Correlation of Structural and Behavioral Factors to Dropout Status of Childhood Immunization

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Abstract.
Immunization dropout (DO) occurs when a child does not receive follow-up immunization according to the set schedule. High dropout status has potential increasing the risk of contracting dangerous diseases because the body immunity is not optimal. Resistance, hesitate and distrust of vaccines lead to delays and refusal of immunization. The study aims to analyze the incidence of immunization dropout from structural and behavioral dimensions. This is a quantitative study with a cross-sectional approach. The population was all children aged 12-23 months in Central Java province with totally sample of 685 people. Data were collected through interviews using structured questionnaire instruments and observations using the MCH Book. The dropout rate for DPT/HB/HiB_1 to DPT/HB/HiB_3 immunization was 6.2%, and to Meales/Rubella was 10.4%. A total of 14.4% of children have a dropout immunization status. For structural dimension, there is a correlation between information sources and family income with dropout status. For behavioral dimension, variables of knowledge, perception of adverse events and perception of booster correlated with immunization dropout status. The involvement of all stakeholders is needed to provide correct information about vaccines and immunization, as well as the use of attractive communication media. Responsive and adequate surveillance and anticipation of adverse immunization reports should be strengthened.

Keywords: childhood immunization; dropout status; behavior dimension

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1. Introduction

Every child deserves protection from the risk of contracting dangerous diseases that can threaten their lives. Through immunization, the risk of morbidity and mortality from certain diseases can be reduced or even eliminated. Immunization has also proven to be a very cost-effective strategy to eliminate various diseases that can be prevented by immunization, although not all children take advantage of it.

In the national immunization program, every child aged <12 months receives 11 immunization services to be considered complete, namely HB-0, BCG, DPT/HB/HiB (3x), Polio-OPV (4x), IPV and Measles/Rubella. Data from the Ministry of Health shows that the achievement of complete basic immunization (CBI) in 2020 was 83.3% (below the target of 92.9%), while the achievement in 2021 increased slightly to 84.2% and is still far from the target of 93.6%. The results National Health Basic Research 2018 showed only 57.9% of children had complete immunization status, 32.9% were incomplete, and 9.2% were not immunized at all.

Many factors influence the low utilization of immunization such as low confidence in vaccines that lead to resistance, hesitation, delay and even refusal. Anxiety about vaccine side effects and the children pain feel when vaccinated makes parents tend to be reluctant to vaccinate their children. Lack of time, low awareness, fear of side effects, and loss of daily income opportunities are the main reasons why children are not immunized, in addition to barriers caused by the behavior of health workers. Parents are generally very concerned about the pain feel for children will experience, potential side effects, and uncertainty about the vaccine effectiveness.

Eden et al. stated that vaccination-related anxiety and pain are most often associated with fear of needles. Vaccination is a painful procedure for children which results in non-compliance with the vaccination schedule.

Another reason for not immunizing children is because they do not feel the need and consider immunization unimportant. Other obstacles often associated with immunization are untimeliness and high drop-out immunization cases.

Immunization dropout (DO) is a condition when infants do not receive follow-up immunization according to the recommended administration schedule and dose in order becoming complete immunization status. Immunization dropout rate is one indicators of immunization program management assessment which is calculated based on the percentage difference in decline of DPT-1 immunization coverage against DPT-3 immunization coverage or against Measles/Rubella (MR) immunization. The immunization dropout rate according to WHO provisions is a maximum 5%. A high dropout rate will reduce vaccine effectiveness, because the immunity provided is not maximized.

The Indonesian Health Profile data shows that the amount of routine immunization dropout calculated from the difference between DPT/HB/HiB-1 coverage and DPT/HB/HiB-3 coverage tends to increase from 1.8% (2019) to 3.2% (2020) and 6.9% (2021). Meanwhile, dropout rate from the difference between DPT/HB/HiB-1 coverage and Measles/Rubella (MR) coverage fluctuates from 3.6% (2019), 4.1% (2020) and -1.6% (2021). The dropout status of -1.6% indicates more children received the MR vaccine than children who received DPT/HB/HiB-1 vaccine.

