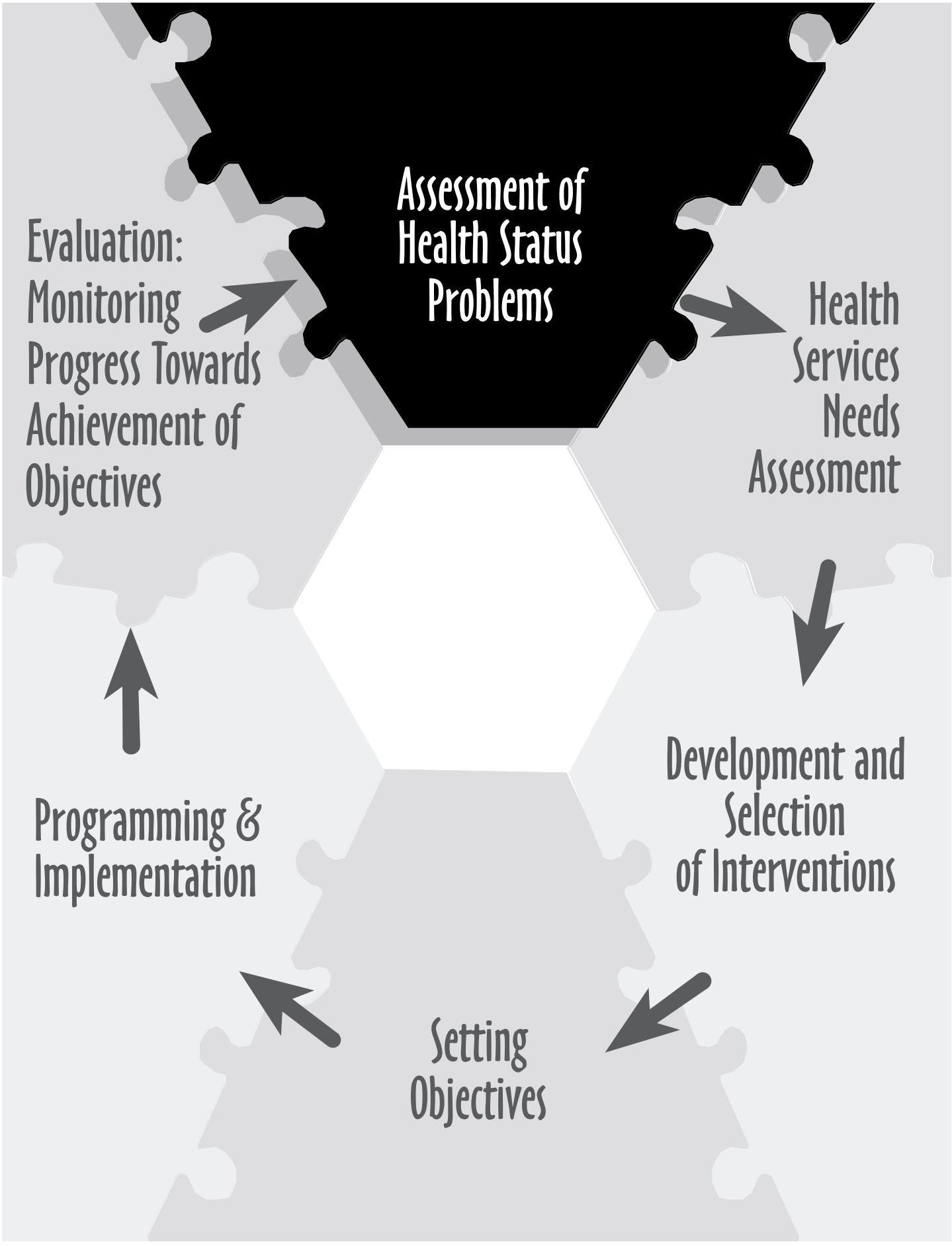
Assessment of Health Status Problems
Health Services Needs Assessment
Development and Selection of Interventions
Setting Objectives
Programming & Implementation
Evaluation: Monitoring Progress Towards Achievement of Objectives

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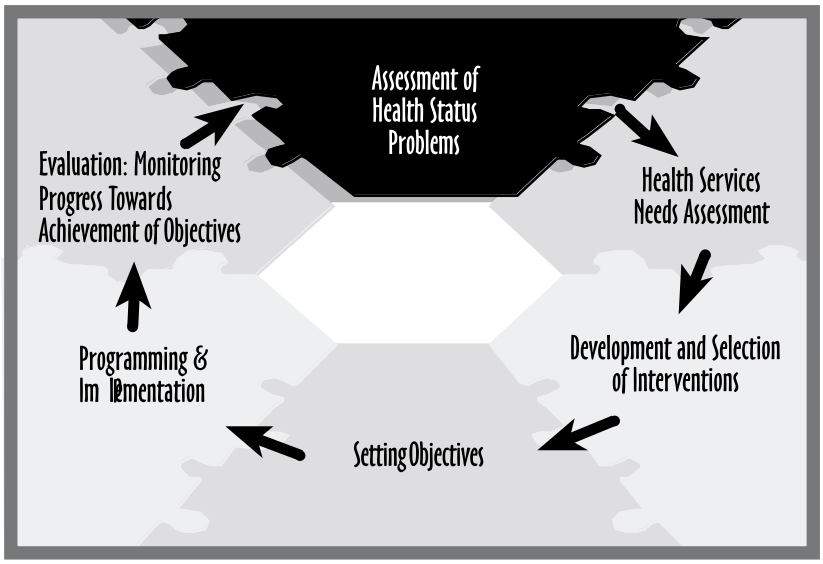
MCHB

Maternal and Child Health Bureau

The BIG Picture...

Figure 1.



You are about to proceed through a self-instructional manual that was designed to help you develop skills in one of the steps of the rational planning process. There are six manuals in this series, each of which explains a step in the process and how to accomplish it:

1. Assessment of Health Status Problems
2. Health Services Needs Assessment
3. Development and Selection of Interventions
4. Setting Objectives
5. Programming and Implementation
6. Evaluation: Monitoring Progress Towards Achievement of Objectives

Each of the steps builds on the ones that precede it and contributes to the ones that follow. This circular process is diagrammed in *Figure 1*.

Assessment of health status problems is the foundation step for the entire planning process. This step involves careful specification of the dimensions of a problem and analysis of its precursors. In the second step, the focus shifts from the health problem to health services. A health services needs assessment examines the adequacy of existing services to prevent the problem by attacking its precursors or compensating for their effects. Where existing services fall short, unmet needs for service become apparent. Step three involves development of interventions to meet these unmet needs. This is the

step that links needs and interventions and constitutes the essential rationality of the planning process. Step three also involves a deliberate selection process, in which each alternative intervention is compared to a set of relevant criteria to identify the most appropriate one to be implemented. Once an intervention has been selected, it is possible to develop measurable objectives (step four) which, as a whole, constitute one or more hypotheses regarding how the program's activities are expected to contribute to an improvement in the problem. The objectives form a blueprint of the program, which is further elaborated in step five, including placement in the organization, job descriptions, budgeting, and implementation activities.

Step six in the cycle of program planning is evaluation. Evaluation involves comparisons between actual experience and standards. There are two major ways of thinking about evaluation. One is a research activity, called evaluation research. The second is an administrative function called monitoring. Monitoring involves assessment of progress towards achievement of the objectives of a program. By monitoring the extent to which targets are achieved, you can determine whether the program has fallen short on some objectives. If it has, this information should trigger an in-depth search for the reasons the targets were not achieved. This search, in turn, is part of the health status problem and service needs assessments in the next round of planning. Monitoring progress towards achievement of objectives is the last self-instructional manual in this series. We did not develop a manual on evaluation research because these methods are discussed extensively in other sources.

These six manuals present a framework for program planning that encourages development of creative, responsive and comprehensive interventions. The framework is useful for addressing problems that range from the very simple to the most complex. It allows for movement back and forth to revise earlier steps based on information that may emerge later in the process. The circular planning cycle may be entered at any point and rational progress can be made as long as the sequence of steps is understood and followed. An emerging problem, for example, may require careful attention to every step in the process, starting with assessment of the health status problem, and ending with an evaluation of the selected intervention. Planning in the context of well-understood problems and ongoing programs, however, may require emphasizing the objectives and programming steps which need frequent adjustments to stay on track. The framework is also flexible enough to be used at any jurisdictional level. While the relative emphasis on particular steps is likely to vary across jurisdictions, the framework provides a common frame of reference.

Program planning serves as a bridge between and among theories, measurement sciences, substantive content, and actual practice of public health. These manuals offer you technical guidance for carrying out the six steps in the planning process. Your planning skills will be enhanced further by training in such analytic areas as epidemiology, biostatistics, decision analysis and evaluation research, and in interactive domains like community development, group process, and leadership. Your greatest challenge as a program planner is to use the rational planning framework to apply each of these skills in the right amount and at the right time to combat public health problems effectively.

Table of Contents

What is this manual about?

This is a self-instructional manual designed to teach you to assess health status problems in order to begin a process of program planning. In this manual you will learn:

- How health problems are perceived initially;
- How to verify initial perceptions;
- How to set priorities among health problems; and
- How to analyze health problems using data from epidemiological studies and the local problem site.

The concepts in this manual are illustrated by several examples. You may wish to supplement these examples with an assessment of a health status problem of importance to you or your agency. For greatest benefit, read through the entire manual before you decide what health problem to assess.

Prerequisite skills

- ability to use basic methods of descriptive and analytic epidemiology and biostatistics
- ability to understand published studies about the risks associated with health problems

Introduction

Assessment of health status problems is the first step in the rational program planning process illustrated in *Figure 1*. Problem assessment involves recognition and analysis of health conditions that appear to have reached unacceptable levels. The problem assessment, in turn, is the basis for the next step in the planning process, health services needs assessment. Sometimes these two steps are combined and called simply "needs assessment." A clear distinction between them is made here because the two concepts (*i.e.*, health problem and health service) and their corresponding assessment methods differ considerably. Also, if they are not clearly differentiated, one step may be given precedence at the expense of the other.

