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HEALTH DATA ISSUES FOR PRIMARY HEALTH CARE DELIVERY SYSTEMS IN DEVELOPING COUNTRIES

International Institute for Vital Registration and Statistics
9650 Rockville Pike
Bethesda, Maryland 20814
U.S.A.

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FOREWORD

This report presents some of the issues associated with the development of data collection and information systems in support of programs of primary health care delivery in developing countries. Mechanisms for the collection of data are described, as well as the potential utilization of data in achieving the goals and objectives of these programs. A brief example of an implementation strategy is presented for the Bombali District in Sierra Leone which was part of the project - Strengthening Health Delivery Systems (SHDS) in West Africa.

The views expressed in this report are those of the author and do not necessarily reflect those of the IIVRS.

HEALTH DATA ISSUES FOR PRIMARY HEALTH CARE DELIVERY SYSTEMS IN DEVELOPING COUNTRIES

VITO M. LOGRILLO

Director of Health Statistics

New York State Department of Health

INTRODUCTION

This paper is intended to describe some of the basic concepts of data collection and information systems development that should be an inherent consideration for primary health care programs in developing countries. Various types of data are described which comprise a minimum basic data set for the management and operation of primary care programs. Sources of data are presented and uses and applications are outlined. A brief discussion of the introduction of data collection and information management systems in Sierra Leone is given for a particular primary health care center.

BACKGROUND

A major component of primary health care delivery systems is the identification, collection, analysis, interpretation, and dissemination of data. Data are necessary to effectively carry out the planning, management, direction, and evaluation of health care programs. All too often, however, this component receives a low level of attention due to the demands required for providing adequate health care services in a particular area. The focus of primary health care is to have available those resources - medical and support staff, supplies and equipment, pharmaceuticals, transportation - needed to address the health needs of the population. With these items representing major operational needs of the system and often requiring constant attention in order to carry out programs of the health care delivery system, the role of a health database or information system is often not adequately emphasized or fully integrated into the health care system.

The collection of data and the use of that data are, however, essential elements of a health care delivery system. Health needs of the population must be defined for data collection to take place and, once obtained, the data must be used in order to realize the benefits within the program. Otherwise efforts to provide health care may result in a significant waste of staff time, resources and funds. Where data are not collected, or collected and not used in an operational health care program, it may be that the value of the data are not recognized or that resources such as technical staff and equipment are not available to analyze or interpret the data.

The latter reason is quite often the case as observed in primary health care projects in many developing countries. This points up a significant gap in these

programs i.e., the failure to recognize data as an integral component of the system in providing health care. It is clear that the decision-making functions of an organization, and the allocation and distribution of resources to conduct an adequate program of primary health care delivery require a great deal of health information and analysis. Information must be derived from statistically sound, complete and reliable data reporting activities; by the judicious use of administrative and other information systems which may not be directly managed by the primary health care facility; and through survey sampling methods.

Data reporting activities must necessarily be defined as a function of the goals of the delivery system in place. Forms design, instructions on completing forms, content, distribution, and training all must be addressed for successful reporting. The design of report forms must be developed so that they are useable in a variety of environments. For example, the use of pictorial representations of health events can produce results where questionnaires could not be read or understood. The content of the form should be simple and straightforward, and limited to very specific health outcomes. Generalizations are not well received in this type of environment, and should be left to the analytical staff at the health care center following data collection activities.

Pre-existing administrative record systems can also serve as a valuable data resource to the system. Historical records relating to prior censuses can provide basic demographics of the population; inventories of drugs and other medical supplies can reflect in part the health conditions and problems of an area; documentation required to obtain employment and school records can provide data on family structure and households; and, other required reporting or registration that may exist for a variety of reasons can represent valuable input to the knowledge base for the health care system.

Sample surveys, whether to determine population characteristics or health status, are an essential component of the data collection plan. Though this activity requires field work, a properly designed sample and a plan for the logistics in conducting the survey can be cost effective and produce relevant and timely data. Sampling plans may be narrowly focused or broad-based in terms of content, geographic coverage, or population; may serve to develop baseline data, provide ongoing input to the health care system, or provide an evaluation process for programs of the system; and, may be used to maintain a continuous health surveillance or monitoring system in support of the health care delivery programs.

