Evaluating Public Health Research: Information from the Literature

Presented at the 2007 American Evaluation Association Conference
November 10, 2007

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Overview

- Background and Context
- Purpose of the Literature Review
- Literature Review Methods
- Literature Review Results
- Main Findings
- Lessons Learned
- Best Practices Applied to Public Health Research
- Summary
Background and Context

- There are increasing demands to justify investments in public sector research domestically and abroad.
- A major purpose of public health research is to improve health by influencing policy, public health programs and practice, health services, and consumer behavior.
- Need to optimally allocate limited research funding dollars:
  - More competition for scarce funding dollars from the private and public sector.
  - Continuously increasing public health research questions with fewer funding dollars.
  - Must balance needs and impact of investments.
Purpose of Literature Review

- Identify useful information to guide the development of a research evaluation program relevant to public health and CDC
- Enhance the knowledge base of the Office of Public Health Research (OPHR) research portfolio assessment program team
- Share lessons learned with the larger research evaluation community by publishing findings
Literature Review Methods

- Carried out by multi-disciplinary six member team
- Literature search sources
  - Bibliographic databases, e.g., MEDLINE, EconLit
  - Google and additional references cited in articles initially retrieved from Google ("cross-reference")
- Used systematic approach and criteria for relevance
- Retrieved peer-reviewed articles, books, grey-literature
**Literature Review Steps**

- **Step 1.** Searched Internet and bibliographic databases to identify evaluation literature
  - **Criteria:** Search terms - research portfolio evaluation, methods, metrics, health, public health impact
  - **Retrieved:** >1M Internet and 457 bibliographic references

- **Step 2.** Screened initial search results (abstracts) to identify potentially relevant articles
  - **Criteria:** Professional judgment (CP, GW) that abstract appeared to address research evaluation and might be applicable to public health research
  - **Retrieved:** 346 potentially relevant references (69 Internet, 277 bibliographic databases)
Literature Review Steps (cont’d)

- Step 3. Obtained full articles of potentially relevant articles to determine relevant articles
  - Criteria: Full article reviewed; characterized on discipline, methods, models and metrics; confirmed to address research evaluation and be applicable to public health research
  - To date, 90 articles have been reviewed
    - Of these, 48 articles were confirmed relevant, and form basis for literature review results presented here
  - Remaining 256 articles will be read in future and literature review results will be updated
Classification of Literature

- All full articles reviewed were characterized on
  - Relevance – to research evaluation and potential application to public health
  - Discipline (e.g., economics, policy and management, evaluation, health services research)
  - Method (e.g., economics, bibliometric analyses, retrospective analyses, peer-reviews, case-studies)
  - Model (e.g., logic model, payback model, qualitative, quantitative)
  - Metrics (e.g., input, process, output, outcome, impact)

- Models and methods were critiqued for main findings
### Discipline of Reviewed Articles

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<th>Discipline</th>
<th>Number of articles</th>
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<td>Economics</td>
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<td>Policy and management</td>
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<td>Evaluation</td>
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<td>Health services research</td>
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<tr>
<td>Methods</td>
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<td>Retrospective analyses</td>
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# Models and Metrics Employed by Reviewed Articles

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<td><strong>Metrics</strong></td>
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<td>Impact</td>
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<td>Outcomes</td>
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<td>Outputs</td>
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<tr>
<td>Other</td>
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<td><strong>TOTAL</strong></td>
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Main Findings

- **Disciplines:**
  - **Economics:** Typically from agricultural economics
  - **Policy and Management:** Typically assessed how research programs performed by tracking them only to the knowledge generation (publications) or outputs phase

- **Methods:**
  - **(Applied) Economics:** Often used input-output analyses which assessed influence of agricultural research on improving agricultural productivity
  - **Bibliometrics:** Typically used in health research and assessed the productivity of research programs using citation analysis and historical tracing
Main Findings (cont’d)