A systematic assessment of a health status problem has four distinct stages: perception, verification, setting priorities, and analysis.

Health status problem perception

In order to perceive that a problem exists, you must be able to recognize one. A problem may be defined as an unacceptable gap between the real (what is) and the ideal (what should be). The problems of interest to health planners are those which relate to health conditions or status of population groups. Thus, health status problems are identified when the actual level of health status of a population is different from the ideal level.

Health status problem perception generally occurs in one of the following ways:

1. There is a "feeling" by an individual, group, or community that there is too much of an adverse health condition. The actual level of the condition is compared with the standards of the perceiver and an unacceptable gap between the real and ideal is identified. For example, community members or leaders might become alarmed because it seems as if the number of children diagnosed with leukemia has increased recently.

2. A statewide or community assessment reveals a problem. This process is conducted by health departments or community/advocacy groups, sometimes because of a required assessment, such as the one for the MCH Block Grant application. A variety of health problems and risk factors are examined for the purpose of identifying health status problems. Methods range from routine surveillance of health indicators to focus groups/interviews. For example, officials in a local health department may have been monitoring the rates of low birthweight (LBW) in the county as part of routine surveillance of several health problems, and they observe a small but steady increase during the past few years. They have also found a steady rise in adolescent smoking, especially among girls. To explore these issues further, they conducted focus groups with interested community persons to gain their perceptions about the problem and factors that might be contributing to it.

To perceive a health status problem, then, indicators of health status and ideal levels for those indicators are required. **Indicators of health status** are usually measures of health conditions (*e.g.*, incidence of asthma, infant mortality, AIDS). However, this definition may be modified under certain circumstances, such as when the health problem is rare and a risk factor is highly predictive of the problem. Then the risk factor may serve as an indicator of the problem. For example, incomplete DPT immunization status may be considered a surrogate indicator for a health problem because a child who does not receive the full DPT series is at higher risk for diptheria, pertussis, and tetanus than a child who receives the full immunization series. Another modification occurs when several health conditions result directly from one risk factor (*e.g.*, injuries). In that case

using the risk factor as the problem on which the assessment will focus may be more efficient and productive than assessing multiple health status indicators.

While some latitude in labeling health problems is wise and practical, it is important not to define the problem as a health service deficiency (*e.g.*, lack of services for...). When the problem is called a health service deficiency, the only possible response is to provide the missing services, which may not be the most effective or appropriate way to improve health status. By focusing on the health problem, you will unlock opportunities to intervene in many ways, including but not necessarily limited to a predetermined set of services.

Ideal levels of health status change over time and across population groups and geographic areas. They are influenced by the levels of health enjoyed by the majority, by advances in technology that enable the health problem of interest to be modified, and by expectations or beliefs that something can and should be done about health problems. The targets in *Healthy People 2010* and similar documents developed by states may be considered ideal levels of health status. Comparisons with these can be supplemented by comparisons with contiguous counties or states, or the United States as a whole.

Problem verification

Verification of health status problems is a process that occurs concurrently with problem perception. In this process, several objective aspects of the problem are examined for the purpose of determining whether or not the observed levels really constitute a problem. Aspects that must be examined are extent, duration, expected future course, and variation across population groups and geographic areas. Questions that must be answered in order to verify that a problem exists are:

Extent: What is the incidence or prevalence of the problem? How many people are affected?

Duration: How long has the problem been at the observed level? In what ways have levels changed over time?

Expected future course: What is likely to happen to the problem if no intervention takes place?

Variation: How does the extent of the problem vary across population groups (*e.g.*, specific racial or age groups) and geographic areas? Does the problem affect some people but not others?

To examine each of these aspects, one or more sources of ideal levels of the indicator are used for comparison. An example is in *Table 1* where the extent of LBW in York County is 9.7%. When this is compared to the percent of LBW in the

entire state at 7.3%, the magnitude of the problem becomes apparent. Even more alarming is when the extent of LBW in York County is compared to the *Healthy People 2010* objectives which have set a goal of reducing the percentage of LBW to 5% by the year 2010. *Table 1* also shows that LBW is a particular problem in certain subgroups, such as among African Americans, teenagers under age 18, unmarried women, and women living in urban areas. In York County, the percentages of each of these indicators is higher than the percentage found in the state.

Table 1. Extent of the Problem and Variations Across Subgroups, Low Birthweight (LBW) York County and State (2010)

Population	York County % LBW	State % LBW
Total	9.7	7.3
Subgroups		
Race		
African American	15.2	12.3
White	6.4	5.4
Age		
≤17	12.1	10.2
18-19	9.2	8.9
20-34	6.8	6.3
≥35	8.6	7.8
Marital Status		
Unmarried	12.5	10.2
Married	5.9	5.6
Geography		
Urban	11.1	9.3
Rural	7.9	6.4

With regard to duration, York County planners also examined trends between 1990 and 2000. They found that the percentage of LBW increased by approximately 2% in each 5-year period between 1990 and 2000. If this rate of increase continues, in the year 2010 the percentage LBW in York County will be 9.9 and in 2015 the LBW percentage will have reached 10.1. These trends alarmed all leaders since they were heading in the opposite direction from the target (5%) in *Healthy People 2010*.

Setting priorities among health problems

Public health agencies are always faced with the dilemma of addressing a large number of health problems with limited human, financial and other resources. This necessitates setting priorities among the problems in order to decide how to allocate resources to address them.*

Criteria for priority setting

Numerous criteria and the perspectives of many individuals should be considered when health problems are being prioritized. Some criteria may appear initially to be non-controversial. For example, problems that have serious consequences are often considered more important than those with less serious consequences, and problems that have been increasing in magnitude may be assigned higher priority than those that are decreasing. Each of these criteria, however, may have controversial aspects. In the first case, the most serious problems may affect only a small proportion of the population. In the second situation, the rate of increase or decrease may modify conclusions about the trends.

It is important to include as many of the stakeholders (people who have an investment in the problem/issue) as possible in the process of prioritizing problems. Representatives of state and local agencies, other public and private organizations, and private citizens should be involved. But when such groups convene, discussions and decisions may be dominated by individuals with especially persuasive and/or persistent verbal skills. In such a milieu, important perspectives on the problem may never emerge. To allow a variety of perspectives and criteria to be fully represented, a framework that encourages consideration of all of them in a balanced, rational way is essential.

The development of a simple matrix can meet this need. *Table 2* shows a matrix with several of the problems of contemporary concern to MCH programs in the left-most column. Heading the other columns are criteria that might be used to prioritize the problems. There is no ready-made set of criteria that will apply in all situations. Criteria will differ from state to state and over time, depending on what is important to the stakeholders. Two potentially useful criteria were mentioned above: the seriousness of the consequences and the direction of trends (improving or worsening). Another important one is the extent of the problem (how many people are affected and/or at risk). Other criteria may be found in written and unwritten policies. For example, problems that have been identified in the *Healthy People 2010* objectives are priorities for all federal agencies. Within a state, similar sets of objectives or special reports may focus

**This section is reprinted, with revisions, from Peoples-Sheps, Farel, and Ahluwalia, 1994.*

Table 2. Matrix of MCH Problems by Prioritizing Criteria Using 0 = No (Low) and 1 = Yes (High) Scores

Health Problem/Criterion	Severe Conse-quences	Trends Increas-ing	Extent (High incidence/ prevalence)	In HP 2010	In State Priorities	Acceptability to citizens	Total
Low birthweight	1	1	1	1	1	1	6
Infant mortality	1	0	1	1	1	1	5
Vision impairments	0	0	0	0	0	1	1
Hearing impairments	0	0	1	1	0	1	3
HIV	1	1	0	1	0	0	3
Childhood communicable diseases	1	1	0	1	1	1	5
Adolescent pregnancy	1	1	1	1	0	0	4
Adolescent smoking	1	1	1	1	0	0	4
Injuries							
Intentional	1	1	1	1	1	1	6
Unintentional	1	1	1	1	1	1	6

on certain problems and these should be taken into account. The acceptability of addressing a problem may also be an appropriate criterion. For example, such controversial problems as smoking and adolescent sexual behavior should be considered in light of the ability of a state or local area to accept any attention or interventions directed to these problems.

Decision framework

When the criteria that will guide the ranking of problems are clearly identified, the discussion shifts from focusing on sometimes minute aspects of single problems to a broader discussion of the framework within which decisions about problems should be made. A lively debate here may lead to new insights and more informed decisions.

Using a matrix as a framework for decision-making is straightforward. The simplest approach is to assess each problem in relation to each criterion and indicate whether it does or does not meet the criterion. For example, whether a problem is in *Healthy People 2010* is a criterion that lends itself easily to a yes/no

answer. Some other criteria might be characterized better with a range of relative options. That is, it may not be very informative to categorize incidence rates as high or low, but a scale that characterizes relative incidence and includes subgroup variations may be extremely helpful.

Another consideration that needs to be taken into account is that the criteria may vary in their importance to the prioritizing process. While all the criteria are important (or they would not have been selected in the first place), some of them may be relatively less important than others. The extent of the problem right now may be more significant than past or future trends in deciding which problems will get the most attention or resources. In other situations, exactly the opposite might be true. Assigning weights is a way to handle different levels of importance of the criteria (Spiegel & Hyman, 1978.)

Three variations of the matrix are shown in *Tables 2, 3*, and *4*. *Table 2* is a simple matrix in which each problem is assessed against each criterion in order to determine whether the criterion is met. In *Table 3*, a range of numerical scores with specific definitions for each score is identified for each criterion. Each problem then receives a score reflecting the extent to which it meets the criterion. *Table 4* adds the dimension of weighted criteria. Here, each criterion is given a weight indicating its importance relative to the other criteria. The weights are then multiplied by the score assigned to each problem to obtain a weighted score. In all three examples, the final summation is done the same way. The scores assigned to each problem are added and a rank ordering emerges. While on each matrix the problem with the lowest score is the same (vision impairments), the problem with the highest score varies somewhat across *Tables 2, 3,* and *4* because of increasing specificity of scores and weights.