The variety of data and information represented in these areas, if recognized, integrated and analyzed can significantly impact the organization, administration and direction of many primary health care activities in developing countries. In doing so, benefits are realized not only in the operation of the program itself, but by the recipients of the services provided and from the support of national and international affiliates concerned with quantitative assessments and health outcomes of the program. Requests for financial support, supplies and related health items which are justified on the basis of hard data and information from the health care program itself have a greater degree of success.

Health intelligence, in turn, represents the appropriate use, application and dissemination of relevant information throughout the entire system through which primary health care is delivered. All too often, data are collected, stored and subsequently forgotten. The time, effort and costs associated with the collection and processing of these data represent major losses to the system. Since data are perceived as less tangible assets in many cases, these losses are not adequately considered in the overall programs of the delivery system.

In addition to the obvious expense associated with data collection, the impact on staff initiatives and incentives, or lack thereof, is significant when health information is not utilized. It becomes an exercise in futility when the efforts to obtain data go unrecognized or unused. The time and effort to collect data in many areas in developing countries requires the commitment of staff beyond normal daily activities. Travel, weather and accommodations often make such efforts very difficult. When benefits are perceived, the results can bring a strong sense of accomplishment to the primary care program staff. Not to recognize this can seriously compromise to some degree the operational program of the system.

Another category of difficulty arises when the application of the data to the particular problem or issue for which data collection was undertaken is misdirected or misapplied. For example, data collected at a remote clinic site to determine the demographics of the population being served should not be used to generalize those characteristics to the population of the geographic area in which the clinic is located. In this instance, the clinic may draw clients from a wide area and not be representative of the geographic area of interest. Similarly, the clients may reflect a specific subset of the population i.e., those needing clinical services, and could present demographics quite different than the population of the immediate area.

Included in this category are applications related to fiscal issues, to evaluation and cost/benefit programs, to research and epidemiologic investigations designed to answer specific health questions, and to day-to-day program operations. It is essential that the results of data collection activities be applied, as appropriate, to each of these areas to assure a coherent and informed program for system management. For this purpose, applications systems management (ASM) should become an ongoing component of primary care delivery programs. ASM, in this context, represents a formalized mechanism to assure that each of the essential components - purpose/objective, data needs, analysis, interpretation - needed for program administration are identified and fully integrated into the health care plan.

The introduction of applications systems to primary health care programs in developing countries provides a mechanism to define specific approaches to meeting health needs, to identify relevant data, and to prepare quantitative measures for analysis and evaluation of program activities. From this development a process for decision-making, resource allocation, and program directions can be made based on an established database. Methods for implementation require statements of goals and objectives of the program and the assignment of an ASM team to design and monitor development and progress. The system may simply focus on one aspect of the health

care program, or may encompass multiple program areas. In any case, a systematic process will have been established to conduct the operations of the program.

Given that the tenets of data use and systems management are followed, it then becomes necessary to assure that all participants in the delivery system share in the results. Whether or not there is specific need in a particular area of the system for information, feedback to the entire system provides a baseline for the sharing and communication of activities, functions, and results of investigations being conducted by the program. This alone oftentimes can serve a vital role in maintaining an interested, informed and involved staff.

Communication with all levels of the health care system is a fundamental concept for a successful program, and should occur from the village level through to the appropriate district, province and national offices. Feedback on results of programs, surveys, studies and new initiatives to the health facilities - clinics, hospitals, dispensaries, village aide centers - as well assures an informed constituency. Such interaction not only keeps the partners in the system apprised of activities, but encourages the sharing of ideas and developments in all areas of the system to enhance the role of primary health care generally.

DATA COMPONENT

In understanding the critical nature of the data component in the primary health care delivery system, it is necessary to recognize the types of data which are essential to the system. These may be broadly characterized under four main categories - demographic, medical and health, administrative, operational - all of which in the aggregate represent the health information and intelligence base for the program. Each of these data categories are designed to strengthen the primary health care program by providing the database for management information needs, planning and evaluation, and statistics.

