

**Designing a Study**  
***Identifying, Defining, and Justifying the Research Problem***

The following chapter is excerpted from *Designing HIV/AIDS Intervention Studies: An Operations Research Handbook*, Andrew Fisher and James Foreit, 2002, Washington, DC: Population Council. ([More on OR Handbook](#))

# IDENTIFYING, DEFINING, AND JUSTIFYING THE RESEARCH PROBLEM

## Problem Identification

The proposal-writing process always begins with a statement of a problem. Countless problems face HIV/AIDS programs. Finding a problem therefore is not difficult, but identifying one for the purpose of research is not always easy.

One of the most important first tasks of research is to identify and define clearly the problem you wish to study. If you are uncertain about the research problem or if you are not clear in your own mind about what you want to study, others who read your proposal will also be uncertain. A well-defined research problem statement leads naturally to the statement of research objectives, to the hypotheses, to a definition of key variables, and to a selection of a methodology for measuring the variables. A poorly defined research problem leads to confusion.

All research is set in motion by the existence of a problem. A problem is a perceived difficulty, a feeling of discomfort about the way things are, or a discrepancy between what someone believes should be the situation and what is in reality the situation. While problems are the initiating force behind research, not all problems require research. A potential research situation arises when three conditions exist:

1. A perceived discrepancy exists between what is and what should be.
2. A question exists about why there is a discrepancy.
3. At least two possible and plausible answers exist to the question.

The last point is important. If there is only one possible and plausible answer to the question about the discrepancy, then a research situation does not exist.

## Example of a Nonresearch Problem

### PROBLEM SITUATION

A recent situation analysis assessment of a hospital in District A found that 125 HIV-positive adults were coming to the hospital every day as part of a DOTS program to take medication for tuberculosis (TB). But last month's service statistics from the hospital's DOTS program revealed that for one entire week, none of the 125 patients received any medication.

### DISCREPANCY

All 125 patients should be receiving a daily treatment for TB, but all 125 did not receive a single treatment for an entire week last month.

### PROBLEM QUESTION

What factor or factors are responsible for 125 patients' failing to receive any treatment for their TB for an entire week?

### ANSWER

During the week when the patients didn't receive daily TB treatments, a very heavy rainstorm caused flooding that washed out several roads and destroyed a major bridge that is used to bring supplies to the district hospital. Because of the flooding and the destroyed bridge, the hospital ran out of TB medication, and a resupply truck could not reach the hospital for one week while the bridge was being repaired.

In this example, a problem situation exists, but the reason for the problem is already known. Therefore, assuming that all the facts are correct, there is no reason to conduct research on the factors associated with the break in the supply of daily TB medication for 125 patients. Nonetheless, there may very well be a need to conduct research on the question of why the supply logistics system is incapable of providing medication during the rainy season, when it is known that roads and bridges are frequently damaged.

## Example of a Research Problem

### PROBLEM SITUATION

District A almost always experiences flooding during the rainy season. Recognizing this problem, the National HIV/AIDS Program, working with the Ministry of Health, established a new supply logistics system for the district. Just before the rainy season, each hospital and health post in the district is given a four-month supply of medication to cover TB and other AIDS-related opportunistic infections. In addition, the Ministry of Health maintains several small motorboats in the district that can be used to transport supplies across rivers where there is either no bridge or the bridge has been destroyed. Despite these new measures, this

year's service statistics from District A indicate that a large number of PLHA enrolled in the DOTS program failed to receive daily medication for TB.

### DISCREPANCY

The new supply logistics system should be able to ensure a continuous supply of medication during the rainy season, but this year large numbers of TB patients did not receive medication during much of the rainy season.

### PROBLEM QUESTION

Why has the new supply logistics system been incapable of delivering needed medication to HIV-positive TB patients?

### POSSIBLE ANSWERS

- An order for new medical supplies was not placed in time before the beginning of the rainy season.
- The motorboats used to transport supplies in emergencies were not working.
- Because of severe flooding, many patients could not reach the DOTS service delivery points on a daily basis.

In this example, there are several possible and plausible reasons for the problem situation. One or more of these reasons might be correct, and at least two of the possible problems may be under the control of managers to fix: ordering drugs on time and improving maintenance of the boats. Therefore, this is a potential research situation.

In some situations, it is relatively easy to identify the problem, define it, hypothesize the reasons for it, and conduct operations research to determine which reason is correct or more nearly correct. The reasons for the supply logistics problem in the example above could probably be determined fairly easily and certainly would not require an extended and expensive research study. Other problems, such as the one in the next example, are not so easy to identify or study.

