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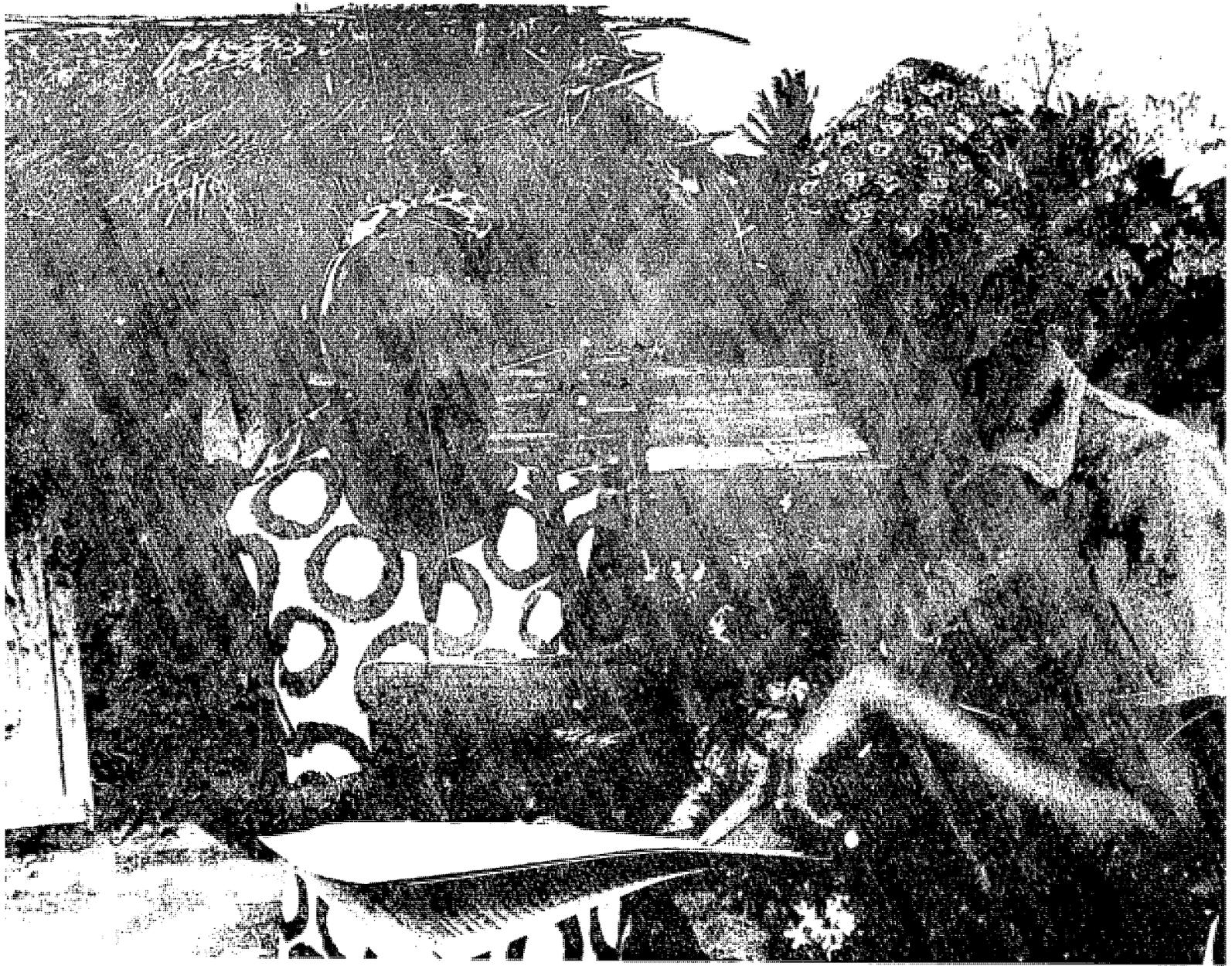
PRIMARY HEALTH CARE ISSUES is a series of reports designed to provide a concise, accurate, and authoritative overview of important developments in the field of primary health care (PHC). The series is directed primarily to concerned health professionals such as program managers and decision makers who plan and implement programs around the world. The series constitutes a system of information transfer for an audience with a special need for timely and relevant information that is at once generically useful and specifically applicable. The series

- addresses PHC policy issues of national and international concern

- analyzes common problems in PHC program management, including planning, implementation and evaluation
- identifies gaps in knowledge about PHC and recommends research to fill those gaps
- provides up-to-date technical and policy information on PHC delivery.

The views expressed in these reports do not necessarily reflect those of the Agency for International Development.

Reader comments are invited. They should be addressed to: the Director, APHA/IHP, 1015 Fifteenth Street, NW, Washington, DC 20005, USA.



Health information is for use by fieldworkers as well as by statisticians. These workers in the Dominican Republic are using clinic records to identify families for home visiting. PHOTO: AID, Washington.

information systems *in primary health care*

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foreword

Management information systems (MIS) contribute to the efficiency and effectiveness of primary health care (FHC). Although the concept of management information systems is not controversial, a certain fuzziness exists about the elements and purposes of such systems. Service statistics, while central to MIS, are only a part of the whole. Data of many kinds are fed into an MIS, but unless selectively compiled and processed into forms useful for decision-making, they convey little other than archival or historical information of doubtful utility.

This report addresses the broad and essential topic of health information systems in PHC. Properly utilized, health information systems report on what has happened in a health program and how material and human resources have been deployed. Together with epidemiological and financial information, they provide corrective feedback and an objective basis for more effective and efficient resource allocation.

Readers will have their level of awareness raised concerning difficult choices necessary when an information system is designed, modified, implemented, or evaluated. In many cases "least worst choices" are made, since no single pattern of choices will result in a desired and affordable outcome. An incremental concatenation of choices often results in unacceptable costs. A country can easily plan itself into a situation where, for example, \$4.50 per capita is spent on data, information collection, and processing, but only \$2.50 per capita is spent on actual services. The example is not fictional.

While health planning is readily acknowledged as an important activity, perhaps even more important is

replanning. The objective reality mirrored through an accurate information system can provide data that make possible corrective feedback, so bringing the real and the ideal in health care into closer juxtaposition. Planning starts with an idea. Replanning starts with data and objective reality.

This publication speaks effectively for itself. Like others in this series, it does not presume to present the last word on its topic. It aims at filling lacunae in knowledge, with the intent of stimulating further dialog and debate. The text is complemented by a very useful bibliography. Those with responsibilities in the health information area will be spared many hours and many errors by reviewing some of the cited documents.

The Office of Health of the Agency for International Development, which commissioned this series, commends this final monograph in the series. PHC is no longer a revolutionary idea; it is now conventional wisdom. For countries that have not yet implemented PHC activities, a growing legacy of information exists for those with eyes to see, ears to hear, and a willingness to review lessons learned by others who have gone before. The clear and present challenge for many of us, however, is to get on with identifying and solving "second generation" problems, improving and fine-tuning PHC systems already in place.

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Data collection and use are important tools for the improvement of public health. These midwives in rural Sierra Leone keep simple records on their activities. PHOTO: UNICEF, New York, by Jette Meng.

introduction

This paper is about management information systems for primary health care in developing countries. Primary health care means integrated health services such as family planning, immunizations, environmental sanitation, and nutrition improvement. It also means simple and affordable health services, with at least minimal care available to everyone. Comprehensiveness and simplicity are the hallmarks of primary health care, just as they are for information systems.

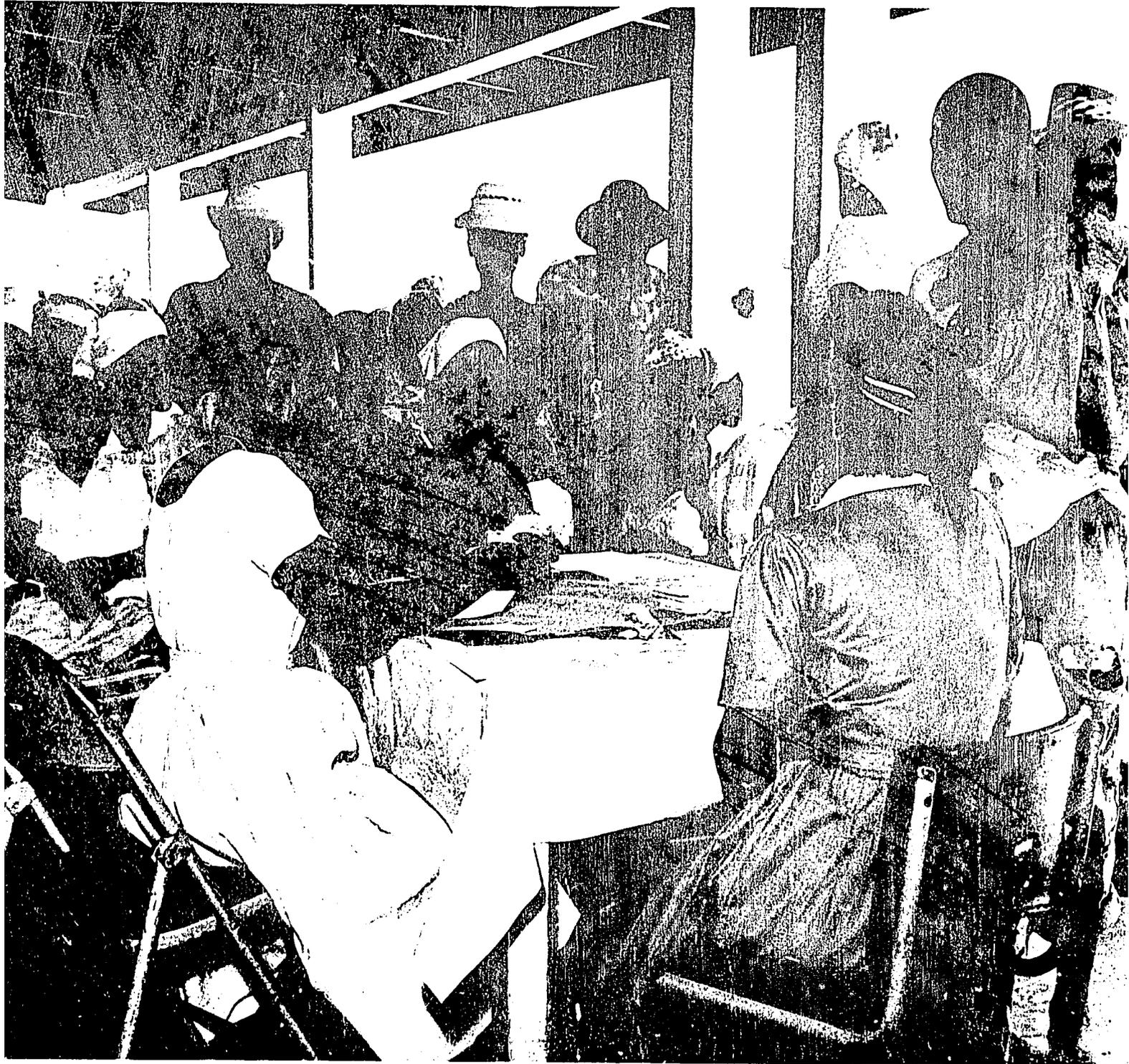
This paper is for managers who want to evaluate and upgrade information systems and for program personnel with some knowledge of health delivery and management who are not already trained in statistics or systems analysis. These readers need guidance about the role of information systems in primary health care, but may lack time or access to review the technical literature. This paper explains the key elements in information systems and tells readers when to consult specialists on more complex problems. The focus is on general guidance, not technical details.

Much of the literature on information systems in health programs is more for classroom use than for field application. This literature usually assumes that information systems can be designed from scratch. But most health programs have something already in place and the challenge is to make it work or work better. To introduce a new system without addressing all of the old systems's problems is often a mistake, since old problems will almost certainly recur. Therefore the emphasis

here is on assessing existing strengths and weaknesses and on evolutionary upgrading and redirection of existing systems.

Since field personnel learn more from each other than from theoretical abstractions or even from well developed manuals, the experiences of primary health care projects in the developing world, especially projects supported by AID, are used as examples here. But since the information available on these projects often comes from pre-project plans or from fragmentary evaluation reports, country examples must be treated as suggestive rather than definitive. They may not be transferable in whole or in part, and so readers must use them judiciously. Local managers are generally skilled at adaptation but need general guidance about application, and this paper is intended to help.

Writing benefited greatly from the help of Robert Bush and Neil Ferraiuolo at the U.S. Bureau of the Census, and of Carlos Ferraro at the Pan American Health Organization. Barbara Stahler at Medical Service Consultants, Inc.; Steven Fabricant, a private consultant; Francis Georgette of Planning and Human Systems; Dr. Huw Jones of the World Bank; and others also provided invaluable assistance. We are grateful to the Development Information Unit at the Agency for International Development and to several AID regional bureaus for permitting access to project files. The author takes full responsibility for any misinterpretation of project examples.



When clinics are crowded, record keeping must be simple so that staff can concentrate on patient service. These patients are being registered at a dispensary in Haiti. PHOTO: AID, Washington.

what is health information, and how is it used?

Health information is information about people's health and what they, the government, and others are doing about it. It describes the incidence, prevalence, and causes of major diseases, as well as the availability and effectiveness of curative activities. In primary health care, it particularly concerns preventive health activities and community efforts to improve environmental conditions. Health information, as used here, is organized and interpreted data about health status, resources, activities, and events, as related to integrated basic health services.

USES OF HEALTH INFORMATION

Health information, like skilled manpower, drugs, money, equipment, and so forth, is one of the essential ingredients of an effective health delivery system. Health information has numerous uses, many of which will be discussed in this paper, and the following list is only illustrative:

- Parents use height and weight information to monitor the nutritional status of their children.
- Community groups use information to identify and correct environmental health hazards.
- Health workers use information to identify persons needing treatment, to follow up on those who miss appointments, and to seek out those who may be candidates for special services.
- Clinical staff use patient histories to diagnose and treat individual health problems.
- Managers use information to maximize program effectiveness and efficiency, to identify the most urgent health problems, and to audit the use of program funds, drugs, and other inputs.
- Epidemic control units use information to spot unusual disease outbreaks.
- Donors use information to document use of funds and justify new programs.
- Evaluators use information to compare alternative health delivery methods and to assess program effectiveness and efficiency.
- International agencies, such as the World Health Organization, use information to monitor progress toward "health for all."

Designers of the Kitui project in Kenya summarized their information objectives as follows:

—Provide an overview of local health conditions for both . . . planning project activities and effectively managing . . . implementation . . .

—Monitor project implementation in terms of inputs into the project, e.g., medical supplies for clinic use, direct project results or outputs, and the initial effects of project activities on the health practices of villagers.

—Evaluate the impact of the project on the health of local residents, including information on changes over time in morbidity, mortality, immunizations of mothers and children, nutrition status of children, practices relating to nutrition, hygiene and sanitation, and knowledge/attitudes regarding selected health problems.

*—Analyze the data to (a) identify and diagnose implementation problems and formulate appropriate modifications in project design and (b) measure the impact of the project on the health of local residents. (070)**

Table 1.1 describes information users and uses for a typical primary health care program. Some of these uses relate to short-term project monitoring and management, while others relate to longer term planning and evaluation. While both types of data use are important, this paper primarily concerns routine project monitoring.

COMMUNITY AND CLIENT INFORMATION NEEDS

Patients and communities can often do more for health than can large bureaucracies, so their information needs are important. Community-level data users include:

- parents of young children
- family planning acceptors
- volunteer health workers
- community health committees and leaders.

Their responsibilities range from monitoring of individual health to assessment and eradication of environmental health hazards. Information is particularly useful for monitoring infant growth, for following tuberculosis, leprosy, and family planning patients needing long-term therapy, and for gradually eliminating pollution sources.

Helping Health Workers Learn by David Werner and Bill Bower (818) contains many helpful ideas about community information use.

Community information activities may flourish even when national data collection and analysis do not. Feedback loops are short because individuals or groups give information directly to the health worker, who then helps them to understand and respond to it. Management-oriented analyses tend to ignore local needs by

*Numbers in parentheses refer to items listed in the references beginning on p. 55.

Table 1.1 Data Users, Purposes, and Types in a Typical Primary Health Care Program

<i>Who needs data?</i>	<i>For what purpose?</i>	<i>About what?</i>
Individual patients and their families	To monitor and manage individual health conditions	Current and past health problems; future appointments for (a) continued therapy, (b) family planning, and (c) immunizations; growth monitoring
Communities	To monitor and manage community health problems	Community health problems and their causes; health services and activities
Fieldworkers	To identify individuals needing attention and determine appropriate therapies	Individuals continuing drug therapy, missing appointments, or in need of special services (antenatal, family planning, immunizations); communities' endemic health problems, disease outbreaks, and environmental hazards
Clinic staff	To determine appropriate therapies; identify persons who miss appointments; to monitor and manage community health problems	Individuals (as above) Communities (as above)
Intermediate supervisors and managers	To supervise and provide technical support to staff	Demography: total population and specific target groups Health status: endemic conditions, and disease outbreaks Records for: personnel, facilities, drugs and other supplies, equipment, and money
National statistical office (may include epidemiology unit, planning unit, or other data users)	To account for resources; to guide program managers and policy-makers; to evaluate projects or experimental activities and to report to donors	Availability and use of health care resources, including personnel, facilities, drugs and other supplies, equipment, and money; health status; health services and activities; accomplishment of policy and program objectives
National program managers	To allocate resources effectively and efficiently within a given program budget; to plan and monitor achievement of objectives and key events; to evaluate results	Same as for statistical office, except that data must be thoroughly digested, interpreted and used for program planning and implementation
Health planners	To allocate national health resources efficiently and equitably; to plan policies and programs; to evaluate results against plans	Same as for statistical office
Staff of categorical programs	Similar to above users, but more specialized	Same as for statistical office
Researchers	To plan and evaluate experimental activities	Greater detail than above, depending on research design
Donors and international agencies	To account for resources; to plan, implement and evaluate assistance activities	Personnel, facilities, drugs and other supplies, equipment, and money; health status, demography; availability and use of health resources; health services and activities; accomplishment of joint objectives

designing complex forms or neglecting to train workers in ways of using information. Many systems also fail to feed interpreted information back to basic health workers so that they can use it to improve performance.

MANAGERIAL INFORMATION NEEDS

Managers need information, too, of course, to:

- allocate resources effectively and efficiently
- monitor the functional status of vehicles, clinics, and equipment
- control epidemics
- manage drug and vaccine supply systems
- set program targets and monitor their achievement
- identify and upgrade poorly performing workers and clinics
- make numerous other daily decisions.

Managers select tactics and allocate resources in pursuit of broad objectives set by planners and policy-makers. They are the day to day and month to month decision-makers, the people who determine training needs, make sure that drugs and vaccines reach target populations, hire and fire personnel, and otherwise facilitate smooth functioning of the health delivery system. They are also the people who detect and resolve problems, who compare achievements with objectives, and account for use of money, supplies, and other tangible inputs.

Target setting, and comparing results with expectations, are two of the most important activities of program managers. Targets may be phrased in terms of number of persons to be served, number of health posts constructed, amount of vaccines to be imported, or virtually any other program input, output, or impact. Managers need these targets as a planning tool, to guide resource allocation, and as an evaluation device to identify program failures. Target setting is especially common in categorical programs, such as family planning and immunizations. Examples of primary health care targets include the following:

- 300 basic health workers trained per year
- 75 percent of population with access to modern health care (defined arbitrarily as residence within 5 kilometers of a health post)
- 10 percent reduction in infant mortality
- 80 percent of pregnant women receiving appropriate antenatal care (defined as three clinic visits before birth).

Targets may be set at the district, clinic, or even individual worker level, and for specific time periods.