This condition shows an indicator of incomplete child immunization.

According to WHO data in 2021, only 81% of the world's children (105 million) received 3 doses of DPT vaccine, while HiB-3 (third dose) vaccine coverage was about 71% with the highest coverage in the Eastern Mediterranean region and Southeast Asia region (82%) and the lowest in the Western Pacific region (29%). Third-dose Hepatitis B vaccine coverage was 80%, and global coverage of Hepatitis-1 given to newborns (within 24 hours) was 42%, highest in the Western Pacific region (78%) and lowest in the African region (17%). The WHO report also shows that 18.2 million children did not receive DPT vaccine at all due to lack of access to immunization facilities, and 6.8 million children received only partial vaccination. Of the total 25 million children, more than 60% live in 10 countries.
naming Angola, Brazil, Congo, Ethiopia, India, Indonesia, Myanmar, Nigeria, Pakistan, and the Philippines (21). The data shows that the potential for immunization dropout is very large in many countries, including Indonesia. A study in Nepal showed an overall dropout rate between the first and third doses of pentavalent vaccine of 28.35% (1). Regarding dropout of immunization, 4% of children received BCG and did not receive DPT-1, 14% of children received DPT-1 and did not receive DPT-3. Also, 9% of children received DPT-3 and did not receive the follow-up Measles vaccine (22).

Various studies have shown a correlation between immunization dropout status and greater risk of outbreaks. A study in Cameroon showed a specific immunization dropout (DPT/HB/HiB1-3) in Foumban district of West Cameroon of 14.1% and a dropout of initial immunization at birth (BCG vaccine) with the last immunization (Measles/Rubella vaccine) of 50%. In addition to reports of low immunization coverage, there is also a high incidence of immunization-preventable diseases in the district. Children's immunization coverage decreases as they get older (19). Venezuela also experienced rapid outbreaks of measles and diphtheria as a result of the economic crisis. The national measles immunization coverage was only 52% and the decline in coverage also occurred in all municipalities in the Venezuelan Amazon region with a range of 5.2%-66.6%. Diphtheria immunization coverage (3rd DPT) also did not reach 50% (23). A measles outbreak also occurred in Kerala India in 2013 and data showed that only 71.6% of children were vaccinated against measles with a miss-opportunity vaccination rate of 15.8% (24). More than 9000 Californians became ill with Pertussis in 2012 with 10 children dying, and DTaP vaccination coverage in some areas has also fallen in recent years. It is evident that the decline in pertussis vaccination rates and the dramatic increase in people suffering or dying from the disease is also occurring in many states and communities (25).

The implication of high immunization dropout in Indonesia can be seen from incidence of diseases that can be prevented by immunization and outbreaks that occur in many regions. In 2021 there were 11 cases of Tetanus Neonatorum, up from 4 cases (2021), which was also followed by increasing of Case Fatality Rate (CFR) to 82% (9 cases died) from 50% for CFR in 2020. Of the 11 cases found, it was evident that 9 people (82%) were not previously immunized. Although measles cases decreased to 2,931 cases (2021) from 3,434 cases (2020), it spread to many other provinces. Reported suspected cases of measles increased to 3,341 cases in 2022 which occurred in 31 out of 34 provinces in Indonesia. Diphtheria cases also spread in almost all provinces with 235 cases (2021) and 25 deaths (CFR 11%). Although the number of cases decreased, the CFR increased from 5.02% (2020). A high CFR rate indicates a greater risk of death. Incomplete immunization is a factor that worsens the condition because children do not have the immunity and immune system needed. Despite meeting the dropout target of <5%, the immunization dropout rate of Central Java province appears to fluctuate for the difference in coverage of DPT/HB/HiB-1 with Measles (MR), namely 1.2% (2019), 1.0% (2020) and 4.0% (2022). The DPT/HB/HiB-1 to DPT/HB/HiB-3 dropout rate increased significantly from 0.4% (2019) to 0.9% (2020) and 12.2% (2021). Booster immunization coverage in Central Java province in 2021 is among the top 5 (five) lowest, namely 34.5% (MR-2) and 34.3% (DPT/HB/HiB-4). The booster coverage is much lower than in 2020, which was 82.5% (MR-2) and 83.1% (DPT/HB/HiB-4). These results illustrate the high immunization dropout rate, especially for the DPT/HB/HiB vaccine. Central Java Province is also the province with the most measles suspected cases in 2021 with 493 cases. Until now, it is not known what factors influence the status of immunization dropout in Central Java. This study aims to analyze the correlation between structural and behavioral factors on the immunization dropout status of children aged 12-23 months.
2. Method

