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The Impact of The Covid-19 Pandemic on The Declining Trend of Hb0, Bcg, And Polio 1 Immunization Coverage in Makassar City

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ABSTRACT

Immunization comes from the word "immune," meaning resistant to a disease, but not necessarily resistant to other diseases. Immunization is the deliberate act of administering an antigen or bacteria from a pathogen to stimulate the immune system and induce immunity, resulting in only mild symptoms when exposed to certain diseases. COVID-19 is a type of coronavirus. The COVID-19 pandemic, declared a pandemic by the WHO on March 11, 2020, has impacted health programs, particularly immunization services and surveillance of Vaccine-Preventable Diseases (VPDs). According to the Ministry of Health's 2020 data analysis, vaccination coverage decreased during the COVID-19 pandemic. This study aims to determine the impact of the COVID-19 pandemic on the declining trend of HB0, BCG, and Polio 1 immunization coverage in Makassar City. This research is an observational analytic study using a cross-sectional approach. The sample was taken using the total sampling method. Data analysis techniques were performed using the SPSS (Statistical Package for the Social Sciences) software. This study used data on the differences in coverage rates identified based on the periods of 2019, 2020, and 2021, and the division of health center areas in Makassar City. The conclusion of this study is that the COVID-19 pandemic has influenced the declining trend of HB0, BCG, and Polio 1 immunization coverage in Makassar City.

Keywords: ***COVID-19*****, Immunization,** ***HB0, BCG, Polio-1***

INTRODUCTION

Since the end of 2019, the world has been facing the COVID-19 pandemic, which has significantly impacted all aspects of life, especially healthcare services globally. COVID-19 is a type of coronavirus, specifically SARS-CoV-2. The virus originated in Wuhan, China, and was discovered in late December 2019. The disease caused by this virus is called coronavirus disease 2019 (COVID-19). It is a single-stranded positive-sense RNA virus that infects a person's respiratory tract. COVID-19 presents symptoms such as fever, cough, and difficulty breathing. (Hungerford, 2020, Yuliana, 2020)

The COVID-19 pandemic, declared a global pandemic by the WHO on March 11, 2020, has significantly impacted health programs, particularly immunization services and the surveillance of Vaccine-Preventable Diseases (VPDs). According to the Ministry of

Health's 2020 data analysis, vaccination coverage has declined during the COVID-19 pandemic. During this period, timely immunization is crucial to protect children from VPDs. Immunization services during the COVID-19 pandemic are carried out in accordance with local government policies, based on the epidemiological analysis of COVID-19 spread, routine vaccination rates, and the epidemiological situation of VPDs. (WHO, 2020, Kemenkes, 2020)

VPDs are mostly diseases that, if they infect someone, will require relatively high treatment and care costs, which will inevitably burden the state, society, and families. The costs associated with vaccination programs are significantly lower than the total potential costs incurred if the population were exposed to VPDs. Therefore, maintaining immunization services during the pandemic, following health protocols and local regulations, is essential to prevent outbreaks of other diseases that could add to the burden during this challenging time. (Halim, 2016, Felicia, 2020)

Immunization data from January to April 2020, compared to the same period in 2019, showed a decrease from 0.5% to 87%. Immunization coverage for babies born in January 2019: HB0, BCG, and Polio 1 (89.5%), and complete basic immunization (39.5%). Immunization coverage for babies born in January 2020: HB0 (96.7%), BCG (83.3%), Polio 1 (85.0%), and complete basic immunization (18.3%). This indicates that the basic immunization coverage for infants before the COVID-19 pandemic was 39.5%, and during the pandemic, it was 18.3%, showing a decline of 21.2%. (Dinkes Kota Makassar, 2020)

According to data from the Makassar City Health Office, 2019 was the year before the COVID-19 pandemic. In 2019, immunization coverage in all health centers reached the target. However, in 2020, as COVID-19 cases began to rise and the pandemic took hold, immunization coverage started to decline, causing several health centers to miss their targets. In 2021, COVID-19 cases surged dramatically, and immunization coverage dropped drastically, failing to meet targets in almost all health centers in Makassar City. Specifically, in 2021, immunization coverage decreased even further compared to 2020. This is evident in health centers such as Layang (72%), Barombong (76.14%), and Karuwisi (68.4%). (Sulsel Tanggap, 2022, Dinkes Kota Makassar, 2019)

The above description shows that the world, particularly Indonesia, is currently experiencing a health crisis that affects healthcare services, including immunization. The spread of COVID-19 cases varies by region, but overall, Indonesia has seen an increase in these cases. Therefore, a study will be conducted titled "The Impact of the COVID-19

Pandemic on the Declining Trend of HB0, BCG, and Polio 1 Immunization Coverage in Makassar City."

