

**CDC Division for
Heart Disease and Stroke Prevention**

State Heart Disease and Stroke Prevention Program

**Evaluation
Guide**

*Developing and Using a
Logic Model*



**Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention
and Health Promotion**



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We encourage readers to adapt and share the tools and resources in the document to meet program evaluation needs. For further information, contact the Division for Heart Disease and Stroke Prevention, Applied Research and Evaluation Branch at cddinfo@cdc.gov or (990) 488-2424.

Heart Disease and Stroke Prevention Program Evaluation Guides

Introduction

Purpose

The Heart Disease and Stroke Prevention (HDSP) Program Evaluation Guides are a series of evaluation technical assistance tools developed by the Centers for Disease Control and Prevention (CDC), Division for Heart Disease and Stroke Prevention, to assist in the evaluation of heart disease and stroke prevention activities within states.

The guides are intended to offer guidance, consistent definition of terms, and aid skill building on a wide range of general evaluation topics and selected specific topics. They were developed with the assumption that state health departments have varied experience with program evaluation and a range of resources allocated to program evaluation. In any case, these guides clarify approaches to and methods for evaluation, provide examples specific to the scope and purpose of the state HDSP programs, and recommend resources for additional reading. Some guides will be more applicable to evaluating capacity building activity and others more focused on interventions. Although examples provided in the guides are specific to HDSP programs, the information might also prove valuable to other state health department programs, especially chronic disease programs.

Background

Heart disease and stroke, the primary components of cardiovascular disease (CVD), are leading causes of death and disability in the United States. As the burden of heart disease and stroke continues to increase, these conditions are projected to remain the number one and two causes of death worldwide through the year 2020. In the United States alone, CVD affects 61.8 million Americans and claims nearly 1 million lives annually among people of all racial/ethnic groups and ages.

In 1998, the U.S. Congress provided funding for CDC to initiate a national, state-based heart disease and stroke prevention program. As of July 2005, CDC funds heart disease and stroke prevention programs in 32 states and the District of Columbia. The priority areas for State activities are:

- Increase control of high blood pressure.
- Increase control of high cholesterol.
- Increase awareness of signs and symptoms of heart attack and stroke and the need to call 9-1-1.
- Improve emergency response.
- Improve quality of care.
- Eliminate disparities.

Many factors increase the risk of developing heart disease and stroke. State-based programs must therefore use strategies that target multiple risk factors in many different settings, including health care settings, work sites, communities, and school worksites to be effective.

States are encouraged to build capacity, use evidence-based approaches when they exist, and develop innovative interventions to address heart disease and stroke prevention. CDC-funded states are charged with providing evidence of capacity, of intervention, and of change within their state and are encouraged to build evidence for innovative and promising practices.

In 2003, CDC convened key public health partners, including state programs, to develop *A Public Health Action Plan to Prevent Heart Disease and Stroke*. The *Action Plan* identifies targeted recommendations and specific action steps necessary to reduce the health and economic toll caused by heart disease and stroke and supports the identification of innovative ways to monitor and evaluate policies and programs. The *Action Plan* is available online at http://www.cdc.gov/cvh/Action_Plan/pdf/action_plan_full.pdf

Using the guides

The guides are intended to be companion pieces to existing program evaluation documents. The *CDC State Heart Disease and Stroke Prevention Program Evaluation Framework* is located on the Internet at http://www.cdc.gov/cvh/library/evaluation_framework/index.htm. The document is also available on CDROM by contacting ccdinfo@cdc.gov or your CDC project officer.

The guide topics are divided broadly into two categories, fundamentals and capacity building- or intervention-related. The guides in the fundamentals series will be completed first and will cover general evaluation topics using specific HDSP examples. Capacity building- and intervention-related guides will provide the tools and techniques to evaluate capacity building activities, like the effectiveness of partnerships, and interventions in the health care, work site, and community settings. Some of the guides will be developed for evaluations of specific interventions and others will focus on tools for evaluating interventions.

Because states have different levels of experience and involvement with evaluation, the series of guides will range from very basic to more advanced topics. Depending on the evaluation capacity of state programs, some guides will be more useful to program staff than others.

The guides are expected to be distributed over time. They will be posted online for easy review and access. State programs should review the guides as they are distributed and determine which are most applicable given current resources and activities. The series will be expanded and enhanced as additional needs are identified and as state evaluation capacity is increased. States are encouraged to provide feedback to the Evaluation Team on the utility of guides and suggested topics for future guides.

Bibliography

American Heart Association. *Heart Disease and Stroke Statistics – 2006 Update*. Dallas, Tex: American Heart Association; 2006.