## Example of a Research Problem

### PROBLEM SITUATION

A recent provincial study revealed great differences among villages in the prevalence of HIV-positive persons. Despite the fact that all villages receive the same level of health education and services from the Ministry of Health, some villages have an HIV prevalence rate as high as 32 percent among adults from 15 to 49 years old, while other villages have a rate as low as 6 percent.

### DISCREPANCY

In a relatively small geographic area, you would expect that all villages should have approximately the same seroprevalence rate but, in fact, there is great variation among villages.

### PROBLEM QUESTION

Which factors are responsible for the geographic variation in HIV prevalence among villages?

### POSSIBLE ANSWERS

- Villages differ in their socioeconomic environments, and these differences influence the context within which HIV is transmitted. Some are stable agricultural villages, while some are mobile fishing communities. Some villages are located on major roads and have easy access to market towns; others are more remote with very difficult access to market centers. Some villages have schools, health clinics, electricity, and a good water supply, while others do not have these advantages. These and many other social, economic, and cultural differences affect the context within which sexual relations take place and HIV is transmitted.
- Villages differ in individual and institutional support for HIV/AIDS prevention, care, and support programs. In some villages, influential local leaders strongly support sexual behavior change and condom distribution programs. In other villages, people are resistant to these

programs, and there is substantial stigma and discrimination associated with HIV/AIDS. In some villages, there are very active anti-AIDS clubs for youth, strong PLHA organizations, and effective orphan care NGOs. In other villages these institutions are absent. These differences in individual commitment to and institutional support for HIV/AIDS programs affect the sexual behavior of individuals, the use of condoms, the level of stigma and discrimination, and the transmission of HIV.

While the problem situation presented above is fairly clear, the possible and plausible reasons for the problem are complex. Several of these reasons have been described, but it is very likely there are many more.

In situations such as this one, the researcher must devote considerable time and attention to identifying and clearly defining the problem situation before any potential solutions to the problem can be tested experimentally through a longitudinal operations research study. The aim of clearly identifying and defining a problem situation is to focus the research on the most important aspects of a problem that can be changed through a program intervention. Consider the next example, which also suggests a number of possible reasons for the problem situation.

## Example of a Research Problem

### PROBLEM SITUATION

In country A, the National AIDS Program has initiated an experimental project to provide highly active antiretroviral therapy (HAART) drugs to 1,000 persons with AIDS. All of the patients in the program receive extensive individual counseling from trained counselors. They also receive information packets on how and when to take the various pills they receive; these emphasize the need to take the pills exactly as prescribed and describe the

possible side effects of the pills. All patients are monitored regularly at a clinic for CD4 cell counts and viral load levels. They are also visited in their homes monthly by trained care providers who answer questions and monitor adherence to the drug regime. Despite these efforts, a recent detailed assessment of all the HAART patients found that 43 percent of them had taken their pills incorrectly over the past month, viral load levels had risen in these patients, and CD4 cells had declined.

### DISCREPANCY

The National AIDS Program prides itself on providing high-quality services to the 1,000 patients with HIV/AIDS in the experimental program. Laboratory equipment is functioning well, drug supplies are available, the lab technicians are trained, the counselors are also trained and supervised, and the information packets given to each patient are comprehensive. Given these conditions, all patients should know how to correctly take their HAART medication, but at least 43 percent of them are not taking the medication correctly.

### PROBLEM QUESTION

What factor or factors are responsible for a relatively high level of nonadherence to the drug regime among patients who are counseled and monitored closely?

### POSSIBLE ANSWERS

- The counselors are inadequately trained to explain in simple terms the complex treatment regime required for patients on antiretrovirals and the consequences of failing to adhere to this regime.
- The information packets received by the patients are too complex, particularly for a population with a low level of literacy, and therefore are not read by many patients.

- The monthly home visits by the care providers had the unexpected effect of identifying patients as HIV-positive to their family and neighbors. Among some patients, this resulted in discrimination and domestic violence, which in turn resulted in patients' discontinuing the medication and requesting that the care providers discontinue the monthly home visits for fear of further discrimination and violence.
- Many patients experienced serious drug side effects, including drug toxicity and drug intolerance, which led to difficulties with adherence to the regime and, in some cases, to nonadherence.
- In some patients, the HAART regime was highly effective, and the patients gained weight and a sense of health that they had not experienced in a long time. Unfortunately, one unexpected consequence of this was that some patients decided they no longer needed the HAART and stopped taking their medication.