Managers often seek information when making important decisions, although most prefer simple options and limited detail. Most managers combine instinct and intelligence with only a modest interest in using program related information. Managers some-

times use information from interpersonal channels, as illustrated by Management Sciences for Health:

It is important to recognize that information systems already exist in every operational program. It may not be obvious to the outside observer, but the decision-makers are already receiving and using information. The old system may not involve typed reports and quantifiable data, but the systems are there. The data include information about what one's superiors want, what is politically acceptable, the families of one's colleagues, what has been tried before, the attitudes and behavior of particular population groups, and the skills and attitudes of staff . . . Every individual and department within the organization is concerned with his or its own survival. The more limited the resources and the more unstable the environment, the more prominent issues of survival in an organization will become." (260, p.99)

Managers generally decide on their own what kind of information they want and will use, but evaluators need to guide and influence their selection as much as possible.

Managers exist at all levels of the health delivery system, and even individual health workers make decisions about use of personal time, service priorities, and so forth.

Many countries, though, have highly centralized bureaucratic structures, and so the actual degree of decision-making authority at lower levels may be substantially less than it appears formally.

Health workers need to know the communities they serve. This nurse in Afghanistan is completing identification cards on local families. PHOTO: United Nations, New York, by K. Muldoon.



WHAT KINDS OF INFORMATION DO HEALTH PROGRAMS NEED?

Comprehensive information strategies normally include elements of five basic data types, namely:

- demographic data
- information on disease patterns and outbreaks
- information on the availability and use of resources

- data on health services and activities (service statistics)

- unaggregated patient management data.

Table 1.2 illustrates these information types and shows how they are used.

Data may also be classified in relation to a specific program by whether they measure inputs, outputs, or impact. Program inputs are resources applied toward

Table 1.2 Typical information needs for primary health care programs

<i>Information type and examples</i>	<i>How obtained</i>	<i>How used</i>
<i>Demographic</i>		
Number of women 15-44	National census	To guide resource allocation
Number of infants	Vital registration systems	To use as denominators in calculating vital rates, disease prevalence, and so forth
Total population by geographic area	Sample surveys	To calculate targets for program coverage and accessibility
Birth rate, by geographic area, maternal age, and other characteristics		
<i>Health Status</i>		
Disease incidence and prevalence	Disease notification systems	To help determine health priorities
Death rate, by cause	Clinic and hospital reporting systems	To evaluate program effectiveness
Notification of disease outbreaks	Growth monitoring programs	To stimulate epidemic control measures
Infant mortality rate		
Nutritional status		
<i>Resources (Inputs)</i>		
Finances (sources and uses)	Special studies (especially for finances and manpower)	To determine resources available for health programs
Manpower	Routine accounting systems	To estimate future resource requirements
Pharmaceuticals and other supplies	Inventory records	To account for use of resources
Equipment		To calculate program efficiency
Fixed facilities		
<i>Health Services and Activities (Outputs)</i>		
Number of patient contacts	Routine clinic and worker reporting systems	To measure program volume, coverage and quality
Number of individual patients treated	Special surveys	To estimate program effectiveness
Frequency and type of group activities		
Number of clinic sessions		
Immunization coverage		
Contraceptive prevalence		
<i>Personal and Community Health</i>		
Personal health information including details on disease history, family planning, immunizations, growth monitoring, and so forth	Patient charts	To assist the health worker in diagnoses and treatment
Information on community health practices, environmental hazards, perceived health priorities	Informal community surveys	To assist in locating persons needing special services
	Community meetings	To assist in follow-up on those who miss appointments
		To help parents monitor and encourage child growth
		To inform community leaders of local health problems and hazards.

change in health status, including money, manpower, equipment, supplies, and facilities. Outputs are personal and community health activities, such as patient visits, health education lectures, water supply systems, and other goods and services resulting from use of health resources. Impact is change in health status or behavior deemed to result from program inputs and outputs.

The ultimate question regarding most health programs is whether they cause people's health to improve. A scientific answer requires precise measurement of health status and some kind of experimental design (use of a control group)—conditions that even small research-oriented projects may find difficult to meet. Routine health service programs should aim first at timely monitoring of inputs and outputs since these are more critical for day to day management.

MEASURES OF PROGRAM ACTIVITY

Integrated primary care programs may include a wide range of activities, as illustrated in Table 1.3. These are all important for health advancement, but routine data collection on all of them at once may interfere with service delivery and thus be counterproductive. The Jamaican health program has conducted virtually all the listed activities but has collected data only on preventive elements. After several years' maturation, the Jamaican information system functions well, and so curative services may soon be counted as well (602).

One of the problems with primary care information systems is that important activities, such as community participation and nutrition promotion, are difficult to define and hence difficult to measure (760).

Program activities are generally measured in terms of:

- volume
- coverage
- quality
- effectiveness
- efficiency.

Table 1.3 Elements of primary health care

-
- curative services
 - antenatal care
 - immunizations
 - family planning
 - water supply activities
 - sanitation and other vector control
 - community participation
 - health education
 - promotion of adequate food and nutrition
-

Some measures of volume are "counts" of patient visits, family planning acceptors, health education lectures, children immunized, and so forth. Measures of

coverage relate these counts to the number of people needing the specific service. Examples include:

- the proportion of women 15-44 using contraceptives
- the proportion of infants and small children who are fully immunized
- the proportion of mothers participating in antenatal activities
- the proportion of community residents who have used curative facilities.

Quality assessments concern patient satisfaction, continuation rates for long-term therapies (such as family planning and tuberculosis control), and the degree to which professional guidance is followed properly (as in use of oral rehydration salts). Managers need information on program quality but may have special difficulty obtaining it.

Effectiveness expresses the degree to which a program achieves its objectives, while efficiency reflects the costs incurred in the process. An immunization program, for example, may be considered effective if it immunizes 90 percent of children under 5, but it is inefficient if large quantities of vaccine are wasted or trained health workers are left idle. Alternatively, a program may be "efficient" because the cost per person served is low but "ineffective" because only a few persons benefit. Evaluators should consider both the effectiveness and efficiency of a program since neither measure is adequate by itself.

HOW MUCH IS HEALTH INFORMATION WORTH?

Like every other program element, health information costs money and staff time, so it is legitimate to ask how much of an investment is worthwhile. As phrased in an Indonesian program, "What is the appropriate price of a compass for an unexplored journey?" (310, p.20). The answer to this question depends on the degree of uncertainty about the "journey" and on whether the "navigator" knows how to use the compass and has the will and authority to change course when necessary.

Program managers have a great deal to learn regarding virtually all aspects of primary health care, but increased expenditure on information must compete with other program priorities. Money is required for:

- managing and designing the system
- pretesting forms
- hiring, training and supervising data collectors
- printing forms
- collecting and analyzing results
- training managers in data use.

Staff are required for data collection and analysis as well as for improving the application of results.

Whether or not increased expenditure is worthwhile depends greatly on local circumstance. Managers may already be aware of many program shortcomings, and

increased data collection may not help resolve them. Some managers, moreover, pay more attention to rules and regulations, or to political pressures, than they do to program objectives: and, in that case, improved information may be of little value to them. Information systems are, nevertheless, a vital and worthwhile investment for programs that have the will, authority, and resources to manage by objectives. And the availability of easy-to-understand information may encourage even bureaucratically oriented managers to improve program implementation.

As stated by one authority:

Essentially a judgment on how much to invest for information systems should be based on benefit-cost estimates. When the benefits derived from the information system exceed the cost of developing the system, then it is a worthwhile investment. Benefits include: the time saved in operations, health status improved as a result of information, better utilization of personnel, equipment, funds, supplies, etc. To identify potential benefits, examine those instances where lack of information causes policies to be ignored, objectives to be missed, funds wasted, vehicles and equipment to arrive late or to be poorly utilized, personnel improperly selected, trained, assigned and motivated, plans and budgets to be unrealistic, key decisions based on inadequate data, etc. Even a rough approximation of the waste from lack of adequate information provides an indicator of the "cost" of inadequate information. (804)

More substantive answers to this question are not easily available because program circumstances differ so widely. Research-oriented demonstration programs normally spend more than routine service delivery programs. Costs may be 5 percent of the program budget in the former case or ½ of 1 percent of budget for the latter (302). A consultant in southern Africa reported that his efforts to improve the information system were handicapped by the lack of an identified budget line item for information systems (180). Much of the cost of

health information, as defined in this chapter, may be borne by international agencies or by ministries other than the Ministry of Health. (The national census, for example, is usually financed by non-health sources, while relevant information may also be collected by household surveys or other separately funded programs.) Donors are often tempted to invest heavily in information systems because they need data for their own purposes, but governments without a keen interest and understanding of data may not support them after external funding is ended.

CONCLUSIONS

Health information is a vital resource for program planning, implementation, and evaluation, and data of several types are normally needed. Data users include everyone in the health delivery system, ranging from individual parents and patients to national planners and international assistance agencies. Data uses likewise range from monitoring of individual health and nutrition to program evaluation and long-term policy development. A six-year effort in Afghanistan developed a range of information systems, from a very simple home-visit reporting method for illiterate midwives to systems for comprehensive logistics management. Components included information systems for the warehouse, mobile training teams, rural health posts, personnel and financial management, village health workers, training programs, drug procurement, and other activities (260).

This does not mean that all information needs can be addressed, however, and in fact much of the weakness in current data systems is due to gross information overload. Selectivity and prioritization are absolutely essential since data collectors have limited capacity and data users have limited interest. Collection of data that will not be used is wasteful. Chapter 2 will discuss selective data collection strategies.

how is health information managed?

Chapter 1 described wide ranging information requirements for primary care programs but omitted details about how these needs could be prioritized and fulfilled. Information collection and use requires careful planning and strong management. It requires both a comprehensive overview and ruthless selectivity in prioritizing information needs. Information will only become available if effective and efficient collection methods are used, and it will only be applied if results are immediately relevant to managerial requirements. This chapter discusses system design and review, while subsequent chapters consider more specific methods of improving data collection and use.

Information systems for integrated primary care programs are generally weak, as summarized admirably by Management Sciences for Health:

The common problems encountered in information systems are that the information does not come, that it is late, that it is incomplete, that it is inaccurate, that it is not analyzed, that it is not disseminated, that it is inappropriate, or that it is not used.” (260, p.99)

Furthermore (as cited by a field consultant):

At the local level, copies of most forms are in short supply, poorly designed, sometimes complicated or repetitious, and seldom in the local language. The forms may be divorced from the realities of data collection in the field. Agencies are concerned mainly with their own agency’s forms—not with the whole system of forms in which field workers operate. Finally, field staff rarely see any tangible benefit from their efforts and hence, look upon records and reports as burdens. (344, p.22)

Additional symptoms of malaise include:

- intended users ignore available information
- data reach users long after relevant decisions are made
- many data collectors fail to report, so that “information” represents only a haphazard sample of health activities
- reports are clearly inaccurate or even deceitful
- reports do not change month after month (suggesting too frequent data collection) or they fluctuate wildly without apparent reasons (suggesting unreliability).

There is no simple solution to these problems although many can be reduced or controlled through strong information management.

THE NEED FOR INFORMATION MANAGEMENT

Information systems require strong central management and support by major decision-makers within the Ministry of Health. Lack of a coordinated data collection

strategy is a recurrent problem in health information systems and leads to duplicated effort and competition among data collecting agencies.* Competing agencies often rely for information collection on the same minimally trained health workers, and if too much is asked of them, they may fail to report adequately to anyone. Coordinated information management is particularly crucial when categorical programs, such as family planning or immunizations, are integrated into a single multipurpose health delivery system.

Health information, like manpower and logistics, is one of the central elements of program planning and implementation, and the bureaucratic placement of the responsible section should reflect this importance. In Swaziland, the information unit became more effective when it was moved from a statistical office to the planning section of the Ministry of Health (180).

The Ministry of Health in Jamaica is attempting to make its Statistical Information Service (SIS) responsible for coordinating all data activities within the Ministry. SIS is creating a special users’ service to act as a central repository for MOH data and to help MOH personnel apply existing data sets. SIS will also provide technical guidance to other ministry units involved in data collection, including those concerned with manpower, nutrition, and logistics (603).

A 1974 report for Afghanistan recommended that a control board be established to coordinate data efforts. The control board would have been responsible for:

- developing procedures for form updating and termination
- development of training materials to be used with forms
- coordination of the data efforts of the various international agencies (261).

Jamaica (601), Indonesia (310), Mauritania (110), Lesotho (083), and presumably other countries have established coordination committees representing all important data users and collectors, in a similar effort to reduce duplication.

*A review in one Latin American country found health data being collected by the following government agencies:

- Ministry of Social Welfare and Public Health (MSW/PH), Division of Biostatistics
- MSW/PH, Division of Epidemiology
- MSW/PH, Sectoral Planning Office
- MSW/PH, Department of Medical Supplies
- MSW/PH, National Director of Administration
- MSW/PH, Division of Environmental Sanitation
- National Institute of Statistics
- Civil register (510)

Information units are weak in many developing countries, reflecting both low managerial priority and shortage of critical resources. A 1981 report on one Caribbean program, for example, noted that:

At present the Statistics and Information Service (SIS) is handicapped in all its work by the lack of basic typing, duplicating, and filing equipment as well as the lack of basic data processing and statistical skills within the majority of its staff. The support of any statistical activity is dependent on rapid access to functioning typewriters to develop forms, instructions, communications to the field, replies to user inquiries, etc. . . . Similarly, access to a copying machine is important . . . for making reports and data rapidly available to users, communicating to the field quickly, pulling together materials for small training sessions, etc. . . . The SIS Unit also lacks filing space. (603, pp.2-3)

The report continued by noting weaknesses in the following personnel skills:

- form design
- table development
- editing and control procedures
- field instruction development
- data interpretation and report writing (603).

These problems are common in many developing countries, and, in fact, the unit described is probably stronger than most.

THE NEED FOR COMPREHENSIVE AND REGULAR REVIEW

Primary health care programs are living, growing entities, and information systems must, therefore, be flexible and responsive to changing priorities and needs. Most information systems change through gradual accretion of new forms and requirements rather than through conscious design and comprehensive planning. Comprehensive information review is particularly essential when categorical programs are integrated since multipurpose workers cannot usually handle all the existing data requirements. Susan Cole-King suggests eight questions for use in review of existing health information systems:

1. Have primary health care objectives been defined?
2. Does the currently collected information provide answers to these questions?
3. Is the information collected necessary or even useful?
4. How much time and money are spent on information collection and analysis?
5. Who uses the information, and for what purpose?
6. What communication exists between levels?
7. Does relevant information exist from non-health sources?
8. How good is the vital registration system? (763)

The importance of these questions will be illustrated throughout subsequent chapters.

Comprehensive reviews should also consider:

- current data users
- how they use information
- what kinds of information they require
- capacity of users to apply existing information in their work
- the system's capacity to collect required information
- appropriateness of current information for user needs
- effectiveness and efficiency of existing data collection methods.

The linkage between data collectors and data users should also be analyzed in detail, as will be illustrated in Chapter 3.

System reviews and revisions have produced dramatic benefits in many countries:

- The Indian Population Project in Karnataka State reduced the number of clinic registers from fifteen to five and the number of monthly reports from eight to two. The recording burden on health workers was reduced from 30 percent of time to 10 percent (302).
- The Ministry of Health in Nepal, with assistance from Management Sciences for Health, reduced the number of recording forms from 137 to 12 (321).
- A Bolivian project reduced the number of reporting forms from twelve to three after a study found that field staff were spending 35 to 60 percent of their time completing forms (513).
- Swaziland reduced the number of reporting forms from 45 to 12 in the late 1970s (180).

THE SYSTEM'S CAPACITY

While in a sense, almost any data can be collected given adequate effort, in reality every program must strike an appropriate balance between use of resources for service delivery and for data collection. When resources are scarce, the one thing worse than data not collected is data so poorly collected as to be unusable. Data not collected at least do not cost anything and will not be the basis for wrong decisions, while data unsuccessfully collected cost money, staff time, and morale. It is normally better to start small and consider augmenting collection objectives as the system proves itself; most programs, unfortunately, start big and then have to scale back.

Evaluation specialists and data analysts are often poor judges of collection capacity because they think first of the data they would like to have and only secondarily of constraints. When new information systems are developed, it is usually because existing ones are inadequate, yet existing problems are likely to recur unless specifically addressed. The capacity of the current information system may be indicative of how strong a new system is likely to be.

More specific indicators of data collection capacity may include:

- the number of Ministry of Health personnel largely engaged in collecting and processing data
- the availability of processing equipment (including adding machines and calculators as well as computers)
- the local availability of expert consultants in statistics, sampling, information systems, and so forth
- the educational levels of key personnel, especially basic health workers
- the adequacy of communications between the central government and peripheral areas.

Even if collection is adequate, use of data may not be; and once again it makes little sense to exceed likely capacity. It is usually easier to include a data item in the hope that someone will use it, than to make hard decisions about priorities. Most programs report greater data collection than use; and while data-use skills may need to be upgraded, the process takes time and money (for training, improved analysis, and so forth). Managers flooded with data may ignore all of them, while those given a little data may learn to appreciate what they have and begin to ask for more.

THE NEED FOR SELECTIVITY

Ruthless selectivity is essential in setting information priorities. Data collection should be:

- linked to key program objectives
- linked to key decisions and decision-makers
- based on problem “indicators.”

Linked to Program Objectives

Information systems can only help managers achieve their objectives if these objectives are clearly articulated before data collection begins. If a program wants to reduce environmental hazards, it needs to be able to measure baseline and achievement. If improved accessibility and coverage are sought, these must be defined and evaluated. Articulation of objectives is often difficult because the various parties involved (donors, host government, individual managers, for example) have widely varying interpretations. AID’s Logical Framework (919) forces planners to specify a hierarchy of goals and objectives, as a necessary first step in planning data collection.

Collection should particularly focus on those problems that are remediable within a given program context or timeframe. Managers may be able to reduce logistical bottlenecks or to order relocation of health workers to underserved areas, but they cannot reduce rural poverty or change deeply ingrained behavior. Nutrition surveillance may be useful in food supplement or health education programs but less relevant in purely curative health activities. Some countries limit detailed disease reporting to malaria and a few immunizable conditions since

they can do little to control the others anyway. All of these conditions should be documented when possible, but detailed reporting from each community and for short time periods may be of little value.

One effect of specifying data requirements is that health workers are likely to adjust their behavior accordingly. If reporting emphasizes easily quantified measures, such as number of new family planning acceptors, number of latrines built, amount of oral rehydration salt dispensed, then quality control to ensure continuation and correct use may be neglected. Community participation is difficult to report meaningfully, and so health workers may ignore it (760).

If workers are judged by pre-specified “results,” they may deliberately falsify data, as has occurred in some family planning incentive programs (330). Several programs have experimented with the effect of reporting on worker behavior (289), and even those that cannot research the problem formally should be aware of possible effects.

Linked to Key Decisions and Decision-makers

Data collection should be tailored to the needs of key users and should reflect their responsibilities within the overall health delivery system. Health information has multiple users, as described in Chapter 1, and their needs are at least partially competitive. Donors’ needs for impact data, for example, may reduce resources for routine program or patient management. Decisions by high level managers are critical for broad program direction, but those of individual health workers may be more important in the aggregate. System designers must balance conflicting needs and establish priorities.

