

# ANALYSIS OF IMMUNIZATION PROBLEMS IN PREVENTION OF DIPHTHERIA

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## ANALYSIS OF IMMUNIZATION PROBLEMS IN PREVENTION OF DIPHTHERIA

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### Abstract.

Diphtheria in Bangkalan Regency is the third highest in East Java. The highest diphtheria cases in the last 5 years occurred in 2018. Until the end of January 2019, there had been 4 cases of diphtheria outbreaks, in which 2 cases of the toxigenic laboratory were confirmed positive. The purpose of this study was to determine the priority and root causes of immunization and to be used in planning and implementing a diphtheria control program appropriately. This was an observational descriptive study conducted at the Bangkalan District Health Office in January 2019. Problem identification was carried out using the Nominal Group Technique method. The determination of priority problems was done by using the Capability, Accessibility, Readiness, and Leverage (CARL) method. The root cause of the problem was done using a fishbone diagram. The priority problems detected were coverage of basic complete immunization and Diphtheria Pertussis Tetanus (DPT) Booster immunization for the last 3 years had not met the target and was not evenly distributed. The priority of the root of the problem is that the village immunization coordinator is not good at collecting data on the number of targets and does not conduct education before immunization. Immunization coordinator training at the village or private level is still limited. Strengthening the role of village immunization coordinators involving other sectors and the formation of community empowerment programs is also limited.

**Keywords:** *Diphtheria, immunization, Pertussis, Tetanus*

### 1. Introduction

Diphtheria is a disease that is commonly found in tropical countries(1). Indonesia stands at the second rank after India in the number of diphtheria cases(2). East Java Province always occupies the first position in the discovery of diphtheria, and in recent years, the cases in East Java have been reported to continue to increase(3). During the last 5 years, the highest cases in Bangkalan Regency occurred in 2018, which is 24 cases. Until the end of June 2019, there

had been 13 outbreaks in Bangkalan Regency with a Case Fatality Rate (CFR) of 7.69%, and 2 cases tested positive for toxigenic(4).

Diphtheria is closely related to the coverage of immunization. Vaccination against diphtheria has dramatically reduced the mortality and morbidity of diphtheria. The World Health Organization (WHO) recommends a 3-dose primary vaccination series with diphtheria vaccine followed by 3 booster doses. The primary series should be started as early as 6 weeks of age with subsequent doses given at intervals of at least 4 weeks between doses. The 3 booster doses should preferably be given during the second year of life (12-23 months old), at 4-7 years old, and at 9-15 years old. Ideally, there should be at least 4 years between booster doses (5).

The coverage of complete basic immunization and 18-month DiphtheriaPertussis Tetanus (DPT) Booster immunization in the Bangkalan Regency has not reached the national target. In 2018, the coverage of IDL in the Bangkalan Regency reached 73.6% of the set target of 92.5%, based on the results of the epidemiological investigation of the diphtheria outbreak in 2018. In 2018, 79% of diphtheria diseases were not immunized (4).

The presence of diphtheria can be a burden for any region economically. The area affected by the diphtheria outbreak forced the government to issue an unexpected budget for handling the case by carrying out mass vaccinations and procuring Anti Diphtheria Serum (ADS). In 2018, efforts have been made to control an outbreak of diphtheria in Bangkalan by providing Outbreak Response Immunization (ORI) 3 and have spent more than 1 billion rupiahs. The purpose of this study was to determine the priority and root causes of immunization and to be used in planning and implementing a diphtheria control program appropriately.

## 2. Material and Methods

### *Research Design, Population, Sample, and Variables*

The design used in this research was descriptive observational with a qualitative approach. Cases were identified using secondary data by looking at monthly reports, the results of epidemiological investigations, and brainstorming using the Nominal Group Technique (NGT) method, which involved the head and surveillance staff of immunization. The priority of the problem was determined using a method named Capability, Accessibility, Readiness,

and Leverage (CARL). Determination of the root of the problem was carried out using the fishbone method. The key samples needed to obtain information in this study were those related to the immunization surveillance program, namely the Head of Disease Prevention and Control, the Head of Immunization Surveillance, one immunization officer, and two surveillance officers from the Bangkalan District Health Office from 14 January to 9 February 2019.

### Research Instruments

The instruments used in this research were problem identification sheets, CARL questionnaires, and in-depth interview guidelines.

