# EPI VACCINATION IN NEPAL

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**Abstract.** A number of surveys, small or large, have been undertaken by various agencies for coverage evaluation of immunization programs. The most commonly used design is the WHO-30 cluster sampling method. Other new methods are the Institute for Refresh Medical Statistics (IRMS) New Delhi method and the lot quality assurance sampling method. This paper describes the National Immunization Day (NID) method to evaluate the immunization coverage of the Expanded Program on Immunization (EPI) vaccines in the Sunsari district of Nepal. A total number of 3,332 respondents (69.4% females and 30.6% males) were interviewed regarding the immunization status of their children during NID. The children with complete immunization (BCG, measles and three doses of DPT and OPV) were 65.7%. The individual coverage by EPI vaccines (except OPV III and measles) was more than 80%. The result shows that there is positive relationship between immunization coverage and educational level of the respondents.

## INTRODUCTION

The Expanded Program on Immunization (EPI) recommends that all countries must sustain the high immunization coverage against poliomyelitis, diphtheria, pertusis, tetanus and measles. The countries with a high incidence of tuberculosis must also have high vaccination coverage against childhood tuberculosis (WHO, 1995). Today the possibility of vaccinating at least 90% of the world's children aged under one is well recognized. It is anticipated that this will drastically reduce the two million deaths a year still caused by vaccine preventable diseases (VPDs) (Bland and Clement, 1998).

Immunization coverage is the proportion of eligible children who have been immunized. Routine reports from health centers provide important information about immunization coverage. However these records may be inaccurate or misleading. An advantage of a coverage survey is that it tells how many children were adequately immunized at a given point of time. Information obtained from an immunization coverage survey can be used at all levels of the health care delivery system. It helps to evaluate performance and find ways to improve the immunization activities, it helps in predicting reduction in morbidity and mortality of children from VPDs (WHO, 1991).

EPI is one of the priority programs of His Majesty's Government of Nepal. It is considered to be one of the most cost-effective health interventions. VPDs are routinely reported through the Health Management Information System (HMIS) complemented by appropriate surveillance. The immediate objectives of the EPI program are to eliminate/ reduce neonatal tetanus and measles, and to eradicate poliomyelitis by the year 2000. To achieve these objectives, various activities are being undertaken (Department of Health Service, 1996/1997). Analysis of the reports from all 75 districts of country shows that the coverage levels for all EPI vaccines are above 80% except for tetanus toxiod. However, coverage is still not uniform within the country, with some districts achieving 100% coverage, and others staying far behind (Department of Health Service, 1996/1997).

The schedule for EPI vaccination in Nepal

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is consistent with that recommended by WHO (Family Health Division, 1996). A number of surveys, small or large, have been undertaken by various agencies for evaluation of immunization programs. The most commonly used methodology suggested by WHO for vaccine coverage evaluation is popularly known as 30 cluster sampling method. Other new recommended methods are the Institute for Refresh in Medical Statistics (IRMS) methodology (Singh, 1996), and lot quality assurance sampling (LQAS) technique (Singh *et al,* 1996). These methods were tested in India, Peru and Costa Rica (Singh, 1996; Singh *et al,* 1996; Singh and Yadaw, 1998). These methods have their own merits and demerits. These methods are generally used as a population based strategy to evaluate the coverage.

We have used the National Immunization Day (NID) method to evaluate the immunization coverage of Sunsari district for the six EPI vaccines. This method was earlier utilized for assessing awareness about NID program in the same district of Nepal (Jha *et al,* 1999).

## MATERIALS AND METHODS

The survey was carried out in Sunsari district of eastern Nepal. In Nepal, the district health office (DHO) is the nodal agency for the implementation of all types of health programs and activities in the district. Sunsari district has an area of 1,257 $km^2$ with a population of 492,718 (BPKIHS, 1996). The crude birth rate and infant mortality rate were 32 per 1,000 people and 71 per 1000 live births respectively. Immunization coverage against 6 VPDs was 52% (BPKIHS, 1994).

There are 38 Sub Health Posts, 8 Health Posts, 3 Primary Health Centers, one District Hospital, one Private Hospital, one Teaching Hospital (BP Koirala Institute of Health Sciences) and four Ayurvedic dispensaries for health care delivery. The survey was carried out on the second National Immunization Day (NID - 18$^{th}$ January 1998). There were 360 immunization posts throughout the district. It was decided to interview 10 guardians form each, to start the interview at 10:00 am and continue till the completion of 10$^{th}$ parents or guardians. These questionnaire included questions pertaining to age, sex, education and occupation of the respondents and immunization status of their children in the age group of 12 to 23 months. It was translated into local Nepali language. After pre-testing final modification was done. Ten questionnaires were distributed to the health worker of each immunization post one day before the NID through the DHO. This methodology has already been used before to assess awareness about NID in the same district (Jha *et al,* 1999). The questionnaires were administered to 10 consecutive persons, who had brought their children (in age group 12 to 23 months) for polio immunization.