The need for both descriptive statistics and reports as well as analytical capabilities in carrying out a program of health care delivery can only be met through a well designed and supported program of data collection and analysis. This implies not only trained staff, but supplies and equipment as well. The introduction of microcomputers in a number of primary health care programs has demonstrated the feasibility and utility of such equipment for data processing. As has been shown, these computers have worked well under adverse environmental conditions and have added a large measure of credibility to the data processing capabilities in remote locations. The implementation and operational plans of primary health care programs should routinely include these capabilities.

Demographic Data

The data elements in this category, for the population in the area covered by the system, consist of a series of variables from which characteristics of the population can be used as the basis for developing epidemiologic surveillance programs. These data

also provide relevant background information to identify appropriate strategies to introduce and conduct health programs and activities in defined areas of need. Characteristics of the population should include:

1) geographic distribution - village, chiefdom, district, province, or other defined geo-political subdivisions.

2) age and sex distribution.

3) religion.

4) household composition.

5) labor force (e.g. employment status, occupation, industry).

6) education.

7) fertility patterns (e.g. number of: children ever-born, births in past year, childre surviving).

8) crude population density; agrarian density.

Each of these characteristics represent basic information essential to the conduct of health care delivery. The location and political (tribal) affiliations of the population serve to define where health service centers are to be located in remote sites (village or chiefdom level) from the primary care center, and how the care can be delivered most effectively. The age and sex distribution of specific areas will define the types of services needed - prenatal care instruction, maternal and child health services, infectious disease control, chronic illnesses support service - and the method of delivery. Religious beliefs, household formation and dissolution, educational level and workforce all combine to prescribe the mode of operation of the primary care system in a particular health service area. Without such data, the successful implementation of outreach programs to the targeted population become less assured.

Medical and Health Data

The following data elements are derived from the relevant variables identified to characterize the health status of the population, identify problem areas, and to assess medical and health needs. Coupled with the above demographic data, the combined data sets offer the basic database for information development from which program direction, evaluation and decision processes can be effectively carried out. These characteristics and the appropriate quantitative measures which can be derived from them provide the required health status profile from which the health care delivery system must derive it's program definition.

Services related to disease prevention, maternal and child health, oral rehydration therapy (ORT), drug treatment, food supplements, and hygiene must be allocated on the

basis of definitive knowledge of the health of the population. The collection of relevant data to this end is paramount to the implementation of a program responsive to meet health needs. These data include:

1) Neonatal, infant, early childhood mortality.

2) Incidence and prevalence of specific diseases (by age and sex).

3) Major causes of death (by age and sex).

4) Spontaneous/induced abortion.

5) Immunization status.

6) Nutritional status.

7) Environmental and water sanitation.

The collection of these data can be facilitated through a number of approaches. Where civil registration is effectively carried out, data related to items 1, 3, and 4 above can be readily obtained from certificates or records of births and deaths. For remaining items, health surveys can be undertaken to determine these measures of health status and conditions. It is clear that population profiles in which specific health outcome data are incorporated significantly improve the service delivery protocols of a primary health care program, as well as providing needed services as opposed to perceived services.

The civil registration system in many developing countries, however, are only marginally implemented or non-existent. The capability of a viable civil registration program to provide timely and relevant health information is well established. The value to primary health care systems, in addition to national and local health care programs is unquestioned. Civil registration represents a significant population based program which can provide government with a quantitative view of population dynamics from a national and local perspective, insights into the health status of the population and subpopulations of the country, and an invaluable quantitative tool to measure and evaluate the impact of health programs on a local and national scale. In several of the developing countries in which I have had the opportunity to review and evaluate the potential impact of a national civil registration system, it has been universally true that the long-term benefits clearly support the investment in staff, time and resources needed for implementation.

Administrative Data

These data elements relate to those variables required to develop the information necessary to administer the primary health care system program. Where the demographic and medical and health data reflect population characteristics and health status, these data are directed to programmatic issues. To the extent services can be

provided, treatment administered, and care delivered, a complete administrative structure of the program must be defined. This places in perspective the scope of the activities and operations which can be undertaken and assures a framework for assessing limitations, evaluating options, and targeting resources to maximize program functions.