In this example, the problem situation is clear: A survey of HIV-positive persons found that 43 percent did not adhere to a prescribed antiretroviral drug regime. A discrepancy exists: With the availability of counseling, information packets, and home visits, HIV-positive patients should know how to take their drugs correctly, but 43 percent do not take their drugs correctly.

The discrepancy between what should be and what is suggests a problem question and five possible answers to the question. It is not known which of these five possible answers are correct or more nearly correct. All possible and plausible answers could relate to factors under the control of program managers. This is a situation that requires research.

## Problem Definition

Identifying a problem situation is the first essential step in designing a research proposal, but it must then be followed by a process of problem definition. The research problem identified must now be defined in terms of its occurrence, intensity, distribution, and other measures for which data are already available. The aim is to determine all that is currently known about the problem and the reason it exists.

While it is always possible to guess why a problem exists, guesses are often wrong and usually do not provide a firm basis for designing a research study. A far better way to define a problem situation is to review relevant literature, examine current service statistics, seek educated opinions from persons concerned about the problem, and obtain probable reasons for the problem from social, economic, or health theory. A careful social, economic, and epidemiologic diagnosis of problems related to HIV and AIDS should always be made. In other words, how widespread is the problem? Who is affected by the problem? What is its distribution? How often does the problem occur? What social or cultural practices are associated with the problem? What costs are associated with the problem? A good social, economic, and epidemiologic diagnosis will help establish the parameters of the problem and help the research investigator and program managers determine the following:

## Incidence and Prevalence

Incidence is the number of new cases (people) who get a disease such as HIV during a specific period of time. Prevalence is the total number of people who have the disease at a specific point in time. Often, people talk about an incidence rate, which

is the number of new cases of a disease that occur during a specific time period divided by the total number of people exposed to the risk of developing the disease during that same period. Similarly, the prevalence rate is the total number of people with the disease at a specific time divided by the total number of people in the population at that time.

## Geographic Areas Affected

It is important to know whether particular geographic regions are affected by the problem. Does the problem generally occur only in rural areas? Does it also affect those who live in cities? Is the problem restricted to mountain areas, coastal areas, or island areas?

## Characteristics of Population Groups Affected

Are there special population groups affected by the problem, such as young girls, miners, truckers, sex workers, newborn infants, men who have sex with men, and injecting drug users?

## Probable Reasons for the Problem

A review of information on a problem should suggest a number of probable reasons why the problem exists. What is the current thinking about the reasons for the problem? Is there general agreement among many people about the reasons, or are there many different, conflicting views?

## Possible Solutions

Many projects and programs may have been directed at the problem in an attempt to overcome it. What types of solutions have been tried in the past? How successful have past efforts been? Have lessons already been learned about how to address the problem? What approaches to solving the problem seem to work? What approaches seem not to work?

## Unanswered Questions

From the review of information on the problem, what seem to be the unanswered questions about it? What aspects of the problem need to be further researched?

Reviewing what is already known about a problem is an essential part of the research process. A good review of information will suggest the social, economic, political, and health importance of the problem. It will help to narrow the focus of the proposed research and will indicate major theoretical concepts and operational variables other researchers have considered important. It will suggest possible research hypotheses that need to be tested. Finally, it will prevent the investigator from reinventing the wheel or, in other words, conducting research on a problem that has already been researched many times in the past with fairly consistent findings.

## Example of a Research Problem Identification and Definition Statement

In Zambia, a pilot program was initiated to train volunteers to provide home-based care for PLHA. The expectation was that this program would provide a more cost-effective means of assisting PLHA than using full-time paid nurses. The volunteers were trained for three weeks. They visited the homes of PLHA once a week to provide palliative care, social and psychological support, basic information about HIV/AIDS, and referral to the closest health center.

A unique aspect of the program was the development of a simple algorithm that the caregivers could use to help diagnose the various conditions the PLHA complained about, such as diarrhea, rashes, fever, cough, and headaches. Depending on the nature of the condition diagnosed, the caregiver would either provide simple medicines such as aspirin or refer the person to the nearest medical center. The program was expected to serve as a

cost-effective model, particularly in rural areas, where there are large numbers of PLHA but relatively few health care facilities and virtually no outreach programs using more highly trained personnel such as nurses.

