Immunization

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Evaluation of immunization coverage at local level

Two simple methods were employed for evaluating immunization activities in three rural health districts of Zaire, with a view to improving service delivery. One method involves the use of cumulative frequency graphs for monitoring progress at the health centre level towards the achievement of coverage targets. The other requires a clinic-based audit and a population-based survey of children aged 12–23 months to ascertain whether they have been immunized against measles at the appropriate time. These approaches can help to identify operational problems and to motivate the people in charge of immunization at local level.

WHO’s Expanded Programme on Immunization has developed a simple method for assessing immunization coverage (1) which has become popular among both national planners and local health managers in many developing countries.

In Zaire a survey employing the method has recently been organized to assess the performance of the national immunization programme on a regional basis. However, the survey provides only overall population estimates of coverage and is of limited use for the monitoring and evaluation of the programme at local level.

Many health professionals in Zaire have made considerable efforts to increase the number of doses of vaccine administered in clinics but have shown little concern about the quality of their performance. They are frequently unaware of the two principal problems in the way of achieving effective immunization for all children, those of drop-outs and missed opportunities (2). We have concluded that it is necessary to design additional methods for monitoring and evaluating the quality of immunization coverage at local level.
The rural health districts of Kirotsh, Masisi and Rutshuru lie in the vicinity of Lake Kivu and the Kivu Mountains in northern Kivu (Fig. 1). The area is densely populated with some 600,000 inhabitants who live mainly by subsistence farming.

Since 1985, with the support of the Centre Scientifique et Médical de l’Université Libre de Bruxelles pour ses Activités de Coopération, these health districts have been endeavouring to run a comprehensive primary health care programme in a two-tier system consisting of a general hospital and a network of health centres. Child immunization is one of the activities organized in the field. Children have the opportunity of completing their vaccination schedule at the child health clinics, which are staffed by trained auxiliary nurses. Duplicate personal vaccination cards are held at these clinics.

Routine data collection allows estimates to be made of immunization coverage in the three health districts. These values are compared in the table with regional and national estimates. It should be noted, however, that such estimates mask the broad range of values for different areas in any given health district. Coverage is highly dependent on availability, accessibility and utilization of the facilities, and ranges from under 10% in some deprived areas to over 80% in the best health centres.

### Monitoring achievement of immunization coverage targets

Quality assurance of immunization programmes requires observation of children who are registered at health clinics and have received some doses of vaccine but have failed to complete the schedule. This is clearly vital for polio and diphtheria-pertussis-tetanus (DTP) vaccines, which require three administrations at monthly intervals, and is of equal importance in

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graphs of vaccination coverage in order to monitor and evaluate the continuity of vaccine delivery (3). Such graphs indicate the cumulative number of vaccinated individuals, or their percentages, over a year. The vertical axis shows the number or percentage of children who have to be vaccinated each month in order to obtain the targeted coverage. The cumulative number is derived by adding the figures for all the preceding monthly intervals; it is plotted in monthly increments. The totals for one or more vaccines can be mapped on the same graph. In its final form a useful graph shows both expected and observed numbers for purposes of comparison.

In 1989 and 1990, good results were obtained by the auxiliary nurse in charge of the Bweremana health centre in Kirotshe district. After a population census had been organized jointly by the centre’s health staff and health committee the nurse multiplied the targeted population by the estimated birth rate for the area to arrive at the number of children who had to be immunized monthly in order to ensure complete coverage of the whole birth cohort. Fig. 2 shows the expected and total number of children vaccinated in 1989. It is noteworthy that the graphs of actual values are completely flat during March and April,

There was a clear need to maximize accessibility to the health services in Kibabi through a network of outreach sites, and to improve the health workers’ capacities in Lushebere through training and close supervision.

respect of the other vaccines, between which the coverage rates are not expected to vary much.

However, in the field we observed that many children dropped out at some stage and that coverage for the first dose was usually higher than that for the last one. This suggests an inability among front-line health staff to deal with the continuous management of the programme. First contact with the health service is a prerequisite for registration at the child clinic, but regular attendance is essential for the completion of immunization. Unfortunately, many auxiliary nurses fail to ascertain whether children are being followed up.

The Expanded Programme on Immunization proposes the use of cumulative frequency
and DPT vaccines; and the estimate of vaccine coverage is much higher for the BCG vaccine than for the measles vaccine, the former being given at birth and the latter at 9–11 months of age.

Fig. 3 shows that the health staff endeavoured to tackle these problems during 1990. The cumulative graphs do not have a flat section, indicating that vaccinations were carried out throughout thanks to improved vaccine supplies; the total numbers of children who received first and third doses of DPT and polio vaccines were similar; and measles coverage was almost the same as BCG coverage at the end of the year. Thus a motivated, well-trained auxiliary nurse using a simple method can identify shortfalls and be committed to improved performance.

