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NATIONAL HEALTH INFORMATION SYSTEMS AND THEIR USE IN NUTRITIONAL SURVEILLANCE

by

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INTRODUCTION

Nutritional surveillance means watching over nutrition in order to make decisions which will lead to improvements in nutrition in a population. This "watching over" requires regular information about the population of concern, and in particular subgroups of the population especially affected by malnutrition. Health is one of the multiple factors that affect nutrition and the health system is one source of data used in the surveillance process.

Health information systems are of interest for two reasons. First, they have existed for some time and their experience can provide useful lessons for nutritional surveillance. Secondly, much of the data recorded within the health system is potentially useful for nutritional surveillance if it could be obtained in a regular, reliable, representative manner. The purpose of this paper is to briefly describe how health and health information systems generally work - including data sources, types of measurement, data flow, data analyses, and current outputs of the system; problems found within these systems; and some possible ways of making specific information from the health sector available and usable for nutritional surveillance. Experience in disease surveillance is drawn upon because there is much experience in this area and it has many similarities to nutritional surveillance. In several countries data from the health sector is currently being used in nutritional surveillance systems. This experience is also included, with particular attention to how data is "captured", analyzed, distributed and used for decision-making. In Africa a recent workshop held in Nairobi (UNICEF/CNSP 1982) dealt with certain of these issues in that part of the world.

(A) History of National Health Information Systems

Emphasis has been placed on improvement in the collection and use of health statistics for many years. The First World Health Assembly in 1947, recommended the formation of national committees on vital and health statistics to work in collaboration with an Expert Committee on Health Statistics which was formed for the study of problems in the field of health statistics, including those connected with the registration of births, diseases and deaths (WHO 1948). The first national committees were formed in 23 countries by 1950. A summary of subsequent international initiatives supported by WHO is given in Table 1.

Since the late 1960's stress has been placed on the need to incorporate more modern management principles in the running of the health system. Populations were becoming more mobile, more urban, more health conscious and demanding more and better health care. At the same time health care was becoming more expensive, and increasingly in competition with other sectors of the economy for available resources. The need to provide an economic justification for receiving its share of available resources acted as an incentive to the health sector to seek data to measure the effectiveness and efficiency of services and the benefits obtained. This need to plan and evaluate, especially in relation to effectiveness, required more information than was reported within the existing health statistics system. Better use of available data was also required.

In response to these needs and taking account of existing resources and constraints, a structure for national health information systems was proposed by the WHO Expert Committee on Health Statistics in their 14th Report published in 1971 (WHO 1971). A summary of the required features is given in Table 2. Since that time the idea of National Health Information Systems (NHIS) has been widely accepted, although details may vary. WHO has included NHIS's as a part of their strategy to reach the goal of "Health for all by the year 2000". They caution that "only information that is required by specific users for specific purposes should be sought. The information need not be more precise than the process it supports; approximate information in good time is better than precise information too late. Measures have to be taken to ensure that the producers of information are provided with feedback information" (WHO 1981a, p.60). As far as we can tell, few if any developing countries at present have fully operational NHIS's as envisaged by the WHO Expert Committee in 1971. Once information is obtained at national level, it can also be used in wider assessments of progress, for example using the series of global indicators suggested by WHO (WHO 1981c). These are shown in Table 3. (Not all of these indicators come from the health sector, indicating the many sectors that can affect health.)

(B) Uses of Health Information.

One major complaint of health personnel is that the information they so laboriously report is never used. This is true in many cases. However, there are many uses, possible and actual, of the information. In addition to national planning and budgeting, the information is useful for evaluation and program management of health programs at the local, regional and national level. Health

information is useful to other government agencies for general planning. National multi-year plans should consider information on the health of the population. National health reports are often used by international organizations to formulate and evaluate plans for projects in the country. WHO and other international organizations who compile global statistics, ie, Population Reference Bureau, US Census Bureau, World Bank, make use of a nation's health statistics. New emphasis is being placed on the use of health information at the local level. Epidemiological thinking and techniques are being taught to primary health workers so that they may more fully utilize the information they collect. This concept is discussed further in Section E. (See also WHO 1980g and 1981c.)

Decisions are often based on the experiences of the decision-maker, "gut feeling", political pressure and the like. Lack of reliable and appropriate information or lack of knowledge on how to use the available information may be contributing to this situation. If these information needs are known, a system can be designed to provide the necessary data. Involving both the producers and users of health information in the formulation of data requirements helps to foster coordination and cooperation between all those with an interest in the output of the system, and decreases the amount of unnecessary data collected.

It would seem that health information is currently used primarily to identify health problems and to document what is being done about them in the way of services provided. Information on the characteristics of those people with the health problem and evaluation of the effectiveness of interventions are often not reported or not available and may require changes in the system to obtain. A discussion of existing systems follows.

(C) Data Collection Methods

Current health statistics are mainly derived from vital statistics registers and from the records of health institutions.

(1) **Vital statistics** are recorded primarily for legal reasons. Birth certificates serve as proof of identify, and are required for various purposes throughout life e.g. admission to school. Death certificates are proof of death of an individual, needed for wills to be probated, burial permits, etc. Birth and death registers contain information which is potentially useful in the health sector, e.g. for compiling causes of death by age, sex and residence. An example of information recorded on birth and death certificates of six countries is shown in Tables 4 and 5. These certificates, as legal documents, may be recorded by

the civil service or other organizations rather than the health sector. Here are some examples. In rural India registration of births and deaths is the responsibility of the Panchayat (local government), revenue service, police agency and/or the health agency (India 1972, p. 13). In Honduras volunteer "health guardians" in villages report births and deaths to the secretary of their municipality (NCHS 1980, p. 6). In Jamaica registration is the responsibility of the health department but is in practice done by a district registrar who is often a postmaster (NCHS 1980, p. 120). The Filipino registrar is a local finance officer, a city health officer or someone appointed by the municipality (NCHS 1980, p. 153). In rural Thailand the local village headman reports through the commune headman to a district officer (NCHS 1980, p. 153). In the latter four countries little training or supervision of the registrars is provided (NCHS 1980, p. 153) and hence the accuracy of reporting may be suspect, especially cause of death. Indeed, the vital registration statistics of many developing countries are known to be rather incomplete. In 1973, an estimated 35% of the world population had reliable data on live births; in Africa the proportion was 17% and in Asia 7% (WHO 1974, p. 10).

(2) **Records in health institutions** are used during the provision of health services to a patient. Patients are usually divided between inpatients and outpatients. Inpatients stay in the hospital or clinic for a period of days. Outpatients come to the health facility for treatment and return home after being seen. Outpatients' problems are more commonly chronic, or if acute of a minor nature. Many more people are seen as outpatients than as inpatients. A summary of information commonly recorded/reported in both types of settings is shown in Table 6. It should be remembered that both inpatient and outpatient records and reports contain data only on people that are seen by the government health system. They give little information on those people utilizing other health services or receiving no health care. Computing of rates is therefore limited as the only known denominator is the clients treated in the health unit - not the population of the geographic area in which the health unit is located. This data is however still useful as an indicator of the health problems of an area.

Reports are commonly prepared from the inpatient's discharge summary and the hospital's census records. A Gambian Discharge Summary is shown in Figure 1. Outpatient statistics are more commonly used in disease surveillance

systems, and Table 7 shows the diseases so reported in eight countries. Outpatient records in hospitals or health clinics are often kept in large ledgers in which the patient's name, age, address, chief complaint and treatment received are written down in appropriate spaces. An alternative is tally sheets, which are used in some clinics. They may have space for patient-identifying data or may be used simply to mark off services rendered or diseases seen. Figure 2 shows an example of a tally sheet used in El Salvador, sent in as a report of clinic activities. This sheet was designed for use in nutritional surveillance. Figure 3 shows a tally sheet proposed for use in the Gambia, designed for improved disease surveillance. Clinics may also have disease registers used to follow up patients with specific long-term diseases, often of public health significance such as TB and leprosy. The information included in such a register needs to be adequate to uniquely identify each individual recorded, and the services he requires, e.g. a TB register may be used to identify TB patients and ensure they receive their drug treatments on schedule (Brooke 1974). Under 5 Clinics and Antenatal Clinics are increasingly using patient retained record systems. The appropriate information is recorded on the record, which is kept by the patient or mother. This record is to be brought by the patient at every clinic visit. To be of statistical use the information recorded on these records must also be recorded at the clinic. A sample Road-to-Health card and a Female Health Card used in Botswana are shown in Figures 4 & 5. Vertical programs such as TB, Family Planning, malaria control and others may have their own special records. These programs' records may or may not be included in clinic reports, depending on their respective locations and the usual procedure for reporting in each country. Malaria records may be useful in determining the population of an area as they often show locations of and have given a number to every house in the area to facilitate mosquito control by spraying. Health inspectors are another group of people who may visit every house and business in an area, and may have records showing number of inhabitants per dwelling, again useful in determining the population of an area.

Reports from clinics may be transmitted to the Ministry of Health on a weekly, monthly or quarterly basis, either directly to the central authority, as with the tally sheets in El Salvador, for example; or through a district-regional-national hierarchy. Routine reports are often sent by messenger or the postal service, whereas notice of quarantinable diseases are supposed to be immediately

telegraphed to the national level in many countries (Gambia 1980). The content of the reports varies between countries and is dependent upon the instructions of the authority requesting them, i.e. Ministry of Health. Reports may be very detailed or have only totals. In the Gambia the Monthly Returns of Outpatient Attendance (Figure 6) are supposed to be filed by every dispensary, subdispensary and hospital outpatient department. This form requests that new cases of particular diseases be reported by adult or child classification. All reattendances are lumped together as one number. Infants under one year of age are separated out as one number for "Babies under 1, all diseases and accidents" (Gambia 1980, Form 3). To prepare this form it is necessary for the dresser to carefully go through his clinic ledger. This takes considerable time and reports are often late (Gambia 1980, p. 2). Similar problems have been experienced in Cameroon. Sentinel clinics were randomly selected and were to report weekly on specific diseases. Reports were as much as 6-7 months late if reported at all. Analysis was sluggish and a report which was to be made annually had yet to be published two years after the project started (Cameroon 1979, p. 2). Outlines of the organization of the Gambian and Cameroon Disease Surveillance Systems are shown in Figures 7 and 8.