This is a quantitative study with cross-sectional approach. The study's location is in Central Java province as the third most populous province in Indonesia which has a high immunization dropout status, as well as the province with the most measles suspected cases at 2021 with 493 cases. The study was conducted from 31 districts out of total 35 districts. The study's location was determined based on the distribution of Thematic KKN on Immunization by Universitas Diponegoro students at 2022. The independent variables were divided into two factors, namely structural factors including: regional characteristics (coastal or mountainous area), access barriers, number of children, family income and information sources, and behavioral factors including: knowledge, attitudes, perceptions of adverse events, perceptions of booster immunization and motivation. The dependent variable was the dropout status of child immunization measured by the completeness of DPT/HB/HiB-1 immunization until Measles/Rubella immunization. Children are declared immunization dropouts when they do not continue immunization according to the provisions and schedule after receiving the DPT/HB/HiB-1 vaccine. The population of study was all children aged 12-23 months in Central Java province with sample of 685 totally obtained using purposive sampling technique. The purposive criteria were based on the Public Health Center (PHC) with lowest complete basic immunization (CBI) coverage of the 31 locus districts, and each PHC determined 1 (one) village area with the lowest CBI status. Respondents were mothers or caregivers who lived with the child. Each village took 25 samples, but through the data screening process, only 685 samples were declared eligible for further analysis. Primary data were collected through interviews using questionnaire that met the validity and reliability test standards. Children's immunization status was observed using the MCH Book as a reference. Enumerators were students participating in Immunization Thematic KKN (fieldwork lecture) who lived in the 31 districts and had received adequate explanation regarding the use of research instruments (questionnaires and MCH Book observations), as well as an explanation of the process of selecting respondents using the accidental principle in the field. All data collected were analyzed descriptively with frequency distribution and Chi-Square test for statistical analysis because the data were categorical. This study has also met the ethical requirements through the issuance of a Certificate of Ethical Review from the Health Research Ethics Commission, Faculty of Public Health, Universitas Diponegoro Number: 361/EA/KEPK-FKM/2022.

3. Result and Discussion

Through observation using MCH Book reference, immunization of BCG and DPT/HB/HiB-1 coverage was highest (94.5%). Polio immunization (IPV) was the lowest (74.3%) followed by MR (84.1%). All coverage has not reached the target of >95% (see Table 1). The coverage of DPT/HB/HiB-3, Polio (OPV)-4 and Polio (IPV) immunizations given together to each baby at 4 months of age is still <90%. The dropout rate from DPT/HB/HiB-1 to DPT/HB/HiB-3 immunization was 6.2%, and from DPT/HB/HiB-1 to MR was 10.4%. The dropout rate is high because it exceeds provisions standard (<5%). There is a decreasing trend of immunization utilization as the age of the child increases. The older the child, the less complete the immunization status. Table 1 also shows that 420 children (61.3%) had complete basic immunization status (had received 11 types of antigens) and the rest were incomplete. Overall, 99 children (14.4%) had an immunization dropout history. Descriptive analysis using cross tabulation showed that proportion of children with dropout status was greater among those who lived in coastal areas, had many barriers with low family income, few sources of information, poor knowledge and attitude, poor perception, ...
of adverse events and perception of booster immunization, and also have low level of motivation. Statistical analysis conducted partially proved a significant relationship between family income, information sources, knowledge and perception of adverse events and perception of booster immunization with a significance value <0.05. The variables of area characteristics, access barriers, attitudes and motivation were not statistically proven to have an association with child immunization dropout status.

