SPECIAL ARTICLE

The Effectiveness of Immunization

by

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Abstract

This article reviews the expanded programme on immunization in Indonesia, Pengembangan Program Imunisasi (PPI) which was launched in 1977. We are apt to know what the current situation is after ten years have passed.

WHO proposes that EPI/PPI be systemically evaluated with respect to their effectiveness which is reflected by a reduction achieved in the incidence of the target diseases. Priority is being accorded to measuring disease trends for three diseases i.e. poliomyelitis, measles and neonatal tetanus.

A considerable effect on target diseases had been observed and it was evident that PPI can reduce the incidence of target diseases. A goal had been set to eliminate indigenous paralytic poliomyelitis by the end of the fifth "Five Year Plan". Another goal had also been adopted, i.e. neonatal tetanus elimination by 1985 in Java and Bali.

The effectiveness of immunization is ascertained and we have the optimism that poliomyelitis and neonatal tetanus elimination goals can be achieved.

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Introduction

The objective of National Development is to develop "human beings as a whole" to attain a better quality of life.

The immunization programme is one of the many tools to improve the quality of life.

WHO proposes that the programme be systematically assessed with respect to their relevance, adequacy, progress, efficiency and effectiveness. At this stage, in most national immunization programmes, emphasis is most appropriately placed on measuring progress and effectiveness as reflected by reduction in morbidity and mortality of the target diseases.

Ten years have passed since the introduction of the Expanded Programme on Immunization in Indonesia. What is the current situation?

This article will review the effectiveness of *PPI (Pengembangan Program Imunisasi* – Indonesia EPI). Firstly the immunization coverage and sample survey will be discusses; subsequently a review of the disease incidence and the "adjustment with a human face" will be put forward. This will show the effectiveness of immunization.

Immunization Coverage

At present, high attention is being given to immunization coverage levels. Coverage is relatively easy to estimate and in most of the developing countries, the level is low. Increasing immunization coverage level is only a means for achieving the goal of reducing morbidity and mortality. In assessing coverage, great precision is usually not needed. The procurement or distribution of vaccine were initially used for the estimation of coverage. This approach is less useful when such estimates reveal a coverage of more than 20%, and thus sample surveys are recommended.

The high immunization coverage leads The Ministry of Health to achieve the goal of "The Universal Child Immunization", UCI. Yet, even in countries with the best programmes, a few children remain unimmunized. Convention dictates that the level should be set above 80%.

A new target for elimination of poliomyelitis in Java-Bali-Sumatera and neonatal tetanus in Java-Bali has also been proposed.

Data of immunization coverage levels in East Java is presented in Table 1 [1].

The table shows that the coverage level is increasing from time to time, but the level for all antigens in 1988/1989 are still below the national figure. This reminds us that immunization activities need to be intensified and accelerated. Prospects for doing so appear encouraging. It can also be seen that not only the quantity is better but also the drop-out rates (quality) are diminishing (Table 2).

Table 1 : *Immunization coverage, East Java 1985/1986 – 1988/1989*

	Cumulative realization			Indonesia	
	85/86	86/87	87/88	88/89	88/89
BCG	63	61	65	70	81
DPT 1	63	61	65	71	82
DPT 3	40	46	53	65	71
POLIO 3	40	47	54	66	73
Measles	40	43	48	57	64
T.T.1*	31	33	33	34	45
T.T.2	21	24	25	29	37

* Tetanus toxoid for pregnant women.

Source : East Java Epidemiological Bulletin, May 1989 [1]

Table 2 . *Drop-out rates, East Java 1985/86 – 1988/89*

Vaccine type	Drop-out Rates in the period (%)				
	84/85	85/86	86/87	87/88	88/89
DPT 1 – 3	59	38	25	18	8
Polio 1 – 3	62	38	24	17	7
DPT 1 – Polio 3	–	–	–	16	7
TT 1 – TT 2	40	33	27	23	14

Source : East Java Epidemiological Bulletin, May 1989 [1]

Table 3. *Number of poliomyelitis cases at Dr. Soetomo hospital 1984 - 1989*

Year	Surabaya	Outside-Surabaya	Total	Year	Surabaya	Outside-Surabaya	Total
1984	29	55	84	1987	34	44	78
1985	37	41	78	1988	19	27	46
1986	36	65	101	1989	24	39	63

