

Step 4: Gather Credible Evidence

Now that you have developed a logic model, chosen an evaluation focus, and selected your evaluation questions, your next task is to gather the evidence. The gathering of evidence for an evaluation resembles the gathering of evidence for any research or data-oriented project, with a few exceptions noted below.

What's Involved in Gathering Evidence?

Evidence gathering must include consideration of each of the following:

- Indicators
- Sources of evidence/methods of data collection
- Quality
- Quantity
- Logistics

Developing Indicators

Because the components of our programs are often expressed in global or abstract terms, indicators are specific, observable, and measurable statements that help define exactly what we mean or are looking for. For example, the CLPP model includes global statements such as “Children receive medical treatment” or “Families adopt in-home techniques.” The medical treatment indicator might specify the type of medical treatment, the duration, or perhaps the adherence to the regimen. Likewise, the family indicator might indicate the in-home techniques or the intensity or duration of their adoption. For example, “Families with EBLL children clean all window sills and floors with the designated cleaning solution each week” or “Families serve leafy green vegetables at three or more meals per week.” *Outcome indicators* such as these indicators provide clearer definitions of the global statement and help guide the selection of data collection methods and the content of data collection instruments.

The activities in your focus may *also* include global statements such as “good coalition,” “culturally competent training,” and “appropriate quality patient care.” These activities would benefit from elaboration into indicators, often called “*process indicators*.” What does “good” mean, what does “quality” or “appropriate” mean?

Keep the following tips in mind when selecting your indicators:

- Indicators can be developed for activities (process indicators) and/or for outcomes (outcome indicators).⁴⁵
- There can be more than one indicator for each activity or outcome.

⁴⁵ Note that if you are developing your evaluation after completing an evaluation plan, you may already have developed process or outcome *objectives*. If the objectives were written to be specific, measurable, action-oriented, realistic, and time-bound (so-called “SMART” objectives), then they may serve as indicators as well.

- The indicator must be focused and must measure an important dimension of the activity or outcome.
- The indicator must be clear and specific in terms of what it will measure.
- The change measured by the indicator should represent progress toward implementing the activity or achieving the outcome.

Consider CDC’s immunization program, for example. The table below lists the components of the logic model that were included in our focus in Step 3. Then each of these components has been defined in one or more indicators.

**Table 4.1
Provider Immunization Program:
Indicators for Program Component in Our Evaluation Focus**

Program Component	Indicator(s)
Provider training	A series of 3 trainings will be conducted in all 4 regions of the state
Nurse educator LHD presentations	Nurse educators will make presentations to 10 largest local health departments (LHDs)
Physicians peer ed rounds	Physicians will host peer ed rounds at 10 largest hospitals
Providers attend trainings and rounds	Trainings will be well attended and reflect good mix of specialties and geographic representation
Providers receive and use tool kits	50%+ of providers who receive tool kit will report use of it (or “call to action” cards will be received from 25% of all providers receiving tool kit)
LHD nurses conduct private provider consults	Trained nurses in LHDs will conduct provider consults with largest provider practices in county
Provider KAB increases	Providers show increases in knowledge, attitudes, and beliefs (KAB) on selected key immunization items
Provider motivation increases	Provider intent to immunize increases

You may need to develop your own indicators or you may be able to draw on existing indicators developed by others. Some large CDC programs have developed indicator inventories that are tied to major activities and outcomes for the program. Advantages of these indicator inventories:

- They may have been pre-tested for “relevance” and accuracy.
- They define the best data sources for collecting the indicator.
- There are often many potential indicators for each activity or outcome, ensuring that at least one will be appropriate for your program.
- Because many programs are using the same indicator(s), you can compare performance across programs or even construct a national summary of performance.

Selecting Data Collection Methods and Sources

Now that you have determined the activities and outcomes you want to measure and the indicators you will use to measure progress on them, you need to select data collection methods and sources from which to gather information on your indicators.

A key decision is whether there are existing data sources—*secondary* data collection—to measure your indicators or whether you need to collect new data—*primary* data collection.