Centers for Disease Control and Prevention. *Prevention Works: CDC Strategies for a Heart-Healthy and Stroke-Free America*. Atlanta, GA: U.S. Department of Health and Human Services; 2003. Available at http://www.cdc.gov/cvh/library/prevention_works/index.htm

Heart Disease and Stroke Prevention Program Evaluation Guide

Developing and Using a Logic Model

The evaluation guide “Logic Models” offers a general overview of the development and use of logic models as planning and evaluation tools. A feedback page is provided at the end of this guide. We will appreciate your comments.

Logic models are tools for planning, describing, managing, communicating, and evaluating a program or intervention. They graphically represent the relationships between a program’s activities and its intended effects, state the assumptions that underlie expectations that a program will work, and frame the context in which the program operates. Logic models are not static documents. In fact they should be revised periodically to reflect new evidence, lessons learned, and changes in context, resources, activities, or expectations.

Logic models increase the likelihood that program efforts will be successful because they:

- Communicate the purpose of the program and expected results.
- Describe the actions expected to lead to the desired results.
- Become a reference point for everyone involved in the program.
- Improve program staff expertise in planning, implementation, and evaluation.
- Involve stakeholders, enhancing the likelihood of resource commitment.
- Incorporate findings from other research and demonstration projects.
- Identify potential obstacles to program operation so that staff can address them early on.

State programs should develop logic models to describe:

- The State HDSP program as a whole.
- A more detailed view of any specific intervention or component of a program, such as developing a state plan or a health communication campaign.

Electronic logic model templates can be created fairly easily in either a Microsoft Word table or a Microsoft Excel work sheet. A sample template is provided as an appendix.

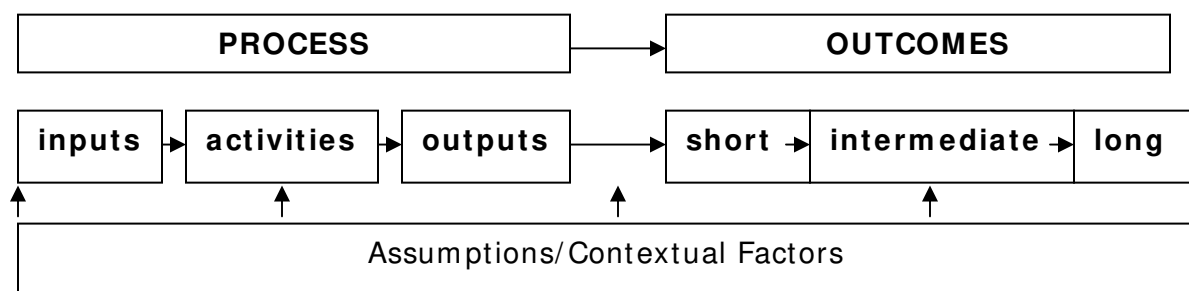
Components of a Logic Model

As with many aspects of evaluation, people use a variety of terms to describe logic models and their components. A logic model can also be visually represented in a variety of ways, including as a flow chart, a map, or a table. The only “rule” for a logic model is that it be presented on one page. The basic components of a good logic model are:

- Displayed on one page.
- Visually engaging.
- Audience specific.
- Appropriate in its level of detail.
- Useful in clarifying program activities and expected outcomes.
- Easy to relate to.
- Reflective of the context in which the program operates.

A basic logic model (Figure 1) typically has two “sides”—process and outcome. The process section describes the program’s inputs (resources), activities, and outputs (direct products). The outcome section describes the intended effects of the program, which can be short term, intermediate, and/or long term. Assumptions under which the program or intervention operates, and the contextual factors can also be included in a logic model. They are often noted in a box below or on the left side of the logic model diagram. Figure 1, below, illustrates the components of a logic model.

Figure 1. Layout of a General Logic Model



Component Definitions

Inputs are the resources that go into a program or intervention—what we invest. They include financial, personnel, and in-kind resources from any source. For example, inputs could include:

- Various funding sources for your program.
- Your partners.
- Staff time and technical assistance.

Activities are events undertaken by the program or partners to produce desired outcomes—what we do. You could include a clear identification of “early” activities and “later” activities. Examples of activities include:

- Create a state-level partnership.
- Train health care partners and staff in clinical guidelines.
- Develop a community health communication campaign on signs and symptoms of stroke, and to call 9-1-1.

Outputs are the direct, tangible results of activities—what we get. These early work products often serve as documentation of progress. Examples include:

- State-level partnerships created.
- Health care professionals trained in clinical guidelines.
- Community health communication campaigns developed.

Outcomes are the desired results of the program—what we achieve. Describing outcomes as short, intermediate, or long term depends on the objective, the length of the program, and expectations of the program or intervention. What is identified as a long-term outcome for one program could be an intermediate outcome for another.

