Media Gizi Kesmas
p-ISSN 2301-7392, e-ISSN 2745-8598
10.20473/mgk.v12i2.2023.847-853

ORIGINAL ARTICLE **Open Access**

Faktor Risiko Kejadian Difteri: Cakupan Imunisasi DPT-HB-Hib 3 dan Ketersediaan Posyandu

Diphtheria's Risk Factors: DPT-HB-Hib 3 Immunization and The Availability of Integrated Healthcare Center

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Submitted: 28-03-2023
Accepted: 26-06-2023
Published: 30-11-2023

Citation:
Ashila, N. R., & Hendrati, L. Y. (2023). Diphtheria's Risk Factors: DPT-HB-Hib 3 Immunization and The Availability of Integrated Healthcare Center. *Media Gizi Kesmas*, 12(2), 847–853. https://doi.org/10.20473/mgk.v12i2.2023.847-853

ABSTRAK

Latar Belakang: *Difteri merupakan penyakit menular yang menyerang tenggorokan dan dapat menular melalui droplet, kontak langsung dengan sekresi saluran napas penderita atau dari penderita karieer. Salah satu faktor risiko difteri adalah rendahnya cakupan imunisasi DPT-HB-Hib 3 dan ketersediaan posyandu aktif.*
Tujuan: *Mendeskripsikan persebaran difteri di Jawa Timur dan menganalisis hubungan antara difteri dan faktor risikonya.*
Metode: *Penelitian ini mengenai evaluasi kejadian difteri di 38 kabupaten atau kota di Jawa Timur. Penelitian ini menggunakan uji korelasi Pearson untuk menganalisis data sekunder dari Profil Kesehatan Jawa Timur 2019-2021. Pengolahan data menggunakan Health Mapper dan SPSS*
Hasil: *Ada hubungan antara cakupan imunisasi DPT-HB-Hib 3 dengan kejadian difteri pada tahun 2019 (2019 (0,53), 2020 (0,27), dan 2021 (0,34). Kemudian ada hubungan antara ketersediaan posyandu dengan kejadian difteri pada tahun 2019 (0,34), 2020 (0,25), dan 2021 (0,29).*
Kesimpulan: *Cakupan imunisasi DPT-HB-Hib 3 dan ketersediaan posyandu aktif berhubungan dengan kejadian difteri di Jawa Timur pada tahun 2019, namun tidak pada tahun 2020 dan 2021.*

Kata kunci: *Difteri, Epidemiologi, Imunisasi DPT-HB-HIB 3, Jawa Timur, Posyandu,*

ABSTRACT

Background: Diphtheria is an infectious disease that attacks the throat and can be transmitted through droplets, direct contact with the secretions of the patient's respiratory tract or from carriers. The risk factors for diphtheria are the low coverage of DPT-HB-Hib 3 immunization and the availability of integrated healthcare center.
Objectives: To describe the distribution of diphtheria in East Java and analyze the relationship between diphtheria and its risk factors.
Methods: This research evaluated the incidence of diphtheria in 38 districts or cities in East Java. The Pearson correlation test was used to analyze secondary data from the East Java Health Profile 2019-2021. The data was processed using Health Mapper and SPSS.
Results: There were a correlation between DPT-HB-Hib 3 immunization and diphtheria incidence in 2019 (0.53), 2020 (0.27), and 2021 (0.34). Then there were a correlation between the availability of integrated healthcare center and diptheria incidence in 2019 (0.34), 2020 (0.25), and 2021 (0.29).
Conclusions: The coverage of DPT-HB-Hib 3 immunization and the availability of integrated healthcare center were related to diphtheria incidence in East Java in 2019 but not in 2020 and 2021.

Keywords: Diphtheria, DPT-HB-HIB 3 Immunization, East Java, Epidemiology, Integrated Healthcare Center

INTRODUCTION

Diphtheria is a disease caused by the bacterium *Corynebacterium diphtheria.* Symptoms of this disease include sore throat, fever, and pseudomembranes of the tonsils, pharynx, and nasal cavity. If not appropriately treated, diphtheria will cause complications such as airway obstruction, myocarditis, palate muscle paralysis, and pneumonia. Different transmission can be through droplets, direct contact with the patient's respiratory tract or from carriers. *Corynebacterium diphtheria* can survive in the air for six months, while the incubation period for this disease is 2-6 days (Hartoyo, 2018).