From the rank-ordered problems, a decision about which, if any, to label high priority can be made. There are no specific guidelines for making these decisions, except that the cut-points for high *vs*. low priority should fit well with the circumstances of the jurisdiction in which the problem exists. Before making any final decisions based on this analysis, the process and the results should always be reviewed to be certain that all participants understand them and agree on them.

It is important to remember that this decision framework is not a mathematical tool to obtain a correct answer; it is a way of organizing a discussion to achieve consensus among different persons and groups (WHO, 1984).

*Table 3. Matrix of MCH Problems by Prioritizing Criteria Using Scores with a Range of Values**

Health Problem/ Criterion	Severe Conse-quences	Trends Increas-ing	Extent (High incidence/ prevalence)	In HP 2010	In-State Priorities	Acceptability to citizens	Total
Low birthweight	4	4	4	3	3	5	23
Infant mortality	5	2	4	3	3	5	22
Vision impairments	3	3	2	1	1	4	14
Hearing impairments	3	3	3	3	1	4	17
HIV	5	5	2	3	2	3	20
Childhood communicable diseases	4	4	1	3	3	4	19
Adolescent pregnancy	4	4	4	3	2	4	21
Adolescent smoking	4	4	5	3	1	1	18
Injuries							
Intentional	5	5	4	3	3	4	24
Unintentional	5	4	4	3	3	2	21

***Scores:**

Severity of consequences:
1 = not lifethreatening or debilitating to individuals or society
2 = slightly debilitating to individuals or society
3 = moderately debilitating to individuals or society
4 = life threatening or debilitating to individuals or society
5 = life threatening and debilitating to individuals and society

Extent of the problem:
1 = low incidence or prevalence
2 = moderate incidence or prevalence in some subgroups
3 = moderate incidence or prevalence in all groups
4 = high incidence or prevalence in some subgroups
5 = high incidence or prevalence in all subgroups

Trends:
1 = rapid decrease in past five years
2 = moderate/slow decrease in past five years
3 = no change in past five years
4 = moderate/slow increase in past five years
5 = rapid increase in past five years

Healthy People 2010:
1 = not tracked by MCHB
2 = subset of an objective for the nation, tracked by MCHB
3 = main focus of an objective for the nation, tracked by MCHB

State priority:
1 = not consistent with state health priorities
2 = moderately consistent with state health priorities
3 = addresses one or more state health priorities

Acceptability:
1 = not perceived as a health problem; any effort to address it would be opposed
2 = not perceived as a health problem; efforts to address it would not be opposed
3 = recognized as a health problem; any effort to address it would be opposed
4 = recognized as a health problem; efforts to address it would not be opposed
5 = recognized as a health problem; efforts to address it would be welcome

Table 4. Matrix of MCH Problems by Prioritizing Criteria Using Scores with a Range of Values and Criteria Weights***

Health Problem/ Criterion (Weight)	Severe Conse-quences (2)	Trends Increasing (3)	Extent (High incidence/ prevalence) (2)	In HP 2010 (3)	In-State Priorities (1)	Acceptability to citizens (2)	Total
Low birthweight	4 x 2 = 8	4 x 3 = 12	4 x 2 = 8	3 x 3 = 9	3 x 1 = 3	5 x 2 = 10	50
Infant mortality	5 x 2 = 10	2 x 3 = 6	4 x 2 = 8	3 x 3 = 9	3 x 1 = 3	5 x 2 = 10	46
Vision impairments	3 x 2 = 6	3 x 3 = 9	2 x 2 = 4	1 x 3 = 3	1 x 1 = 1	4 x 2 = 8	31
Hearing impairments	3 x 2 = 6	3 x 3 = 9	3 x 2 = 6	3 x 3 = 9	1 x 1 = 1	4 x 2 = 8	47
HIV	5 x 2 = 10	5 x 3 = 15	2 x 2 = 4	3 x 3 = 9	2 x 1 = 2	3 x 2 = 6	46
Childhood communicable diseases	4 x 2 = 8	4 x 3 = 12	1 x 2 = 2	3 x 3 = 9	3 x 1 = 3	4 x 2 = 8	42
Adolescent pregnancy	4 x 2 = 8	4 x 3 = 12	4 x 2 = 8	3 x 3 = 9	2 x 1 = 2	4 x 2 = 8	47
Adolescent smoking	4 x 2 = 8	4 x 3 = 12	5 x 2 = 10	3 x 3 = 9	1 x 1 = 1	1 x 2 = 2	42
Injuries Intentional Unintentional	 5 x 2 = 10 5 x 2 = 10	 5 x 3 = 15 4 x 3 = 12	 4 x 2 = 8 4 x 2 = 8	 3 x 3 = 9 3 x 3 = 9	 3 x 1 = 3 3 x 1 = 3	 4 x 2 = 8 2 x 2 = 4	 53 46

Scores as defined in *Table 2

****Weights** 1 = Important
2 = Very Important
3 = Most important

Problem analysis

Once the highest priority problems have been identified, each problem must be analyzed to identify its precursors and consequences, and to understand the direction and strength of the relationships among them. This aspect of health status assessment is crucial for linking health status problems to appropriate interventions. Unfortunately, it is often omitted in busy health agencies.

There are many ways to analyze health problems (Witkin and Altschuld, 1995). The approach we recommend forces consideration of a broad range of precursors and consequences that represent all relevant domains (*e.g.*, physical, behavioral, psychological, social, environmental). The central feature of the approach is a diagram which helps to conceptualize the dimensions of the problem and can be used as a reference throughout the planning process.

Creating a diagram of the problem

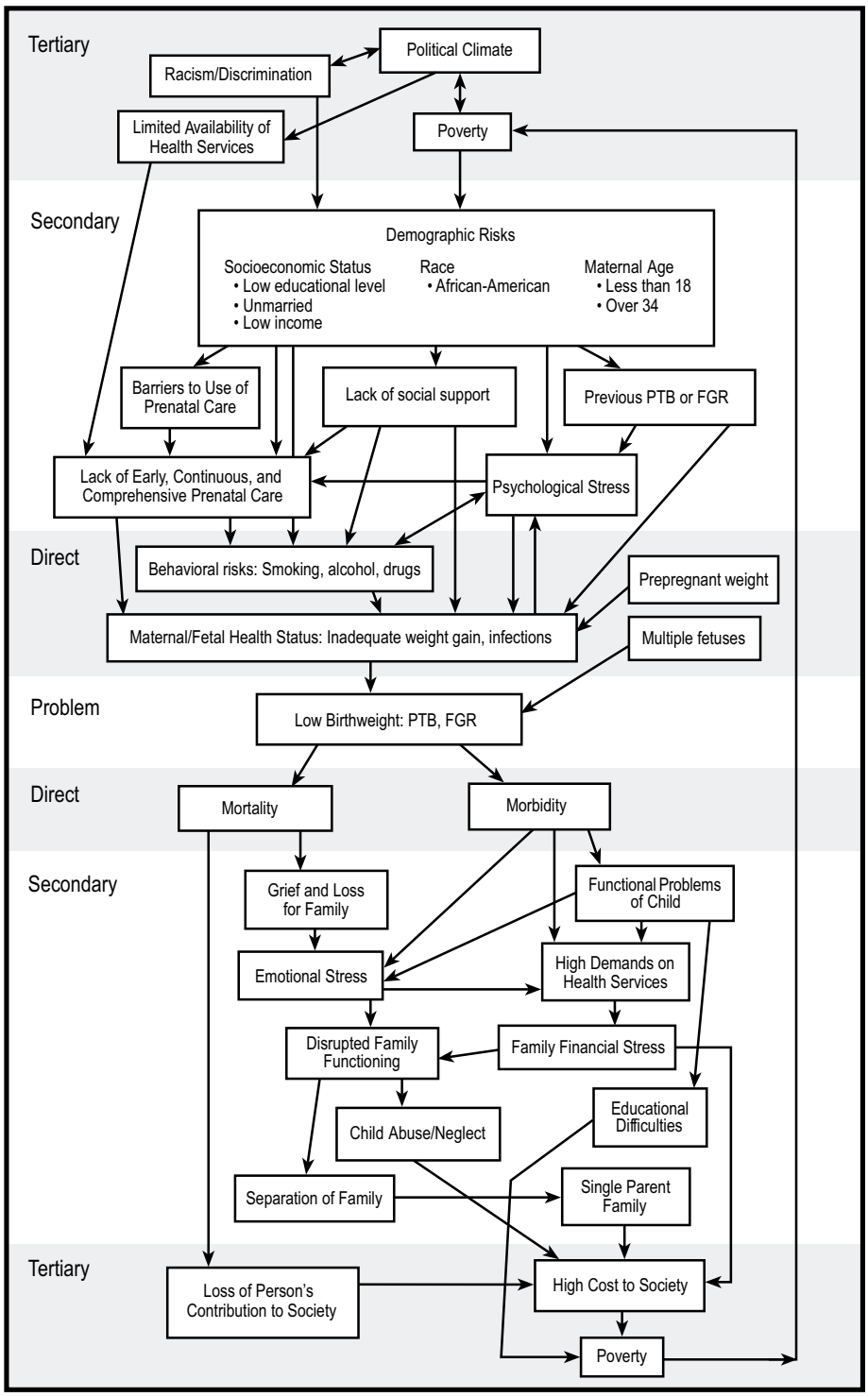
A problem diagram has four components: the problem, precursors, consequences, and linkages. There is no intrinsically correct or incorrect way to develop one of these diagrams. Your goal is to find the most revealing way to show the precursors and consequences of the problem at hand. In the diagram, the problem itself is generally identified in the middle. Precursors of the problem are in the upper portion and consequences are depicted in the lower portion of the diagram. Arrows indicate known and/or hypothesized linkages. These diagrams can also be drawn from left to right. *Figure 2* is sample problem diagram for low birthweight in York County.

