



EVALUATION OF SERVICES AND HEALTH SYSTEMS INTERVENTIONS

LEARNING AND GROWING THROUGH EVALUATION

MODULE 5

October 2015

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http://www.cdc.gov/asthma/program_eval/guide.htm

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Module 5

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Evaluation of Services and Health Systems Interventions

After reading this module, users should be able to:

- ① Understand how to apply evaluation steps to services and health systems interventions
- ② Develop an individual evaluation plan for an asthma service or health system intervention
- ③ Implement a service or health system evaluation in a manner that conforms to professional evaluation standards
- ④ Translate findings into an action plan to improve asthma interventions

PROGRAM EVALUATION can help us see how our intervention efforts are contributing to intended change. Program evaluation can also provide insight into program modifications to improve efficiency. Because of the complex environments in which public health programs operate, our evaluation probably can't tell us definitively whether an intervention is directly responsible for an outcome, but it can help us make difficult decisions about where to target funding and other resources.

Module 5 of the *Learning and Growing through Evaluation* series focuses on evaluation of service and health systems interventions. We are using the term “**INTERVENTION**” to refer to any group of activities that are coordinated by the asthma program to achieve outcomes. Service interventions are those that are targeted to individual people with asthma and their families and other caregivers. Health systems interventions address issues more broadly, often at the population level.

We define an intervention as any group of activities coordinated by the asthma program to achieve outcomes.

The module begins with a brief overview of how interventions fit within a Comprehensive Asthma Control Program to achieve program goals. The remainder of the module describes how the CDC Program Evaluation Framework is applied to an intervention evaluation. To facilitate use, we have revisited some topics found in other modules, while focusing on application to interventions. Appendix A includes additional information (indicated by the leaves ) , and Appendix B is a glossary of terms (highlighted in **GREEN**).

Additional appendices include practical information and tools for evaluating asthma interventions: Appendix C for evaluating the interrelation between infrastructure and interventions; Appendix D on using social science theory in evaluation; and Appendix E on selecting indicators.

Asthma Interventions for Comprehensive Asthma Control

Evidence-based interventions are known to achieve and sustain substantial improvements in the health and wellbeing of people with asthma and their families. The evidence shows that there are seven interventions that work to reduce the burden of asthma. These evidence-based interventions are part of the **TECHNICAL PACKAGE** for asthma programs, which is organized into EXHALES (see text box below). To appropriately serve people with asthma, asthma programs will combine some or all of these interventions into multi-component interventions. In addition to the information in Appendix A there is information in Appendix D about the evidence base related to the seven interventions.

The EXHALES Evidence-based Interventions

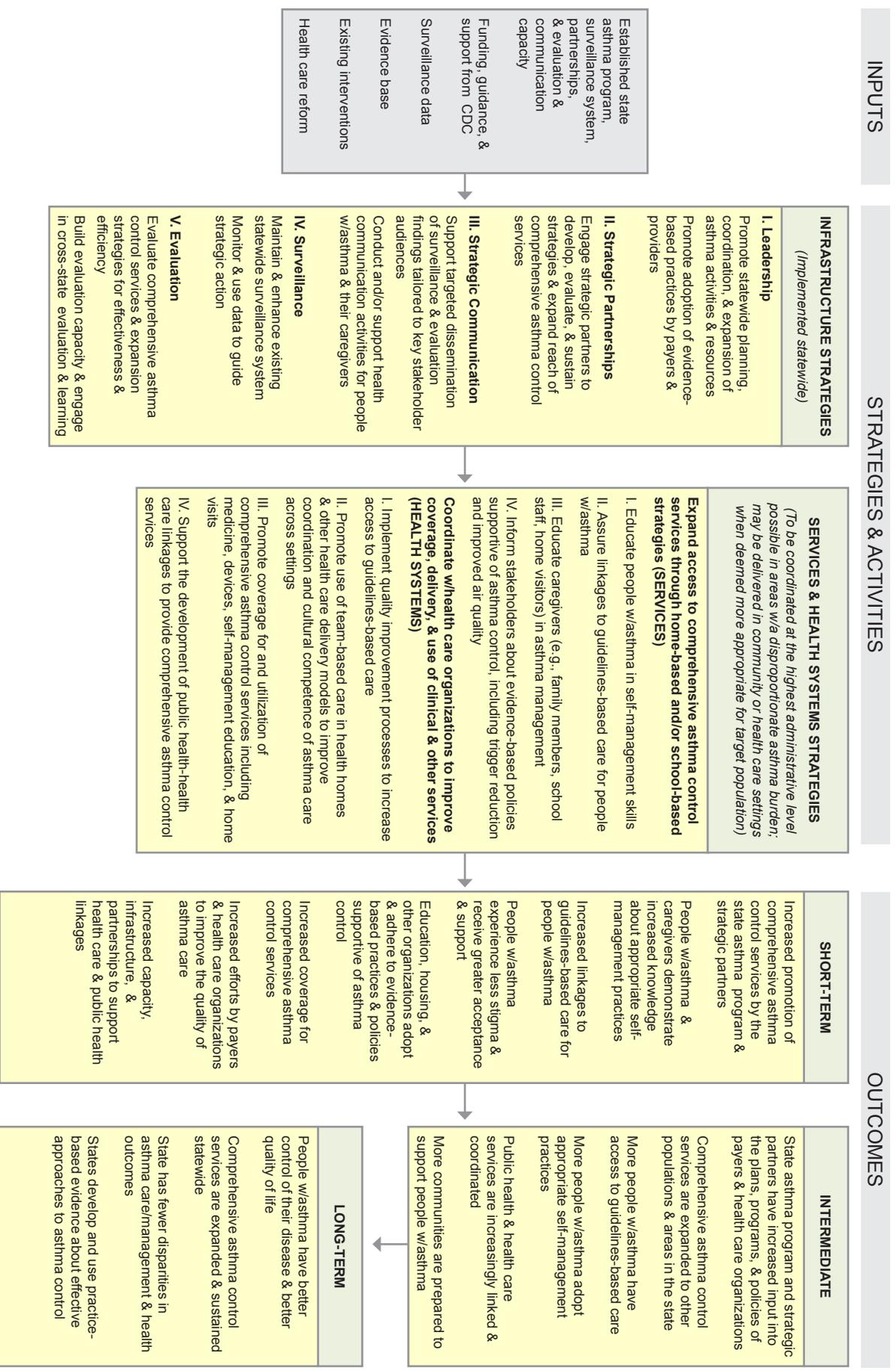
- Education on asthma self-management
- X-tinguish cigarette exposures, especially in-utero and during early childhood
- Home-base trigger reduction for difficult-to-treat cases of asthma
- Access to and provision of guidelines-based care
- Linkages and coordination across settings
- Environmental trigger reduction policies in multi-unit housing and schools
- Surveillance to identify priority populations and geographic areas for focus and intervention

Asthma Interventions and the Comprehensive Asthma Control Logic Model

As shown in the Comprehensive Asthma Control logic model, evidence supports three interrelated groups of strategies to address asthma in communities (Figure 1). Infrastructure strategies, such as leadership and strategic partnerships, provide a foundation for all of our work. Services strategies provide direct support to people with asthma and, when paired with focused evaluation activities, community-specific evidence for use in expanding those strategies. Health systems strategies offer a way to transfer what we learn in the services strategies and the health care sector to bring evidence-based practices to a much larger, population-based scale. Finally, the comprehensive approach means that the services and health systems strategies work together by linking people with asthma to guidelines-based care and, for those whose asthma remains poorly controlled, to progressively more individualized services (intensive self-management education, home-based trigger-reduction services, and other environmental management strategies).

The logic model (Figure 1) shows how the three main strategies (infrastructure, services, and health systems) work together to effect change. Evaluation is the way we assess how well these strategies are implemented and the changes that occur.

Figure 1. Comprehensive Asthma Control through Evidence-based Strategies and Public Health-Health Care Collaboration



It will be helpful to think about whether an intervention being evaluated is part of a **SERVICE STRATEGY** or a **HEALTH SYSTEMS STRATEGY**. Although there are conceptual overlaps, identifying where change is intended to occur will help guide the evaluation. Understanding the level of an intervention will help you determine the **AUDIENCE** for the intervention. Audiences for service strategies may be individuals with asthma, their families, and individual healthcare providers; health systems strategy audiences may be health care organizations, their administrators, and policy makers. Often health systems strategies are designed to support and promote services-based strategies. Consider the **SETTING** in which the intervention occurs, e.g., homes or schools, when thinking about the audience.

Because service and health systems interventions are undertaken with the support of the asthma program's infrastructure, it is equally important to assess the infrastructure strategies (evaluation, leadership, strategic partnerships, strategic communications, and surveillance). Modules 3 and 4 of the *Learning and Growing through Evaluation* series address evaluations related to partnership and surveillance evaluations, respectively. Although the main text of Module 5 focuses on evaluating service strategies and health systems strategies, Appendix C of this module addresses how the interconnected model for infrastructure can be evaluated. Since the interconnections among infrastructure, services, and health systems are essential, you may need to draw on multiple aspects to appropriately evaluate your interventions.

Examples of Performance Measures:

Below are a few of the performance measures from the Funding Opportunity Announcement published in 2014.

- Map, chart, or other tool demonstrating the overlap between existing program activities and areas with poor asthma outcomes as indicated by most recent surveillance data
- Number and description of meetings to educate high-level decision makers about asthma burden and evidence-based strategies.
- Total enrollment, including racial, ethnic, and SES breakdown, of schools or districts covered by MOAs, MOUs, or other formal agreements.
- Percentage of program participants with poorly controlled asthma using long-term control medications (pre/post).

The Role of Performance Measures in Evaluating Interventions

CDC asthma awardees are required to collect performance measures. **PERFORMANCE MEASURES** are important tools for management of a program; they clarify “what” is occurring related to the program and may help to identify what works. Unlike evaluation, performance measures do not answer “why” or “how” questions. However, performance measures can serve as a “dashboard” to help identify and prioritize program areas that may benefit from evaluation.

It will be helpful to review the performance measurement data related to the intervention you will be evaluating. For example, if you are considering evaluating a self-management education intervention, you will want to examine the data that you are collecting (see the textbox to the right). If the numbers of program participants do not reflect what you expected, your evaluation can be used to find out what barriers exist in identifying and recruiting program participants and what strategies can work to overcome the barriers.

Applying the CDC Evaluation Framework to Services and Health Systems Evaluation

In the following sections we walk through the six steps of the CDC Framework. In Module 1, Learning and Growing through Evaluation, Chapter 2, you developed a **STRATEGIC EVALUATION PLAN** where you identified one or more interventions to evaluate. You may further have developed an **INDIVIDUAL EVALUATION PLAN** for an intervention or interventions comprising a strategy. This section is designed to help you refine that evaluation plan in preparation for implementing your evaluation.

Prior to making the decision to evaluate a particular intervention, you may wish to conduct an **Evaluability Assessment** to determine how feasible it is to conduct evaluation at a given time.



Step 1 – Engage Stakeholders

STAKEHOLDERS are important to evaluation at all stages, from planning to implementation to using evaluation findings to improve your intervention strategy. Who the stakeholders are for a given intervention strategy will vary. Knowing the audience, setting, and type of change expected will help you identify the people you need to engage. In deciding whom to engage, you might ask these questions:

- Who is the intervention intended to affect?
- Who are the beneficiaries of the intervention?
- Who are the people implementing the intervention?

Consider including people from each of these groups as stakeholders in your evaluation.

For services interventions, your stakeholders may include people with asthma and their family members, community members (including teachers, coaches, and employers) that reflect the diversity of the community, health care providers delivering services, direct supervisors and managers of services, local program staff, and state asthma program staff. The setting for the intervention will also influence your decisions about whom to include as stakeholders.

For health systems interventions, stakeholders may include state or regional directors for health care systems or chains, insurers and plan representatives, managers and staff from related state programs, school superintendents, housing authority administrators, state legislature staff and members, and state asthma program staff.

Remember to discuss with your stakeholders their specific needs for information about the intervention, and when they can use the information. For example, evaluations in school settings need to account for the school calendar. The needs for information and timing of these needs will drive many of the decisions you make in the following steps.

 To assure the **cultural competence** of your evaluation, it is critical to engage stakeholders that reflect the diversity within the community. Try to employ strategies to assure that all perspectives are respected in the design, conduct, and use of evaluation.

EVALUATION PLANNING TEAM. We recommend that you bring stakeholders into the planning process early by including them in your individual evaluation planning team. On this team, you will want to include stakeholders who are particularly knowledgeable about the intervention you are evaluating. Include those who are involved in implementing the intervention, organizational leaders who can help to provide access to data or to the intervention setting, beneficiaries of the intervention or their representatives, people who are interested in the evaluation findings, funders, and people who have access to data or will be involved with data analysis. Not all of these people may need or want to be part of the day-to-day evaluation planning, but most will be interested in the opportunity to provide input into the evaluation design or receive information about the evaluation's progress and findings.

EVALUATION IMPLEMENTATION TEAM. Your evaluation implementation team may be the same as your evaluation planning team, or you may decide to bring in different members to help facilitate implementation. Depending on the evaluation design, you may need the cooperation of your intervention partners at several different levels within their organizations. For example, if your design calls for a delay in implementation to allow for baseline data collection, it will be important that organizational leadership for your intervention partner(s) understands the rationale for the delay so they will support the data collection activities. If your design calls for support from clinic staff to collect information from or provide information to patients, pull medical records, and/or abstract medical records, it will be important that staff personnel are involved to ensure that the design is feasible.

Step 2 – Describe the Intervention

Evaluation of your intervention starts from a clear description of the overall service or health system strategy, the interventions that comprise it, and how they interrelate to achieve outcomes. This step in the evaluation cycle is typically where you will determine the scope of your evaluation, i.e., deciding if you will evaluate the entire intervention strategy (all related interventions), some part of the strategy (selected interventions), a specific intervention, or even a subset of activities within an intervention. For example, within the school-based services strategies, an intervention evaluation may examine the effects of an entire intervention, or it may ask questions about segments of an intervention, for example, a caregiver education strategy in one school or a training intervention for coaches in a particular school district. You will work with your stakeholders to make decisions on scope based on their needs for information (including timing of collecting these data) and the resources available for evaluation.

Most intervention strategies are either implicitly or explicitly based on some type of social science theory. **THEORY-DRIVEN EVALUATION** involves using theory to describe how your intervention is expected to work and then designing the evaluation to test that theory. For those who wish to review more information on how social science theory can be used to inform your asthma evaluation, see Appendix D.

A written description of the intervention will serve as a communication tool to assure that all stakeholders are informed as the evaluation moves forward. Developing this intervention description with your stakeholders will help ensure that members of your evaluation planning team share a common understanding of the intervention being evaluated and what it is expected to accomplish.

For your intervention description, you can build on what you developed earlier in your strategic evaluation plan. To expand this initial description, questions in the Individual Evaluation Plan Template in Appendix F, Module 1, *Learning and Growing through Evaluation* can help you develop and/or refine your intervention description.

The use of a **LOGIC MODEL** may help to better understand the theory of change behind the interventions as well as describe the overall intended operations of the program. As explained in Module 1, *Learning and Growing through Evaluation*, logic models are a good way to graphically depict your program. Typical components of a logic model include **INPUTS**, **ACTIVITIES**, **OUTPUTS**, and **OUTCOMES**. You may also want to consider including elements of **CONTEXT** that affect the implementation of your interventions or the outcomes it can achieve. Even if your evaluation purpose is narrow, it is generally important to map out all of the aspects of an intervention.

While the overarching logic model (Figure 1) will help frame how your overall program is operating, you will need to customize your logic model so that it matches the intervention you will evaluate. The new logic model needs to clearly show the type of **CHANGE(s)** your intervention is intended to achieve, as well as a clear and logical set of activities that will achieve that change. You may want to include information such as:

- The target audience or setting affected (e.g., what population(s) should experience the change)
- The specific change(s) sought (e.g., what type(s) of behavior change)
- The criteria or performance standards being used to assess success (e.g., what level of change is expected)
- The time period (e.g., when should change occur)
- The costs or resources needed to implement the intervention in a real world setting

You may also find it helpful to look at the performance measures being collected related to the intervention. Data for these measures can help form your “snapshot” and may help with the next evaluation step.

Step 3 – Focus the Evaluation Design

Developing good **EVALUATION QUESTIONS** is at the heart of any evaluation. Your questions will determine all evaluation activities that follow, from your design to your data collection strategy.