- Methods (cont’d):
  - Main Types of Bibliometrics
    - Literature bibliometrics: Count of publications, citations
    - Patent bibliometrics: Citations
    - Linkage bibliometrics: Link citations from patent to scientific papers
  - Methods Strengths and Weaknesses
    - Economic approaches are great at quantifying changes in output and productivity of inputs, but provide limited evidence on measures of downstream impact
    - Bibliometric approaches can suggest if an agency is producing or supporting highly cited papers, but can’t speak to longer term impacts of research investments; however, they are useful in assessing if knowledge outputs influence policy decisions and practice
Main Findings (cont’d)

- **Models:**
  - **Logic Model:** Core organizing framework for most research evaluation programs and studies
    - Used by National Academies of Science; US Dept. of Agriculture; National Health Service, UK; Health Economics Research Group, UK; and others
  - **Payback Model:** Combines qualitative and quantitative assessments in case studies to evaluate research benefits
    - Current state of the art in research evaluation
    - Built upon economics and logic model
    - Pioneered by Health Economics Research Group, UK
    - Used by Canadian Health Services Research Foundation
Main Findings (cont’d)

- **Metrics:**
  - Metrics should be defined over several phases which can be shown in a Logic Model
  - Metrics* commonly used in research evaluation
    - **Inputs** measure tangible quantitative resources put into a process to achieve a goal
    - **Processes** measure a course of action taken to achieve a goal
    - **Outputs** measure the products and services delivered
    - **Outcomes** measure results that stem from use of the outputs and influence stakeholders outside the program
    - **Impacts** measure the long-term societal, economic, or environmental consequences of an outcome

Main Findings (cont’d)

- Metrics (cont’d):
  - Input-Output Models
    - Evaluate how productivity of inputs affect the generation of outputs
    - Do not capture the impacts phase of research
    - Serve as an organizing framework for the Payback model
  - Challenges in Developing Metrics
    - There is a long time span from research initiation to realized benefits, resulting in reliance on intermediate indicators
    - Attribution or relative contribution of research to a benefit may be difficult to determine
    - Scale and aggregation across research projects pose challenges - single research project versus research portfolio
Lessons Learned

- There is minimal scholarship on health or public research evaluation methods so need to rely on lessons learned from other disciplines
- Research evaluation methods have changed slowly over time
  - Historically relied on bibliometric approaches to quantify performance of research programs
  - Currently recognize that new evaluation methods are needed that can better measure research’s multiple attributes and benefits
- Program peer-review is important to maintain quality of science
- Case studies are essential to elicit full benefit and value of research
Lessons Learned (cont’d)

- Knowledge generation is insufficient to influence policy, programs, practice, and consumer health behavior.
- For any research to produce change, its findings should relate to one or more of the key areas of interest to the agency and its decision makers.
- Researchers should engage and share responsibility with managers and policy makers for translating their research into policy and practice.
- Optimal research resource allocation depends on the market for research results - it should be clear who the customers are.
Best Practices Applied to Public Health Research

- Adopt the logic model as the organizing framework
- Study, adopt and adapt the Payback model to evaluate research investments
- Employ program peer-review to evaluate and maintain scientific quality
- Employ case study approach to elicit unique views of programs and scientists
- Evaluate intermediate outcomes of research while working to improve measures of longer term impact, e.g.,
  - Weave bibliometric analyses into evaluations to assess outputs and productivity of scientists and agency
- Engage stakeholders to maintain relevance of research and accountability for results
Summary

- Research evaluation has been conducted by many disciplines using different methods, models, and metrics.
- Economic and bibliometric methods have historical influence on evaluation.
  - Each has strengths and limitations.
  - Still useful methods.
- The logic model is the organizing framework for most research evaluations.
  - Public health research evaluation program would benefit from adopting the organizing framework.
Summary (cont’d)

- Payback model is the current state-of-the-art method
  - Has quantitative and qualitative characteristics
  - Contains aspects of logic model and input-output models

- Multiple metrics, covering quantitative and qualitative attributes, are needed for research evaluation

- Investigators’ involvement in research translation is important to enhancing the impact of research

- The literature review was instrumental in guiding our analytical approaches for evaluating the impact of research and research
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