Although some of the volunteers were quite active in making regular home visits to PLHA, many of the volunteers were not as active or committed. Indeed, over time, more and more of the volunteers either dropped out of the program or significantly decreased the amount of time they devoted to caring for PLHA and making home visits. A diagnostic study of the volunteer program indicated several difficulties:

- While the involvement of volunteers to make home visits is obviously less costly than using full-time paid nurses, it is not necessarily as effective. Volunteers may or may not have the time or motivation to visit homes regularly. Typically, the initial motivation and enthusiasm quickly wanes and after a period of some months the volunteers visit few, if any, homes.
- Working with HIV/AIDS-affected people is not easy, even for the most dedicated volunteers. Many of the volunteers developed strong emotional ties with the PLHA they visited. The death of a PLHA was emotionally stressful for the volunteer and often led to a sense of despair, followed by an inability to continue as a home-based caregiver.
- The area assigned to each volunteer, usually several villages, was too large for one person to cover adequately. The volunteers tended to use an ad hoc method for making home visits and did not have a coordinated, scheduled plan. One result of this was that the volunteers visited some houses far more often than others.
- There was little or no supervision of the volunteers in the field. This may be one reason that the enthusiasm of many volunteers declines. While PLHA need social and psychological support, caregivers also need the same type of support from supervisors.

- Although the volunteers completed an initial three-week training course, no effort was made to provide them with ongoing training that might have served to strengthen and reinforce their skills.
- Reports from PLHA who had been visited by the volunteers suggested that the information provided during home visits was superficial and not very helpful. Many volunteers apparently were unable to give the type of specific information about opportunistic infections that the PLHA desired. Also, PLHA stated that the volunteers were simply not able to alleviate most of the problems they had.

The findings from the diagnostic study were discussed extensively by the project management team and the district health authorities. It is not known which one of these problems or which combination of them is affecting the volunteer home-based care program the most. On the basis of the diagnostic study, several possible solutions to the problems have been proposed:

- It might be possible to eliminate the volunteers entirely and replace them with full-time paid nurses. These nurses would undoubtedly devote more time to home visits and would probably provide more detailed information and a greater range of services to the PLHA. However, using nurses might result in an extremely costly home care program that probably would not be sustainable in the long run. Moreover, relatively few nurses are available for this kind of work.
- A second alternative might be to retrain the volunteers. While this solution would cost less than having full-time paid nurses provide home-based care, it is not likely to solve all of the problems. The area assigned to each volunteer would still be too large to be covered effectively. There would still be a need to establish an effective supervisory system. Follow-up of clients might still be a problem, and even though the knowledge and skills of



the volunteers might improve, there would still be the problem of emotional burnout resulting in volunteers dropping out from the program.

- A third alternative might be to combine the first two suggestions. Volunteers could be retrained, and a regular program of supervision by nurses could be instituted. On a selective basis, the nurses could make home visits to PLHA most in need of more comprehensive medical services. The geographical area covered by the volunteers could be reduced. An improved referral system with the health posts could be established. Finally, regular refresher training could help the volunteers deal with the emotional distress of working with PLHA.

## Comments on the Example

The first paragraph focuses on just one country, Zambia, and on just one home-based care program for PLHA. It was expected that the use of volunteers would be a cost-effective alternative to using full-time paid nurses.

The second paragraph notes a problem situation, a discrepancy between what was expected and what actually happened. It was expected that the volunteers would be an effective alternative to nurses. What happened, however, was that the volunteers began to drop out of the program or significantly reduced the amount of time they devoted to caring for PLHA. A diagnostic study of the volunteer program suggested six possible problem areas.

The third paragraph notes that the problems identified by the diagnostic study have been extensively discussed by the project management team and the district health authorities. Several possible solutions for overcoming the problems were presented. The first two were rejected as being inadequate for one reason or another. The third solution, a combination of the first two solutions, was accepted as the most likely to succeed and thus is the solution to be tested in an operations research intervention study.

# What To Do: Problem Identification and Definition

1. Follow this general procedure when identifying and defining a problem situation:
  - Start with a simple statement of the problem situation.
  - Add details as you review the literature, review theoretical concepts, and investigate the problem in greater depth.
  - Simplify the focus by identifying the most important aspects of the problem that are researchable.
2. Make a first attempt at identifying the problem situation by using the following format:
  - Problem Situation: Write a small, simple paragraph that identifies the problem.
  - Discrepancy: State the discrepancy between what is and what should be.
  - Problem Question: Write down the central problem question.
  - Possible Answers: Write two or more plausible answers to the problem question.
3. From available research literature, health and behavioral theory, current service statistics, educated opinions, the assistance of PLHA, and other sources of information, try to add details to the problem situation you have just identified. Look for theoretical concepts and operational variables that you may have missed. List these concepts and variables on a piece of paper as you come across them. Try to answer the following questions:
  - What are the incidence and prevalence of the problem?
  - Which geographic areas are affected by the problem?
  - Which population groups are affected by the problem?
  - What are the findings of other research studies?
  - What has been done to overcome the problem in the past?
  - How successful were past efforts to overcome the problem?
  - What seem to be major unanswered questions about the problem?
4. With the information you have collected from a literature review and other sources, rewrite your statement identifying and defining the problem. Use the format described above: Problem Situation, Discrepancy, Problem Question, and Possible Answers. Add details that help to define the problem, but organize the information. Try to establish the boundaries of the problem. Focus your attention on the most important, researchable aspects of the problem.
5. Have one or more colleagues read your final statement identifying and defining the problem situation. Have them tell you what he or she thinks the problem is. If they are unclear about the problem situation or cannot describe the discrepancy between what is and what should be, then go back to the beginning and start all over again.