There are many aspects of your intervention that you could potentially evaluate. Key evaluation questions you may want to address include:

- What did we do?
- How did we do it?
- Who was affected?
- What change(s) did we accomplish?
- How can we improve upon what we have done?
- How did the context affect our implementation (process) and our results (outcomes)?

However, given time and resource constraints, you will need to focus your evaluation to ensure that it is useful and feasible. Typically, evaluations will have 3-5 evaluation questions. Focus questions at the level where the intervention is occurring, where the stakeholders can most directly use evaluation information. Ask yourself and your stakeholders:

- What do we most need to know about this intervention?
- What issues or challenges do we face with this particular intervention?
- What resources are needed to reach the appropriate audience(s)?
- How successful was the program in executing the selected strategy?
- Which boxes in the logic model seem most important at this point in time?
- Which links between boxes in the logic model seem most important at this point in time?
- What level of change can be accurately measured at this stage?

Remember to consider how long an intervention has been operating when selecting your evaluation questions. The Evaluation Questions Checklist can help with this process.

Process evaluation questions. Table 1 lists some generic process evaluation questions that are appropriate for interventions targeted to any type of change. Evaluation questions about inputs and activities (e.g., dose delivered, dose received, fidelity to original intervention plan, and reach of intervention) are characteristic of a process evaluation.¹ However, process targets can also be measured in an outcome evaluation to better explain how outcomes were reached.

1 Steckler A and Linnan L, eds. *Process Evaluation for Public Health Interventions and Research*. San Francisco, CA: Jossey-Bass, 2002.

Table 1: Overarching Intervention Evaluation Question Types – Process Questions

Process Evaluation Questions
Inputs
What are the starting conditions and contexts?
Are adequate resources available for intervention implementation?
What needs are being addressed by the intervention?
How does the intervention fit with the overall strategy for asthma control?
Activities and Outputs
What were the key activities implemented?
Was the intervention implemented as planned?
To what extent is the intervention reaching the appropriate target population?
How well was the intervention administered?
How can intervention administration be improved?
Is the intervention acceptable to the target population? Culturally appropriate? Feasible?
Is the intervention being used by the target audience? Disseminated?
What are the major barriers to or facilitators of intervention success?
To what extent has the intervention had unintended consequences?
Context
What support has been mobilized for action?
What progress has been made in capacity-building to support increased implementation?
How sustainable is the intervention over time?
How well coordinated is the intervention with other interventions within the community or system?

Outcome evaluation questions. Table 2 presents generic outcome questions. Questions that focus on short-, medium-, or long-term changes are typically characteristic of outcome evaluations. The outcome evaluation questions for short- and medium-term outcomes need to “match” your intervention description and the specific type(s) of change targeted. However, long-term health outcomes may potentially be achieved through any change type (or through multiple changes working together), since these outcomes represent higher-level changes that usually result from a convergence of short-term and intermediate changes.

Table 2: Overarching Intervention Evaluation Question Types – Outcome Questions

Short-Term Outcomes
Have knowledge or awareness of asthma changed?
Have skills and behaviors related to asthma changed?
Have environmental changes been made?
Have policy/procedure changes been made?
Have relationships/linkages been formed to promote systems change?
Medium-Term Outcomes
Has the intervention changed asthma management and care?
Has the intervention affected the level/amount of asthma triggers?
Has the policy change resulted in knowledge/awareness, behavior, environmental, or systems changes of interest?
Has the systems change resulted in knowledge/awareness, behavior, environmental, or policy changes of interest?
Long-Term Outcomes
Has the intervention made a difference to the health and quality of life of individuals/families affected by asthma?
Has the intervention made a difference in addressing asthma disparities?
What was the cost-benefit or cost-effectiveness of the intervention?
How can the impacts of the intervention be strengthened?

Depending on your intervention’s stage of development, you may decide to conduct a process evaluation only. If the outcomes you expect have not yet had a chance to materialize, then an outcome evaluation does not make sense. For an intervention that has only been operating for several weeks or months, process evaluation can assess fidelity to the intended model and may show ways to improve and enhance the intervention, thereby promoting the likelihood of positive outcomes.

When you conduct an outcome evaluation, however, it is important to always collect process information as well to help you interpret the outcomes. For example, if you know that your intervention was well implemented, you will feel more confident that your intervention was responsible for the changes you observe. Similarly, if you learn that expected outcomes are not occurring as planned, process evaluation allows you to know whether the model is not being implemented as intended, or if the model itself is not designed to produce desired outcomes.

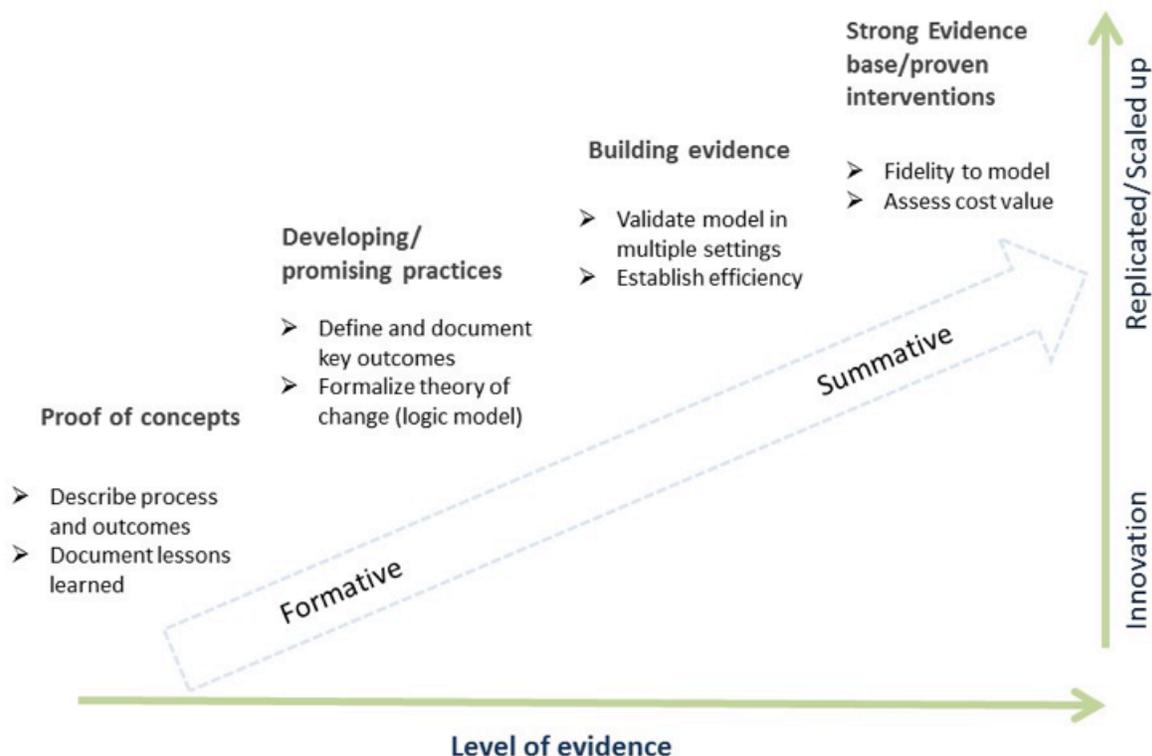
To a great extent, your evaluation questions will drive your **EVALUATION DESIGN** (see Module 2, Implementing Evaluations, Appendix E for more information on evaluation designs). For example, if you want to examine change over time you will need to include **REPEATED MEASURES**. If you want to compare results of the interventions (e.g., in different groups, different settings, or to a different intervention) you may need an evaluation design that includes a **COMPARISON GROUP** or **CONTROL GROUP**. If you want to answer a causal question (e.g., did the intervention result in the outcomes observed?), you may want to consider an evaluation design that helps you rule out **THREATS TO INTERNAL VALIDITY**. You may also want to consider including some elements of cost evaluation to your design (see Economic

Evaluation, Module 6). Talk with your evaluation technical advisor (ETA) about the implications of using different types of evaluation designs and ensure that the type of design you select is adequate to answer your evaluation questions.

It is important while developing your design to consider the analyses stakeholders will want later on. For example, how will they want to sub-categorize information? Will they want to look at separate geographic areas? Different demographic variables? You may want to pose different scenarios to the stakeholders to assure that the design will provide sufficient information. This is also an opportunity to build evaluation capacity as well.

The type of design you select needs to be informed by the evidence base related to your intervention. Figure 2 below summarizes how evaluation can support recommended tiered-evidence programming.²

Figure 2: Evidence Continuum and Types of Evaluation



Proof of concept. Evaluation of a **PROOF OF CONCEPT** is helpful when evidence is needed to explain the viability of an intervention or determine what supports are needed for a successful implementation. These types of projects are usually smaller in scale since the objective is to establish feasibility and not effectiveness or impact. Useful data include information on implementation lessons learned and a description of process and outcomes. Evaluation of proof of concept can be challenging and using innovative evaluation methods, such as **Developmental Evaluation** may be considered.

² Adapted from HHS Evaluation Day (2014). A Proposed Framework for Continuous Evidence Building.

Developing or promising practices. With promising practices, the scale of the intervention increases after proof of concept has been demonstrated. At this stage, effect sizes and the significance level of changes in outcomes can begin to be estimated. Evaluation data are helpful in formalizing theory of change (logic model). Assessing program fidelity is important to establish that the potential for success can be achieved even in different settings.

Building evidence. In the building evidence stage, the viability of the intervention is examined in multiple settings. Effect sizes are still estimated. In addition to measuring effect size on the intended audience, the efficiency of its implementation needs to be explored—how well can the intervention be implemented. Each additional setting introduces new contextual factors that may complicate achievement of intervention effects. Evidence is built by assessing how intervention effects are maximized while maintaining the same level of effort.

Evidence based/proven interventions. An intervention deemed evidence-based or proven indicates that that intervention would work in diverse settings and would yield substantial intervention effects and statistically significant changes for participants. When an intervention has proven to be effective using rigorous measurement, cost evaluation can offer additional evidence on the value of the intervention by comparing costs with level of effectiveness, benefits, and utility. Cost data can also provide information on how to improve efficiency or whether or not an intervention should be scaled up or down.

As Table 3 shows, evaluation designs needs to align with interventions along the evidence continuum. Interventions, even those with a strong evidence base, may not have been proven effective in a specific context. In these cases, evaluation needs to be done at a level associated with lesser evidence.

Table 3: Level of Evidence and Evaluation Design

Continuum	Level of Evidence	Evaluation goal and design elements
-	Proof of Concept	Goal: Descriptive evaluation to explain the intervention Possible design: Pre- and post- single group design to determine if it “works” as intended
+	Promising Practices	Goal: Process evaluation to establish clear theory of change (logic model) and document modifications Possible design: Interrupted time series design with a single group; extensive feedback loops to refine model
++	Potentially-effective Practices	Goal: Process evaluation to establish “efficient” operations and interrupted time series with multiple groups Possible design: Control or comparison group in addition to determine if intervention can be replicated and remain effective
+++	Proven Programs Evidence-based Practices	Goal: Assure fidelity to model; routine monitoring to assure outcomes are occurring; assess cost-effectiveness, utility, or benefits Possible design: Interrupted time series with comparison group

Step 4 – Gather Credible Evidence

What information will you gather to help you answer your evaluation questions? What information is credible to your stakeholders? Since other stakeholders may join later in evaluation, consider brainstorming other data you may need by considering a wide range of objections to your positive findings and collecting evidence to counter them. Keep in mind at this stage that different stakeholder groups may consider different types of evidence to have more or less credibility. Be sure to include data sources that will be meaningful to your various stakeholders.

Selecting indicators, data sources, and methods. One of the first tasks in this step is to identify indicators that will show what changes should be occurring due to the intervention. When selecting indicators, you need to work with stakeholders to assure the level of measurement is appropriate for the level that the intervention occurs. For example, if you are interested in how well a state policy regarding asthma-friendly schools is being adopted, you may be able to review district-wide policies and procedures. However, if you are interested in whether or not students with asthma are benefiting from asthma friendly school policies, you will need to work with individual schools to determine how the policy is implemented and document specific changes that have occurred. There are many options for developing indicators, described in Appendix E.

Once you have selected indicators, you will need to identify data sources. Options include existing data or collecting new data from participants in the intervention (these are discussed below).

Analyzing existing data. Before you allocate resources to designing new data collection instruments and procedures, consider whether any existing data sources could be used in your evaluation. Using existing sources may save you time and money but does require some up-front planning. You may know of existing sources of information or your partners may be able to alert you to sources that you can use. Review these data sources carefully to determine their suitability for use in the evaluation. What data items are being collected? Who collects the data? How often are data collected? Who has access to these data? What permissions are needed to access these data?

You may find that existing sources do not have all of the information you need to fully answer an evaluation question. Or you may find that the data elements you need are incomplete or inaccurate. For example, if you want to know whether your intervention is affecting asthma health disparities, any existing source you use would need to include demographic data to help you assess whether you are making progress among subgroups of interest.

Sometimes you may have the opportunity to modify the existing data source to better meet your needs. Can you add questions to an existing form? Can you combine two data sources with complementary information? Can you influence the frequency or timing of existing data collection efforts to better track intervention outcomes or processes? Can you influence data collection instructions or training to improve data quality? In some cases you may not have control over the existing data source and will simply need to use the data you have. In this case you may need to supplement existing sources with new data collection or revise your evaluation

question to better match the evidence you have available. Be sure to pilot and ensure the cultural relevance and appropriateness of any questions you add or modifications you make to the data collection process.

New data collection. Once you have made the decision to collect new data, you will need to design appropriate instruments and data collection procedures. Remember, pilot testing is very important to be sure that your instruments and procedures are getting you the data you need.

Even if you choose to collect new data rather than relying on existing sources of information, you may not need to design instruments and procedures from scratch. There are many survey instruments, focus group guides, checklists, and interview instruments already developed and available that you may be able to use or adapt for your own purposes. Using instruments that have been developed previously to support other evaluations or studies can help you:

- Save effort in designing your evaluation.
- Compare your results to results from interventions implemented by others.
- Provide greater assurance of the validity of your data collection efforts.

In the following section we provide some guidance on using existing tools and instruments. If you decide to develop your own data collection instrument(s), it can still be useful to look at existing instruments for ideas about how others have collected similar information.

How to Choose from Previously Developed Data Collection Instruments

Given the sheer number of existing resources for data collection, how can you choose among them and what factors do you need to keep in mind?

- **Instrument purpose.** The key consideration in using an existing instrument is whether it will suit your evaluation purposes. Does this instrument ask the questions you are interested in? Does it cover all the topics you need to answer your evaluation questions? You may need to add some questions to cover your own topics of interest. Remember to pilot test!
- **Making changes.** When using an existing instrument, especially one that has been validated (tested for validity and reliability among large groups of people), it is probably not a good idea to make major changes to question wording, sequence, or answer categories as you will then lose the benefit of the prior testing. Many survey instruments contain scales (multiple questions related to the same topic) and, if you need to adapt or remove elements, it is better to remove or keep an entire section rather than cherry-pick certain questions.
- **Target audience.** Has the instrument been used in a population similar to your target audience? Is it appropriate for your population in terms of literacy level, idioms, language, or cultural relevance? If possible you may want to look for an instrument that has been used with a similar audience rather than adapting an instrument that was designed for a different group.
- **Instrument length.** In deciding whether or not to use an existing instrument, keep in mind how long your target audience will have to participate in data collection in your evaluation versus how long it takes to complete the existing instrument. Pilot testing the instrument with a small group of people prior to wider use can help you determine whether use of the instrument is feasible in your situation.
- **Getting permission.** It is good practice to get permission from the instrument developer to use an instrument. This is usually as simple as an email or telephone call. In addition to making sure you are covered when using the instrument, you may also get valuable information not included in public sources, such as information about a new version of the instrument or details about how to analyze results.
- **IRB/Participant Protection.** Before administering the instrument, the level of risk may need to be assessed by an institutional review board (IRB). Initiate data collection after the IRB has determined that minimum risk is involved and specified what protections are appropriate for your target population.

How much data to collect. You will also need to decide how much data you will need to collect. The amount of data needed to be credible will depend on many factors, including the type of intervention being evaluated and the needs of the stakeholders. Please see Module 2, *Implementing Evaluations*, Appendix H for more information on **SAMPLING**.

Selecting methods. Ensure your individual evaluation plan also contains detailed methodologies for how you will collect each source of data. Your individual evaluation plan will need to include instruments, data collection guides for evaluation staff, and other data collection materials (such as consent forms and advance letters for a survey), as well as a detailed timeline for data collection activities.