The data system from which information can be developed to plan and operate health service activities must include:

1) System organization, including national, regional and local interactions and relationships.

2) Financial balance sheet, including sources of funds, expenditures and income from services (if any); inventories.

3) Staffing patterns, including administrative, medical, health, other health support staff such as Traditional Birth Attendant (TBA), Village Health Worker (VHW), MCH assistant.

4) Hospital, clinic, dispensary, and other care delivery locations.

5) Supporting organizations (local, national, international).

6) Inventory system - publications, medical and other supplies, pharmaceuticals, equipment.

The use of ASM in the administrative area can assist in the development of the overall structure of the health care organization. The data elements identified above represent input to the type of administrative models that can be developed using this process, pointing up the need for this type of data system. The applications areas (i.e., the underlying reasons for establishing a primary health care program in a particular location) can be used to define and describe fully the administrative linkages and organizational framework necessary to system operation. To the extent this can be effectively done is dependent on the types of data available for analysis and the integration of derived information with the predetermined goals and objectives of the program.

Operational Data

These data represent the actual implementation requirements of performing the day-to-day tasks associated with the program at the primary health care center. The major focus of activities are in responding to the needs of local villages and surrounding geo-political jurisdictions. It is clear that operational support staff must have the resources to address each segment of the data sets described below. Data needs related to operational activities include:

1) Office and staff accommodations.

2) Transportation facilities (garage, motor vehicles, motorcycles, bicycles).

3) Training activities.

4) Field operations.

5) Volunteer programs.

6) Storage facilities (cold chain, vehicle/equipment parts, drugs, fuel).

7) Disease control activities (spraying, septic systems, composting, chlorination).

8) Reporting mechanisms for operational control (inventory sheets, trip logs, forms control).

The above data sets - population description, health status, program organization, operational activities - are needed to serve a multiplicity of functions which comprise an effective health care system. Primary health care, with a major focus on the delivery of health and health-related services, must also support an information base from which planning, decision-making, and evaluation strategies can be developed. The information base must serve not only the district-level program, but the essential reporting requirements to regional and national offices, international support agencies, and to provide feedback to the local areas and workers.

APPLICATIONS

At the Fourth Annual Disease Surveillance Conference held in Bamako, Mali, April 14 - 18, 1986, a significant part of the conference was devoted to data needs in the participating countries as a direct supporting component of primary health care delivery systems. Each country, in developing outlines for national health action plans, invariably included demographic data, epidemiologic data, and data on available resources as essential to the system. In every instance, it was noted that there were significant gaps in the data systems of each country. Some of the gaps noted by the conference participants included data needed for programs directed to

1) Improve survival in communicable diseases.

2) Improve percentage of successful follow-up of specific cases (for example, TB).

3) Reduce infant/early childhood mortality due to specific causes (diarrhea, dehydration, fever).

4) Expand percentage of immunization in children under 5 years of age.

5) Improve maternal and child health services.

6) Establish fixed and mobile clinical/medical services delivery units.

7) Provide training for local health workers (including MCH assistants, TBA's, VHW's, ORT, civil registration and statistics).

Countries attending the Conference included Burkina Faso, Togo, Cameroon, Gambia, Ghana, Mali, Nigeria, Senegal, and Sierra Leone. International agencies included Agency for International Development, African Development Bank, WHO/AFRO, and the Strengthening Health Delivery Systems in Africa project.

To meet these information needs, a number of specific activities were identified. These included the establishment of formalized reporting procedures to all levels of the organization, the conduct of field surveys to obtain relevant data on the population as well as health status (mortality, incidence, prevalence, natality), standardization of report forms, and use of extant data from other reporting systems. Major difficulties associated with accomplishing these activities were lack of funds, untrained staff, and transportation needs (vehicles, fuel, parts).

Sierra Leone - An Example

The experience in Bombali District, Sierra Leone serves as an example of the processes undertaken to assure that appropriate, timely, and relevant information was available to the Primary Health Care Program (PHCP) in the District. The PHCP was a joint project of the Ministry of Health and a number of non-governmental and international organizations. The District Health Development Committee served as the coordinating body in carrying out the programs and activities of the PHCP.