Diphtheria is a global health problem. The South-East Asia Region (SEARO) is the WHO division region with the highest incidence of diphtheria each year (Tarigan and Manik, 2021). Indonesia is the second highest number of diphtheria cases with 3,203 diptheria cases after India with 18,350 cases (Hamidah, Defrin and Rachmawati, 2022). In 2019 in Indonesia, there were 944 cases of diphtheria spread across 25 provinces, while until May 2020, there were 129 suspected cases of diphtheria spread across 16 provinces. From December 2019–May 2020, the most diphtheria cases were reported in East Java, West Java, DKI Jakarta, East Kalimantan, and Aceh (Kemenkes RI, 2020). In East Java, diphtheria cases have decreased every year. In 2019, 358 cases were recorded (Dinkes Jatim, 2019). In 2020, it dropped to 94 cases (Dinkes Jatim, 2020). While in 2021, it again reduced to 45 cases (Dinkes Jatim, 2021).

Diphtheria is a disease that can be prevented by immunization. Diseases that can be prevented with immunization are expected to be eradicated in Indonesia by immunization programs aimed at increasing the body's immunity against certain diseases. Immunization plays a role in achieving individual and environmental protection which is called herd immunity (Lusita, Syahrul and Ponconugroho, 2021). However, the low coverage of DPT-HB-Hib 3 immunization and the availability of integrated healthcare center are the risk factors for diphtheria. Following the policy of the Ministry of Health of the Republic of Indonesia, diphtheria immunization is carried out in two stages. The first stage is three times (basic immunization when the child is two months, three months, and four months), while the second stage is given when the child is 18 months old, which aims to maintain the child's antibodies. Therefore, if the child does not receive the DPT-HB-Hib 3 immunization, they will be at risk of contracting diphtheria (Rahma, Suryoputro and Fatmasari, 2019) .

Integrated healthcare center is a comprehensive and integrated health service facility for infants and mothers so it was managed from, for, and with the community in carrying out health development, empowering the community, and making it easier for them to access health services. Five priority programs by integrated healthcare center are maternal and child health, family planning, nutrition improvement, techniques, and diarrhea control. Therefore, the availability of integrated healthcare center is crucial in the implementation of DPT-HB-Hib 3. The low availability of integrated healthcare center in the regions will also result in low coverage of the use of DPT-HB-Hib 3 (Theresia and Rikiy, 2020). Therefore, this study aimed to describe the distribution of diphtheria in East Java and analyze the relationship between diphtheria and its risk factors like DPT-HB-Hib 3 immunization and the availability of integrated healthcare center.

METHOD

This research was a population correlation study conducted in 38 districts or cities in East Java. The incidence of diphtheria was the dependent variable, while the DPT-HB-hib 3 immunization coverage and the availability of integrated healthcare center were the independent variables. Secondary data on the incidence of diphtheria, DPT-HB-Hib 3 immunization coverage, and the availability of integrated healthcare center in 38 cities or districts were accessed in the Health Profile Book of East Java Province for 2019 (Dinkes Jatim, 2019), 2020 (Dinkes Jatim, 2020), and 2021(Dinkes Jatim, 2021). Secondary data collection has obtained research ethics permit with ethical number 966/HRECC.FODM/XII/2022 at Universitas Airlangga Faculty of Dental Medicine Health Research Ethical Clearance Commision. Descriptive data were analyzed using the health mapper version 4.3. Health mapper is an information and mapping application designed and developed by WHO'S GIS *(World Health Organization's Geographic Information System)* Unit for public health. Health mapper depicts infectious disease surveillance at national and global levels. Variable data is presented in a regional distribution map.

To analyze the correlation between the incidence of diphtheria with DPT-HB-Hib 3 immunization coverage and the availability of integrated healthcare center in every district or city in East Java, the Pearson correlation test was used because the research used ratio data. However previously the Kolmogorov-Smirnov was conducted normality data test and the result was stated that all

data were normally distributed because the error had a significant value was more than 0.05 (Table 1).