Short-term outcomes are the immediate effects of the program or intervention activities. They often focus on the knowledge and attitudes of the intended audience. Examples include:

- Increase partner knowledge of HDSP priorities and strategies.
- Increase physician knowledge of clinical guidelines.
- Increase knowledge of signs and symptoms of stroke and of the need to call 9-1-1.

Intermediate outcomes are behavior, normative, and policy changes. Examples include:

- HDSP State Plan has been developed and published with partner involvement.
- Health systems implement clinical guidelines.
- Decrease transport time to treatment for stroke victims.

Long-term outcomes refer to the desired results of the program and can take years to accomplish. Long-term outcomes include:

- Increase in statewide policy and environmental strategies for HDSP.
- Increase in blood pressure control in a health center population.
- Increase in early treatment for stroke.

Impacts refer to the ultimate impacts of the program. They could be achieved in a year or take 10 or more years to achieve. These may or may not be reflected in the logic model, depending on the purpose and audience of the logic model. A logic model that portrays an HDSP intervention may show expected long-term outcomes, such as a state-level system change, and impact, such as a population-wide reduction in death rate. Examples of impacts include:

- Decrease in the rate of death due to heart disease.
- Eliminate disparities in treatment for stroke between general and priority populations.

Assumptions are the beliefs we have about the program or intervention and the resources involved. Assumptions include the way we think the program will work—the "theory" we have used to develop the program or intervention. (See the subsequent section on *Theories of Change*.) Assumptions are based on research, best practices, past experience and common sense. The decisions we make about implementing a program or intervention are often based on our assumptions. Examples of assumptions we sometimes make include:

- Funding will be secure throughout the course of the project.
- Because we teach information, it will be adopted and used in the way we intended.
- Professionals will be motivated to attend learning sessions.
- External funds and well-placed change agents can facilitate institutional change.
- Staff with the necessary skills and abilities can be recruited and hired.
- Partnerships or coalitions can effectively address problems or reach into areas we cannot.
- Policy adoption leads to individual behavior change.

In developing your logic model, you should explore and discuss the assumptions you are making. Often, an in-depth discussion is included as a narrative that accompanies your logic model. Inaccurate or overlooked assumptions could be a reason that your program or intervention did not achieve the expected level of success.

Contextual Factors describe the environment in which the program exists and external factors that interact with and influence the program or intervention. These factors may influence implementation, participation, and the achievement of outcomes. Contextual factors are the conditions over which we have little or no control that affect success.

Examples include:

- Competing or supporting initiatives sponsored by other agencies.
- Socioeconomic factors of the target audience.
- The motivations and behavior of the target population.
- Social norms and conditions that either support or hinder your outcomes in reaching disparate populations, such as the background and personal experiences of participants.
- Politics that support or hinder your activities.
- Potential barriers or supports that could affect the success of your project.

In program or intervention planning and development, we should consider contextual factors that are likely to affect our activities and either address them or collect data on them as part of the process evaluation.

Steps for developing a logic model

1. Determine the **purpose** of the logic model, who will use it and for what? Is your purpose to develop a work plan, to talk with stakeholders about the program or intervention, or to develop an evaluation plan?
2. **Convene stakeholders.** Who should participate? Program planners and managers, epidemiologists, and groups with a stake in program outcomes.
3. Determine a **focus** for the logic model. Will the logic model depict a single intervention, a multiyear intervention, or a comprehensive picture of your HDSP program? Determine what level of detail is needed to make this a useful tool.
4. Understand the situation. Use the program **objective or goal as your anchor.** Set **priorities** and **clarify** expectations.
5. **Explore** the research, knowledge base, and what others have done/are doing. Compile research findings and lessons learned, applicable program theory, and resources. Identify and discuss assumptions you are making and contextual factors.
6. **Construct a series of linked activities and outcomes or statements using a “left-to-right” or “right-to-left” approach. Then connect the activities with arrows to show linkages.**

One way to proceed is using a “left-to-right” process by connecting a series of “If, then” statements that help you identify and connect activities and anticipated outcomes.