(3) Problems of data collection. Many of the problems experienced in health information systems are relevant to those in nutritional surveillance. In fact the problems may be the same, since a health information system, particularly if including nutrition measurements, would be a data source for nutritional surveillance and of course the converse may also apply. In reviewing the status of health information systems certain problems were commonly reported. Some of these relating to data collection specifically are briefly discussed here; those of a more generally administrative nature are discussed in Section (E) of this paper.

The effort needed in preparation of reporting forms, as noted above, is one crucial problem. It is not easy to achieve consistent and regular transcription of information, from a clinic's own records onto a reporting form, by the health worker whose main responsibilities and motivation are for individual care. The information required may be routinely obtained for purposes of diagnosis and treatment - in which case it may be reasonably accurate. But transcription of the information is tedious, may require out-of-hours work, and may often be done with the expectation that the results will never be used - an expectation frequently justified in reality. Moreover, reporting is often not part of the

health workers' training, and indeed may not even be regarded as a legitimate (or important) part of the job. It is probable that the reporting of notifiable diseases, such as cholera, is much more successful than for other diseases, precisely because at all stages of reporting there is a sense of the importance of the information and the expectation that action will follow.

Requirements for recording and reporting can escalate to enormous proportions. For example, in one state in India some 400 or so reports were required per health center per year (Johns Hopkins University 1976); in Egypt, one health center was observed to have 31 different logs in which to record information, all of which were considered necessary. (William Reinke 1981: personal communication). Much of the data recorded is likely to be non-essential, and certainly it is not all analyzed. Rationalization and simplification of reporting systems is evidently required. The starting point should be to clearly identify the purposes for which data are needed, at which levels and how much (sampling records is discussed below). Non-essential or unused items could then be weeded out. This requires coordination among the various users of the data and may involve changing the system - a process that is often difficult.

A major problem in reports is distinguishing between the number of patients -different individuals - seen and the number of visits made to the clinic. The number of different individuals seen is often calculated directly from the number of "visits" recorded, which will not be correct unless first visits of a patient for a health problem are separated from repeat visits by that same patient. The tally sheet used in El Salvador (Figure 1) is one attempt to solve this problem. It has one column for first visits and a separate column for second or subsequent visits; however, in practice distinguishing between the first and subsequent visits of a patient is difficult. Another problem may be how totals are arrived at: if all patients from all clinics of a health unit are added together to make a grand total of patients seen, a patient who was seen in two or more clinics may be counted as two or more people. For example, an infant in the Under Five Clinic who had a stool test run and then was seen by a doctor would be counted as three people or visits (one for Under Five clinic; 1 for lab; and 1 for seeing the doctor). Only if one wanted to know the total work load of a health center and specified that this be determined by a grand total of all visits to all departments would such a compilation be correct. For nutritional surveillance purposes the percent of children seen who were malnourished may

be overestimated if the malnourished children visit the clinic frequently and are counted as a new case every time they come.

Basic observations, such as weights and ages, may often be incorrect for various reasons. For example health workers in some countries may have difficulty reading weighing scales. Mothers may not remember the date their children were born. The problem may be further complicated by the use of more than one type of calendar. For example in Afghanistan the government and the cities use a solar calendar, the rural people follow a lunar one; local events calendars with both solar and lunar month noted have been used with some success in rural clinics.

The possibility of bringing the volume of data to be handled down to manageable proportions by sampling records has been suggested for nutritional data obtained through the health system. It applies equally to processing clinic and hospital records. The sampling can in principle take place at the point of recording the data. An example might be nutritional status data from clinics. This could be done in a clinic by having the staff use a special tally sheet to record the WA of all children seen 1 day every month or every nth child all the time. Another possibility would be to have a non-clinic person go to all the clinics on a rotating basis to record the WA data on all children seen the day he was there. This second alternative has the advantage that it would require no extra effort from frequently over-worked clinic staff and might give some standardization of data collection as one or two people would be doing all the recording for the district or region. These people could also serve as a type of quality-control as they would be observing the weighing process in the clinics and could correct such practices as not undressing the child before weighing or plotting the weight incorrectly. Either method, clinic personnel or "roving recorders", would require careful training of the staff involved; and careful attention to factors that might cause sampling bias i.e. sampling clinics on only days that all the sicker children would come or would not come. This particular example could be corrected by varying the day of the week that the sample is taken or taking the sample on the same day for all clinics, i.e. have the "roving recorder" come with the doctor to all the clinics. Sampling accumulated records at a central point may be inefficient in the sense that it causes redundancy in collected data, but if it meant that more timely analyses were achieved in situations where there is a backlog it might be a useful first step.

With sampled as with all clinic data, consideration must be given to the representativeness of the data as alluded to in section C-2. As pointed out for nutritional data at the Kenya Workshop, "changes in clinic attendance may be adequately representative of changes in the prevalence of malnutrition in a population... The same data may be quite unrepresentative to differences in the prevalences of malnutrition across populations..."(UNICEF/CNSP 1982, p. 17) Representativeness could be verified by small studies based on probability sample surveys. Trowbridge et al. (1980) carried out such a survey in El Salvador to evaluate clinical and anthropometric indicators for the nutritional surveillance system. They found (see Table 8a) that the clinic WA data over-estimated the prevalence of malnutrition but did accurately reflect regional differences. The clinical diagnosis data was unsatisfactory to reflect regional differences but did reflect seasonal ones when observed over a prolonged period of time. This study demonstrates that clinic data can be a practical source of valid information for use within El Salvador. The same data, however, should not be used to compare nutritional status in El Salvador with, say Brazil.

Another study was done by Solon et al. (1978) in the province of Albay in the Philippines to validate data to be used in a nutritional surveillance system. Birthweight data were investigated by interviewing midwives which revealed discrepancies in equipment and technique, i.e. incomplete or non-use of scales and weighing the newborn fully clothed. Morbidity reported by Rural Health Units was investigated by following up reported cases of night blindness, a disease to be included in the surveillance system. One center had reported a child over the age limit to be included and another had randomly picked a name from the clinic register just to have a case to report. The nutritional status indicator was a community wide weighing program for preschoolers (OPT). These results (Table 8B) were checked against a household survey. Overall the discrepancies were not too large, however in Legazpi City a much larger proportion of children were called malnourished by OPT than were shown to be by the survey. One explanation might be a difference in coverage of the OPT programs such that in Legazpi City a disproportionate number of malnourished children were being weighed and inadvertently biasing the sample. (Mason et al. 1981).

(D) Data Analyses and Outputs

A summary of data collection, analysis, and use as reported by 36 counties is shown in Table 9. Reports that come in to a central authority are processed either by hand, by calculator, or by computer; however not infrequently large quantities of data are never processed at all. If computer analysis is done it may be performed in some place other than the health ministry. For example, El Salvador data went initially to CDC in the USA (F. Trowbridge 1981: personal communication) while in Malawai outpatient information comes in on tally sheets, is coded by the Statistics Unit of the Ministry of Health, and is then sent to the Ministry of Finance to be processed by computer (WHO 1980c).

The outputs produced from these data are to be found in the familiar report which are usually annual. These cover such statistics as: leading causes of death (from hospital records usually, occasionally from death certificates); patients seen by preenting illness (hospital and outpatient records); numbers of immunizations performed; etc. The unit by which data are analyzed are by administrative area, age-group, sex, etc., but rarely by socio-economic characteristics. This would often be feasible from the existing data (see eg. Tables 4, 5, 6, 9), and could be used for planning and targeting of programs by health and other sectors.

More frequent and up-to-date reporting is attempted for notifiable diseases, such as cholera, (this requires no detailed analysis, just a report of the numbers and location of patients with the disease). Efforts to upgrade reporting (eg. in Cameroon, Colombia and the Gambia) have tried to improve both accuracy and timeliness, rather than change the form of intended outputs.

In the context of monitoring coverage of primary health care and progress In the context of monitoring coverage of primary health care and progress towards the WHO objective of health for all by the year 2000, much thought has been given to the necessary indicators, reporting methods, and data sources. (see Table 10). (WHO 1981a) An outline proposed for national Annual Health Progress Reports is shown in Table 11.

The issues addressed by nutritional surveillance for health and development planning are given in Table 12. The outputs from health information systems could address analagous issues, and contribute to those relevant to nutritional surveillance itself. In Table 13 certain questions which seem relevant to health information systems are put forward, with possible sources of data.

(E) Administrative Problems and Local Level Decision-Making

Health information is recorded at the point at which the patient enters the health system. Its primary use is in the resolution of individual patients' health problems. Much of the information thus recorded does have other uses, i.e. identifying health problems in the local population from clinic and hospital records; budgetting of time, personnel and supplies based on patient load - the number of patients/visits of patients to a health facility; and contributing to national statistics on the prevalence of health problems, often including malnutrition. To be of use information should be as accurate and timely as possible - two qualities health information is frequency accused of lacking. In the patient care setting in which health information is primarily used, the information is both timely and accurate i.e. the patient gives information about his complaint at the time he is seen and action of some sort is initiated. It is in the secondary uses of health information that accuracy and timeliness often deteriorate. This may be due in part to technical problems previously mentioned (Section C) or to what can roughly be classified as administrative problems -supplies, personnel, etc.

Problems of both local and central administration are well documented (eg. WHO 1971, 1980b) (see Table 14). Those at local level may prove to be the most intractable, and are in many respects the same difficulties faced by health delivery: supervision and logistics. In addition, a reporting system requires feedback of information and maintaining of motivation for reliable data collection. There is little doubt that without long-term solutions to these difficulties, health reporting systems (or nutritional surveillance relying on these data sources) will not succeed. Some notes on these problems, extracted from material reviewed and based on discussions, are given below.