Table 1. Results of Normality Data Test for Diphtheria Cases, DPT-HB-Hib 3 Immunization Coverage and The Availability of Integrated Healthcare Center in 2019-2021

Year	Variable	N	Asymp. Sig (2-tailed)
2019	Diptheria	38	0.19
	DPT-HB-Hib 3 Immunization	38	0.45
	Integrated Healthcare Center	38	0.68
2020	Diptheria	38	0.06
	DPT-HB-Hib 3 Immunization	38	0.56
	Integrated Healthcare Center	38	0.70
2021	Diptheria	38	0.07
	DPT-HB-Hib 3 Immunization	38	0.41
	Integrated Healthcare Center	38	0.72

RESULT AND DISCUSSION

Correlation between DPT-HB-Hib 3 immunization and the availability of integrated healthcare center with diptheria incidence in 2019-2021 used the Pearson correlation test (Table 2).

Based on Roflin and Zulvia, (2021) if sig (2-tailed) < 0,05 it means correlation while if sig (2-tailed) > 0,05 it means no correlation. Coefficient correlation was classified into 0-0.25 is very weak correlation, 0.26-0.5 is sufficient correlation, 0.51-0.75 is strong correlation, 0.76-0.99 is very strong correlation and 1 is perfect correlation.

Distribution and Correlation Between DPT-HB-HiB3 Immunization Coverage with Diphtheria Incidence in 2019-2021

In 2019, there were 358 diphtheria cases with 559,134 DPT-HB-Hib 3 immunization coverage. This number decreased in 2020 and 2021. In 2020 there were 94 diphtheria cases with 534,309 DPT-HB-Hib 3 immunization coverage, while in 2021, there were 45 Diphtheria cases and 448,962 DPT-HB-Hib 3 immunization Coverage. Out of 38 districts or cities in East Java, four districts had increased diphtheria cases and decreased DPT-HB-Hib 3 immunization coverage, namely Tulungagung Regency, Magetan Regency, Bojonegoro Regency, and Sampang Regency as shown in Figure 1.

Based on Figure 1, Tulungagung Regency had 2 diphtheria cases in 2019 and 2 cases in 2021. The coverage of DPT-HB-Hib 3 immunization in Tulungagung Regency had decreased 3,127 coverage from 2019-2021. Magetan Regency had 4 cases in 2019 and 2 cases in 2021. The coverage of DPT-HB-Hib 3 immunization in Magetan Regency also had decreased 3,532 coverage from 2019-2021. Bojonegoro Regency had cases every year, 9 cases in 2019, 1 case in 2020, and 2 cases in 2021. The coverage of DPT-HB-Hib 3 immunization also had decreased 9,320 coverage from 2019-2021. Lastly, Sampang Regency had 2 cases in 2019, 1 case in 2020 and 2 cases in 2021. Sampang Regency also had decreased DPT-HB-Hib 3 immunization coverage like 3,816 coverage. From the results of the pearson correlation test on the coverage of DPT-HB-Hib 3 immunization with diphtheria cases (Table 2), it was a correlation coefficient of 0.53 in 2019, 0.27 in 2020 and 0.34 in 2021. Therefore, it can be concluded that the lower DPT-H-Hib 3 immunization coverage in an area makes the higher the diphtheria.

The distribution of diphtheria in East Java in 2019-2021 was statistically analyzed for its correlation with the expansion coverage of DPT-HB-Hib 3. In 2019-2021 it showed a negative correlation, meaning that the higher the diphtheria cases, the lower the coverage of DPT- HB-Hib 3 in East Java. According to Pratama, Tandirogang and Yadi, (2019) research, the Ministry of Health states that diphtheria cases are endemic due to the immunity gap or limiting population immunity due to an accumulation of people who do not get DPT-

Table 2. Pearson Correlation Test between DPT-HB-HiB3 Immunization Coverage and The Availability Integrated Healthcare Center with Diphtheria Incidence in 2019-2021