Problem

Often, the problem itself is well known. But sometimes it requires further exploration just to determine whether or not it can/should be considered in its component parts. There are several different ways this situation might manifest itself. Some examples are:

- What appears at first to be a high rate of preschool injuries may be limited to injuries in certain day care centers;
- Pregnancies among very young pubescent girls may be the outward manifestation of incest;
- Low birthweight consists of both preterm birth (PTB) and fetal growth restriction (FGR), with preterm birth constituting 2/3 of low weight births and carrying a greater risk of death and disability.

*Figure 2. Problem Diagram for Low Birthweight in York County**



**This diagram was derived from the Spring, 1995 issue of* The Future of Children: Low Birthweight*, and from findings from the* 1992–1998 Patient Outcomes Research Team on Low Birthweight. Clinical Highlight. *AHRQ Publication No. 00–P010, January, 2000. Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/clinic/lobrhigh.htm.*

In each of these cases, a more precise definition of the problem will help to narrow the scope of the analysis of precursors and, ultimately, encourage more effective interventions.

Figure 2 shows that the York County planners chose to characterize the problem of low birthweight via its component parts: preterm birth and fetal growth restriction. While a review of all the issues they considered in making this decision is beyond the scope of this manual, it is important to acknowledge that they relied on advice from experts in the epidemiology of this problem. People actively engaged in research in a particular area are especially well qualified to assist planners, who are often generalists, to become acquainted with the latest findings about a health problem of concern.

Precursors

The precursors of the problem are factors that have been associated with the problem. Some of them are directly related to the pathological processes that lead to the problem. Others are not as directly linked; instead, they influence the precursors that have a more direct effect. Still others, like race and marital status, may be associated with the problem statistically but these factors are considered markers for other unknown or unmeasured phenomena.

At the direct level, the factors describe individuals and may be biological, medical, or behavioral. While there may be two or more levels of these factors, they have the most influence on the problem and are often called direct precursors. In the LBW diagram (*Figure 2)*, conditions that reflect the health status of the mother and fetus, such as inadequate weight gain and vaginal/intrauterine infections are biologically occurring events that contribute to LBW. Other direct precursors are behavioral risks, such as smoking, alcohol and drug use, and prepregnant weight, which have their effects on low birthweight through the biological processes.

Socioeconomic, psychological and familial characteristics may be at the next (secondary) level. Preventive health services that are known to be associated with the problem also may be secondary precursors. These secondary factors are often, although not always, precursors to the direct factors. For LBW, psychological stress, lack of social support, lack of prenatal care, and demographic risks are a few of the secondary precursors which exert their influence through the direct precursors. For example, lack of early, continuous, and comprehensive prenatal care can affect behavioral risks; a woman in need of a drug abuse treatment program may not get referred for treatment to modify her behavior if she is not seen in prenatal care. Tertiary factors tend to be more societal, policy, and environmental in nature. As shown in *Figure 2*, racism and discrimination, poverty, and political climate are tertiary factors. Like direct factors, both the secondary and tertiary categories may have multiple levels.

An issue that will invariably evolve as you develop your diagram is how much detail to put in it. The dilemma is often related to the fact that public health problems have many facets, each of which could be developed into an extensive model. In *Figure 2*, for example, the planners could have expanded the diagram by including detailed biologic pathways to each of the components of low birth weight. They chose not to do that in this case for two reasons: 1) while it is generally accepted that there are two pathways, the paths themselves are not well understood, and 2) a high level of biological detail usually leads to medical, rather than public health, interventions. A clear understanding of your purpose in developing a problem diagram will inform your decision about the level of detail to include.

Identifying the linkages among the precursors and the problem requires familiarity with the epidemiology literature and an understanding of the concept of relative risk. Relative risk, which is measured by an odds ratio, is an indicator of the strength of association between a risk factor and a health problem. It is the ratio of the incidence of the problem in the population of people with the risk factor to the incidence in the population without the risk factor. So, literature which reports results of studies of risk factors for a health problem can be used to identify risk factors for the problem diagram. Relative risk indicators can also help you in determining the potential impact of intervening at a specific precursor. For example, if vaginal/intrauterine infections have a higher relative risk for preterm birth than maternal cigarette smoking, an intervention directed towards detection and treatment of infections for pregnant women would potentially have more impact on preterm birth than an intervention focused on cigarette consumption.

To link factors to each other, additional research may be necessary. If your problem has a behavioral component (and most do), there are theories of human behavior, many of which have been tested empirically, that specify what factors contribute to certain behaviors and how these factors relate to each other. In *Figure 2*, current theories of social support and stress guided the development of the diagram. You can see lack of social support is viewed as affecting maternal/fetal health status in three ways. First, it has a direct effect depicted by the straight arrow between the two precursors. Second, it has an indirect effect in which lack of social support affects use of prenatal care which, in turn, affects maternal/fetal health status. In the third version, lack of social support has been shown to modify the effect of psychological stress on maternal/fetal health status by making it worse. This is depicted in *Figure 2* by the arrow that intersects the straight arrow between psychological stress and maternal/fetal health status.

Consequences

Consequences are the effects of the problem on individuals, families and society. They provide significance to the problem as shown in *Figure 2*, where the impact of having a low birthweight infant is evident in emotional and financial stress and, possibly, disruption of the family unit. Like precursors, consequences can be categorized according to direct, secondary, and tertiary levels, each representing one or more domains that are increasingly removed from the problem. Note that the consequences of one cycle of the problem may become precursors of the next as indicated by the arrow connecting poverty in the consequences to the same factor in the precursors.

Reality checking

The diagram prepared so far may be derived from published literature. It is a solid beginning but not a finished product. A complete problem analysis is refined by discussions with people involved with the problem, by examination of extent, duration, and likely future course of the precursors and consequences, and through statistical analysis of the precursors in that population. This refinement stage will allow you to identify precursors and consequences that are especially prevalent in your population and those that do not apply to your population. For example, smoking is a well-accepted precursor of low birthweight. But if few people in your population smoke, it is not likely to have a significant effect on the incidence of low birthweight in your community. *Table 6* shows that 11.9% of the mothers in York County who had a live birth smoked during pregnancy. This percentage is low compared to the state, where the percentage of mothers who smoked during pregnancy was 15.3. By displaying the data in formats like *Tables 6* and *7,* differences in the prevalence of the precursors across groups become apparent. A relatively low prevalence suggests that intervening to reduce that precursor in the given population may have little effect on the problem.

Table 5. Percent Low Birthweight, Preterm Birth, and Fetal Growth Restriction among Women <18 years in York County, all Women in York County, and all Women in the State who had a Live Birth in 2000

	York County < 18 years	York County	State
Low birthweight	11.2	9.7	7.3
Preterm birth	13.7	12.3	11.6
Fetal growth restriction	10.8	9.2	8.3

Table 6. Extent of Selected Direct and Secondary Precursors of Low Birthweight Among Women <18 in York County, all Women in York County, and all Women in the State who had a Live Birth in 2000

Precursors	Percentage of all live births		
	< 18 Yr.	York County	State
Maternal/Fetal Health Status			
Inadequate weight gain	42.0	38.2	32.4
Infections	Not available	Not available	Not available
Behavioral Risks			
Smoking	19.3	11.9	15.3
Alcohol	14.0	12.3	13.1
Drug use	Not available	Not available	Not available
Psychological Stress			
Unintended pregnancy	69.3	46.1	37.0
Lack of Early , Continuous, and Comprehensive Prenatal Care			
Prenatal care starting after the first trimester	47.0	28.0	20.5
Received no prenatal care	4.2	1.9	1.6
Received less than adequate prenatal care	52.0	41.2	36.2
Previous PTB or FGR	Not available	Not available	Not available
Lack of Social Support	Not available	Not available	Not available
Demographic Risks			
Low educational level (< 12th grade)	100	29.5	26.4
Unmarried	91.3	43.4	30.5
Low income (births paid for by Medicaid)	63.0	49.0	42.8
African American	61.7	43.5	39.5
Age < 18	100	13.4	7.6
Age > 34	0	6.5	6.1

Table 7. Extent of Selected Tertiary Precursors of Low Birthweight in York County and State (2000)

Precursor	Extent	
	York County	State
Political Climate	Not available	Not available
Availability of Health Services		
Health department clinic	1	In 30 of 44 counties
Number of private providers who provide prenatal care	5	245
Ratio of providers to women having a live birth	1:515	1:420
Racism/Discrimination	Not available	Not available
Poverty		
% of families with income below poverty	19.8	9.7

Another way to assess the impact of a risk factor on a health problem in a given community is through calculation of population attributable risk. Population attributable risk combines the relative risk of a factor for a health problem and the prevalence of the risk factor in the population. The measure suggests what might be expected to happen to the problem in this population if the risk factor were eliminated. The analysis should be based on data from the population of concern, although extrapolations from other similar populations are sometimes used. The concept of population attributable risk has been illustrated by Hogue and Yip (1989) with intendedness of pregnancy. Intendedness might be considered a measure of the psychological stress factor in *Figure 2*. Suppose that the risk of low birthweight among African American infants whose births are unintended is higher than African American infants whose births are intended, a relative risk of 1.33. For white infants, the comparable relative risk of LBW associated with unintended pregnancy is 1.17, lower than for African American infants. Also, the prevalence of unintended births is higher among African American infants than among white infants (59% versus 36%). By applying a formula for calculation of population attributable risk, the risk among African American women is 16% and among white women it is 6%. This means that 16% of LBW births among African American women are attributable to unintendedness. Among white women, only 6% of LBW births are attributable to unintendedness. Thus, a reduction in all unintended pregnancies would bring a greater reduction in LBW among African American women than among white women.

Reality checking in our sample York County situation involved using descriptive epidemiology to analyze the problem itself and its precursors. With regard to the problem, the planners started with data on low birthweight and then examined its two components: preterm birth (<37 weeks gestation) and fetal growth restriction (<10th percentile of weight for gestational age), as shown in *Table 5.* They also examined these rates by various risk factors and found that York County adolescents under age 18 had larger percentages of each condition than all women in York County or in the state as a whole. Based on this, they dug a bit further and discovered that while mothers under 18 made up 13.4% of live births in the county, this group accounted for about 30% of LBW, PTB, and FGR. The planners decided to examine the data on precursors separately for adolescents.