Lack of supervision can lead to inaccurate or late reports, and absence of follow up. Supervision can act as a type of feedback. The effects of close and frequent supervision on improving the recording of weight for age in child

welfare clinics has been demonstrated, for example in an MCH project in the Yemen sponsored by Catholic Relief Services (C. Adelman 1981: personal communication). Lack of supervision can also be a logistical problem, e.g. when adequate provisions for transportation are not made. Without reliable transport, a supervisor is limited in personal contact with those supervised . Use of bicycles can greatly increase traveling capabilities in suitable terrain, but, for areas like the hilly regions of Nepal where walking is the only way to get to some places, much dedication is required to properly supervise health posts two-three days walk from a center. Another aspect of supervision worth mentioning is that of the "worker's advocate" (eg. equivalent to patient's advocate in the health field). Supervisors are often the link between labor and management, and clinic workers may react better to a supervisor who works for them - makes their complaints known in the proper places and takes measures to correct problems.

Many of the factors that normally provide motivation - money, prestige, autonomy, self-satisfaction - are not readily available to health care providers in the Third World. Rural health centers are located in areas unappealing compared to the capital city where health workers are frequently trained. Pay is often poor. Housing may be provided near the health center, but furnishings may be limited and all food will have to be purchased unless the health center has a kitchen garden. If the health agents have families, there will be concern about the quality of education available locally; should they decide to leave their families and go alone to the posting, there will be the added stress of separation and the possible expense of maintaining a second house. Recruitment and training of local people is often recommended to avoid these family problems and also to enhance the acceptability of the worker in the area. In some cases this is successful, although in others local loyalties can severly limit effectiveness, particularly if the health worker is from the "wrong" tribe or religion.

Feedback of information can be a means of motivation. Many projects advocate feedback but few report either how it is done or its effectiveness. In the project in Cali, Colombia, computer printouts of results are sent to the health centers which provided the data; no evaluation of this feedback system is available at present (Colombia 1980, p. 3-14). In central Africa OCEAC (Organization de Coordination pour la Lutte contre les Endemies en Afrique Centrale) produces a newsletter periodically which discusses EPI (Expanded

Program of Immunization) activities, studies and surveys in the area. Personnel from Cameroon who have worked with OCEAC during their training reportedly have returned to OCEAC after posting with proposals for improving local surveillance and simple analysis of the impact of existing programs from data which had been placed in the archives by their predecessor (Cameroon 1979, p. 2). More research into the effectiveness and organization of feedback in routine service situations would seem to be of value.

Change is facilitated when participants are involved in the decision-making before the change is implemented (eg. Lance and McKenna 1975, p. 92). At the level of the health worker, knowing why they are collecting information and what it is used for and perhaps getting some use from the information themselves could be motivating. Increased responsibility and autonomy in the work setting could be motivating factors to workers (Robbins 1976, p. 310) - if so, allowing more local level decision-making might result in increased motivation and better job performance by health personnel who are allowed to make decisions.

Decisions to be supported by data from the health system - e.g. as implied in Table 13 - are often viewed as being primarily of importance centrally. However, if local decision-making could be supported by such data this would provide additional motivation for maintaining the reporting system. The question is: are there in reality decisions that are taken at the level of the health center or district health office for which a need for data is perceived?

Viewed from the perspective of the health worker in a clinic (doctor, nurse, dispenser, etc.), or of an administrator at district level, most of the decisions needed concern disposition of available resources and anticipating short-term future needs. Resources in this case are staff, supplies, transport, etc. From a district office, this could involve allocation of these resources based both on present and anticipated needs (eg. seasonally - if certain diseases are of variable prevalence at different times of the year). Quite simple data on numbers of patients and presenting illnesses collected from clinics within a district, suitably analyzed, could provide useful information for this purpose. (Such data could help validate requests for additional resources). Results could also be used to assess needs for additional services, such as specialty clinics (Under 5's, Antenatal, TB, etc.).

For a health center, day-to-day decisions involve staff scheduling, ordering supplies, organizing home visiting, etc. It is possible to work out a simple scheme for using data from clinic records to aid these routine decisions. Use at a local level could give the motivation for providing information for use higher up in the administrative structure. A team of WHO experts is currently working on the introduction of "epidemiologial thinking" for primary care workers. (See Figure 9 for a diagramatic representation.) Reports from several countries suggest that it is possible for primary health workers to make use of the health information they collect for solving both individual and community health problems. In Malaysia a community nurse noted a clustering of cases of child malnutrition in children of rubber tappers, identified the probable cause as unrefrigerated bottles of milk fed to the children at a poorly supervised nursery and initiated "treatment" by training the attendants and improving their hygiene and methods of feeding the children. In Iran a cluster of viral hepatitis cases was noted in a group of 5 families using the same well. The health workers chlorinated the well and contained a potential epidemic. In Indonesia, a malaria worker traced 17 cases of jaundice in pregnant women to a local midwife's unsterile injections. In Burma a midwife and her supervisor discovered 5 children with dengue haemorrhagic fever and efforts were then made to teach people about mosquitoes, dengue, and the need to keep water jars covered. (WHO 1981c). In all of these cases the primary health worker did more than just treat symptoms, she asked questions and sought out the answers to prevent future problems. These workers are currently <u>using</u> their records - adding up total cases, noting the geographic area where they occur, investigating causes and the like. A listing of some of the tools these workers use is given in Table 15. Using these tools, it should be fairly simple for them to report the usual clinic data that many governments require. This would be especially true if the workers have been keeping graphs of cases of diseases, determinig various rates in their clinic clientele or have taken censuses of their area, as totals will have been determined and thus easily transferred to a report.

The existing government structures and procedures limit local level decision-making in some countries. Other countries are trying to encourage it. In the cholera surveillance program in coastal towns of the Cameroon, nurses in the sector center have been taught to culture and type rectal swabs coming in

from health posts in the sector. A duplicate swab is sent to OCEAC for confirmation but local level action is initiated based on the sector results. This program is considered a success. A program for African Hemorrhagic and Yellow Fevers has not had the same success. Kits were left at sentinel health posts. These kits contained instructions and equipment for blood drawing and viscerotomies. Specimens taken were to be sent to CDC via OCEAC for analysis. After five years 17 blood specimens and no viscerotomy specimens have been received. The nature of the specimens as well as lack of local results could have effected this program (Cameroon 1979, pp. 3-4). The amount of local decision-making possible would seem to depend on government policies, staff job description and the initiative and ability of the person making the decisions.

(F) Experience in Using Health System Data for Nutritional Surveillance.

Several countries are in fact using information from the health sector for nutritional surveillance - either exclusively or in combination with data from other sectors. A brief discussion follows of how existing systems work in Botswana, Chile, Colombia, Costa Rica, Malawi and Zambia; and how they are planned to work in Honduras and Tanzania. The system that was set-up in El Salvador is also discussed, however, given the disturbance there its current operating status is unknown.

In the Nutritional Surveillance System in **Botswana** (Maribe 1982) nutritional status data (weight and height) on preschool children seen in Maternal Child Health (MCH) clinics are recorded on a Road-to-Health Card (# > or < 80% WA) and a specially designed computer form (height). These are sent monthly to the Regional Medical Officer (RMO) who analyzes and checks the data for errors and sends it on to the Central Statistics Office where it is further analyzed by computer. The results are interpretted by the Nutrition Unit of the Ministry of Health, aggregated by region, 6 month time periods and ecological zone then sent to the government and to the original clinics via the RMO. The MCH clinics use the returned processed data to follow up malnourished children and include them in local feeding plans; the government uses the information on areas with 40% children at risk as one of the criteria for determining the areas to receive drought relief assistance. The Nutrition Unit uses the data for planning nutrition intervention programs. Recognized problems with system are: the sample is biased as only children attending MCH clinics are included, leading to either an

over- or under-estimate of the true prevalence of malnutrition; health workers incorrectly plot data on the reporting sheet; feedback reports are not getting back to clinics; and when the reports are returned to the clinic, the health workers are reluctant to follow-up the malnourished children. Even with these problems, the data are considered one of the most important indicators for the drought monitoring system.

The **Zambian** MCH service (Chikamba 1982) is the core of the nutritional surveillance system. Weight-for-age of children 0-5 is recorded on the child's Road-to-Health card then transferred to the MCH register by untrained staff under supervision. This information is then collapsed by the medical assistant or enrolled nurse and submitted as monthly, quarterly or annual reports to the provincial medical officer who gives them to the provincial statistician for combining into a provincial nutrition report for the Ministry head office. The information is used nationally for policymaking and planning. Provincial and district staff have access to the information through reports from the head office. Lack of training in data analysis and use has delayed intentions to increase the provincial and district level use of the data. Recognized problems of this system are biased sample; no report of first degree PEM; no uniform format for data collection or reporting; poor quality scales in clinics; data at the head office too aggregated for meaningful planning; and data analysis by the head office takes too long. A lack of motivation among the health staff is attributed to their lack of understanding of the rationale for data collection - a problem that might be solved by giving the staff more training in nutritional surveillance. In addition there is a fear that in the interest of economy more and more work is piled on the health workers resulting in decreased time available for all tasks. The data collected could be used to partially relieve this problem by indicating how resources could be better distributed.

Nutritional surveillance in **El Salvador** (Trowbridge & Stetler 1980; El Salvador 1981) was based on government health clinics' data collected by the doctor at the time of the first visit on the form shown earlier (Figure 2). The forms were compiled in San Salvador and a sample of one week per month was coded, punched onto cards and sent to the USA for analysis. Attempts were being made to do more local analysis. These data were presented in time-series tables and graphs of nutritional status and morbidity for age groups by region, department and residence. The data were used to identify and monitor trends in

nutritional and health status by region, season and specific population group. Twice a year a working group published a bulletin which discusses results and developments in nutritional surveillance.

Health centers in **Chile** and **Colombia** (Habicht 1980; Colombia 1980) provide annual reports to the central government on anthropometry of preschool children. These results are analyzed, manually in Chile and by computer in Colombia, at the central level and used for planning purposes. In Colombia maps and rankings of morbidity, birthweight and nutritional status by sextiles are returned to the local clinics as well as distributed to government offices. At the clinic these results are intended to be used as a basis for action.