Year	Dependent Variable	Independent Variables	Sig (2-tailed)	Correlation Coefficient	
				r	Additional Information
2019	Diphtheria	DPT-HB-Hib 3 Immunization	0.01	0.53	Significant-Strong
		The Availability of Integrated Healthcare Center	0.03	0.34	Significant-Sufficient
2020	Diphtheria	DPT-HB-Hib 3 Immunization	0.09	0.27	Insignificant
		The Availability of Integrated Healthcare Center	0.13	0.25	Insignificant
2021	Diphtheria	DPT-HB-Hib 3 Immunization	0.03	0.34	Significant-Sufficient
		The Availability of Integrated Healthcare Center	0.07	0.29	Insignificant

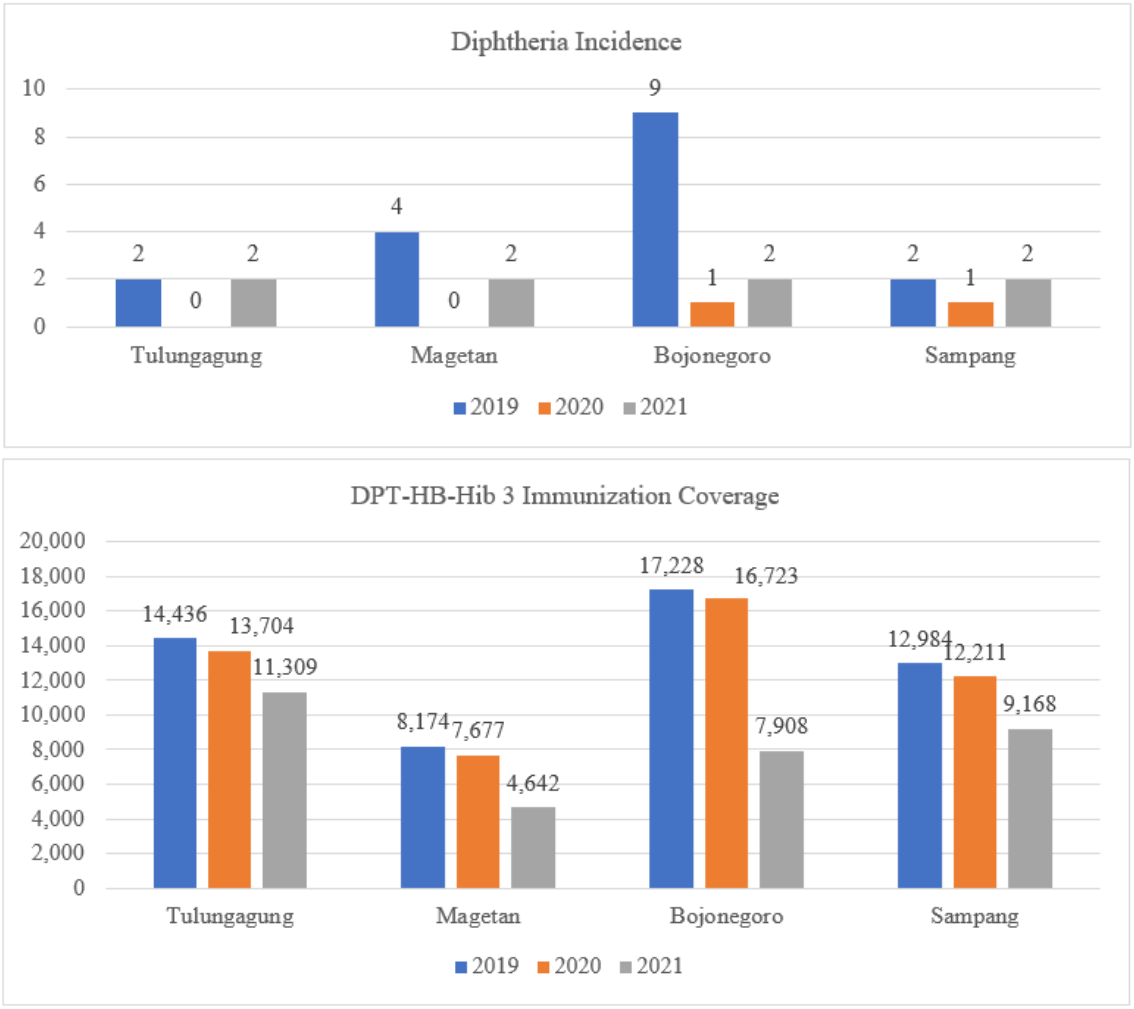

Figure 1. Graph of Diphtheria Incidence and DPT-HB-Hib 3 Immunization Coverage

HB-Hib 3 immunization. The immunization DPT-HB-Hib 3 program aims to prevent the transmission of diphtheria in children (Lusita, Syahrul and Ponconugroho, 2021). Based on Riskesdas data, immunization coverage for HB-0 of 79,1%, BCG of 87,6%, DPT-HB-Hib 3 of 75,6%, polio 4 of 77% and measles of 82,1%. In the Riskesdas data, the lowest immunization coverage is DPT-HB-Hib 3. According to the Decree of the Minister of Health of the Republic of Indonesia Number 1611/MENKES/SK/XI/2005, the immunization program is one time for HB-0 immunization, one time for BCG immunization, three times for DPT-HB-Hib 3 immunization, four times for polio immunization and once measles immunization (Rahmawati *et al.*, 2018). The priority for all countries is to achieve 90% of child immunization coverage by giving three doses of DPT vaccine to children under 1 year of age. Diphtheria in developing countries is endemic, giving three doses of this therapy can prevent diphtheria epidemics (Fauziah, Notoadmodjo and Masyitah, 2018).

DPT-HB-Hib 3 immunization is an immunization to increase active immunity at the same time against diphtheria, pertussis and tetanus. DPT is an immunization that contains diphtheria germ poison which has had its toxic properties removed but can still stimulate the formation of antibodies (toxoids) (Salmastuti, 2022). DPT-HB-Hib 3 immunization in