Once you have determined credible data sources for your evaluation, matched the data sources (whether existing or new) to your evaluation questions, and documented your proposed methodologies in an individual evaluation plan, you will then implement your data collection plan and collect or compile the information needed to answer your evaluation questions. Module 2, *Implementing Evaluations* provides much valuable guidance on implementing your evaluation, including information on dealing with common evaluation challenges, training data collectors, conducting and monitoring data collection, budgeting for evaluation as well as other helpful topics.

Step 5 – Justify Conclusions

This step involves analysis, synthesis, and interpretation of results to answer your evaluation questions. Developing an analytic strategy for your intervention evaluation is part of your individual evaluation plan. However, while it is important to analyze your results, you and evaluation stakeholders also need to interpret them in order to justify the conclusions you make about your intervention.

Hopefully you began thinking about how data would be analyzed back in Step 3, when you were developing your evaluation design. In this step you will execute that plan. Since many evaluations will be multi-leveled and multi-faceted, it is important that you remember the level from which the data were collected during the analysis and maintain the connections among data when triangulating information. For example, information from one school typically would not be analyzed with information from district-level participants.

To assure their questions are answered in a manner meaningful to them, keep your stakeholders engaged in the analysis. Since stakeholders may not have expertise in all analytical techniques, it is your responsibility to assure that they understand what is being done and how evaluation information is generated. You may find that you need to teach stakeholders or even to revise your analytic plan to assure understanding. This iterative analysis process will reveal the findings and help stakeholders integrate knowledge gained from the evaluation.

It is very important that you begin the analysis process as early as possible. A piloting phase of the evaluation is useful for this activity. Analyzing data early will enable you to identify any gaps or misunderstandings in the data being collected and revise the evaluation protocol accordingly.

Further, this is an excellent way to share with stakeholders the way information is being built so that there are no surprises at the end of the evaluation. Occasionally, you may even find that sufficient information is garnered earlier in the data collection process than anticipated. If this occurs, you can stop the data collection process or refocus it to answer additional questions.

Once the evaluation team has sufficiently analyzed the data, there are a number of different ways to justify your conclusions.

- **Standards.** Apply standards or indicators by which you can assess whether you have met your objectives for your intervention and identify areas for improvement. Developing such standards and indicators with your stakeholders is one good way to justify your conclusions and ideally occurs during your individual evaluation planning process.
- **EVIDENCE-BASED INTERVENTIONS and promising practices.** Research existing evidence-based interventions or promising practices to see what other evaluators have found to be appropriate levels of success for their interventions.
- **Social science theories.** There are existing social science theories to help justify your conclusions. In Appendix D a number of well-known social science theories that have been applied to asthma programs.

Developing recommendations

Not all evaluations produce specific recommendations. If your evaluation is intended to generate specific recommendations, consider the following activities:

- Develop recommendations in partnership with stakeholders. Stakeholders will be knowledgeable about what is feasible and appropriate with the program's context.
- Assure that the recommendations are supported by the evaluation information and findings. While it may be tempting to jump to a solution to a problem, evidence uncovered by the evaluation needs to be used to clearly show how the recommendation will address the issue.
- Tailor recommendations for those who can implement them. Often, evaluations have recommendations that require actions be taken on different levels, e.g., program staff may be asked to change practice, while administrators address policy issues. You may find it helpful to have different sets of recommendations that focus on what actions specific stakeholders can take.

Step 6 – Ensure Use of Evaluation Findings and Share Lessons Learned

Evaluation findings are meant to be used. The findings may help you decide whether to continue an intervention or, more likely, identify ways to improve an intervention that is basically working well but might need some tweaking.

Communicating findings. Thinking early and often about communicating evaluation results to different audiences is an important way to ensure the use of your findings. You will want to refer back to your communication and reporting plan developed as part of your individual evaluation plan (Module 1, *Learning and Growing through Evaluation*, Appendix F). Are there any additional audiences for communication of results? Are there additional ways to communicate your findings? Have you tailored dissemination of findings to your stakeholder needs? Do you need to make any other revisions to your **COMMUNICATIONS PLAN**?

The timing of communications can be as important as the content of the communications. For example, those whose support is needed to take action may be too busy attending to other matters. If this is the case, it may be prudent to delay sharing your evaluation findings to a time when the people who can provide support have the ability and time to do so.

Action planning. Developing an action plan based on the findings of your evaluation is a critical step for ensuring use of your findings (see Module 2, *Implementing Evaluations*, Appendix K). Including your evaluation stakeholders in developing your action plans also promotes the use of your findings.

As you develop your action plans consider the following questions.

- Why did partners get involved in the intervention? Why should they get involved in future interventions?
- What were the positive results of the intervention? How can they be sustained and strengthened?
- Were there unintended positive results from the intervention? How can we assure they continue to occur?
- Were there negative unintended consequences of the intervention? How can they be mitigated or avoided?
- How did the intervention change over time? Why were changes made? Should these changes be maintained?
- What were the main barriers faced in implementation the intervention? How were they (or how could they be) overcome?
- What factors facilitated implementation of the intervention? How can these factors be supported?
- What improvements would you like to make to the intervention in the future?
- How can you promote sustainability or institutionalization of the intervention in the future?

We encourage you to think broadly about the lessons learned from evaluating the intervention. You may want to hold a debriefing session with your evaluation planning team and intervention partners after each evaluation to discuss lessons learned and how to share them. You have probably learned more than you realize. Documenting these lessons and their corresponding actions creates a record that you and your stakeholders can refer to and use to improve your intervention in the future. It also serves to foster collaboration and create a learning environment among your partners and stakeholders.

You have just invested considerable effort and time in conducting and implementing your evaluation. Make sure as you ensure use and share lessons learned that you also take the time to celebrate your accomplishments, build on your relationships, and acknowledge the many contributions by partners and stakeholders that contributed to your successful evaluation.

Applying the Program Evaluation Standards throughout the Evaluation

As you learned in the earlier modules of the *Learning and Growing through Evaluation* series, the graphic that accompanies the CDC Framework for Program Evaluation has at its center the evaluation standards: **UTILITY**, **FEASIBILITY**, **PROPRIETY**, and **ACCURACY**. The modules have provided you with methods and strategies to apply these standards to any type of evaluation you are undertaking.

In addition to the four standards shown in the graphic, evaluators have one more standard that has recently been added for our profession. This standard is **Evaluation Accountability**, and it is unique in that it focuses on assuring the evaluation is properly managed and implemented. While the other standards can serve as parameters for evaluation during our work with any stakeholders, this standard is for evaluators to know their work is meeting professional expectations.

The first task to meet this standard is to assure that the evaluation is documented appropriately. You can use the evaluation plan as a starting point for this documentation, noting what was done, what was modified, and why decisions were made.

The standard also promotes internal and external review of the evaluation. Is it being planned and implemented in the best manner? Per the standard, all evaluations need to have at least an internal review, a strategy that promotes accountability. Within this grant program, your ETA can serve this function. For evaluations that involve major investments of resources, or can have major consequences, i.e., “high stakes” evaluations, external review is appropriate. This type of **META-EVALUATION** will likely involve additional time or resources, so consider this during the planning process.



Appendix A

Notes

Technical Package: EXHALE and NACP's Strategic Direction

NACP prioritizes the three interventions with the strongest evidence of effectiveness: medical management based on the National Asthma Education and Prevention Program's (NAEPP) EPR-3 guidelines (1), asthma self-management education, and home visits for multi-component, multi-trigger reduction.

Just as the EPR-3 uses a stepwise approach to the medical management of asthma, the NACP recommends a step-wise, control-based approach to the management of asthma on a population level:

- People with intermittent or mild persistent asthma may achieve control of their symptoms with good medical management and office-based or written instructions alone. (2)
- People whose asthma is not controlled with medical management, especially those with moderate and severe persistent asthma, may benefit from referral to formal, skills-based self-management training. (3,4)
- People whose asthma is not controlled with these measures may require a home-based assessment with a focus on decreasing asthma triggers. (5)

Inherent in this approach is that these three interventions be linked with communication and feedback across providers.

Adding to these three priority interventions is evidence of an association between smoking during pregnancy and transient early wheeze (starting during the first year of life and resolving around 3 years of age) (6). This transient early wheeze is a risk factor for adult asthma (6), and reducing exposure to maternal smoking and environmental tobacco smoke among pregnant women and infants is a priority action under strategy four of the Coordinated Federal Action Plan to Reduce Racial and Ethnic Asthma Disparities. And finally, as part of good public health practice, surveillance information can be used to identify populations in need of services and geographic areas to locate interventions to serve those needs.

These evidence-based strategies are the core of a technical package, referred to as EXHALES:

- Education on asthma self-management
- X-tinguishing smoking and second hand smoke, particularly among pregnant women and young children(6)
- Home visits for asthma education and trigger reduction for those whose asthma is uncontrolled with medical management and self-management education
- Access to and the provision of guidelines-based care, including inhaled corticosteroids
- Linkages and coordination across settings

- Environmental trigger reduction policies in multi-unit housing and schools
- Surveillance to identify priority populations and geographic areas for focus and intervention.

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Evaluability Assessments

Evaluability assessments (EAs) are pre-evaluation assessments of a program or activity designed to determine the utility and feasibility of conducting a full evaluation. They are typically undertaken when there is uncertainty regarding a program's capacity to conduct an evaluation. Since conducting an evaluation requires significant resources, EAs can assure that the investment will be made wisely. Because EAs collect only enough information to decide whether or not a program is ready for evaluation, they require fewer resources.

If the program is ready for evaluation, the EA-generated information will inform evaluation design and promote clarity of evaluation use. If the program is not ready for evaluation, the EA will assess areas of capacity insufficiency and provide guidance towards building evaluation capacity. Such guidance may include suggesting the need to increase access to information, improve consistency of program records, or address perceptions and attitudes that are counterproductive to evaluation. These suggestions may facilitate evaluation capacity building.

To learn more about EAs, please see:

Wholey, Joseph S., Harry P. Hatry, Kathryn E. Newcomer. (2010). *Handbook of Practical Program Evaluation* (3rd ed.). San Francisco: Jossey-Bass.

Cultural Competence

To respond to persistent disparities in health outcomes, ensure the public health workforce has the sensitivity and flexibility to work effectively in diverse contexts. Similarly, evaluation of programs requires a culturally responsive approach. To assist with developing and implementing practical strategies for culturally competent evaluation, a guide and tip sheet are available at

http://www.cdc.gov/asthma/program_eval/cultural_competence_guide.pdf

http://www.cdc.gov/asthma/program_eval/cultural_competence_tip_sheet.pdf

Additionally, an assessment tool, the Cultural Competence Assessment Tool for State Asthma Programs and Partners (CCAT), is a practical resource designed to promote and enhance cultural competence among our many asthma partner organizations. Based on the Culturally and Linguistically Appropriate Service (CLAS) Standards, the CCAT is a self-assessment tool designed to guide programs in assessing the cultural competence of their own programs. Using a flexible, team-based approach, programs use the CCAT internally, with the aim of identifying program strengths and areas for improvement in cultural competence. You can find it at <http://www.cdc.gov/asthma/pdfs/ccat.pdf>

Evaluation Planning Team or Evaluation Implementation Team

Broad stakeholder engagement is an essential element of CDC and NACP's approach to evaluation. People who have been included in evaluation planning and implementation are more likely to help ensure that the findings, which represent an investment of their time, are put to use. And so it follows that the evaluator is but one member of a team of people necessary to make the evaluation useful. A packet is available to help you think about how to build your evaluation team. It includes a sample job description for an evaluator, a list of evaluator competencies, and sample letters for recruiting members of your strategic and individual evaluation planning teams. You can find it at http://www.cdc.gov/asthma/pdfs/finding_the_right_people_for_your_program_evaluation_team.pdf

Evaluation Questions Checklist

The need for good evaluation questions is critical to good evaluation, yet the evaluation literature generally has provided only broad guidance on developing them. To help in choosing good evaluation questions—questions that are likely to lead to actionable evaluation findings—we created a checklist for use in assessing potential evaluation questions. The list is grounded in the evaluation literature and has benefitted from the practice wisdom of many evaluators inside and outside of CDC. Contact Maureen Wilce for a list of references: mwilce@cdc.gov.

Download the Evaluation Questions Checklist[PDF - 337 KB](http://www.cdc.gov/asthma/program_eval/assessingevaluationquestionchecklist.pdf)

Developmental Evaluation

Developmental Evaluation (DE) is a type of utilization-focused evaluation that is designed to be used with innovative, quickly evolving programs. Pioneered by Michael Quinn Patton, DE involves adapting evaluation methods and rapidly implementing them, so that real-time feedback is available and used for continuous improvements. DE may be appropriate early in the stage of development of complex programs. In DE, the evaluator works alongside the program’s developers to help guide program development. Program developers need to welcome evaluation and be willing to learn and respond to it. If a culture of collaboration and “evaluative thinking” is built, DE can help advance program development efficiently and appropriately.

However, DE is typically not appropriate for (more) mature programs. For programs that are more established and operate in a routine or stable manner, other types of evaluation methods will provide more useful and accurate information. Even for new and innovative programs, if circumstances prohibit constant and rapid changes being made (e.g., administrative requirements that prohibit adding or changing job responsibilities), DE is not appropriate. For more information about DE, please see: Patton Michael Quinn. (2010). *Developmental Evaluation Applying Complexity Concepts to Enhance Innovation and Use*. New York: Gilford Press.

Evaluation Accountability and the Evaluation Standards

The 3rd edition of the evaluation standards, published in 2011, provides evaluators with benchmarks to use in assessing the quality of their evaluation work. This edition expands the standards to include a new fifth standard: Evaluation Accountability. Meeting this standard requires that the process and decisions behind an evaluation be documented in a transparent manner. One strategy to achieve this documentation is to annotate the evaluation plan. We suggest adding something like the following to the evaluation plan templates found in Appendices E and F of Module 1, *Learning and Growing Through Evaluation* to quickly note and explain changes if they occur.

___ Evaluation was implemented as planned

___ Changes were made to the plan (describe changes as well as the rationale for changes)

The standard also requires that evaluators critically review the evaluation itself. This can be done internally by the evaluators on the project and can be done formally with evaluators external to the project on major evaluation efforts. Your CDC ETA can assist in meeting this standard. Please see: Yarbrough, Donald B., Lyn M. Shulha, Rodney K. Hopson, Flora A. Caruthers. (2011). *The Program Evaluation Standards: A Guide for Evaluators and Evaluation Users*. Thousand Oaks: Sage.

Appendix B

Glossary

Note: Numbers in square brackets [#] refer to sources from which a given definition has been drawn or adapted, as listed at the end of the Glossary. Words highlighted in green, bold, small caps indicate cross-references to other terms included in the Glossary.

