14 Approaches to strengthening health information systems

Theo Lippeveld and Steve Sapirie

Introduction

Information is crucial for decision-making at all levels of the health services. Policymakers need information for better allocation of scarce resources; planners for the design of more effective programmes; district managers for monitoring and evaluation of the health facilities under their responsibility; health unit managers to ensure the community equitable access to the services offered; and, most of all, care providers to provide quality care to their clients. In the last 2 decades, increasing need for efficient use of scarce resources has put information even higher in demand. Cost recovery, quality management, and the development of decentralized systems are all heavily dependent on well-functioning health information systems.

The focus of this book has been on routine health unit-based information systems. Routine health information systems, more than nonroutine methods such as surveys or rapid assessment methods, are the main data source in most countries. Yet they have the infamous reputation for producing a plethora of irrelevant or low-quality data. Therefore, most health managers, as a rule, do not use the information generated and make decisions based on "gut feeling".

By their nature, routine health information systems are intimately linked with the health services structure. The hypothesis that restructuring routine health information systems can have a direct impact on improved service delivery served as a major impetus for the authors to write this book. Routine health information systems, to live up to this potential, need to be more responsive to information needs of the health services at all levels—particularly at the service delivery levels, where the data are generated. This book, therefore, provides a health services model based on concentration levels, where, from the periphery to the centre, three types of management functions can be distinguished: patient/client management, health unit management, and system management. Restructuring of routine health information systems means better matching these management functions with the various components of the information-generating process and of the health information system management structure (see Chapter 2). Once routine health information systems fulfil their support role to the decision-making process at all levels, many expensive surveys can be eliminated, or at least redirected to generate data that are not captured by routine systems. In addition, such restructured facility-based systems can more easily be linked to population-based community health information systems as described in Chapter 9.

Although a clear conceptual model is helpful to the process of restructuring routine health information systems, it cannot provide all the practical approaches and strategies for successful health information system design and implementation. It is for this reason that in the subsequent chapters of the book, the authors integrate the text with country experiences in which they have been actively involved. This final chapter summarizes the lessons learned and sets an agenda for further development experiences.

Restructuring routine health information systems: what works and what does not work?

The materials in this book have been assembled by a number of experienced professionals who have worked within health information system development efforts around the world for over 20 years. Throughout the book, these authors make frequent references to the many difficulties that impede the development and successful use of routine health information systems or subsystems. Their collected observations confirm that a number of prerequisites must be satisfied to ensure that health data generation and use will succeed. Conversely, there are also a number of approaches and conditions that will almost certainly lead to failure. This chapter identifies both the prerequisites for success as well as the approaches that do not seem to work, and proposes alternative strategies that may increase the chances of success.

Preconditions for success

High-level interest and sponsorship: in search of a "saint"

All health development efforts require the support of senior managers and decision-makers, but nowhere is it more important than for the restructuring of health information systems. Health information system development touches all Ministry of Health departments, programmes, and institutions, both technical and administrative, as well as other government departments. High-level direction and coordination are imperative for the success of a health information system development effort. Eventually, a senior decision-maker, such as a director-general or deputy minister, should be identified as the project director, or, as Peterson et al. (1994) define him, as the "saint". In order to fulfil their role as "system development protectors" and to decrease resistance, directors should (i) be committed to the health information system restructuring process, (ii) be ready to take the necessary risks, and (iii) have the right political connections. The presence of a project director will facilitate participation and cooperation from all departments and programmes, which in turn will minimize duplication of data being recorded and reported, as well as help to establish systemwide data standards and procedures. In addition, distribution of a policy statement and strategy description can also give the development effort a certain legitimacy and clear definition of purpose.

Broad agreement with the principle of "information for action" at all levels

Early in successful health information system development efforts, managers and health workers at all levels must understand and acknowledge the importance of the linkage between management and information. One critical principle is that all information generated by

the new system must serve the process of action taking at all levels: within communities, for case management, for health unit management, for district management, for central level programme management, and for policy and planning at higher levels of the health system. Another principle is that no data should be requested from a service level which is not necessary and useful for managing the delivery of health care and performing other public health functions. This principle will help prevent the expansion of reporting requirements and ensure relevant monitoring and evaluation of the health status and service performance by higher health system levels.

Health information system development strongly linked to the overall health system development and reform process

If a health information system is a functional entity within the framework of the health services as a whole, it is obvious that health information system restructuring can only succeed if it is narrowly linked with reform at other levels of the health care system. For example, effective flow of information within the health care system depends upon the organizational structure of the health care system (organizational reform). Similarly, without a clear set of priorities (programmatic reform), managers and policymakers will find it difficult to agree upon a set of essential indicators for the health information system. And, of course, it is meaningless to restructure health information system for health services that are not used by the population (systemic reform).