Depending on your evaluation questions and indicators, some secondary data sources may be appropriate data collection sources. Some existing data sources that often come into play in measuring outcomes of public health programs:

- Current Population Survey and other U.S. Census files
- Behavioral Risk Factor Surveillance System (BRFSS)
- Youth Risk Behavior Survey (YRBS)
- Pregnancy Risk Assessment Monitoring System (PRAMS)
- Cancer registries
- State vital statistics
- Various surveillance databases
- National Health Interview Survey (NHIS)

Before using secondary data sources, ensure that they meet your needs. Although large ongoing surveillance systems have the advantages of collecting data routinely and having existing resources and infrastructure, some of them (e.g., Current Population Survey [CPS]) have little flexibility with regard to the questions asked in the survey, making it nearly impossible to use these systems to collect the special data you may need for your evaluation. By contrast, other surveys such as BRFSS or PRAMS are more flexible. For example, you might be able to add program-specific questions, or you might expand the sample size for certain geographic areas or target populations, allowing for more accurate estimates in smaller populations.

The most common primary data collection methods also fall into several broad categories. Among the most common are:

- Surveys, including personal interviews, telephone, or instruments completed in person or received through the mail or e-mail
- Group discussions/focus groups
- Observation
- Document review, such as medical records, but also diaries, logs, minutes of meetings, etc.

Choosing the “right” method from the many secondary and primary data collection choices must consider both the *context* in which it is asked (How much money can be devoted to collection and measurement? How soon are results needed? Are there ethical considerations?) and the *content* of the question (Is it a sensitive issue? Is it about a behavior that is observable? Is it something the respondent is likely to know?).

Some methods yield qualitative data and some yield quantitative data. If the question involves an abstract concept or one where measurement is poor, using multiple methods is often helpful. Insights from stakeholder discussions in Step 1 and the clarity on purpose/user/use obtained in Step 3 will usually help direct the choice of sources and methods. For example, stakeholders may know which methods will work best with some intended respondents and/or have a strong bias toward quantitative or qualitative data collection that must be honored if the results are to be credible. More importantly, the purpose and use/user may dictate the need for valid, reliable data that will withstand close scrutiny or may allow for less rigorous data collection that can direct managers.

Each method comes with advantages and disadvantages depending on the context and content of the data collection (see Table 4.2).

Table 4.2
Advantages and Disadvantages of Various Survey Methods

Method	Advantages	Disadvantages
Personal interviews	<ul style="list-style-type: none"> • Least selection bias: can interview people without telephones—even homeless people. • Greatest response rate: people are most likely to agree to be surveyed when asked face to face. • Visual materials may be used. 	<ul style="list-style-type: none"> • Most costly: requires trained interviewers and travel time and costs. • Least anonymity: therefore, most likely that respondents will shade their responses toward what they believe is socially acceptable.
Telephone interviews	<ul style="list-style-type: none"> • Most rapid method. • Most potential to control the quality of the interview: interviewers remain in one place, so supervisors can oversee their work. • Easy to select telephone numbers at random. • Less expensive than personal interviews. • Better response rate than for mailed surveys. 	<ul style="list-style-type: none"> • Most selection bias: omits homeless people and people without telephones. • Less anonymity for respondents than for those completing instruments in private. • As with personal interviews, requires a trained interviewer.
Instruments to be completed by respondent	<ul style="list-style-type: none"> • Most anonymity: therefore, least bias toward socially acceptable responses. • Cost per respondent varies with response rate: the higher the response rate, the lower the cost per respondent. • Less selection bias than with telephone interviews. 	<ul style="list-style-type: none"> • Least control over quality of data. • Dependent on respondent's reading level. • Mailed instruments have lowest response rate. • Surveys using mailed instruments take the most time to complete because such instruments require time in the mail and time for respondent to complete.

The text box below lists possible sources of information for evaluations clustered in three broad categories: people, observations, and documents.

Some Sources of Data

Who might you survey or interview?