The nutrition information system (SIN) in **Costa Rica** (Payne & Thomson 1981; Valverde et al. 1981) uses health data collected by health workers on their regular home visits to every rural family. Data collected on these visits include anthropometry, vaccination status and socio-economic status. These data are combined with data from other sources and distributed as articles in regular SIN publications to various government offices. The information provided is used for planning purposes.

In **Malawi** the nutritional surveillance system (Chiligo and Msukwa 1982), under the Ministry of Agriculture, uses data on malnourished children identified in Under Fives' clinics and referred to nutrition rehabilitation centers. The system is designed to follow these children after discharge and note their progress. Information from the Ministry of Health's own monitoring system; and agricultural, crop forecasting, food availability and food consumption data are also part of the system. The system is experienceing problems in following the children - many were treated in mobile clinics with no recorded home address; also lack of transport limits the effectiveness of supervisors.

The pilot nutritional surveillance system in **Honduras** (Aranda-Pastor et al. 1978, 1981) uses mortality, morbidity, nutritional status and birthweight data from rural health clinics along with information from schools, climate stations, agricultural extension agents and other government offices. Initial data analysis is done at the regional level by sector then the summarized data are sent to the

sector's central office. The central offices of the various sectors then pass the data on to the central unit. Here the data from all sectors are processed, analyzed, interpretted and fed back to the lower levels. The system is being developed so that results above a certain level will trigger action. Research is being done to determine what these trigger levels should be. Currently the information is used for planning of targetted programs. The system has reportedly improved the coordination among participating institutions at all levels.

The MCH clinics of **Tanzania** (Bategeki et al. 1982) are seen as potential components of a nutritional surveillance system - in addition to early warning crop monitoring and a national socio-economic profile. Already problems with unreliable data and keeping on schedule have been recognized.

CONCLUSION

Some type of system for collecting health information exists in virtually every country of the world. These systems can be useful in nutritional surveillance as both sources of experience (in data collection, flow and processing) and sources of data. Health data is being used in nutritional surveillance, however research is needed to develop and test better methods of retrieving and processing the data quickly and efficiently. Further research is also needed to improve the representativeness and reliability of clinic data. The WHO program aimed at introducing epidemiological skills to primary health workers is a promising beginning in these areas. Linkage of data to decision-making does exist; however in many countries stronger links need to be forged. Having necessary information from reliable data available when it is needed for decision-making is a big first step in this strengthening process.

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TABLE 1

HISTORY OF HEALTH INFORMATION SYSTEMS
DEVELOPMENT OF NHIS

1948 - 1st WHA - Recommended establishment of national committees on vital and health statistics

1948 - International Classification of Diseases/Deaths - Single list for both morbidity and mortality

1950 - Expert Committee on Health Statistics Established

1950 - Establishment of National Committees on Vital and Health Statistics in 23 countries:

Bolivia	Egypt	Lebanon	Thailand
Brazil	France	Mexico	United Kingdom
Canada	Guatemala	New Zealand	United States of America
Chile	Haiti	Norway	Venezuela
Colombia	Iceland	Panama	
Costa Rica	Japan	Paraguay	

1953 - 1st International Conference on National Committees on Vital and Health Statistics

1955 - Study Group on Measurement of Levels of Health - Planning and evaluation of health services

1965 - 18th WHA - Established basic statistical requirements for an analytical approach to provision of health services as:

- demographic data
- vital statistics
- morbidity data
- inventories of public & private institutions
- inventory categories of manpower
- data on expenditure

1968 - WHO Expert Committee on Health Statistics - Considered the type of statistics required for planning, administration and evaluation of health services. Determined that statistics are needed:

1. To assist in administration and coordination of health services and effective management
2. For the short and long-term planning of services
3. For measuring accomplishment in terms of effectiveness and efficiency
4. For research purposes and to provide background information for use by administration, legislative bodies and the public

1970 - 14th Report of WHO Expert Committee on Health Statistics - Identified obstacles to the use of statistics in health planning, suggested ways to improve the use of statistics in health planning, and outlined the requirements of a health information system, its components, data sources and areas for research

1973 - 2nd International Conference of National Committees on Vital and Health Statistics - Recommended modifying existing HIS by rebuilding in a modular fashion

1977 - 30th WHA - "Health for all by the year 2000"

1977 - Report of a Working Group on Primary Health Records - Reviewed the purposes of health records and reports, stressed standardization of records and reports, suggested guidelines for effective record keeping in primary health care setting

1977 (?) - Establishment of WHO collaboration centers for training in the use of health records, and the planning and development of NHIS in Rijeka, Yugoslavia and Alexandria, Egypt

1978 - Report of a working group meeting held to look more closely at issues raised in the 1977 meeting. Reviewed existing methods of primary health care records, identified difficulties and recommended specific actions to be undertaken by WHO and member countries

1978 - Alma Ata Conference on Primary Health Care

1978 - 1979 - Regional Conferences on HIS - Defined HIS

1979 - Inter-regional Conference on NHIS, Costa Rica - "every country needs a NHIS to effectively implement health for all by the year 2000"

1981 - Health for All Indicators developed. NHIS listed as source.

Sources: WHO 1971; 1978; 1979a,b; 1980a,b; 1981c.

TABLE 2

PROPOSAL FOR A HEALTH INFORMATION SYSTEM (HIS)

I. Requirements for a HIS
The system must:

1. be population based
2. avoid unnecessary agglomeration of data
3. be problem oriented
4. employ functional and operational terms
5. express information briefly and imaginatively
6. provide for feedback of data to the collectors of data

II. The range of components required to produce integrated national, regional and local statistics should cover:

1. vital events and deomgraphy
2. environment in relation to health
3. morbidity - subjective and objective
4. use and nonuse of services
5. drug production and consumption
6. facilities and equipment
7. manpower and training
8. expenditure and finance
9. social aspects of health

III. These components could be obtained from the following sources:

1. health service statistics
   a. hospital discharge statistics
   b. ambulatory medical care statistics
   c. drug surveillance statistics
   d. health facilities statistics
   e. health manpower and training statistics
   f. expenditure and finance statistics
2. vital statistics
3. environmental health statistics
4. household interview statistics*
5. health examination statistics
6. accident statistics

*Household interview statistics should be the starting point because they measure need perceived by the population

IV. Information can be collected in the following methods:

1. routine records and reports
2. surveys
3. registers
4. record linkage
5. "ad hoc" studies

Source: WHO 1971.

TABLE 3

WHO GLOBAL INDICATORS

The number of countries in which :

(1) *Health for all has received endorsement as policy at the highest official level*, e.g., in the form of a declaration of commitment by the head of state ; allocation of adequate resources equitably distributed ; a high degree of community involvement ; and the establishment of a suitable organizational framework and managerial process for national health development.

(2) *Mechanisms for involving people in the implementation of strategies have been formed or strengthened, and are actually functioning*, i.e., active and effective mechanisms exist for people to express demands and needs ; representatives of political parties and organized groups such as trade unions, women's organizations, farmers' or other ocupational groups are participating actively ; and decision-making on health matters is adequately decentralized to the various administrative levels.

(3) *At least 5 % of the gross national product is spent on health.*

(4) *A reasonable percentage of the national health expenditure is devoted to local health care*, i.e., first-level contact, including community health care, health centre care, dispensary care and the like, excluding hospitals. The percentage considered " reasonable " will be arrived at through country studies.

(5) *Resources are equitably distributed*, in that the per capita expenditure as well as the staff and facilities devoted to primary health care are similar for various population groups or geographical areas, such as urban and rural areas.

(6) *The number of developing countries with well-defined strategies for health for all, accompanied by explicit resource allocations, whose needs for external resources are receiving sustained support from more affluent countries.*

(7) *Primary health care is available to the whole population, with at least the following :*

— safe water in the home or within 15 minutes' walking distance, and adequate sanitary facilities in the home or immediate vicinity ;

— immunization against diphtheria, tetanus, whooping-cough, measles, poliomyelitis, and tuberculosis ;

— local health care, including availability of at least 20 essential drugs, within one hour's walk or travel ;

— trained personnel for attending pregnancy and childbirth, and caring for children up to at least 1 year of age.

(8) *The nutritional status of children is adequate, in that :*

— at least 90 % of newborn infants have a birth weight of a least 2500 g ;

— at least 90 % of children have a weight for age that corresponds to the reference values given in Annex 1 in this volume.

(9) *The infant mortality rate for all identifiable subgroups is below 50 per 1000 live-births.*

(10) *Life expectancy at birth is over 60 years.*

(11) *The adult literacy rate for both men and women exceeds 70 %.*

(12) *The gross national product per head exceeds US $ 500.*

Source: WHO 1981c, pp.39-40.