Efforts to implement more accessible decentralized district health systems are now underway in several developed as well as developing countries. Health information system restructuring is part of this effort, as was stated by the WHO Expert Committee on Information Support for New Public Health Action at the District Level: "Health information is not only an essential resource for the development of district health systems, but also an integral component of that development" (WHO, 1994).

Availability of a core health information system development team

Successful health information system restructuring requires broad participation by future users at critical steps of the development process such as the selection of essential health indicators or the standardization of case definitions. However, successful efforts are always spearheaded by a small group of experts who carry out the staff work needed to develop standards, design criteria, and prototype databases. Moreover, high-level sponsorship and support as proposed earlier may not be available from the outset. The health information system development team may have to prove the worth of the proposed strategies by developing modest products early, even while the development plans are still being formulated.

Ideally, the health information system development team is multidisciplinary and includes, at a minimum, a health planner/epidemiologist, a computer expert, and a skilled trainer. Such staff may come from institutes of public health or epidemiological units, but placing such groups within the ministry of health during the entire health information system development process is usually an advantage. In this way, they can maintain communication with all services and programmes, and help ensure institutionalization of the restructured system. It is extremely

important to keep the staff of the health information system development team in position during the entire health information system reform period.

Characteristics of health information system development approaches that are likely to fail

The folly of pursuing the grand design

Often the best-intentioned health information system projects fail because their managers and system designers are too ambitious, wanting to create an entirely new system that satisfies all user felt needs. The result is a health information system project that attempts to revise all data generation and reporting processes, whether they need improvement or not. Such efforts often attempt to integrate the generation and maintenance of health data at all levels, whether or not such integration is justified. These full system design efforts are intended to be systematic and efficient, because they are led by systems analysts who know how to normalize data. But the sheer difficulty of total system redesign and implementation normally exceeds the technical and management capabilities of most public sector health administrations. Such efforts are seen to be expensive and time-consuming, and often result in the operation of parallel systems of reporting, due to the difficulty and ineffectiveness of the new system and its procedures.

Health information system restructuring for central-level data accumulation

Traditionally, routine health information systems have been designed to provide epidemiological and statistical data to the central administration and programmes in the ministry of health. While it is true that central decision-makers need relevant information for policy and planning, the designers of such reporting systems often forget the important principle that all data to be recorded and reported should, first and foremost, be useful at the service delivery level. Even patient/client record forms sometimes contain data which have no use in the care process, but have been included because some central level office feels they need the data to monitor health or performance trends and produce annual reports. Often this practice is reinforced by international donor agencies which promote their own indicators while providing financial assistance in order to develop routine recording systems for capturing the necessary data. Such health information system restructuring methods wreak havoc on information use at all levels: not only do care providers, discouraged by the burden of data collection, make little use of the data for health unit and case management, but they also report incomplete and invalid data to higher levels, making them useless for policy and planning actions.

Forms review and revision without confirming the service information needs

Related to the previous issue, there is a tendency for many health information system development projects to review and revise registers, records, and forms used in service facilities, presumably to increase the validity, relevance, and completeness of reports to higher levels. Even if health information system developers start with proper identification of central level information needs, the result is usually only limited improvement of the information generated, in spite of the extensive resources and staff time consumed. Most important, these approaches fail to improve the relevance and usefulness of the information gen-

erated to support service staff in delivering clinical and outreach services to their patients and communities. Designers should place forms revision late in the health information system development plan of action, after the identification of information needs at all levels, and particularly at service delivery levels. Furthermore, they should only include those recording improvements which reinforce the performance of proper clinical and outreach procedures.

Information needs based on detailed decisions

New systems are often referred to as "management information systems" which are intended to support managers in decision-making. Designers therefore try to break down functions and activities into a list of decisions for which information needs are defined. For this purpose, senior service managers are carefully interviewed, but seldom do they know what data are most useful for decision-making. In truth, specific day-to-day decisions are rarely made consciously, and are often based on subjective feelings and experience. In any case, the designers' and planners' efforts generally produce long lists of data elements which are then incorporated into the new design. The result is an overly complex system which is even more burdensome to the care providers than the "inefficient" system it is intended to replace. One of the main assets of a well-designed routine health information system is a simple but essential set of indicators able to identify key problems. If needed, additional data and information to solve these problems can be generated through ad hoc data collection or nonroutine methods.