Ask yourself how you can complete the following to describe your program:

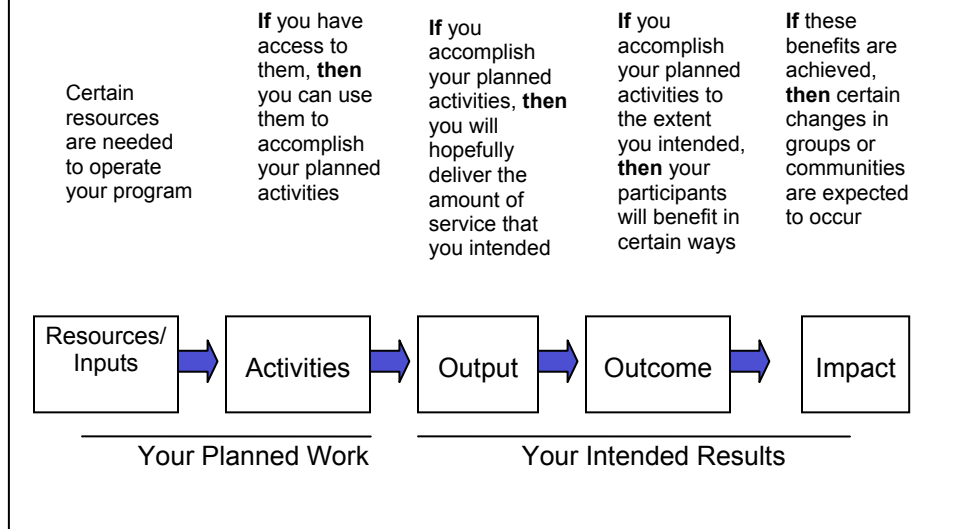
If we have _____ and _____, we can (do) _____ and _____, which will result in _____ and _____

The first two blanks list the resources available to conduct your program, the third and fourth blanks describe the activities to be conducted, and the final two blanks list the expected outputs of those activities.

Example:

“If we have program funding and participating clinics, we can inform our clinic partners of the need to implement clinical practice guidelines and sponsor training for clinic teams on the chronic care model, which will then increase the number of clinic teams who are aware of clinical practice guidelines and who implement the chronic care model.

A Series of “If...Then” Statements



By asking other similar questions, you can determine your short-, intermediate-, and long-term outcomes.

If we educate clinic teams and train them in the chronic care model in clinics, then we will see _____ and _____ occur in the short-term.

Example:

“If we educate clinic teams and train them in the chronic care model in clinics, we will see implementation of the chronic care model resulting in appropriate treatment for patients with high blood pressure.”

Continuing with the flow of the logic model, you should next complete:

If clinics implement the chronic care model and have an increase in appropriate treatment for high blood pressure (short-term outcomes), then we will see _____ occur (intermediate outcomes).

Example:

“If clinics use the chronic care model and increase appropriate treatment for patients with high blood pressure, then we will see an increase in the number of patients with high blood pressure under control.”

Next, consider what the accomplishment of intermediate outcomes will lead to:

If there is an increase in the number of current clinic patients whose high blood pressure is under control, then we expect that to lead to _____ (long-term outcomes).

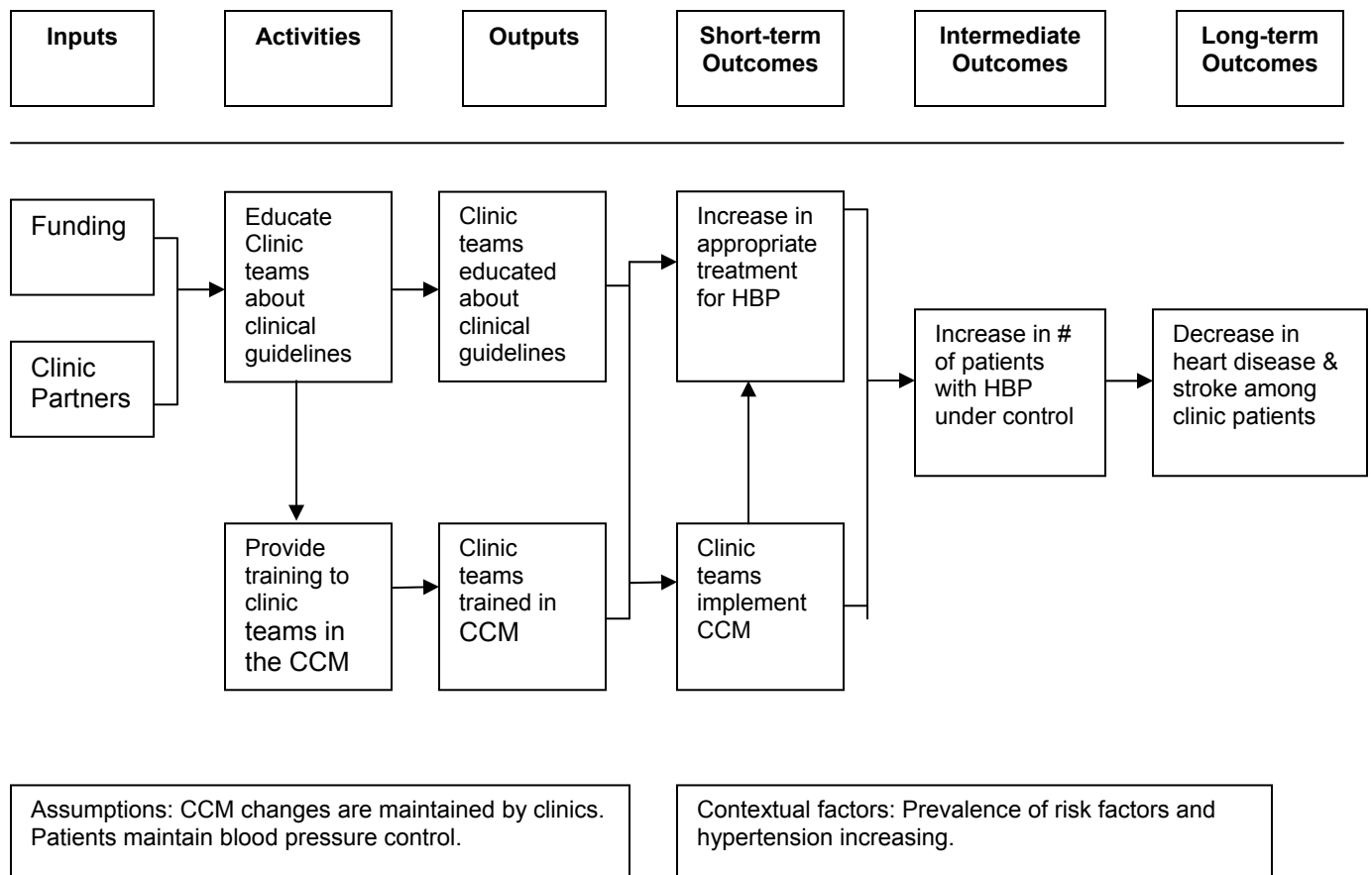
Example:

