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Review Article

Immunisation programme of Nepal: an update

Suvedi BK

Abstract

Nepal initiated Expanded Programme on Immunisation (EPI) in the fiscal year 1978/79. By the next decade the programme was expanded to all the 75 districts of the country. However, due to various structural changes, the programme lagged behind and the national coverage of immunisation to around 80% could be reached by the year 2000 only. By 2004, some Vaccine Preventable Diseases (VPD), namely neonatal tetanus, diphtheria and poliomyelitis are reported to be reduced drastically. However, despite good coverage, measles and tuberculosis still remain prevalent.

Key Words: Nepal, immunization, EPI, Vaccine Preventable Diseases, VPD, Morbidity

With the eradication of Smallpox from the planet Earth, it was proved that certain diseases can be controlled, some can be eliminated and a few can be eradicated. This view was deeply based on the achievements of science and technology related with biological sciences and particularly with advancement in medical sciences. On the verge of eradication of smallpox, World Health Organization in 1974 established a program called EPI (Expanded Program on Immunization) [1]. Soon after this, many countries of the globe started Immunization programmes. In Nepal, EPI was introduced in the fiscal year 1978/79. Actually, it was termed as a "convergence" from smallpox eradication project to a new National EPI Project [2].

It is stated that approximately 18% of under five children's death in Nepal results from Vaccine Preventable Diseases[3], translating the number into some 18,000 deaths per year. Though currently 19 vaccines are licensed in Nepal for commercial purpose, only six antigens (namely BCG, DPT, OPV and Measles) are provided free of cost in the Childhood Immunization Programme in the public health sector. About 70% of the total cost of these vaccines were borne by the government as of 2002.

This article tries to review the performance of the EPI program of Nepal for last one decade.

Objectives of the Study

- To review the trend of the EPI Programme of Nepal and its performance over the past decade.

Methods and materials

The information and statistics available at the Child Health Division and at the Health Management Information System (HMIS) section of the Management Division under the Department of Health Services form the basis of this article. The secondary sources of information include surveys, programme documents and published articles.

Results

There is scarcity of relevant information to estimate the incidence of vaccine preventable diseases (VPD) in Nepal. Recently published documents and reports are silent on the estimates / burden of the VPD in Nepal. So, an estimate has been presented here to show the incidence using the accepted formula for calculating the incidence of VPD in the absence of any immunisation programme.

Table 1 Annual Incidence of vaccine preventable disease in Nepal

Disease	Estimation	Denominator	Estimated Number
Measles	474/ 1000 Live Births	680,498	322,556
Neonatal tetanus	14.9/1000 Live Births	"	10139
Polio	12.4/1000 Live Births	"	8438
Diphtheria	27.5/1000 Live Births	"	18713
Pertussis	502/1000 Live Births	"	341610
Tuberculosis	13.3/ 1000 Live Births	"	9051

Source: CHD/EPI

Correspondence
Dr. B. K. Suvedi
P. O. Box 2323, GPO
Kathmandu, Nepal
E-mail: bksubedi@healthnet.org.np

It is clear from the above table that in the absence of immunisation programme a significant number of children might catch the vaccine preventable infections. However, if immunisation programme is conducted successfully, the incidence of the VPD declines sharply as evidenced by experience from various countries.

The reported number of VPD for the last ten years is given in the table below

Table 2 Number of Reported Cases for VPD

Disease	Measles	Whooping Cough	Tuberculosis	Diphtheria	Neonatal Tetanus	Poliomyelitis/AFP	Total
FY 1994/95	4810	12166	13068	2038	727	NA	32809
1995/96	8513	13852	15034	1491	557	9	39456
1996/97	12677	13089	19125	998	306	154	46349
1997/98	5771	14339	19450	511	197	28	40296
1998/99	6878	8272	16463	414	50	31	32108
1999/2000	9397	6021	15214	368	134	38	31172
2000/2001	10849	5908	16490	390	327	32	33996
2001/2002	6749	4683	16189	108	92	7	27828
2002/2003	13344	4479	14580	173	51	18	32645
2003/2004	12074	3708	15140	81	27	23	31053

It is seen from the Table 2 that reported number of some of the VPD is decreasing considerably, namely diphtheria, neonatal tetanus, whooping cough and poliomyelitis for last five years. However, tuberculosis, and measles still occupy considerable number and are the frequently reported diseases among the VPDs.

The EPI programme uses various indicators for the assessment of its performance. One of the widely used indicators in assessing the immunisation service is the coverage rate. The coverage rate for immunisation is defined as the proportion of individuals in the target population that have been given vaccine. The table below shows the coverage rate for various vaccines for last 10 years.