Accuracy	One of the program evaluation standards developed by the Joint Committee on Standards for Educational Evaluation that is intended to increase the dependability and truthfulness of evaluation representations, propositions, and findings, especially those that support interpretations and judgments about quality. See also FEASIBILITY , PROPRIETY , EVALUATION ACCOUNTABILITY , and UTILITY . [9]
Activities	The actual events or actions that take place as a part of the program. [19]
Audience	The individuals (such as your STAKEHOLDERS and other evaluation users) with whom you want to communicate the results of an evaluation. [14]
Change	As used in this guide, this term refers to the observed difference in asthma control after an INTERVENTION has been delivered. [also see 2]
Communications Plan	A document that describes: the communication needs and expectations for the project; how and in what format information will be communicated; when and where each communication will be made; and who is responsible for providing each type of communication. [3]
Comparison Group	A group not exposed to a program or treatment. Sometimes referred to as a CONTROL GROUP , comparison group is a term used more frequently in QUASI-EXPERIMENTAL DESIGNS (than in EXPERIMENTAL DESIGNS). [19]
Context	The socioecological conditions that directly and indirectly influence how an INTERVENTION is delivered, received, and evaluated.
Control Group	A group whose characteristics are similar to those of a program's participants but who do not receive the program services, products, or activities being evaluated. Participants are randomly assigned to either the experimental group (those receiving program services) or the control group. A control group is used to assess the effect of program activities on participants who are receiving the services, products, or activities being evaluated. The same information is collected for people in the control group and those in the experimental group. See also RANDOM ASSIGNMENT . [22]

Evaluability Assessment	An evaluability assessment (EA) is a systematic pre-evaluation assessment of a program or activity designed to determine the utility and feasibility of conducting a full evaluation. Evaluability assists with determining whether an intervention is at an appropriate stage of development to warrant rigorous outcome evaluation; it also ascertains a program's capacity to carry out such an evaluation. [Adapted from 10]
Evaluation Accountability	One of the program evaluation standards developed by the Joint Committee on Standards for Educational Evaluation that encourages adequate documentation of evaluations and a meta-evaluative perspective focused on improvement and accountability. See also FEASIBILITY , ACCURACY , PROPRIETY , and UTILITY . [25]
Evaluation Design	The kinds of information, sampling methods, and comparison base that are used (or proposed) to address the specified EVALUATION QUESTIONS . Evaluation designs may also address information sources, information collection methods, the timing and frequency of information collection, and information analysis plans. Evaluation designs fall into one of three broad categories: EXPERIMENTAL DESIGN , QUASI-EXPERIMENTAL DESIGN , and NON-EXPERIMENTAL DESIGN . [Adapted from 18]
Evaluation Implementation Team	As used in this guide, this term refers to a small group of evaluation STAKEHOLDERS convened by a state asthma program to implement or supervise implementation of an INDIVIDUAL EVALUATION PLAN . This group may include external evaluation contractors.
Evaluation Planning Team	As used in this guide, this term refers to a small group of evaluation STAKEHOLDERS convened by a state asthma program to develop and regularly update the STRATEGIC EVALUATION PLAN .
Evaluation Question	A question related to a program's OUTCOMES , OUTPUTS , INDICATORS , or other definition of success. The goal of an evaluation effort is to answer one or more EVALUATION QUESTION(S) . [17]
Evidence-Based Interventions	Interventions with documented evidence from systematic peer reviews and rigorous evaluations that indicate that these health strategies are capable of yielding their intended impact across settings. These interventions are synonymous with interventions described as "proven" or "practice based." [Adapted from 15]
Experimental Design	Designs that try to ensure the initial equivalence of one or more CONTROL GROUPS to a treatment group by administratively creating the groups through RANDOM ASSIGNMENT , thereby ensuring their mathematical equivalence. Examples of experimental or randomized designs are randomized block designs, Latin square designs, fractional designs, and the Solomon four-group. [19]

Feasibility	One of the program evaluation standards developed by the Joint Committee on Standards for Educational Evaluation. The feasibility standard is intended to ensure that an evaluation will be realistic, prudent, diplomatic, and frugal. See also ACCURACY, EVALUATION ACCOUNTABILITY, PROPRIETY, and UTILITY . [9]
Health Systems Strategy	These strategies are directed at improving collaboration between health care and public health/community-based agencies so as to reach people with asthma on a population level. [20]
Individual Evaluation Plan	As used in this guide, a written document describing the overall approach or design that will be used to guide an evaluation. It includes what will be done, how it will be done, who will do it, when it will be done, why the evaluation is being conducted, and how the findings will likely be used. May also be called an evaluation protocol. [22]
Inputs	Resources that go into a program in order to mount the ACTIVITIES successfully. [19]
Intervention	Any group of activities that are coordinated by the asthma program to achieve outcomes. Service interventions are those that are targeted to individual people with asthma and their families and other caregivers. Health systems interventions address issues more broadly, often at the population level.
Logic Model	A systematic and visual way to present the perceived relationships among the resources you have to operate the program, the ACTIVITIES you plan to do, and the changes or results you hope to achieve. [19]
Meta-evaluation	External and internal review of evaluation processes and outcomes to determine whether or not procedures were appropriate and conclusions are valid. [Adapted from 1]
Non-experimental Design	An EVALUATION DESIGN in which participant information is gathered either before and after the program intervention or only afterwards. A CONTROL GROUP or COMPARISON GROUP is not used. Therefore, this design does not allow you to determine whether the program or other factors are responsible for producing a given change. [19]
Outcomes	The results of program operations or activities; the effects triggered by the program (for example, increased knowledge or skills, changed attitudes, reduced asthma morbidity and mortality). [19]
Outputs	The direct products of program ACTIVITIES ; immediate measures of what the program did. [19]
Performance Measurement	Ongoing monitoring of a program's progress toward preestablished goals. Performance measures may address program activities conducted or the results of products or services. [16, 24]

Program Evaluation	The systematic collection of information about the ACTIVITIES , characteristics, and OUTCOMES of programs to make judgments about the program, improve program effectiveness, and/or inform decisions about future program development. [19]
Proof of Concept	A term synonymous with innovation testing and emerging practice, these evaluations are instrumental in determining if an intervention works as intended. Typically viewed as the beginning of the evidence-building continuum, the findings from these small-scale projects help to identify the pathways of change, the potential for impact and whether or not the concept has to be modified before expanding use. [Adapted from 4 and 15]
Propriety	One of the program evaluation standards developed by the Joint Committee on Standards for Educational Evaluation. The extent to which the evaluation has been conducted in a manner that evidences uncompromising adherence to the highest principles and ideals (including professional ethics, civil law, moral code, and contractual agreements). See also ACCURACY, EVALUATION ACCOUNTABILITY, FEASIBILITY, and UTILITY . [9]
Quasi-experimental Design	Study structures that use COMPARISON GROUPS to draw causal inferences but do not use randomization to create the treatment and CONTROL GROUPS . The treatment group is usually given. The control group is selected to match the treatment group as closely as possible so that inferences on the incremental impacts of the program can be made. [8, 19]
Random Assignment	The assignment of individuals in the pool of all potential participants to either the experimental (treatment) group or the CONTROL GROUP in such a manner that their assignment to a group is determined entirely by chance. [23]
Repeated Measures	This elementary QUASI-EXPERIMENTAL DESIGN involves the measurement of “ OUTCOME ” indicators over time. This design has higher internal validity than a simple pre and post evaluation design where the indicator in question is only measured once before the intervention and after the intervention is introduced. For the repeated measures design, data are collected in the same manner multiple times prior to and post implementation of the intervention. Increasing frequency of measurement helps to improve accuracy in detecting trends. This EVALUATION DESIGN is also useful when a comparison or CONTROL GROUP is not available to use. [Adapted from 13]
Sample	A subset of a population that is selected to resemble the whole population. How closely the sample resembles the population will often depend on how units of the sample are drawn from the larger population. For more information on how to draw a sample, see Appendix H in Module 2.

Service Strategy	Services strategies involve strengthening and expanding asthma control efforts in homes and schools while linking with services offered by health care organizations. Strategies need to operate at the highest administrative level possible (e.g., partnering with school districts or systems rather than individual schools, or with housing complexes or authorities rather than individual homes) and focus in areas with a disproportionate asthma burden. [20]
Setting	The physical location where an intervention is delivered (e.g. school or home). [Adapted from 21]
Stakeholders	People or organizations that are invested in the program (<i>program stakeholders</i>) or that are interested in the results of the evaluation or what will be done with results of the evaluation (<i>evaluation stakeholders</i>). [19]
Strategic Evaluation Plan	As used in this guide, this term refers to a written document describing the rationale, general content, scope, and sequence of the evaluations to be conducted over time. [also see 12]
Technical Package	A set of evidence- and practice-based interventions that are used to improve public health and reduce burden of disease. [7]
Theory Driven Evaluation	An evaluation approach that is organized by articulated assumptions for how an intervention will affect social change. These articulated assumptions are used to guide the design and execution of evaluation projects by prescribing what factors affect change and the types of change expected. Theory-driven differs from method-driven evaluation in that the latter is guided by the structural goals of a particular method, e.g., qualitative evaluation. [5, 6]
Threats to Internal Validity	<p>The factors that can threaten internal validity include:</p> <p><i>Confounding:</i> The true effect between an input and an output is influenced by one or more extraneous factors (called confounders), so that the observed effect indicates an incorrect relationship.</p> <p><i>Selection bias:</i> The inclusion or exclusion of individuals, groups, or data in an evaluation which are systematically more likely to have characteristics that lead to the outcome being measured, resulting in a biased estimate of a program's effect.</p> <p><i>Information bias:</i> An estimate that arises from consistent measurement error. Includes misclassification bias and recall bias. [11]</p>
Utility	One of the program evaluation standards developed by the Joint Committee on Standards for Educational Evaluation. The extent to which an evaluation produces and disseminates reports that inform relevant audiences and have beneficial impact on their work. See also ACCURACY , EVALUATION ACCOUNTABILITY , FEASIBILITY , and PROPRIETY . [9]

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Appendix C

Evaluating the Infrastructure Strategy

As we think about comprehensive asthma control through evidence-based strategies and public health-health care collaboration, one of the earliest steps is to examine the functionality of infrastructure systems. Infrastructure is grounded on the interrelated capacities of leadership, partnership, surveillance, evaluation, and communication. The successful development and sustainability of these elements contribute to the success of services and health systems strategies and are indirectly linked to and may thus contribute to outcomes in asthma control.

Evaluation plays a unique role in the overall infrastructure strategies, since evaluation is necessary for determining what the resources and supports that are needed to strengthen these activities, and whether or not these activities are executed as intended and yield the anticipated outputs. Evaluation, therefore, is an implied and encouraged strategy for ensuring that proper planning occurs, improvements are made, and successes are achieved in the areas of leadership, partnership, communication, and surveillance, as depicted in the following figure.

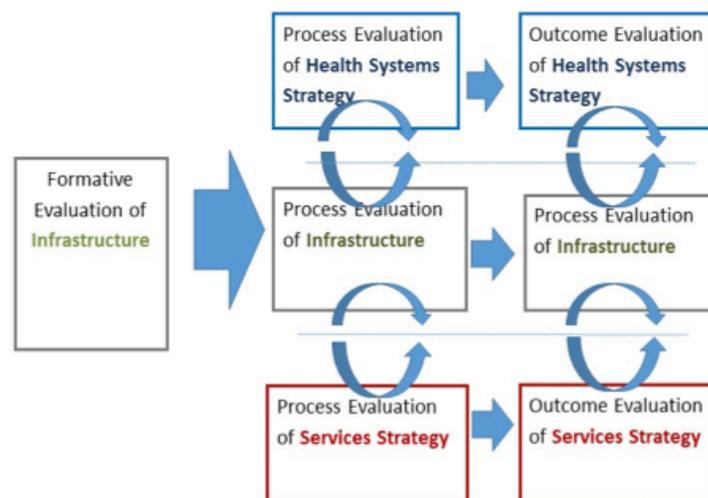
Figure 1. Conceptual Model of Evaluation's Role in Infrastructure Strategy Area



Without evaluating the status or current needs of your state asthma program's infrastructure, program staff may find it difficult to determine if existing resources are appropriate for planned interventions. In addition, given that resources and conditions change over time, periodic evaluation keeps you informed of the soundness and capacity of your program's infrastructure. Furthermore, evaluating the relationships among the various components and strategies that comprise program infrastructure and their linkages to outcomes could offer valuable information on available capacity to scale up or replicate interventions beyond the original sites.

Based on the theory of change reflected in CDC-RFA-EH14-1404¹, the development and refinement of infrastructure precedes implementation of services or health systems strategies. The inherent logic is that the success of services and health systems strategies is dependent upon a strong infrastructure. How do we know that the quality of infrastructure can adequately support planned interventions and strategies? Rather than rely only on markers of performance, evaluation can provide important information on how to best enhance the infrastructure to improve the likelihood that desired services and health systems outcomes will result. For example, strategic partnerships often assist with the implementation of an intervention. Routinely assessing the quality of support from strategic partners is recommended since changes in membership so often occur in coalitions and other formal partnerships. The quality of support that existed at the beginning of the intervention may be missing at the end of the project. Thus, it is advantageous to include process evaluation of strategic partners and other infrastructure components throughout the lifecycle of a project. In fact, evaluation can be considered cyclical. In Figure 2, we depict how essential process evaluation of infrastructure is at different stages in the life span of a project and how infrastructure evaluations are related to evaluations of service and healthy systems strategy areas.

Figure 2: Infrastructure Evaluation Lifecycle



Moreover, because state asthma programs operate in a complex, dynamic environment, it is important to periodically evaluate infrastructure to ensure its efficiency and effectiveness. Measuring efficiency involves determining how use of resources is minimized and how productivity (outputs and outcomes) is maximized. Assessing effectiveness is a way of ensuring that the objectives of the infrastructure strategies have been accomplished.

¹ Centers for Disease Control and Prevention (2014). Comprehensive asthma control through evidence-based strategies and public health-health care collaboration. National Asthma Control Program, Center for Disease Control and Prevention: Atlanta, Georgia.

The benefits of infrastructure evaluation in uncharted waters

Understanding *how* outcomes are achieved is as vital as measuring *whether* they were achieved. Even with a strong outcome evaluation design, collecting process data is still important to inform important decisions, such as whether or not surveillance communications are reaching the appropriate audiences. Further, assessing how each of the infrastructure strategies individually or collectively contributed to health services and health systems strategy areas, as well as how well the asthma program is functioning overall, provides evidence for making important decisions, including cost-related decisions. Integrating cost analysis into an infrastructure evaluation will offer additional insight on efficiency and lay the groundwork for comparing costs of resources to program effectiveness.

Your evaluation approach will be influenced by existing needs and preexisting conditions, as well as theoretical perspectives. We encourage a mixed methods approach in the design and implementation of infrastructure evaluation to ensure accuracy and comprehensiveness of the findings. We also encourage use and integration of the results of action planning from earlier evaluations and revisiting the viability of infrastructure strategies beyond what is monitored in performance management.

Most state asthma programs have had some experience designing and implementing different aspects of infrastructure strategies. It is often the case with evaluation that, in addition to guiding the program, the findings can help improve the evaluation approach. Previously generated evaluation data can help guide decisions regarding the appropriate scale for future infrastructure evaluations. In addition, using action plans from prior evaluations can help with deciding where to focus an evaluation. Given that most infrastructure strategies are already relatively developed, the focus of an infrastructure evaluation is often less on planning and more on assessing efficiency and effectiveness.

Evaluating infrastructure helps bridge the gap between past successes and current efforts. Therefore, learning from corrections made as a result of past evaluations, you can employ a more refined, efficient approach to your infrastructure evaluation. In addition to ensuring follow through with earlier action plans, infrastructure evaluation provides information on how state asthma programs adapt when encountering new conditions. This is especially true for innovative practices that require a constant feed of information to guide next steps.² Given that health systems strategies are a new area for many state asthma programs, they may require innovative efforts and approaches not previously considered. If your state asthma program is planning to initiate a new intervention strategy, we encourage you to evaluate the adequacy and capacity of your program infrastructure to implement the new strategy.