### Monitoring timeliness of measles immunization

The efficacy of a vaccine depends partly on the capacity of the health services to immunize the targeted children properly within a definite period of time. The schedule recommended by the Expanded Programme on Immunization and endorsed by the local health authorities should be observed by the health staff in charge of the immunization programme in the field.

In Zaire, all children should be fully immunized before their first birthday. Any birth cohort aged 12–23 months can therefore be checked in order to ascertain the performance of the immunization programme during the previous year. In general, measles vaccination can be taken as a good indicator for the programme as a whole because it is likely to be omitted unless the schedule is completed. The proportion of eligible children who attend the health facility and either are or are not vaccinated against measles at the proper time is therefore one of the most useful quality assurance indicators in local immunization programmes.

To make health workers aware of this key question, we use a simple form that was originally employed to ascertain vaccination
status among children attending public consultations for mother and child care in Belgium (4). On the day of supervision of the vaccination session, the form is given to the auxiliary nurses from the health centres and they are asked to retrieve the vaccination records for all children aged 12–23 months who are registered at the clinic. It should be noted that this is only feasible where duplicate vaccination cards are maintained at the clinic, as was the case in our study area. Each card is checked in order to determine whether the child to whom it refers has been vaccinated against measles, and, if so, whether vaccination was performed before or after the age of nine months. This produces a quick estimate of the proportion of vaccinated children among those attending the clinic, and of the proportions of children immunized at an appropriate time or at a time when the standard vaccine is not sufficiently protective. Such a clinic-based audit is primarily designed to assist health workers to conduct evaluations unaided and to reinforce their analysing capacities.

Thanks to this method, local health managers can easily verify whether the auxiliary nurses on the spot are adequately developing their ability to schedule the administration of the recommended vaccines. Regular completion of the supervision form helps to clarify problems that may not be apparent to local staff. When supervision reveals an upward or downward trend in the proportion of children who are being vaccinated at the right time, members of the health staff can communicate more easily about their own performances than would otherwise be possible.

Supervision, however, does not gather information about children who do not attend the health facility. In order to collect data on the target population as a whole, it is necessary to conduct a population-based survey. We report here the results of a survey carried out in Masisi during January 1990 in three health areas. After a rapid but exhaustive population census, we enrolled the whole 1988 birth cohort of 1771 individuals aged 12–23 months in a retrospective health survey. Their mothers were interviewed at home by trained health workers under close supervision about the timing of vaccination against measles.

Because duplicate vaccination records were held at the clinic we were able to obtain immunization data for all the registered children, either at home from their individual cards or at the clinic from their files. Of the 1771 children, 1523 were registered at the clinic, 1251 had been vaccinated, and 272 had remained unvaccinated. Among the vaccinated individuals, 1082 had been vaccinated at nine months of age or later and 169 had been vaccinated before they were nine months of age. The proportions differed from place to place and useful comparisons can be made between health centres (Fig. 4).

The proportions of vaccinated children in the total target population, which were 76%, 79% and 58% in Masisi, Lushebere and Kibabi respectively, were associated with paternal educational level, maternal educational level, and distance from the health facilities. Kibabi is a large remote area where most of the people are poor and illiterate, whereas Masisi and Lushebere are
Fig. 4. Retrospective measles vaccination status of children aged 12–23 months in three health areas, Masisi District, 1990
located on a main road and many of their inhabitants engage in administrative and commercial activities. Of the vaccinated children, the proportions vaccinated at the right time were 90%, 79% and 91% in Masisi, Lushebere and Kibabi respectively. The performance of health workers in Lushebere clearly left something to be desired.

There was a clear need to maximize accessibility to the health services in Kibabi through a network of outreach sites, and to improve the health workers’ capacities in Lushebere through training and close supervision.

**Lessons learned**

The effective delivery of a potent vaccine to a child attending a rural clinic is a challenging task for health professionals. Epidemiological, operational and social constraints have to be overcome so that all children have a reasonable chance of being fully immunized. A secure vaccination system requires quality assessment at the site of vaccine administration to verify whether all the targeted children receive all the scheduled vaccines. The method developed by the Expanded Programme on Immunization for assessing coverage is very useful for the monitoring and evaluation of outputs but is of limited value in quality assurance. Additional methods are necessary which focus on process.

With a fairly low investment, mainly in the training and supervision of local health staff, we used two simple methods that can identify operational problems and motivate the people in charge of immunization at local level.

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**References**