Tables 6 and *7* show values for the year 2000 on selected indicators of precursors for preterm birth and fetal growth restriction. While values on some key items (*e.g.*, infection rates and previous PTB or FGR) were not available, the planners nevertheless made some illuminating observations. Most of these derived from the differences between York County and the state that were particularly pronounced in the adolescent population. The tables show that adolescents tended to have less adequate weight gains during pregnancy and more unintended pregnancies. Also, more of them smoked and had late or

inadequate prenatal care. These observations, derived from existing data sources, led the planners to survey a sample of pregnant adolescents to understand better the precursors to low birthweight in this population. Survey results suggested that more than 50% of teenagers faced one or more of three barriers to receiving prenatal care: limited understanding of the importance of care, transportation problems, and inability to pay for care. This information added important depth to the assessment of low birthweight as a health status problem. The planners were able to identify a target population and some important precursors that may be amenable to intervention. They were ready to move on to the next step in the planning process.

Why are precursors and consequences important?

Both precursors and consequences play critical roles in the rational planning process. Precursors:

- Constitute a framework for identifying alternative interventions that either modify the risk factors or compensate for those that cannot be modified;
- Link the assessment phases of planning to programming; and
- Identify the hypothetical relationships from which the program hypothesis is developed.

Moreover, by analyzing a broad range of precursors from different domains, interventions with multiple components can be devised. These often attack several precursors with greater probability of success than single component interventions.

While precursors are in many ways the base from which program planning unfolds, consequences serve a very different, but equally important function. The consequences of a problem are often the symptoms that cause the problem to be noticed and, if they are significant and/or extensive, they may form the rationale that convinces policy-makers and funding agencies that the problem must be addressed.

Finding the data

Often the data required for assessment of health status problems are available in national sources, such as those described in *Principles and Practice of Public Health Surveillance* (Teutsch and Churchill, 1994), *From Data to Action: CDC's Public Health Surveillance for Women, Infants and Children* (Wilcox and Marks, 1995) and *Healthy People 2010, Volume II*, Tracking (USDHHS, 2000). Data sources that are specific to states and local areas may be identified by state centers for health statistics. If data of acceptable quality are not available, you will have to consider collecting your own. This is a decision that should be made carefully and in consultation with experts in both qualitative and quantitative research, since collecting data is expensive and producing data of high quality depends upon well-conceived and executed methods.

Practice

On the following pages, four different health conditions are presented: motor vehicle crash injuries in children 0 to 6, frequent asthma attacks among children with asthma, limited mobility among children with special health care needs, and HIV+ status in women of childbearing age. Select the problem of greatest interest to you and review the information about it. For each problem, the following is available for your review: a table of data on the extent (distribution) of the problem in the population and among subgroups compared with another area with similar sociodemographic characteristics, a diagram of the problem analysis, and a table of the distribution of direct and secondary precursors. In most of the tables, the data are presented as percentages. In the HIV+ tables, however, actual numbers are used because the condition is still sufficiently rare in these hypothetical counties that rates would be unstable. Answer the following questions for whichever health status condition you select.

1. Is the condition sufficiently prevalent to be considered a problem?
2. Are there any subgroups of the population who are disproportionately affected by the problem? Which ones?
3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?
4. What additional information would you like to have about the diagram in order to better understand the relationships among precursors, consequences, and the problem?
5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area?
6. Write a brief (1–2 paragraph) summary about the problem, based on your answers to questions 1 through 5.

Practice

Motor vehicle crash injuries in children 0–6 years

City Council members were alarmed when informed by the Public Safety Office that the motor vehicle crash injury rate for children 0 to 6 years old in their city was twice the state rate. They asked public safety officers to analyze this problem.

Extent of the Problem and Variations Across Subgroups, Motor Vehicle Crash Injuries in Children 0–6 Years, Your City and State (1995)

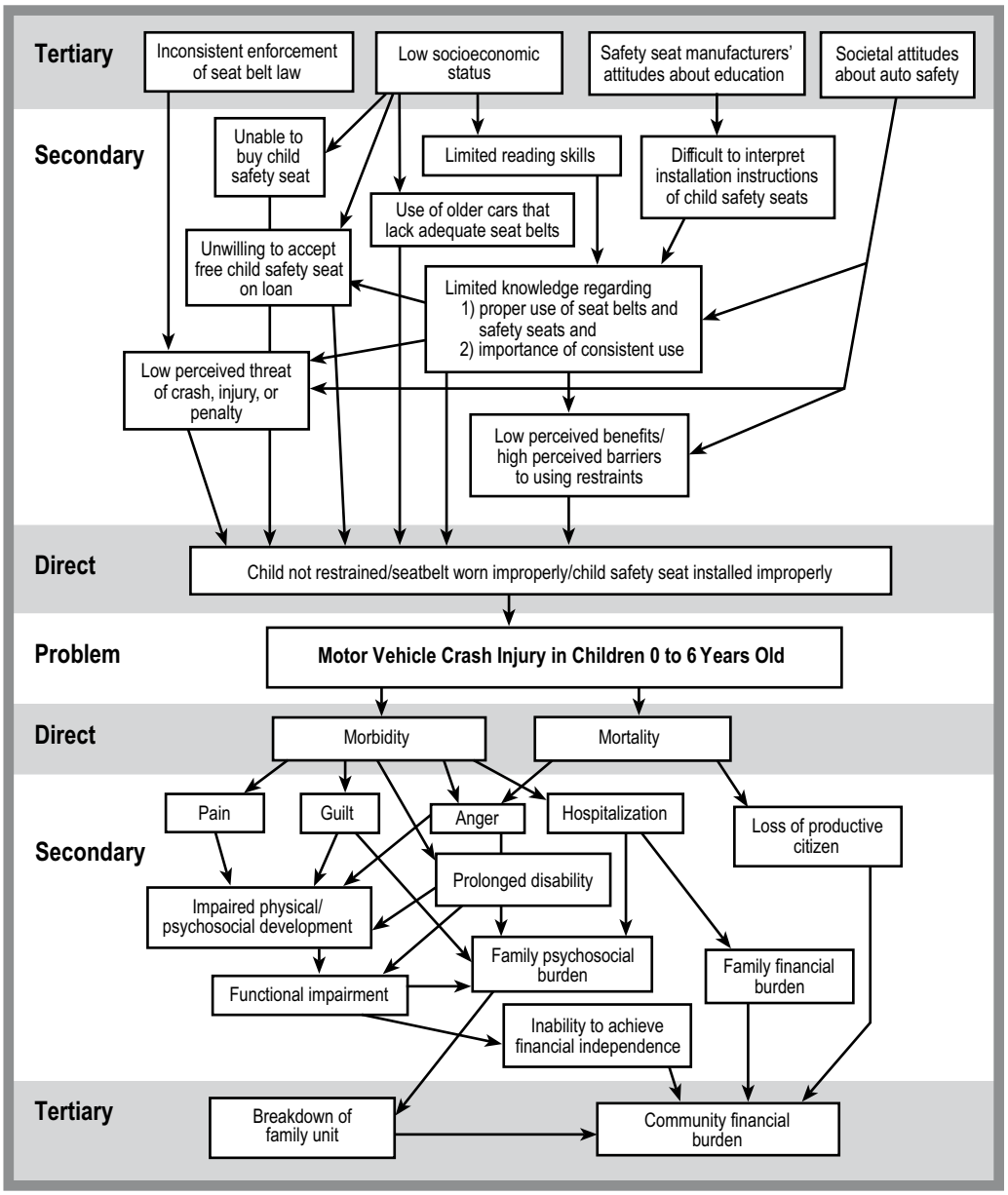
	Motor Vehicle Crash Injury Rate*	
Population	City	State
Total	4.8	2.3
Subgroups		
Gender of Driver		
Male	4.9	2.5
Female	4.7	2.1
Race		
African American	5.1	2.4
Hispanic	5.0	2.4
White	4.5	2.1
Maternal education		
<12th grade	5.2	2.6
12th grade	4.9	2.5
>12th grade	4.3	2.0
Income		
≤ $20,000	5.3	2.8
> $20,000	4.3	1.8

**Rate per 1,000 children 0–6 years of age*

1. Is the condition sufficiently prevalent to be considered a problem?
2. Are there any subgroups of the population who are disproportionately affected by the problem? Which ones?
3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?

Practice

Motor vehicle crash injuries in children 0–6 years



4. What additional information would you like to have about the diagram in order to better understand the relationships among precursors, consequences, and the problem?

Practice

Motor vehicle crash injuries in children 0–6 years

Extent of Direct and Secondary Precursors of Motor Vehicle Crash Injuries Among Families with Children 0–6 Years in Your City and the State (1995)

	Percent of Families with Children 0–6 Years	
Precursors	City	State
Child 0–6 not restrained	20.0	15.0
Seat belt worn improperly 4–6	25.0	17.0
Child safety seat (CSS) installed improperly 0–3	15.2	12.5
Unable to buy CSS	12.0	Not available
Limited reading skills	9.0	5.6
Difficult to interpret installation instructions for CSS	21.0	17.0
Unwilling to accept free CSS loan	2.0	1.7
Use of older cars that lack adequate seat belts	5.0	5.0
Limited knowledge regarding:		
• proper use of seat belts and CSS	25.0	15.0
• importance of consistent use	35.0	20.0
Low perceived threat of crash, injury or penalty	55.0	Not available
Low perceived benefits/high perceived barriers to using restraints	35.0	Not available

5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area?

6. Write a brief (1–2 paragraph) summary about the problem, based on your answers to questions 1 through 5.

Practice

Frequent asthma attacks among children with asthma

The nurse at your elementary school was alarmed by the frequency of absences among children with asthma. Although these children account for only 10% of the school population, they contributed over 60% of the school absences and averaged 7.6 days absent/year, in contrast to 2.5 days absent/year for children without asthma. With a little investigation, the nurse confirmed that the majority of these absences were due to asthma attacks and associated treatments. After discussing the situation with school administrators, the nurse conducted a problem assessment. In this case, the problem was frequent asthma attacks. Since asthma attacks were difficult for her to measure directly, she used a surrogate measure, average number of days absent from school.