Based on Problem Indicators

Even within key areas, data collection should concentrate on *indicators* of problems and progress rather than on comprehensive analysis. To quote William Reinke:

Routine information should be comprehensive, yet rudimentary. It should scan all possible problem areas, calling attention to exceptional conditions in need of closer scrutiny, but it need not exhaustively describe problem conditions. Otherwise the information system will inevitably tell the manager more than he needs to know about non-issues as well as real issues. Once an exception has been understood, it can be explored in greater depth selectively. (803)

These problem-detecting measures are called indicators because they summarize situations without explaining them. A fall in patient contacts per month, for example, may suggest poor worker performance or inadequate drug supply, or it may simply reflect improved health. Likewise, a drop-off in family planning acceptance rates may signal loss of public confidence, poor publicity and promotional effort, or lack of contraceptive supplies—or it may indicate that more clinics are failing to report. While detailed data could be gathered on each potential factor, it is more efficient to identify the problem first and look for explanations later.

Selection of indicators is a major problem in primary care programs because of the multiplicity of services and the lack of clear relationships between activities and health status. The World Health Organization has selected twelve measures of progress toward "health for all" (921), but some of these are not appropriate for short-term management. Gorosh and Wishik have produced an exhaustive list of MCH/family planning indicators (779). Indicators should be selected in conjunction with specific objectives, and so the references given above are only suggestive. Categorical programs have better defined objectives than most integrated activities and have focused more clearly on evaluation.

Specification Processes

Data selection may appear to be a technical matter but in fact involves negotiation and compromise between multiple data users. The "best" data selection from a technician's viewpoint may differ from managerial preferences, and the latter generally differ from the needs of individual health workers and communities. Donor agencies have conflicting requirements, and categorical program advocates have special needs, too. Design by technicians may seem simpler than political bargaining, but it will fail in the long run if influential users feel slighted. Technicians are best used as *consultants*, not as arbitrators, since the managers themselves will eventually decide what data they actually use.

Cole-King, in an unpublished paper, suggests that each group of users define their data needs independently and that a representative committee make the final selection (763). Something like this was done in Jamaica, with U.S. Census Bureau guidance (601): representatives of various users met as a peer group to critique individual data requests and to hone them down to an achievable minimum. Technicians can help groups such as the Jamaican one by refining user requirements, by acting as catalysts, and by recording and implementing collective decisions. "Expert" recommendations may be ignored if they are developed independently of local managers, however.

THE NEED FOR TIMELINESS, ACCURACY, AND EFFICIENCY

After deciding what information they need, managers should then review alternative methods of collecting data. The choice of collection method for each data item depends on several questions:

- How soon after the event must information reach managers?
- How accurate must information be?
- Do the facts reported vary greatly from one month or geographic area to another?
- How much money and staff time is it worth to have the information?
- Will results be used for monitoring and supervising small areas, or for national-level evaluation?

This section discusses the importance of these concerns for data collection, while the next discusses and evaluates alternative methods of data collection.

Timeliness

Generally speaking, the faster data are required, the less accurate and complete they are likely to be, yet the longer the time before they are available, the less useful they are for short-term management. How soon data are needed must be a prime determinant of reporting method because data that arrive too late may be useless.

Reports of sudden disease outbreaks, for example, must reach epidemic control officials almost immediately to trigger drug and vaccine shipments and investigation of causes. A number of developing countries have instituted telephonic and telegraphic reporting systems for this purpose. Other information is for medium-term management. If program performance falls below target, managers need to know and take remedial action, but they need time to observe trends and cause. Evaluation and selection of alternative health delivery modes takes even longer. Long-term managerial data, like emergency reports, must be available when decisions are made, but they may be gathered through one of the slower moving information systems.

Accuracy

Accuracy, like quick feedback, is essential for certain decisions but less important for others. Accuracy costs money, and the need for it must be balanced against other needs.

Accuracy is usually essential, for example, in accounting for cash and supplies, to discourage misallocation of resources. And it is needed in comparing numbers because if errors are in opposite directions, the effect on differences may be quite large. Comparisons between one year and the next, or between an experimental and a standard health delivery mode, are only possible if real differences are greater than likely errors. It is not worth the effort to collect these data if they will not provide valid comparisons.

While inaccuracy is never desirable, some errors are inevitable and may be tolerable for routine monitoring of individual clinics, for alerting officials to epidemics, for estimating populations to be served, and for certain other purposes. Some errors can be estimated and statistically controlled; age, for example, is widely misreported but summary reports can be adjusted to provide reasonable estimates (for groups, however—not for individuals). Problem indicators, as described above, can also be somewhat inaccurate, as long as they are used to stimulate investigation rather than to make final decisions.

Variability

Data that are likely to be highly variable need to be reported often and in great detail, while stable conditions can be measured less frequently. The number of

clinic patients, for example, is likely to differ greatly from one geographic area or time period to another, while the age, sex, treatment history and other characteristics of these patients may be relatively constant. Reports on variable conditions are essential for short-term management, but stable data are used mainly for planning and evaluation.

When data are variable, they need to be collected frequently from every relevant location. When data are stable, a 5 to 10 percent sample every year or two may be adequate. Few programs report too often, but many try for 100 percent reporting when a sample would be just as useful and less costly.

Costs

Selection of data collection methods also depends on how much money and staff time managers are willing to devote. The degree of burden on minimally trained and over-extended health workers should be a major consideration in deciding both whether information is essential and whether health service personnel should be asked to provide it. Use of existing personnel to collect data is attractive because it seems to reduce costs, but the sav-

ings may be illusory. As reported by one Indian program:

The time spent by the field worker, especially auxiliary nurse midwives, on maintaining various registers and records ranges from 20-30 percent of the total working time. This naturally cuts down the time available for field work. (281, p.1)

Botswana (021) and Bolivia (513) report similar problems. The money "saved" in not hiring new personnel may actually be drawn from resources for service delivery. Data collection methods differ in the burden they place on health workers, and in other costs.

OPTIONS FOR DATA COLLECTION

A wide range of data collection methods is available for primary health care, and the collection strategy chosen should be tailored to the time, accuracy, and cost constraints of the particular program. Most planners concentrate excessively on service and administrative records, and give too little thought to sampling. This section describes many of the collection methods in current use, while the next discusses criteria for choosing among them.

Ompati, an anganwadi (day care center) worker in Dhandlan, India, carries out a family health survey. PHOTO: UNICEF, by T. S. Nagarajan.



Service and Activity Records

All but the most basic health programs keep records of persons treated, services and activities performed, and clinic hours and home visits provided. Records are both individualized—that is, created and stored for specific clients—and summarized for higher level review. When aggregated, reports are known as “service statistics,” and when individualized, they are usually called patient records or charts. Service records are created day after day, month after month, at health posts and clinics throughout the area served, and they form the bulk of information gathered in most programs.

Most programs use a multitude of forms, often with duplicative information and carbon copies. Recording difficulties may be accentuated by categorical programs, each with distinct reporting requirements, and by the frequent use of both new and outmoded (and officially withdrawn) forms within a single clinic. Forms are also kept for a variety of purposes, leading to similar but separate reports on the same subject. The next chapter considers service reporting in detail, so discussion here concentrates on the variety of clinic forms in current use.

Service forms and reports generally fall into the following groups:

- individual visit records, containing separate reports for each clinic visit
- individual patient records, summarizing all contacts for the particular person
- patient identification cards, possibly with a unique patient number
- log books, listing all client contacts as they occur
- referral forms, to facilitate contact with secondary institutions
- summary reports, for defined time periods.

As was noted, most programs use several forms of each type because of differing program and client needs.

The most basic of these record types is the *client register* or log book, maintained by most health clinics and at least some fieldworkers. These generally record the name, date, client characteristics, symptoms, treatment, visit status (whether first visit or follow-up), and other factors regarding each person seen. Registers for continuing programs, such as tuberculosis control or antenatal care, may show all contacts with a single patient on one page, but in other cases, information on specific clients is scattered and difficult to retrieve. Some registers omit names altogether since they are not useful and increase the reporting burden.

Patient records are better than log books for patient management, but they are also more cumbersome, and many programs limit them to activities requiring follow-up and return visits. Examples include:

- growth charts for children
- immunization records

- family planning histories
- prenatal care.

These, it may be noted, all relate to preventive activities requiring long-term maintenance. Hospitals and the more sophisticated primary care programs may keep curative histories as well, especially for tuberculosis and chronic conditions. Most patient records show both history and future appointments.

Individual *visit records* are common for referral from one service level to another and for inpatient hospital care, but they are relatively infrequent (except in some family planning programs) for routine outpatient care. Separate forms are completed for each client contact, usually with carbons for the clinic and the central statistical unit. Visit records facilitate distinction between first and return contacts (an important point in most programs) and generally contain more detail than patient records, but the sheer number of patient contacts may create overwhelming paper work. Most programs that maintain visit records either use them solely at the clinic level or process them by computer.

The final method of service recording is the periodic *summary report*, showing the number of client contacts by various characteristics. Periodic reports generally indicate the number of cases of specific diseases seen during the reporting period and may provide rough evidence of current health conditions. Programs that emphasize growth monitoring may report the number or proportion of children that are either stunted or underweight for age. Reports are compiled weekly, monthly, or quarterly from whatever kind of log or tally sheet the clinic uses. They are generally sent to the next highest supervisory level, although some programs have at least a copy sent directly to a central statistical unit. Preparation of summary reports can be time consuming, so some programs have clinics send in their log books (or copies) instead. Because summary reports omit patient details, they are more useful for supervision and evaluation than for individual health care.

One issue in primary care recordkeeping is whether health workers should record patient diagnoses or only symptoms. Workers do need accurate diagnoses in order to prescribe medication, but they are generally poorly trained and equipped to recognize more than a few of the most common conditions. Even when they can make a diagnosis, they often lack appropriate medicines, and resulting data may be inadequate for epidemiological analysis. For these reasons Cole-King has recommended that routine worker reporting be limited to malaria and the major immunizable conditions* (763).

The above paragraphs describe general record types, and most programs have more than four forms in total.

*To aid in diagnoses, the World Health Organization has developed sophisticated guidelines for “lay reporting” of diseases (823), while the Expanded Programme on Immunization has published colorful photos depicting its target diseases (761).

The Indonesian family planning program in the mid-1970s used the following forms at the clinic level:

- an annual clinic registration form showing type of clinic, sponsoring agency, date of establishment, available staff, services provided, and so forth
- an annual personnel data card showing the characteristics of each clinic staff member
- a referral card for fieldworkers to use in introducing clients to the clinic
- an acceptor card for each new family planning client
- an identification card retained by the client
- a patient index card, retained by the clinic
- a continuous clinic register of contacts
- a contraceptive register showing all supplies received and distributed
- a follow-up card, filed in the clinic by date of next appointment
- a monthly clinic report submitted to supervisors (310).

Multipurpose primary care programs may use even more forms because of the variety of specific activities. With careful planning, however, forms may be consolidated or eliminated in many cases, and these examples should not necessarily be emulated.

However simple the requirements, record keeping almost always creates extra burdens for health workers, and both service delivery and information gathering suffer as a result. Health workers are primarily interested in patient management and community health, and they are most likely to record information that they perceive to be personally helpful. They are likely to be reluctant to record data that reflect badly on themselves. Some data may require supervisory interpretation, but few supervisors are able or willing to provide it. Service records are nevertheless an indispensable part of all but the most basic health programs.

Surveys

Surveys are periodic and nonindividualized methods of collecting health care data, often using a sample. They may be scientific or informal; they may be performed by specialists or by health workers with only the barest of training. Surveys can have important functions in primary health care, but they have been relatively neglected as a means to study service use.

Two survey types may be distinguished: those using samples and generally based on scientific questionnaire design and analysis; and less formal ones conducted by workers and community leaders.

Scientific surveys: Scientific surveys are usually major undertakings requiring trained staff, sophisticated data collection, and considerable time for both gestation and analysis. Results are generally directed at national managers and policymakers; and they usually relate more to long-term planning and evaluation than to short-term management. They have an important role in primary

health care programs but only for certain kinds of analysis.

Examples of scientific surveys include the following:

- studies of health sector financing in specific countries, such as Bangladesh (805), Sudan (777), Sri Lanka (777), Thailand (805), and Korea (777)
- the addition of health questions to general social or economic surveys, as in Thailand (352)
- studies of health status
- knowledge, attitude, and practices studies, especially for family planning (799)
- contraceptive prevalence surveys (768)
- detailed analyses of a sample of clinic records, as in Botswana (021), Jamaica (604), India (817), and Malaysia (817).

Surveys for baseline measurement and planning have long been a stock in trade of major donor-assisted projects. A big Afghan rural health project, for example, interviewed 723 people before project initiation and developed lengthy recommendations for training, financing, and drug supply (260). The Lampang project in Thailand conducted numerous community health surveys (354). The Menoufiya (Egypt) project used so-called "mini-surveys" to give rapid feedback to managers (031). Baseline surveys are most useful if actually completed before project initiation, but many projects have been overly ambitious and have not completed planned studies.

Sampling of service records may be a useful way to simplify routine data collection, especially when results do not vary much from one time period or location to another. In Botswana, clinic log sheets are uniquely numbered, and the copies sent to central headquarters are periodically sampled and tabulated (020). Indonesia uses computers to analyze 10 percent of visit records, while Malaysia analyses a 5 percent sample (817). In both cases, results are speedier than if they had been based on 100 percent analysis. Jamaica keeps patient records at the clinics and plans to sample them periodically on site (603); in this case, analysis is slower, but fewer forms are lost and paper work is reduced. These surveys reduce the burden of preparing periodic summary reports at the clinic level.

Informal community surveys are an effective way to determine locally perceived health priorities and to establish rapport between health workers and their clientele. They are normally conducted and analyzed at the local level, using health workers, community leaders, and volunteers. Health education programs in school often have students gather information from their own homes and then use resulting data for background and illustration. The Hanang project in Tanzania required health worker trainees to collect information before each training session and to use it in developing a community health plan (191). These efforts teach trainees

and students to use information, and they may also be of value for local planning.

Community surveys sometimes use structured questionnaires—examples of these are provided in the appendices—but they consist more often of discussion topics and casual notation. Subjects frequently addressed by community surveys include the following:

- population size, by age and sex
- perceived health priorities
- immunization status of children
- pregnancy or family planning status of women
- other current personal health problems
- existence and use of latrines
- sewage disposal arrangements.

Programs in the Philippines (340) and Guatemala (564) use surveys to map communities, showing environmental health hazards and other problems needing attention.

Informal surveys of the type discussed here are very different from scientific studies and should not be used for the same purposes. Scientific comparisons between geographic areas or time periods require precise definitions and uniform methods of collecting and recording

data. Immunization coverage, for example, can only be measured if each data collector records age in the same way and uses the same list of recommended shots. Interviewers must also be trained to ask questions without introducing bias and to contact every household within a specified sample. Programs should actively encourage community diagnosis and informal surveys, but they may jeopardize both data quality and worker-community relationships if they try to use minimally trained workers for accurate statistical measurement (818).

Both scientific and informal surveys have a strong advantage over clinic records, as described above, because they cover the entire community. Analyses of clinic records may generate great detail about clinic users and services but say nothing about non-users or private sector activities. A program may provide good treatment for a minority of the population but be totally inadequate for the group as a whole. Surveys can avoid these biases by studying non-users as well as users and by drawing information from the community at large.

Censuses and Enumerations

Censuses differ from surveys because they are mainly used to obtain complete population counts and not to

D I A G N Ó S T I C O C O M U N I T Á R I O

COMUNIDADE: _____ LOCALIZAÇÃO: _____ POPULAÇÃO: _____
 ATENDENTE DE SAÚDE RURAL: _____ PAGO POR: _____

P R O B L E M A S I D E N T I F I C A D O S

P R O B L E M A	D A T A D E I D E N T I F I C A Ç Ã O	D A T A R E S O L V I D O

Simple forms can be used to list, and stimulate resolution of, individual community problems. This one comes from Project Esperança in Brazil.

measure attitudes and behavior. An effort must be made to locate and count every population member and to avoid double counting. The variables recorded are often limited to age, sex, number of children, place of residence, and economic status. Census data are essential for apportioning project resources geographically, for setting coverage targets and for calculating vital rates, coverage, and accessibility.

Health programs often use data from two types of census:

- decennial or less frequent national counts
- community enumerations and listings by health workers.

The first type yields regional or national population estimates and some evidence of birth and death rates in the period before the census. When suitably adjusted, birth rates and population counts can be used to estimate the current number of infants and pregnant women. National census data may not be current at the local level, however, because they take several years to analyze and population movements have often changed by then.

Local enumerations can estimate current population size and composition, but they are most useful for identification of persons needing specific services. Many programs instruct fieldworkers to register:

- pregnant women (for prenatal care)
- women of reproductive age (for family planning)
- infants needing immunizations
- those in need of tuberculosis or leprosy follow-up.

Much of China's success in population control appears to be due to individual listing of each reproductive-age woman to identify need for service and follow-up, and similar systems have been adopted in projects in Bangladesh (270) and elsewhere. In the Indian family planning program, these listings are known as target couple registers (283). Listings of potential clients by name is most useful in programs with active outreach and home visits, and may be a waste of time in clinic-based programs. Population counts, on the other hand, can be useful for calculating program coverage even when outreach does not occur, although they are usually too imprecise for analysis above the community level.

Event Reporting Systems

Censuses and surveys are performed only periodically—rarely more often than every several years—and are useless for immediate event reporting. Health workers need ways to identify and report events, such as births, deaths, and communicable diseases, as they occur, and they cannot simply wait for cases to appear in clinic. Vital event and disease reporting are almost universally inadequate for good statistics, but they are nevertheless essential for controlling disease outbreaks and managing those cases that do get reported.

Event identification is severely handicapped by:

- the lack of health workers and clinics in most rural areas

- scarcity of diagnostic skills and facilities
- inadequate incentives for reporting.

Once cases are identified, they must be accurately recorded, reported to authorities, and analyzed, and these processes lead to further data loss.

Many programs encourage basic health workers to identify and count births, deaths, and diseases, but official vital registration and epidemiological reporting may be left to hospitals and civil authorities. Health workers need to identify births so they can provide immunizations as well as baby care, and they need to investigate deaths to see whether program failure was a cause. In Menoufiah, Egypt, for example, health workers and family members conduct public inquests into deaths to see what behavioral and programmatic factors contributed (031). Health workers can bring vital events to the attention of civil authorities for formal registration, but they usually do not register these events themselves.

Case identification is obviously easier with active outreach and in programs that have valued services to offer. Parents may have little reason to report a birth to civil authorities, but they may actively seek immunization or infant care, which can then facilitate registration. The Hanang (191) and Lampang projects (355) ask community leaders and volunteers to report vital events, but in the former case only 10 percent did so. The Health Information and Planning System in Nicaragua (610) established "neighbor networks" to inform health workers of disease cases and to reduce treatment delays from five to two days. The PUSH project in the Philippines paid health workers a small bonus for each reported case (343), a system that could be abused if reports are not checked periodically. In spite of the difficulties, case identification remains a useful adjunct for many programs.

Event reporting through health workers may be useful for detecting problems requiring managerial response (such as disease outbreaks within a service area), but it does not produce valid trend data or even current statistics for the country as a whole. Few government health programs reach more than a fraction of rural or marginal urban areas, and most report only on hospital inpatients. Statistical changes may be due more to changes in reporting systems than to field situations. Almost every program encourages some reporting of this nature, but some choose not to aggregate results above the clinic or district level due to competing information needs and the poor statistical quality of results.

Accounting and Inventory Records

Like service reports, these documents are virtually universal in development programs and are a vital management tool. Subjects normally include:

- money
- supplies (especially drugs)
- equipment
- personnel
- facilities.

Reports show both receipts and disbursements; and in the case of equipment, personnel, and facilities, they also show functional status, need for repair, and so forth. *Managing Drug Supply*, by Management Sciences for Health (814), is a useful reference on recordkeeping for drugs and supplies. Data on equipment, personnel and facilities are often incomplete.