Table 1. Basic Immunization Coverage of Children and Dropout Status in Central Java Province

<table>
<thead>
<tr>
<th>Immunization type</th>
<th>Yes n (%)</th>
<th>Not n (%)</th>
<th>Dropout rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB</td>
<td>615 (89.8%)</td>
<td>70 (10.2%)</td>
<td></td>
</tr>
<tr>
<td>BCG</td>
<td>647 (94.5%)</td>
<td>38 (5.5%)</td>
<td></td>
</tr>
<tr>
<td>DPT/HB/HiB</td>
<td>647 (94.5%)</td>
<td>38 (5.5%)</td>
<td></td>
</tr>
<tr>
<td>Polio oral (OPV)</td>
<td>630 (92.0%)</td>
<td>635 (92.7%)</td>
<td></td>
</tr>
<tr>
<td>Polio injection (IPV)</td>
<td>509 (74.3%)</td>
<td>176 (25.7%)</td>
<td></td>
</tr>
<tr>
<td>measles/rubella</td>
<td>576 (84.1%)</td>
<td>109 (15.9%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Correlation Analysis of Independent Variables on Dropout Status of Childhood Basic Immunization in Central Java Province

<table>
<thead>
<tr>
<th>Variables</th>
<th>Dropout n (%)</th>
<th>Not Dropout n (%)</th>
<th>Σ</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional characteristic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal area</td>
<td>56 (15.4)</td>
<td>43 (13.4)</td>
<td>308</td>
<td>0.529</td>
</tr>
<tr>
<td>Mountainous area</td>
<td>308 (84.6)</td>
<td>278 (86.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access barriers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Many</td>
<td>66 (15.2)</td>
<td>33 (13.2)</td>
<td>369</td>
<td>0.553</td>
</tr>
<tr>
<td>Few</td>
<td>287 (84.8)</td>
<td>217 (86.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large ((≥3 child))</td>
<td>23 (14.7)</td>
<td>76 (14.4)</td>
<td>133</td>
<td>0.906</td>
</tr>
<tr>
<td>Small (1-2 child)</td>
<td>453 (85.6)</td>
<td>453 (85.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (&lt; Rp. 2.000.000)</td>
<td>51 (19.8)</td>
<td>48 (11.2)</td>
<td>206</td>
<td>0.002*</td>
</tr>
<tr>
<td>High (≥ Rp. 2.000.000)</td>
<td>206 (80.2)</td>
<td>380 (88.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Few</td>
<td>28 (20.3)</td>
<td>71 (13.0)</td>
<td>110</td>
<td>0.041*</td>
</tr>
<tr>
<td>Many</td>
<td>287 (79.7)</td>
<td>476 (87.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>43 (19.9)</td>
<td>56 (11.9)</td>
<td>173</td>
<td>0.008*</td>
</tr>
<tr>
<td>Good</td>
<td>287 (80.1)</td>
<td>413 (88.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>49 (14.6)</td>
<td>50 (14.3)</td>
<td>286</td>
<td>0.985</td>
</tr>
<tr>
<td>Good</td>
<td>287 (85.4)</td>
<td>300 (85.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.1. The Dropout Rate of Childhood Immunization

The large dropout rate indicates an obstacle in utilizing advanced immunization services and WHO requires a maximum immunization dropout rate of only 5%. The results showed that there was a difference coverage of DPT/HB/HiB-1 to DPT/HB/HiB-3 of 6.2% and with Measles/Rubella (MR) immunization of 10.4%. This figure exceeds the WHO standard (>5%). According to WHO and UNICEF estimates, global DPT immunization coverage has stagnated during year 2010-2019 with a range of 89%-90% for DPT-1 and 84%-86% for DPT-3. In year 2019-2020, global coverage decreased from 90%-87% for DPT-1 and 86%-83% for DPT-3 (2).