Extent of the Problem and Variations across Subgroups,
Average Number of Days Absent for Children with and without Asthma
in the Elementary School Last Year

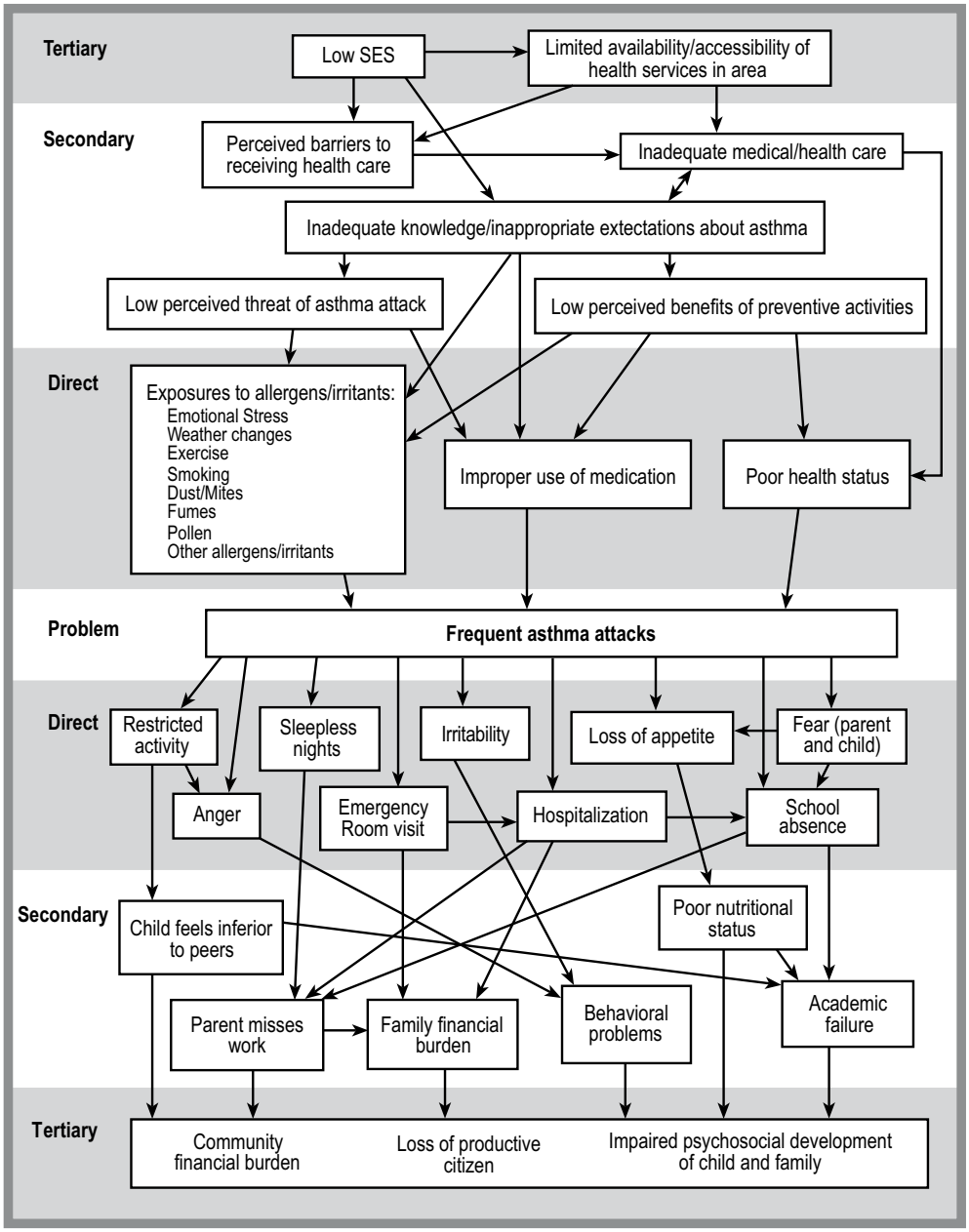
	Average Number Days Absent	
Population	With Asthma	Without Asthma
All Students	7.6	2.5
Subgroups		
Gender		
Male	8.5	2.7
Female	6.0	2.4
Race		
African American	7.9	2.6
Hispanic	8.0	2.9
White	7.2	2.2
Maternal education		
<12th grade	8.2	2.9
12th grade	7.8	2.6
>12th grade	5.0	1.8
Income		
≤ $20,000	8.3	3.0
> $20,000	6.5	2.2

1. Is the condition sufficiently prevalent to be considered a problem?

2. Are there any subgroups of the population who are disproportionately affected by the problem (*i.e.*, average number of days absent)? Which ones?

Practice

Frequent asthma attacks among children with asthma



3. What additional information would you like to have in order to decide whether or not school absenteeism (a surrogate measure for frequent asthma attacks) is a problem?

4. What additional information would you like to have about the diagram in order to better understand the relationships among precursors, consequences and the problem?

Practice

Frequent asthma attacks among children with asthma

Extent of Direct and Secondary Precursors of Asthma Attacks by Number of Absences Last Year, All Children with Asthma in the Elementary School***

Precursors	Percent of Children with Asthma	
	< 5 absences	≥ 5 absences
Exposure to allergens/irritants	96.0	95.0
Improper use of medication	50.0	65.0
Poor health status	25.0	75.5
Perceived barriers to receiving health care	55.0	79.0
Inadequate medical/health care	35.0	57.8
Inadequate knowledge/inappropriate expectations about asthma	55.0	70.2
Low perceived threat of asthma attack	53.0	65.0
Low perceived benefit of preventive activities	33.0	55.0

**Number of absences last year is used as a surrogate indicator for the number of moderate to severe asthma attacks.*

***Since no data on the precursors were available from existing sources, the school nurse conducted a survey of the families of all children with asthma in the school. As she suspected, the distribution of precursors was different for children with fewer absences when compared to those with relatively more absences.*

5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area? (In this case, "population group" substitutes for "area.")

6. Write a brief (1–2 paragraph) summary about the problem, based on your answers to questions 1 through 5.

Practice

Limited mobility among children with special health care needs (CSHCN)

Providers in a multi-specialty clinic serving many children with special health care needs (CSHCN) observed that these children often develop mobility limitations that are secondary to their primary medical conditions. The specialists contacted your state's program for children with special health care needs to inquire about this issue, and they discovered that the state was about to convene a task force to assess the problem of secondary conditions in this population. Two members of the clinic staff joined the task force with an explicit charge to assess limited mobility among CSHCN. Secondary conditions like limited mobility have received relatively little attention by researchers, but some potential precursors could be identified from the literature. This information was supplemented by interviews with other providers and CSHCN policy analysts, and surveys of parents of children at risk. Fortunately, similar data had been collected in a neighboring state and they were available for comparison.

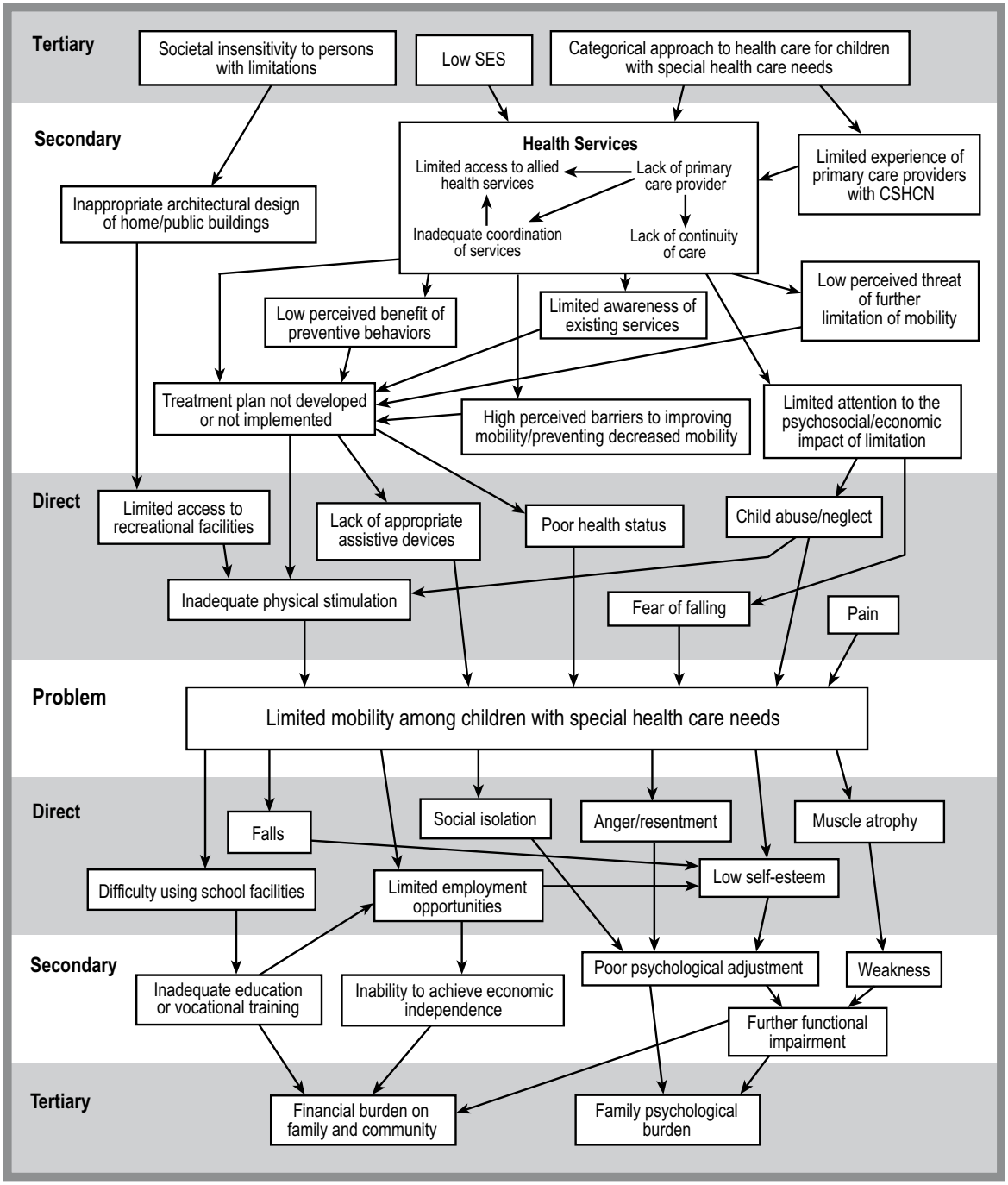
Extent of the Problem and Variations across Subgroups, Limited Mobility Among Children with Special Health Care Needs, Your State and a Neighboring State, 1995

Population	% of CSHCN with Limited Mobility	
	Your State	Neighboring State
Total	15.0	5.0
Subgroups		
Gender		
Male	15.2	5.5
Female	14.9	4.6
Maternal education		
<12th grade	15.8	7.0
12th grade	15.0	5.2
>12th grade	14.6	3.7
Income		
≤ $20,000	19.0	7.9
> $20,000	13.0	4.0

1. Is the condition sufficiently prevalent to be considered a problem?
2. Are there any subgroups of the population who are disproportionately affected by the problem? Which ones?
3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?