- Clients, program participants, nonparticipants
- Staff, program managers, administrators
- Partner agency staff
- General public
- Community leaders or key members of a community
- Funders
- Representatives of advocacy groups
- Elected officials, legislators, policymakers
- Local and state health officials

What might you observe?

- Meetings
- Special events or activities
- On the job performance
- Service encounters

Which documents might you analyze?

- Meeting minutes, administrative records
- Client medical records or other files
- Newsletters, press releases
- Strategic plans or work plans
- Registration, enrollment, or intake forms
- Previous evaluation reports
- Records held by funders or collaborators
- Web pages
- Graphs, maps, charts, photographs, videotapes

When choosing data collection methods and sources, select those that meet your project's needs. Try to avoid choosing a data method/source that may be familiar or popular but does not necessarily answer your questions. Keep in mind that budget issues alone should not drive your evaluation planning efforts.

The four evaluation standards can help you reduce the enormous number of data collection options to a more manageable number that best meet your data collection situation. Here is a checklist of issues — based on the evaluation standards — that will help you choose appropriately:

Utility

- Purpose and use of data collection: Do you seek a “point in time” determination of a behavior, or to examine the range and variety of experiences, or to tell an in-depth story?
- Users of data collection: Will some methods make the data more credible with skeptics or key users than others?

Feasibility

- Resources available: Which methods can you afford?
- Time: How long until the results are needed?
- Frequency: How often do you need the data?
- Your background: Are you trained in the method, or will you need help from an outside consultant?

Propriety

- Characteristics of the respondents: Will issues such as literacy or language make some methods preferable to others?
- Degree of intrusion to program/participants: Will the data collection method disrupt the program or be seen as intrusive by participants?
- Other ethical issues: Are there issues of confidentiality or safety of the respondent in seeking answers to questions on this issue?

Accuracy

- Nature of the issue: Is it about a behavior that is observable?
- Sensitivity of the issue: How open and honest will respondents be in responding to the questions on this issue?
- Respondent knowledge: Is it something the respondent is likely to know?

Using Multiple Methods and Mixed Methods

Sometimes a single method is not sufficient to accurately measure an activity or outcome because the thing being measured is complex and/or the data method/source does not yield data that are reliable or accurate enough. Employing multiple methods (sometimes called “triangulation”) helps increase the accuracy of the measurement and the certainty of your conclusions when the various methods yield similar results. Mixed data collection methods refers to gathering both quantitative and qualitative data. Mixed methods can be used sequentially, when one method is used to prepare for the use of another, or concurrently, when both methods are used in parallel. An example of sequential use of mixed methods is when focus groups (qualitative) are used to develop a survey instrument (quantitative), and then personal interviews (qualitative and quantitative) are conducted to investigate issues that arose during coding or interpretation of survey data. An example of concurrent use of mixed methods would be using focus groups or open-ended personal interviews to help affirm the response validity of a quantitative survey.

Different methods reveal different aspects of the program. Consider some interventions related to tobacco control:

- You might include a group assessment of a school-based tobacco control program to hear the group’s viewpoint, as well as individual student interviews to get a range of opinions.
- You might conduct a survey of all legislators in a state to gauge their interest in managed care support of cessation services and products, and you might also interview certain

legislators individually to question them in greater detail.

- You might conduct a focus group with community leaders to assess their attitudes regarding tobacco industry support of cultural and community activities. You might follow the focus group with individual structured or semi-structured interviews with the same participants.

When the outcomes under investigation are very abstract or no one quality data source exists, combining methods maximizes the strengths and minimizes the limitations of each method. Using multiple or mixed methods can increase the cross-checks on different subsets of findings and generate increased stakeholder confidence in the overall findings.

Illustrations from Cases

Consider the provider immunization education and the childhood lead poisoning examples. Table 4.3 presents data collection methods/sources for each of the indicators presented earlier for the provider immunization education program. Table 4.4 shows both the indicators and the data sources for key components of the CLPP effort presented earlier. Note in both cases that the methods/sources can vary widely and that in some cases multiple methods will be used and synthesized.