TABLE 4

BIRTH CERTIFICATES

Information		Honduras	Jamaica	Mexico	Philippines	Thailand	Iowa USA
Infant's	name	X	X	X	X	X	X
	sex	X	X		X	X	X
	weight				X	X	
	height					X	
	birthdate	X	X	X	X	X	X
	place		X	X	X	X	X
	single/multiple	X			X	X	X
	order	X			X	X	
Parent's	name	X	X	X	X	X	X
	age	X	X	X	X	X	X
	occupation	X	X	X	X	X	X
	education	X				X	
	birthplace		X		X	X	X
	address	X	X	X	X	X	X
	religion				X	X	
	nationality	X		X	X	X	
	race				X		X
Mother's obstetric history			X		X	X	
Birth attendant		X	X		X	X	X
Informant's name			X	X	X	X	X
Legitimacy					X		
Date of Registration			X	X	X	X	X

Sources:

NCHS 1980; Official Certificate of Birth, Iowa, USA, 1951

TABLE 5

DEATH CERTIFICATES

Information	Honduras	Jamaica	Mexico	Phillippines	Thailand	USA	1st Priority International Standard
Deceased's name	X	X	X	X	X	X	X
age	X	X	X	X	X	X	X
birth date				X		X	
sex	X	X	X	X	X	X	X
race				X		X	
residence	X	X	X		X	X	X
occupation	X	X	X	X	X	X	
education	X				X		
marital status	X		X	X	X	X	X
citizenship	X		X	X	X	X	
religion					X		
place of birth		X		X	X	X	
parents' names			X	X	X	X	
Date of death	X	X	X	X	X	X	X
Cause of death	X	X	X	X	X	X	X
Underlying cause	X	X	X	X	X	X	
Symptoms of illness					X		
Duration of illness			X	X	X	X	
Performance of autopsy				X	X	X	
Location of death		X	X	X	X	X	X
Disposal of body				X	X	X	
Physician's certify		X	X	X		X	
Other's certify					X		X
Name of Informant	X	X	X	X	X	X	
Surviving Spouse			X	X		X	

Sources:
NCHS 1980; Lilienfield 1976, pp 54 - 55

TABLE 6

POTENTIAL SOURCES OF INFORMATION

Data Available from Various Sources

	Hospital				Health Center								
	Gen. Regis-tration	In Pt. Chart	Dis-[1] chg. Sum.	Out [2] Pt. Record	Poly Cli-nic	↓5's RTH Card	Family Planning	Antena-tal	TB	Mal-aria	Sani-tarian	Birth Cert.	Death Cert.
Total Patients Seen	X			X	X				X	X	X		
Patient's name	X	X	X	X	X	X	X	X	X	X	X	X	X
age		X	X	X	X	X	X	X	X	X		X	X
address	X	X	X	X	X	X	X	X	X	X	X	X	X
tribe/race		X	X		X							X	X
sex	X	X	X	X	X	X	X	X	X	X		X	X
religion												X	X
occupation			X									X	X
diagnosis		X	X	X	X	X	X	X	X	X			X
treatment		X	X	X	X	(X)			X	X			
birth date		X	X			X						X	X
(infant) birth wt.		X				X							
arm circumference													
weight for age						X		X					
height								X					
blood pressure		X	X				X	X					
hemoglobin		X	X					X					
proteinuria		X	X					X					
glycosuria			X					X					
past OB history			X				X	X					
length of breast fdg.						X							
introduction of solids						X							
house numbers										X	X		
type of latrine											X		
water sources											X		
immunizations						X		X					
cause of death			X										X
duration of hosp. stay	X		X										
parent's name						X						X	
age												X	
residence						X						X	
birth place												X	
use of contraception							X	?					
duration of illness		X											

1 Gambia 1980

2 Jamhouriat Hospital
Outpatient Dept.
Kabul, Afghanistan

3 Morley 1966

4 Tables [illegible]

TABLE 7

RECORDED DISEASES

ICD NO.[8]		Col-umbia[1]	Mor-occo[2]	Gam-bia[3]	Cam-eroon[4]	Haiti[5]	Mada-gascar[6]	Niger[7]
001	Cholera	X		X	X			
002	Typhoid & paratyphoid Fevers	X	X	X	X	X		
004	Shigellosis					X		
006	Amoebiasis					X		
007-9	Other intestinal infections	X	X	X	X	X		X
010-018	TB	X		X	X	X	X	
020	Plague	X		X	X	X	X	
022	Anthrax			X	X	X		
023	Brucellosis	X						
030	Leprosy	X	X		X		X	
032	Diptheria	X	X	X		X		X
033	Whooping Cough	X		X		X		X
034	Streptococcal sore throat and scarlatina	X	X	X		X		
036	Meningococcal infection	X						
037	Tetanus	X	X	X		X		X
045	Polio	X	X	X	X			X
050	Smallpox	X		X	X	X		
052	Chickenpox			X		X		
055	Measles	X	X	X	X	X	X	X
056	Rubella	X				X		
060	Yellow Fever	X		X	X	X		
061	Dengue	X						
062-64	Viral encephalitis	X						
065	Hemorrhagic Fever				X			
070	Viral hepatitis	X		X	X	X		X
071	Rabies	X	X	X				
072	Mumps	X						
076	Trachoma		X					
080-81	Typhus	X		X				
084	Malaria	X	X	X		X	X	X
086	Trypanosomiasis			X	X			
087	Relapsing Fever		X	X				
090-97	Syphilis	X	X	X		X	X	
098	Gonorrhea	X		X	X	X	X	
102	Yaws			X		X		
120	Schistosomiasis		X	X			X	
121-129	Other Helminthiasis					X		
133	Scabies (Ascariasis)			X				
140-239	Neoplasms					X		
260-269	Nutritional deficiencies			X		X		
320-322	Meningitis		X	X	X	X		X
323-359	Nervous System Diseases			X				
360-79	Eye Diseases		X	X				
380-389	Ear Diseases			X				
430-438	Cerebrovascular Disease					X		
480-486	Pneumonia			X		X		
487	Influenza			X		X		
533	Peptic Ulcer			X		X		
630-676	Complications of Pregnancy Childbirth & the Peurperium			X				
680-709	Skin Diseases			X				
710-19	Arthropathies & related disorders		X			X		
725-29	Rheumatism		X			X		
784	Headache			X				

1 Colombia 1980, p. 3-26
2 Morocco 1976, p. 3
3 Gambia 1980, form 3 & Table 3
4 Cameroon 1979
5 USDHEW 1972, pp 4-5 (Syncrisis: VI: Haiti)
6 WHO 1980, p. 7
7 WHO 1980, p. 11

TABLE 8A

A comparison of nutritional field survey data with two nutritional indicators and diarrheal disease data derived from clinic records in five regions of El Salvador for children 1–4 years of age in 1975 and 1976.

Region	Months for which data apply	Field survey data: % of children below 75% of Iowa standard weight for age, 1976	Surveillance indicators derived from clinic records: % of children below 75% of Iowa standard weight for age 1975	1976	% of children diagnosed at the clinic as malnourished 1975	1976	% of children with diarrhea 1975	1976
Higher-prevalence regions:								
Central	May–July	24.9	44.4	42.1	12.2	12.8	21.6	25.5
Northern	May–July	22.7	59.6	47.5	22.9	38.1	23.4	13.7
Coffee	May–July	22.6	41.4	42.7	22.0	26.6	24.3	22.9
Lower-prevalence regions:								
Urban	May–July	15.3	36.2	27.6	16.3	20.8	11.0	17.6
Coastal	Jan–March	13.9	34.0	28.4	16.0	26.5	10.0	15.0

Source: Trowbridge et al. 1980, p.240

TABLE 8B

Percent Distribution of Pre-schoolers by Nutritional Status and Source of Data: Albay and Legazpi City

Nutritional Status	Albay (Over-all)		Legazpi City	
	Nutrition Surveillance	Operation Timbang	Nutrition Surveillance	Operation Timbang
Normal	27.8	26.4	26.9	14.8
1°	50.9	48.6	53.4	36.1
2°	17.4	21.4	17.2	34.2
3°	3.9	3.6	2.5	14.9

Source: Solon et al. 1978, p.41.

TABLE 9

A REVIEW OF NHIS AS REPORTED BY THE COUNTRIES TO WHO REGIONAL OFFICES

COUNTRY	Data Collected										Data Sources Used					Frequency of Report				Records are Sampled	Analysis				Quality Control	Feedback	Use of Data						Problems					
	Morbidity	Mortality	Births	Anthropometry	Vaccination	Sanitation	SES/urban/rural	Age/Sex	Hlth. Ser. Activities	Finance	Inpatient	Surveys	Outpatient	Vital Statistics Register		Weekly	Monthly	Quarterly	Annually		Computer	Manually	MOH	Other			Planning	Evaluation	Management	Teaching/Research	Local/Regional	MOH	Outside MOH	Information	Manpower	Training	Facilities	Supplies
Afghanistan	X								X				X					X	X													X						
Australia	X	X									X	X		X							X		X	X														
Bahrain	X	X	X													X	X		X			X	X			X	X		X			X	X	X				
Bangladesh	X	X	X									X									X																	
Cameroon	X												X			X	X						X			X		X			X				X			
Cape Verde	X	X			X				X								X							X														
Chad	X	X					X	X	X	X	X		X			X	X		X					X							X	X						
Cook Islands	X	X	X		X	X					X		X	X			X		X				X			X					X	X						
Costa Rica				X	X	X	X					1							X		X		X								X	X						
Cyprus	X	X	X																					X														
Egypt	X	X			X	X			X		X	X	X			Numerous								X														
El Salvador	X			X			X	X					X				X			X	X			X		X												
Ethiopia	X					X		X			X		X			X	X	X								X					X	X	X	X	X	X	
Fiji	X		X								X	X	X			X	X	X					X				X				X	X						
Gambia	X							X					X			X	X																					
Ghana	X	X				X	X				X		X					X	X	X				X		X	X			X	X							
Gilbert Island Colony	X	X	X		X	X					X		X				X		X			X	X															
Guam														X					X				X				X		X		X							
Hong Kong	X						X	X	X		X	X							X		X		X				X	X	X		X							
India	X	X	X				X	X				X		X									X		X													
Indonesia	X		NHIS	JUST	BEGINNING)							X	X								X				X													
Iraq	X		X										X																									
Ivory Coast		X			X							X																			X	X						
Japan	X	X	X						X		X		X	X							X			X		X	X	X	X			X			X	X		
Madagascar	X	X			X	X			X	X						X	X	2	X							X			X	X		X						
Malawi	X	X						X	X		X		X				X			X	X			X			X					X						
Maldives		X	X									X		X			X																					
Mongolia		X		X																																		
Nepal	X	X	X					X			X		X				X						X															
Niger		X	X		X							1				X	X	X				X					X					X			X	X		X
Senegal	X				X			X								X	X	2	X								X			X		X						
Sri Lanka	X	X			X	X			X		X	X	X	X			X	X	X		X		X				X					X						
Thailand	X	X	X						X			X	X	X		NEW		NHIS					X				X		X			X						
Togo		X							X		X						X				X			X		X	X			X			X					
Upper Volta	X	X														X	X		X								FOR	BULLETINS				&	REPORTS				
Yemen											X		X								X		X				X					X	X					