2 Patton, M. (2011) *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use*. Guilford Press: New York.

Sample Evaluation Questions

Efficiency and effectiveness are paramount to successfully implementing and sustaining evidence-based strategies and public health-health care collaboration. Under CDC EH14-1404, the National Asthma Control Program is interested in knowing how state asthma programs evaluate their comprehensive asthma control services and expansion strategies for effectiveness and efficiency. The following section provides some sample evaluation questions to consider when planning your infrastructure evaluation with an eye to efficiency and effectiveness as indicators of value. Sample questions are organized around the major components of the infrastructure strategy areas:

Leadership

- | | |
|---------------|--|
| Efficiency | <ul style="list-style-type: none"> • How can leadership better facilitate sharing of resources, information, challenges, and data among asthma stakeholders? • Are resources sufficient for leadership to develop and disseminate written summaries of experiences and outcomes across implementing sites and contribute to cross-state communities of practice? |
| Effectiveness | <ul style="list-style-type: none"> • How has leadership contributed to the increased promotion of comprehensive asthma control services by the state asthma program and strategic partners? • Which leadership activities are most helpful with increasing stakeholder input into the plans, programs, and policies of payers and health care organizations? |

Partnerships

- | | |
|---------------|---|
| Efficiency | <ul style="list-style-type: none"> • How can partners' labor and material costs be reduced as they engage school districts, community-based organizations, health care organizations, federally qualified health care centers, and hospitals? • How can strategic partners better identify and engage interested school districts or health systems in participating in comprehensive asthma control activities and expanding partnerships to provide high-quality clinical care? |
| Effectiveness | <ul style="list-style-type: none"> • How instrumental are strategic partners in expanding access to and availability of comprehensive asthma services? • How have strategic partners supported efforts to reduce stigma experienced by people with asthma and help them gain greater acceptance and support? |

Communication

- | | |
|---------------|---|
| Efficiency | <ul style="list-style-type: none"> • How can dissemination of surveillance and evaluation findings be improved without substantial cost increases? • How does the volume and frequency of communication products compare to the amount of resources invested? |
| Effectiveness | <ul style="list-style-type: none"> • How has targeted dissemination of surveillance and evaluation findings influenced efforts by payers and health care organizations to improve the quality of asthma care? • To what degree has visibility of the state asthma program increased as a result of strategic communication efforts? |

Surveillance

- | | |
|---------------|--|
| Efficiency | <ul style="list-style-type: none"> • How has the process of using surveillance data to identify at-risk or disproportionately affected subpopulations been improved? • How has productivity increased in identifying, collecting, and analyzing additional data sets to guide program activities and to promote comprehensive asthma control services? |
| Effectiveness | <ul style="list-style-type: none"> • How has surveillance data been used to increase coverage for comprehensive asthma control services? • How has the state's asthma surveillance system been used to identify and prioritize provision of care and services for people with persistent or poorly controlled asthma? |

Evaluation

- | | |
|---------------|--|
| Efficiency | <ul style="list-style-type: none"> • What resources have been identified to minimize labor and material support used by state asthma programs to conduct evaluation? • What strategies have been identified to increase the use of evaluation findings to guide program planning and improvement? |
| Effectiveness | <ul style="list-style-type: none"> • How has evaluation contributed to the coordination of health care organizations to improve coverage, delivery, and use of clinical and other services? • What evaluation methods have been used to assess knowledge and demonstration of appropriate self-management practices among people with asthma and their caregivers? |

Focusing our evaluation efforts on these and other similar types of questions can help us develop a deeper understanding of how successful public health-health care collaboration for asthma control can be fostered. With several distinct components to infrastructure, developing a systematic process of assessment and decision-making is critical to ensure synergy among and between its subcomponents. The execution of a well-planned, stakeholder-driven infrastructure evaluation is ultimately guided by the state's program theory and its capacity to respond to emerging circumstances. Furthermore, we encourage the inclusion of efficiency and effectiveness as additional value markers to help increase the utility of findings, as these evidence standards are vital for those in the public health and health care arena.

Appendix D

Using Social Science Theory in Evaluation

The Air Pollution and Respiratory Health Branch at CDC funded Battelle to conduct a literature review of the use of social science theory in the asthma field. The review is intended to support both the design of interventions and their evaluation. This appendix presents summary findings from this literature review of articles, published books, and dissertations and theses employing a variety of social science theories in publications related to asthma. For further detail on the methodology used for this literature search, see the last section of this appendix.

Through our review of the literature, we found that a number of references in the asthma field utilized a theoretical approach. We hope that the summaries in this appendix can be used to understand the main theories that have been applied to asthma-related concepts and interventions and the main concepts behind these theories. We also summarize the main uses of these theories related to asthma and the main findings of these studies related to asthma outcomes and interventions. References to relevant literature throughout the appendix, as well as a comprehensive bibliography, can help you identify further resources that can be consulted.

This appendix is meant as a general resource on the use of social science theory in the design, implementation, and evaluation of asthma interventions. We do not expect you to sit down and read it cover to cover. Especially if you are new to social science theory, you may want to begin simply by reading the introductory information in the blue text boxes, where the theories themselves are explained. This will give you a general overview of what each theory involves. If you recognize a theory that seems applicable to the type(s) of interventions your program is implementing, you may choose to delve more deeply into the remaining subsections for that theory to learn how it has been applied to asthma intervention research and what has been learned to date.

For a systematic but more general discussion of social science theories and their use in support of health behavior and health education efforts, we recommend the reference below, which covers many of the theories presented in this appendix.

Glanz K, et al., eds. *Health Behavior and Health Education*. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 97–122.

We have organized this appendix according to the following major sections:

- Individual-level theories (Section D.1)
- Interpersonal-level theories (Section D.2)
- Organizational-level theories (Section D.3)
- Planning models (Section D.4)
- Methodology for the literature search (Section D.5)

D.1 Individual-Level Theories

Theories discussed in this section relating to behavior of individuals include:

- The Health Belief Model (HBM)
- The Transtheoretical Model (TTM)
- Theory of Planned Behavior (TPB)/Theory of Reasoned Action (TRA)
- Self-Regulation Model
- Stress and Coping Theory

These theories are presented in Sections D.1.1 through D.1.5 below.

D.1.1 The Health Belief Model (HBM)

The **Health Belief Model (HBM)** is one of the most widely used theories in health behavior research and is used both to predict health behaviors and to develop interventions. Several constructs are involved in the HBM, including:

- Perceived susceptibility
- Perceived severity
- Perceived barriers
- Perceived benefits
- Cues to action
- Self-efficacy (a relatively recent addition)

For health-promoting behaviors, the HBM theory posits that if individuals believe that they are susceptible to a condition, that the consequences of not taking action are severe (serious), and that the benefits of taking action outweigh the barriers, they are more likely to engage in a given behavior. Cues to action (which can incorporate external reminders as well as physical symptoms or media messages) can also help to promote action when the appropriate health beliefs are in place. The individual's belief in his/her ability to take action (self-efficacy) can also help to support taking action. In the case of a chronic disease such as asthma, the focus on perceived threat has been on the extent to which an individual believes his/her diagnosis and feels susceptible to disease outcomes rather than the disease itself.

Application of Health Belief Model in Asthma Programs

References utilizing the Health Belief Model focused on a number of different types of behavior changes of interest. These included:

- Medication usage and adherence (Holden et al., 1998; Putman, 2002; Zimmerman, 2008; Depaola et al., 1997; Trueman, 2000; Branstetter, 2001)
- Trigger avoidance (Holden et al., 1998; Putman, 2002; Munro et al., 1996)
- Recognizing asthma attacks early (Holden et al., 1998)
- Following treatment recommendations during an asthma attack (Holden et al., 1998)
- Making and keeping appointments (Holden et al., 1998; Putman, 2002; Jones et al., 1987)
- Peak flow measurement (Putman, 2002; Zimmerman, 2008)
- Following an asthma action plan (Emmer, 2005)
- Managing a child with asthma (Keel, 2003; Branstetter, 2001)
- Willingness to attend asthma self-management training (Dupclay, 2000)
- Influenza vaccination among individuals with asthma (Szilagyi et al., 1992; Lyn-Cook et al., 2007).

Addressing misperceptions and providing ways to overcome barriers or drawbacks to asthma management behaviors and medications may help improve treatment adherence (Depaola et al., 1997; Branstetter, 2001). Interventions for children with asthma should also target family members, as one study demonstrated that mothers and children influence one another's perceptions regarding asthma medication (Depaola et al., 1997).

Communication between the parents of a child with asthma and their child's school is important to understand the true level of asthma control and frequency of asthma symptoms (Crawford, 1998).

D.1.2 The Transtheoretical Model (TTM)

The **Transtheoretical Model (TTM)** integrates processes and principles across major theories and presents health behavior change as a progression through six stages. These stages include precontemplation, contemplation, preparation, action, maintenance, and termination. Often individuals will cycle and recycle through the stages before making the behavior change.

- Precontemplation. Individual not planning on taking action within the next six months.
- Contemplation. Individual thinking about taking action in the next six months.
- Preparation. Individual preparing to take action in the next month.
- Action. Individual has made lifestyle modifications in the last six months.
- Maintenance. Individual has maintained the lifestyle modification for six months and continues to work on preventing relapse.
- Termination. Individual reaches 100% self-efficacy; this stage is not emphasized as much in TTM research as it may be an unrealistic goal for most people.

The model also includes activities, called processes of change, that individuals use to progress through the stages of change. Some of the processes are used primarily in the early stages of change (experiential processes), while others are used for the later stages of change (behavioral processes). Experiential processes include consciousness raising, dramatic relief, environmental reevaluation, social liberation, and self-reevaluation. Behavioral processes are stimulus control, helping relationships, counter-conditioning, reinforcement management, and self-liberation.

Decisional balance is the comparison of pros and cons for making the change. Decisional balance will shift as an individual progresses through the stages of change. In the precontemplation and contemplation stages, the individual perceives that the cons outweigh the pros, but in the preparation and action stages the balance has shifted to the pros outweighing the cons. To avoid relapse in the maintenance stage, it is important that the individual still perceives the pros as outweighing the cons.

Self-efficacy also influences progression through the stages of change or relapse. Self-efficacy in TTM is the confidence an individual has that they can resist temptation to relapse back into their unhealthy behavior when in high-risk situations. Temptation types may include emotional distress, positive social situations, and craving.

Prochaska JO, Redding CA, and Evers KE. The Transtheoretical Model and Stages of Change. In: Glanz K, et al., eds. *Health Behavior and Health Education*. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 97–122.

Application of the Transtheoretical Model in Asthma Programs

In the references identified, TTM was used to develop tailored interventions related to various asthma behaviors, including asthma management behaviors, medication adherence, and removal of pets from the home (Hagan et al., 2008; Bensley et al., 2004; Cassidy, 1999; Joseph et al., 2007). Interventions included a series of questions to determine whether an individual was in the precontemplation, contemplation, preparation, action, or maintenance stage. The material, information, or activities presented to individuals varied depending on their stage of change with the goal of progressing participants through the stages.

In terms of findings from these studies:

- Moving through the stages of change takes time and may require multiple education sessions and follow-up with specific activities related to asthma to help individuals progress through the stages (Cassidy, 1999).
- Two of the four interventions used a web-based approach. Using web-based TTM interventions allows for broader dissemination while tailoring information based on answers selected by users.

Due to the small number of studies included in the review, evidence for effectiveness of these TTM-tailored interventions varied.

D.1.3 Theory of Reasoned Action (TRA); Theory of Planned Behavior (TPB)

The **Theory of Reasoned Action (TRA)** and the Theory of Planned Behavior (TPB) focus on individual motivational factors influencing the performance of a behavior. The TRA includes relationships between beliefs, attitudes, intentions, and behavior. An individual's attitude toward the behavior and beliefs related to others' approval or disapproval of the behavior impacts the individual's perceived likelihood of performing the behavior (behavioral intention). The TPB is an extension of TRA. It includes an additional construct of perceived behavioral control to account for influential factors outside of an individual's control.

Constructs for TRA and TPB include:

- Behavioral belief. An individual's belief that performing the behavior is associated with particular attributes or outcomes.
- Evaluation. The value the individual attaches to a behavior's outcome or attribute.
- Normative beliefs. An individual's belief related to whether important referents approve or disapprove of the behavior.
- Motivation to comply. An individual's motivation to do what each important referent thinks.

Behavioral beliefs and evaluation feed into an individual's attitude toward the behavior, while normative beliefs and motivation to comply feed into an individual's subjective norm. Both attitude toward the behavior and subjective norm influence an individual's intention to perform the behavior.

Constructs for TPB only:

- Control beliefs. An individual's beliefs regarding the facilitators and barriers to performing the behavior.
- Perceived power. An individual's beliefs regarding the strength or impact of each factor to facilitate or inhibit their ability to perform the behavior.

Control beliefs and perceived power together make up an individual's perceived behavioral control. This construct takes into consideration factors outside of the individual's control that could influence his or her intention and behavior.

Montano DE and Kasprzyk D. The Theory of Reasoned Action and the Theory of Planned Behavior and the Integrated Behavioral Model. In: Glanz K, et al., eds. *Health Behavior and Health Education*. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 67–96.

Application of the Theory of Reasoned Action and the Theory of Planned Behavior in Asthma Programs

Studies tested the Theory of Reasoned Action's or the Theory of Planned Behavior's ability to predict such things as:

- Pharmacists' intent to provide pediatric asthma counseling (Pradel et al., 2007)
- Onset of smoking in adolescents with asthma (Van De Ven et al., 2007; De Ven et al., 2006)
- Individuals with asthma's compliance with asthma treatment (Putman, 2002; Blackwell, 2005)
- Doctors' intent to use asthma guidelines (Limbert and Lamb, 2002)
- Smoking parents' modification of smoking behaviors (Mcintosh, 1992)
- Teachers' intent to manage symptomatic children with asthma in their classrooms (Rodehorst, 2001).

TRA and TPB components can also be applied to the development of interventions. Asthma interventions are generally directed toward individuals with asthma, parents or caretakers of those with asthma, healthcare providers, or teachers.

- Subjective norm appears to influence healthcare provider decisions regarding asthma care (Pradel et al., 2007; Limbert and Lamb, 2002), with possibly more influence over younger healthcare providers (Limbert and Lamb, 2002).
- Subject norm also appears to influence the decision to smoke by adolescents with asthma (Van De Ven et al., 2007).
- Two studies investigating the TPB's ability to predict asthma treatment compliance found different mechanisms. One study (Blackwell, 2005) demonstrated that perceived behavioral control significantly contributes to treatment adherence, while another study (Putman, 2002) indicated that health beliefs and behavioral intention are better predictors.

D.1.4 The Self-Regulation Model

The way individuals experience and cope with stress affects whether and how they seek medical care and social support and how well they adhere to health professional advice. Furthermore, reaction to stress can either promote or hinder healthful practices as well as motivation to engage in health-promoting behaviors.

The **Transactional Model of Stress and Coping** is one framework for evaluating the way people cope with stressful events. In this model, stressful experiences are viewed as person-environment “transactions” in which the impact of an external stressor is mediated by the person’s appraisal of the stressor and the resources (psychological, social, and cultural) available to him or her. A person’s primary appraisal is his or her evaluation of the significance of a potential stressor (e.g., perceptions of susceptibility and severity). Secondary appraisal refers to his or her evaluation of the controllability of the stressor along with his or her coping resources.

Coping efforts refer to the actual strategies used to mediate primary and secondary appraisals and include problem management (active coping, problem solving, and information seeking) and emotional regulation (seeking social support and venting feelings as well as avoidance and denial). Dispositional coping styles such as information seeking and optimism can moderate the way an individual responds to a stressor. Social support and positive psychological states can also influence how people adapt to stressful events.

Glanz K and Schwartz MD. Stress, coping, and health behavior. In: Glanz K, et al., eds. *Health Behavior and Health Education*. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 211–236.

Application of the Self-Regulation Model in Asthma Programs

Most studies cited tested the self-regulation theories’ ability to predict asthma management behaviors or outcomes (Preechawong et al., 2007; Lee et al., 1995; Zimmerman et al., 1999; Kieckhefer, 1987; Gibson-Scipio, 2006; Nothwehr, 1997) or used self-regulation theories to develop interventions (Bonner et al., 2002; Kuijer et al., 2007; Cox, 2001). A few studies used self-regulation to develop a model (Burns, 1999) or provide the theoretical framework for the study (Preechawong, 2004).

The asthma management behaviors investigated included:

- Resourceful coping (Preechawong et al., 2007)
- Attack management skills (Lee et al., 1995)
- Self-care and proactive coping (Kuijer et al., 2007)

- Illness management behaviors (Kieckhefer, 1987).

Outcomes investigated included:

- Asthma-related emergency department visits (Zimmerman et al., 1999; Cox, 2001; Gibson-Scipio, 2006)
- Hospital and clinic visits related to asthma (Cox, 2001)
- Activity limitations (Bonner et al., 2002; Gibson-Scipio, 2006)
- Wheezing and sleep disturbances (Bonner et al., 2002; Zimmerman et al., 1999)

Findings from these included the following:

- Progressing children with asthma and families of children with asthma through the phases of self-regulation may help improve asthma outcomes (Bonner et al., 2002; Zimmerman et al., 1999; Gibson-Scipio, 2006).
- Self-regulation theories can be used to develop a comprehensive nursing system to be used across providers to reduce healthcare system gaps and optimize access and continuity of asthma care (Cox, 2001).

D.2.1 Social Support/Social Networks

Social support is a function of social relationships and can be categorized into four main types of support behaviors: emotional support (e.g., empathy, caring), instrumental support (e.g., direct assistance), informational support (e.g., providing information or advice), and appraisal support (e.g., providing constructive feedback or affirmation). A **social network** is defined as the collection of social relationship connections surrounding a person. Social networks can offer resources and support to individuals beyond solely social support. Social support and social networks may impact health directly or indirectly through influencing health decisions regardless of current stress levels, influencing the exposure to stressors, creating a buffering effect on stressors, or influencing preventive health behaviors.

Heaney CA and Israel BA. Social networks and social support. In: Glanz K, et al., eds. *Health Behavior and Health Education*. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 189–210.