Table 4.3
Provider Immunization Education Program:
Data Collection Methods and Sources for Indicators

Indicator(s)	Data Collection Methods/Sources
A series of 3 trainings will be conducted in all 4 regions of the state	Training logs
Nurse educators will make presentations to 10 largest local health departments (LHDs)	Training logs
Physicians will host peer ed rounds at 10 largest hospitals	Training logs
Trainings will be well-attended and reflect good mix of specialties and geographic representation	Registration information
50%+ of providers who receive tool kit will report use of it (or "call to action" cards will be received from 25% of all providers receiving tool kit)	Survey of providers Analysis/count of call-to-action cards
Trained nurses in LHDs will conduct provider consults with largest provider practices in county	Survey of nurses, survey of providers, or training logs
Providers show increases in knowledge, attitudes, and beliefs (KAB) on selected key immunization items	Survey of providers, or focus groups, or intercepts
Provider intent to immunize increases	Survey of providers, or focus groups, or intercepts

Table 4.4
CLPP: Indicators and Data Collection Methods/Sources

Logic Model Element	Indicator(s)	Data Source(s) and Method(s)
Outreach	High-risk children and families in the district have been reached with relevant information	Logs of direct mail and health fair contacts Demographic algorithm Geographic Information System (GIS) algorithm
Screening	High-risk children have completed initial and follow-up screening	Logs and lab data
Environment assessment	Environments of all children over EBLL threshold have been assessed for lead poisoning	Logs of environmental health staff
Case management	All children over EBLL threshold have a case management plan including social, medical, and environmental components	Case file of EBLL child
Family training	Families of all children over EBLL threshold have received training on household behaviors to reduce EBLL	Logs of case managers Survey of families
“Leaded” houses referred	All houses of EBLL children with evidence of lead have been referred to housing authority	Logs and case files
“Leaded” houses cleaned	All referred houses have been cleaned up	Follow-up assessment by environmental health staff Logs of housing authority

Quality of Data

A quality evaluation produces data that are reliable, valid, and informative. An evaluation is reliable to the extent that it repeatedly produces the same results, and it is valid if it measures what it is intended to measure. The advantage of using existing data sources such as the BRFSS, YRBS, or PRAMS is that they have been pretested and designed to produce valid and reliable data. If you are designing your own evaluation tools, you should be aware of the factors that influence data quality:

- The design of the data collection instrument and how questions are worded
- The data collection procedures
- Training of data collectors
- The selection of data sources
- How the data are coded
- Data management
- Routine error checking as part of data quality control

A key way to enhance quality of primary data collection is through a pretest. The pretest need not be elaborate but should be extensive enough to determine issues of logistics of data collection or intelligibility of instruments prior to rollout. Obtaining quality data involves trade-offs (i.e., breadth vs. depth). Thus, you and stakeholders must decide at the beginning of the evaluation process what level of quality is necessary to meet stakeholders' standards for accuracy and credibility.

Quantity of Data

You will also need to determine the amount of data you want to collect during the evaluation. There are cases where you will need data of the highest validity and reliability, especially when traditional program evaluation is being supplemented with research studies. But there are other instances where the insights from a few cases or a convenience sample may be appropriate. If you use secondary data sources, many issues related to quality of data—such as sample size—have already been determined. If you are designing your own data collection tool and your examination of your program includes research as well as evaluation questions, the quantity of data you need to collect (i.e., sample sizes) will vary with the level of detail and the types of comparisons you hope to make. You will also need to determine the jurisdictional level for which you are gathering the data (e.g., state, county, region, congressional district). Counties often appreciate and want county-level estimates; however, this usually means larger sample sizes and more expense. Finally, consider the size of the change you are trying to detect. In general, detecting small amounts of change requires larger sample sizes. For example, detecting a 5% increase would require a larger sample size than detecting a 10% increase. You may need the help of a statistician to determine adequate sample size.

Logistics and Protocols

Logistics are the methods, timing, and physical infrastructure for gathering and handling evidence. People and organizations have cultural preferences that dictate acceptable ways of asking questions and collecting information, and influence who is perceived as an appropriate person to ask the questions (i.e., someone known within the community versus a stranger from a local health agency). The techniques used to gather evidence in an evaluation must be in keeping with a given community's cultural norms. Data collection procedures should also protect confidentiality.

