Rapid Microcomputer Surveys

In much of the developing world, if one wishes to know about the health status of people one needs to go to their homes and watch, interview, or examine them. Of course, persons who have come to hospitals or health centres are routinely described in the many data forms completed by the attending physicians, midwives, and other health workers. Unfortunately, for several reasons this information is of limited use in determining the health status of a defined population. First, sick persons may not seek the assistance of a trained health worker. Thus, using only provider data, the impact of illness in a given region would be underestimated. Secondly, the population being served by either local or regional medical care providers may not be easily identified. Thus, with too large or too small a denominator, the local disease rate would be either under- or over-estimated. Thirdly, the providers of care may be too busy to complete and submit the many forms required by most government administrators. Their omissions would result in fewer reported cases so that the local disease rates would be underestimated. Administrators and planners are well aware of these problems. As a result, they often question the value of the presented data for comparing one region with another so that the information has little effect on the decision-making process. Yet if 'health for all' is to become a reality, objective information on the needs of the community must be quickly gathered and evaluated so that resources can be allocated in the most efficient manner.

One solution to the information gap is to rely more extensively on health surveys. Trained interviewers or examiners can sample small or large populations and obtain standardized data of high quality. Until recently, however, the processing and analysis of most surveys has been so cumbersome and has taken so long that information is old and often irrelevant before it is even available for dissemination. All this is now changing with the development of Rapid Survey Methodology (RSM). Using portable 'laptop' computers and contemporary software, surveys can now be done very quickly in even the poorest of countries.1-4 For example, using RSM in Hlegu Township, Burma, during May, 1987, health department staff were able, in 3½ days in the field, to gather the appropriate survey data, in another half day to complete the analysis, and on the fifth day to present the results in computer-generated tables and graphs to the local Township Medical Officer and his staff. Five days later, they presented a 50-page report on the study findings to the Director of Public Health in Rangoon. Thus, within 10 days of going into the field in a rural region of Burma, health department staff were able to provide the detailed information necessary for decision-making both at the local and national levels.

How was this possible? Several developments have taken place in recent years which fostered the development of RSM and enable community-based surveys to be done more quickly than ever before. First, the development of sampling methods applicable to developing countries; the Expanded Program on Immunization of the World Health Organization (EPI/WHO) has for years been using a two-stage cluster sampling scheme to assess immunization coverage throughout the world.5,6 Until recently, however, the validity of the sampling method has not been tested. Using computer simulation techniques, Lemeshow and his colleagues have shown that the approach used by EPI/WHO does provide valid estimates, at least within the range specified by the sampling proponents.7 Others have successfully used the EPI/WHO sampling procedure to assess the occurrence of disease,8 or the use of health services.9 Secondly, the emergence of relatively inexpensive 'laptop' computers; these small, but powerful, computers usually weigh between 6 and 14 pounds, are battery powered, and are relatively resistant to the effects of unstable electrical power, heat, humidity, and dust. Concurrent with the development of these computers has been that of small, portable printers which also operate on batteries. Finally, there is the availability of 'user friendly' software for operating the computers.

To assemble all of these components into a working unit requires an initial investment and a change in thinking. The price of computer hardware (i.e. the machines) is coming down dramatically. A battery-powered, 'laptop' computer of sufficient size to process and analyse surveys can now be purchased for less than $800 while a portable printer costs $300–400. Software may cost an additional $600–900, depending on the programs required. Supplies per year might cost another $300–500, depending on the amount of discs, paper, and ink consumed. Thus, the total initial cost would be $1700–2100 with an additional annual cost of $300–500. Foreign assistance agencies are often very willing to purchase the
TABLE 1
Steps for doing a rapid, computer-assisted survey

<table>
<thead>
<tr>
<th>Step No.</th>
<th>Description of steps</th>
<th>Necessary hardware</th>
<th>Necessary software</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Development of survey instrument for feasibility testing</td>
<td>Microcomputer, printer</td>
<td>Word-processing</td>
</tr>
<tr>
<td>2</td>
<td>Determination of necessary sample size</td>
<td>Microcomputer</td>
<td>Spread-sheet</td>
</tr>
<tr>
<td>3</td>
<td>Development of final survey instrument</td>
<td>Microcomputer, printer</td>
<td>Word-processing</td>
</tr>
<tr>
<td>4</td>
<td>Development of control forms for managing the survey</td>
<td>Microcomputer, printer</td>
<td>Form-preparation</td>
</tr>
<tr>
<td>5</td>
<td>Selection of sample clusters with probability proportionate to size</td>
<td>Microcomputer, printer</td>
<td>Spread-sheet</td>
</tr>
<tr>
<td>6</td>
<td>Gathering of data (interview and/or examination)</td>
<td>Portable computer, portable printer</td>
<td>Entry, editing and analysis, spread-sheet</td>
</tr>
<tr>
<td>7</td>
<td>Processing and initial analysis of data</td>
<td>Microcomputer, printer</td>
<td>Statistical analysis</td>
</tr>
<tr>
<td>8</td>
<td>Final analysis of data (optional)</td>
<td>Microcomputer, printer</td>
<td>Word-processing</td>
</tr>
<tr>
<td>9</td>
<td>Preparation of final report</td>
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Table 1 shows the nine steps to be completed when doing a rapid survey.

1. Using the word-processing program, the survey instrument is constructed.
2. The investigator decides on the desired level of precision for the estimate and determines the sample size. A special routine is easily written to assess the desired sample size using various spreadsheet programs.
3. Revisions are rapidly made and the final survey instrument is printed.
4. The necessary forms to manage the study are constructed and printed.
5. A spreadsheet program is used to select the necessary clusters with probability proportionate to size of the population residing in the clusters (the EPI/WHO routine).
6. The data are collected in the field. Note that, at this step, the computer is not used. We never take a computer with us into the home of a respondent. Our fear is that it would be too disruptive both for the interviewer and the respondent. Instead, the machine is maintained in a central location where the survey team assembles in the evening.
7. The data are entered into the computer each day and, on the final day, the analysis is completed. Since processing and editing is done on a daily basis, the investigator can review the findings, and send the interviewer or examiner back to a respondent's home to check on blank or unreasonable data entries.
8. An eighth step may be necessary if more sophisticated analyses are desired. Many statistical analysis packages are available, although all require a more detailed knowledge of statistics.
9. Word-processing software is used to prepare the final report.

All nine steps can be completed in less than a month. Never before in a developing country has it been possible to have information become available so...
quickly. Rather than focusing only on the production level of the health workers, government decision-makers can now view the prevailing conditions affecting people at the community level. The findings can be quickly presented to the appropriate government official while there is still immediate interest. Such questions as, 'do women have oral rehydration packets available at home?'; 'are children completing their DPT immunization schedule at the right age?'; 'are early growth patterns being monitored?'; and 'are tuberculosis or leprosy patients receiving adequate long-term care?' can easily be answered once a computer-assisted survey team has been established.

While change is not always easy, the microcomputer revolution has simplified the process. Soon portable computers will become common throughout the developing world, as is evident today with other recently introduced electronic items such as programmable calculators, video recorders, and the like. Visionary health officials will welcome these changes, realizing that quality information gathered and analyzed in a timely manner will help them to more effectively serve their communities.

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References