children is given in two stages. The first stage is given three times during basic immunization, and the second stage is at the vulnerable age of 18-24 months to maintain and increase antibodies in children. Children with complete immunization status havefive times less chance of contracting diphtheria compared to those whose immunization status is incomplete (Rofiasari and Pratiwi, 2020) . Research in Saudi Arabia (2017) explains that incomplete immunization status will result in severe diphtheria and death (Mohammed, Redwan and Almehdar, 2017). Based on Saputra, (2018) research, children who didn't get DPT-HB-Hib 3 immunization will be more susceptible to diphtheria. In one family, if there is only one sufferer, it can infect other family members because with just a splash of saliva, diphtheria can infect a number of people in front of it (Saputra, 2018). The reduced coverage of DPT-HB-Hib 3 immunization in East Java, in 2019-2021 is in line with Hamidah, Defrin and Rachmawati, (2022) research which

stated that low immunization coverage could cause children to get an infectious disease, namely diphtheria. DPT-HB-Hib 3 immunization can cause active immunity in the body and is expected to reduce the number of babies who die from diseases that can be prevented by immunization (Hamidah, Defrin and Rachmawati, 2022).

Distribution and Correlation Between the Availability of Integrated Healthcare Center with Diphtheria Incidence in 2019-2021

The availability of integrated healthcare center is essential in increasing the coverage of DPT-HB-Hib immunization as a step to prevent diphtheria. DPT-HB-Hib 3 immunization is carried out at level 1 health facilities, like integrated healthcare center. If there is no integrated healthcare center in an area, it will be difficult for the community to get health services, especially the DPT-HB-Hib 3 immunization. Out of 38 districts or cities in East Java, four districts had increased cases of diphtheria and decreased availability of integrated healthcare center as shown in Figure 2.