Informal Observation and Communication

Discussion of information techniques is incomplete without reference to informal observation, limited though it may be for quantitative analysis. Workers and supervisors can often learn more from a few hours of intelligent observation than from weeks of number crunching, and they should not wait for statistical verification to react to obvious problems. Evidence of problems may include:

- an unusually large number of severely dehydrated children (suggesting failure of oral rehydration, or epidemic conditions)
- a high relapse rate among tuberculosis patients (lack of follow-up)
- abortion (family planning failure)
- disease occurrence among immunized children (poor vaccine quality)

- public complaints about lack of medicine or absence of health workers.

Reporting of these and other problems must not be limited to printed forms and should occur informally at all bureaucratic and service levels. In Cornwall County, Jamaica, a “Problem Solving Committee” met periodically to identify program problems and to suggest solutions (789). The Lampang project in Thailand conducted special seminars to encourage non-formal communication (354).

In Kitui, Kenya, clinic staff collected data through regular community meetings, using notebooks and a checklist of discussion items, such as:

- types and frequency of illnesses
- practices and attitudes related to:
 - breast-feeding
 - daily household diets
 - use of latrines
 - use of rubbish pits
 - source of water for humans/livestock
 - personal cleanliness/cleanliness of clothes
 - use of clinics, including immunizations

Table 2.1 Strengths and weaknesses of alternative data collection methods

Type	Characteristics	Sub-types	Frequency	Information source	Information collection	Timeliness: Lag between event and recording or analysis
Service records	Complete listing of individual (and sometimes group) contacts, by various characteristics	Visit records (separate form for each visit)	Continuous	Client	By health worker, on standard forms	Individual records are useful immediately; aggregation and analysis may be long delayed
		Patient records (all visits recorded on a single form)	Continuous	Client	By health worker, on standard forms	Records kept by patient or clinic; may be aggregated periodically
		Registers (daily or weekly forms listing all contacts)	Continuous	Client	By health worker, in log book	Generally, long lag before they can be aggregated and used for management
		Summary reports (tallies of individual and group contacts)	Usually monthly	Visit registers or forms	By clinic staff, on standard forms	Lag can be brief if data collection is rapid, but long delays are common

- knowledge related to:
 - disease prevention
 - disease cures (070).

APPROPRIATE STRATEGIES FOR HEALTH INFORMATION

Managers need to review all the collection methods that may be available and decide how each piece of required information can be most effectively and efficiently obtained. A comprehensive strategy might include the following elements:

- use of service records for patient counts and other highly variable data
- simple but scientific surveys for stable data (such as patient characteristics) and for community health practices
- community surveys and listings to guide individual health workers
- event reporting systems for epidemic detection and to start the process of improving vital statistics
- accounting and inventory systems for financial management and logistical support

- censuses to provide denominators for planning and evaluation
- unstructured observation to assist in problem detection and diagnosis.

Table 2.1 details the strengths and weaknesses of alternative data collection methods.

REGULAR SYSTEM REVIEW

Effective health information systems must be responsive to user needs, and these are likely to change continuously as data utilization improves, as new users become interested, and as weaknesses in current systems become apparent. Periodic reviews are likely to find:

- recording form questions that have not worked properly
- information requirements that are no longer essential
- new information requirements that need to be added
- data tabulations that are misunderstood or not used.

Frequent system changes are potentially disruptive—especially if old and new forms are used side by side, or if changes are major and not explained—, but regular fine tuning in conjunction with data collectors and users is essential for system effectiveness.

<i>Appropriateness for small areas</i>	<i>Relative accuracy</i>	<i>Costs</i>	<i>Appropriate uses</i>	<i>Inappropriate uses</i>	<i>Comments</i>
Mainly useful for individual patients; aggregated analysis possible but costly	Usually accurate for total visit counts, but may be less accurate than surveys for patient characteristics	High, both for record keeping and for analysis; likely to reduce time available for patient services	Management of individual clients, especially in hospitals or by self; useful for program evaluation but only where data management capacity is well developed	Routine outpatient services, except where data management is relatively sophisticated	Widely used for in-depth evaluation of categorical programs; less common for integrated activities because of their complexity and volume
Mainly useful for individual patient monitoring	Adequate for patient monitoring	Take less health worker time than visit record	Monitoring and follow-up of individual patients	Difficult to use for visit counts	Not appropriate for management; may be more useful if retained by patient
Quite appropriate	Can be accurate for patient counts	Lower cost than individual visit or patient records	Mainly for counts of the number of patient contacts	Monitoring of individual patients	May be retained at clinic level (as basis for periodic reports), or copy may be sent to data unit for analysis
Quite appropriate	Usually adequate for patient counts	Depends on how often and in what detail they are required; usually detracts from time available for health services	Management and planning at all levels	Should not be used for detailed analysis of patient or visit characteristics	This is the most useful method for short-term and local-level management and for contributing local information to regional and national levels

Table 2.1 Strengths and weaknesses of alternative data collection methods (continued)

<i>Type</i>	<i>Characteristics</i>	<i>Sub-types</i>	<i>Frequency</i>	<i>Information source</i>	<i>Information collection</i>	<i>Timeliness: Lag between event and recording or analysis</i>
Surveys	More detailed studies of individuals and events, sometimes based on random sampling	Scientific studies	One-time, or every 3-5 years	Individuals; clinic records	By trained interviewers or record analysts, using formal questionnaires	Usually quite long, but quick and simple surveys are also possible
		Community surveys	Usually only at program initiation	Household heads	By health worker, school children, etc., often without a formal questionnaire	Information is usually used by the information collector (health worker), so lag can be quite short
Censuses	Enumeration of all residents by certain characteristics	Formal national censuses	Usually every 10 years	Household heads	By trained interviewers, using formal questionnaires	Generally several years
		Community listings	Usually every few years	Household heads and individuals	By health workers, using informal registers	Can be maintained as a continuous register, but most workers make listing once a year or less
Event reporting systems	Registration of specified events	Births and deaths	As they occur	Family members	Usually by a civil (non-health) authority, although health worker may report informally	Individual reports may be 3-6 months late; aggregated reports take a year or longer
		Disease notification	Variable; some systems provide for weekly or even daily reports	Health workers	By health worker, by clinic reports or (sometimes) telegram	Can be quite rapid, if system is appropriately managed
Accounting and inventory records	Item by item recording of amounts received and expended	Money Supplies Equipment Personnel Facilities	Variable	Records kept at almost all levels of health system	Variable	Inventories should be current, but other records are often long delayed
Informal observation	Unstructured but purposeful questioning and observation		Constant	Variable	Qualitative and unstructured	No lag

<i>Appropriateness for small areas</i>	<i>Relative accuracy</i>	<i>Costs</i>	<i>Appropriate uses</i>	<i>Inappropriate uses</i>	<i>Comments</i>
Not appropriate	Often higher than for other methods	Usually cheaper than service records for the same types of information	For scientific research; for detailed study of patient characteristics and other relatively stable variables	Routine management of individual clinics	Sample may consist of patient records or of community members, depending on purpose
Excellent (not appropriate for larger areas)	Usually poor	Low, as long as they are kept simple	Assessment of community-perceived health priorities	Quantitative evaluation; not appropriate for management above the community level	Many programs use them as a way of acquainting worker and community with each other
Usually poor, owing to inaccuracies and changes since census date	Sometimes poor, though gross errors can be estimated and controlled	High—though usually not borne by health ministry	For estimation of target population at the regional and national levels	Measurement of change, except over long periods	
Excellent (not appropriate for larger areas)	Generally not useful for population counts but may be accurate enough for assisting health worker	Low, as long as they are kept simple	Identification of individuals needing specific services	Total population counts above the community level; not appropriate for national or regional management	
Usually not sufficiently accurate	Poor in most developing countries	Casual reporting is cheap, but complete registration is costly	Health workers may use birth reports to identify clients; aggregated data—if complete—may be used to calculate vital rates	Incomplete and unadjusted data should not be used to calculate vital rates	Most programs ask health worker to report vital events, though results are almost universally incomplete
Usually not sufficiently accurate	Adequate for identification of epidemics, but often inadequate for epidemiological analyses, especially if data are collected by minimally trained health workers	Often high	Detection of disease outbreaks, in those areas being reported on	Routine epidemiological studies (except where diagnostic capacity is strong and health services reach most of population); not appropriate for measurement of health status	Many programs ask even basic health workers to report diseases treated
Quite appropriate	Should be exact, but usually are not	Often quite high	Accounting and inventory control; provide denominators for calculation of efficiency		
Only appropriate for small areas	Observations are generally not quantitative	Minimal	Direct supervision of individual workers and clinics, to supplement quantitative data	As a basis for major managerial decisions (except possibly where no other information is available)	

Jamaica plans formal reviews once a year, with the following process:

1. A small user seminar to identify Ministry information needs and priorities as well as user problems (July).
2. Technical review of system to identify problem areas and/or bottlenecks (July).
3. Modifications to the system based on the above, developed and submitted to Ministry for approval (July).
4. Detailed system redesign and materials development (August).
5. Pretest of materials (September).
6. Print materials and forms (October).
7. Training of field staff in modified system (November-December).
8. System implementation (January 1).
9. Broad user seminars to provide Ministry personnel both in Kingston and in the field with guidance on how they can make use of the system output (March-April) (603, pp.4-5).

This process was followed in 1981 and led to minor changes that obviated the need for one additional reporting form. Regular changes are only feasible if they are minor and if old and new forms are switched smoothly. In one southern African country, major changes every two years over a period of six years created considerable dissatisfaction (083). In the case of Botswana, lack of regular review led to overloading and complications of a once simple system (022).

CONCLUSIONS

This chapter has emphasized the need for severe limitation of data collection to keep requirements within the information system's capacity. Most systems try to col-

lect more data than they can actually manage, and so available data are both inaccurate and underused. Systems should concentrate on obtaining only information which can be collected accurately and in a timely fashion and which managers are able to use. Few systems do this well.

Information collection should be targeted to key program objectives, and data should not be collected on problems that are currently beyond solution. For this to occur, managers must specify their objectives in a quantifiable form, something that is difficult for many. Collections should focus on problem indicators rather than on amassing complete data for each possible problem. A program without adequate supervisory resources, for example, may choose to delay data collection on village health workers because little could be done about problems that might be revealed. Data objectives should be planned after considering both collection and use constraints.

Many data collection methods are available, including service and activity records, scientific and informal surveys, censuses, event reporting systems, accounting and inventory records, and informal observation and communication. These alternatives have contrasting strengths and weaknesses. Many programs place too much emphasis on collection of routine service statistics from every reporting station, when periodic samples or other collection devices would be equally or more effective.

Initial improvements to information systems are likely to require considerable effort, but future problems can be reduced through periodic system review and revision, as in Jamaica. Program needs change continually, and systems should be flexible enough to respond. Periodic review facilitates evolutionary rather than revolutionary change and encourages a close link between data collection and use.

systems of health information: the case of service records

Two of the most important considerations in data management are that information should *flow* from collector to analyzer to user, and that data collectors have appropriate *incentives* to report promptly and accurately. Information systems form chains, linking basic health workers to supervisors to national managers, and weakness in any single link threatens the entire system. One of the most common causes of weakness is that individual “links” perceive no personal or professional benefit from reporting, and so they do it begrudgingly and poorly. This chapter is about systems—about the role of each link as a data collector and as a potential user, with particular reference to client records and service statistics.

Most programs already have some form of service reporting, and few have the luxury of designing from scratch. Even when new systems are feasible, they should reflect detailed analysis of their predecessors because many of the same strengths and weaknesses

will recur. New systems are attractive, but old systems can be improved if weak links are identified and strengthened.

The first step in system review is to identify those who collect and use data, and to analyze how they relate to others in the system. Their overall program responsibilities should be considered as well as specific functions in data collection and use. These latter functions should be related to program responsibilities to ensure compatibility. Reviewers should then consider the support that data collectors/users need to carry out these functions and should identify frequent problems. This chapter will illustrate such a review.

WHO IS INVOLVED IN A TYPICAL SERVICE STATISTICS SYSTEM, AND HOW DOES IT OPERATE?

Service-related information originates with individual clients and communities, rises through multiple layers to

Her child on her lap, this mother provides family health information at a Sierra Leone health center. PHOTO: UNICEF, New York, by Bernard P. Wolff.



Support Needed

Families and communities participate in these ways only if their local health workers are well trained and easily accessible. Workers need to understand information themselves and must be able to explain it coherently to others. This is easier if reporting and monitoring forms are well designed and use local vocabulary. Health education helps families and communities to make better use of information.

Common Problems

Table 3.1 details familiar problems, including inadequate worker training and supervision, and a sense that data collection is for national managers rather than for communities. Many programs using growth monitoring charts report that workers fail to explain them or that the clinic keeps the chart so that parents rarely see it. Parents and community health volunteers often have little incentive for reporting births, deaths, or disease outbreaks.

FIELDWORKERS

Overall Responsibilities

In primary health care, the first line of service reporting is the fieldworker or clinic staff or both. Fieldworkers are generally of local origin and provide a link between the somewhat more formally trained clinic staff and their service population. They are minimally educated and sometimes illiterate, yet they are expected to diagnose common diseases, to refer problems to clinics and hospitals, and to organize community health activities. Some are clinic based and closely supervised, but many work from their homes or shops with only occasional outside technical support.

Information Collection

The responsibility of fieldworkers for data collection varies from program to program, depending partly on whether they are paid or volunteer, and partly on their literacy status. Fieldworkers may keep records of infant weight and height, of home visits, of drug distribution, and of other activities. They may be asked to either record or inform others of vital events and disease incidence. In a Bangladesh project, for example, fieldworkers report births, deaths, and diarrhea episodes to supervisors, who then record them (797). Fieldworkers may also organize and conduct community health surveys.

Information Use

Fieldworkers use information to guide their own work and support data use by families and communities. They may use population registers to identify individuals needing specific services, and they may use clinic files to follow up on persons who have missed appointments. They explain growth monitoring charts to parents and help illiterates to read appointment schedules. With community leaders, they review the results of local health surveys.

Support Needed

Fieldworkers need training and supervision to understand the rationale for data collection, to complete standardized forms, to help others to apply health information, and to use information themselves. When data are required for higher levels, workers may need appropriate incentives, especially when the government is not giving them a regular salary. Supervisors, referral institutions, and others receiving fieldworker data should both acknowledge information receipt and respond supportively. An adequate supply of forms is also essential.

Common Problems

Information collection, unfortunately, tends to have a bad name at the field level, because managers often require more data than direct service personnel are able to collect or use. Reporting is often seen as a duty rather than a tool. Training for data application is inadequate, and supervisors who do keep in regular contact with subordinates (a minority in many programs) may ignore worker reports. The frequent result is that fieldworkers report only sporadically and do not teach communities and families to use information.

More specific problems include the following:

- form design does not reflect worker educational level or illiteracy
- workers may leave reports at home and record from memory rather than at the time of service (510)
- referral institutions may ignore worker information and fail to report back on the treated patients
- reporting forms may be unavailable (340, 605, 321).



Community nutrition surveys allow even minimally trained health workers to identify persons needing special care. This worker in Uganda is measuring the child's arm circumference. PHOTO: UNICEF, New York, by Thorning.

Table 3.1 An illustrative analysis of a service statistics system

<i>Actor</i>	<i>Roles in system</i>		
	<i>Overall responsibilities</i>	<i>Information collection</i>	<i>Information use</i>
Individual users, their families, and the community at large	<ul style="list-style-type: none"> • Care for own or family health • Modify health-related behavior, including diet and treatment regimens • Manage environmental health activities 	<ul style="list-style-type: none"> • Provide patient data to health worker • Notify worker of communicable diseases, pregnancies, births and deaths • Participate in community surveys 	<ul style="list-style-type: none"> • Monitor child growth and development • Return for scheduled appointments, booster doses, etc.
Fieldworker	<ul style="list-style-type: none"> • Link clinic and clients • Follow up on missed appointments • Organize community for environmental activities • Do disease and vital event surveillance • Offer basic curative and preventive services 	<ul style="list-style-type: none"> • Report home visits, educational meetings, vital events, disease incidence • Dispense (and record use of) drugs, contraceptives, oral rehydration, etc. • Organize community health surveys • Gather diagnostic data before referring patients to clinics or hospitals • Create lists of persons needing specific services 	<ul style="list-style-type: none"> • Explain growth monitoring, follow-up regimens, etc., to patients • Use clinics or hospital information to monitor patients after referral • Use survey register to identify clients, environmental health problems, etc.
Clinic staff	<ul style="list-style-type: none"> • Manage individual and family health • Organize environmental health activities 	<ul style="list-style-type: none"> • Complete individual patient records • Complete visit registers • Receive reports from fieldworkers • Store information • Forward periodic reports to higher managerial levels 	<ul style="list-style-type: none"> • Manage individual patients • Follow up missed appointments • Manage and evaluate clinic (see "district supervisors") • Explain growth charts and other records to patients
District supervisors/ Regional managers	<ul style="list-style-type: none"> • Provide technical support and supervisory control • Provide secondary treatment for more difficult cases 	<ul style="list-style-type: none"> • Receive weekly or monthly forms from clinics • Supervise staff in data collection; follow up on late or inadequate reporting • Forward data to higher levels, perhaps after aggregation 	<ul style="list-style-type: none"> • Evaluate clinic performance; reward high performers and investigate low performers • Help lower staff to interpret data and apply results to their own work • Review clinic diagnoses and treatment and give needed technical help

- Access to worker to report vital events or diseases
- Careful explanation of growth chart, follow-up schedule, etc. from health worker

- Data collectors ask "too much" information
- Respondents cannot accurately answer questions (e.g., age)
- Health worker fails to explain growth monitoring or other feedback
- Communities have few incentives to report vital events or disease incidence
- Clinic may retain record

- Train health worker to complete growth chart and explain it properly
- Give health education to mothers
- Design forms so that patients can understand them
- Have patient retain their records
- Feedback personal and community health information

- Training/supervision for completion of forms, for conduct of community surveys, for use of information
- Adequate supply of forms
- Performance feedback from supervisors
- Incentives/sanctions for timely and accurate reporting
- Information from referral institutions regarding discharged patients

- Worker does not understand how to use information in his/her work
- Worker fails to explain growth monitoring or other records to clients
- Supervisory feedback is minimal
- Worker is illiterate or does not otherwise understand forms
- Clinic/hospital does not respond to referrals
- Worker does not complete forms
- Forms are not available

- Collect detailed information only on clients that need continuing attention; consider sampling for other information gathering objectives
- Design forms for illiterates
- Feedback personal and community health information

- Adequate supply of forms
- Training/supervision for completion of forms and for information use
- Performance feedback from supervisors
- Reporting requirements that do not interfere with service delivery
- Incentives/sanctions for accurate and timely reporting

- Form completion interferes with service delivery
- Clinic records cannot be located
- Clinic has multiple forms for single patient, duplicative information requirements, etc.
- Clinic may not have current forms or may be completing out-moded versions
- Staff may be inadequate to follow up on missed appointments
- Forms may be completed late or never

- Reduce or eliminate forms
- Train staff in form completion and use of information; perhaps develop a manual
- Give timely feedback
- Collect some information on a sampling basis
- Give incentives for accuracy; reduce incentives for inaccuracy
- Have supervisors complete reports during site visits

- Timely and accurate reporting from below
- Timely and accurate feedback from above
- Resources to facilitate supervision
- (Perhaps) a statistical clerk to process forms

- Data flow from below and above is inadequate
- Managers lack will or authority to remedy problems
- They have inadequate resources for supervision
- They are unable to interpret data
- Data ignore vital program components, such as community participation, home visits, etc.
- They receive too much data, often not related to key objectives

- Reduce data collection to essential indicators only
- Make spot checks to validate clinic data
- Follow up on late or missing reports
- Accelerate feedback from central processing unit
- Increase supervisory resources and authority
- Provide data clerk to expedite reporting
- Send reports directly from clinics to central processing facility

Table 3.1 An illustrative analysis of a service statistics system (continued)

Actor	Roles in system		
	Overall responsibilities	Information collection	Information use
National statistical staff	<ul style="list-style-type: none"> • Direct supervision of data collection and processing systems • Strong guidance and assistance to others for use of information • Design and modification of information system to help management achieve its objectives 	<ul style="list-style-type: none"> • Receive and process data from lower levels: monitor completeness of reporting, verify accuracy, and keypunch or manually tabulate data • Prepare program statistics • Supervise and assist lower-level data collection; prepare manuals, organize training sessions, rectify common problems • Develop data collection instruments 	<ul style="list-style-type: none"> • Prepare action-oriented summary reports • Prepare newsletters to dramatize key findings • Meet regularly with program managers • Train managers in information use
National program managers	<ul style="list-style-type: none"> • Determine program objectives • Manage program in light of these objectives and results 	<ul style="list-style-type: none"> • Establish information objectives • Allocate funds for all aspects of data collection and analysis • Supervise statistical unit 	<ul style="list-style-type: none"> • Manage program in light of results • Encourage information use by subordinates

CLINIC STAFF

Overall Responsibilities

Clinic staff have many of the same functions and responsibilities as fieldworkers, but they are generally better educated and trained. Unlike at least some fieldworkers, they may be exclusively preoccupied with personal curative and preventive services and have little role in community activities. They receive as well as initiate referrals and are likely to be less isolated than fieldworkers from the rest of the health delivery system.

