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HEALTH AND MANAGEMENT
INFORMATION SYSTEM FOR
CHILD SURVIVAL PROJECT IN PAKISTAN

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TECHNOLOGIES FOR PRIMARY HEALTH CARE (PRITECH) PROJECT
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REPORT OUTLINE

I. SUMMARY DESCRIPTION OF THE SCOPE OF WORK (include changes made to initial SOW)

Health information system for the Child Survival Project in Pakistan.

II. PURPOSE(S) OF THE PROJECT

To achieve a 25% reduction in the infant mortality rate over a 6 year period (1988-93)

III. METHODOLOGY

Rapid assessment of current information system and of needs for technical support at local, provincial and federal levels.

IV. SUMMARY OF OPERATIONS AND FINDINGS

Current weakness of present HIS caused by: - lack of standardization, no definition of information needs, no operational definition. No incentives to collect information. No use of information by supervisors and decision makers. Weakness of statistical units at provincial and federal levels. Absence of training in epidemiology at any level.

V. MAIN CONCLUSIONS

Building up an efficient HIS will require time, efforts and technical support.

VI. PRIMARY RECOMMENDATIONS:

- THE PROJECT SHOULD: - Finance at least 3 years of technical assistance.

- Finance long term training (MPH in epidemiology) for 10 physicians

- Buy 100 micro computers for provinces, districts and major hospital. Finance in country training for health staff

- Finance operations research and systems analysis

Executive Summary

The overall objectives of the Health and Management Information System are the measurement of the impact of child survival strategies on morbidity and mortality, and the development of an instrument to monitor, manage, and supervise health programs as well as regular health services delivered to the public.

Problems and Issues: The present health and management information system is too weak to satisfy the needs of the Child Survival Project. Information is difficult to obtain and a solution must be found to provide regular update of births and deaths at the village level. Information is irregularly reported to supervisory levels by health centers and hospitals. Lack of standardization of registers and performae impedes the transmission of quality data. Personnel are not motivated to comply with requirements of the health information system and never receive feedback from their reports. With few exceptions, information collected is not used locally nor at the supervisory level and reporting becomes merely an administrative procedure. Each vertical program has a tendency to develop its own reporting system. This reflects the lack of integration of the programs at most health center's level. Lack of computer facilities at provincial and district levels prevents regular entry, processing and analysis.

Strategies: In as much as information should be used for planning and decision-making, systems analysis will play a key role in defining information needs at each level of the health system.

Multiple sources of data will have to be explored through operations research, testing and reviewing.

Surveys, whether they are nationwide or regional, are likely to remain important providers of information. Survey methodologies will be carefully reviewed or designed in order to obtain statistically valid information. Standardization and consistency will be obtained by designing uniform and simple registers and performae to be used in hospitals and health centers. An operation manual will be edited and will include standard definitions of diseases as well as guidelines for reporting and analysis procedures.

Computer equipment will be made available at the Provincial and District Health Offices. Sentinel hospitals will also be equipped. It is recommended that IBM PC-XT and AT be selected as well as standard widely used software packages. Introduction of micro computers will be done very progressively and under careful supervision.

Training will be directed toward several levels. A basic epidemiology course will be designed and delivered to MOIC's and LHV's in association with other training sessions organized for health center staff. More detailed curriculum will be developed for use in teaching institutions and hospitals selected to be part of the sentinel site system. Computer training for the district and province will be organized in four-six week sessions and it will integrate with epidemiology training and management courses.

Given the paucity of qualified Public Health specialists in Pakistan, it seems appropriate to train 10 physicians out of country at Master's level in Epidemiology. Guarantees must be provided that they will be assigned to Provincial Health Service Departments and

major teaching institutions upon completion of their training.

Technical Assistance: To propose a computer-based health and management information system is a very ambitious goal. Experience gained in other countries and even in Pakistan under other projects demonstrates the need for a technical assistance team for at least three years. Such a team would consist of:

- 1 Chief of Party MD, M.P.H. with strong background in Health Information Systems
- 1 Manager with knowledge of microcomputers
- 1 Microcomputer specialist with strong skills in data analysis
- 1 Microcomputer specialist with experience in data base management and good knowledge of hardware

In addition to the long-term technical assistance team short-term consultants will be needed for systems analysis, operations research, and survey design. The design phase will eventually include:

- assessment of information needs
- definition of indicators required by management/supervision of health services
- elaboration of instruments for data collection and reporting
- design of training courses in epidemiology, management, and microcomputer use
- design of software applications for easy data entry/analysis
- operations research and review of survey methodology