Tulungagung Regency had 2 diphtheria cases in 2019 and 2 cases in 2021. The availability of integrated healthcare center in Tulungagung Regency had decreased 17 integrated heathcare centers from 2019-2021. Magetan Regency had 4 cases in 2019 and 2 cases in 2021. The availability of integrated healthcare center in Magetan Regency had decreased 11 integrated heathcare centers in 2020 but increased 15 integrated healthcare centers in 2021. Bojonegoro Regency had cases every year, 9 cases in 2019, 1 case in 2020, and 2 cases in 2021. The availability of integrated healthcare center in Bojonegoro Regency had increased 29 integrated heathcare centers in 2020 and decreased 4 integrated healthcare centers in 2021. Lastly, Sampang Regency had 2 cases in 2019, 1 case in 2020 and 2 cases in 2021. The availability of integrated healthcare center in Sampang Regency had 224 integrated heathcare centers from 2019-2021. From the results of the Pearson correlation test on the availability of integrated health center with diphtheria cases (Table 2), it was a correlation

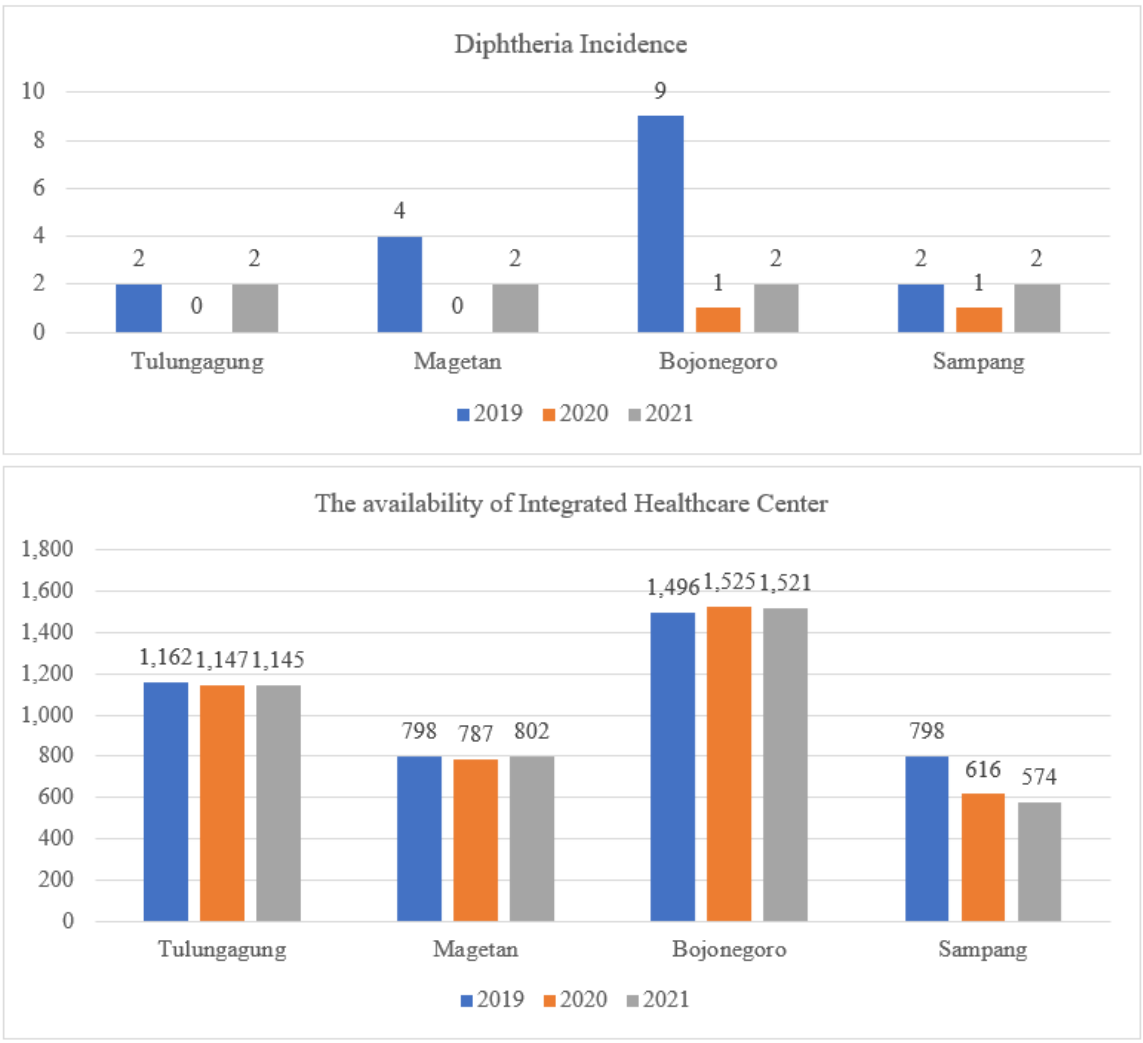

Figure 2. Graph of Diphtheria Incidence and The Availability of Integrated Healthcare Centers