Mistaking computerization for health information system restructuring

One of the main objectives of many typical health information system development projects is the computerization of important data to be managed, monitored and analysed, and reported. In all countries, there are always numerous opportunities to apply computers in new or improved ways. However, whenever computerization becomes the primary objective of a health information system development effort, the more important purpose of serving the data needs of the care providers may be lost. Registers and records will be redesigned for facilitating data capture and entry, rather than reinforcing proper action for planning, management, and service delivery. Computers are, first and foremost, a support tool for data processing, data analysis, and data presentation and should be employed only if it is cost-effective to do so.

Donor-driven health information system restructuring

In the last decade, governments of developing countries have been under pressure from multilateral and bilateral donor agencies to increase the efficiency (and, less frequently, the equity) of their health care delivery systems. Health care reforms have been imposed as "conditionalities" for further disbursement of funds. In several countries, such external donor pressure has been the real impetus for getting health information system restructuring on the agenda. Although health information system restructuring in these countries is, in actuality, key for improving planning and management of the health services, it is obvious that without mobilizing national support, such projects ultimately cannot be sustained and may actually damage the existing routine health information system.

Most of these "donor-driven" health information system restructuring efforts include the redesign of the recording and reporting system, the

development of integrated databases, the training of national staff locally and abroad, the abroad, the provision of computers, and the sponsorship of on-site expertise. Sometimes these projects succeed in getting a new recording and reporting system up and running within a 2-year period. But often, once the project is terminated, the situation rapidly deteriorates with accumulation of software and hardware maintenance problems, incomplete and delayed reporting, and the lack of continuity of national staff for managing the system. Part of the problem is the time constraint facing the donor agency. It must deliver its support within a fixed period of time, whether the necessary prerequisites such as national involvement and management capability are in place or not. A second problem is that such projects have to be planned in their entirety at the outset, with limited opportunity for revision in content and timing. A third problem arises when several agencies support the health information system development process. Each agency has its own approach and may find it difficult to collaborate with others. The national administration may find it difficult to act as the coordinator of the effort when most of the resources, both financial and human, are provided by the donor agencies, often as a grant. While external support can bring useful technical expertise and visibility from a political perspective, institutionalized and sustained health information system restructuring can only happen if the national administration "owns" the reform process, and therefore has full control over the content, the process, and the resources required.

Characteristics of health information system development approaches that are likely to succeed

Start every health information system development effort with the definition of indicators based on a conceptually sound health services system and specific management functions within the services

If the final outcome of health information system restructuring is to ensure better information support to the health services system, then the first requirement for any health information system designer is to have a clear understanding of how a health services system is structured and which management functions are involved. The model proposed in Chapter 2 categorizes management functions in three groups: patient/client, health unit, and system management. Management functions further vary according to the concentration level: from periphery to centre. They address curative, preventive, and promotional services, personal care as well as public health services. When restructuring is based on a conceptually sound health system model, information support can be more easily translated into relevant and appropriate indicators.

The first activity of health information system restructuring, therefore, is the selection of indicators for health services support, health services monitoring and management. This should be done through a consensus-building process involving health services managers at various levels, such as senior executives, programme managers, and district service staff. In countries where such a process has never taken place, the first step should be the development of a set of "essential" indicators. Such indicators address well-defined priority health problems, the services required to control those problems, and the resources critical for service delivery. They may also be used to monitor progress in health system reform and management.

Apply an evolutionary, problem-directed approach for improving the health information system

At the outset of a new initiative to strengthen the health information system, the health administration may not have a clear view of all the steps that need to be taken. In these cases, the early steps may involve different types of assessments that confirm where there are opportunities for improving the generation, use, and communication of important health data. Sometimes these assessments focus on specific types of data and communications processes, such as the disease surveillance system or the generation and use of clinic data. Planners and designers can undertake overall assessments of health information subsystems to uncover the cause of specific service and management issues or deficiencies. From such assessments, designers can use the findings to identify the information-related problems that most need early attention. They can then formulate short-term plans of action which include activities needed to address some of the problems found. As the implementation proceeds, they can extend the plan of action to include more of the components of the information system in need of strengthening. This evolutionary approach to health information system development allows for adjustment to accommodate new issues and opportunities for improvement.

Include policy analysis as a full part of health information system assessment

The success of health information system reform depends not only on technical improvements but also on in-depth understanding of political, sociocultural, and administrative factors. An essential question for health information system designers is how "to add rationality while still accommodating the interests of diverse constituencies and value systems" (Reinke, 1988). As described in Chapter 13, we suggest undertaking an in-depth policy analysis as part of any health information system restructuring process. Following the model proposed by Walt and Gilson (1994), such analysis includes (i) identification of all actors with stakes in the health information system reform (political mapping), and (ii) research on contextual political, socioeconomic, and administrative factors likely to influence the outcome of the health information system reform.