The implementation phase will last two years. The team will:

- supervise the selection and installation of microcomputer equipment
- participate in the training of health professionals .
- supervise and monitor the introduction of computers into the public health system
- periodically review and if necessary modify the instruments and procedures for data collection and analysis
- regularly verify the quality of data and adequacy of personnel training
- participate in the design and execution of surveys or special studies which will be useful to the Child Survival Project

J.J. Frere, 4 December, 1987

HEALTH AND MANAGEMENT
INFORMATION SYSTEM
FOR
CHILD SURVIVAL PROJECT IN PAKISTAN

The weakness of the present health and management information system in Pakistan could severely reduce the impact of child survival strategy. Although one could distinguish between several components such as management information, disease surveillance, reporting of vital events, and monitoring of specific health programs, it is clear that design and implementation of each of these components will require the use of the same tools and will be built upon the same principles.

I. Goals:

Goals of the Health and Management Information System are :

- to upgrade the quality of health services through better identification of needs, more careful monitoring, improved management of resources and information-based decision making; and
- to provide a mechanism by which to evaluate project impact.

II. Objectives

The specific objectives of this Health and Management Information System are:

- to obtain information on the health and nutritional status of the under-5 population;
- to monitor the utilization and activities of the health services;

-to obtain information needed for the assesment of efficacy of child survival programs;

-to improve the management of health services and most especially staff activities, supplies, equipment, facilities, personnel, etc; and

-to improve management and monitoring of major vertical programs such as CDD and EPI.

III. Problems_and_Issues

A rapid assesment of the situation confirms what was already implied by previous reports and acknowledged by Pakistani health officials. The present health and management system is in to critical a stage to adequately fill its role in the implementation child survival activities.

Vital_Events

Information on births and infant deaths is extremely difficult to obtain. Although it is thought that approximately 80% of parents comply with regulations which require them to report every birth to the registrars office just after delivery, there is no evidence that this is actually done. Deaths are not usually reported.

Disease_Reporting

The reporting of disease cases is done irregularly, and is hampered by the lack of standardization of registers and performance.

--Registers are not often pre-printed and vary from one health center to another;

--The number of registers being used is too great. The Lady Health Visitor alone uses 15 different registers. In one health center as many as 100 different registers and performae may be used at the same time;

--The current format of the abstract register is difficult to use and favors reporting errors. This register includes 101 different diagnoses and corresponds neither to the needs nor to the capacities of the health centers;

--There is no need to maintain regular reporting on diseases which have been eradicated (Smallpox) or which are extremely rare (Plague), or are benign and of no public health importance;

--Disease surveillance, including monitoring cases of EPI target diseases is currently done through 4 different channels (e.g. yearly report made after the abstract register information, quarterly report on communicable diseases, monthly report of same diseases but different format, reports from sentinel sites), none of which is satisfactory;

--There is a need for establishing standard definitions of diseases. At present it is doubtful that all medical officers even agree on the definitions of the diseases which they are asked to report;

--At peripheral levels, personnel do not perceive the usefulness of the information they collect and therefore have little motivation to do it correctly. Medical Officers Incharge (MOIC) are often not sure of their administrative or reporting role;

--There is no attempt to analyse the data once it is collected at local level; it is only compiled and passed on to the level above with no other contribution from the local staff;

--Provincial or District Health Officers receive large but irregular flows of data which they have no capacity to process or analyse.

--Once collected, information is almost never used in the policy decision-making process;

--Despite efforts to improve the integration of vertical programs, information gathered at rural levels does not meet program requirements, or is duplicated, and almost never circulated horizontally. Because of lack of horizontal dissemination rural facility MOIC's tend to ignore activities carried on by other health staff (eg. EPI officer, LHV's, malaria staff.etc.);

--Given the relatively low use of government facilities even in rural areas (16%) it is clear that information collected by these facilities does not necessarily reflect health patterns of the community, and that data obtained at this level must be cautiously interpreted.

At the moment, with the exception of Punjab where statistical offices have been assigned to each Division, the statistical unit at the provincial level is staffed with only one person. This officer has no equipment and is deprived of the leverages that would be needed to encourage health centers and hospitals to comply with reporting requirements. Data which he collects is of low quality and of little interest. Moreover, it is unlikely that this information is used by any senior officer. None of the statistical officers has received any training in epidemiology, and it can be asserted that at the provincial level, with the exception of the EPI staff, no one has the technical background needed to interpret data which reaches the statistical division. Unless a considerable effort is made to increase the number of statistical officers, to train them and have them supervised by a qualified epidemiologist in each province, the statistical divisions will never be able to contribute to the development of the health information system.