Table 3 National Coverage Rates for different antigens by year

Fiscal Year	BCG	DPT3	OPV3	Measles
1994/95	86	76.8	77.6	78.2
1995/96	97	81	83	87
1996/97	100	80.4	80.6	87.8
1997/98	100	82.7	82.6	88.6
1998/99	93.3	76.4	76.1	80.5
1999/2000	97.1	79.8	80.2	76.9
2000/2001	94.6	80.0	80.0	75.0
2001/2002	94.0	80.3	80.3	75.6
2002/2003	97.0	86.2	84.0	80.2
2003/2004	96.3	90.3	90.2	85.4

From the Table 3 above it can be seen that the national coverage rate for various antigens has improved significantly in last few years and has crossed the cut-off point of 80%. However, there is wide fluctuation in various years and districts (not shown in the table).

This table also indirectly indicates that there might be a significant number of children who are left without vaccine querying the effectiveness of the programme to show its impact. Besides, there are technical issues as vaccines like DPT and OPV need at least three doses to be really effective, if all other factors remain same.

From a programmatic point of view, it is very important to put a target for implementing the programme and assess the performance by the end of the designed period. In EPI, completed third dose of DPT (DPT3) is considered as an indicator to get the glimpse of the programme performance. Table 4 shows the target and performance of Nepal's EPI programme for last one decade.

Table 4 Target and Achievement for DPT3 in different years

Fiscal Year (FY in BS)	Target	Achievement	Coverage Rate
1994/95 (051/52)	612,034	470,226	76.8
1995/96 (052/53)	628,445	518,678	81.0
1996/97 (053/54)	645,325	519,007	80.4
1997/98 (054/55)	662,670	548,134	82.7
1998/99 (055/56)	680,498	519,920	76.4
1999/2000 (056/57)	698,824	557,764	79.8
2000/2001 (057/58)	717,664	573,887	80.0
2001/2002 (058/59)	737,032	591,934	80.3
2002/2003 (059/60)	756,943	652,640	84.0
2003/2004 (060/61)	728473	657,811	90.3

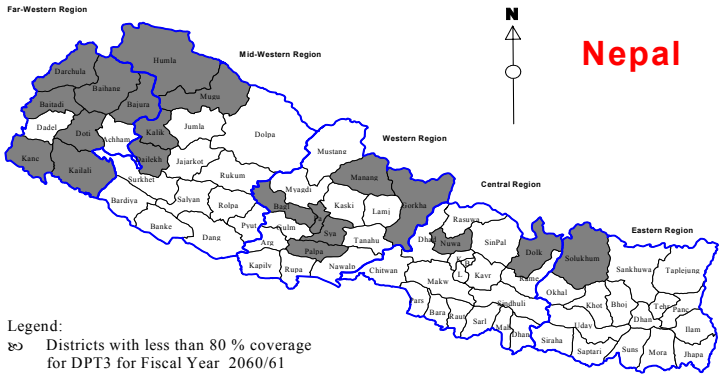
This table shows that though there is more or less narrow range in achievement (in absolute numbers), the coverage rate fluctuates quite significantly: 76.4 % to 90.3%. Another noticeable point is that the number of target population (the denominator) is also fluctuating, giving the impression that we have better coverage over years. However, the reported coverage rate (see Table 3) and the actual number of vaccinated children (Table 4) might lead to inappropriate decision making.

Table 5 Comparative Table showing Reported Coverage versus Coverage Survey

Vaccine	1995		1996		1998		2001	
	HMIS Report	NMIS Survey	HMIS Report	NFHS Survey	HMIS Report	ICS Survey	HMIS Report	DHS Survey
BCG	76	73	92	76	93	86.3	94.6	82.9
DPT3	65	50	75	54	76	75.9	80.0	70.6
OPV3	66	50	76	51	76	70.2	80.0	96.4
Measles	71	47	80	57	80	73.1	75.0	63.6

This table shows disparity between reported coverage versus survey results. Similarly, there seems non-uniformity in the various coverage surveys too. Especially noticeable in this respect is the measles coverage (47, 57 and 73% by NMIS, NFHS and DHS consecutively), whereas there is no significantly marked change in performance over these three years (compare with Table 3). This disparity in various surveys might be due to the specificity of the tool used or some inherent biases.

Performance of various districts in relation to EPI Coverage



As we can see from the map above, few districts still have low coverage rate, as taken proxy for DPT3 coverage. These districts are basically the mountainous and situated in Mid-western and Far-Western regions with relatively low population density. However, this raises a major issue of control, elimination and eradication of the VPD. Can we achieve the control, elimination or eradication target is a major question.

Discussion

The World Health Organization (WHO) established the Expanded Program on Immunisation (EPI) in 1974 [1,3]. The goal of the EPI was to reduce morbidity and mortality by making immunisation service available for all children of the world by 1990. Coming to the end of the millennium, the EPI essentially includes immunisation against the six diseases- diphtheria, whooping cough (pertussis), tetanus, measles, poliomyelitis and tuberculosis. However some countries have included other vaccines in their routine immunisation programs.

Since the initiation of EPI by WHO, many scientific and technological advancements have taken place. However, in Nepalese context, the epidemiological situation has changed comparatively a little, if taken into consideration the "estimated incidence" of the six vaccine preventable diseases (VPD). Though steps in reducing the number of neonatal tetanus, diphtheria and poliomyelitis seem to have a great success, other three VPD remain still a major challenge. Besides, a pool of unvaccinated and thus "vulnerable" children remains high. For example, if the vaccination coverage is 80% of the target population with denominator as 737,032 (a target set for the fiscal year 2001/2002), there will be some 147,406 children left without vaccination. This is a considerable number to keep the infection going on, even if the effectiveness of vaccine is 100%.