MATERIALS AND METHODS

The research design used in this observational analytic study is directed towards describing a state and situation. The study aims to investigate the impact of the COVID-19 pandemic on the declining trend of HB0, BCG, and Polio 1 immunization coverage in Makassar City using a cross-sectional approach. The data used are secondary data, including COVID-19 case numbers and immunization coverage rates for HB0, BCG, and Polio 1 obtained from the Makassar City Health Office's Department of Disease Prevention and Control. The Makassar City Health Office is located at Jl. Teduh Bersinar No.1, Gn. Sari, Kec. Rappocini, Makassar City, South Sulawesi. This research was conducted from July to August 2022.

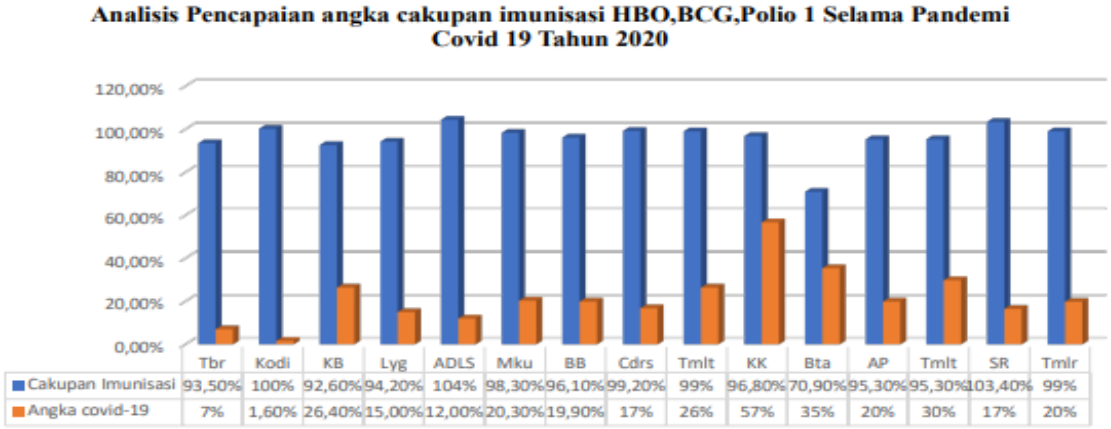
The instrument for this study is secondary data acquired from the Makassar City Health Office, including data on the highest and lowest COVID-19 case numbers and immunization coverage rates. The immunization coverage data were obtained from secondary sources at the Health Office based on clusters per subdistrict, selecting one health center per subdistrict, resulting in a total of 15 health centers. Makassar City has 15 subdistricts and 47 health centers.

The data were analyzed using the SPSS (Statistical Package for the Social Sciences) software. Univariate analysis was used to determine the frequency distribution of the independent variable, which is the immunization coverage rates for HB0, BCG, and Polio 1. The influence analysis used a simple linear regression test. This study identified differences in coverage rates based on the time periods and the distribution of health center areas within Makassar City.

RESULTS

Based on the bar chart illustrating the differences in immunization coverage rates for HB0, BCG, and Polio 1 during the COVID-19 pandemic in 2020 (Figure 1), out of 15 health centers that conducted immunizations, four did not meet the immunization targets. These health centers are Tabaringan Health Center, with an immunization coverage rate of 93.50% and 7% COVID-19 cases; Kaluku Badoa Health Center, with an immunization coverage rate of 92.60% and 26.40% COVID-19 cases; Layang Health Center, with an immunization coverage rate of 94.20% and 15.00% COVID-19 cases; and Batua Health Center, with an immunization coverage rate of 70.90% and 35.40% COVID-19 cases. The

other health centers met the immunization coverage targets.