The situation is somewhat similar at the federal level where a single person is in charge of federally administered health facilities. However, the Biostatistics Division's primary mandate is to compile and aggregate reports coming from the provinces. Although this role could probably be considerably expanded, it is much less critical than the situation at the provincial level.

IV. Strategies

In order to construct an efficient and sustainable health and management information system, some basic principles will have to be introduced. These simple rules appear in the recent report by Dr. Stanley O. Foster, "___."

- data should be collected to answer specific questions;
- data collection should be limited to what is needed and used;
- when data are passed from one level to another, feedback of the results of analysis is important;
- needs of data and frequency of collection vary with level (e.g. RHC, tehsil, district, provincial, national).

Given the size of Pakistan and the magnitude of the existing problem of data collection, a realistic strategy should focus on improving those existing components that are satisfactory, identifying a limited number of key indicators, and progressively introducing new methods of data collection, processing and analysis.

Knowledge gained under the present Primary Health Care Program should be extremely useful. Careful attention and follow-up should be given to the Health Management Information System (HMIS) which is currently being tested in 13 health centers.

The HMIS should be designed so that it is easily expandable. Standardization is highly sensible but some degree of flexibility should be maintained so regional disparities are taken into account.

Attempts should be made to integrate information collected by NGO's and private practitioners into the health information system. Even though private practitioners may be reluctant to comply fearing some type of government control, enlisting their participation in the information gathering process would be a positive and important step. Practitioners may be more willing to participate if information requested of them is limited in quantity and focused on specific diseases.

Vital Events and Measurement of Mortality

a) Recording of births is of extreme importance to the EPI program. It will be necessary to test and explore several methods of birth reporting. TBAs might be the best and most obvious persons to register births and record pregnancies. Training and financial incentives based on performance will be necessary to ensure the willingness and accuracy of TBA reporting. Alternative providers of information would be community health workers, LHV's, and possibly Union Councils, school teachers, and even religious leaders.

b) Deaths, especially when they occur in young infants or children under 5, should be systematically reported. Cause of death data are useful for identifying priorities and estimating program impacts. Since deaths mostly occur without medical attendance, information on the cause of death must come from verbal autopsies. It will be necessary to develop a structured questionnaire with symptom-prompted questions to avoid biased interpretation of

responses. TBA's can be trained in the use of these questionnaires. Their access to the mothers of children who have died will be far greater than the male Medical officer from the fixed center.

An alternative to continuous household surveillance by various health reporting personnel, is the use of multi-round surveys to evaluate mortality trends. This approach should at least be tested in several areas.

Measurement of Morbidity

Measuring morbidity has two objectives, measuring program impact and identifying health needs. On some occasions, disease surveillance is used to detect epidemic outbreaks that call for timely interventions. Although the requirements of the EPI program might call for measurements of specific immunizable disease occurrences, there is no justification for keeping a separate reporting system for other diseases (e.g. diarrheal illness, ARI, malaria, etc.). Diseases ought to be routinely reported once a month from rural facilities to the district level. This report should contain all reported diseases and diagnoses by all health workers attached to the fixed center for that monthly period, and not just those collected by the MOIC. The MOIC should, however, be responsible for this report and should discuss and review all data received from other health workers in the area covered by the health center.

More precise measurements of morbidity may be difficult to obtain. Interviews of mothers using structured questionnaires can provide information on prior infections of such as measles or neonatal tetanus, but for common illnesses like ARI or diarrhea,

maternal recollections are less precise and their answers are difficult to interpret.

Sentinel Sites

At present, sentinel sites only provide data on the most severe cases of illness. However, information on cases of immunizable diseases and on number of diarrhea cases admitted with severe dehydration, are likely to change as CDD and EPI programs reach their objectives, and these changes should be reflected in the hospital reports. Since hospitals have better equipment and better trained staff than rural facilities, it is assumed that they will provide good quality data. But using only the best equipped hospitals, such as teaching hospitals, limits the validity of the information because the population's access to these centers is highly variable. It is therefore advisable that the number of sentinel sites be increased and that they also include hospital facilities other than large urban centers. In addition, some carefully selected and well supervised RHC's should be part of the sentinel site system. Adequate training should be provided to health personnel at these sites. Research will be necessary to compare data over time as well as between facilities and to analyze trends.

Better Integration of Vertical Programs

The time has not yet come for full integration of CDD and EPI programs. It is hoped though, that having the MOIC's more involved in the health information system will help to reinforce their interest in preventative health care and child survival strategies. Similarly, at the district and provincial levels, efforts and administrative adjustments should be made to ensure that staff

members involved in vertical programs have a good understanding of all problems linked with other health activities.