“If there is an increase in the number of current clinic patients whose high blood pressure is under control, then we will see a reduction in heart disease and stroke among these patients.”

Finally, identify contextual factors and assumptions that should be considered and stated when developing the logic model and interventions. In the example above, although we expect that controlling high blood pressure in an individual will reduce their risk for heart disease and stroke, when we apply this theory to a population, there are a number of confounding factors:

- Risk factors for high blood pressure such as obesity and diabetes are increasing in prevalence. This is likely to cause an increase in the prevalence of high blood pressure and the number of heart disease or stroke patients.
- We assume in this model that once control of high blood pressure has been achieved, it will be maintained. This might not be the case.
- We assume that once the chronic care model is implemented and clinic-based changes occur, the changes are maintained.

If we put this all together in a logic model, it would look like this:



As you develop your logic model, remember the amount and types of resources, activities, and outcomes depicted can vary and are particular to each program. Some programs will have an abundance of resources that allow a variety of activities and other programs may choose to conduct fewer activities. The activities and expected outcomes are based on the type of program or intervention you are implementing, the resources you have available and their distribution, the needs and desires of your program or department, and your partners.

Theories of change

In a logic model, arrows are drawn to indicate the links between resources, activities, and outcomes. A theory of change is used to provide a rationale for the expected links between program resources, activities, and outcomes. It explains how and why activities are expected to lead to outcomes in the particular order depicted.

Health promotion and prevention activities are based on numerous theories of change — a reasonable explanation of why and how a certain set of activities leads to certain outcomes. These theories are based on our beliefs, expectations, experience, and conventional wisdom. They describe the set of assumptions that explain both the steps that lead to long-term objectives and the connections between program activities and outcomes that occur at each step of the way. Several common theories of change are used in health programming. To learn more about theories of change, the following Web sites will be useful:

- http://www.csupomona.edu/~jvgrizzell/best_practices/bctheory.html.
- <http://www.cacr.ca/news/2002/0212elder.htm>.
- <http://www.cancer.gov/theory/pdf>.

Theories of change allow us to hypothesize that a program's intermediate and long-term outcomes are a result of short-term outcomes, which are a result of the activities implemented. The logic model for the State Heart Disease and Stroke Prevention Program is based on a socio-ecological model that links environmental and policy or systems changes with individual-level behavioral changes. The "systems" interventions of HDSP result in policy or environmental change that can lead to changes in knowledge and attitudes that reinforce behavior change among individuals and gatekeepers. For example, implementing the Chronic Care Model in a health care system would include use of electronic medical records that remind physicians of services needed to increase the number of patients who have their high blood pressure under control. This, in turn, leads to changes in patient behavior that result in better management of their high blood pressure.