Based on the bar chart illustrating the differences in immunization coverage rates for HB0, BCG, and Polio 1 during the COVID-19 pandemic in 2021 (Figure 2), out of 15 health centers that conducted immunizations, eight did not meet the immunization targets. These health centers are Tabaringan Health Center, which had an immunization coverage rate of 84.16% and 51.10% COVID-19 cases; Layang Health Center, with an immunization coverage rate of 64.33% and 68.20% COVID-19 cases; Makkasau Health Center, with an immunization coverage rate of 90.66% and 133.30% COVID-19 cases; Tamalate Health Center, with an immunization coverage rate of 93.33% and 72.00% COVID-19 cases; Batua Health Center, with an immunization coverage rate of 84.66% and 38.00% COVID-19 cases; another Tamalate Health Center, with an immunization coverage rate of 76% and 138.30% COVID-19 cases; Sudiang Raya Health Center, with an immunization coverage rate of 91% and 134.60% COVID-19 cases; and Tamalanrea Health Center, with an immunization coverage rate of 88.33% and 189.60% COVID-19 cases. The other seven health centers met the immunization coverage targets.

Figure 1. Bar Chart of HB0, BCG, and Polio 1 Immunization Coverage Rates During the COVID-19 Pandemic in 2020

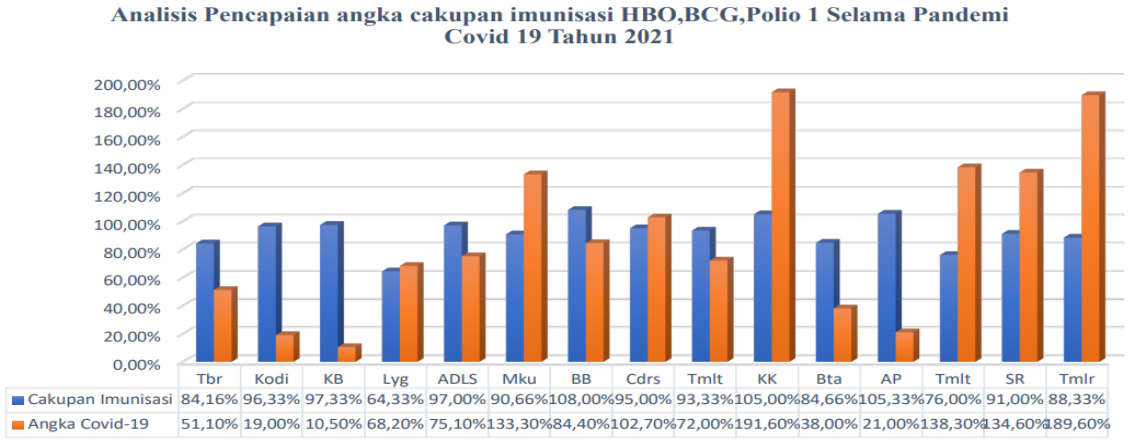


Figure 2. Bar Chart of HB0, BCG, and Polio 1 Immunization Coverage Rates During the COVID-19 Pandemic in 2021

The results of this study, based on Table 1, show the impact of the COVID-19 pandemic on the declining trend of HB0, BCG, and Polio 1 immunizations in Makassar City in 2020. The linear regression test results indicated a p-value of 0.000, which means there is a significant impact of the COVID-19 pandemic on HB0 immunization coverage, with an R-value of 0.826, BCG with an R-value of 0.818, and Polio 1 with an R-value of 0.818 for the year 2021. The coefficient of determination for the HB0 variable was found to be 82.6%, for BCG it was 81.8%, and for Polio 1 it was 81.8%. This shows that the COVID-19 pandemic had a significant impact on immunization coverage for HB0, BCG, and Polio 1, accounting for 82.6%, 81.8%, and 81.8% of the decline, respectively.

Table 1. The Impact of the COVID-19 Pandemic on HB0, BCG, and Polio 1 Immunization Coverage in Makassar City in 2020

Primary Health Center Name	Immunization coverage			Covid-19 Data
	HB0	BCG	Polio 1	
Tabaringan	280	281	89	70
Pulau kodingarreng	87	89	1341	16
Kaluku Bodoa	1289	1341	604	264
Layang	584	02	274	150
Andalas	285	283	572	120
Makkasau	507	544	803	203
Cenderawasih	777	803	373	199
Panambung	375	373	1041	168
Tamalate	1179	1041	1522	264
Kassi-kassi	1530	1523	1045	567
Batua	1054	1045	246	354
Antang Perumnas	397	246	712	199
Tamalanrea	717	712	970	298
Sudiang Raya	1028	970	752	165
Bara-barayya	756	752	89	198
Nilai *p-value*	**0,000**	**0,000**	**0,000**	
Nilai *R*	**0,826**	**0,818**	**0,818**	

