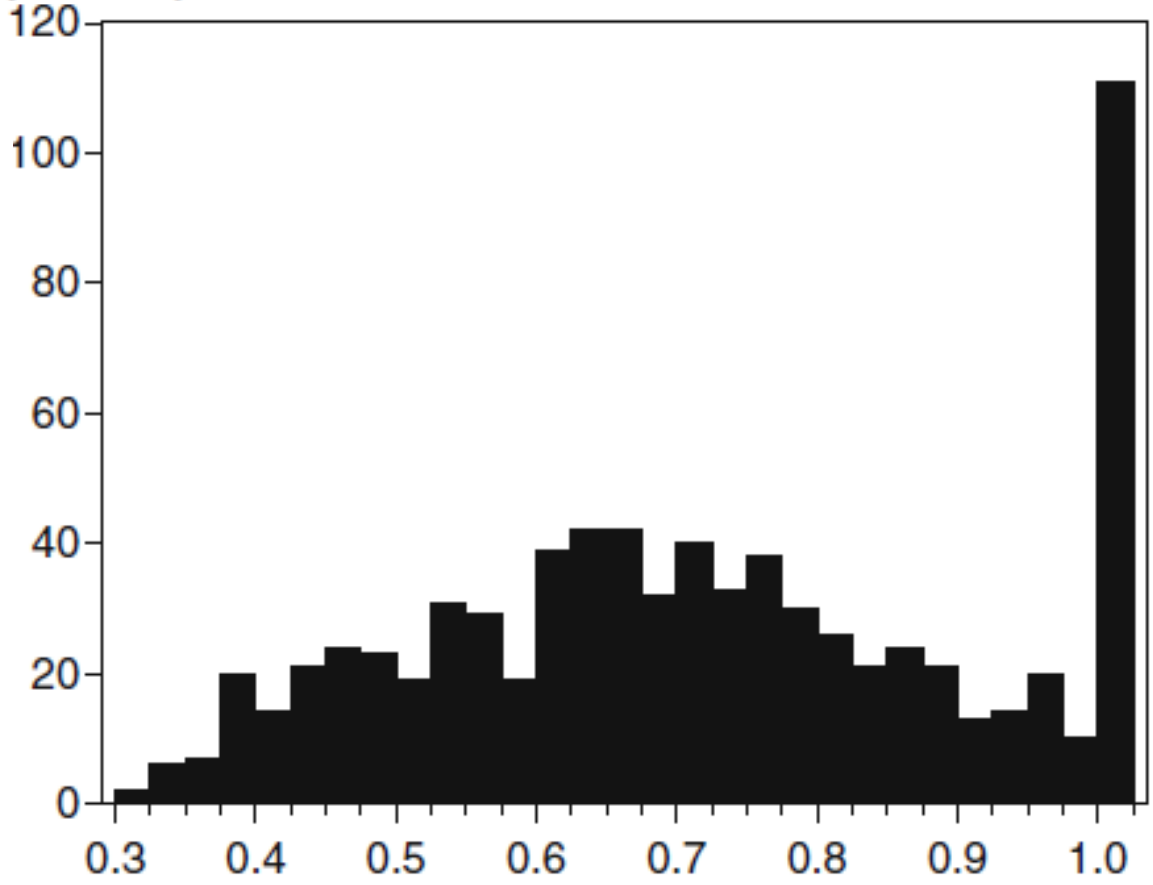


Fig. 4 Relative efficiency of 771 LHDs with nonzero inputs and outputs

Resources

- USDHHS Assistant Secretary for Planning and Evaluation. Guide to **Analyzing the Cost-Effectiveness of Community Public Health Prevention Approaches**. www.*aspe.hhs.gov/health/reports/06/cphpa/report.pdf*
- Haddix AC et al (CDC). **Prevention Effectiveness: A Guide to Decision Analysis and Economic Evaluation**. Oxford University Press.
- RTI. **Substance Abuse Services Cost Analysis Program**. http://www.rti.org/page.cfm?objectid=7E6095C8-AE6E-4568-874839C81FAD414B