Use of the logic model as a planning tool

As a planning tool, a logic model clarifies the sequence of outcomes and the relationship between activities and specific outcomes. It helps you:

- Examine/refine the program mission and vision, goals and objectives, preferably with stakeholders.
- Identify the most important desired outcomes.
- Identify the "critical path." If efforts must be reduced, which paths are most effective, are likely to get you there quickest, and/or are most cost-effective?
- Identify existing and needed, or weak and strong, components of the program and ways to enhance performance.

Much of the benefit of constructing program logic models comes from the process of discussing, analyzing, and justifying the expected relationships and linkages between activities and expected outcomes with staff and partners.

Use of the logic model as an evaluation tool

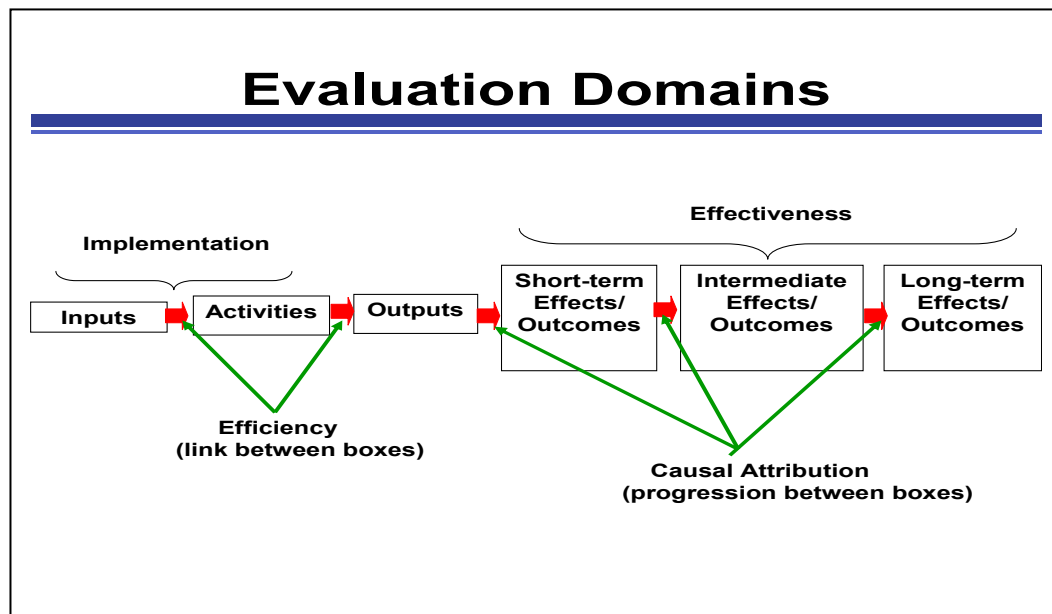
A logic model is often used to guide evaluation planning. It can help you:

- Determine what to evaluate.
- Identify appropriate evaluation questions based on the program.
- Know what information to collect to answer these questions—the indicators.
- Determine when to collect data.
- Determine data collection sources, methods, and instrumentation.

Using a logic model we can identify four areas, or domains, on which we can focus evaluation activities. The four evaluation domains embedded within the logic model shown in Figure 2 are:

1. Implementation (Process): Is the program or intervention implemented as planned? Were all of the activities carried out as expected?
2. Effectiveness (Outcome): Is the intervention achieving its intended short-, intermediate-, and/or long-term effects/outcomes?
3. Efficiency: How much “product” is produced for a given level of inputs/resources?
4. Causal Attribution: Is progress on outcomes due to your program or intervention? In public health practice, causal attribution is often difficult to ascertain, especially for your more distant outcomes. However, determining causality between your activities/outputs and your short-term outcomes can often be accomplished without too much effort. Usually, surveys and interviews, or analysis of records can establish causality at that level. And the brief time duration for short-term outcomes usually insures that causal results can be determined in a relatively small amount of time. By using theories of change to develop your logic model you can assume, with more confidence, that intermediate and long-term outcomes are a result of your short-term outcomes. Therefore, it is important to establish causality between at least the activities (and resulting outputs) you carry out and the short-term outcomes.