The results of this study, based on Table 2, show the impact of the COVID-19 pandemic on the declining trend of HB0, BCG, and Polio 1 immunizations in Makassar City in 2021. The linear regression test results indicated a p-value of 0.001, which means there is a significant impact of the COVID-19 pandemic on the immunization coverage for HB0, BCG, and Polio 1 in 2021. The coefficient of determination for the HB0 variable was R = 0.762, for BCG it was R = 0.742, and for Polio 1 it was R = 0.747. This indicates that the COVID-19 pandemic had a significant simultaneous impact on immunization coverage, accounting for 76.2% of the decline in HB0 immunization, 74.2% in BCG, and 74.7% in Polio 1.

Table 2. The Impact of the COVID-19 Pandemic on HB0, BCG, and Polio 1 Immunization Coverage in Makassar City in 2021

Primary Health Center Name	Immunization coverage			Covid-19 Data
	HB0	BCG	Polio 1	
Tabaringan	233	233	233	511
Pulau kodingarreng	86	94	94	19
Kaluku Bodoa	1379	1341	1314	1052
Layang	393	403	402	682
Andalas	284	283	283	71
Makkasau	507	514	514	1333
Cenderawasih	736	764	764	1027
Panambung	377	367	367	720
Tamalate	1161	1159	1159	1916
Kassi-kassi	1532	1520	1520	3800
Batua	1152	1187	1081	2100
Antang Perumnas	412	284	286	1383
Tamalanrea	633	647	647	1896
Sudiang Raya	922	909	926	1346
Bara-barayya	729	883	901	844
Nilai *p-value*	**0,001**	**0,002**	**0,001**	
Nilai *R*	**0,762**	**0,742**	**0,747**	

DISCUSSION

The results of the research conducted in 15 health centers in Makassar City show the impact of the COVID-19 pandemic on the immunization coverage rates for HB0, BCG, and Polio 1. This is illustrated in a line graph where the immunization coverage rates for HB0, BCG, and Polio 1 decreased in 2020 and 2021. In 2019, only two health centers did not meet the immunization targets, but this number increased to four health centers in 2020 (Figure 1) and drastically rose to eight health centers in 2021 (Figure 2) that did not meet the immunization targets.

These findings are consistent with the research conducted by Safira (2020) titled "The Impact of the COVID-19 Outbreak on Basic Immunization Coverage in South Sumatra Province," which found a decrease in complete basic immunization coverage in 2020, starting in January with a reduction of 0.6%. However, after COVID-19 cases were confirmed in South Sumatra Province, the decline in immunization coverage increased, with the highest drop occurring in April and May 2020. Similarly, research by Ziad Mansour et al. (2021) titled "Impact of COVID-19 Pandemic on The Utilization of Routine Immunization Services in Lebanon" found a 30% decrease in immunization services. In the private sector, immunization services decreased by 46.9%, especially between February and April 2020, with the highest decline observed. The number of vaccine doses administered in the public sector dropped by 20%, with the most notable decrease detected for OPV and measles vaccines, and during October 2019 and March 2020. (Safira,

2020, Ziyad et al. 2021).

The drastic drop in immunization coverage in 2021 was due to the high number of COVID-19 cases in Makassar City during that period. This decline is evident in Figures 1-2 showing that in 2019, before the COVID-19 pandemic, only two health centers did not meet immunization targets. This number increased to four health centers in 2020 during the COVID-19 outbreak, with each having over 100 COVID-19 cases: Tabaringan Health Center (370 cases), Kaluku Badoa Health Center (264 cases), Layang Health Center (150 cases), and Batua Health Center (354 cases). (Satari, 2017, Nurhasanah, 2021) The drop in immunization coverage can also be attributed to the healthcare services focusing on preventing transmission and managing COVID-19 cases, along with the implementation of lockdown measures that disrupted routine health services such as immunization. Additionally, mothers were concerned and reluctant to bring their children to health centers for immunizations (Felicia and Suarca, 2020, Ramadhian, 2016).