Practice

Limited mobility among children with special health care needs (CSHCN)



4. What additional information would you like to have about the diagram in order to better understand the relationships among precursors, consequences, and the problem?

Practice

Limited mobility among children with special health care needs (CSHCN)

Extent of Direct and Secondary Precursors of Limited Mobility among CSHCN, Your State and a Neighboring State, 1995

	% of Children with Special Health Care Needs	
Precursors	Your State	Neighboring State
Limited access to recreational facilities	7.2	8.5
Inadequate physical stimulation	25.0	8.0
Lack of appropriate assistive devices	15.0	7.8
Poor health status	8.2	7.5
Fear of falling	7.0	6.8
Child abuse/neglect	3.0	2.5
Pain	3.2	3.6
Treatment plan not developed or not implemented	26.4	6.7
High perceived barriers to improving mobility/ preventing decreased mobility	8.0	6.5
Limited attention to psychosocial/ economic impact to the limitation	Not available	Not available
Low perceived benefit of preventive behaviors	22.6	15.0
Limited awareness of existing services	20.3	4.7
Low perceived threat of further limitation of mobility	15.3	8.2
Inappropriate architectural design of home/public bldgs.	Not available	Not available
Lack of primary care provider	27.5	10.2
Lack of continuity of care	20.3	5.2
Inadequate coordination of services	22.8	7.3
Limited access to allied health services	20.4	6.0
Limited experience of primary care providers with CSHCN	Not available	Not available

5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area?

6. Write a brief (1–2 paragraph) summary about the problem, based on your answers to questions 1 through 5.

Practice

HIV+ status in women of childbearing age

In your county, women increasingly are infected with the Human Immunodeficiency Virus (HIV). Many of these women go on to develop Acquired Immune Deficiency Syndrome (AIDS), which is almost always fatal. You have been asked to assess this problem.

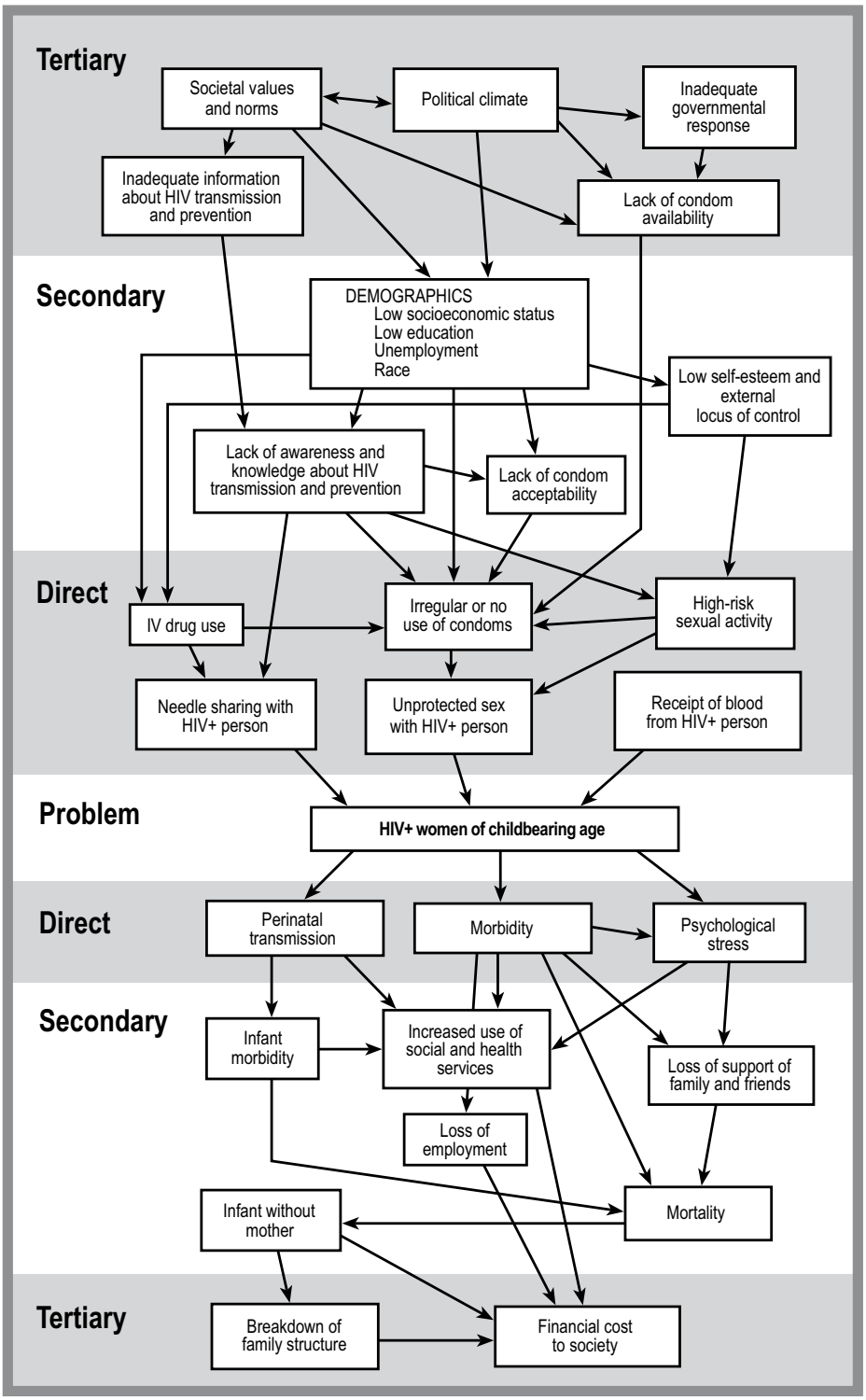
Extent of the Problem and Variations Across Subgroups,
HIV+ Women of Childbearing Age
Problem County and Comparison County (1995)

Population	#HIV+women	
	Problem County	Comparison County
Total	204	61
Subgroups		
Race		
African American	163	46
White	41	15
Age		
≤19	23	6
20–29	86	26
30–39	72	22
40+	23	7
Marital Status		
Unmarried	NA	NA
Married	NA	NA
Geography		
Urban	135	34
Rural	69	27

1. Is the condition sufficiently prevalent to be considered a problem?
2. Are there any subgroups of the population who are disproportionately affected by the problem? Which ones?
3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?

Practice

HIV+ status in women of childbearing age



Practice

HIV+ status in women of childbearing age

Extent of Direct and Secondary Precursors of HIV In Women of Childbearing Age in the Problem and Comparison Counties (1995)

Population	Problem County*	Comparison County*
	% among HIV+ cases	
Contact with HIV+ person through:		
Unprotected sex	42.0	46.0
Needle sharing	49.0	38.0
Receipt of blood products	4.0	5.0
Unspecified	5.0	11.0
User of IV drugs	7.8	4.2
Uses condoms regularly during sexual activity	20.0	42.0
Engages in high-risk sexual activity	Not available	Not available
Considers condom use unacceptable	46.0	33.0
Low self-esteem and external control	Not available	Not available
Lack of knowledge about HIV transmission and prevention	41.0	32.0
Demographic Risks		
Low socioeconomic level		
Women with income below poverty level	26.0	14.5
Low educational level (<12th grade and >18 years of age)	12.3	6.0
Unemployed	16.2	11.2
African American	51.0	27.4

**% of women 15–44 years unless otherwise indicated*

4. What additional information would you like to have about the diagram in order to better understand the relationships among precursors, consequences, and the problem?

5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area?

6. Write a brief (1–2 paragraph) summary about the problem, based on your answers to questions 1 through 5.

Practice answers

Motor vehicle crash injuries in children 0–6 years

1. Is the condition sufficiently prevalent to be considered a problem?

   Probably so. The rate for the city is slightly more than twice the state rate. This relationship holds across all subgroups.

2. Are there any subgroups of the population who are disproportionately affected by the problem?

   Yes. The subgroups most affected are: African Americans and Hispanics, children of mothers with a 12th grade or lower education, and those whose family incomes are $20,000 or less. The rates for male and female drivers are virtually the same in the city but there is a bigger difference in the state.

3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?

   Additional data should include:

   - Actual number of cases;
   - Size of the population from which the rates were derived;
   - Trends over the past five years and projections for the next five years; and
   - Types of injuries by age of child.

4. What additional information would you like to have about the diagram in order to understand better the relationships among precursors, consequences, and the problem?

   Measures of association, such as odds ratios, between the precursors and the problem, the problem and the consequences, and between pairs of precursors.

5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area?