Information Collection

Clinic staff almost universally record data, although often only in a visit log. More developed systems use individual patient records, which are either given to the patients themselves or filed at the clinic. If filed, they must be retrieved and updated at each visit. Some reports are forwarded to supervisors or directly to central offices for analysis; these may consist simply of the visit log (usually a copy), or they may be summary counts of patient contacts by certain characteristics. Jamaican Ministry of Health clinics keep daily tallies of

patient visits (as well as individual patient records) and transfer monthly totals to a summary report (see Page 38 (603)). If fieldworkers collect data, clinic staff are also expected to provide them with forms, advise them in form completion, and supervise them for prompt and accurate reporting.

Information Use

Clinic staff use patient information to manage individual clients, and they assist parents and clients to interpret growth monitoring charts and to recall appointment dates and other specific information. They create "tickler files"—systems to remind them of patients due for visits—and they use them to follow up on missed appointments. In conjunction with supervisors, they use information fed back from higher levels to evaluate and adjust their activities.

Support Needed

Clinic staff need both technical guidance and an adequate supply of forms, but more importantly they need understanding and encouragement from supervisors.

Support needed

- Adequate staff
- Adequate computational facilities
- High-level political and managerial support for data collection and use
- Accurate and timely reporting from lower levels

Common problems

- Staff and equipment are inadequate
- Political support is inadequate
- Results are based on incomplete or inaccurate data
- Statisticians are more interested in numbers than in managerial needs; they often communicate poorly

Ameliorative measures

- Train and expand staff
- Supply calculators, computers, or other data processing equipment
- Publish data more selectively, with more interpretation
- Orient managers to make better use of statistical resources

- Timely reporting and analysis
- Data relevant to program objectives
- Action-oriented recommendations rather than undigested statistics

- Managers are unable or unwilling to manage
- Managers prefer informal information channels, perhaps related to personal rather than to program objectives
- Results are too late to be applied
- Results are too incomplete or inaccurate to be useful
- Data are not related to key program objectives
- Managers do not understand statistics

- Train managers
- Simplify presentations by statistical unit
- Simplify information collection: reduce number of forms and use sampling
- Monitor data collection more closely
- Concentrate on key program indicators

The value of information needs to be illustrated to them by using data they themselves have collected. They need training in data collection and manuals for reference, as well as the opportunity to suggest changes in data collection procedures.

Common Problems

Clinic-level data collection is fraught with problems that sometimes undermine the entire health information system. Workers may spend 30 percent or more of their time completing and filing forms and summarizing data for supervisors (302, 513, 023). Multiple and sometimes redundant forms may be required for the same patient. Workers fall behind in their reporting; data may be "made up" or recorded incorrectly. Patient records filed at the clinic may be lost or at least not easily retrieved when the patient returns. A consultant in one Caribbean country, for example, reported that many clinic forms were stored in cardboard boxes and had been partially eaten by rats and cockroaches (605). Out-moded forms may be in use, or there may be none available at all. Reports from Liberia (811) and India (811)

Bulky health records may complicate home visiting. Patient retention may ease the fieldworker's burden. PHOTO: WHO, Geneva, by D. Deriaz.



TALLY SHEET--ANTENATAL SERVICES

MONTH OF: HEALTH CENTRE:
 PARISH:

1 Day of Month	2 Sessions	3 Total Visits	4 Total No. of Women Receiving Antenatal Services at Health Centre for First Time this Pregnancy by Length of Pregnancy			5 Total No. of Pregnant Women (New & Old Patients) Completely Immunized or detected to be Completely Immunized against <i>feranus</i> this month.	6 Total No. of Pregnant <i>First Visit</i> patients who before becoming pregnant were using <i>Family Planning Methods</i> by reason for discontinuing use of methods.													
			a Less than 16 wks.	b 16-28 wks.	c More than 28 wks.		a Planned Birth	b Method Failure	c Method Misuse	d Method Dissatis- faction	e Supp- lies Not Avail- able	f Dissatis- faction with F.P. Services	g Social Pres- sure	h Othe						
			1																	
2																				
3																				
4																				
30																				
31																				
TOTAL																				

One of several monthly tally sheets used in the Jamaican health program.

MONTHLY REPORT 1

indicate that forms were not available because of a paper shortage, while workers in Bolivia (510) and India (302) had to record information in personal notebooks and transcribe it later when forms became available. Many programs do well to know whether particular clinics are staffed or not, let alone to know how many patients they see.

Problems occur partly because neither supervisors nor clinic staff know why data are required and how they might be used. Recording is considered obligatory and an obstacle rather than a support to service delivery. Supervisors do not encourage data use because they make few field trips and receive little performance feedback from above.

DISTRICT SUPERVISORS AND REGIONAL MANAGERS

Overall Responsibilities

Bureaucratic structures above the clinic level vary greatly from country to country, but in most places there are both small district hospitals and some form of regional authority between the primary care subcenter and the Ministry of Health. District personnel usually supervise subcenter personnel.

Information Collection

Some programs have clinic data sent directly to the central government, while others use intermediate person-

Month: _____

Village: _____ Health worker: _____

How many sick people did you see this month? Men ___ Women ___ Children ___

What health problems did you see most often this month? _____

What was the most serious problem you saw this month? _____

What were the causes? _____

What are you doing to help prevent these problems from happening again?

Include activities of health workers, health committee, parents' groups, and school children.

What was done in the following areas?

Latrines _____

Safe water supply _____

Village cleanliness _____

Vaccination _____

Nutrition _____

Other _____

Did someone from the program visit this month? _____

What did you do together? _____

How is your supply of medicines? _____

What help or information do you and the health committee need in order to do a better job? _____

Even simple forms, such as this suggested by the Hesperian Foundation, can help community workers summarize their activities. (Source: 818, p. 10-9)

nel to consolidate and forward local data. Programs in Thailand (Lampang) (355) and India (Bangalore) (302) require supervisors to collect data directly from health worker records during supervisory visits. Intermediate personnel are responsible for distributing forms and ensuring that they are completed on time.

Information Use

In decentralized programs, intermediate personnel have significant responsibility for identifying, investigating, and resolving programmatic difficulties. They should also assist subordinates to use information in their own work.

Support Needed

The support that managers require depends on their degree of decision-making authority and on whether they process clinic level data. District offices that consolidate local reports or prepare statistical analyses require appropriate staff and equipment. Many larger programs routinely provide them, while even tiny Rwanda has statistical assistants in each of its ten districts (150). Intermediate personnel in centralized programs require feedback from central units, preferably within thirty days of each reporting period. They must also have vehicles, gasoline, and travel allowances so that they can supervise.

Common Problems

Intermediate personnel may sometimes act more as a barrier than as a facilitator to communication between local units and the Ministry of Health. In an African country, for example, regional supervisors acknowledged receipt of far fewer forms than clinics claim to have sent, due either to loss in transit or to inadequate regional office procedures (170). Regional staff may lack the will or resources to manage effectively, or the data they receive may be inappropriate. The strength of regional personnel in information systems reflects their overall strengths in management.

NATIONAL STATISTICAL OFFICE

Overall Responsibilities

The service statistics system is ultimately under the authority of some central unit within the Ministry of Health. This unit is unlikely to house all aspects of health information activity, as defined in Chapter 1, however, since the census, vital registration, and epidemiological units are often separate. Data on personnel, equipment, and supplies are usually collected by the administrative branch rather than by the statistical office. These separate statistical units should ideally work together but often do not.

Information Collection

The central service statistics unit has overall responsibility for activity reporting. It translates managerial objectives into information requirements, advises managers on alternative methods of data collection, designs and

pretests forms, and prepares manuals and training modules for collectors. It then prints and distributes forms, institutes systems for managing data flow, and follows up vigorously on those who report late or inaccurately. This office should also investigate problems in collecting data and advise managers of possible changes.

Information Use

The statistical office's role is equally important in facilitating data application. This begins with the processing and analysis of service records and includes the preparation of interpretative reports for managers. Statistical staff should ideally communicate with managers both verbally and through numerical presentation. They should understand managerial objectives, and the degree to which key personnel can use statistics. They may develop manuals or training modules on data use and prepare informal newsletters highlighting important findings. Appropriate data application is ultimately the responsibility of managers and planners, but the statistical office has a major supportive role.

Support Needed

The statistical office cannot perform these functions without high-level political and budgetary commitment to information use. It needs an adequate and stable staff, office space, and functioning electronic or mechanical equipment. (The latter, of course, is an important issue, to be discussed in Chapter 5.) It needs clear guidance about program objectives and managerial requirements. A close collaborative relationship between managers and data specialists can exist only if both sides are actively interested.

Common Problems

Required support is generally weaker than might be desirable, however, and, as described in Chapter 2, most statistical units are inadequately equipped and staffed. Managers may not understand how to use data, and may lack the will or authority to do anything about results. Statisticians may prepare sophisticated reports that interest only themselves, or, more often, they prepare non-analytical tabulations that interest nobody. The data provided them by lower levels are often incomplete and inaccurate. The result is that data specialists become weak and isolated and fail to fulfill either their data collection or data use responsibilities.

NATIONAL PROGRAM MANAGERS

Overall Responsibilities

National managers set program objectives, allocate budgeted resources to achieve them, and monitor problems and progress in order to correct course when necessary. They are generally responsible for the major decisions relating to project implementation, and in highly centralized bureaucracies they make numerous day-to-day decisions, too. Ideally, they work closely with planners and evaluators.

Information Collection

Effective information systems cannot exist without active and objective-oriented managers. Managers should determine what kinds of information need to be collected, how often and in what detail it is required, and how it should be collected. They decide how much will be spent on data gathering and who within the ministry structure will be in charge.

Information Use

Managers also create the environment in which formalized information is applied or ignored. They may reward subordinates who use data to manage by objectives, or they may alternatively choose to reward political allies, friends, or those who simply stay out of trouble. They may show the way by using data in their own work, or they may ignore statistical reports and allow data specialists to isolate themselves. The information environment is not created by single actions, but by the manager's training, by the larger bureaucratic structure, and by much of the sociocultural context.

Support Needed

Managers need high level political and financial support in order to create a strong information system, and they need resources and authority to respond to whatever problems the system may uncover. They cannot be effective managers without timely, reliable, and comprehensive reports from the statistical office, and they cannot apply data effectively if subordinates are political appointees or otherwise beyond their control.

Common Problems

The link between management and formalized information is often weak for a variety of reasons:

- Managers do not articulate clear objectives, so information gathering is undirected.
- Stated managerial objectives differ from those actually manifested by managerial behavior.
- Managers lack resources or authority to resolve problems.
- Statisticians produce more (or more complex) data than managers can digest.
- Alternatively, they produce statistical compendia without appropriate interpretation.
- Reports are too late or incomplete for use in decision-making.

The list is familiar and could be lengthened. The basic problems may be that statisticians and managers have different professional outlooks and that neither thinks in terms of management by objectives.

CONCLUSIONS

Two principles must be emphasized about information collection and use:

- Data flows in systems made up of multiple individuals and offices. If even one link is weak, the entire system

suffers. Improvements should begin with the weakest link because strength in one link cannot compensate for weakness elsewhere.

- Data collection is closely tied to data use, and improvement in one is generally not feasible without improvement in the other. Managers who do not use data are unlikely to encourage collection. For the most part, field and clinic workers should collect information that helps directly with their work. Information will not be used if it arrives after decisions are made, if it is irrelevant, or if it is hopelessly inaccurate.

Existing information systems should be thoroughly analyzed before being modified or replaced. Evolutionary changes may be more practical and effective than revolutionary ones. Systems need to grow and change with time, and sudden shifts in data collection methods may confuse rather than simplify. Major overhaul is undoubtedly necessary in many systems, but planners should give priority to the weakest links because these reflect problems that are likely to recur later if the basic causes are not treated.



Patient retention of health records may be superior to clinic retention, especially where file space and staff are scarce. This family has just presented their records to a health worker in Chad. PHOTO: UNICEF, New York, by M. Murray-Lee.

improving information collection

Chapter 3 touched on numerous data collection problems, and while some of these remain unavoidable, many programs have found ways to reduce and adjust them. This chapter considers ways to improve information collection with particular emphasis on service statistics.

FORM DESIGN

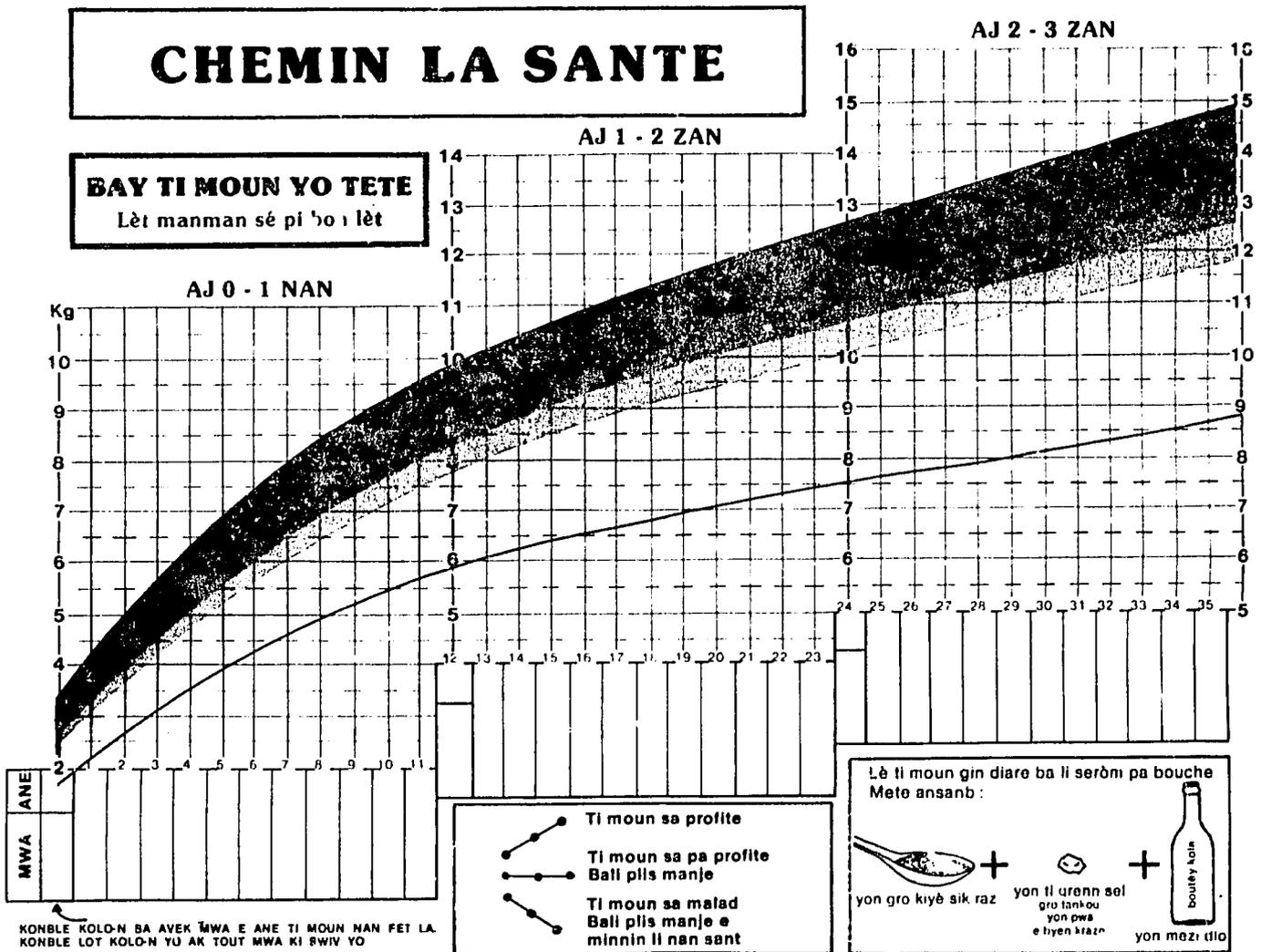
Systematic information collection uses standardized forms, like the ones in the figures in this volume. Most forms have multiple blanks or boxes, and many use abbreviations to save space. They are rarely self-explanatory, even to a person familiar with a specific program.

Those who fill out forms can be taught the necessary

shorthand and abbreviations, but mistakes will nevertheless occur, especially when new forms are introduced or untrained workers complete them. Some mistakes become visible only after many errors, thus wasting the good efforts of those who record correctly. Many errors are not predictable. A well-educated urbanite or foreigner, for example, may have little idea how an illiterate or semi-educated health worker will record.

Pretesting of forms in typical field situations is essential to evaluate their simplicity and accuracy. A Philippine program reported:

Before new service statistics forms are introduced, they should be pretested locally—not just to make sure they are clear and ask obtainable information, but also to



Child growth charts, such as this one from Haiti, should be written in local dialects so that parents can understand their child's progress.

ensure that they fit into the whole system of forms already being filled out by fieldworkers. (Designers should be required to fill out their own forms under typical field conditions!) Since service statistics systems tend to be already overloaded with forms, a primary concern should be with simplification, not adding more forms which would only reduce the quality of information already being collected. (344, p.22)

Pretest participants should represent normally trained and supervised health workers, and activities should be both recorded and independently observed for confirmation. Pretesting will uncover obvious problems such as confused wording, undue complexity, and so forth, but some implementation problems will occur anyway and need to be observed to permit later form revision or statistical adjustment.

Simplicity is especially critical when forms are to be used by communities and families, as in informal surveys, growth monitoring, and activities requiring return patient visits. Infant growth, for example, is usually recorded on colorful "road to health" charts, as pioneered by David Morley (792), and when properly explained these may give parents a graphic picture of child growth. The rural health program in Haiti (584) uses colloquial Creole on growth monitoring forms to facilitate comprehension, even though standard French is used for clinic forms (see Page 41). Community survey forms also need to be simple, as illustrated in Appendices A, B, and C. *Helping Health Workers Learn* by Werner and Bower (818) presents a number of model forms for minimally trained health workers.