Sources: WHO 1980 b,c,d,e; Cameroon 1979; Gambia 1980

1 Home visits

2 Every 6 months

TABLE 10

Principal sources of data for indicators or groups of indicators
P = primary source ; A = alternative source

Indicators	Source of data						
	vital events registers	population and household censuses	routine health service records	epidemiological surveillance data	sample surveys	disease registers	other
Health status indicators :							
Birth weight	P				A		
Weight and height			P	A	A		
Arm circumference			P	A	A		
Infant mortality	P	P		A			
Child mortality	P	P			A		
Under-5 mortality	P	P			A		
Under-5 proportionate mortality	P				A		
Life expectancy at given age	P	P			A		
Maternal mortality	P	P	P			A	
Crude birth rate	P	P			A		
Disease-specific death rates	P		P	P	A	A	
Proportionate mortality from specific disease	P		P	P	A	A	
Morbidity :							
incidence rate			P	P	A	P	
prevalence rate			P	P	A	P	
Prevalence of long-term disability			P		A		P
Indicators of the provision of health care :							
Physical accessibility		P	P	A	A		
Percentage of population served		P	P	P	A		
Water and sanitation		P			P		P
Immunization coverage			P	P	A		
Population/health personnel ratio		P	P		A		P

Source: WHO 1981a, p. 44

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TABLE 11

Annual Health Progress Report

I. Measures of priority health problems, by province, for the latest year and three preceding years.

II. Measures of coverage with activities related to priority health problems, by province, for the latest year and three preceding years.

III. Amount (per x population) of resources related to coverage measures (in II), by province, for the latest year and three preceding years.

IV. Health expenditures, by subsector of the health system, for the latest year and three preceding years.

V. Number of certain health care activities (per x population), by province, for the latest year and three preceding years.

VI. Percentage of the population with reasonable access to safe water supply and to sanitary excreta disposal, by urban and rural population, for the latest year and three preceding years.

VII. A selected measure of satisfaction with health care, for the latest year and three preceding years.

VIII. Unit costs or resource productivity for activities included in II, by province, for the latest year and three preceding years.

XI. Social, economic, and/or demographic indicators related to health, for the latest year and three preceding years.

X. Outstanding features of the health and health care situation: achievements, shortcomings, and their explanations, as they appear from the data presented. This may be specified for the components of primary health care and for community participation.

XI. Action planned for further implementation of health and health care strategies. This may be specified by principles and requirements of the primary health care approach.

Source: WHO 1981b, pp.8-3,8-4.

TABLE 12

ISSUES ADDRESSED BY SURVEILLANCE

Question

1. (a) Are there certain areas/people with appreciably worse nutritional conditions than others, and what are their characteristics?
   (b) Which characteristics are most closely associated with outcome?*

2. (a) Is the overall health, nutrition and socio-economic situation deteriorating or improving?
   (b) Is the trend the same for all groups, or are there some groups different from the trend?
   (c) How are deteriorating or lagging groups defined?
   (d) What characteristics are associated with this difference in trend?*

3. Is a specific short-term problem indicated? (e.g., food shortage, epidemic)

4. (a) Are there fluctuations that indicate recurrent short-term deterioration, or
   (b) Trends that indicate projected crisis in the future?

*Dependent variable is, for question 1, outcome, for question 2, change in outcome.

Source: Mason and Habicht, 1981, p. 541.

TABLE 13

ISSUES ADDRESSED BY HEALTH INFORMATION SYSTEMS

	Data Sources
1. Definition of health problems	Hospital discharge summaries, health center records, census and household survey data. Death certificates.
2. Who is affected?	As above, by location; occupation data from hospital records and death certificates potentially from health center records.
3. Timing of problems	As above, analysed seasonally, month-to-month.
4. Trends in health problems	As above, analysed year-to-year, or seasonally.
5. Coverage and costs of services	Administrative data
6. Effectiveness of services	As adequacy evaluation from above data; impact evaluation requires specific studies.

TABLE 14

PROBLEMS WITH EXISTING HEALTH INFORMATION SYSTEMS

Administration.

1. Lack of coordination between processors, administrators, planners, data collectors, and information users.

2. Governments are more concerned with output than outcome; may not acknowledge negative reports.

3. Little reporting from the private sector.

4. Published reports unavailable.

5. Inadequate planning, programming, and management of projects and programs.

6. Lack of feedback.

7. Lack of resources: trained manpower, supplies, equipment, and refresher training.

Data Collection.

1. Inappropriately designed forms.

2. Restricted coverage of the system.

3. Lack of appropriate techniques for : registration, classification of health problems, identification of individual patients, retrieval of information from charts and patient held records.

Data Processing.

1. Little analysis of data at local level.

2. Too much data causes slow analysis resulting in information reaching decision-makers too late to be of use.

3. Data from vertical programs not integrated with other health information.

Personnel.

1. Inaccurate, unreliable and incomplete records.

2. Late reports.

3. Lack of motivation - no commitment to develop and maintain the system - information is not perceived as vital.

Sources: WHO 1971;1978;1979a,b,c; JHU 1976; Johnson 1976; Daza 1978. Personal communication 1981 with: William Reinke, Samir Basta, J. Weissman, and C. Ferrero.

TABLE 15

PARTIAL LIST OF EPIDEMIOLOGICAL TOOLS AND TECHNIQUES WHICH MAY BE APPLIED BY FRONT-LINE HEALTH WORKERS

1. Line-listing of collective health events.
2. Tally-sheets for morbidity, health care events such as immunizations.
3. Lay reporting list.
4. Maps to show the physical environment, population settlements, locations of health events, etc.
5. Time charts and graphs of vital events; of diseases and other health conditions of local importance; and of health care activities.
6. Children's health cards - based on weight-for-age.
7. Mothers' cards.
8. Family cards, sheets or folders.
9. Check-lists of community health-risk factors: unfavourable environment or habits, low immunization levels, high proportion of high-risk pregnancies.
10. Simple survey guides.
11. Simple indicators of economic status, hygienic practices and others.
12. Registers of problem or vulnerable families. Special care registers.
13. Local census. Household surveys.
14. Village profiles.
15. Calendar boxes for preparation of clincs or visits or tracing defaulters.
16. Drug consumption forms.
17. The health worker's diary.
18. The record books of peripheral health units.
19. Checklists of epidemiological abilities required from each type of health worker. (For supervisors)

Source: WHO 1981c, pp. 54-56.

FIGURE 1

HOSPITAL INPATIENT RECORD.

THE GAMBIA.

Ministry of Health

HOSPITAL	WARD	BED	Case Number
(Capitals) First Second NAME	AGE Approximate	DOB If Known	Physn/Surgn.
	SEX M F Status M S W D Child		
HOME ADDRESS	NATIONALITY	GAMBIAN	Admitting M.O.
	OTHER.		
	RELIGION	ISLAM	Police Case
TEMPORARY ADDRESS	OTHER		Obstetric.
	TRIBE		Condition on
NEXT of KIN	RACE		Discharge
	WORK		Recovered
ADDRESS RELATIONSHIP	EMPLOYER		Improved

ADMITTED. DATE	TIME	DISCHARGED DATE	TIME	I.p. Days	Not Improved
1.					Left
2.					Died
3.					Date of Death
4.					

PROVISIONAL DIAGNOSIS	FINAL DIAGNOSES	I.C.D. No.	Time
			DRUG Sensitivity

OBSTETRIC CASES	L.B.	S.B.	M	F	Date of Birth	
ABORTION	YES	TERMINATION	YES	STERILISATION	Date	

OPERATIONS	NATURE	SURGEON	Anaesthetic	Date		
1.						Cross Ref Nos.
2.						
3.						

BLOOD TRANSFUSION	Date	Units	NUMBERS	NO	YES	
				GROUP		Office Use
						Bill No.
				HE AS SC SS		Amount

X RAY POST MORTEM SEE OVER LEAF

Source: Gambia 1980..

FIGURE 2

MINISTERIO DE SALUD PUBLICA Y ASISTENCIA SOCIAL
DIRECCION DE PLANIFICACION
DEPARTAMENTO DE ESTADISTICAS DE SALUD

REGISTRO DIARIO DE CONSULTA EXTERNA

HORARIO DEL MEDICO. DE _____ A _____

LOCALIDAD _____ NOMBRE DEL ESTABLECIMIENTO _____ CODIGO DEL ESTABLECIMIENTO _____

FECHA: DIA ___ MES _____ AÑO _____ SEMANA _____ FORMULARIO Nº _____

Ase Gen	Nº de Expediente Clinico (2)	RESIDENCIA Departamento (3)	Codigo (4)	Municipio (5)	Codigo (6)	U-R (7)	Sexo (8)	EDAD (9) Años	Meses	PESO K&L (10)	(11)	(12)	Consulta (13)	Diagnostico Principal	Codigo	Consulta	Otro Diagnostico (17)	Codigo (18)
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

NOMBRE DEL MEDICO _____ FIRMA DEL MEDICO _____ CONSULTORIO _____ CODIFICO _____

(7) Urbano - U
Rural - R
(8) Sexo:
Masculino - M
Femenino - F

(9) Edad: para niños menores de cinco años, anotar anos y meses, para niños menores de un mes, anotar "0" en las columnas meses y años

* Solamente para menores de cinco anos.
(10) Para el peso en kilogramos anotar "K"
Para el peso en libras anotar "L"

(11) Anotar el peso en libras o kilogramos
(12) Anotar lo de mas del peso en onzas or decimas de kilogramos

(13y16) Consulta:
Primera consulta - P
Consulta subsecuente - S

Source: F. Trowbridge.