### Research and Analysis Procedure

Data collection was analyzed using a descriptive method with a qualitative approach in the form of a narrative containing the results of the identification of diphtheria problems, problem priorities, root causes of problems, and alternative solutions. This analysis was carried out using a systems theory approach to classify the causative factors. After getting to the root of the problem, an alternative solution to the problem was formulated.

## 3. Results

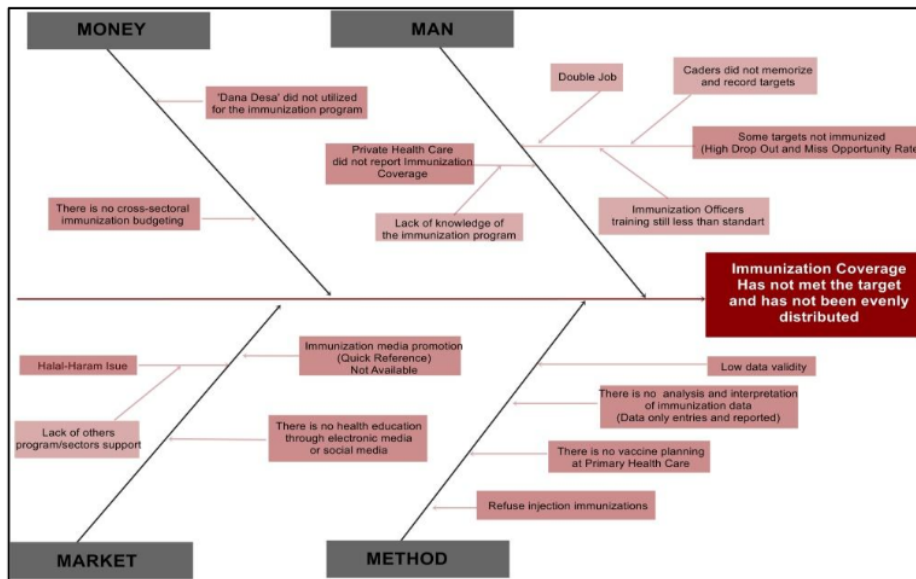


Figure 1. Analysis of Factors Causing the Problem of the Coverage of Basic Immunization and Advanced Immunization in Bangkalan Regency, 2018

Based on the results of problem identification using existing secondary data in 2018, the number of diphtheria increased by 300%, which amounted to 24 cases from 2017. The highest cases occurred in Burneh and Bangkalan Sub-districts. From 2014 to 2018 the highest trend according to the age of the victims occurred in the group of children aged 5 to 9 years and 15 years or more (Figure 1). From the results of the NGT brainstorming, there were 3 main problems related to the increase in diphtheria cases in Bangkalan in 2018, namely the coverage of complete basic immunization that was not on target and uneven, lack of capacity of midwives, and lack of cross-sector collaboration.

**Table 1.** Diphtheria Problem Priority in Bangkalan Regency, 2018

No	Problem	C	A	R	L	Total	Rank
1	Immunization coverage in the last 3 years has not met the target and is not evenly distributed	4	3	3	5	180	1
2	The capacity and ability of village health workers is still lacking	4	3	3	3	108	3
3	Collaboration in other programs and other sectors is still lacking	4	4	3	3	144	2

**Table 2.** Coverage of Complete Basic Immunization, UCI Village, and Coverage of DPT Booster in Bangkalan Regency during 2016-2018

No	Diphtheria Problem Indicators	Immunization Coverage (%)		
		2016	2017	2018
1	Complete Basic Immunization	72	69	73,6
2	Universal Village Children Immunization	50,2	47	52
3	Diphtheria Pertussis Tetanus (DPT) Booster	33,1	29,9	66,4

**Table 3.** Coverage of Outbreak Response Immunization (ORI) in Bangkalan Regency, 2018

No	Outbreak Response Immunization (ORI)	Coverage (%)	
		Real	Projection
1	Outbreak Response Immunization (ORI) 1	92,3	84,0
2	Outbreak Response Immunization (ORI) 2	88,0	78,9
3	Outbreak Response Immunization (ORI) 3	93,1	86,5