The PHCP was located in Makeni, the largest city in the district, which was approximately 180 kilometers from Freetown, the capital, in the northern province of the country. The area is primarily rural with an agricultural economy. The population is organized into thirteen chiefdoms, with each chiefdom containing from 100 to 200 villages. The size of the villages ranges from approximately 10 households to over 100 households. The number of villages in the district total over 1,500. Makeni serves as the center for administration of government activities and is the source for electrical power, piped water and telephone service. Unfortunately, during much of the time a severe oil shortage curtailed many of these services. Power at the PHCP was provided by portable generators.

Health services were provided in settings much like that in other developing countries. Villages have Village Health Workers (VHW), birth attendants (TBA), and maternal and child health (MCH) nurses as the primary care providers. These workers had some formal training and served the population in the village or area where they lived, and related to the health care center in the chiefdom. The Makeni PHCP served as the focal point for medical services that could not be handled at the local level, and provided the training and administrative facilities for the entire district.

Support systems including drug storage, vehicle and parts supplies, forms, computing equipment and general supplies were administered from the PHCP. Field activities began with orientation and assignments from PHCP administrative staff. A hierarchy of management, supervisory and technical staff provided the operational framework for conducting daily activities. Consultation and assistance was provided by a number of international agencies and volunteer groups. This is of particular importance to note, since these groups may be able to provide additional support activities such as computer programming or statistical training which may not be their primary support function.

SHDS Program

The primary organization responsible for developing the data bases and information systems for the PHCP was the regional project, Strengthening Health Delivery Systems (SHDS) in West Africa. SHDS operated under the auspices of the World Health Organization Regional Office for Africa (WHO/AFRO). The project was funded by USAID, with Boston University serving as the project contractor. The principal office for the project was located in Abidjan, Ivory Coast.

One major objective of the SHDS project was "to improve regional and national disease surveillance and health demographic data systems and to integrate these systems into national health planning delivery systems". In meeting this objective, several activities were implemented beginning in 1983 by the SHDS project team with which I was associated. These included placing two microcomputers at the PHCP site and training staff to use the equipment for data entry purposes, data analysis, and information presentation (graphs, tables, charts). This was a successful introduction of computers in an environment which had no environmental controls for heat, humidity, dust and severe electrical variations. Power was provided by a portable generator, with all the incumbent problems that type of power source represents.

In order to obtain baseline data on health status as well as demographic profiles of the population served by the PHCP, a demographic survey was developed using a stratified random sampling design. A ten percent sample of villages was taken from each of thirteen chiefdoms in Bombali District. Survey forms, which had previously been designed by SHDS staff, were completed for each household in the sampled villages. The survey form contained information on the following characteristics:

1) population by age and sex.

2) births and deaths.

3) environmental data (protected water supply, animal control, composting, use of latrines).

4) accessibility to PHCP center, clinics, other health facilities.

The survey was conducted over a six-month period in which teams (usually 2 or 3 staff depending on the size of the village to be surveyed) visited each village in the sample and completed a data collection form for each household. Approximately 145 villages were visited during this period. The form was pre-tested in a non-sampled village, with interviewers trained at the PHCP center by SHDS staff. The sample was designed as follows:

1) Each Chiefdom was stratified into villages with the number of houses in a village of less than 10, 10-49, and 50+.

2) Villages were selected from each strata, using a proportional allocation based on the total number of villages in the entire sample. This worked out to be approximately a 10 percent sample.

3) Each sampled village was visited by staff from the PHCP, with interviews conducted first with the village headman and followed by interviews with household members.

4) The completed survey forms were returned to the PHCP for processing using the installed personal computers.

Travel to the villages in the sample was carried out on foot, or using motorcycles and vehicles. Fuel shortages seriously delayed completion of this phase of the survey, adding approximately 3 months to completion of the survey. The data collected however were essential to the PHCP and formed the basis for identifying potential health problem areas for follow-up, for redirecting ongoing programs, and for initiating new programs and conducting program evaluations.