In outlining procedures for collecting the evaluation data, consider these issues:

- When will you collect the data? You will need to determine when (and at what intervals) it is most appropriate to collect the information. If you are measuring whether your objectives have been met, your objectives will provide guidance as to when to collect certain data. If you are evaluating specific program interventions, you might want to obtain information from participants before they begin the program, upon completion of the program, and several months after the program. If you are assessing the effects of a community campaign, you might want to assess community knowledge, attitudes, and behaviors among your target audience before and after the campaign.

- Who will be considered a participant in the evaluation? Are you targeting a relatively specific group (African-American young people), or are you assessing trends among a more general population (all women of childbearing age)?
- Are you going to collect data from all participants or a sample? Some programs are community-based, and surveying a sample of the population participating in such programs is appropriate. However, if you have a small number of participants (such as students exposed to a curriculum in two schools), you may want to survey all participants.
- Who will collect the information? Are those collecting the data trained and trained consistently? Will the data collectors uniformly gather and record information? Your data collectors will need to be trained to ensure that they all collect information in the same way and without introducing bias. Preferably, interviewers should be trained together and by the same person.
- How will the security and confidentiality of the information be maintained? It is important to ensure the privacy and confidentiality of the evaluation participants. You can do this by collecting information anonymously and making sure you keep data stored in a locked and secure place.
- If your examination of your program includes research as well as evaluation studies: Do you need approval from an institutional review board (IRB) before collecting the data? What will be your informed consent procedures?

You may already have answered some of these questions while selecting your data sources and methods.

Agreements: Affirming Roles and Responsibilities

Agreements summarize the evaluation procedures, clarify everyone's role and responsibilities, and describe how the evaluation procedures will be implemented. Elements of an agreement include statements concerning the intended users, uses, purpose, questions, design, and methods, as well as a summary of the deliverables, timeline, and budget. An agreement might be a legal contract, a memorandum of understanding, or a detailed protocol. Creating an agreement establishes a mutual understanding of the activities associated with the evaluation. It also provides a basis for modification if necessary.

Standards for Step 4: Gather Credible Evidence

Standard	Questions
Utility	<ul style="list-style-type: none"> • Have key stakeholders been consulted who can assist with access to respondents? • Are methods and sources appropriate to the intended purpose and use of the data? • Have key stakeholders been consulted to ensure there are no preferences for or obstacles to selected methods or sources? • Are there specific methods or sources that will enhance the credibility of the data with key user and stakeholders?
Feasibility	<ul style="list-style-type: none"> • Can the data methods and sources be implemented within the time and budget for the project? • Does the evaluation team have the expertise to implement the chosen methods? • Are the methods and sources consistent with the culture and characteristics of the respondents, such as language and literacy level? • Are logistics and protocols realistic given the time and resources that can be devoted to data collection?
Propriety	<ul style="list-style-type: none"> • Will data collection be unduly disruptive? • Are there issues of safety of respondents or confidentiality that must be addressed? • Are the methods and sources appropriate to the culture and characteristics of the respondents—will they understand what they are being asked?
Accuracy	<ul style="list-style-type: none"> • Are appropriate QA procedures in place to ensure quality of data collection? • Are enough data being collected,—i.e., to support chosen confidence levels or statistical power? • Are methods and sources consistent with the nature of the problem, the sensitivity of the issue, and the knowledge level of the respondents?

Checklist for Gathering Credible Evidence

- Identify indicators for activities and outcomes in the evaluation focus.
- Determine whether existing indicators will suffice or whether new ones must be developed.
- Consider the range of data sources and choose the most appropriate one.
- Consider the range of data collection methods and choose those best suited to your context and content.
- Pilot test new instruments to identify and/or control sources of error.
- Consider a mixed-method approach to data collection.
- Consider quality and quantity issues in data collection.
- Develop a detailed protocol for data collection.