A high dropout status indicates an obstacle in the quality assurance of immunization program. Incomplete immunization status makes children vulnerable to serious infections and risks of morbidity, even mortality, as well as having implications for potential developmental disorders, including malnutrition and stunting disorders. A study by Simbolon et al showed that apart from low birth weight, the number of children was >3 and parental care, completeness of immunization was also a protective factor against stunting in children under five (<5 years). The prevalence of stunting in children with incomplete immunization is 41.1% higher than children with complete immunization (32.5%) (27). A study in Ethiopia showed that children who were not immunized had 2.5 times more at risk of being underweight and the prevalence of stunting was 3.8 times greater when they were in households with large extended families (28). Study in Pakistan also prove that immunization completeness is significantly related to malnutrition and underweight for children (29).

Completeness of immunizations and infectious diseases history among children in Timor Leste have associated with the risk of stunting experienced (30). High dropout cases also occur in many countries in the world with various contributing factors. A study in Ghana reported dropout rate of BCG immunization to measles of 31.5%. The predictor factors for dropout immunization incidence are marital status, religion (faith), gender and immunization card ownership (3). Study in Kenya also show that having caregivers with lower secondary education, living far from health facilities (>5 km) was correlated with a greater chance for dropping out of immunization, whereas parents who regularly receive text messages containing information about immunization less chance of experiencing dropout immunization (8). As many as 31% of children in Afghanistan experience immunization dropouts, with the reason like vaccination site is far away, they feel they don't need vaccinations, they don't trust vaccines, their mothers are too busy and afraid of vaccination side effects (6). The dropout rate of the first and third doses of pentavalent vaccination in Nepal is 28.35%, where the maternal literacy rate is directly related to infant immunization visits (1). Factors related to health services, distance, access, regional characteristic, and family socioeconomic status affect the dropout status of child immunization (31). Lack of awareness, difficult access, complicated schedules and fear of side effects or adverse events after immunization (real or perceived) make parents hesitate receiving vaccines and they will tend to miss it. The high immunization dropout is...
Many factors influence parents' reluctance to provide further immunizations to their children. This is very logical because child parenting is parental responsibility who make decisions on behalf of their children. According to several studies, the DPT/HB/HiB or pentavalent vaccination is the most painful vaccination because for completeness it must be given 3 times injections in the thigh muscles with a month interval after the previous administration. The side effects are also relatively fast, only a few hours after the injection with a swollen reaction around the injection area and fever for about 2-3 days. This condition is certainly very worrying and inconvenient for parents, especially those who work because it will interfere with their work when their children are constantly crying and fussing. Anxiety can also be caused by fear of needles which creates feelings of pain because vaccination is indeed a very painful medical procedure for children which can cause non-compliance with immunization, and even can injure them. The painful experience when first received the vaccine injection caused a different reaction to get the next immunization. The decision to immunize is influenced by social factors, including personal experience, family history, opinions of friends or peers which will determine the decision whether a child is immunized or not. Negative experiences can raise doubts about vaccine effectiveness, so that greater support is needed for parents who have bad experiences so that they can reduce their negative attitude, hesitate and refusal of immunization.

3.2. Correlation between Structural Factors and Childhood Immunization

The structural dimension of this study includes variables of regional characteristics, access barriers, number of children, family income, and information sources. Statistically proven that regional characteristics, access barriers and number of children were not associated with immunization dropout status. This result is not in line with study of Allan et al in Kenya which proved that children born and living in coastal areas had a 74% higher chance of complete immunization, while those living in urban areas had a 26% lower chance of complete immunization than those living in rural areas, also the number of children in the family had a 37% lower chance of complete immunization. A study of Mugada et al proved the correlation of regional characteristics with maternal knowledge and education. The results of this study also not in line with Thapa et al study which proves that health services, access distance, regional characteristics, living conditions and family socioeconomic status affect the status of children's dropout in immunization. The logical reason that can explain this is the fact that compliance and utilization of basic immunization are more influenced by family socioeconomic factors, such as maternal education, knowledge, employment status, living conditions and wealth index.