FIGURE 3

PROPOSED GAMBIA TALLY SHEET

Name of Facility _____

District _____ Type of Clinic _____

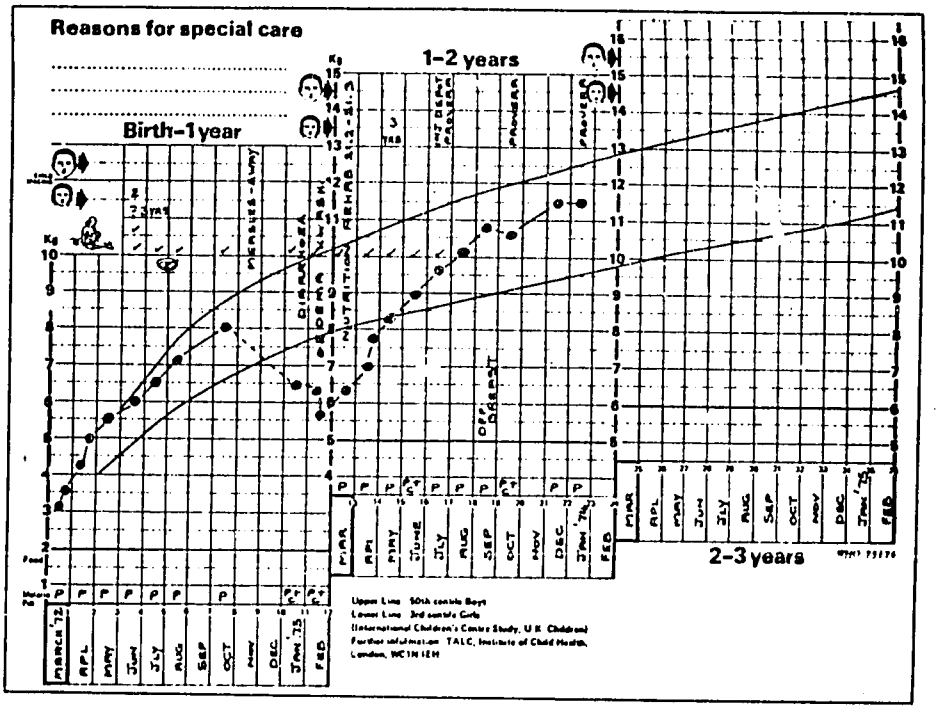
Officer in Charge _____

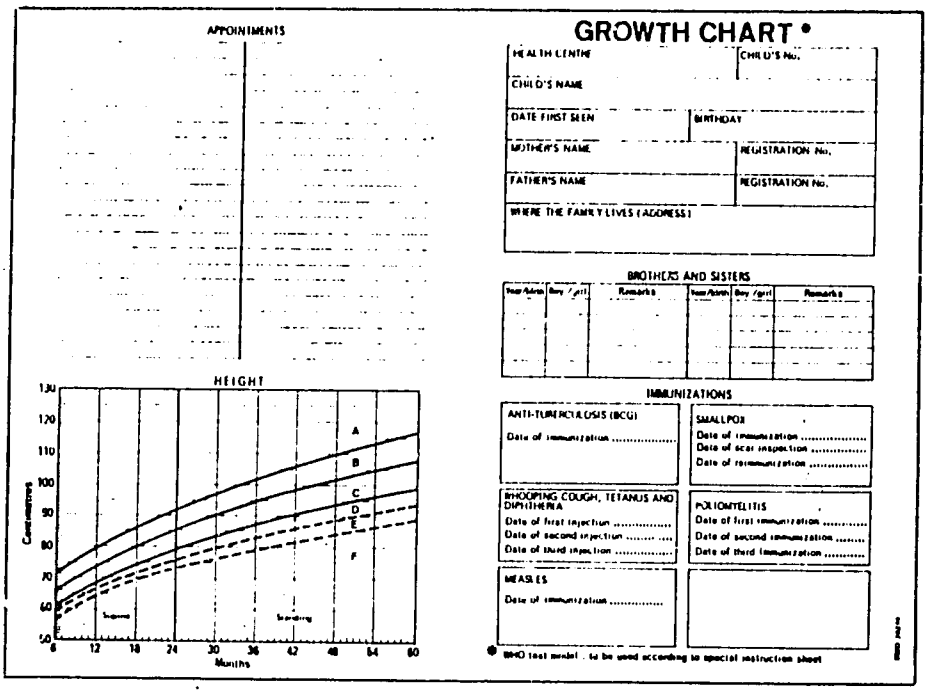
Date(s) _____ Signature _____

Name	Age				Immunisations											Diagnosis		Comments
	Sex	0-11 mo.	1-44 yrs	5-14 yrs	over 14 yrs	BCG	DPT 1	DPT 2	DPT 3	Polio 1	Polio 2	Polio 3	Measles	Y. Fever	TT. 1	TT. 2	Injections & Dressing		New	Repeat	
1.																					
2.																					
3.																					
4.																					
5.																					
6.																					
7.																					
8.																					
9.																					
10.																					

Source: Gambia 1980.

FIGURE 4





Source: Beaton, GH and Bengoa, JM., eds. 1976. Nutrition in Preventive Medicine. Geneva: WHO. pp 524-5.
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FIGURE 5

Female Card

OP. 101

FRONT OF CARD

Name:	Birth Date (or Age):
Present Address: House Number/Kgotla	Home Village: Kgotla

MEDICAL HISTORY

Date of Immunization

	1	2	3	1st Booster
B.C.G.				
Smallpox				
D.P.T.				
Polio				

Previous Serious Illness, Tuberculosis, Operations or Injuries

Obstetric History

	Number
Children Born Alive	
Children Still Alive	
Abortions/Stillbirths	

Remarks:

Fold — Fold

CONTINUOUS CARE REPORT

Year 197			Family Planning	Malaria Prophylaxis	
Family Planning					
Date Begun	Method	Jan			
		Feb			
		Mar.			
		Apr			
		May			
		June			
		July			
		Aug			
		Sept			
		Oct.			
		Nov.			
		Dec			

Year 197			Family Planning	Malaria Prophylaxis	
Family Planning					
Date Begun	Method	Jan			
		Feb.			
		Mar.			
		Apr.			
		May			
		June			
		July			
		Aug			
		Sept.			
		Oct.			
		Nov.			
		Dec			

Year 197			Family Planning	Malaria Prophylaxis	
Family Planning					
Date Begun	Method	Jan.			
		Feb.			
		Mar.			
		Apr.			
		May			
		June			
		July			
		Aug			
		Sept.			
		Oct.			
		Nov.			
		Dec.			

Fold — Fold

HOSPITAL DISCHARGE RECORDS (after Card was issued)

Non-obstetric				
Treatment Centre	Date of Adm.	Date of Disch.	Admission Number	Notes

Obstetric				
Date of Childbirth	Alive	Dead	Birthweight	Notes on pregnancy, delivery and child

BACK OF CARD

Drug Sensitivity:

Out-Patient Visits

Date	Treatment Centre	Complaint, investigations, treatment, referral	Initials

Source: Stephens et al. 1977, p.247.

FIGURE 6

MONTHLY RETURNS OF OUTPATIENT ATTENDANCES

.....(Sub) Dispensary Month of .....19...

Disease	Adult	Children	Disease	Adults	Children
NEW CASES			NEW CASES		
1. Schistosomiasis			21. Boils & Abscesses		
2. Trypansomiasis			22. Conditions associated with pregnancy or childbirth		
3. Yaws			23. Nervous diseases		
4. Tetanus			24. Malnutrition		
5. Syphilis			25. Headache		
6. Gonorrhoea			26.		
7. Notifiable infectious Diseases (excel. Dysentery)			27.		
8. Indefinite fever Influenza Colds			28. Other illnesses Accidents		
9. Malaria			29. Fractures		
10. Diseases of the eye			30. Burns		
11. Diseases of the ear			31. Poisoning		
12. Pneumonia Acute Bronchitis			32. Wounds		
13. Coughs and Chest pains			33. Injuries to the eye		
14. Indigestions Abdominal conditions Constipation			34. Cuts & Bruises		
15. Dysentery & Diarrhoea			35.		
16. Worms			36.		
17. Haemorrhoids			37.		
18. Muscular & Joint pains			38. Other accidents		
19. Scabies			39. Babies under 1 all diseases & Accidents		
20. Other skin conditions			Total New Cases		
			Re-attendance		
			All Cases		
			Total All Attendances		

Day/Days of the week Dresser/Dispenser is in Attendance .....

Date .....19....

Signed.....

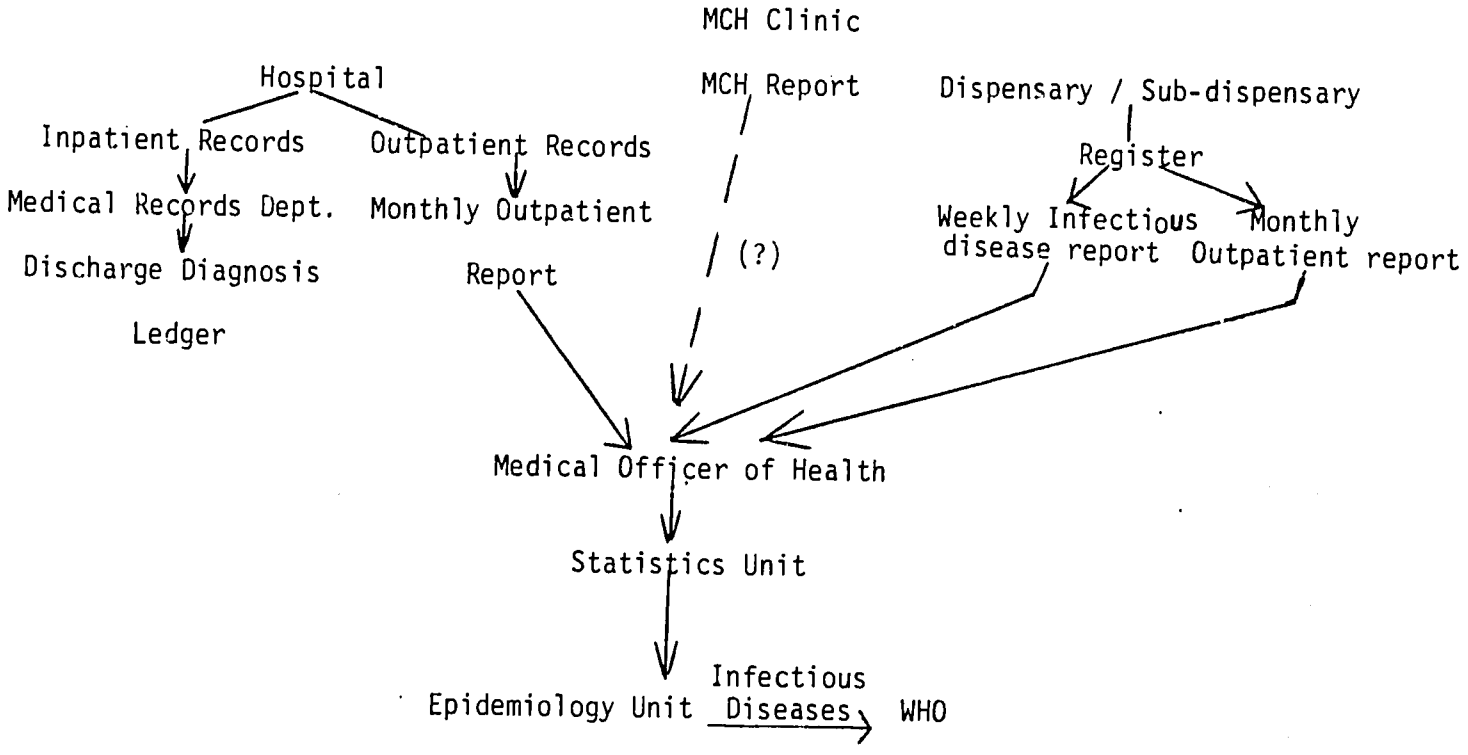
Dresser/Dispenser.....