The coverage of complete basic immunization and advanced immunization in the Bangkalan Regency reached the highest CARL value for the last 3 years. However, the problem was that this figure had not met the target of 92.5% so that the coverage of complete basic immunization and advanced immunization in Bangkalan Regency for the last 3 years had not met the target. This was a priority in overcoming the problem of high diphtheria rates in Bangkalan Regency. Moreover, this issue was also a priority after considering the availability of funds, facilities, and staff readiness (Table 1). Complete Basic Immunization Coverage (IDL), UCI village coverage, and Diphtheria Pertussis Tetanus (DPT) Booster coverage in Bangkalan in 2016-2018 had not reached the specified target. In 2018, the IDL coverage in Bangkalan was 73.6%, while the IDL target was 92.5%; the coverage of UCI villages in Bangkalan was 52%, while the target set was 90%; the coverage of the Diphtheria Pertussis Tetanus (DPT) booster had increased but not reached the specified target of 95%. The increase in coverage was due to the ORI program in Bangkalan in 2018 (Table 2). In the coverage of UCI villages in each public health center (*puskesmas*), as many as 40.9% of public health center had reached the IDL target in 2018. Efforts to overcome the diphtheria outbreaks had been carried out through mass injections or Outbreak Response Immunization (ORI), in which three rounds of ORI in Bangkalan had not reached the target (Table 3). Then, the next stage would be an analysis of the root of the problem by conducting in-depth interviews with the person in charge of the related program. The results of the in-depth interviews would then be illustrated in the form of a fishbone diagram, as well as a conclusion about the problem.



#### 4. Discussion

The high number of diphtheria cases during the pre-vaccine period mostly occurred in the 40-49 year age group because they had never been exposed to Diphtheria Pertussis Tetanus (DPT) immunization when they were children. The age distribution illustrates the long-term impact of vaccines, wherein countries with high cases, most cases occur in pre-school to school-age children. Meanwhile, in countries with rare cases, the distribution of cases is more evenly distributed across all ages but is higher in the adult group.

Infants who get 3 doses of Diphtheria Pertussis Tetanus (DPT) vaccine have good immunity to diphtheria within a few years(7). Incomplete DPT immunization can cause diphtheria to spread rapidly in the community. The universal dose that is given to infants actually depends on the epidemiological conditions of each country, but the World Health Organization (WHO) recommends 90% coverage for basic DPT immunization(6). All villages must achieve the UCI and coverage of Complete Basic Immunization for infants aged 0-11 months for a minimum of 90%. Increasing the coverage of UCI in villages in an area is expected to reduce the incidence of Preventable Diseases through Immunization (PD3I), especially diphtheria. The causes of diphtheria outbreaks are UCI coverage and Complete Basic Immunization (IDL) which have not reached 90%(8).

One of the problems related to immunization coverage is data collection on the number of targets and data validity. Immunization results must be recorded by the regional midwife and recorded in the infant cohort by copying the immunization book records from each immunization service. Village midwives must record the achievement of complete basic immunization to meet the village UCI targets(9). Data on the results of complete basic immunization included in the infant cohort must be the same, which does not depend on the number of data but on the presence of differences in the recorded data. Immunization data inaccuracies can affect the success rate of immunization coverage(10).

The village midwife, as a representative of the public health center, has enormous potential because the village midwife is very close (geographically and socially) to the surrounding community. One of the things that midwives can do is disseminate information with effective counseling techniques to mothers and families(11). Immunization officers (village midwives) have an important and strategic role in implementing the immunization program. Officers who are competent in providing counseling related to immunization and providing motivation

to families, especially mothers, have a significant role in distributing immunization coverage(12).

The competence of village midwives in implementing immunizations for infants and toddlers needs to be improved through several pieces of trainings. Training is an effort to improve the knowledge, attitudes, and skills of officers in order to improve employee performance and quality. Immunization officer training commonly uses the CBT (Competency-Based Training) approach(13). Low performance may be caused by several internal and external factors. Moreover, officers who have low performance are influenced by a lack of knowledge and skills. Knowledge can be obtained from the following education and training(14).

### **5. Limitation of the Research**

The limitation of this research is that researchers do not collect primary data from the public and those who are responsible for administering the immunization program. The root cause of a component systems point of view is input. Other component systems in the implementation of health checks are not examined.

### **6. Conclusion**

The priority problem is the coverage of complete basic immunization and advanced immunization in the Bangkalan Regency for the last 3 years has not met the target of 92.5%. The root of the problem that becomes a priority is that immunization officers at the village level (village midwives) are not good at collecting the target number. In addition, immunization officers also do not analyze immunization data and disseminate the results of the analysis to the community, cross-program or cross-sectoral. Furthermore, the training for immunization officers at the public health center, villages, or private services are still very limited.

Recommendations that need to be done are strengthening the role of the immunization village coordinator by involving other sectors and establishing community empowerment programs such as My Home My Village.



## 7. Acknowledgment

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