Support Services

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For fuller utilization of health data

Work is proceeding on the microcomputerization of health information in six of Papua New Guinea’s 19 provinces. Indicators are being obtained for provincial decision-making and for monitoring progress towards the health-for-all goals, and graphs are being generated to facilitate data interpretation. If the system proves successful the remaining provinces will be given the opportunity to participate.

Papua New Guinea comprises 19 provinces with populations ranging from 35,000 to 370,000. Each province has a Division of Health headed by an Assistant Secretary who is answerable to the provincial government. The Divisions of Health are responsible for aid posts, health centres, provincial hospitals, ambulance services, maternal and child health services, disease control programmes, dental services, and environmental health programmes. The decentralization of responsibility for these services has created a need for management and planning capabilities at the provincial level.

The health information system used in the provinces is a legacy from the days of a strong, centralized Department of Health. Health centres collect data monthly and forward them to the Divisions of Health. As a rule the data are sent on to the national Department of Health without being analysed or used for management purposes.

Within the ambit of a project supported by the Asian Development Bank, six provinces were selected to receive assistance and training in management practices. This has included periodic applied management training in the provinces for Health Division staff as well as assistance with the development of medium-term plans and the microcomputerization of health information systems. It is hoped that the latter process will:

— provide up-to-date information and thereby improve management and decision-making;
— relieve supervisors from manual data analysis so that they can spend more time overseeing staff in the field;

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— make available useful information that can be sent regularly to health centres;
— provide more complete information for provincial planning.

Analysis and system design

A health management consultant and a computer analyst/programmer were engaged to work on the computerization of provincial information. The management consultant visited the six provinces to analyse the information systems in use. Since all of these provinces collected a uniform core set of data with minor individual variations, it was decided to develop a single software system. In designing the software the following principles were adhered to.

- The system was to be based on currently collected data so as to avoid major changes in long-established data collection practices at the health centres.
- It was to preserve unity with the national Department of Health by emphasizing the core data that are passed on to the national office and by using report formats similar to those being developed concurrently by the Department.
- Pressures aimed at giving the provinces new data-collection burdens were to be resisted.

Management training in the provinces has included guidance on how to set objectives, select indicators, and monitor progress so that the computer reports can be maximally utilized.

**Indicators available from provincial microcomputer data in Papua New Guinea**

- Child clinic coverage (children aged less than 12 months)
- Weight for age (children aged less than 12 months, children aged 1–4 years)
- School entry examination coverage
- Family planning coverage
- Antenatal coverage
- Average number of visits per antenatal patient
- Percentage of deliveries supervised
- Immunization coverage (1-year-olds)
- Disease incidence and monthly trends (12 reportable diseases)
- Leading causes of death in five age groups
- Leprosy incidence and prevalence; age and sex analysis of cases
- Tuberculosis incidence and prevalence; age and sex analysis of cases
- Ratio of health care providers to population
- Water supply coverage
- Health centre inpatient utilization (average length of stay; discharge-population ratio; ratio of inpatient days to population)
- Causes of health centre admissions
- Health centre outpatient utilization (outpatient-population ratio)

The software was developed in two stages and graphics programmes were incorporated. The system was designed to be user-friendly, allowing computer operators to choose between four types of programmes from
menus. These choices include data entry, reports, graphs, and file maintenance (permitting health centre codes and population figures to be updated). Once the original choice is made, subsequent menus appear, offering further choices and enabling the operator to enter data and produce reports and graphs on the desired data-set. It was anticipated that data-entry error could be a serious problem, and data-entry screens were therefore made to follow the order of the data on the monthly forms; error check prompts were built in where possible.

The data available in the provinces which are included in the information system concern antenatal services, family planning, child clinics, immunization, communicable disease reporting, tuberculosis, leprosy, health centre discharges, water supplies, manpower, facilities, and causes of death. All reports are designed to reflect population-based coverages or incidence rates which can be used as indicators for management and planning purposes. Part of the management training in the provinces has included guidance on how to set objectives, select indicators, and monitor progress so that the computer reports can be maximally utilized. The indicators available from the data collected are listed in the box.

The reports tally and analyse data for the health centre, district, and provincial levels. This allows individual health centre and district analysis as well as providing provincial totals. All reports reflect totals for the elapsed part of the year in progress, so that the provinces can set yearly targets and monitor what is happening. Graphs accompany most reports, comparing performances with targets, showing monthly trends in disease occurrence, and providing comparisons between districts in each province.

The hardware configuration for each province consists of two IBM XT compatible microcomputers each with an 8088 processor, 640K RAM, a 20-Mbyte hard disk, and a single 5.25-inch disk drive. The computers share a dot matrix printer. The main power supply is linked to a voltage regulator and then to a stand-by battery that can provide current for 10 minutes. This guards against power failure and allows 10 minutes for the system to be closed down. The total cost for hardware, comprising 14 computers, seven printers, and seven power supplies, was US$40,000.

Both the selection of the hardware and the design of the software took place after consideration of the remoteness of the provinces, with a view to providing maximum backup. Two identical microcomputers were chosen so that, in the event of one failing, the other would be able to operate while repairs were being carried out. The backup concept was extended to include staff: potential replacements for all computer operators are now being selected and trained.

Implementation

After the system had been designed and the software developed, the accuracy of all input

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programmes, reports and graphs was tested. The hardware was purchased and tested before shipment to the provinces. A manual has been developed which contains a description of the system and instructions on how to operate the computer.
Each provincial Assistant Secretary has selected three or four staff to be trained. Training on computer operation is conducted in each province over a three-week period by the analyst/programmer and a national counterpart. Post-installation visits are made to check on microcomputer operation and to assist staff in interpreting and using the computer reports. Because the system can generate 35 reports and 80 graphs, additional assistance has been necessary so as to obtain a sensible flow of information to managers and health centres.

The training of operators encompasses menu selection, data entry, report production, and file maintenance. No programming is taught because it is felt that this would be unnecessary; in any case, time and resources would not allow for it. Computers have been installed and training has been conducted in six provinces. Since the use of actual data began, several software errors have been detected and corrected. This has highlighted the need to continually check reports and graphs in detail. Suggestions made on several occasions by provincial staff have led to improvements, demonstrating the need to remain flexible and to see the programmes as being in a state of continuing modification and refinement. If two trainers are used, a three-week period is adequate for teaching provincial staff the skills necessary to operate the system. It is anticipated that certain essential functions at the end of the year will require telephone contact.

The Department of Health will provide continuing technical support to the provinces as needed. This will include assistance with any software problems that may occur. It is hoped that a refinement of the backup procedure will be included by linking the provincial installations to the Department with modem connections. In this way, trouble-shooting could be carried out and information passed directly from the provinces to the national data system. Maintenance of the hardware is a responsibility of the provinces. If the system proves successful and durable, other provinces will be given the opportunity to use the software and the operator training scheme, provided that they purchase compatible hardware.

It is understood that the data now being collected are not optimal in many respects. However, prior to any redevelopment of the data system it is felt that the provincial Divisions and the national Department should make the best possible use of the one in existence. Eventually, changes could be made on the basis of experience. It is intended to conduct an evaluation one or two years after completion of the project, in order to see whether the computers have been maintained and used on a regular basis and whether the information produced has been used by provincial health staff. The results of this evaluation could be helpful to other countries considering the computerization of provincial or district health units.