Worksheet 4A
Evaluation Questions, Indicators, and Data Collection Methods/Sources

Logic Model Components in Evaluation Focus		Indicator(s) or Evaluation Questions	Data Method(s)/Source(s)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Worksheet 4B Data Collection Logistics

	Data Collection Method/Source	From whom will these data be collected	By whom will these data be collected and when	Security or confidentiality steps
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

EVALUATING APPROPRIATE ANTIBIOTIC USE PROGRAMS

Step 4: Gather Credible Evidence

The stakeholder discussions in Step 1 and the program description in Step 2 led to the selection of an evaluation focus in Step 3. At this point, you have a set of program components – activities and outcomes – that will be used in the evaluation. Next, you will need to develop tangible indicators (evaluation measures) for these components and identify data sources for each of the measures. The following table lists examples of indicators for selected appropriate antibiotic use activities and outcomes, as well as some associated data sources (Table 4.5).

Table 4.5: Appropriate Antibiotic Use Programs: Indicators and Data

Activities	Indicators	Data Sources
Formation of state or local coalition to develop and implement appropriate antibiotic use efforts	<ul style="list-style-type: none"> • Number of coalition meetings • Number and type of organizations involved in coalition 	Sign-in sheets and meeting minutes
Implementation of media campaign	<ul style="list-style-type: none"> • Number of impressions for print, television, radio, and outdoor media ads 	Media tracking reports
Development of health education materials	<ul style="list-style-type: none"> • Number and type of materials 	Program logs
Outcomes	Indicators	Data Sources
Increased public knowledge and awareness of appropriate antibiotic use messages	<ul style="list-style-type: none"> • Percentage of people who believe antibiotics will not help cure colds and flus • Percentage of people who recall the content of appropriate antibiotic use media campaign 	Consumer surveys
Increased knowledge and awareness among providers of appropriate antibiotic use messages	<ul style="list-style-type: none"> • Percentage of providers who believe inappropriate prescribing contributes to antibiotic resistance • Percentage of providers who recall the content of appropriate antibiotic use media campaign 	Provider surveys
Improved skills among providers to communicate appropriate antibiotic use messages to consumers	<ul style="list-style-type: none"> • Percentage of providers who report talking to patients about when antibiotics work and when they do not work • Percentage of patients who report satisfaction with their provider's communication 	Provider surveys Patient satisfaction surveys
Increased social norms favoring appropriate antibiotic prescribing	<ul style="list-style-type: none"> • Percentage of providers who believe that their peers follow prescribing guidelines 	Provider surveys

Increased adherence to appropriate antibiotic use guidelines	<ul style="list-style-type: none"> Percentage of providers who indicate that they follow appropriate antibiotic use guidelines (e.g., providers use rapid antigen test or throat culture to diagnose streptococcal pharyngitis) 	Provider surveys Chart reviews
Decreased patient demand for antibiotics	<ul style="list-style-type: none"> Percentage of consumers who state they do not ask providers for antibiotics Percentage of providers who state that their patients do not demand antibiotics 	Consumer surveys Provider surveys
Increased adherence to prescribed antibiotics among consumers	<ul style="list-style-type: none"> Percentage of consumers who state they finish the course of antibiotics Percentage of consumers who report they do not share antibiotics with others 	Consumer surveys
Incorporation of prescribing guidelines by provider practices or organizations	<ul style="list-style-type: none"> Number of provider practices or organizations that adopt appropriate prescribing guidelines as policy 	Surveys or interviews with practices or organizations
Changes in childcare or workplace policies supportive of appropriate antibiotic use	<ul style="list-style-type: none"> Number of childcare centers or work sites that do not require use of antibiotics before returning after an illness 	Surveys or interviews with childcare centers or work site staffs
Decreased inappropriate antibiotic use	<ul style="list-style-type: none"> Rates of antibiotic use for non-specific upper respiratory illnesses Rates of children tested for group A strep before receiving antibiotics for sore throats 	Pharmacy data Health plan data Health Plan Employer Data and Information Set (HEDIS®) performance measures

Secondary Data Sources

In some cases, data to evaluate the effectiveness of appropriate antibiotic use programs can be found in existing data sources. Three key secondary data sources are described below.