Source : Medical rehabilitation unit

Table 4. *Measles immunization status, Sekaran Village, March, 1989*

Immunization-Status	Disease +	Disease −	Total	Attack rate %
+	5	45	50	10.0
−	178	108	286	62.2
Total	183	153	336	34.5

Table 5 : *Number of measles cases Dr. Soetomo hospital 1970 - 1989*

Year	Total	Deaths	%	Year	Total	Deaths	%
1970	72	9	12.5	1980	394	33	8.4
1971	68	13	19.1	1981	326	43	13.2
1972	94	23	24.5	1982	322	20	6.2
1973	205	53	25.8	1983	233	32	13.7
1974	84	20	23.8	1984	272	32	12.9
1975	98	19	19.4	1985	146	15	10.3
1976	226	41	18.1	1986	299	15	5.0
1977	233	35	15.0	1987	163	11	6.7
1978	243	47	19.3	1988	114	2	1.7
1979	258	45	17.4	1989	126	6	4.8

Source : Tropical and communicable diseases ward

Table 6 : *Immunization coverage surveys East Java, 1986 and 1989*

Antigen	percents		
	1986	1989/89[1]	1989
Infants :			
DPT 1	79	74	92
2	72	69	91
3	60	68	86
Polio 1	78	74	92
2	72	70	91
3	59	69	86
Measles	55	59	82
BCG	78	74	91
Scar BCG	67	-	80
Pregnant Women :			
TT 1	49	35	59
TT 2 / TT re-vacc	46	30	52

Source : East Java Epidemiological Bulletin : "Buku Pemantauan Prǫgram Imunisasi Tahun 1988/89" [4]

Table 7 : *Number of neonatal tetanus cases at Dr. Soetomo Hospital 1970 - 1989*

Year	Total	Deaths	%	Year	Total	Deaths	%
1970	48	27	56.2	1980	41	16	39.0
1971	52	24	46.1	1981	37	19	51.3
1972	58	37	63.8	1982	24	13	54.2
1973	66	49	74.2	1983	32	17	53.1
1974	60	30	50.0	1984	20	8	40.0
1975	61	29	47.5	1985	22	9	40.9
1976	52	22	42.3	1986	18	6	33.3
1977	51	27	52.9	1987	11	4	36.4
1978	38	23	60.5	1988	8	5	62.5
1979	47	21	44.7	1989	8	2	28.7

Source : Tropical and communicable diseases ward

Disease Incidence

The best measure of an immunization programme is the reduction achieved in the incidence of the target diseases. In the *PPI,* priority is being accorded to measuring disease incidence trends for three diseases i.e. poliomyelitis, measles and neonatal tetanus.

Poliomyelitis

Quite dramatic falls in the incidence of poliomyelitis are being recorded in developing countries, even in the face of modest levels of immunization coverage. It is then used to be one of the earliest indicators of the impact of the programme [2].

From surveys conducted in 1977-1980, Soewarso reported around 8000 new residual cases of paralytic poliomyelitis occurred each year, and the highest proportion was in the age-group of 1 year with an average Case Fatality Rate of 2.7% [3].

Data of Communicable Diseases Wards showed that there were no poliomyelitis patients in the last 3 years. Data of Medical Rehabilitation Units revealed that a higher percentage (60%) of the patients came from outside Surabaya (Table 3). They usually came in the rehabilitation phase (33.9%) or the convalescence phase (40.3%). The fact revealed that 5.9% had received oral polio vaccine.

PPI included Poliomyelitis Immunization in 1980/81. During Pelita IV there was a significant increase in coverage. The level of coverage for the first contact has passed 80% and the drop-out rate was minimal in 1988 (the National Drop-Out Rate was 10% [4].

Poliomyelitis elimination needs a high coverage level and equity especially in the difficult areas and the unreached children. Administration of polio vaccine at birth has been advocated since OPV induces intestinal infection and 20% to 40% of infants will have an antibody response. By means of this strategy, hopefully it will raise the immunization coverage [2].

In conclusion, several facts can be mentioned. The incidence of poliomyelitis has decreased. The immunization coverage level was sufficiently high and the drop-out rate was low. Thus one might say that polio immunization is effective.