Application of Social Support/Social Networks Theory in Asthma Programs

Most articles discussed social support in general without specific reference to components of social support as a theory or the difference between social support and social network, although some of the measures of social support included distinctions between support and network. The source of social support was identified (e.g., spouse, parent, friend, teacher), but for the most part the type of support behaviors provided was not described.

- Two interventions for adolescents (Buckner et al., 2007; Van Es et al., 2001) included social support components such as transfer of social skills to classroom and home environments, developing friendships with other adolescents with asthma, avoiding peer pressure, and talking with peers who do not have asthma.
- A summer asthma camp (Buckner et al., 2007), including education geared towards adolescents learning to increase their responsibility for self-management and opportunities for social interaction with other adolescents who have asthma, demonstrated increased social self-efficacy and self-management after the camp. The increased self-management remained significant six months after the camp, but social self-efficacy did not remain significant. Although the education included transferring social skills to the home and school environments, the lack of a sustained increase in social self-efficacy may indicate a need to strengthen social skills components of asthma programs for adolescents or to have follow-up interventions. Authors recommended that school-based and clinic-based providers collaborate on interventions to support adolescent social functioning and self-management responsibility through Asthma Action Plans.

Asthma programs for adolescents may also address social support since this support has been shown to help adolescents accept their asthma diagnosis, increase self-management, and adhere to medications. Social support can come from a variety of sources, including family members, friends, teachers, and classmates. More social support from multiple sources may better meet the needs of adolescents with asthma. Consider methods to improve teacher and classroom social support for asthma programs directed toward early adolescents and adolescents. For short-term interventions, such as a camp, follow-up interventions or activities can be considered to sustain increases in social self-efficacy.

D.2.2 Social Cognitive Theory (SCT)

Social Cognitive Theory (SCT) is a model demonstrating a constant interaction between behavior, personal factors, and environmental influences. Personal factors may include expected outcomes of a behavior, self-efficacy in performing the behavior, and self-regulating. Environmental influences include factors external to the person such as social environment (friends or family) and physical environment (availability of an item). There are several major concepts in SCT as described below.

- *Reciprocal determinism.* The continuous interaction between the person, behavior, and the environment, with each component constantly influencing the other.
- *Observational learning.* Learning the behavior through observation of other individuals' actions and the reinforcement they receive by performing the action.
- *Behavioral capability.* Knowledge and skill to perform a behavior.
- *Reinforcement.* A positive or negative response to an individual's behavior, which increases or decreases the likelihood that the behavior will be repeated.
- *Outcome expectations.* Anticipated outcomes resulting from performing the behavior.
- *Outcome expectancies.* The value placed on the outcome, also considered as incentive.
- *Self-efficacy.* One's belief in one's ability to perform the behavior and overcome barriers.
- *Self-control.* Monitoring one's behavior and regulating performance.
- *Managing emotional arousal.* Managing emotions to allow for learning.

Baranowski T, Perry CL, and Parcel GS. How individuals, environments, and health behavior interact: Social Cognitive Theory. In: Glanz K, et al., eds. *Health Behavior and Health Education*. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 169–187.

Application of Social Cognitive Theory in Asthma Programs

References utilizing Social Cognitive Theory tested the theory's ability to predict:

- Asthma treatment adherence (Van Es et al., 2001; Branstetter, 2001)
- Asthma management behaviors (Nothwehr, 1997)
- Asthma morbidity (Clark et al., 2001; Lee et al., 1995; Gibson-Scipio, 2006)

Studies also tested the impact of self-efficacy on:

- Treatment adherence (Zebracki and Drotar, 2004; Branstetter, 2001)
- Morbidity (Clark et al., 2001; Lee et al., 1995)
- Self-management skills (Creer, 2008; Nothwehr, 1997).

Major concepts of Social Cognitive Theory—such as self-efficacy, self-control (monitoring/regulating), and behavioral capacity (knowledge and skill)—were further applied in the development of interventions. Interventions included multiple SCT components incorporated into:

- A computer program (Shegog et al., 2001)
- A school-based program with puppetry and role play (McGhan, et al., 2003)
- Teaching asthma self-management and monitoring skills (Creer et al., 1988; Bailey et al., 1987; Primomo et al., 2006; Berg, 1995) including: daily peak expiratory flow (PEF) monitoring (Burkhart et al., 2007; Burkhart et al., 2001; Burkhart, 1996); focus on attitudes, social influences, and self-efficacy (Van Es et al., 2001); and use of a written action plan (Primomo et al., 2006; McGhan, et al., 2003).

Some of these interventions were able to demonstrate an impact on treatment adherence and asthma outcomes, including asthma episodes and school days missed.

Other findings included:

- Higher self-efficacy in children and adolescents appears to be associated with greater asthma treatment adherence (Zebracki and Drotar, 2004; Branstetter, 2001).
- Teaching children self-management and monitoring skills may help decrease asthma attacks and school days missed due to asthma (Creer et al., 1988), as well as improve self-efficacy (Shegog et al., 2001).

Daily peak expiratory flow (PEF) monitoring is one method of asthma self-management. In one study (Burkhart et al., 2007) those with greater adherence to daily PEF monitoring were less likely to have an asthma episode. However, compliance to daily PEF monitoring may be poor. Consider electronic monitoring if accuracy of self-report is questioned. For school-aged children, encourage parents to supervise treatment adherence and record keeping.

Implementing asthma programs for children in the school setting may be beneficial by influencing the school environment (e.g., teacher knowledge of asthma, school policy) and facilitating optimal attendance by reducing burden on parent schedules and the need for transportation to a different location (McGhan, et al., 2003).

D.2.3 Provider Patient Interaction Theory

Key functions of provider-patient interaction or communication include building the provider-patient relationship, exchanging information, responding to emotions, managing uncertainty, decision-making, and enabling patient self-management. These may have a direct or indirect influence on health outcomes. For example, an indirect pathway to health outcomes would involve providers improving patient knowledge. Key functions of provider-patient communication are further described below:

- *Building the provider-patient relationship.* Mutual trust and respect between provider and patient is an important foundation of the relationship. Providers and patients need to communicate openly about expectations for the relationship (e.g., views on level of patient involvement in making decisions) to agree on standards for the relationship.
- *Exchanging information.* Providers and patients need to actively participate in the exchange of information. Successful information exchange includes providers taking time to learn about the patient's beliefs and understandings and to explain the health issues or risks in a manner that is clearly understood by the patient. It is important for providers and patients to have a shared understanding of the health issue.
- *Responding to emotions.* Patients with health issues may have negative emotions that could impact their quality of life. Providers may help patients handle these emotions by communicating clearly about the health issue and treatment, encouraging patients to talk about their emotions, and validating the patients' emotions.
- *Managing uncertainty.* Uncertainty will need to be managed instead of reduced because uncertainty can have both a positive and negative effect.
- *Decision-making.* Having mutually agreed upon provider-patient relationship standards may help with making decisions. Different patients have different preferences for their level of involvement in decision-making. Knowing patient preferences and health beliefs is beneficial in the decision-making process and can lead to greater patient satisfaction. Providers and patients need to both agree on the decision made.
- *Enabling patient self-management.* Providers can help improve patient self-efficacy by providing recommendations, instructions, and supportive guidance that allows the patient to take greater responsibility for their health and treatment. Providers need to make sure information and recommendations are clear and understandable to the patient.

Street RL and Epstein RM. Key interpersonal functions and health outcomes: Lessons from theory and research on clinician-patient communication. In: Glanz K, et al., eds. Health Behavior and Health Education. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 237–269.

Application of Provider-Patient Interaction Theory in Asthma Programs

Continuing education programs on effective communication strategies can be offered to providers. Optimal provider-patient communication includes a patient-focus, a collaborative self-management approach, and the use of communication behaviors associated with positive patient outcomes (e.g., interactive conversation, addressing fears, tailoring medication schedule, reaching agreement on short-term goals, providing criteria for decision making). Such provider education programs have been shown to have an impact on provider communication and teaching behaviors, as well as on patient asthma outcomes (Worstell, 2000; Irwin and Richardson, 2006). Worstell (2000) also described the important role of patient support organizations in supplementing the information provided by physicians.

Provider education programs on communication will want to also address the need for cultural competency. Miscommunication between providers and patients due to language barriers, low health literacy, provider stereotyping, or poor communication of patient-reported symptoms may contribute to asthma health disparities (Diette and Rand, 2007). Greater provider cultural competency is correlated with patient trust and satisfaction with the provider, which could possibly lead to improved health outcomes (Lucas et al., 2008). Cultural competency is comprised of a provider's knowledge of a given culture, sensitivity to his/her own cultural biases and how they may influence their perceptions of a patient, and ability to interact with patients in a culturally relevant manner.

D.2.4 Family Functioning/Family Dynamics Theory

Family functioning, dynamics, and routines are broad concepts that cover a wide range of theories and systems. Descriptions of family functioning and its dimensions varied in the studies reviewed as different aspects of family functioning were investigated.

- *Family functioning* – interaction and communication between family members and the family’s ability to adapt to changes or stressors. Dimensions include adaptability and cohesiveness (McClellan and Cohen, 2007; Gustafsson, 2005; Vinson, 1996); hierarchical organization, communication, and construction of reality (Gustafsson, 2005)
- *Family dynamics* – patterns of family interactions and how those interactions change. Dimensions include enmeshment, over protectiveness, rigidity, and lack of conflict resolution (Onnis et al., 1986); and attachment (Gilchrist, 2004)
- *Family routines/rituals* – regularly followed, predictable procedures or tasks and symbolic actions for special occasions. Dimensions include: dinnertime or weekend routines (Spagnola, 2008) and annual celebration (e.g., birthday), religious celebration, or cultural tradition rituals (Markson and Fiese, 2000)

Specific theories emerging from the literature reviewed included a family systems approach, King’s systems framework, attachment theory, the Circumplex Model of Family Systems, and the Resiliency Model of Family Stress, Adjustment and Adaptation.

- *Family systems* approach considers the family as a whole and the interaction between family members instead of looking at the individual outside of their family context (Celano, 2001; Von Schlippe et al., 2001; Frey, 1995; Erickson, 1991).
- *King’s systems framework for nursing* is used to understand the interaction of various factors that influence the family and child health. King’s framework is comprised of three interacting systems: personal, interpersonal, and social (Frey, 1995).
- *Attachment theory* indicates that the attachment relationship between a child and parent is necessary for the child’s emotional wellbeing. In this model child health can be compromised by an emotional response by the parent who is unable to respond to the child’s needs (Gilchrist, 2004).
- *Circumplex Model* of Family Systems hypothesizes that family cohesion (emotional bonding with each other) and family adaptability (the family’s ability to change its structure and roles in response to stress) are important concepts to the family structure and function (Erickson, 1991).
- *The Resiliency Model of Family Stress, Adjustment and Adaptation* is a theoretical framework that describes family adjustment and adaptation when families experience stressful life situations such as illness of a family member (Swartz, 2004).

Application of Family Functioning/Family Dynamics Theory in Asthma Programs

Overall recommendations for interventions emerged from the studies based on their findings:

- Asthma demands affect the whole family so interventions need to have a family focus instead of solely focusing on the child with asthma (Franck and Callery, 2004; Buford, 2004; Zimmerman et al., 1999; Von Schlippe et al., 2001; Celano, 2001; Swartz, 2004; Nookong, 2005; Gustafsson, 2005; Svavarsdottir, 1997; Celano, 2006).
- Interventions need to be comprehensive and include the entire family (Von Schlippe et al., 2001; Celano, 2006) as well as be tailored based on the family's readiness, strengths, relationships or dynamics, resources, and/or needs (Buford, 2004; Zimmerman et al., 1999; Frey, 1995; Swartz, 2004; Svavarsdottir, 1997; Celano, 2006). By identifying family needs and tailoring interventions, family functioning may be improved, which could positively impact treatment adherence, asthma symptoms, and asthma severity, as well as the ability of the family to adapt to the asthma diagnosis and management.

Assessing family needs to tailor interventions may include:

- Identifying at-risk families (Erickson, 1991), which may include younger families that need help adjusting to stressors (Donnelly, 1994)
- Identifying family stresses and needs (Gustafsson, 2005)
- Gathering information from multiple family members to obtain all perspectives (McClellan and Cohen, 2007)
- Assessing caregiver demands and available resources (Lee et al., 2006).

Some specific intervention components to consider:

- Involve the entire family in the intervention (Franck and Callery, 2004; Buford, 2004; Hamlett et al., 1992; Zimmerman et al., 1999; Von Schlippe et al., 2001; Celano, 2001; Swartz, 2004; Nookong, 2005; Gustafsson, 2005; Celano, 2006). Some examples include conducting activities in group settings with parents and children and allowing families to share experiences with each other (Von Schlippe et al., 2001), developing families' self-regulatory skills (Zimmerman et al., 1999), or education that takes into consideration the family dynamics (Swartz, 2004).
- An interdisciplinary team to combine family therapy (e.g., therapist, psychologist) to address family functioning and medical asthma management (e.g., doctors, nurses, asthma sport coach) (Von Schlippe et al., 2001; Celano, 2001; Gustafsson, 2005; Celano, 2006).
- Components geared toward increasing treatment compliance (Von Schlippe et al., 2001; Nookong, 2005), that also bear in mind the family views or perspectives regarding asthma management (Buford, 2004; Bender, 2007).

- High-quality communication with families (Buford, 2004; Buford, 2002; Von Schlippe et al., 2001; Levit, 1996; Bender, 2007), which consists of developing a partnership between providers and families (Jokinen, 2004; Von Schlippe et al., 2001) as well as teaching and listening to families (Buford, 2002).
- Components designed to assist families with managing caregiver demands (Svavarsdottir, 1997) or decreasing stress (Swartz, 2004; Nookong, 2005).
- Include ways to promote self-esteem and resourceful coping in adolescents with asthma (Preechawong et al., 2007).

D.3 Organizational-Level Theories

Theories discussed in this section relating to organizational “behavior” include:

- Healthcare Theories
- Diffusion of Innovations Theories

These theories are presented in Sections D.3.1 and D.3.2 below.

D.3.1 Healthcare Theories

Several articles and one dissertation looked at various **theories of healthcare systems, healthcare delivery, and healthcare utilization** related to asthma. These theories vary but generally look at how care is organized and how that organization affects various types of asthma-related outcomes. Theories examined are listed below.

- *Family-Centered Care (FCC)*. A model that posits that families are central to dealing with chronic illness in children's healthcare and that healthcare organizations and providers need to seek to involve parents and other family members in decision-making around care. There are several models of FCC, but all are intended to guide clinical service delivery and ensure close collaboration between families and healthcare providers (Franck and Callery, 2004).
- *The Behavioral Model of Health Services Utilization*. A widely used model for studying healthcare utilization. The model has four main components: population characteristics, environmental influences, health behaviors, and health outcomes. Population characteristics—including predisposition to use services, ability to use services, and need for health services—constitute the primary determinants of healthcare utilization. Environmental influences—including type of healthcare system and contextual influences—are more distal influences on use. Health behaviors are seen as assessments of health resource utilization. Health outcomes were added to the model to look at measures of the benefit the recipient obtains from using health services (Erickson et al., 2002).
- *Systems Approach*. Systems approaches look at how the healthcare practice is organized to provide care and to influence what type of care is offered. Systems approaches also look at how providers' knowledge, attitudes, and practices may be influenced by the systems of care in which they are embedded (Tumiel-Berhalter and Hershey, 2005).
- *Medical Pluralism*. Looks at how multiple medical systems (such as including home treatment, traditional healers, and Western medicine) can intermingle to produce health and healthcare (Schwartz, 2001).
- *Chronic Care Model*. A comprehensive model for improving the healthcare system in terms of dealing with patients with chronic conditions. The model looks at how to strengthen community resources and policies, health system organizations, self-management support, delivery system design, decision support, and clinical information systems to support informed and activated patients interacting with a prepared and proactive practice team to create improved outcomes (Anonymous, 2001).

Application of Healthcare Theories in Asthma Programs

References utilizing various healthcare theories described the applicability of an existing model to asthma (Anonymous, 2001; Franck and Callery, 2004), or in a few cases conducted studies utilizing healthcare theories (Erickson et al., 2002; Tumié-Berhalter and Hershey, 2005; Schwartz, 2001). The more conceptually oriented references tended to promote application of theory to asthma programs.