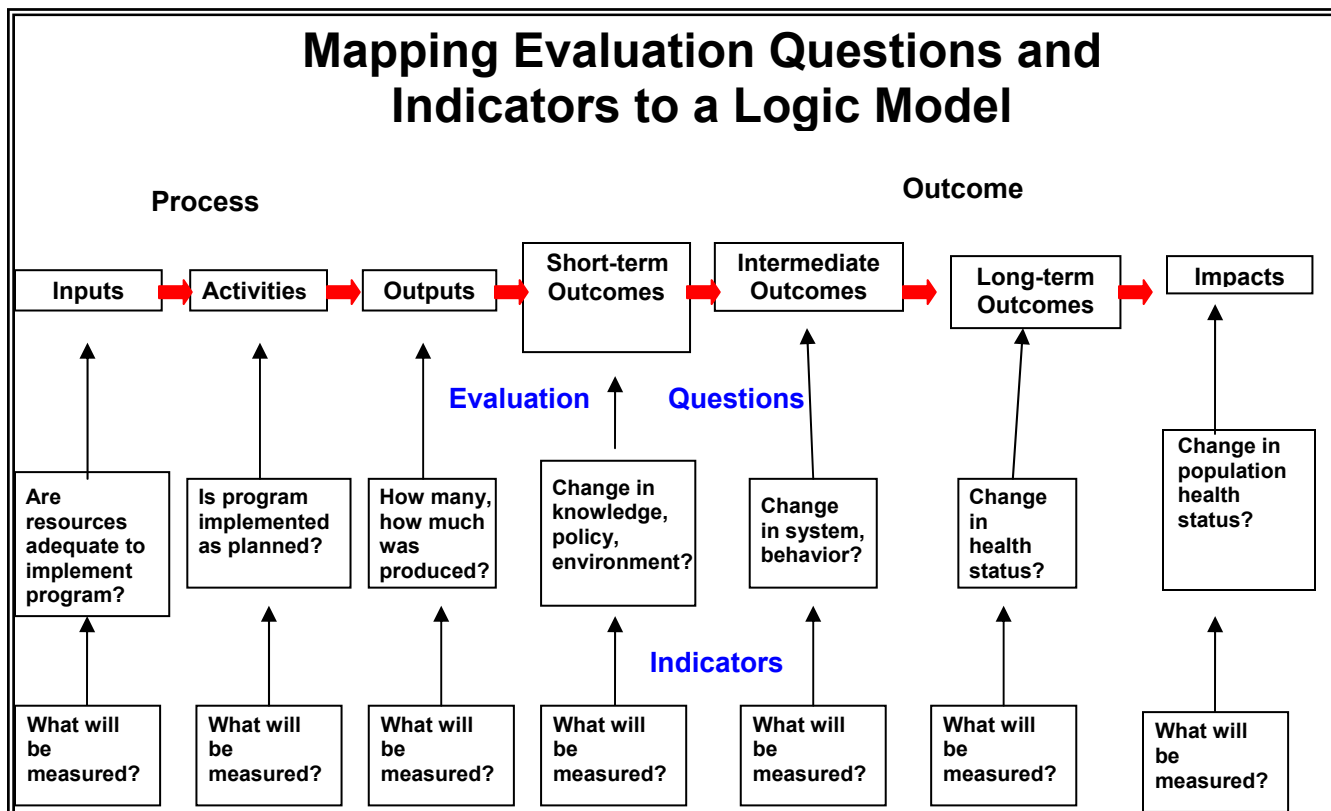
Figure 2: Evaluation Domains



The boxes and arrows in Figure 2 indicate evaluation points or places where it is logical to ask evaluation questions. As the program or intervention progresses through the logic model—as the intervention matures—new series of evaluation questions can be identified. Outcome evaluation looks back over the entire model. If based on a good process evaluation, the logic model can help identify reasons for less than successful interventions by asking “where did the model break down?”

Using this thinking, the logic model can facilitate mapping evaluation questions and indicators as shown in Figure 3.

Figure 3: Mapping Evaluation Questions and Indicators to the Logic Model



HDSP Program Logic Model

The Healthy People 2010 Objectives for Heart Disease and Stroke are national goals to unify and focus work done by states, federal agencies, and non-profit agencies. State HDSP programs are not directly responsible for these long-term, high-level outcomes; however, state interventions and accomplishments contribute to achieving them. Typically, surveillance data are used to track progress on such long-term outcomes.

The CDC HDSP program logic model is provided in Appendix 1. The logic model was developed to describe the processes and events that are expected from combined state and federal resources and activities to prevent heart disease and stroke. CDC and State activities are outlined in terms of capacity building, surveillance, and interventions. These activities and outcomes result in changes in policy and environmental supports (intermediate outcomes), which in turn influence system or population changes and improve health status (long-term outcomes). A population decrease in premature death and disability (impact) is the ultimate result of program activities. As programs focus efforts on disparate populations, these activities are also expected to eliminate disparities between general and priority populations.