Family income statistically proven to correlate with child immunization dropout status. The higher income indicates the better socioeconomic status of family which is expected to influence their behavior for complete child immunization compliance. Economically, income levels affect the family's purchasing power in fulfilling life needs, including the ability to buy health services. This result was in line with study of Tauil et al that the number of children born, low maternal education and socioeconomic status were variables that contribute most to the delay or incomplete immunization status of children. Children born into wealthy households in Kenya are 43-57 times more likely to be fully immunized than those born into poor families. Good socioeconomic status makes it easier to get a lot of information from trusted sources, access adequate services and various other structural supports.

There is correlation between information sources and immunization dropout status. The more sources of information owned can increase parents' knowledge, understanding and positive perceptions about immunization. Thus, parents will try to get services, complete, and
comply with the immunization schedule for their children. Sources of information about immunization were generally obtained from Primary Health Center or PHC (including health workers), village midwives and health cadres, although pediatricians also play a significant role as information sources. More correct information about immunization can reduce parent hesitation and distrust of vaccines and immunization, while increasing compliance. Pro-vaccination information sources from midwives, nurses or other health workers have the greatest influence on immunization compliance. Apart from health workers, other sources of information include electronic media, mass media, books, and literature. Information can be obtained from many parties, both verbal and non-verbal, using various media, including social media. Access to information is a prerequisite for increasing immunization knowledge, attitudes, and practices. Children whose parents do not have adequate access to information media experience more missed opportunities than parents with good access to information. Several studies also prove that there are many rejections of the Measles/MR vaccine which are generally related to information gaps.

Utilizing advances communication and information technology using internet networks and social media can be a means as well as a relevant source of information for parents, because both can be combined well and can support each other. The use of social media has been proven effective as an intervention tool that can help parents make decisions related to immunization, so the information material provided must be able to explain the benefits and risks of immunization, clarity of information sources, ease of access to information searches, and attractive visual display of media so that it can satisfy parents. Advances in communication technology have implications for the ease with which information can be obtained, both positive and negative information, so the ability to filter correct information is a key factor that must be considered. Differences in psychological cognitive factors in everyone often lead to biases in the information process that cause negative responses and attitudes towards immunization. According to Browne et al, the delivery of correct information about immunization is not only through empirical evidence, but also using communicative features and narratives related to the expected natural conditions. Efforts to build public trust about immunization must not only be evidence-based, but also tailored to the needs, intentions, expectations, so-socio-cultural values and various other community preferences, as it was believed that skepticism towards immunization was the result of cultural and psychological orientations.

3.3. Correlation between Behavioral Factors and Childhood Immunization

The results prove that behavioral dimension variables that correlate with immunization dropout status are knowledge, perception of adverse events and perception of booster immunization. Attitude and motivation variables are not proven to be related. The attitude and perception can have different meanings. Attitudes are behavioral preferences which, although still closed, are relatively influenced by external factors such as values, norms, culture, and other social pressures. Perception is a closed behavior that is only influenced by the internal individual concerned. This may explain why attitudes are not associated with immunization compliance, including immunization dropout. Poor maternal knowledge has 20.9 times risk of not being compliant in complete basic immunization compared to mothers with good knowledge. Low maternal knowledge about vaccination has a 6.73 times greater chance of experiencing missed-opportunity vaccinations than mothers with high knowledge. This result is in line with the study in Iraq which proves that parental knowledge and practices are positively related to children's immunization status. There is a very strong relationship between parental knowledge and willingness to immunize their children, especially knowledge of essential vaccines such as pentavalent, pneumococcal (PCV) and inactivated polio (IPV) in Pakistan.
The decision to vaccinate children are influenced by parents' knowledge and practice regarding immunization, so that constraints related to misinformation about vaccines, side effects, co-morbidities, diseases that can be prevented by immunization and post-vaccination care influence every decision. Parents' literacy level was directly related to children's immunization visits, where children of parents with low literacy did not continue the third dose of pentavalent vaccination compared to parents who are well literate (1). The lack of knowledge and perceptions of the benefits of immunization were related to misleading information received from the internet and the strong anti-vaccine movement could influence parents' decisions not to immunize their children (12).