The precursors that are most prevalent are:

- Child not restrained
- Seat belt worn improperly
- Child safety seat installed improperly
- Limited reading skills
- Difficult to interpret installation instructions
- Limited knowledge of the proper use of seat belts and child safety seats

6. Write a brief summary about the problem, based on your answers to questions 1 through 5.

   In our city, the motor vehicle crash injury rate for children between the ages of birth and six years is more than twice as high as that of the state. This differential holds for all racial groups, educational levels and income levels and it signals a significant problem for us. At the present time, we do not have trend data on this phenomenon but we are in the process of conducting those analyses. The population groups most affected by this high rate are African Americans and Hispanics, children of mothers with low education and children in low income families.

   A recent statewide survey of a representative sample of families with children under six suggested that larger proportions of families in our area did not restrain their children at all, used seats belts improperly, and installed child safety seats improperly. In addition, we have larger percentages of parents with limited reading skills, using CSSs with difficult to read installation instructions, and with limited knowledge of the proper use of seat belts and CSSs. Unfortunately, the statewide survey did not address perceptions of the threat of crash, injury or penalty, or perceptions about benefits and barriers associated with using restraints. We collected data on these items in a local survey. The percentages of parents with incorrect and unhealthy perceptions are high enough for concern (see table) even though we have no suitable standard to which they can be compared. We are about to search the literature to determine whether any general standards for such percetions have been defined.

   While additional analyses are clearly warranted, we can say with conviction that motor vehicle crash injuries among children between birth and six years are a problem in the city. Moreover, it appears that we should address the problem by improving the knowledge and behavior of parents of children in this age range.

Practice answers

Frequent asthma attacks among children with asthma

1. Is the condition sufficiently prevalent to be considered a problem?

   Yes. When comparing children with asthma to children without asthma, there is a clear excess of school absences due to asthma attacks. Mild attacks can generally be managed with medications at home and do not require removal from school. Thus, many of the attacks that are apparent in absentee statistics are of a more serious nature.

2. Are there any subgroups of the population who are disproportionately affected by the problem?

   Yes. The subgroups that are disproportionately affected are males, African Americans and Hispanics, children of mothers with low educational levels, and those in low income families.

3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?

   Additional data should include:

   - Data from other schools for comparison
   - Trends over the past five years and projections into the future
   - Distribution of asthma attacks by age
   - Actual number of children affected in each category

4. What additional information would you like to have about the diagram in order to better understand the relationships among precursors, consequences, and the problem?

   Measures of association, such as odds ratios, between the precursors and the problem, the problem and the consequences, and between pairs of precursors. Of particular interest for this problem is the strength of effects of exposure to each specific allergen/irritant on frequency and severity of asthma attacks.

5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area?

Data from a comparison area were not available for this analysis. However, we created two groups for the purpose of comparison from data generated by a survey of all children with asthma in the school. Children with more school absences due to asthma attacks demonstrated greater prevalence of:

- Improper use of medication;
- Poor health status;
- Perceived barriers to receiving health care;
- Inadequate medical/health care;
- Inadequate knowledge/inappropriate expectations about asthma;
- Low perceived threat of an asthma attack; and
- Low perceived benefit of preventive activities.

6. Write a brief summary about the problem, based on your answers to questions 1 through 5.

   While only 10% of the children in our elementary school have asthma, they accounted for over 60% of the school's absences last year. This group averaged 7.6 days absent compared with a 2.5 day average for children without asthma. Males, minorities, low income, and children of mothers with low educational levels have particulary high absentee rates. These rates are exacerbated when the children have asthma. Our records indicate that the usual reason for excess school absence among children with asthma is asthma attack. Attacks which cannot be managed easily at home with medications involve a visit to a health care provider and may require missing school for one or more days.

   Many of the precursors of frequent asthma attacks can be prevented. Our survey of the families of children with asthma indicates that the families with more frequent attacks (as measured by 5 or more absences last year) are those characterized by improper use of medication, poor health status, perceived barriers to receiving health care, inadequate medical/health care, inadequate knowledge and/or inappropriate expectations about asthma, low perceived threat of an asthma attack, and low perceived benefit of preventive activities.

   Our analysis suggests that an intervention to improve knowledge and attitudes about asthma, targeted to children with asthma and their families, should reduce the frequency of attacks and, hence, improve their rate of school absenteeism.

Practice answers

Limited mobility among children with special health care needs (CSHCN)

1. Is the condition sufficiently prevalent to be considered a problem?

   Yes. Limited mobility in children with special health care needs is three times as prevalent in this state (15%) as it is in the neighboring state (5%). This relationship is fairly stable across all subgroups.

2. Are there any subgroups of the population who are disproportionately affected by the problem?

   While males are slightly more likely to experience limited mobility, there is very little difference across genders. Limited mobility is more prevalent among CSHCN whose mothers completed 12 or fewer years of formal education and whose families have incomes less than or equal to $20,000.

3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?

   Additional data should include:

   - Data collected more systematically and consistently in both states;
   - Raw numbers for both numerators and denominators used to calculate the percentages of the extent of the problem in each state; and
   - Trends over the past five years and projections for the next five years.

4. What additional information would you like to have about the diagram in order to understand better the relationships among precursors, consequences, and the problem?

   This problem diagram is based on a very limited amount of empirical research. Many research studies need to be undertaken to support or refute the relationships depicted in the diagram. In a case like this, it is especially helpful to differentiate the relationships that are fairly well supported from those that are believed to exist but require further documentation. This can be done diagrammatically by depicting the relationships with limited support with dotted lines.

5. Which of the direct and secondary precursors are clearly more prevalent in the area where the problem was identified than in the comparison area?

The precursors that are clearly more prevalent are:

- Inadequate physical stimulation
- Lack of appropriate assistive devices
- Treatment plan not developed or not implemented
- Low perceived benefits of preventive behaviors
- Limited awareness of existing services
- Low perceived threat of further limitation of mobility
- Lack of primary care provider
- Lack of continuity of care
- Inadequate coordination of services
- Limited access to allied health services

6. Write a brief summary about the problem, based on your answers to questions 1 through 5.

   Limited mobility among children with special health care needs is a significant problem in our state. While some children, possibly as many as 6.6% of CSHCN, have primary conditions that limit their mobility, these children and others can develop further limitations if they do not receive appropriate interventions. These mobility limitations are preventable and they lead to numerous consequences. Limited mobility among CSHCN is three times as high in our state as it is in our neighboring state, and that relationship is consistent across selected subgroups. The problem is also more prevalent among low socioeconomic groups; however, the difference between the prevalence in our state and that in our neighbor is much larger than the difference between low and high SES groups.

   While acknowledging that the research is slim and our data sources are limited, we have been able to piece together a comparison of the precursors of limited mobility between the two states. For some of the precursors, there is very little difference, but for others, the magnitude of difference is striking. Each of the health service precursors (lack of primary care provider, lack of continuity of care, inadequate coordination of services and limited access to allied health services) is more prevalent here at home than in the other state. This is also true of the following precursors, each of which is linked to the health service box either directly or indirectly in the problem diagram: low perceived threat of further limitation of mobility, limited awareness of existing services, low perceived benefits of preventive behaviors, undeveloped or not implemented treatment plan, lack of appropriate assistive devices, and inadequate physical stimulation.

During the past few years, our neighboring state has implemented several strategies to increase the use of primary care providers by children with special health care needs. We know that the use of primary care providers in that state was similar to ours four years ago. While our data were not collected for research purposes, they suggest that our neighbor has been successful not only in increasing the number of children with primary care providers but in improving several other precursors of limited mobility.

In conclusion, this analysis suggests that a program which improves any of the precursors in the health services box in the problem diagram will also reduce the prevalence of limited mobility among children with special health care needs. The program should give special emphasis and assistance to children in low income families.

Practice Answers

HIV+ status in women of childbearing age

1. Is the condition sufficiently prevalent to be considered a problem?

   Probably. Even though the numbers are relatively small, approximately three times as many women in the problem county are HIV+. This holds across all subgroups.

2. Are there any subgroups of the population who are disproportionately affected by the problem? Which ones?

   Subgroups that appear to be disproportionately affected are African Americans, those beween 20 and 39 years of age, and urban residents.

3. What additional information would you like to have in order to decide whether or not the health status condition is a problem?

   Additional data should include:

   - Population size for each subgroup and the total group;
   - Sociodemographic characteristics of the two counties; and
   - Prevalence over the past five years and projections for the next five years.

4. What additional information would you like to have about the diagram in order to better understand the relationships among precursors, consequences, and the problem?

   Measures of association, such as odds ratios between the precursors and the problem, the problem and the consequences, and between pairs of precursors.

5. Which of the direct and secondary precursors are more prevalent in the area where the problem was identified than in the comparison area?

   The precursors that are most prevalent are:

   - Needle-sharing among HIV+ women
   - IV drug use
   - Irregular use of condoms
   - Negative attitudes about condom use

5. (continued)

   - Lack of knowledge about HIV transmission and prevention
   - Women living in poverty
   - Women with low educational levels
   - Unemployment
   - African American race

6. Write a brief summary about the problem based on your answers to questions 1 through 5.

   While the number is still relatively small, there is some evidence that the number of HIV positive women of childbearing age in this county is excessive, suggesting that we have a problem with potentially major implications. When compared with a county of similar size and population characteristics, approximately three times as many women of childbearing age are HIV+. This holds across all population subgroups for whom data are available; however, in both counties African Americans, women between the ages of 20 and 39 years, and urban residents are disproportionately affected.

   HIV positivity has several known precursors (shown in the diagram of the problem), some of which are particularly prevalent in the childbearing age population in the county when compared with a similar population in the comparison county. Specifically, we have greater percentages of IV drug users, women who use condoms irregularly or not at all, women with negative attitudes about condom use and limited knowledge about HIV transmission and prevention, and women characterized by poverty, low education, unemployment, and who are African American. Among women who are HIV+, the most frequent cause in our county is needle-sharing.

   It appears from this analysis, then, that an intervention to address both needle-sharing and unprotected sexual activity holds great promise for reducing the number of women of childbearing age who are HIV+ in our county. Interventions could be directed at one or more of several other precursors in order to influence these behaviors. The intervention selected is likely to be most effective if it is targeted at women 20–39 years of age, those who are living in poverty in urban areas, and African Americans.

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