Forms for basic workers should be designed as if the users are illiterate or semi-educated since even literate

workers may understand pictures better than words. Community-based programs prefer to deliver services through representative local residents and to draw on traditional practitioners and birth attendants, and in many places these personnel have little or no formal education. Programs in Ecuador and Guatemala (560), Indonesia (030), Egypt (030), Mali (100), and elsewhere have developed special forms for illiterates, and a recent consultant in Mauritania recommended seventeen pictographs for specific diseases and health conditions (111). (See illustration.) Most programs pretest pictographs carefully, but results have not been scientifically evaluated or published.

DEFINITIONS

Precise definition of certain data is essential so that everyone will record information in the same way. Most programs, for example, want to know the number of people they serve as well as the number of clinic visits. Patients may be counted twice (at the first and second visits, for example) if "first visit" is poorly defined or if confirmation of earlier visits is difficult. Pretesting will reveal some unclear definitions, especially if data collectors are obviously confused, but even after implementation, workers may interpret questions differently and create problems that become apparent only after a year or two.

Unduplicated patient counts are easier to achieve in programs with a well-defined beginning and end than in programs requiring long-term clinic-patient relationships. Antenatal programs, for example, start with the first contact prior to a specific birth and end with the delivery, while immunization programs start with the

With adequate training, even illiterate workers can use simple forms such as this one suggested for Mauritania. (Source: 111)

RMA/013/S/A Département de: _____ Village N°: _____ A.S.C.: _____ Superviseur: _____		FICHE DE TRAITEMENT بطاقة علاج Date: _____		Supervision N°: _____ Nois de: _____																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
																													
																													
																													
																													

first shot and end when the series is completed. Family planning is more complicated because contraception is used intermittently and may be interrupted for a change of method or a planned pregnancy; a client may be new to a specific clinic but experienced with service elsewhere. Curative programs are lifelong but usually count the number of clients seen each calendar year. Problems in defining "new patient" may be reduced if computers are used to search for prior visits, or if clients have unique numbers or identifiers, but this is rarely possible. Questionable definitions, such as these, must be refined and recorded so that everyone involved knows precisely what is meant.

TRAINING AND MANUALS

Training in data collection should cover the mechanics of definitions and form completion as well as more general methods of record keeping. It should also show how data are used, since data collection will falter without clearly understood purpose. Instructions should be preserved in manuals for later reference.

A report on the Indian Population Project followed these guidelines in introducing a new information system:

—The training for all categories of staff should be of at least two days duration; the first day should be devoted for explaining the details of the system including the items included in various registers, forms and charts . . . The second day should be spent on practical exercises with the new registers and forms and also field work.

—The training should be organised for the supervisory staff . . .

—The training for the other field personnel . . . should be conducted at the primary health centers, and the supervisory staff trained in the districts should be made responsible . . .

—A detailed training manual should be prepared in the local language explaining the principles of the system, each of the records and forms used, methods of filling up these forms and the usefulness of each item of information collected . . .

—After the initial phase of training is completed and the system introduced . . . it is necessary to have orientation training for the staff in the system at least once a year for one day, at the primary health center for the field staff and at the district level for the supervisory staff. It is found that at least one orientation programme is necessary within the first six months after the introduction of the system, for the supervisory staff . . . (302, p.46)

This project, serving nineteen rural districts outside Bangalore, held the following training courses:

- two-day training sessions at each primary health center
- a one-day session for lady health visitors (who were to complete summary reports during monthly supervisory visits)
- individual discussions with district-level supervisory staff

- two one-day sessions for primary health center statistical clerks
- a one-day orientation session for senior medical officers (300).

Constant retraining may also be needed because:

- trained people leave
- someone other than the trainee fills out forms
- trainees forget
- new forms are occasionally introduced.

Training programs are also needed in data application, a point to be further discussed in Chapter 5.

MISSING AND LATE REPORTS

Programs in many countries are plagued by missing or late reports, leading to uninterpretable statistics and wasted effort. Examples include:

- 59 percent of clinics not reporting in the Philippines population program, as of 1978 (342)
- 60 percent of facilities reporting more than one month late in Lesotho, as of 1979 (083)
- 30 percent not reporting within fifteen days in Jamaica; 17 percent not reporting within forty-five days as of 1981 (603).

Incomplete reports complicate national statistics, although they may still be useful within local areas.

Common problems, besides direct noncompliance, include lack of forms and loss in transit. As was men-

MINISTRY OF HEALTH & SOCIAL WELFARE

PATIENT INFORMATION TALLY SHEET

FACILITY _____ MONTH _____

AGE GROUP	MALE				TOTAL	FEMALE				TOTAL
0-28 days	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Under 1	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
1-4	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
5-13	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
14-49	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
	0000	0000	0000	0000		0000	0000	0000	0000	
50-65	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
65+	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Referred in	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Patient outside of Service Area	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
	0000	0000	0000	0000		0000	0000	0000	0000	
Overnight Stay	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
No. Lab. Tests	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
No. Minor Surgical Procedures	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Childbirth in Facility	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Childbirth outside of Facility	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
Deaths Reported in Area	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Tally sheets such as this one from Liberia may simplify data collection. Clerks fill in circles to represent patients seen.

tioned previously, paper shortages prevented the introduction of new forms in Liberia (812) and Somalia (812), while printing of forms in Nepal was delayed in 1981 by a procedural difficulty (321). In India (302) and Bolivia (510), workers reportedly kept records in personal notebooks and transferred them later; the results were substantial extra work and probable errors. An Indian report recommends that stockpiles of forms be adequate for two years' use; they should be distributed as follows:

- one year's supply at state level
- six months' supply at the district level
- four months' supply at primary health centers
- two months' supply at subcenters (302, pp.47-48).

The Jamaica program plans to review and possibly revise forms every twelve months, however, and could not use such a lengthy pipeline.

Losses in transit have been reported from Africa (170) and elsewhere, though some of these may have actually resulted from non-reporting or poor storage at the receiving end. Many family planning programs supply postage-paid envelopes and require direct mailing from clinics to the central government; examples include Indonesia, Malaysia, Nepal, the Philippines, and Thailand (817). This method is most appropriate when there is quick feedback to intermediate personnel since they will otherwise lack data for supervision and management.

Many programs seek to expedite reporting by establishing fixed due dates and publicizing clinics that fail to meet them. The Jamaica program calculates compliance rates by district and requires dilatory districts to investigate and resolve problems (603). Programs in India and Indonesia make salary payment contingent on reporting, an effective but possibly risky innovation (because some workers may file false reports) (817). These efforts are inappropriate where data are collected by volunteers, and, in fact, a consultant report from Bolivia concluded that data collection by volunteers was "doomed to failure" (510, p.3).

A recent comparison between primary health and immunization reporting systems in Rwanda concluded that the latter achieved superior compliance simply because immunization officials emphasized reporting and made sure that workers knew it (150). In Indonesia, 97 percent of reports reached Jakarta within fifteen days of the close of each reporting period, a success that administrators attributed to:

- (1) *Rapid feedback reports.*
- (2) *Use of "ranking" to distinguish outstanding performance.*
- (3) *Monthly specific notations of non-compliance in timely reporting.*
- (4) *Use of postpaid envelopes for all data system reports sent to central headquarters.*
- (5) *Continued field supervision by central and provincial headquarters staff.*

(6) *Extensive circulation of feedback reports to maximize peer review by co-workers and professional colleagues. (310, p.17)*

Improved information use clearly influences the data collection rate.

SHIFTING THE BURDEN OF ANALYSIS

Data collectors in health programs are mainly direct service personnel, and time they spend on reporting reduces time available for clients. Not surprisingly, many workers emphasize service and consider reporting a bother—except to the extent that it helps them to serve their clientele. Whenever possible, data should be collected and analyzed by those who will use them, since they will have the strongest motivation for accuracy and completeness.

Most programs have the clinic staff calculate monthly visit totals by various characteristics, using daily registers, visit forms, or other types of records—even though in many cases copies of these records could be forwarded instead. In Botswana, visit registers include a carbon copy that goes to the capital for analysis (020). Supervisors in one Indian project are required to visit the staff monthly and make their own summaries (302);* this relieves basic health workers of some reporting burden and gives the supervisor a more direct understanding of what is happening. In Costa Rica, administrators spend one day a month assisting health workers with record keeping (540). These innovations are only rarely possible, however, given the paucity of supervision in most programs.

VALIDATION

Data validation—the checking of reports for accuracy—is a final essential aspect of any careful study. Validation is similar to the testing discussed earlier except that it occurs after implementation and should include some checking on individual clinics and workers. (Pretesting, by contrast, evaluates only the forms themselves, not the workers filling them out.) Programs may inadvertently encourage workers to over- or under-report certain activities in order to gain supervisory approval. They may also provide inadequate guidance on form completion. Validation checks for these biases using a small sample of reports, and it usually develops methods to adjust for error.

The Lampang project in Thailand, for example, observed health volunteers informally and determined that they were under-reporting patient contacts and creating an overall underestimate of program activities (354). Under-reporting could not be precisely measured, but interviews produced an estimate which was then

*The Philippines project reports, however, that volunteers sometimes resist data collection by supervisors. Some supervisors were not allowed to see the forms, while others were told that they could see them only on certain days. In one area, the field personnel demanded to deal with someone of "a higher level" than the supervisor. (342)

used to adjust available data. Few other programs report adjustments of this nature, however.

PATIENT RETENTION OF PERSONAL HEALTH RECORDS

A major issue in personal health records is whether they should be retained by the family or by the clinic. Patient-retained records are common in Africa and virtually unknown in Latin America (773). In Botswana, patients are given a simple plastic envelope containing (as appropriate) "Under Five," "Male," "Female," and "Antenatal" cards; the envelope itself records the dates and purpose of upcoming appointments. The Botswana study reported loss rates of under 2 percent, substantially less than those for clinic-retained records (023).

Loss rates may be especially low where families have few personal documents or where patients are required to purchase record forms as a sort of membership card. Swaziland charged fifty cents per card-set in the late 1970s, and residents traveled considerable distances to buy them—even before they needed service! The country's largest hospital employed seven clerks to file and retrieve clinic records under the old system, and files stacked to the ceiling and into the halls; only two of these clerks were needed after the system was changed (180).

Two consultants reports from a small Caribbean country illustrate both the potential and problems of patient-held records. The first recommended extended use:

Some of the advantages of patient-retained records are: (1) the time that is necessary to retrieve records in the clinic can be used instead for service, (2) the patient has a personal health data base that he can present if he goes to other units for service, (3) the "agents de sante" can determine the patients' followup health needs (immunizations, family planning, etc.) during home visits—without having to keep cumbersome records themselves, (4) certain community-based health surveys are more easily conducted, (5) patient-retained records can be used for patient education and to stimulate patient responsibility for their own health care, (6) over time, especially in large outpatient units (such as hospital outpatient services), it has been found that more records are lost by the clinic than by the patients, (7) hospital discharge information can be integrated into the patient retained card, thus providing a data base for followup outpatient care. (586, p.33)

The second report, only a few months later, took a different tone, however:

Nevertheless, there are considerable problems with patient-held records. Often, patients lose them; sometimes they get wet and deteriorate. One team member saw a mother give her card to her children to play with; the card was mangled promptly. Confusion results when clinics run out of stock and begin issuing cards in different colors. If, for example, a mother arrives with a blue card when the clinic is issuing pink cards, she is apt to say she does not have a card and then be issued a new one. (582, pp.73-74)

This program, it should be noted, charged patients forty cents for new cards, suggesting that fees may not always reduce loss rates (582).

The best choice for a given country weighs both program structure and the relative risk of loss by clinics or patients. Programs with individualized outreach, such as family planning, may prefer to keep records at the clinic to facilitate follow-up on those who miss appointments.* Others may emphasize growth monitoring or regular home visits to all community residents and may, therefore, prefer patient retention. Some loss will occur regardless of where records are kept—the country described above is not far from the one where clinic-held records were eaten by rats and roaches—and so the only question is where losses will be greater. Patient retention is almost always likely to be more effective than clinic retention for health education, however.

CONCLUSIONS

Information systems in most primary care programs suffer from delayed and incomplete reporting, and many results are of questionable validity because of recording errors and ambiguous definitions. Data collection is only justified if results will be applied to program decisions, but this will not occur if data quality is inadequate. Key variables, such as "new patient," must be precisely defined, and data collectors must be trained and given manuals to ensure that they understand.

In many programs, fewer than half of the participating clinics report on time, and so information from those that do may be partially wasted. There is no simple solution to low data collection rates. Perhaps the most essential prerequisite for improvement is managerial emphasis on both systematic reporting and data application. To improve data use, managers must listen and respond to the needs of data collectors. Adequate collection and effective application are inextricably linked. If collection is poor, users lack confidence or make decisions without data, while if data are not used, collectors will see little point in diligence. Chapter 5 discusses methods of improving data application, while Chapter 6 amplifies on environmental problems that influence both collection and use of information.

*Programs may, of course, use both patient- and clinic-retained records to take advantage of the strengths of each.



Parents use information to monitor the health of their children. This nurse is explaining the baby's weight chart so that the mother will better understand her child's health status. PHOTO: WHO, Geneva, by N. N. Mashalaba.

improving information use

Even the best data collection systems are valueless if results are not used, and without strong user support, they will soon wither and collapse. Inadequate data use results from:

- managerial disinterest or misunderstanding of data
- lack of concern for managerial issues on the part of data analysts
- lack of appropriate processing equipment (manual or electronic)
- weak statistical skills among data analysts
- inappropriate presentation of results
- delayed reporting, after relevant decisions have been made.

Data collection without application is a waste of money and personnel, so either collection should be reduced or application should be improved. A 1976 consultant report noted that one African Ministry of Health was far better at collection than at use, and similar comments are common elsewhere (121). An Asian program commented that "we are drowning in a sea of facts while dying of thirst for information." (302, p.6) Data units in developing countries often have boxes and boxes of questionnaires and computer cards dating from long-forgotten surveys, many never analyzed. There is, unfortunately, no "quick fix" for any of these problems.

UPGRADING NATIONAL STATISTICAL OFFICES

Most national statistical offices need more and better staff, improved equipment, and greater office and filing space. Some might also benefit from a change in bureaucratic placement, to facilitate communication between statistical staff and decision-makers.

Manpower

Improved staff capability is often needed both centrally and regionally, and this may require new training and hiring. A 1980 consultant report from Rwanda, for example, recommended that the family planning information service hire one statistician and two demographers and that the demographers receive one month's training in Tunisia at the Office National du Planning Familial et de la Population. Trainees would learn:

- how to keep records and collect family planning data
- how to calculate objectives and compare them with results
- how to measure the program's impact on fertility

- how to analyze program activities
- how to train personnel to keep records (150).

A consultant in Somalia conducted two courses for the five assistant statisticians and eight statistical clerks in the national office during approximately a one-month period. Topics covered included:

- a description of health statistics
- information needed for planning
- logistics of information collection, including information flow, forms used, and designation of responsible individuals at each level
- presentation of data
- health statistics.

The course for assistants required seven 4-hour sessions, while that for clerks needed ten sessions (160).

This relatively brief inservice training is an inadequate substitute for a good prior education and knowledge of statistics. A donor in one southern African country planned the following more basic contributions:

1. Two long-term external participant training courses in data management for the statistical and planning units (24 person months).
2. Two short-term external participant training courses in data management for the Statistical Unit (12 person months).
3. Three statistical calculators for the Statistical and Planning Units.
4. Training for statistical reporting to be included in the curriculum of nurse clinicians.

While the government of the concerned country was to contribute:

1. One permanent MOH employee to undergo long-term (1 year) participant training at donor cost, and then serve as Chief of the Statistical Unit.
2. One statistician from the national Bureau of Statistics to serve as an advisor to the Chief of the MOH Statistical Unit.
3. Development/expansion of statistical training capabilities for MOH personnel within the Statistical Unit and for the nation's health facilities (083, pp. 40-41).

Equipment

Common equipment needs include calculators, typewriters, copying machines, and sometimes computers. A consultant report for Jamaica, for example, recommended buying two electric typewriters, a small desk-

top copying machine (with a one-year service contract and adequate paper and toner), and five five-drawer file cabinets (603). Several programs have suggested buying calculators for regional health offices, although simpler adding machines or local counting devices may sometimes be preferable.

A common dilemma concerns the extent to which data processing should be automated, particularly through use of computers. Computers can handle huge volumes of data, as large as a census or an information system based on individual visit records. They are essential when individual records are compiled and analyzed, as in the more developed health and family planning systems. Computers facilitate sophisticated analysis and reanalysis, including linkage between repeat visit records for the same individual (when a unique patient identifier is assigned). Computers can check for incomplete or obviously erroneous data and can impute values according to probabilistic formulae when information is missing (a process called "allocation"). Computers have many advantages—when they are available and practical.

Computers do not function well in many settings, however, and information processing may be seriously delayed if they are introduced too soon. Equipment failures that would be quickly overcome in developed countries may last for weeks in some developing ones because of inadequate maintenance arrangements (spare parts and technicians). Programming and operational personnel are scarce and hard to retain; private sector salaries are generally more attractive than government ones. Software may not be readily available. Most of these problems can be gradually resolved, but only after several years of processing delay.

Microcomputers are generally more practical than mainframe ones in developing countries, but they are appropriate only for relatively small data sets. Potential uses include:

- analysis of epidemiological data, as in Morocco
- survey analysis
- management of supply inventories or of small hospitals.

The U.S. Census Bureau is currently studying the potential role of microcomputers in developing countries and will issue recommendations in December 1982 (798).

The best recourse in many countries may be to gradually introduce new systems with "computer compatible" forms and perhaps mechanical processing of data cards before full automation. Computer compatible forms use only closed ended questions with a numbered list of possible responses, and they generally indicate the column number in which data will eventually be keypunched on cards. They are usable for both manual and electronic processing and thus represent a halfway house. Data may also be keypunched by counter-sorter before the computer is put to work.

Computer use is already widespread in family plan-

ning projects and in Latin American health programs, but the picture elsewhere is mixed. In Botswana (024) and Jamaica (604) (and presumably elsewhere), clinic rather than individual level reports are computerized. Small-scale demonstration projects may use computers (354). The AID-supported Hanang project in Tanzania sent reports to the United States for processing but encountered serious delays and eventually discontinued the practice.

Space and Files

Statistical offices often lack adequate space, tables, and filing arrangements. The Ministry of Health statistical office in one African country, for example, lacked even a desk (110), while in another there was only one room with four tables (812). Reports and computer printouts may be piled high on shelves rather than filed. Such conditions may reflect the low regard managers have for the potential value of information to their planning and guidance efforts. Unfortunately, in another vicious cycle, these conditions are conducive to neither adequate evaluation nor to high worker morale and hence discourage recruitment and retention of skilled analysts.

MAKING ANALYSES MORE MEANINGFUL

Improved machinery and facilities will not by themselves reduce one of the most common problems in data use, that of inappropriate or insufficient analysis. Many programs produce voluminous statistical reports, but without any attempt to draw conclusions or to show how results can be applied. Data collection appears to be an end in itself in many programs, since analysts frequently misunderstand what managers need for decision-making. Managers need interpreted information, not just raw numbers, and this almost always requires comparison between two or more information sets.

Results may be compared with:

- program objectives
- previous results
- costs
- population needs
- international norms.

The following sections illustrate.

Comparison With Objectives

Management by objectives requires continuous comparison between project targets and the direction and magnitude of current achievement. Managers can use the percent of target achieved as a stimulus to investigate poor performers or reward outstanding ones. They can also tell from target comparisons whether or not their activities are effective, that is, whether or not they are doing what they hoped they would do. Targets are only as good as the assumptions that underlie them, and shortfalls (or overly easy achievement) may result from poor planning as much as from differences in implementation. Some programs reward or punish workers

on the basis of the percent of target achieved, but this practice may encourage false reporting. Others investigate results to better understand whether planning or implementation was at fault. Comparisons are useful in either case because they distinguish successes from failures.