## Problem Justification

Now that you have identified and defined the problem situation, it is necessary next to justify the importance of the problem. Research often is expensive and time consuming. Ask yourself why the problem you wish to study is important. Can you justify your selection of the research problem? Can you convince others that the problem is important?

### Example for Justifying the Selection of a Research Problem

Over time, millions of HIV-infected people in Africa and elsewhere in the world are developing HIV-related illnesses. In most African countries, hospitals, clinics, and other formal health care system institutions simply cannot cope with the large numbers of people in need of physical care and social and psychological support. In some hospitals, well over half of the beds are already occupied by AIDS patients; in some countries the figure is as high as 70 percent of all hospital beds. This is a problem of great concern to health care planners, as well as to the Ministry of Finance, which simply does not have the resources to build new facilities or train large numbers of new providers.

The problem of providing care and support for PLHA is particularly challenging in rural areas because there are relatively few health facilities or adequately trained providers available. In this situation, an alternative is to provide care, support, and treatment in the homes of those with AIDS. How to do this in a cost-effective manner while simultaneously providing high-quality services is a challenge. New models of delivering care and support services in rural areas need to be developed and tested to improve the quality of life for PLHA. Without effective new approaches, large numbers of people with AIDS will suffer physical and psychological pain that might otherwise be avoided or at least lessened.

### Comments on the Example

The first paragraph establishes the dimensions of the problem. The large number of people with AIDS cannot be adequately treated or supported by the formal health care system, which is already overwhelmed in many countries. The second paragraph notes that the problem is particularly acute in rural areas, where health facilities and providers are relatively few in number. An alternative is to provide services to PLHA in their homes. The important question is how to do this. The paragraph ends by saying that without the development of new approaches to care and support, large numbers of PLHA will needlessly suffer.

## What To Do: Justifying the Selection of a Research Problem

1. In justifying the importance of a research problem, it is helpful to ask yourself a series of questions and then try to answer each of them.
  - Is the problem you wish to study a current and timely one? Does the problem exist now?
  - How widespread is the problem? Are many areas and many people affected by the problem?
  - Does the problem affect key populations, such as youth, PLHA, mothers, or children?
  - Does the problem relate to ongoing program activities?
  - Does the problem relate to broad social, economic, and health issues, such as unemployment, income distribution, poverty, the status of women, or education?
  - Who else is concerned about the problem? Are top government officials concerned? Are medical doctors or other professionals concerned?
2. Review your answers to these questions, and arrange them into one or two paragraphs that justify the importance of the research problem. Start by discussing the broad issues that justify the problem and then begin to focus on the more specific issues related to a particular population group or geographical setting.

## **Involving Program Managers and Others in the Research Process**

One important way to accomplish the first step in the OR process is to involve not only researchers but also program managers and many other people, such as village chiefs, teachers, health personnel, NGOs, and PLHA organizations, in the entire problem identification, definition, and justification process. This involvement links the program experience of managers with the HIV/AIDS problem experience and understanding of PLHA with the technical and methodological skills of researchers.

Teaming researchers, program managers, and PLHA is an educational experience for everyone that can have long-range benefits that go far beyond the mere design and implementation of a single OR study. Researchers, for example, begin to understand more fully the day-to-day administrative concerns of managers, the service delivery problems NGOs face, and the social, economic, psychological, and health concerns that PLHA confront every day. This increased understanding can help sharpen the focus of a study on those aspects of a program problem that could be changed.

Administrators begin to appreciate the need to identify and define program problems on the basis of accurate data. They begin to view research as an important tool for decision making and as an ongoing process to which they can contribute.

PLHA begin to experience a sense of empowerment and hope for the future as they become involved in identifying problem situations that affect their lives but could be changed through an operations research process. The early involvement of all key stakeholders in the operations research process is more likely to increase their interest later in reviewing and using the results from OR studies.