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Microcomputers And Health In Developing Countries

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MICROCOMPUTERS have become available at the right time. In the last two decades medical science has made available a host of effective and relatively inexpensive interventions that are capable of saving countless lives: vaccines against the killing childhood diseases such as diphtheria and poliomyelitis, oral rehydration therapy for diarrhoeal disease, cheap safe drugs for schistosomiasis. Simple, reliable diagnostic techniques allow better forecasting of epidemics as well as improved management of individual cases. Still other drugs and vaccines are already on the horizon.

But to adopt such interventions without adequate evidence of their effectiveness, and without confirmation thereof in the local setting, can lead to what has been called "the sickest possible type of inflation". If the new medical technology is to be put to good use, information systems must be developed as a basic element of the national health system. Timely and suitable health information is indispensable for ensuring the progress and cost-effectiveness of health care programmes, as well as for national planning and training. The key to generating and disseminating this information may well be the microcomputer.

The WHO Inter-Regional Consultation on National Health Information Systems (Costa Rica, 1979) recognized that health information systems must be made capable of delivering information for specific health service aims over a long period. This presupposes:

- health service aims that are capable of being identified and quantified, and

What are the difficulties associated with the collection of adequate health data at the periphery of a national health care system? And what is the relevance of the microcomputer to analysing these data, extracting useful health information, and conveying it quickly to the decision-makers? An international seminar was convened by WHO in Egypt to discuss these questions and to see how the host country's recent experience with microcomputers could contribute to answering them. The following article, based on a background paper prepared for the seminar, argues that the use of microprocessors in health information could be the most important single factor in improving management and thus bringing health for all within reach.

- medical interventions that are genuinely effective and locally affordable.

These, then, are prerequisites for the design of the health information system. For its implementation, data must be collected, stored, processed, analysed, and interpreted; the resulting information must be printed and disseminated; and feedback must be obtained. The timeliness of the information is a necessary condition for its use. Here the critical factors are the volume of data at the processing level and the remoteness of the intended recipient of the information.

Data are usually collected at local health centres. Since the work of collection is relatively light, the data are amenable to hand manipulation. It is at the later stages that problems arise: the expertise and facilities needed for the processing, analysis and inter-

pretation of the data and for the printing and exchange of information are usually not available at the peripheral level nor may they be cost-effective to establish there. Such facilities can be provided by an expensive central computer, but in a large country with poor communications there will be lengthy delays at both ends, in the relaying of the data and in the dissemination of the resulting information. Such delays totally defeat the purpose of data collection, which is the timely use of the findings for decision-making.

A logical alternative would be to do the assembling, processing, analysis, and interpretation of data and the publication and exchange of information at and from an intermediate point in the data-cycling process, between the national focal point and the peripheral health care units.

One would have to determine in each case the optimum population size to yield meaningful information on morbidity, disability, and mortality and on the effective use of available resources. For a large number of developing countries, a population of 200,000 would perhaps be reasonable since it could generate potentially usable data even on diseases with low case-fatality or disability rates. Nevertheless, the problems of hand sorting and processing data analysis and interpretation, and printing facilities would still remain. It would appear therefore that, even at an intermediate level, the minimum requirements of an information system cannot be met without the support of appropriate technology for data processing and information dissemination.

THE ROLE OF MICROCOMPUTERS: Such support can be provided by the microcomputer, which being flexible can be adapted to suit the needs of the user, and is available at prices well within the reach of most developing countries. A lower-range microcomputer of 32000-48000-character memory can process almost all the health indicators needed for the affordable and medically justified health programmes for a population of 200,000. Storage and printing are easily provided. No special rooms or facilities are needed—just a clean desk-top and a power point. Even the expertise required is far less than for a traditional computer. The whole configuration will cost at most US\$ 5000. The data can be processed and the information outputs printed in 10 working days (60 hours) maximum, leaving as many work-

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ing days for the gathering of data and the distribution of information up and down the hierarchy. These figures have been confirmed in Egypt where following a pilot study carried out with WHO collaboration microcomputer-based information systems are now largely operational in Fayoum, Ismailia and South Cairo provinces.

The use of microcomputers at the intermediate level not only solves the problem of the central processing of large amounts of data and that of timely output of information; it increases the number of users, thereby helping the technology to be transferred successfully. It also disciplines and trains people in planning, logistics, and objective measurement, and allows for the wide diffusion of health information among medical and health-related personnel within the health service. It addresses the primary health care level, where assistance can be most effective.

TRANSFER OF TECHNOLOGY: Criticism of the transfer of microcomputer technology to the Third World usually stresses its effect on employment, difficulties of maintenance, lack of expertise in developing applications, and cost. But such criticisms are unjustified.

Traditional computer technology, a more demanding and expensive resource, is already in use in the Third World—in airports, banking, the armed forces, and medical research. To operate a computer is not to know how to construct one; and many people in the Third World can do the former. Many if not most of the developing countries, in which good health and sophisticated technology—aircraft, cars, brain scanners, oil refineries, weather stations, hydroelectric and various industrial plants—exist alongside disease and poverty, have secondary school graduates who can be trained to operate and service a microcomputer. This was found to be the case in Egypt.

It cannot be denied, however, that the transfer of technology has its problems. One of them is that commercial competition has resulted in the proliferation of hardware components, similar in function but sufficiently diverse to prevent the universal use of a single item of software for a specific application. This lack of international standards creates a trade dependency. Another problem is that of language. Modification of hardware to allow input and output in native languages is both possible and simple, but expensive. Systems analysis and software development and acquisition are also expensive. Yet these are problems that can be solved (indeed, they

have been solved in some instances) and do not justify failure to exploit microcomputer technology.

AN INTERNATIONAL EFFORT: For some time now it has been part of the work of WHO to identify health objectives and to develop health indicators, concepts, and guidelines for national information systems. It is now time to examine more closely the logistics and implementation of such systems and to develop national expertise in microcomputer technology and its uses.

WHO's Division of Information Systems Support, in collaboration with a number of technical programmes at headquarters and in the regional offices, is studying with several developing countries the usefulness, operation, and costs of microcomputers in health statistics, health literature, and health system management. Technical cooperation can and should become broader in scope. One need of developing countries, for example, is for simulation studies to determine the need for microcomputer technology that will yield information useful to decision-makers—information, that is to say, that will help in monitoring progress towards health objectives, identifying further health needs, and implementing new target-oriented activities. Such studies could indicate, among other things, how large and how densely populated an area should be to produce useful statistical information at low cost. Once the optimum size for such a unit has been established, it will probably become clear at what hierarchical level in the health services system microcomputers could be placed most effectively, although this will, of course, also be influenced by the availability, at the different levels, of secondary school graduates who can be trained to operate microcomputers.

Other action is needed. Those responsible for health matters in the Third World must be made aware of the potential of microcomputers. Member States will require cooperation in choosing and testing hardware and in negotiating with industry over service charges, e.g. for adapting hardware and software components to local needs, including local languages. Finally, it is essential to carry out research aimed at developing flexible and versatile software packages and low-cost hardware for widespread use in health activities.

Microcomputer technology is compatible with the conditions prevailing in the Third World. To transfer it to the field of health will require coordination at the international level under the auspices of a body such as the World Health Organization (WHO).

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