Geographic Comparisons

Geographic comparisons also highlight strong and weak achievers, although again the cause of relative performance may be unclear. Regional program managers should use information results to evaluate districts, while districts should use them to evaluate individual clinics. Clinics are unlikely to understand how well or poorly they did without knowing how others did in similar circumstances.

Comparisons With Need

Program achievement can also be compared with an estimate of need, even though the latter may appear arbitrary. Family planning programs, for example, estimate the number of women of reproductive age not currently pregnant, and use it to calculate contraceptive prevalence. Immunization programs use the number of infants and small children as a basis for estimating immunization coverage. The number of pregnant women receiving prenatal care within sixteen weeks of conception may be compared with the total number of pregnant women. Managers use comparisons with need as a basis for allocating resources and examining priorities.

Integrated primary care programs emphasize two comparisons with need, namely, coverage and accessibility. Both use the number of persons needing service as the denominator, but one (accessibility) indicates whether the service was available, while the other (coverage) indicates whether the service was actually used.

Accessibility is usually defined arbitrarily as residence within a specified distance or travel time of a service source, even though other factors, such as clinic hours, the sex of health workers, and the length of waiting time may be more critical for utilization. In its simplest form, the accessibility index (AI) may be formulated and applied as follows:

$$AI = \frac{\text{Population living within specified distance from a service site}}{\text{Total population}} \times 100$$

To calculate accessibility, statisticians have to know where service sites are located and where people live in relation to them.

Coverage, on the other hand, tells what part of a target population actually receives the specified service. Its formula is:

$$\frac{\text{Number of persons receiving a specified service}}{\text{Number of persons needing the service}} \times 100$$

The proportion of pregnant women who receive antenatal services is a coverage indicator, as is the proportion of people living within, say, five kilometers of a health post who visit the post during a calendar year. Coverage calculation requires a clear distinction between new and repeat visits, which in turn requires unambiguous definitions and a reliable method of counting.

Comparison With Effort

It is important to compare program outputs (the number of patients served, for example) with the monetary, personnel, and other resources expended to produce them. Two clinics with the same staff levels, for example, may have quite different activity levels, while field personnel may differ significantly in the number of families they are able to visit in a day. Differences between clinics or workers, like target comparisons, may be used to identify strong and weak performers. Comparisons with effort indicate the program's efficiency, that is, the amount of output produced per unit of input.

Formal cost studies require considerable expertise and time and are generally more appropriate for evaluation than for short-term management. Even routine reports, however, can compare output with level of effort, using indicators such as:

- number of patients per clinic session
- number of new family planning acceptors per worker.

These indicators can be calculated and compared for individual service sites and workers. Comparisons at the local level may be particularly useful for routine management.

Time Trends

Program activities should also be compared over time to see whether targets are coming closer to achievement. Comparisons must be carefully made, however, because statistical change may be due to modification in data collection procedures or in the number of reporting stations rather than to actual field changes. Seasonality factors should also be considered and, if possible, statistically controlled. Changes from one reporting period to the next are generally less reliable than long-term trends.

Comparison With International Norms

These may be useful for long-term planning but generally not for short-term management. Comparison of death rates by cause may help in understanding environmental and program factors. Nutritional surveillance programs usually use international "Gomez" standards (901).

IMPROVING THE PRESENTATION OF RESULTS

If managers are to respond to statistical reports, those reports should be appropriately presented and interpreted (and even then, of course, the response may be inadequate). Reports should:

- highlight critical indicators
- present material in a simplified, preferably graphic, way
- be reported at an appropriate frequency
- target key decision-makers.

Statisticians and managers should see each other regularly, so that they will understand each other better.

Ranking indicators in order of importance is as necessary for data analysis as it was for collection. Managers rarely have the patience to sift through results, so the most important ones need to be highlighted for immediate attention. Reports should generally begin with summaries and then go to the detail, and the covering memo should describe the most significant results.

Particular use should be made of management by exception, that is, the reporting of certain kinds of results only when they deviate from some predetermined norm or standard. Managers need not look at every epidemiological report, for example, but they must recognize and respond to emergencies as quickly as they can be reported. If they define in advance what constitutes an emergency, then statisticians can make special efforts to ring the alarm when immediate action is required.

Summaries may include rank or categorical scores. A program run by the Indian Institute of Management in Ahmedabad, for example, gives clinics A, B, or C scores, and supervisors are supposed to give special attention to the latter category (295). The Indonesian family planning program ranks regencies, districts, and clinics by percent of target achieved (310). These summary measures call attention to problems and encourage reviewers to look in other tables for detail.

Reports should be tailored to specific decision-making levels, and the degree of detail should correspond to responsibilities. Regional managers, for example, need to know how their regions compare with others and how districts under their supervision are performing, but they may not need to know about individual districts in other regions or about specific clinics. District and local supervisors, on the other hand, need clinic and worker performance indices.

Highly variable data, as described in Chapter 2, should be reported monthly, but other information may be more effective if managers have to look at it only when something significant has changed.

IMPROVING MANAGERIAL SKILLS

Inadequate information use is, of course, the fault of managers as much as it is of statisticians, and managerial problems may be even more intractable than statistical ones. Case studies in India, for example, identified the following managerial problems:

- 1) *There was hardly any planning at the primary health care center and district levels. Activities were carried out on an ad-hoc basis as and when instructions were received from the higher level.*
- 2) *The officers at these levels, by and large, did not have*

“problem-solving attitude.” Each officer listed the problems that he was facing for which he either blamed his subordinates or superiors.

3) *Supervision consisted of fault-finding and record keeping. The style of supervision needed further improvement.*

4) *Most officers saw their role as that of carrying out orders from the “top.” They did not perceive their role as that of a ‘manager’ trying to achieve the programme objectives within the given resources and constraints. (292, p.6)*

These problems, though identified as managerial and supervisory, clearly relate to information use. To reduce them, the Indian Population Project conducted ten-day training sessions for those involved (292). In Indonesia, annual health management workshops were conducted in 1975, 1976, and 1977 (311). While training may help, ingrained managerial habits (or nonhabits) may be hard to change.

COMMUNITIES AND FAMILIES

Communities and families are potentially among the most important information users in primary health care, but many programs neglect them. Local information use may be increased by patient retention of personal health records, by discussion of community statistics at village meetings, and by graphic display of certain indicators. Patient retention of records was discussed in Chapter 4 since it pertains to both data collection and use.

Many programs encourage health workers to post some of their key results in public locations and to submit monthly reports to local committees as well as to supervisors. In Upper Volta, for example, community growth monitoring results are posted after each weighing session (210). Costa Rican health clinics display house by house village maps with green, red, and black pins marking the residence of every pregnant woman, and every case of first or second degree malnutrition (540). A similar system was used in the Nicaraguan Health Information and Planning System (610). In Lardin Gabas, Nigeria, workers discuss reports with representative community health committees (141).

CONCLUSIONS

This chapter has reviewed a number of measures to improve data use, including appropriate analysis and presentations. Where data use is minimal, statisticians must take care to encourage rather than to intimidate managers. They must stimulate and educate them, not antagonize them by sending complicated reports. They must lead managers into more detailed analyses by first developing their confidence in simpler ones. Many statisticians prefer to demonstrate their professional expertise, or they may simply blame managers for nonresponsiveness, without realizing how they themselves might contribute more effectively.

Statistical personnel should give managers the data they want, but they should also lead them toward

related information which they do not specifically request. Statisticians can detect some problems or successes better than managers can, and they should not refrain from reporting them simply because program personnel seem uninterested. Regarding tuberculosis, for example, managers may ask only for the number of cases treated, not for relapse rates, so statisticians may

use special oral or written reports to highlight specific problems. The statistician-manager relationship requires continuous and delicate cultivation. Managers need to convey their program priorities, and statisticians need to advise them on results, but mutual trust and respect are often difficult to achieve.

Graphic presentations improve information use. Health workers in Swaziland prepared this simple map showing results of a community survey. PHOTO: H. Daniel Thompson.





Even carefully recorded information may be of little value if managers do not know how to use it.

the managerial environment

Accurate, timely, and appropriate information is critical to organizations that manage by objectives, whether they be in health delivery, agricultural development, or public education. Managers at all levels need to know what their objectives are and whether they are being achieved. They need to identify logistical bottlenecks and sudden disease outbreaks. They need to know whether services are being provided as planned, and whether their intended clientele are actually making use of them. Above all, they need to know (if possible) whether the services are making any difference to fundamental problems—whether fewer children are malnourished or dying of diarrhea, whether mothers are spacing their babies, whether the general level of public health is improving. Information is needed for all of these purposes, including the planning and setting of objectives, and methodical and well-administered systems are required to get it.

Few countries have good data collection systems, however, and even fewer are able to apply information effectively for either routine or long-term management. In the worst cases, those data that are collected are incomplete and irrelevant to priorities. They arrive late, after critical decisions have been made, and have only historical significance. The information burden on health workers may be considerable, but programs may benefit little from their efforts. Even when data are good, managers sometimes ignore them and use impressionistic or interpersonal information instead—to the detriment of both the information system and the program. These problems are not the rule everywhere—many countries and programs are making substantial progress in information collection and use—but they are common enough to be a significant barrier to primary health care.

A report from Indonesia typifies the situation in many developing countries, in summarizing critical obstacles to effective management information:

- a. *The health system is incredibly complex with many components, and their interrelationship is barely understood.*
- b. *Social systems (such as the health services) usually evolve through a series of trial and error modifications rather than by deliberate design, and the health system is no exception.*
- c. *A “crisis management” atmosphere reinforced by the “crisis care” model of medical care.*
- d. *The existence of health professionals untrained in management who resist administrative inputs.*
- e. *Unclear criteria of success/performance.*

f. The existence of multiple professional disciplines in health care, often with conflicting goals.

g. Organizational and managerial resistance to evaluation.

h. Lack of management’s information absorption capacity. (311)

As has been said before, information systems—like chains—are only as strong as their weakest link, and many potentially good systems may benefit from minor improvement. The trick is to identify and address the weak links (see Chapter 3), and this need not require expensive foreign consultants or technical manuals. Some programs jump too readily to revolutionary schemes for data improvement. Marginal or evolutionary changes in a step-by-step process may be more effective.

Health information systems should be both comprehensive and highly selective. They should consider multiple data users and sources and cover information needed for planning, management, and evaluation. The needs of families and communities should be addressed because these groups can often have more impact on personal health status than can ministries of health. Few governments are able to coordinate all data users, however, and most end up with duplicative and somewhat competitive systems. Donors, like other information users, tend to be more interested in their own needs than in the broad picture, and sponsored programs often place too little emphasis on routine management requirements.

Data systems must, nevertheless, be selective and reflect the organization’s ability to both collect and use information. A program’s information objectives should lie somewhere between “the minimum essential” and “the maximum feasible.” The former is often higher than programs can realistically attain, yet “the maximum feasible” is often low and must be improved. The problem with aiming beyond current capacity is that poorly collected data may be both unusable and a waste of scarce personnel and money. In fact, many programs use little or no data now, and successful though marginal improvements are likely to be a greater benefit than ambitious, but poorly implemented, ones.

The difficult question is how to be selective, since it is always easier to add information requirements than to subtract. Clearly, data collection should correspond to program priorities and decisions, while intractable problems and basic research should be studied by other systems. Indicators should be used to reveal but not describe managerial problems; when problems do appear,

other methods can be used to diagnose and resolve them. Not so clear is how to get managers to express objectives and how to devise appropriate indicators, and this may be a major problem in many programs.

Remedial efforts can go a long way toward system improvement, but they may ultimately fail if the bureaucratic and cultural environments do not support data use. Information systems chiefly benefit organizations that are oriented toward well-defined objectives and that take rigorous action to keep activities on target. Programs mainly oriented toward political and procedural rectitude have little use for systematic information. Managers set the overall tone for data collection and use; they either use it or fail to use it in their own work, and they are likely to expect similar behavior from subordinates. Data collection systems lacking strong managerial interest are orphans.

In the long run, this lack of managerial interest may be the toughest problem to crack in health information systems because it results not from lack of training but from long tradition. Managers can be taught planning and evaluation skills to the Ph.D. level, but if the bureaucracy rewards them for loyalty or “not rocking the boat,” then formalized information will be of little value. In one Southeast Asian country, for example:

The limitations on planning, on information available for decision-making, and on the effectiveness of the Provincial Health Office organization are perhaps symptomatic of a broader problem which affects all government units serving the rural areas: a highly centralized bureaucracy All recruitments and most senior level appointments for health positions at the pro-

vincial level (down to the district level) are made by the Central Ministry of Public Health, and all promotions and appointments are often based more on seniority and adherence to rules and regulations than they are on the job performance and program achievement. In short, advancement in the system is based more on ability to serve the needs of the bureaucracy than on the effectiveness with which the worker has served his client group—the rural population. (354)

The best place to start for systems improvement may be with managers who are sincerely interested and have authority to direct. Systems imposed (or mostly supported) by donors are likely to be short-lived without a guiding spirit within the Ministry of Health. At best, system improvement takes a long time. Managers have to gain confidence in data application; they have to learn what it is good for and not good for, and how to mold it to their own needs. Revolutionary new systems are attractive but risky. Managers who delay action until a computer can be purchased or streamlined forms are introduced may end up with nothing because the real problems are deeper. The need for improved information is great, but ideal solutions are unavailable.

However, enough success stories exist at the national and subnational project levels, in countries where rational health management remains poor, to be hopeful about the future. Primary health care information collection, processing, and feedback systems can be developed and can meet their objectives of guiding the evolution of a system in which “primary health care for all” is more than an idealistic slogan.

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This state-of-the-art paper is a review of growth monitoring in nutrition and primary health care programs in communities or clinics. It discusses the activities which make up a growth monitoring project, the major issues and problems involved in growth monitoring, and some of the lessons learned in various projects and settings. The paper was authored by Marcia Griffiths.

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Available from: AUPHA - The Health Management Educational Consortium, Office of International Health Administration Education, One Dupont Circle, N.W., Suite 420, Washington, D.C. 20036. Cost: \$5.00 per volume (softcover).

These simply written manuals are to help managers define and evaluate project objectives. Each volume asks users a series of questions and leads them through decision-making processes. The importance of information for planning and evaluation is illustrated.

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This easy to read primer introduces major evaluation concepts and techniques, including form design and basic statistics, using full page illustrations and step by step procedures wherever possible. Topics covered include formulation of questions, construction of measuring instruments, information collection, reporting, and evaluation management. Though written for an American setting, this is a useful reference for developing countries as well because of its clarity and comprehensiveness.

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This easy to read primer introduces major evaluation concepts and techniques, including form design and basic statistics, using full page illustrations and step by step procedures wherever possible. Topics covered include formulation of questions, construction of measuring instruments, information collection, reporting, and evaluation management. Though written for an American setting, its clarity and comprehensiveness should make this a useful reference for developing countries as well.

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social projects in developing countries. It is neither a manual nor a theoretical treatise but rather a discussion of practical problems in field application.

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Available from: Sage Publications, P.O. Box 5024, Beverly Hills, California 90210. Cost: \$45.00 (prepaid orders).

These eight volumes give step by step guidance through the evaluation process, for both students and administrators. They are written for developed countries but may be useful as well in developing country settings.

- 910 Moser, C. A. and G. Kalton. *Survey methods in social investigation*. 2nd edition. 1972. 549 pp. Available from: Basic Books, 10 East 53rd Street, New York, NY 10022. Cost: \$13.95.

From initial planning, through the survey design stages of sampling, questionnaire construction, and interviewing, and through data processing, analysis and report writing, the authors treat the reader to a relatively non-technical yet comprehensive overview of methods used in social surveys. In this revised version of an earlier edition by Sir Claus Moser, increased emphasis has been given to issues of measurements and analysis, and a key section on sampling has also been revised and expanded.

- 911 "Participatory evaluation—an appropriate technology for community health programmes." *Contact*, no. 55, February 1980: whole issue. Available from: Christian Medical Commission, 150, route de Ferney, 1211 Geneva 20, Switzerland.

Participatory evaluation is the assessment of programs by their intended beneficiaries. It is one form of community information use, as described in Chapter 1. This issue of *Contact* discusses issues and problems in participatory evaluation and describes how it was performed in several settings.

- 912 Patton, M. Q. *Qualitative evaluation methods*. 1980. 384 pp. refs. Available from: Sage Publications, P.O. Box

5024, Beverly Hills, California 90212. Cost: \$22.50 (hardcover).

The well-known quantitative approaches to testing hypotheses and guiding program evaluation, those stressed most heavily in classical approaches to study designs, are often not the most appropriate means for obtaining the information needed by program managers in making decisions. Patton seeks, with considerable success, to present strategies for generating and using relevant qualitative information, in expanding the evaluator's repertoire of research designs for obtaining utilization-focused information.

- 913 Selltitz, C., L. S. Wrightsman and S. W. Cook. *Research methods in social relations*. 4th edition. 1981. 624 pp. Available from: Holt, Rinehart and Winston, 383 Madison Ave., New York, N.Y. 10017. Cost: \$24.95 (hardcover).

In this much revised version of a well-known text on methods of investigation appropriate to social research, the authors emphasize the application of research findings in seeking solutions to the problems under investigation. Various study designs, from experimental and quasi-experimental to non-experimental observational approaches, are considered, along with the factors dictating which ones are best suited to answer the questions of concern to the researcher, and to elucidate the causal relationships among variables. In something of a departure from usual practice, the book is concerned also with the "why" of social research, in dealing explicitly with ethical issues which are often barely acknowledged in the conduct and application of research.

- 914 Smith, N. L., ed. *Communication strategies in evaluation*. 1982. 304 pp. (New Perspectives in Evaluation Series, vol. 3) Available from: Sage Publications, P.O. Box 5024, Beverly Hills, California 90210. Cost: \$22.50 (hardcover).

Evaluators' abilities to effectively report their findings often determine whether their evaluations have any impact. This book reviews a number of presentation techniques and shows how they can be used in program evaluation.

- 915 Spector, P. "Research designs." 1982. 88 pp. Available from: Sage Publications, P.O. Box 5024, Beverly Hills, California 90210. Cost: \$4.50 (softcover).

This pamphlet provides a clear, compact introduction to the principles of experimental and nonexperimental design in program evaluation. Appropriate statistical techniques are also recommended.

- 916 Suchman, E. A. *Evaluative research: principles and practice in public service and social action programs*. 1967. 186 pp. Available from: Russell Sage Foundation, 112 East 64th St., New York, New York 10012. Cost: \$10.00 (hardcover).

This brief book provides an academic introduction to the principles and problems of evaluation research, including discussion of research design, reliability and validity, research administration, and use of results. It is one of the best available introductory texts on these topics but lacks technical details for field application.

- 917 Thompson, M. S. *Benefit-cost analysis for program evaluation*. 1980. 310 pp. Available from: Sage Publications, P.O. Box 5024, Beverly Hills, California 90210. Cost: \$12.00 (softcover).

This book attempts to make benefit-cost analysis—a technique routinely used in the evaluation of social programs—accessible to non-experts. It discusses appropriate applications, frequent errors, and use of the technique in decision-making.

- 918** University of Chicago. Community and Family Study Center. *Rapid feedback of family planning information (RFFPI) manuals*. 1970.

No. 1: Family planning improvement through evaluation: a manual of basic principles. \$1.50

No. 7: Mini-Tab Edit, Mini-Tab Frequencies, and Mini-Tab Tables: a set of three interrelated statistical programs for small computers. \$2.25

No. 11: Cost-effectiveness analysis of family planning programs. \$2.00

No. 14: Mini-Regression: a small computer program for performing multiple regression analysis. \$1.50

Available from: University of Chicago, Community and Family Study Center, 1411 East 60th Street, Chicago, Illinois 60637.