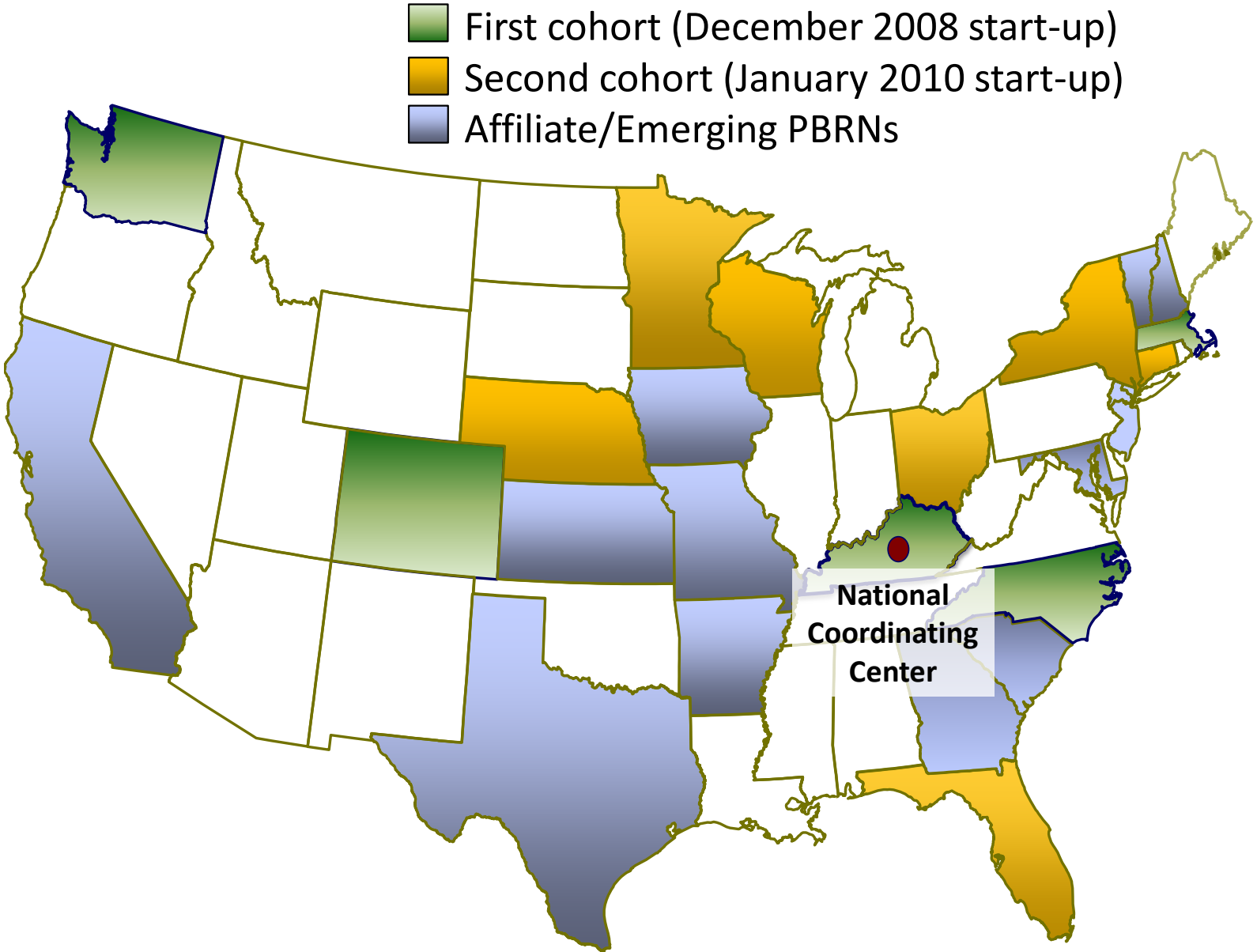
Conclusions: Advancing ROI Analysis in Public Health

- Enhanced tracking of public health expenditures
- Enhanced monitoring of program performance
  - Reach/targeting
  - Effectiveness
  - Efficiency
  - Equity
- Analysis of cross-cutting infrastructure needed to implement/maintain programs

Related Initiatives

- NACCHO Public Health Uniform Data System
- Public Health PBRN Delivery and Cost Studies
- RWJF/CDC National Chart of Accounts Workgroup

The Robert Wood Johnson Foundation's Public Health PBRN Program



Informing practice and policy decisions

- Align spending with preventable disease burden
- Identify and address inequities in resources
- Improve productivity and efficiency
- Demonstrate value: linking spending to outcomes
- Strengthen fiscal policy: financing mechanisms

For more information

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