coefficient of 0.34 in 2019, 0.25 in 2020 and 0.29 in 2021. Therefore, it can be concluded that the lower the availability of integrated healthcare center in an area makes the higher the diphtheria cases.

Based on the Ministry of Health of the Republic of Indonesia, in 2012, one of the health facilities that implemented DPT-HB-ib 3 in preventing diphtheria was integrated healthcare center. Integrated healthcare center is a form of community-based health efforts carried out by, from, and with the community to facilitate the community in obtaining health services, especially for infants, toddlers, mothers, and the elderly. Integrated healthcare center usually holds immunization at least once a month. Integrated healthcare center locations are in every village and in special places built by non-governmental organizations and easily accessible by the community (Hidayah, Sihotang and Lestari, 2018). The reduced availability of integrated healthcare center in East Java in all regions will increase diphtheria cases. This happened because it was stated in Putra, Wiyono and Adi, (2017) research that the absence of an integrated healthcare center close to the house would hinder the implementation of immunization and incomplete immunization. Then it was also stated that the distance from the availability of integrated healthcare center to the house risks the mother not bringing her baby because of consideration of other activities that must be done (Putra, Wiyono and Adi, 2017). The availability of an integrated healthcare center will provide health facilities to mothers from pregnancy to having children. In addition, mothers who bring their children to the integrated healthcare center will receive information about their child's growth and development, healthy food and vitamins for children, as well as basic techniques (Dahlia, Kartasurya and Arso, 2022). The use of integrated healthcare center can be felt because integrated healthcare center activities have become a routine tradition that is carried out every month such as giving vitamins and fitness, weighing, knowledge about health and fulfilling child nutrition (Isnaini, Aidha, Khairunnisa, *et al.*, 2023)

However, based on Septianingtyas, Soesetijo and Widi, (2018) research, many mothers do not know the benefits of integrated healthcare center and reluctant to come. In this regard, it is stated that integrated healthcare center cadres play a major role in basic immunization needs. Cadre support encourages mother's behavior to fulfill a complete immunization for their child. The absence of cadre support has a greater risk for mothers not fulfilling complete basic immunization for children compared to the support of integrated healthcare center cadres. This is in line with Isnaini, Aidha, Khairunnisa, *et al.*, (2023) research which states that immunization at integrated healthcare center to prevent diphtheria has not been maximized because there are still many parents who do not want their children to be immunized for the reason that they are afraid of having a fever after being immunized, immunization is illegal, and immunization doesn't have benefit. Therefore, it is better for health cadres to provide education about complete immunization so that the coverage of immunization increases (Isnaini, Aidha, Khairunnisa, *et al.*, 2023).

CONCLUSION

There was a significant relationship between DPT-HB-Hib 3 immunization coverage and the availability of integrated healthcare center with diphtheria incidence in East Java in 2019, but no in 2020, and 2021. Four areas had increase in diphtheria cases in East Java, namely Tulungagung Regency, Magetan Regency, Bojonegoro Regency and Sampang Regency. In the future, it is necessary to educate the public about the function of integrated healthcare center to access health services such as DPT-HB-Hib 3 immunization so that the availability of integrated healthcare center and the coverage of DPT-HB-Hib 3 in East Java increases and diphtheria cases in East Java can reduce to zero.

Acknowledgement

The authors would like to thank the East Java Health Office for providing data on the incidence of diphtheria, DPT-HB-Hib 3 immunization coverage, and the availability of integrated healthcare centers in 38 cities or districts in East Java in 2019-2021.

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