After completing the questionnaires, these were sent to the DHO and subsequently to the investigators. The data were analyzed statistically using EPI INFO (Version 6.0).

There were some limitations for examples responses were based on the recall method. There was no checking of immunization cards. BCG scars were not oberved. These limitations were imposed by the survey being carried on the NID, when these immunization posts were busy in administration of polio vaccine to a large number of children waiting in a queue.

## RESULTS

A total number of 3,332 questionnaires were received against the expected 3,600 a response rate of 92.6%. The sex distribution of the respondents was 69.4% females and 30.6% males. These respondents were interviewed to learn the immunization coverage. About 58% of the respondents were in the 20 to 30 years age group (Table 1). Among them 65.7% were literate (can read and write). About 70% of them were involved in agricultural work and most of them (84.7%) were from rural areas.

The sex distribution of the 3,332 children was 1,722 (51.7%) males and 1,610 (48.3%)

Table 1
Characteristics of the respondents.

| Characteristics | No. (n=3,332) | % |
|---|---|---|
| Age group (year) | | |
| 20-30 | 1,930 | 57.9 |
| 30-40 | 867 | 26.1 |
| 40-50 | 318 | 9.5 |
| 50-60 | 217 | 6.5 |
| Sex | | |
| Female | 2,312 | 69.4 |
| Male | 1,020 | 30.6 |
| Residence | | |
| Rural | 2,821 | 84.7 |
| Urban | 511 | 15.3 |
| Education | | |
| Bachelor degree and above | 55 | 1.6 |
| SLC and Intermediate | 132 | 4.0 |
| Up to high school | 869 | 26.1 |
| Literate[a] | 2,192 | 65.8 |
| Illiterate | 84 | 2.5 |
| Occupation | | |
| Agriculture | 2,301 | 69.1 |
| Business | 247 | 7.4 |
| Labor | 367 | 11.0 |
| Service | 190 | 5.7 |
| House wife | 174 | 5.2 |
| Others | 53 | 1.6 |

[a]Can read and write no formal education.

Table 2
Coverage level of EPI vaccines of children (13 - 24 months).

| EPI vaccines | No. (n=3,332) | % |
|---|---|---|
| BCG | | |
| Yes | 2,948 | 88.5 |
| No | 384 | 11.5 |
| DPT-I | | |
| Yes | 2,836 | 85.1 |
| No | 496 | 14.9 |
| DPT-II | | |
| Yes | 2,778 | 83.4 |
| No | 554 | 16.6 |
| DPT-III | | |
| Yes | 2,709 | 81.3 |
| No | 623 | 18.7 |
| OPV-I | | |
| Yes | 2,835 | 85.1 |
| No | 497 | 14.9 |
| OPV-II | | |
| Yes | 2,898 | 87.0 |
| No | 434 | 13.0 |
| OPV-III | | |
| Yes | 2,588 | 77.7 |
| No | 744 | 22.3 |
| Measles | | |
| Yes | 2,615 | 78.5 |
| No | 717 | 21.5 |

females. 65.7% of the children had complete immunization for BCG, measles, three doses of routine DPT and OPV (Fig 1). Partially immunized (having received at least one of the above vaccines) children represented 29.3%, 5.0% were non-immunized with any vaccine.

The coverage level of EPI vaccines is shown in Table 2. The BCG, DPT I, II, III and OPV I, II coverage was more than 80% which is very favorable, but OPV III and measles had coverage levels of 77.7% and 78.5% respectively. There were 53.4% males and 46.6% females among the children with complete immunization.

Table 3 describes relationship between the respondent's education and immunization

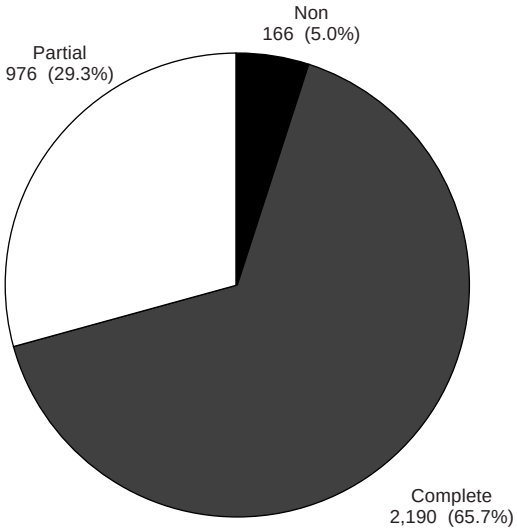


Fig 1–Immunization status of the children.