A. EPI in Nepal

As stated earlier, Nepal initiated the implementation of EPI in the fiscal year 1978/79. At the start, only three districts of the Kingdom of Nepal were taken for piloting of the EPI Programme in the first year, i.e. 1978/79. Then the number of districts included in the EPI programme were gradually increased. All the districts of the country were covered with EPI programme in 1987/88[2, 3] when Universal Childhood Immunisation (UCI) was a priority [4,5,6].

B. Shift in Programme Operations

Various adjustments have been tried for the implementation of EPI in Nepal. The adjustments for operations of the programme seem to occur at various levels affecting the structure:

a). Change in external structure, and
b). Change in internal structure of the programme.

The EPI remained as a project of Ministry of Health of Nepal from 1978 till 1988. The project hired its own human resources and was conducted in a "vertical" mode, with its inherent characters of financial autonomy and managerial flexibility. However, after reorganization of EPI into a division at the central level as well as at the district level, these characters seem to be lost. Some characters were lost during the “integration phase also. Coming to the year 1992, the central structure of EPI totally collapsed. A unit called “child health” with just two personnel at the centre were allocated for EPI under the Family Health Division of Department of Health Services to run the whole EPI programme. However, due to programme related pressures and "observed" importance of EPI as an essential component of primary health care system, it was "upgraded" as a section of Child Health Division in 1995. With just three personnel at the central level, it tries to achieve the global goal. However, grass root level health workers directly involved in EPI are allocated in each village development committee (numbering 3914) of the country.

The shift in the internal structure of the EPI programme as such seems to be an important aspect in the legacy of immunization programme in Nepal. There seems to be very poor institutional memory pertaining to the changes and replacement of the human resources, though the functioning of the programme appears appropriate in the national context, because of the tireless effort of the grass root level health workers and volunteers.

The changes seen in the EPI can be summarized as follows:

Period	At the central level	At the District level
1978- 1986	Establishment of EPI Project	Vertical Institutions located at few districts
1986 - 1993	EPI Programme (Project)	Integrated "EPI" Unit Under the District Public Health Office
1993- 1995	Integrated in FHD as "Child Health" unit	Existing as unit
1995 - 2004	Functioning as EPI Section under the CHD	Integrated "EPI" units

Nepal expanded its EPI service to all the 75 districts of the country by 1988/89 (2). Initially only two antigens (BCG and DPT) were introduced in the programme with subsequent addition of other antigens: Polio vaccine was added in 1980 and the measles vaccine was added in the programme in 1982.

It was estimated in 1985/86 that about 42,600 deaths occurred due to vaccine preventable diseases (VPD) because of absence of immunisation. This number was estimated to be about 36,655 in 1991. There is no reference available what was the situation at the end of the millennium.

If we see retrospectively, the work plan developed by National Planning Commission in 1992 [7] seems to be very ambitious: it planned to eradicate neonatal tetanus by 1995, reduce the mortality of measles by 95% by 1995 and aimed to eradicate polio by 2000. It seems that the target was too ambitious without focussing on the various aspects of the programme, when the program was virtually collapsed at the centre because it was minimized to "Child Health Unit" looking for nutrition, control of diarrhoeal diseases and acute respiratory infection and EPI. However, immunisation service at the grass root level survived because of the demand from the community and good acceptance of the programme.

Even if we shift the target for few more years, there are still many challenges ahead to reach the target. With the initiation of National Immunization Days, with lots of resources and human resources mobilization, Polio eradication seems virtually certain[6]. Nepal has had no case of laboratory confirmed wild poliovirus detected since November 2000.

Special activities were also carried out to eliminate maternal and neonatal tetanus (MNT) and has been recently completed. All the 75 districts of Nepal have carried out MNT elimination activities through campaign approach by providing three doses of tetanus toxoid vaccine to all women aged 10-39 years of age. The national coverage of the campaign stands at >90%, though some fluctuation has been observed.

Nepal also has recently initiated measles control activities. The target is to reduce measles mortality through vaccination of children aged 9 months to 14 years. The campaign intends to reduce measles mortality by 50% from the currently estimated 5000 deaths.

Starting 2002, Nepal has also introduced Hepatitis B vaccine in the routine immunisation programme in a phased manner, planning to cover all the 75 districts by 2005.

Conclusion

Almost 25 years have elapsed since the establishment of EPI programme in Nepal. It has seen ups and downs during these years from the programmatic perspective. However, community has accepted the EPI service and the service coverage is gradually increasing to acceptable level of more than 80%. A few diseases seem to have been reduced to a minimum level because of the immunisation programme. However, challenges remain with some other VPD, namely tuberculosis and measles. Besides, active surveillance and appropriate action, these remain as a challenge in the effort to reduce the burden of the VPD.

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