Research articles utilizing theory generally utilized the relevant model as an organizing framework for the research. For example:

- A researcher utilized the behavioral model of health services utilization as a way to organize measures from existing quality of life instruments (Erickson et al., 2002).
- A dissertation (Schwartz, 2001) was conducted utilizing ethnographic methods to understand how medical pluralism affects conceptions of asthma and how asthma is treated in a U.S.-Mexico border region that has been found from international surveillance data to have low asthma incidence.
- Finally, one researcher decided to take a systems approach to understand factors beyond clinician attitudes that may constrain or promote the use of asthma guidelines (Tumié-Berhalter and Hershey, 2005).

D.3.2 Diffusion of Innovation Theory

Diffusion of innovations is the process of communicating a new idea or practice over time to members of a social system. The innovation, communication channels, time, and the social system are the four main elements of diffusion of innovations. Several innovation characteristics may affect how quickly and to what extent an innovation is adopted.

- *Relative advantage.* Is the innovation perceived to be better than what is currently available?
- *Compatibility.* Is the innovation compatible with social system values and norms?
- *Complexity.* Is the innovation easy to understand and use?
- *Trialability.* Can the innovation be tested on a trial basis?
- *Observability.* Are innovation results visible to others?

An innovation is communicated to members of the social system through various channels. Communication channels include mass media channels (e.g., television, newspapers) interpersonal channels (e.g., face-to-face interaction), and the Internet. Effective communication can be difficult due to the different attributes and beliefs of members in the social system (heterophily).

The time required for diffusion of innovations is determined by the innovation-decision process, adopter categories, and the rate of adoption.

- *Innovation-decision process.* Decision-making process an individual goes through from first exposure to the innovation through the decision to adopt or reject the innovation, implement the innovation, and confirm the decision.
- *Adopter categories.* There are different categories of adopters based on the degree an individual adopts new ideas compared to other members of the social system. Categories include innovators, early adopters, early majority, late majority, and laggards. Innovators actively seek information about new ideas and are the first adopters. Laggards are the last members of the social system to adopt an innovation.
- *Rate of adoption.* How quickly is the innovation adopted by the social system?

The social system has a structure that includes established norms or behaviors for members of the social system. Diffusion of innovations can be facilitated or hindered by the social system structure. Opinion leaders and change agents can help influence individuals' attitudes or innovation decisions.

Rogers EM. Diffusions of Innovations. 5th edition. New York, NY: Free Press, 2003.

Application of Diffusion of Innovations Theory in Asthma Programs

References utilizing the Diffusion of Innovation theory tested the adoption of asthma educational protocols (Mesters and Meertens, 1999) and asthma training materials (Rodehorst et al., 2005) by healthcare professionals; and asthma interventions (Wilson and Kurz, 2008) by school districts. Additionally, one study (Mesters and Meertens, 1999) investigated the innovation characteristics that would promote dissemination of an asthma protocol.

Two studies (Mesters and Meertens, 1999; Wilson and Kurz, 2008) examined institutionalization or sustainability of the innovation once adopted. Institutionalization is the long-term integration of an innovation within a social system or organization. Between these two studies, dissemination was viewed as having four slightly different phases: adoption, implementation, institutionalization, and maintenance (Wilson and Kurz, 2008) versus awareness, adoption, implementation, and continuation (Mesters and Meertens, 1999).

Diffusion of new asthma protocols or guidelines may be difficult, with more experienced healthcare providers not adopting the change as readily as others. Demonstrating that the new protocol is better than the existing protocol is very important in the decision of healthcare providers to adopt the protocol. Funding or resources may also impact the ability to sustain an innovation.

D.4 Planning Models

The planning model discussed in this section is the PRECEDE-PROCEED Model, presented in Section D.4.1 below.

D.4.1 PRECEDE-PROCEED Model

The **PRECEDE** (Predisposing, Reinforcing, and Enabling Constructs in Educational/ Environmental Diagnosis and Evaluation) – **PROCEED** (Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development) **Model** is a framework that helps provide a structure for applying theories and concepts systematically in planning and evaluating health behavior change programs. This framework consists of four planning phases, one implementation phase, and three evaluation phases. In Phase 1: Social Assessment, understanding of the specific community of interest is expanded through multiple qualitative and/or quantitative data collection activities. The social assessment articulates the community's needs and desires and incorporates the strengths and resources of the community members as well as their problem-solving capacity and readiness to change. Phase 2: Epidemiological, Behavioral, and Environmental Assessments identifies health priorities and their behavioral and environmental determinants. In Phase 3: Educational and Ecological Assessment, predisposing, reinforcing, and enabling factors—factors influencing the likelihood that change will occur—are identified. Program components are selected and aligned with the previously identified determinants of change in Phase 4: Administrative and Policy Assessment and Intervention Alignment to form the program plan. Phases 5–8 cover implementation (Phase 5), process evaluation (Phase 6), impact evaluation (Phase 7), and outcome evaluation (Phase 8).

Gielen AC, McDonald EM, Gary TL, and Bone LR. Using the PRECEDE-PROCEED Model to apply health behavior theories. In: Glanz K, et al., eds. *Health Behavior and Health Education*. 4th edition. San Francisco, CA: Jossey-Bass, 2008; pp. 407–433.

Application of the PRECEDE-PROCEED Model in Asthma Programs

The PRECEDE-PROCEED framework has been used in both designing and evaluating asthma interventions:

- Two articles (Chiang et al., 2003; Chiang et al., 2004) reported on a self-management asthma education program based on the PRECEDE-PROCEED Model. The authors used content analysis of interviews with parents of children with asthma to identify 12 predictor variables, classified them based on the PRECEDE-PROCEED Model as predisposing factors (perceived severity, asthma knowledge, asthma attitude, and self-efficacy), enabling factors (facilities of environmental control, convenience of transportation, education required), and reinforcing factors (family support, health profession support, doctor-patient communication, perceived effectiveness, children's cooperation), and examined the relationship of these factors to self-management behaviors.

- Another study (Bailey et al., 1987) utilized the PRECEDE-PROCEED model to develop an asthma self-management intervention—the University of Alabama at Birmingham (UAB) asthma self-management program for adults with asthma. The evaluation of this program utilizes the Asthma Opinion Survey, which was developed at UAB and includes items related to predisposing, enabling, and reinforcing factors.

The PRECEDE-PROCEED model was also utilized as an organizing structure for an evaluation of the Neighborhood Asthma Coalition, an intervention developed to engage children with asthma as well as their caregivers, friends, and neighbors using a community organization approach.

D.5 Literature Search Methodology

This appendix presents summary findings from this literature review, which was conducted for the time period 1983–2008 and included articles, published books, and dissertations and theses employing a variety of social science theories in publications related to asthma. The English-language-only literature was searched using the following databases: PubMed/Medline, Cochrane, CINAHL, Sociological Abstracts, ERIC, SocSciIndex, PsychInfo, Dissertation Database, OCLC, and the University of Washington Library Catalog.

We were broad in our conceptualization, searching these databases for references that included the terms “asthma” AND “theory” and further searching specifically for known theories including “asthma” AND any of the following terms:

Health Belief Model (HBM)

Transtheoretical Model OR Stages of Change

Theory of Planned Behavior (TPB) OR Theory of Reasoned Action (TRA) OR Integrated Behavioral Model

Precaution Adoption Process Model (PAPM)

Self-Regulation Model

Attribution Theory OR Decision-making Theory

Control Theory

Grounded theory

Social Cognitive Theory (SCT) OR Social Learning Theory (SLT)

Social Support OR Social Network

Provider – patient interaction OR Clinician-patient communication

Stress Theory OR Coping Theory

Family Functioning OR Social Systems Theory OR Family Dynamics

Community Organization OR Community Building

Diffusion of Innovations

Organizational Change OR Organizational Development Theory

Communication Theory

PRECEDE OR PROCEED

Social Marketing

Ecological models OR Socio-Ecological Framework OR Ecologic theory

RE-AIM

References returned by the search were reviewed using the following inclusion/exclusion criteria.

1. Primary condition or diagnosis must be asthma. Do not include articles where asthma is merely a symptom or complication of another disease or condition or is a passing reference.
2. The article must relate to one or more asthma outcomes, e.g., medication adherence, self-management, healthcare utilization, etc.
3. Theory or model must be mentioned either explicitly or implicitly, but does not have to be one of the theories or models on the social science theory search list (e.g., not sufficient for the article to merely talk about the term such as “patient-provider communication” without discussion of a theoretical framework around this issue).

Note: Term “grounded theory” is a special case – references with this key word (in the absence of mention of other theories) should be examined for the development of “new” theories but should not otherwise be included.

Two reviewers independently reviewed each reference based on title/abstract/keyword and made a determination as to inclusion/exclusion. Where the reviewers disagreed, a third reviewer made a final determination. A total of 203 references were included in the review at this stage and assigned to a reviewer for abstraction. All of these references were requested and further reviewed. Sixty-nine additional references were excluded at this stage for failing to meet inclusion criteria. A total of 134 references were abstracted and included in the final review.

Based on this review we identified a total of 134 references that discussed both asthma and an asthma outcome and utilized a social science theory in a substantive way. Several of these references included discussion of more than one theory. This set of 134 references discussed 43 “theories” to a greater or lesser extent; a large number of these theories were discussed by only one reference. For the purpose of this review, we developed summaries of 12 of the predominant theories, defined as those discussed by at least four references.

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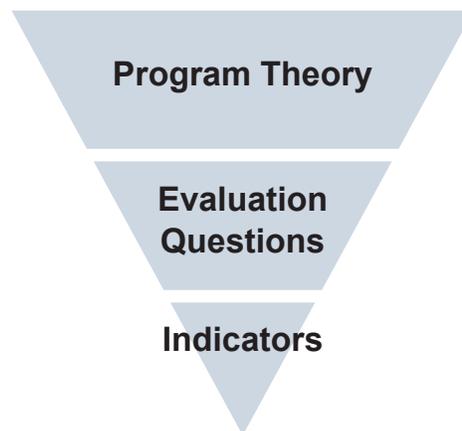
Appendix E

Selecting Indicators

Indicators are observable characteristics or changes that can be attributed to an intervention. We look to indicators for the answers to our evaluation questions—to learn whether a program is operating and producing results as intended—and so guiding stakeholders to select meaningful indicators is a very important task as we “gather credible evidence”.

To select strong indicators, we revisit earlier steps in the evaluation process. We start with a sound program theory, represented by the logic model, and then we generate and prioritize the evaluation questions that reflect stakeholder information needs. Once we’ve narrowed our focus, then we’re ready to identify the indicators that will provide insight, or answers, to our evaluation questions.

In this appendix, we will illustrate how to use a logic model to create evaluation questions and select indicators. Our example will be a state-level program that is designed to support community-based home visiting programs for people with poorly controlled asthma.



Using Your Logic Model to Ask Evaluation Questions

As we have learned, a logic model is a useful tool in designing an evaluation. It provides a visual description of the intended connection between what a program does (its activities) and what it intends to change in the world (its outcomes). Once stakeholders have agreed that this “picture” accurately represents the program, we can use the picture to clarify evaluation questions and develop indicators.

In theory, every “box” and “arrow” in our logic model is an opportunity to ask evaluation questions and identify indicators to answer the questions. Since resources are limited, evaluators can help stakeholders prioritize the most important information needs. Together, we can scan, for example, all the boxes with short-term outcomes. Do any merit a deeper look than is possible with already available program data?

We find a balance between the ideal – collecting information about everything we may want to know, and the practical – collecting enough information to make sound program decisions. In a phrase, it’s need to know versus nice to know.

After generating a list of potential evaluation questions and visually tracing, or mapping, them to the logic model, we can see whether we have selected a sufficient number of related questions and indicators to fully answer our questions. It is important to ensure that our evaluation will provide decision makers with enough information to take action—that, once we’ve finished the

evaluation, we aren't missing a critical piece of information. Typically, for a program evaluation, we aim to focus our evaluation so that, overall, we get just the right amount of information to act on. We find a balance between the ideal – collecting information about everything we may want to know, and the practical – collecting enough information to make sound program decisions. In a phrase, it's need to know versus nice to know. (For more information on focusing your evaluation to support your evaluation's purpose, see Learning and Growing Module I)

Below is the logic model for our home-visiting intervention (Figure 1). It shows the activities a state-level program could undertake to develop a program in which community-level organizations and health care providers collaborate to ensure that people with poorly controlled asthma receive home-based services. Following the logic model is Table 1, which illustrates just some of the questions that can be derived from each of the boxes and arrows.

Figure 1: State-Level Model for Home-based Intervention

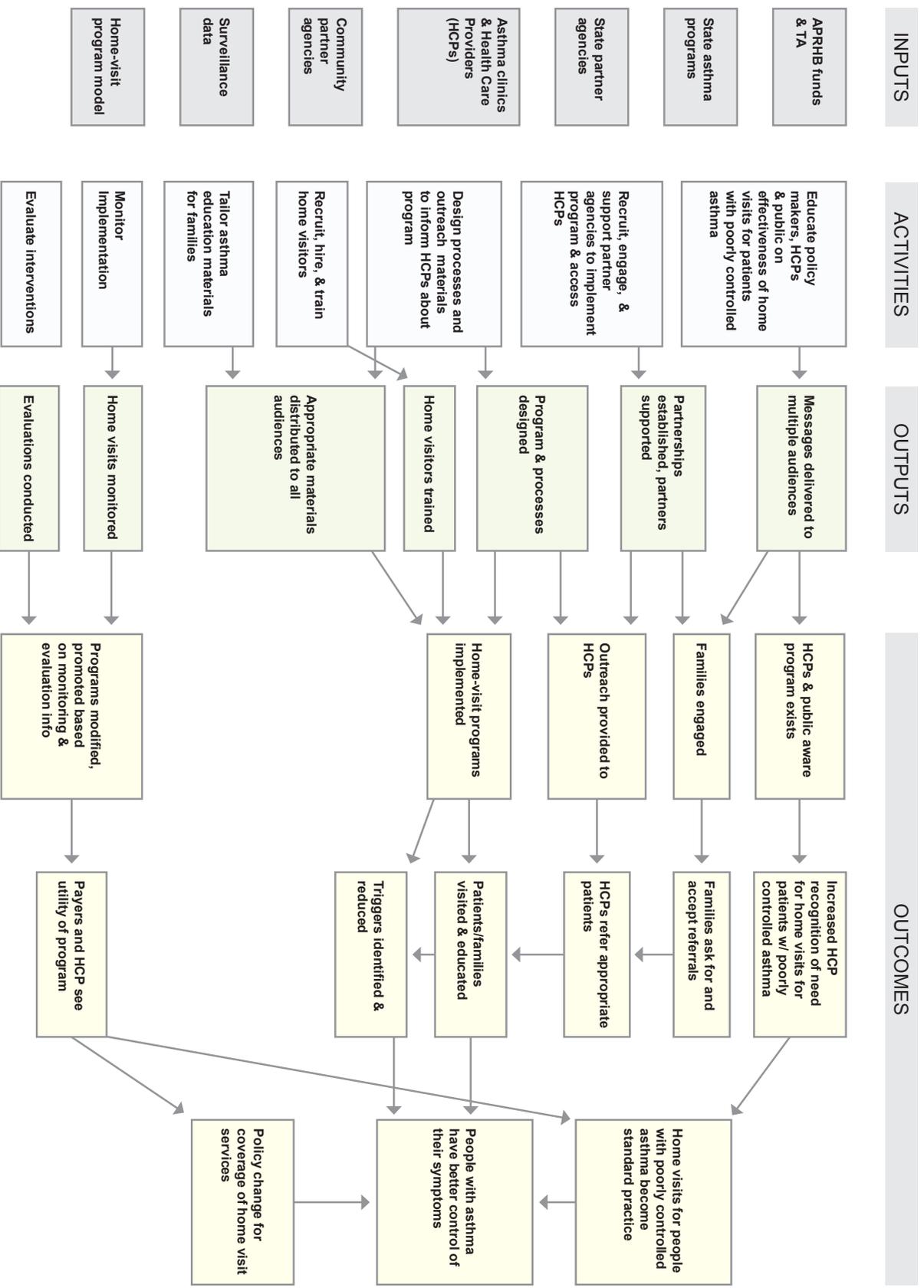


Table 1: Sample Evaluation Questions Derived from Logic Model

Logic model element	Possible Evaluation question(s)
<i>Inputs</i>	
APRHB funds and TA	Are we using funds to perform our activities efficiently and in line with our program goals? Are we maximizing technical assistance resources?
State asthma programs	To what extent are we collaborating with other state programs that could contribute to or impact home-based asthma programs?
State partner agencies	Have we engaged appropriate partners? Are there potential partners missing who are critical to program success?
Asthma clinics and Health Care Providers (HCPs)	How well are we engaging with asthma clinics and HCPs?
Community partner agencies	Are we working with existing infrastructures and helping to strengthen the community-level agencies that work with clinics, HCPs, and people with asthma?
Surveillance data	Do we and can we show how we use surveillance data to guide development of our home-visit programming to areas of need?
Home-visit program model	Is the home-visit model matched sufficiently well for our community?
<i>Activities and Outputs</i>	
Educate policy makers, HCPs, and the public on effectiveness of home visiting programs for patients with poorly controlled asthma	To what extent are we providing information to build awareness of the need for the program among HCPs, key policy makers and the public (including people with asthma and their families)?
Recruit and engage partner agencies who can implement program and access HCPs	Do we have the right mix of community partner agencies engaged implementing the home-visit program?
Design processes and outreach materials to inform HCPs about program	Have we developed outreach and a referral process that community partner agencies can use to inform and enable HCP's to make appropriate referrals?
Recruit, hire, and train home visitors	Are home visitors competent to perform the intervention?
Tailor education materials for families	Are the asthma self-management educational materials designed for the families of people with asthma sufficiently true to the model? Are materials appropriately tailored given program context? Are the materials appropriately distributed by HCPs and home visitors?
Monitor implementation	Are monitoring activities sufficient to assure the program is being implemented as intended? Are partners implementing the home visiting programs in accord with the model?