Table 3
Relationship between respondent's education and immunization status of the children.

| Education | Completely immunized children | | Partially immunized children | | Non immunized children | | Total | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| Bachelor degree and above | 41 | 74.6 | 14 | 25.4 | 0 | 0 | 55 | 100.0 |
| SLC and intermediate | 97 | 73.5 | 29 | 22.0 | 6 | 4.5 | 132 | 100.0 |
| Up to high school | 602 | 69.3 | 245 | 28.2 | 22 | 2.5 | 869 | 100.0 |
| Literate[a] | 1,402 | 63.9 | 657 | 30.0 | 133 | 6.1 | 2,192 | 100.0 |
| Illiterate | 48 | 57.2 | 31 | 36.9 | 5 | 5.9 | 84 | 100.0 |
| Total | 2,190 | 65.7 | 976 | 29.3 | 166 | 5.0 | 3,332 | 100.0 |

[a]Literate = Can read and write but non formal education, p=0.003 (one way ANOVA).

Table 4
Relationship between respondent's occupation and immunization status of the children.

| Education | Completely immunized children | | Partially immunized children | | Non immunized children | | Total | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| Agriculture | 1,530 | 66.5 | 662 | 28.8 | 109 | 4.7 | 2,301 | 100.0 |
| Business | 172 | 69.6 | 62 | 25.1 | 13 | 5.3 | 247 | 100.0 |
| Laborer | 216 | 58.8 | 118 | 32.2 | 33 | 9.0 | 367 | 100.0 |
| Service | 131 | 68.9 | 55 | 29.0 | 4 | 2.1 | 190 | 100.0 |
| House wife | 102 | 58.6 | 68 | 39.1 | 4 | 2.3 | 174 | 100.0 |
| Others | 39 | 73.6 | 11 | 20.8 | 3 | 5.7 | 53 | 100.0 |
| Total | 2,190 | 65.7 | 976 | 29.3 | 166 | 5.0 | 3,332 | 100.0 |

p=0.001 (one way ANOVA).

status of the children. The percentage of children with complete immunization increased with higher educational level of the respondents. The one way ANOVA indicated that there was a significant effect of education ($p = 0.003$) on the categories of complete immunization, partial immunization and non-immunization.

Table 4 shows the relationship between the respondent's occupation and immunization status of the children. This indicates that the highest percentage (9%) of non-immunized children were children of laborers. The one way ANOVA showed that there was a significant effect of occupation ($p = 0.001$) for partial and non-immunization categories.

## DISCUSSION

The population characteristic of the sample being predominantly rural is consistent with the demographic characteristic of the district. The overall coverage of fully immunized children was 65.7%. The figures reported for the country was lower ranging 43% in the country (Family Health Division, 1996) to 52% for the district (BPKIHS, 1994). These could be attributed to different methodologies. The awareness regarding NID in this population reported in the same district was 93.1% (Jha *et al*, 1999). The coverage level for most of the vaccines was more than 80% (except for OPV III and measles). That is similar to the report from the Department of Health Services, HMG Nepal (Department of Health, 1996/1997). It was also found in Alwar in Rajesthan that there was a low coverage of OPV III in rural areas (Bhattacharjee *et al*, 1997). A possible reason for low OPV III coverage is the failure of health workers to set a specific date to the guardians for OPV III and to emphasize its importance. There may be lack of awareness among the people or frequent polio drops were given to the children during NIDs. Regarding low coverage by measles vaccine, specified dates for immunization might not have been informed by the health workers to the parents. The children might suffer from measles, so parents think measles vaccine is not necessary for the children. The absence of bias towards male children in regard to bringing them to the booths indicates a positive social change and has been reported by other workers (Singh *et al*, 1996; 1998). The higher coverage in certain aspects for urban children may be due to factors like better client knowledge and motivation reported by some workers (Perry *et al*, 1998). The finding that literate respondents had a higher level of coverage is consistent with the theory that parental education does have an influence on immunization coverage in children (Perry *et al*, 1998). The findings are, however encouraging, as overall coverage difference between literate and illiterate parents was less than expected, since the country as a whole has low literacy rate (52.6%) (His Majesty's Government, 1997). There was a significant difference found in occupation and immunization coverage of the children except for the complete immunization coverage category, which is encouraging as children from agricultural families had a equally good coverage to those from urban areas. This may be attributed to awareness about immunization and outreach delivery of immunization services by sub-health posts, health posts and primary health care centers in the district.

## CONCLUSION

The high proportion of female respondents (69.4%) in participatory in this NID study indicates good participation for a developing country like Nepal. The individual vaccine coverage levels were more than 80% (except OPV III and measles). However, children with complete immunization coverage were only 65.7% which needs more funding, attention and hard work by Government and non-government organizations to achieve maximum coverage, so to reduce/eliminate and eradicate VPDs. The NID method has given good estimate of immunization coverage inspite of various limitations mentioned earlier. This simple, quick and less expensive method can be used to evaluate the immunization coverage by EPI vaccines.

## ACKNOWLEDGEMENTS

We express our sincere thanks to District Health Office (DHO), Sunsari and his team for helping in this survey.

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