Increasing knowledge can be done through formal education and strengthening literacy about immunization from various available information sources. Studies in Greece prove that high knowledge about vaccination is related to a high level of mother's education (15). This result is also in line with a study in Kenya which showed that educated mothers had a 54% higher chance of complete immunization than those with low education (34). Children with mothers in low education (not in school) were 2-3 times more likely not to receive DPT vaccine and 1.5 times more likely to experience DPT-1 to DPT-3 vaccine dropout when compared to children who her mother was highly educated (20). Therefore it is necessary to develop a planned education program by considering educational level of parents when planning it, especially for groups of parents who have lower education (47).

Referring to Mugada et al opinion, efforts to increase knowledge must be adjusted to the education level and characteristics of cultural environment, including how developing vaccination promotions through educational programs and campaigns aimed primarily at those with low education, as well as through strengthening intense communication between health workers and parents who delay or who have not decided on vaccination for their child (15). Socialization and counseling can be carried out by health workers to mothers and other family members using a variety of interesting information media or other assistive media so that they can generate interest to better understand the more benefits of immunization on the health status of their children in the future.

Adverse event following immunization (AEFI) is any health problem that occurs after vaccination and is considered adverse, either directly related to the vaccine or a coincidental event that occurs after vaccination. Many studies prove that the fear of adverse events makes parents reluctant or even refuse immunization. Excessive worry leads to reluctance receiving the recommended vaccine, resulting in postponement or a repeat visit (14). The response to adverse events is usually associated with clinical risks that arise after vaccination such as fever, swelling and reddish rash in the injection area, dizziness, nausea, vomiting and so on. Adverse events experienced by children after immunization increase parents' hesitancy to vaccinate in the future, even though most adverse reactions are expected sequelae or "effects" to build immunity and are low in severity (49). Despite several studies proving that vaccines are safe and the association of vaccination with serious adverse events is very low, concerns about vaccination have not decreased, and in fact tend to increase as the number and types of new vaccines scheduled increase (26). Admittedly, vaccination has been the subject of many false myths, such as the association of the Hepatitis B vaccine with multiple sclerosis, or the MMR vaccine causing autism, and so on. Fear of autism and other side effects is frequently reported "vaccine safety" concern for parents (12).

Reactions to adverse events are inseparable from vaccine choice and conditions. Having children encourages all parents to learn about vaccine choices. Parents who hesitate and refuse vaccines are generally due to a sense of distrust, either of the vaccine itself, of the pharmaceutical company that makes it or even of the agency/institution that oversees vaccine safety. This distrust triggers parents' fears regarding the risks of vaccination and its side effects because it is considered to hurt and or harm their children (32). Elran et al. explained that the main concern of parents is not actually the safety of the vaccine, but rather,
4. Conclusion

Basic immunization coverage for all antigen types has not reached the target of 95%. Only 61.3% of children have complete immunization status. Coverage of children with a history of missed immunizations was 14.4%. The dropout rate from DPT/HB/HiB-1 to DPT/HB/HiB-3 is 6.2% and to MR is 10.4%. There is a tendency for decreasing immunization utilization as the age of the child increases. A structural factor that correlated with immunization dropout status were family income and source of information. The behavioral factors that correlate was knowledge, perception of adverse event and perception of booster immunization. Parental anxiety and concern about immunization is more related to vaccine safety and the side effects risk that occur after immunization. Immunization dropout occurs due to a combination of various structural and behavioral causal factors.

Efforts to improve parents' knowledge and positive perceptions of immunization must be carried out through comprehensive IEC (information, education, communication) by involving all stakeholders in the community to actively provide correct information about vaccines and vaccination through socialization, counseling, or information dissemination models (personal and communal), using attractive communication media, including utilizing digital-based technology (internet).
Digital-based technology (internet). Adverse surveillance activities must still be carried out responsibly and adequately to anticipate any reports of adverse that occur. Advocacy skills on immunization programs and policies to decision makers must be improved too.

References


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