- Health plan data** – Health plans can be an excellent source of population-based data on antibiotic prescribing and utilization. When data are combined from several health plans, it is possible to obtain a good representation of the entire population. In addition, for patients with pharmacy benefits, pharmacy dispensing can be captured and linked to visit data. However, there are several limitations of working with health plan data. Missing claims and misclassification of diagnoses are common. In addition, health plan data usually do not cover drugs not paid for by the plan (e.g., samples dispensed in the office or drugs paid for out-of-pocket). Furthermore, the Health Insurance Portability and Accountability Act of 1996 (HIPAA), which protects the confidentiality of individually identifiable health information, may limit the ability of health plans to share these data unless all personal identifiers can be removed. While there may be significant limitations to using health plan data, this data remains one of the most precise and useful sources of information on antibiotic

prescribing. Coalitions that include health plans can not only explore the use of health plan data for evaluation, but they can also use this data as part of their interventions (e.g., providing prescribing feedback to providers or to support organizational changes).

- Pharmacy data – Several companies collect and process data from pharmaceutical records of a number of sources, including drug manufacturers, wholesalers, retailers, pharmacies, mail order, long-term care facilities, and hospitals. Both antibiotic prescribing data and antibiotic retail sales data can be purchased, and these data can be used to evaluate the impact of a program on antibiotic prescribing. Some systems allow for data to be broken down to the level of the individual provider, and this information can be shared with providers as part of an intervention to promote more appropriate prescribing. These data are primarily used by pharmaceutical companies, and costs may be prohibitive for appropriate antibiotic use programs.
- Medicaid data – Medicaid claims data have been used by some programs to assess changes in prescribing. These data are freely available and contain information on prescribing to Medicaid recipients. However, the same caveats apply as described above for health plan data regarding HIPAA regulations, difficulties in interpreting administrative data, and completeness of reporting. In addition, in some states, the privatization of Medicaid has made these data no longer centrally available.

Data Collection Tools

In many cases, programs will not be able to obtain the necessary data from secondary data sources and will need to collect their own data for evaluation. Rather than developing entirely new data collection tools, programs can often use or adapt parts of existing tools. Many state and local programs have developed surveys to assess the knowledge, attitudes, and behaviors of both consumers and providers related to antibiotic use and prescribing. CDC has collected a number of these evaluation tools and has facilitated discussions of the strengths and limitations of tools and specific questions. Check the CDC Get Smart website (<http://www.cdc.gov/getsmart>) for a list of campaign partners and their current activities and evaluation plans. You can contact local program coordinators directly or request assistance through CDC.

In addition, questions on appropriate antibiotic use have been included in the population-based surveys described below. Programs may be able to access state or local data from these surveys. Programs can also model questions after these when designing their own questionnaires.

- Behavioral Risk Factor Surveillance System (BRFSS) – The BRFSS is a telephone survey conducted by the health departments of all states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam with assistance from CDC. The BRFSS is the primary source of information for states and the nation on the health-related behaviors of adults and includes questions related to behaviors associated with preventable chronic diseases, injuries, and infectious diseases. States can add questions specific to their needs, and in recent years,

some states have added questions on appropriate antibiotic use. See <http://www.cdc.gov/brfss/index.htm> for more information.

- FoodNet Population Survey – The Foodborne Diseases Active Surveillance Network (FoodNet) is the principal foodborne disease component of CDC's Emerging Infections Program (EIP). FoodNet conducts population-based telephone surveys to estimate the burden of acute diarrheal illness in the United States and the frequency of important exposures. The 2002-2003 FoodNet Population Survey included several questions to assess knowledge, attitudes, and behaviors surrounding appropriate antibiotic use. EIP sites may be able to use these data to document the need for their programs or to assess changes over time in knowledge, attitudes, and behaviors. Other states can model questions after these for local use and may be able to compare local results with those from FoodNet sites. See http://www.cdc.gov/foodnet/surveys/pop_cov.htm for more information.