The computer system was set up to process the data from the survey, as well as to prepare analyses and reports. This capability significantly improved the data systems of the PHCP, owing to the interest of the staff in electronic computing as opposed to the hand tallying that had been done in previous surveys. The work function and work environment related to data processing had become a learning process in new technology for the staff and less of a time-consuming, repetitive manual labor activity. This also had the benefit of freeing up staff time to do other activities at the PHCP.

Following the survey, statistical summary data and reports were prepared for use by the PHCP for program direction and evaluation. Reports were also prepared for use by the various international groups involved in the PHCP project and for reporting to the Ministry of Health. Included in these activities were forms designed for health data collection of various types, executive summaries, forms for internal administrative use such as drug, equipment and parts inventories, and for data summaries provided to the village health centers and workers. Feedback of these reports and data to the local areas was felt to be a critical factor in developing a reliable input mechanism for health reporting to the PHCP in Makeni. Initial results of this approach were very positive.

There were a series of activities, plans, and programs implemented and abandoned in coming to a reasonable data and health information program for the PHCP. Forms design, survey methods, data collection protocols, reporting mechanisms, and analytical and administrative support systems were all part of the SHDS efforts in developing the system in the Bombali District. Many of the difficulties as well as the successes are not enumerated here, but rather a sense of the process has been described. It is important to emphasize however that the impact of the SHDS information system was significant and provided an information base for decision-making, program direction and targetting, as well as for population-based health data not previously available.

The utility of the data and information to the PHCP in seeking support from the national government and from the international organizations that have supported the PHCP was significant. The ability to demonstrate a basis for the PHCP activities, to provide for an effective evaluative tool of the programs conducted, and to have a mechanism for managing resources based on quantitative data all contributed to the primary goal of the program namely, the delivery of health care services where most needed in an efficient and effective manner to the benefit of the population.

SUMMARY

The need for sound, reliable data in conducting primary health care service programs is unquestioned whether the program is in a developed or developing country. The process becomes more problematic for developing countries owing to the severity of health problems and the availability of funds and resources to carry out needed programs. Basic concerns for electrical power, fuel, equipment, drugs, transportation and trained staff all combine to constrain capabilities to provide needed services. However, these concerns should not mask the importance of data collection and information systems development.

A potential major source of health information for primary health care programs is through the implementation and use of civil registration systems. Though commitments to civil registration are long-term, the benefits are clear - health information on the entire population of a country for health program planning, evaluation and resource allocation, in addition to data for use in population dynamics, projections and censuses. The process for a national civil registration program need not be implemented country-wide, but on a scheduled basis. This would involve establishing civil registration programs in selected areas of the country, and eventually integrating the system country-wide.

The role of primary health care programs could be to begin the process for defined areas and as the health care system evolved to encompass broader geographic areas, the civil registration program could likewise be expanded. The familiarity of primary health care programs with the local areas would help to insure completeness of participation and reporting. Additionally, the continuous interaction of the local population groups with the primary care system would provide an incentive to participate. The degree to which this role has been undertaken by primary care

programs has been limited, but information regarding any instances of implementation would be welcome input to this author.

An effective information system is essential to the conduct of primary health care programs. Such systems can serve to 1) optimize the allocation and distribution of available supplies and resources, 2) evaluate health outcomes as a result of the time, effort and funds expended in conducting health programs, 3) provide a quantitative basis for defining and demonstrating need for support systems and, 4) characterize the extent, nature and severity of the health status of the population to be served. Each of these items requires data and the intelligence derived from resulting information. Health needs of the population and the services required to meet these needs can only be provided when we know who and where the people are, what health problems exist, and the resources available to address the problems.

The role of data is clear; the deficiencies are known; and the process to implement and prepare health intelligence in support of effective health care delivery systems has been demonstrated. More support and attention to the data component of the system is needed in the primary health care delivery programs operating in developing countries. There is a direct relationship of the quality, effectiveness, delivery, and economics of health care services provided to known characteristics of the population to be served. To undertake the service functions without due attention to the data collection, analysis and reporting functions is to introduce weaknesses to a system that can ill afford them.

The recognition of these features in the Makeni PHCP in Bombali District, Sierra Leone, and the efforts of the SHDS project to implement an information system for the program all contributed to achieving the goals of primary health care in the country.