Table 1: Sample Evaluation Questions Derived from Logic Model

Logic model element	Possible Evaluation question(s)
Evaluate interventions	Are evaluations of sufficient depth and quality to inform program decision making?
Outcomes	
HCP and public aware of home visiting program	Has awareness of the home visiting program increased among key audiences (including families of people with asthma and policy makers)?
Families engaged	Are people with asthma and their families accepting referrals to participate in the home visiting program?
Outreach provided to HCPs	Are the community partner agencies effectively providing outreach to HCPs and providing them with information and support to effectively make referrals?
Home-visit programs are implemented	Is the program sufficiently comprehensive in line with NACP recommendations? Are programs established in alignment with data re: disparately impacted areas?
Programs modified, promoted based on monitoring and evaluation information	Are program decisions made based upon monitoring and evaluation information?
Increased HCP recognition of need for home visits for poorly controlled patients	Do HCPs understand the need and value of the home visiting program in increasing control of asthma?
Families ask for and accept referrals	Do families understand the need and value of the home visiting program in increasing control of asthma?
HCPs refer appropriate patients	Are HCP's referring appropriate (e.g. poorly controlled) patients to the program?
Patients/families visited and educated	Is there an increase in knowledge of asthma and how to control it among patients/families participating in the programs?
Triggers identified and reduced	Are there fewer identified triggers in homes of program participants?
Payers and HCP see utility of program	Are payers aware of the value of the program when considering offering coverage or allocating sufficient reimbursement for the program?
Home visits for those with poorly controlled asthma become standard practice	Are home visits offered and provided to virtually all those with poorly controlled asthma?

Table 1: Sample Evaluation Questions Derived from Logic Model

Logic model element	Possible Evaluation question(s)
People with asthma have better control of their symptoms	Do patients and HCPs see better adherence to appropriate treatment and fewer exacerbations and symptoms?
Policy changes around asthma reimbursement for home visit services	Are policies established and implemented to provide reimbursement or coverage for home visit services?

In this example, if our stakeholders need information about how well the program is working – how well a particular outcome is met—the logic model shows that there is a sequence of activities, or pathway, to reach that outcome. While it may be tempting to look only at the outcome box, we can look at the logic model to see the other sorts of information we can gain by asking questions about the boxes and arrows that feed in to the outcome box. The boxes on the left, or process, side of the model may hold the key to the change we do, or don't, see in the outcome.

For example, if we want to know whether HCP's are referring appropriate patients (e.g., people with poorly controlled asthma) to the program, we can follow the arrows to see a path on the logic model. This path shows us that the answer to this question is influenced by the answers to many questions:

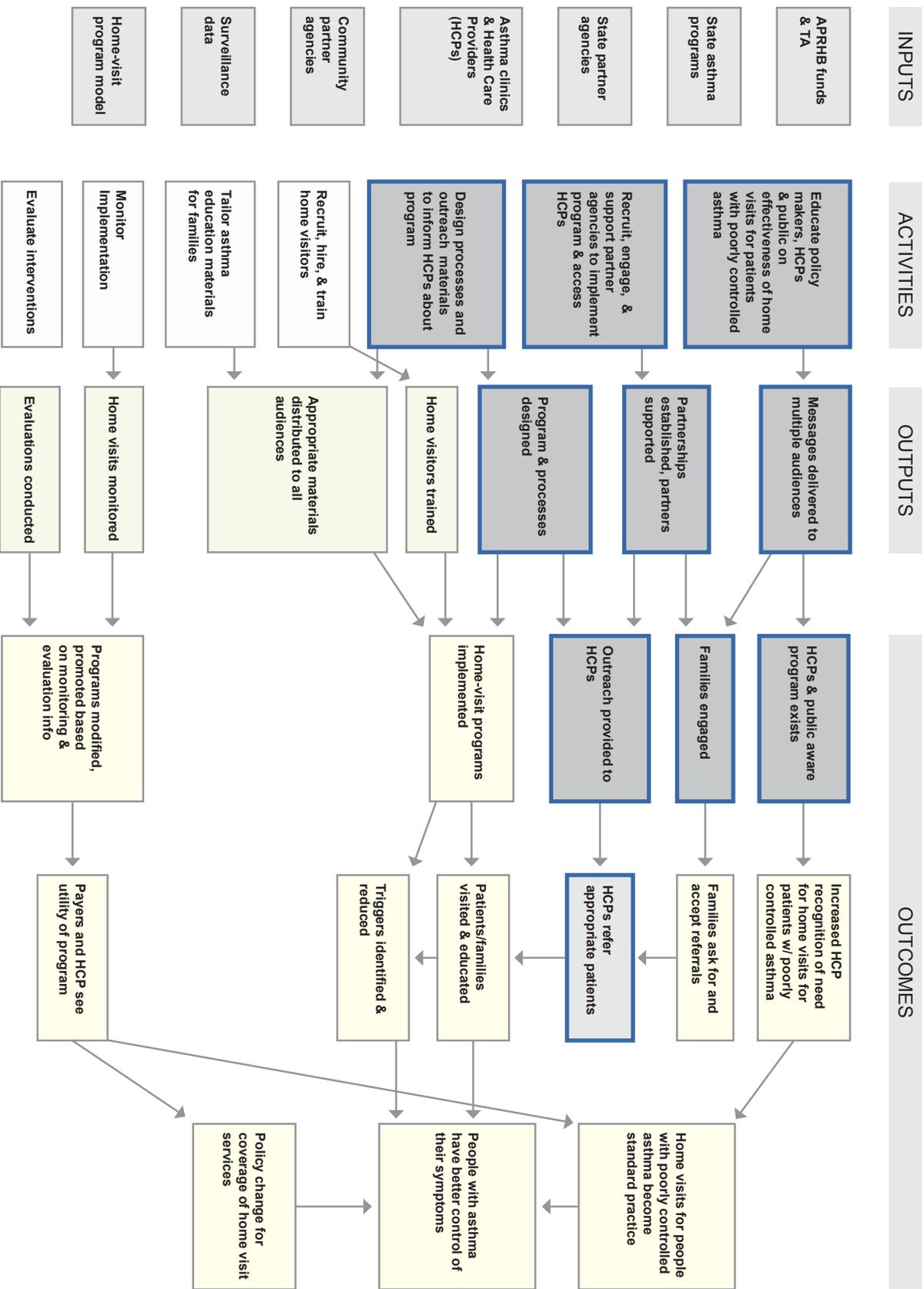
- Do HCPs and families understand the need and value of the home visiting program in increasing control of asthma? And before that...
- Are community partner agencies effectively providing outreach to HCPs and providing them with information and support to effectively make referrals? And...
- Have community partner agencies developed outreach and referral materials and a strategy to inform the HCP's about making appropriate referrals? And...
- Have we engaged the right mix of community partner agencies to implement the home-visit program? And...
- Are we at the state working with our existing infrastructure to strengthen the community-level agencies that work with clinics, HCPs, and people with asthma? And...
- Are we providing information to build awareness of the need for the program among HCPs, key policy makers, and the public (including people with asthma and their families)?

By working backwards along this path in the logic model and identifying all the boxes that contribute to the outcome we're interested in (HCP's referring appropriately), we can see how and why we're getting a particular answer to our evaluation question. Program monitoring data could easily answer a question about the number of appropriate referrals. However, if we want

to understand more about how our referral process works—an evaluation rather than monitoring question—we need to look at additional boxes in the logic model. For example, we might want to confirm that our program’s activities, and not some other factors in the health care system, are leading to the appropriate referrals. In this case, we need to take a broader approach.

In considering the program’s referral process, the stakeholders may decide to narrow or widen the path of inquiry. For example, stakeholders may want to focus on the outreach, information, and referral support provided to the HCPs; or, they might want to see how well families are being engaged so that they request referrals from their providers. The logic model in Figure 2 highlights this process.

Figure 2: State-Level Model for Home-based Intervention – Focusing on Referrals



While the decision about where to focus an evaluation is driven by the stakeholders, it is the evaluator's role to ensure that their choices will produce useful, and actionable, information.

Using Indicators to Answer Evaluation Questions

Once the stakeholders have selected the questions, our logic model can help identify and select indicators to answer them. If we think about all we can measure about our asthma program, the list of possible indicators may be endless. Focusing the evaluation on a set of “need to know” questions helps us narrow down the potential indicators. After all, with each indicator comes data collection, analysis, and interpretation!

Some evaluation questions have obvious indicators. You may find that the labels on the logic model are indicators themselves. “Outputs” in the logic model, by definition, are observable products that indicate an activity is done. For example, the output “partnerships established” could easily be turned into an indicator: number of partnerships established.

In other cases, identifying indicators can be more challenging. Some evaluation questions cannot be answered by something that can be directly and easily seen or counted. For these aspects of a program we typically create “proxy indicators.” These are indirect, but observable, ways of showing that something has occurred. For example, if we want to know whether people receiving home visits trust information they receive from non-medical providers such as community health workers, we need to identify an observable way to measure “trust”. Evaluators can rely on stakeholders to identify credible proxies.

When selecting indicators, keep in mind the following:

- Logic model components or evaluation questions can have multiple indicators.
- The same indicator can inform more than one program area, logic model component, or evaluation question.
- Select multiple indicators so that upon completion of the evaluation, you have information to act on.

In many instances, in the process of selecting indicators, we have to clarify (and agree on) what we mean by the terms we choose. These are very important discussions to have with stakeholders, and they reinforce the valuing process. For example, what do we mean by “appropriate” HCPs? Do we mean “providers who have demonstrated a commitment to offering guidelines-based care”? Or do we mean “providers serving in high-burden areas”? Both?

In Table 2, we show how the logic model elements, evaluation questions, and indicators are related. Following the path we have selected above we even further narrow the indicators we will use to answer our potential evaluation questions:

Table 2. Possible Indicators

Logic model element	Possible Evaluation question (s)	Possible Indicators
Inputs		
Community partner agencies	How well are we engaging with asthma clinics and HCPs?	# agencies that serve as partners to provide outreach to HCPs
Activities and Outputs		
Design outreach materials to inform HCPs about program and process to refer patients	Have we developed outreach and a referral process that community partner agencies can use to inform and enable HCP's to make appropriate referrals?	Outreach materials and referral process meets program standards
Outcomes		
Outreach provided to HCPs	Are the community partner agencies effectively providing outreach to HCPs and providing them with information and support to effectively make referrals?	# HCPs who receive outreach and are provided with information to make appropriate referrals
HCPs refer appropriate patients	Are HCP's referring appropriate (e.g., with poorly controlled asthma) patients to the program?	# referrals of appropriate patients # inappropriate referrals

Vetting Your Indicators

Now that you have an agreed-upon list of indicators, your next task is to review them carefully and think about how you will collect the data. Indicators are typically assessed according to common criteria (shown in Table 3). Conducting this review with stakeholders gives the evaluator access to their insights and helps the stakeholders understand the ramifications of using various indicators.

In this review process, you may decide to eliminate some of the indicators. Be sure to document these decisions and the rationale for the choices you make.

Table 3. Criteria for Indicator Selection

What will be measured?	What are the inclusion and exclusion criteria that will be applied? What stratifications/categories will be made?
Valid?	Does the indicator measure what it is intended to measure?
Reliable?	Is the indicator based upon accurate and complete data? Will it produce the same results if it is used more than once to measure the same condition or event?
Specific?	Does the indicator reflect only the issues it is meant to measure?
Sensitive?	Is the indicator able to reveal changes in the issue under consideration?
Relevant?	Does the indicator have a clear, meaningful connection with the matter at hand?
Useful?	Will the information produced by the indicator serve the information needs of intended users? Will it be action-oriented? Will it help you figure out a next step?
Feasible?	Is it realistic, prudent, diplomatic, and frugal to collect data for this indicator?
Accessible?	Are the data sources easily accessible and in a usable format? is it not too burdensome to collect?
What data sources are available?	Where are data available?
Ethical?	Are individual data obtained with informed consent? Are they kept confidential and stored securely?
What are the limitations?	What are the potential problems with data collected for the indicator?

Tables 4 and 5 illustrate this review and documentation using two indicators from our example.

Table 4. Criteria for Indicator Example

Indicator	# agencies that serve as partners to provide outreach to HCPs
What will be measured?	Simple count of agencies, affiliated with our state partnership, who have provided at least one outreach event to HCPs regarding the home visiting program in the state in the past calendar year.
Valid?	Yes, we work through community partners to provide outreach to HCPs providing asthma care.
Reliable?	Yes, we can identify which partners have provided asthma outreach for HCPs.
Specific?	Yes, we can identify.
Sensitive?	Yes.
Relevant?	Outreach provided to HCPs is how we expect HCPs to be able to make referrals. Knowing the number of partner agencies actively providing outreach will enable us to know the extent of referral we should anticipate.
Useful?	Somewhat. Knowing the number of agencies will give us a sense of whether or not we need to actively recruit (or re-engage) different partners to provide outreach to HCPs.
Feasible?	Since these agencies are partners, we should be able to identify which are actively offering outreach fairly easily.
Accessible?	May be able to look on line or contact partner agencies.
What data sources are available?	Event listings, with dates and other activity logs.
Ethical?	No issues were identified.
What are the limitations?	Will not tell us which providers receive outreach, why these HCPs were selected, nor any measures of quality of outreach activities provided.

Table 5. Criteria for Indicator Example 2

Indicator	Outreach materials and referral process meet program standards
What will be measured?	The content of outreach materials developed for HCPs will be compared to the program's design and criteria established by stakeholders. The referral process will be mapped out and compared to other known-effective referral processes
Valid?	Acceptable. Relies on stakeholder judgment, so expert stakeholders will need to be included.
Reliable?	Acceptable. Any discord among reviewers will be recorded (for use in action planning)
Specific?	There may be some questions about how adaptable (if at all) the materials should be; this may have to be discussed.
Sensitive?	Having expert stakeholders will address.
Relevant?	HCPs know about and are able to make appropriate referrals therefore content of the materials and efficiency of the referral process is complete, accurate, and understandable.
Useful?	Despite limitations, the indicator will show whether or not our materials reflect our intent.
Feasible?	Expert stakeholders' time will be the critical factor, so a well-structured review process will be crucial.
Accessible?	Yes
What data sources are available?	Several key stakeholders are already signed on for the review.
Ethical?	No issues were identified.
What are the limitations?	Will require some effort to identify comparable referral processes for comparison.

Next Steps

With a finalized list of indicators, we are ready to plan for data collection, management, and analysis. The logic model may again be useful in the early stages of data collection. Often, mapping results to the model helps stakeholders visually analyze information and see the connections among program elements. For example, if our indicator for referrals tells us that the program is not meeting our expectations for referrals, we can revisit the various boxes and arrows in the pathway that leads to referrals. In this way, we may identify potential improvements or additional questions or data to collect. Alternately, if the referrals are exceeding expectations, using our evaluation to examine these earlier parts of the process can identify activities that are working well and should be sustained.

Finally, the visual mapping to the logic model may also help in the later evaluation steps as we interpret the findings and communicate and use our results. Throughout the process, modifications to the logic model based on stakeholder discussion and any other decisions need to be recorded in your evaluation's documentation.