Enable broad participation in the health information system design process, but ensure technical soundness throughout by the use of a health information system design team

Everyone in the health sector cannot participate in all aspects of the design and implementation of health information systems, but based on careful policy analysis, the design team should at least ensure participation of key actors in the process and thereby foster their understanding and ultimate support during the implementation. Selected programme managers and service staff should be involved in the selection of essential health indicators. In addition, programme and service staff should participate in rapid assessments of health information system performance, as well as oversee specific functions such as disease surveillance and control, and clinic diagnosis and recording. The results of such assessments as well as options for improvement can be presented to larger groups of future users, and ultimately create broad ownership of the restructured health information system. This applies particularly to the establishment of standard case definitions and of standard treatment guidelines. Nevertheless, a considerable amount of health information system design and development work must be carried out by specialists

belonging to the health information system development team. Report design, reporting procedures, database design, and the design of recording formats and registers need to be carried out by system analysts, epidemiologists, clinical specialists, and computer specialists, drawing on the inputs of programme and service staff.

Introduce information technology in an effective, efficient, and sustainable manner

Successful projects make judicious use of computer and communications technology at points in the system that will most benefit from this technology. The expansion of computer use, particularly at subnational levels, is undertaken gradually, and fully involves staff who will be required to enter data and use the resulting information. The development of databases and software is carried out within the country, with the full involvement of the staff who will be required to maintain and further develop the computer system. Hardware systems, even if financed by external sources, should take into account the local capacity to bear the recurrent costs generated by such systems. Imported software applications should be avoided. If commercial support is received in the development of the software, local firms should be used to ensure that maintenance capability is on hand. Both computer and communications hardware should have local sources of maintenance.

Attempt to produce useful, new information processes and products early in the development effort

The evolutionary health information system development strategy must insure that useful products are generated early in order to gain the confidence and support of senior managers, programme managers, and service staff. The confirmation of essential indicators is often one such product, and it leads naturally to others. Frequently, countries recognize that their clinicians are not applying standard case definitions in their recording of diagnoses. Sometimes such standard case definitions are not known or promulgated in the services. Establishing standard definitions for common and important health problems and conditions is a useful early product in health information system development. Frequently underuse of existing information is a major lacuna which can be addressed early through processes such as district or facility level problem-solving exercises. Before designers create solutions or interventions addressing these lacunas, they often request service staff to analyse their existing records and reports to assess performance and to understand the cause of operational problems. If carried out effectively, such activities inspire interest and ideas for further improvements of the information system.

An agenda for further health information system development experiences and research

While the experiences of health information system restructuring efforts in various countries have permitted the authors to propose a list of useful health information system development strategies, many questions regarding the development of relevant health information systems remain unanswered and need further experience and research. We conclude this book by inviting interested health system developers and researchers to address such questions through carefully set up health information system projects and research studies. The list of questions presented in Box 39 is certainly not exhaustive, but hopefully it will

Box 39 Future directions

General health information system development questions

- How can service providers and particularly communities as key information users be more actively involved in health information system development efforts?
- What is the ideal process and level for development of interdisciplinary social information systems, through which interactions between health, education, and economic development can be identified in an action-oriented manner?
- Given the benefits of a population-based community health information system, as described in Chapter 9, how can it effectively be linked to the facility-based routine health information system?
- Can health information system reform by itself have a direct impact on improved functioning of the health services, and if so, how?

Questions on indicator selection

- What are relevant and operational indicators for management support systems such as financial systems, personnel planning and management systems, building and equipment management systems (in addition to health problem and health services indicators for which extensive experience is available)?
- How can qualitative information be operationalized in a routine health information system (e.g. the quality of interpersonal relations between the care providers and the patients)?

Questions of data collection

- How can patient/client data recording be improved in order to help care providers to monitor and maintain the quality of their services?
- What innovative structural interventions can be proposed to better link routine service statistics with other nonroutine data collection systems (surveys, vital events registration, rapid assessments methods, etc.)

Questions of data transmission

- In hierarchical vertical transmission systems (still the most common data transmission system in many countries), how can the speed of data transfer be improved?
- What is the most efficient way to provide feedback to lower levels in systems where data are compiled at higher levels?

Questions on the use of information

- What is the relationship between the format in which information is displayed (maps, action-oriented graphs, etc.) and its use in management decisions?
- How can one design and conduct training that effectively improves the actual use of information for health services planning and management?

Questions on computerization in the health sector

- Is there an approach for determining where computerization is likely to pay the greatest dividends?
- What is an efficient strategy for designing and testing computer support for important components of the health information system such as hospital data, surveillance data, and various types of administrative information such as supplies, budget, and human resources management?

further contribute to establishing health information systems responsive to the management needs of effective and efficient health services systems in both developed and developing countries.

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