Equipment and Computers

One of the key improvements in the health information system will be computerization.

--Computers will allow large amounts of data to be entered, processed and analyzed.

--They will considerably alleviate the burden of cumbersome and counterproductive paperwork.

--They will provide more timely and accurate information and hopefully favor more rigorous monitoring, management and planning of health services.

Experience shows that once the initial reluctance has been overcome, computerization not only makes more accurate data available but also stimulates the demand for more information.

Other projects active in Pakistan have already successfully introduced micro-computers in their activities. The Economic Analysis Network and the Agriculture Data Collection Management Project are two.

The current primary health care project will conduct an experiment including the introduction of computers at the district level. Careful monitoring of this experiment will be essential and the lessons learned are likely to be extremely useful to the expansion of computerization under the child survival project.

For consistency, purposes, and in order to maximize standardization of computer equipment, personal computers, IBM-PC-DOS compatible should be selected. Many firms are now competing on the local market, and computers could even be

purchased in Pakistan. Maintenance contracts can also be negotiated with reliable service companies in all major cities.

As for the software, it is recommended that widely known packages such as D-Base III, LOTUS, and Word Perfect be used. Elementary statistical operations will be performed at the district and provincial levels, but unless a fully trained statistician becomes available for each data processing center, it is not advisable to use comprehensive and sophisticated software like SPSS-PC.

Surveys

Ideally, the health information system should provide all required information to program managers and decision-makers, but immediate needs to measure the effect of health problems on mortality and morbidity calls for surveys as alternatives to the regular reporting system. A nationwide health examination survey will be conducted by the Federal Bureau of Statistics in 1988-1989. This survey might be a good opportunity to obtain baseline data on morbidity and nutritional status. The survey design might also be modified to obtain specific mortality rates. However, one should be careful not to develop too heavy or too complicated a questionnaire. The sampling strategy will have to be carefully reviewed. It is common to see costly studies crippled by inadequate sampling frames and poor statistical validity from trying to obtain too much information from one single survey.

If the need is felt for a nationwide survey independent from the FBS health examination survey, the following should be considered:

--the size of the country is a major obstacle. A compromise

will have to be found between logistical constraints and an acceptable sampling frame.

--a national survey cannot reflect regional variations in morbidity and mortality access and use of health services.

--the size of data sets will impede rapid data entry, cleaning and analysis. Federally located mainframe computers will have to be used and obtaining results might take too long to use them in an evaluation process.

--smaller scale cluster surveys, possibly repeated in selected areas, are probably a better adapted means of estimating project impacts. Sound methodology, especially with regard to sampling frames, questionnaire designs, and training for interviewers will have to be developed in order to facilitate investigation of several health problems at the same time. Such surveys would be more cost-effective, easier to perform, and all data would be executed locally on microcomputers. The information would also be obtained in a more timely manner.

Monitoring

As the new health and management information system is being progressively implemented, it will be of the utmost importance to assess the soundness of the information processed. This could be achieved by periodic review of randomly sampled data sets, comparisons of information between sites, and also by operational research activities.

Basic Epidemiology Training

At the BHU and RHC levels a very simple training will be designed for the MOIC and other workers involved in community medicine. This training will include definitions of rates and ratios, graphic production, and interpretation analysis of trends, correct use of growth curves and anthropometric tables. Concepts of mean, median and standard deviations could also be approached.

In hospitals, starting with sentinel sites and teaching institutions which offer a community medicine program, a more elaborate course of 4-6 weeks should be designed and would include basic exposition to biostatistics. Health personnel responsible for data handling at the district and provincial level should also undergo the same kind of epidemiology and biostatistic training. A 4-6 week course would adequately train two health employees per district and four employees per province. Trained provincial and district hospital staff would be used as trainers at the peripheral levels for the basic course. Ideally, the course should be tied to computer training.

Given the paucity of qualified public health professionals in Pakistan, it seems advisable that 10 physicians be sent for long term training to the United States. They should be enrolled in a Master's of Public Health program concentrating on epidemiology. Six of them will be recruited in medical institutions that include a Department of Community Medicine or Social Pediatrics. It will be necessary to ensure that these trainees be given teaching positions as they are given their Master's Degrees. Four trainees will be selected later to serve at provincial Directorate of Health Services. It is hoped that long-term training given to Provincial Health Officers will significantly upgrade the technical capacities of the DHS and will favor adequate supervision of child survival activities.