These manuals are explicitly written for developing country family planning programs and for small computers and have filled an important gap in quantitative analyses. Computer programs include clear guidelines for local adaptation and modification.

- 919** U.S. Agency for International Development. *Design & evaluation of AID-assisted projects*. November 1980. 264 pp. illus. Available from: AID Document and Information Handling Facility, 7222 47th Street, Suite 100, Chevy Chase, Maryland 20815. Cost: \$35.76 (softcover).

This handbook is designed for use during and after special evaluation training workshops. It describes systems used by the United States Agency for International Development in project design and evaluation, including the logical framework, means-ends analysis, and introductory statistical techniques. Although directed to AID staff, much of the discussion will also be helpful for other development personnel.

- 920** Weiss, C. H. *Evaluation research: methods for assessing program effectiveness*. 1972. 160 pp. bibl. (Prentice-Hall Methods of Social Science Series) Available from: Prentice-Hall, Inc., Mail Order Sales, Old Tappan, New Jersey 07675. Cost: \$12.95 (softcover).

This brief paperback is an academic yet down-to-earth review of evaluation methods and problems. It differs from most other textbooks and manuals in its discussion of contradictory program objectives and constantly shifting implementation measures. It deals with evaluation as a real life activity affected by social context rather than as a theoretical modeling process.

- 921** World Health Organization. *Development of indicators for monitoring progress towards health for all by the year 2000*. 1981. 91 pp. ("Health for All" Series, no. 4) Available from: World Health Organization, Distribution and Sales Service, 1211 Geneva 27, Switzerland. Cost \$4.00 (softcover).

This volume is intended to help policy-makers decide which indicators to use, particularly at the national level but also at the regional and global levels, as they monitor progress towards health for all by the year 2000. It proposes four categories of indicators: health policy indicators; indicators of the provision of health care; social and economic indicators; and indicators of health status, including quality of life. Particular emphasis is given to

the collection and analysis of information. The volume stresses that countries should not aim at comprehensiveness, but instead select a small number of relevant indicators for which information can be obtained at a reasonable cost. A bibliography and height, weight, and arm circumference reference values are included.

- 922** World Health Organization. *Health programme evaluation: guiding principles for its application in the managerial process for national health development*. 1981. 47 pp. ("Health for All" Series, no. 6) Available from: World Health Organization, Distribution and Sales Service, 1211 Geneva 27, Switzerland. Cost: \$2.00 (softcover).

This volume presents guidelines for health program evaluation which were endorsed by the Thirty-First World Health Assembly. The guidelines are intended for managers and planners of health plans at the national level and can be easily adapted to the circumstances of individual countries. The guidelines point out that the purpose of evaluation is to improve health programs and infrastructure and to guide in the allocation of resources. The volume is divided into four sections: introduction; guiding principles; the process of evaluating health policies, programs, services and institutions; and the evaluation of the managerial process in national health development. Each of the sections is organized into numbered paragraphs, with important statements in italics.

- 923** World Health Organization. Expanded Programme on Immunization. *Field manual of the Expanded Programme on Immunization*. 1977. 290 pp. illus. Available from: World Health Organization, EPI, 1211 Geneva 27, Switzerland.

A step by step discussion of all aspects of the organization and management of immunization programs. Provides practical suggestions and guidelines for managers at all levels of the supply system. The five major sections are (1) program design, (2) program management, (3) vaccine handling, (4) health education, and (5) evaluation.

- 924** World Health Organization. Expanded Programme on Immunization. *Training manuals for mid-level managers*. 1980.

No. 1: Conduct disease surveillance.

No. 2: Evaluate vaccination coverage.

Available from: World Health Organization, EPI, 1211 Geneva 27, Switzerland.

The Expanded Programme on Immunization has developed a number of manuals and procedural guidelines for program managers, and these include considerable material relating to information systems. Much of the above reference material is relevant to integrated primary care programs as well as to immunization activities.

- 925** World Health Organization. Programme for Control of Diarrhoeal Diseases. *Manual for the planning and evaluation of national diarrhoeal diseases control programmes*. 1981. 110 pp. illus. (Document no. WHO/CDD/SER/81.5) Available upon request from: World Health Organization, Programme for Control of Diarrhoeal Diseases, 1211 Geneva 27, Switzerland.

This concise manual suggests research methods and indicators for measuring the incidence of diarrhoeal diseases and for program evaluation. It includes discussion of target setting, form design, sampling, and application of results. Discussion assumes a categorical diarrhoeal diseases control program rather than one integrated in the context of primary health care.

appendix A

AN ENVIRONMENTAL HEALTH AND KNOWLEDGE, ATTITUDES, AND PRACTICES SURVEY*

House (structure slept in by head of household):

- Permanent (none of the materials are temporary) = 3
- Semi-permanent (some of the materials are temporary) = 2
- Temporary (all of the materials are temporary) = 1

Latrine Score (maximum 4):

- 1 point for hole in ground
- 1 point for roof
- 1 point for proper lid
- 1 point for absence of contamination of opening

Rubbish Disposal Score (maximum 3):

- 1 point for existence of rubbish pit
- 1 point if pit is partially used
- 2 points if pit is always used

Water Utilization:

Type of Container (describe)	Estimate of Capacity	No. of times filled yesterday	Total litres
1 Debe = 18 litres	Grand total litres		

$$\frac{\text{Grand Total Litres}}{\text{No. of Residents}} = \frac{\boxed{} \boxed{} \boxed{}}{\text{litres/person/day}}$$

KNOWLEDGE, ATTITUDES, AND PRACTICES

KNOWLEDGE

What diseases do people in this area get?

Which diseases are most harmful?

Which diseases do your family have most frequently?

What are the primary causes of the diseases you listed?

Diseases	Primary Causes		

Can any of the diseases you listed be prevented? (read list)

If yes, what are the primary preventive measures? In asking this question, suggest the following list by disease: a) eating proper food; b) drinking clean water; c) washing your bodies; d) washing your clothes; e) using a clean choe; f) keeping the food you store covered; g) giving your baby breast milk; h) receiving immunizations from a clinic.

Diseases	Preventive Measures		

*Suggested for the Kitui project in Kenya (Source: 07C)

Can any of the diseases you listed be cured? (read list)

If yes, what are the best cures?

Disease	Cures		

What is the best place to seek treatment for your illness? In asking this question, suggest the following: (a) traditional doctor; (b) clinic/health center/hospital; (c) buy medicine from a private doctor.

Disease	Source of Treatment		

PRACTICE AND ATTITUDE

Is it a good idea to go to a clinic?

If yes, what is it best to go to a clinic for?

When did you last go to a clinic?

What did you go to the clinic for?

For what illnesses is it a good idea to get an injection?

For what illnesses is it harmful to get an injection?

Why?

Is tube-feeding at a health center for an ill person a good idea?

If no, why not?

How long should you breastfeed your baby?

How many times a day is it best to feed your child (after the child is weaned)?

List the food it is best for a child to eat in one day.

Is it a good idea to use a choe?

Why?

How often should the choe be cleaned?

Is it a good idea to have a rubbish pit near your house?

Why?

Does it do any harm to have cows drinking from the same source where humans draw their water?

How often is it best to take a bath?

If you don't take a bath frequently, will it be harmful to you?

If yes, how?

appendix B

A VILLAGE RECORD*

VILLAGE RECORD

(to be updated once in three years)

I. GENERAL INFORMATION

1. Name of village: _____ 2. Sub-centre: _____
3. Date of commencement of base-line survey: _____
4. Date of completion of base-line survey: _____
5. (a) Total No. of households: _____ (b) Total No. of families: _____
6. Population according to age and sex:

Sl. No.	Age group	Male	Female		Total
			Currently Married	Others	
1.	Under 1 year				
2.	1 - 4 years				
3.	5 - 14 years				
4.	15 - 44 years				
5.	45 years and above				
	Total				

7. Private practitioners:

Sl. No.	Name	System	Address

8. Dais:

Trained		Untrained	
Name	Address	Name	Address

*Suggested for health and family welfare projects in rural India
(Source: 297)

9. Community Health Volunteer/Contact Persons/Opinion Leaders:

Sl. No.	Name	Occupation/Designation	Address

10. Community resources and agencies (Youth Club/Mahila Mandal/Bhajan Mandal/Young Farmers' Club/Drama Club/Balwadi/Co-operative, etc.):

Sl. No.	Type of resources	Address

11. Public facilities (specify number available):

Primary Schools:_____ Secondary Schools:_____ Post offices:_____
 Police Stations:_____ Panchayath Office:_____
 Others (specify):_____

II. FAMILY PLANNING (From Eligible Couple and Children Register)

Number of couples presently using family planning methods:

Vasectomy	Tubectomy	IUD	Oral Pill	Condom (Nirodh)	Other (specify)	All

III. ENVIRONMENTAL SANITATION

1. No. of Wells:_____ 5. No. of households having:
 2. No. of hand pumps:_____ (a) Latrine:_____
 3. No. of Ponds/Tanks:_____ (b) Kitchen garden:_____
 4. No. of taps:_____ (c) Soak pits:_____

IV. COMMUNICABLE DISEASES

No. of cases of TB:_____ Leprosy:_____ Others (specify):_____

Signature:_____

Designation:_____

appendix C

A COMMUNITY SURVEY FORM*

COMMUNITY SURVEY

by Village Health Guide
in Saradidi

Age.....Guide.....Date.....

1. How many families are there in your village? (Count a family as all those who usually eat together.) Put an x over one of these circles for each family you count, like this .

ooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

2. How many people are there in each family? For each family mark an o for the number in that family.

- 1) person family ooooo
- 2) person family ooooooooo
- 3) person oooooooooo oooooooooo
- 4) person oooooooooo oooooooooo oooooooooo
- 5) person oooooooooo oooooooooo oooooooooo
- 6) person oooooooooo oooooooooo oooooooooo
- 7) person oooooooooo oooooooooo oooooooooo
- 8) person oooooooooo oooooooooo oooooooooo
- 9) person oooooooooo oooooooooo
- 10) person oooooooooo oooooooooo
- 11) person oooooooooo
- 12) person oooooooooo
- 13) person ooooo
- 14) person ooooo

How many have scabies?

How many children are protected? Include babies. Look at each child under 5 years. Look at left arms. Look for two things, a BCG scar and scabies. Make one mark about BCG and one mark about scabies for each child.

3. BCG? YES oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo
NO oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo
4. Scab? YES oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo
NO oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

*used in the Kisii project in Kenya (Source: 832)

5. Is this family using a latrine?

YES 0000000000 0000000000 0000000000 0000000000 0000000000

NO 0000000000 0000000000 0000000000 0000000000 0000000000

6. How much water is brought to this family each day?

1) debe 0000000000 0000000000 0000000000

2) debes 0000000000 0000000000 0000000000

3) debes 0000000000 0000000000 0000000000

4) debes 0000000000 0000000000 0000000000

5) debes 0000000000 0000000000 0000000000

6) debes 0000000000 0000000000 0000000000

7) debes 0000000000 0000000000 0000000000

8) debes 0000000000 0000000000 0000000000

9) debes 0000000000 0000000000 0000000000

10) debes 0000000000 0000000000 0000000000

11) debes 0000000000 0000000000 0000000000

12) debes 0000000000 0000000000 0000000000

13) debes 0000000000 0000000000 0000000000

14) or more 0000000000 0000000000 0000000000

7. What about sicknesses in this family? In adults which part of the body is most commonly sick? What about children?

	ADULTS	CHILDREN
Head	0000000000 0000000000	0000000000 0000000000
EENT	0000000000 0000000000	0000000000 0000000000
Chest/Heart	0000000000 0000000000	0000000000 0000000000
Abdomen	0000000000 0000000000	0000000000 0000000000
Sex/Urine	0000000000 0000000000	0000000000 0000000000
Other	0000000000 0000000000	0000000000 0000000000

8. Does this family know how to treat malaria? Ask the most responsible person "what should an adult take to cure malaria?" The correct answer is 4 tablets of chloroquin. Did the person give you the correct answer without being told?

YES oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

NO oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

9. Do these women go for antenatal care? Find the mother of the youngest child in the family. Ask her "how many times did you attend antenatal clinic during this last pregnancy?"

None oooooooooo oooooooooo

1 or 2 times oooooooooo oooooooooo

3/4 times oooooooooo oooooooooo

4/5 times oooooooooo oooooooooo

10. What foods replace breast milk? Ask the same mother. Did her answer include any of these body building foods?: cow milk, eggs, beans, meat/fish, greens, nuts.

YES oooooooooo oooooooooo oooooooooo oooooooooo

NO oooooooooo oooooooooo oooooooooo oooooooooo

11. What is the most important crop for this family?

maize oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

millet oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

_____ oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

_____ oooooooooo oooooooooo oooooooooo oooooooooo oooooooooo

12. Long coughing. Has anyone in this family been coughing for a month?

YES, one or more people oooooooooo oooooooooo oooooooooo

NO, no one oooooooooo oooooooooo oooooooooo oooooooooo

13. What kind of water do your families get? For each family mark the kind of source they use the most during the year.

River or dam oooooooooo oooooooooo oooooooooo

Unprotected spring or well oooooooooo oooooooooo oooooooooo

Protected spring or well oooooooooo oooooooooo oooooooooo

Piped or borehole oooooooooo oooooooooo oooooooooo

How many adult cattle owned by each family?

- 1) oooooooooo oooooooooo
 2) oooooooooo oooooooooo
 3) oooooooooo oooooooooo
 4) oooooooooo oooooooooo
 5) oooooooooo oooooooooo
 6) oooooooooo oooooooooo
 7) or more oooooooooo oooooooooo

What sicknesses bring these people to dispensary? Ask the person in charge to let you look at the registry book. Look at the most recent 100 new attendances. Make a mark for each attendance in the correct part of this table. (Like you did in question 7)

	<u>ADULT ATTENDANCE</u>	<u>CHILDREN ATTENDANCE</u>
Head	oooooooooo ooooooooooo	oooooooooo ooooooooooo
EENT	oooooooooo	
Chest/Heart	oooooooooo	
Abdomen	oooooo	
Sex/Urine	ooooo	
Other	oooooooooo oo	

appendix D

A SUPERVISORY CHECKLIST*

Name of the Supervisor: _____

Place, Name of Supervisee: Hospital Area _____

Local Center/Hospital _____

Health Post _____

Promoter _____

Date of Supervision: _____

A. Physical Plant

1. Premises are appropriate
2. Good hygiene on premises
3. Maintenance of premises

Installations

1. Water
2. Sewage
3. Adequate illumination
4. Electric light
5. Installations worked properly

Own Property

Observations and Recommendations:

B. Equipment and Furniture

1. Equipment

- a. Is there an updated inventory?
- b. Does the inventory correspond to what is in stock?
- c. Is the equipment in good condition?
- d. Are there minimum essential requirements?
- e. Is there a refrigerator?
- f. Does it work properly?

2. Furniture

- a. Is there an updated inventory?
- b. Does the inventory correspond to what is in stock?
- c. Is the furniture in good condition?
- d. Are there minimum essential requirements?

C. Organization

1. Dependency _____
2. Is there an organogram?
3. Personnel: Number _____
Physician _____ Midwife or
Nurse _____ Auxiliary Nurse _____
Accountant _____ Statistical or
other personnel _____
4. Are there manuals, guides, and defined functions?
5. Does the staff know them?
6. Are the staff identified and are they motivated to the work?
7. Is the coordination between the hierarchy and executive level adequate?
8. Are staff meetings held?
9. How frequently?
10. Is there knowledge of the programs that are developed? Are these programs integrated?
11. Is there a work plan?
12. Is it fulfilled?
13. Is there any incentive in the institution for the workers?

Observations and recommendations:

D. Activities

1. Are the goals for the different activities known?
2. Are the following activities fulfilled?
 - a. Vaccination
 - b. Tuberculosis Control
 1. Sample-taking
 2. Control of sick people
 3. Administration of medicine

*Suggested for Peru (Source: 630)

- c. Maternal Health
 - 1. Control of pregnant women
 - 2. Control of puerperas
 - 3. Attraction of pregnant women
 - 4. Derivation of puerperas
 - 5. Follow-up
 - 6. IUD insertions
 - 7. Prescription of O.C.
- d. Child Health
 - 1. Control of newborn
 - 2. Control of infants
 - 3. Control of preschool child
 - 4. Follow-up
 - 5. Attention of morbidity
- e. Food Support
 - 1. Pregnant woman
 - 2. Infant's mother
 - 3. Child
 - 4. Follow-up
- f. Morbidity Demand
 - 1. First Aid
 - 2. Derivation of patients
- g. Are the patients who are referred well attended?
- h. Health Education
 - 1. Frequency: Daily () Monthly () Weekly ()
 - 2. Subjects most frequently covered: _____
 - 3. What techniques are most frequently used: Number _____
 - 4. What audiovisual aids are used? _____
 - 5. To whom is health education directed? _____
- i. Environmental Sanitation
 - 1. Improvement of housing
 - 2. Protection of springs
 - 3. Construction of WCs
 - 4. Others: _____

d. What are the future training requirements? _____

F. Community Resources

- 1. Are leaders of the community trained? No ___ Yes ___ Which? Community leaders ___ Traditional Midwives ___ Promoters ___ Teachers ___ (To observe a course).
- a. Are scheduled courses held?
- b. Is there a curriculum for the course?
- c. Is the curriculum followed?
- d. Do the instructors know the subject?
- e. Do the instructors use an adequate language?
- f. Is an appropriate evaluation of knowledge made?

Comments and recommendations: _____

G. Supervision

- 1. Received
 - a. Person who made the last supervision _____
 - b. Date of last supervision received: _____
 - c. Were the recommendations from the previous visit fulfilled?
 - d. Opinion of person supervised of supervision received: _____

E. Training

. Health Personnel

- a. Is there a program for training personnel? Is it fulfilled?
- b. Who has been trained since the last supervision? _____
- c. Are personnel trained for the work they are doing? Physician ___ Midwife ___ Nurse ___ Health Auxiliary ___ Others ___

2. Made

- a. Is the supervision planned?
- b. Is there a chronogram? Is it fulfilled?
- c. Is a report made of the supervision?
- d. Is the guide used during the supervision?
- e. Is technical assistance provided?
- f. Is direct attention given to the patients of the community?

g. Are meetings held with the community?

Comments and Recommendations: _____

H. Records and Statistics

1. Are the following records kept?

- a. Attention: Daily? Correctly?
- b. Attention: Monthly? Correctly?
- c. Information analyzed?

I. Supplies

- 1. Are supply orders filled out?
- 2. Are they well done?
- 3. Are the orders duly sent?
- 4. Is advantage taken of the supervision to take the supplies?
- 5. Are the orders received when requested? If not, what action is taken? _____
- 6. _____
When the supplies are received, are they checked?
- 7. Is the warehousing of the supplies adequate?
- 8. Is the stock of medicines adequate? Is there a sufficient quantity of medicine?

Comments and Recommendations: _____

J. Budget

- 1. Does the person supervised participate in the elaboration of the budget?
- 2. Does he know what the budget for his establishment is?
- 3. Does he know what the expenditure is to date?
- 4. Is it appropriate?
- 5. Are the accounts up-to-date?
- 6. Does the promoter use the money to replenish medicine?
- 7. Does the community control the money for the medicine?
- 8. Does money correspond to sales?

K. Community

- 1. Does the communal organization know and participate in the health activities?

- 2. Is there a Health Committee?
- 3. Does it have active participation?
- 4. Are the promoter and traditional midwife selected by the community?
- 5. Did the health team motivate the community?
- 6. Does the community know if the promoter is a volunteer?
- 7. Does the community recognize the work of the promoter? In what way?

Comments and Recommendations: _____