NOTE: A copy of this return must be kept available in the Dispensary for at least 12 months.

Source: Gambia 1980, Form 3

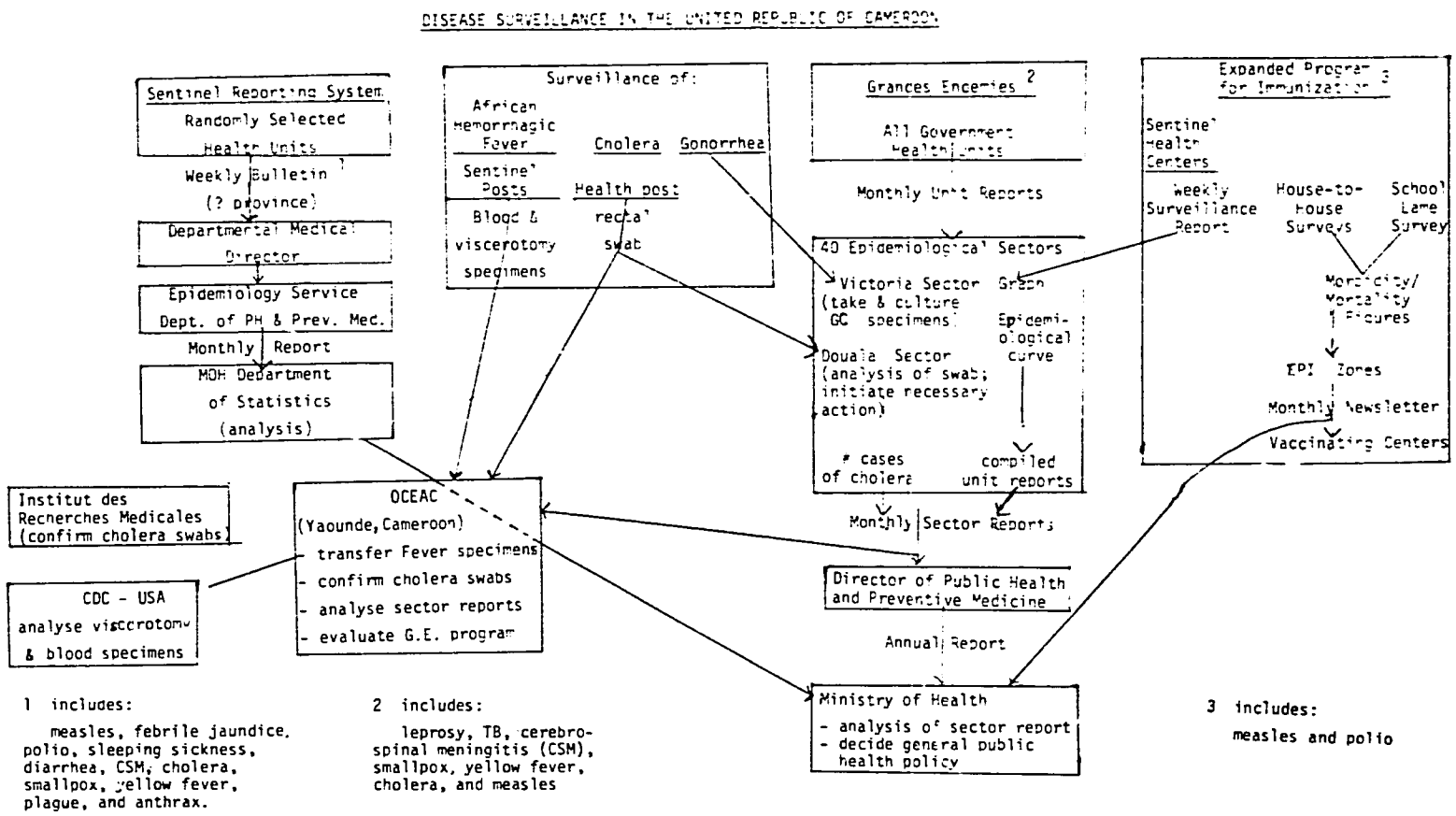
FIGURE 7

DISEASE SURVEILLANCE IN THE GAMBIA



Source: Compiled from information in Gambia 1980.

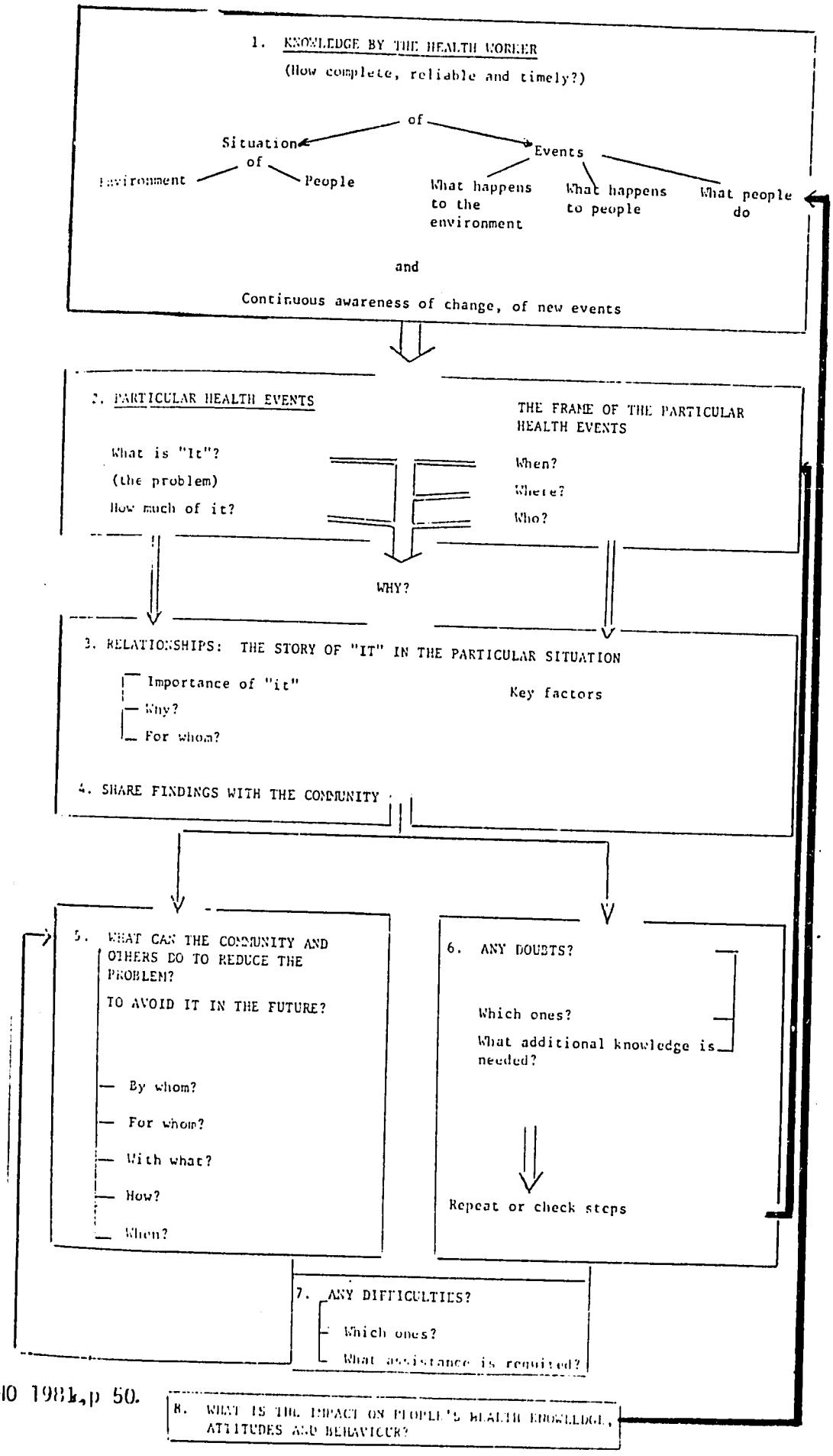
FIGURE 8



Source: Cameroon 1979 - compiled from information in the text.

FIGURE 9

GENERAL EPIDEMIOLOGICAL THINKING



Source: WHO 1981, p 50.

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Background Papers for Workshop on Social and Nutritional Surveillance in Eastern & Southern Africa. May 17-19, 1982.

8/83