Computer Training

If computers are to be used in every district and province as well as in 20 hospitals, approximately 200 employees should be trained in microcomputer utilization. A four-six week course based on hands-on training and case studies will be especially designed for that purpose. Training will be tailored to fit the specific needs of health programs, managers and supervisors. It will focus on basic D-O-S commands, word processing, simple statistical operations, spreadsheets and principals of data base management. It will be necessary that 10 computers be used for training purposes only and be installed in one training center preferably located in Islamabad. Groups with no more than 20 trainees will be trained over a three year period. Experienced computer instructors can be found in Pakistan, but the course design and organization will involve health professionals and will be under the responsibility of a technical assistance team.

Management Training

Management training will be organized by the most appropriate institution like NIPA (National Institute of Pakistan Administration) or Pakistan Institute of Management (PIM), Administration Staff College or the National Institute of Health Management. It seems logical that management courses be integrated with computer and epidemiology training.

Project Inputs

Computer_Equipment

Computer Equipment will be purchased, keeping in mind the need for standardization, the availability of spare parts, and the existence of maintenance services in Pakistan.

70 districts and 20 hospitals will receive one IBM-PC-XT micro-computer equipped with one floppy disk drive and a 20 megabyte hard disk.

Each Provincial Directorate of Health Services will be equipped with one IBM-PC-AT micro-computer

Ten IBM-PC-XT's will be installed in Federal health institutions involved in child survival activities and each will be provided with a printer and a software package

It will probably be necessary to undertake minimal reconstruction in most offices in order to achieve an acceptable level of protection from dust. Air conditioners will have to be installed in most computer rooms.

Technical_Assistance

Given the magnitude of the problem, technical assistance will be necessary to help Pakistan in putting together a sound, sustainable health and management information system. The team would ideally consist of two expatriates and two nationals, required for a minimum of three years.

A suggested profile for this would be:

- Chief of Party, MD, MPH, with considerable experience in health planning, health information systems, and epidemiology
- Management expert with considerable experience in the health sector and in micro-computers
- One locally hired micro-computer expert with good programming skills, training in statistics and experience in handling large data sets
- One locally hired micro-computer expert with extensive experience in data-base management and good knowledge of hardware
- in addition to long-term technical assistance, place should be kept for short-term consultants in training, survey design and analysis, systems analysis, and other technical fields.

At least 18 person months will be required

The scope of work for the technical assistance team will be divided into two phases, design and implementation. The design phase will last approximately 1 year and will include the following tasks:

- detailed analysis of current system
- systems analysis research in order to assess the information needs, to determine how information will be used, and to formalize the relation between available information and the decision-making process at all levels of the health service;
- designing new supports for data collection and transmissions (this will include designing standardized registers and proforma;

- production of an operations manual which will particularly include standard case definitions, detailed instructions on how to fill out forms, instructions on information reporting (e.g. how to report, how often, to whom, etc.)
- guidelines for local analysis of data;
- define appropriate indicators to supervise and monitor accomplishments of the project;
- design the curriculum of the basic epidemiology course for MDIC's and LHV's;
- design the epidemiology-biostatistics course curriculum;
- design a computers course using case studies relevant to Pakistan's situation;
- design an appropriate menu-driven program required for simple data entry and production of reports.
- review sampling strategies and develop survey instruments needed to monitor outputs of EPI, CDD, and MHC activities
- design instruments to internally evaluate the Health and Management Information System.

The implementation phase will take a minimum of two years, supporting the technical assistance team, and will include:

- elaboration of an implementation plan with a timeline for purchase and installation of equipment, training of personnel, testing and reviewing new components of the HMIS, and monitoring the results;
- selection and purchase of appropriate hardware and software equipment;
- supervision of equipment installation in health facilities;

- active participation in the computer, management, and epidemiology training sessions;
- monitoring and supervision of progressive integration of micro-computers into the health system;
- periodical review and revision of registers, performance, and reporting and analysis procedures;
- regular assesment of the quality of data and the adequacy of personnel training;
- participation in the design and execution of special studies and surveys useful to the child survival projects;
- participation in data analysis and the production of reports.

Training

Long-term training will be offered to 10 physicians at Master's level in epidemiology. This will prepare them for quantitative assesment of health needs, rigorous supervision techniques, and evaluation of health programs. The MPH degree can usually be obtained in one year by candidates holding an MD.

The project will support additional expenses generated by the introduction of the epidemiology course at peripheral levels. It will also finance workshops organized to deliver epidemiology training in hospitals and teaching institutions.