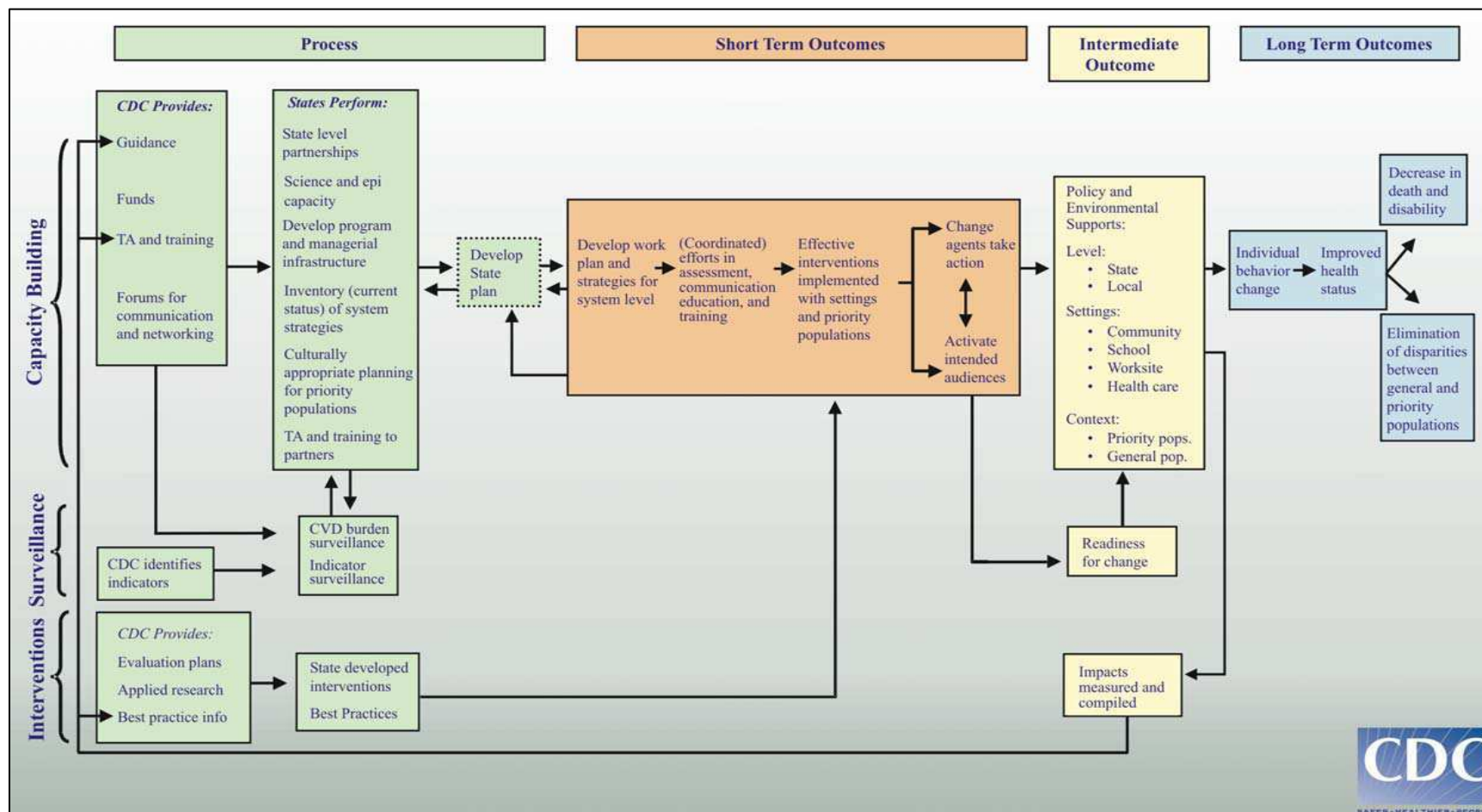
Bibliography and Additional Resources

To learn more about logic models, the following sources are helpful:

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- *Kellogg Foundation Logic Model Development Guide*. Retrieved from W.K. Kellogg Foundation Evaluation Toolkit: Retrieved October 2005 from <http://www.wkkf.org/default.aspx?tabid=101&CID=281&CatID=281&ItemID=2813669&NID=20&LanguageID=0>.
- US Department of Health and Human Services. Centers for Disease Control and Prevention. Office of the Director, Office of Strategy and Innovation. *Introduction to Program Evaluation for Public Health Programs: A Self Study Guide*. Atlanta, GA: Centers for Disease Control and Prevention; 2005.

Appendices: Logic Models

HDSP State Program Logic



State HDSP Logic Model

| INPUTS | ACTIVITIES | OUTPUTS | Outcomes | | |
|--------------------|------------|---------------------------|----------|--------------|------|
| | | | SHORT | INTERMEDIATE | LONG |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| <u>Assumptions</u> | | <u>Contextual Factors</u> | | | |

HDSP Evaluation Guide Comments

The Program Services Branch and the Applied Research and Evaluation Branch will appreciate your comments and feedback on this Evaluation Guide.

**Please return your comments by fax to:
HDSP Evaluation Team at
770-488-8151 (fax)
Or to your CDC HDSP Project Officer**



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