During the COVID-19 pandemic, healthcare workers should continue to emphasize the importance of immunization and ensure that every child is protected from preventable diseases through immunization. Immunizations must be complete according to schedule to protect children from vaccine-preventable diseases, and immunization services during the COVID-19 pandemic should be carried out in accordance with local government policies (Yaazia et al., 2020). Immunization services should be conducted according to Infection Prevention and Control (IPC) principles and maintain a safe distance of 1-2 meters. The health sector should coordinate with and support local governments in providing immunization services during the COVID-19 pandemic. Additionally, health workers should monitor the vaccination status of their target population in their working areas. However, in areas with a high number of cases, there have been temporary withdrawals of posyandu services at several health centers in Makassar City. While some posyandu activities continue, some parents are afraid to bring their children due to fear of contracting COVID-19, PSBB, and lockdown measures (Shrestha, 2020, Yazia, 2020, Agustin, 2015).

Based on Tables 1 and 2, the impact of the COVID-19 pandemic on the trend of declining immunization coverage for HB0, BCG, and Polio 1 in Makassar City in 2020 and 2021 was analyzed using linear regression tests. In 2020, the results showed a significant impact with a p-value of 0.000 for HB0, BCG, and Polio 1. Similarly, in 2021, the linear regression test results showed a p-value of 0.001 for HB0 and BCG, and 0.002 for Polio 1,

indicating a significant impact of the COVID-19 pandemic on the immunization coverage for HB0, BCG, and Polio 1 in both 2020 and 2021. (Sundoro, 2014)

With the onset of the COVID-19 pandemic, the implementation of immunization programs faced various obstacles. To address these challenges, the Directorate of Surveillance and Health Quarantine of the Directorate General of Disease Prevention and Control at the Indonesian Ministry of Health issued Technical Guidelines for Immunization Services during the COVID-19 pandemic. These guidelines include mechanisms for providing immunization services, reporting procedures, and the management and logistics of vaccines in health centers and other health facilities. (Nainggolan, 2019, Nurhasanah, 2021)

There are four principles that serve as a reference for immunization services during the pandemic: prioritizing the administration of basic and advanced immunizations for children to prevent vaccine-preventable diseases (VPDs); adhering to local government policies for the operational implementation of immunization services at health centers, posyandu (integrated health service posts), mobile health centers, and other immunization services; optimizing surveillance activities for VPDs and their reporting; and implementing infection prevention and control (IPC) principles and maintaining a safe distance of 1-2 meters during the service delivery. (Hadinegoro, 2016, Kemenkes, 2020)

The continuity of immunization services is determined based on risk and benefit considerations. Health departments and primary health centers (Puskesmas) conduct risk mapping and assessments based on the epidemiological analysis of local COVID-19 transmission, local immunization coverage, and the VPD situation in the area. This data forms the basis for making recommendations on the continuity of immunization in the area, followed by advocacy with local governments to obtain policy and operational support to optimize immunization services. (Kemenkes, 2020, IDAI, 2020)

Subsequently, health departments and Puskesmas conduct intensive monitoring of immunization coverage and VPD surveillance to understand the level of community protection and identify high-risk groups for outbreaks. These high-risk groups are prioritized for catch-up immunization activities once the COVID-19 pandemic is over. This approach ensures that immunization services can continue effectively during the pandemic while preparing for post-pandemic catch-up efforts to maintain community health and prevent outbreaks of vaccine-preventable diseases. (Rosandali, 2016,

Kemenkes, 2020)

Based on risk mapping analysis, recommendations for immunization services may include selecting appropriate service locations depending on regional conditions, such as health centers, posyandu, or mobile health services in vulnerable areas. If conditions do not allow for regular immunization services, the recommendation is to postpone immunizations, with health workers and cadres recording the names of children who have not yet received their immunizations so they can be prioritized as soon as immunization services become available again. (Kemenkes, 2020)

According to the technical guidelines issued by the Ministry of Health, immunization services can continue during the COVID-19 pandemic, provided they adhere to health protocols and service provisions. This approach is considered beneficial, given the importance of preventing VPDs to avoid the potential burden of concurrent outbreaks during the pandemic. (Kemenkes, 2020)

CONCLUSIONS

The COVID-19 pandemic has impacted the immunization coverage rates of HB0, BCG, and Polio 1 in the Puskesmas working areas across the districts of Makassar. During the pandemic in 2020, out of 15 Puskesmas conducting immunizations, four did not meet their immunization targets for HB0, BCG, and Polio 1. In contrast, the remaining Puskesmas met their immunization coverage targets. However, in 2021, the situation worsened, with eight out of 15 Puskesmas failing to meet their immunization targets. This decline in immunization coverage correlates with higher rates of COVID-19 incidents in these areas, indicating a significant impact of the pandemic on routine immunization services.

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