Measles

Measles remains to be a global health problem; among the immunizable diseases measles is one of the main causes of child deaths.

In developing countries, including Indonesia, the epidemiologic characteristics are very different. A proportion of children are infected in their first year of life when the risk of complication and death is high.

Compared with the preceeding years, the number of cases in 1988 have markedly reduced. The highest proportion of cases were underfives (47.9%) followed by the age-group of 5-14 years (42.6%) [5]. Outbreak studies revealed the following informations: the average attack rate was 5.37 per 10.000 population with a case fatality rate of 2.0%; and vaccine efficacy was 8.4%. Attack rate of children who had received immunization was 10% compared with 62.2% in unimmunized children (Table 4) [6]. Thus the protection resulted from immunization was significant.

The number of measles patients in Dr. Soetomo Hospital indicated also the same trend, the reduction was not so dramatics as PPI included measles immunization later than DPT and Poliomyelitis (Table 5) and there was a shift in the age-group risk. Result of coverage survey in 1989 was encouraging (Table 6).

Thus, the effectiveness of immunization was proven by the current situation of measles.

Neonatal tetanus

This disease remains to be one of the main causes of neonatal deaths. The national house-hold survey in 1986 revealed that neonatal tetanus replaced diarrheal diseases as the "number one killer" of Indonesian infants.

The immunization programme uses the neonatal tetanus mortality as an index of the impact of the programme and its progress in achieving the goal of "Health for All by The Year 2000."

As it appears in Table 7, a reduction of the number of neonatal tetanus cases occurred during the last 6 years in Dr. Setomo Hospital, but the Case Fatality Rate was still high.

Data of immunization coverage in East Java showed that eventhough the coverage level was still low, there was a progress in tetanus toxoid immunization coverage and there was also a reduction of drop-out rate from 13.7% in 1987 to 8.8% in 1988.

Studies by Runizar Rusin (Lombok, 1986-1989) using "Risk Approach Strategies" has shown the effectiveness of tetanus toxoid immunization. The risk approach can improve the routine programme by reaching the underprivileged group of women who are usually beyond the reach of the programme.

Adjustment with a Human Face

Global prolonged and severe economic recession in the 1980s resulted in a setback in the child health status in many developing countries. There was an increase in the infant and environment derangement [7].

Indonesia has adapted the approach named "Adjustment with a Human Face" proposed by UNICEF. The proportion of the total public expenditure allocated to the public health sector remains constant. The Ministry of Health has shifted the expenditure more towards routine function than the development expenditure and shifted the allocation towards preventive services. Various progresses have been made during the last decade, even during the world economic recession. Gani showed the evidence of the success to maintain or even to expand the intensity of the health sector development [8]. Indonesia has been able to moderate the impact of expenditure cuts by maintaining or even expanding, the preventive and promotive programmes such as *PPI*. Indonesia has achieved in the 1980s higher rates of mortality reduction than in the 1970s. This indirectly clarifies once again the effectiveness of immunization.

Conclusion

To achieve a better and higher quality of life, a multi sectoral approach in encompassing mortality, morbidity and fertility control is a prerequisite. Subsequently human development would create healthy life norm as such to provide the highest level of health possible. The approach should raise community commitment and participation in the health sector especially in the field of prevention and promotion.

Immunization programme is one of the many tools to improve the quality of life where the primary goal is to reduce the morbidity and mortality rate of immunizable diseases. Priority is being focused on three main diseases i.e. poliomyelitis, measles and neonatal tetanus.

Ten years have passed since the introduction of the Expanded Programme on Immunization. Various progresses have been achieved and a considerable effect on immunizable diseases have also been observed. Data showed that the coverage level is increasing and the drop-out rates are decreasing. Hospital data also showed that the number of patients suffering from immunizable diseases are diminishing. A reduction of poliomyelitis, measles, and neonatal tetanus cases have been observed.

A goal has been set to eliminate poliomyelitis by the end of the fifth "Five Year Plan" and another goal has also been adapted to eliminate neonatal tetanus by 1995 in Java and Bali [4].

Thus the effectiveness of immunization has proven to be unquestionable, the situation is encouraging, and it is promising that the UCI goal can be achieved.

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