

ORIGINAL RESEARCH REPORT

Impact of COVID-19 pandemic on giving basic immunization, weight measurement, and vitamin A to toddlers in Surabaya 2019-2020

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ABSTRACT

Background: On January 30, 2020, the World Health Organization (WHO) declared the COVID-19 pandemic a Public Health Emergency of International Concern. Surabaya, East Java, reported the highest number of COVID-19 cases, with 24,545 confirmed cases. The pandemic caused significant disruptions to healthcare services, particularly the Posyandu, a community-based health initiative providing vital services such as immunizations, weight monitoring, and vitamin A supplementation to toddlers. **Objective:** This study aims to examine the impact of the COVID-19 pandemic on the provision of basic immunizations, weight monitoring, and vitamin A administration to toddlers in Surabaya during the years 2019 to 2020. **Method:** A retrospective analytical study was conducted using secondary data from public health centers and the Surabaya Health Office. The data were analyzed descriptively, and paired T-tests were used to determine statistical significance in changes in coverage rates. **Results:** The study observed a decline in coverage for BCG (5.78%), hepatitis B (3.33%), polio (5.19%), pentabio (4.08%), and MR (3.12%) immunizations. Weight monitoring coverage decreased by 1.07%, while vitamin A administration increased slightly by 0.05%. Significant reductions were found for BCG, MR, and polio immunizations, while changes in hepatitis B, pentabio, and weight monitoring were not statistically significant. The increase in vitamin A administration was also not significant. **Conclusion:** The COVID-19 pandemic led to a notable decline in immunization coverage and weight monitoring for toddlers in Surabaya, although vitamin A administration saw a minor increase. These results emphasize the importance of maintaining essential healthcare services during global health crises.



Highlights

1. The study identified a significant decrease in the coverage of key immunizations, including hepatitis B, BCG, polio, pentabio, and MR, in Surabaya during the COVID-19 pandemic.
2. A reduction in weight measurement among toddlers was also noted during the same period, suggesting potential disruptions in routine health services.
3. Despite these declines, the administration of vitamin A saw a modest increase, indicating some continuity in preventive health efforts.

BACKGROUND

The COVID-19 pandemic, declared by the World Health Organization (WHO) on January 30, 2020, significantly impacted public health systems worldwide, including Indonesia. As of June 2021, Indonesia had nearly 2 million confirmed COVID-19 cases, with East Java, particularly Surabaya, recording a high number of infections. The pandemic has disrupted various aspects of daily life, especially within the healthcare system (Güner et al., 2020). Community health services such as Posyandu, which provides essential health interventions for toddlers, including basic immunizations, weight monitoring, and vitamin A supplementation, have been affected by public fear and restrictions on physical interactions. Posyandu, a key part of community-based health initiatives, plays a vital role in reducing infant mortality and improving child health outcomes (Depkes RI, 2006).

However, during the pandemic, healthcare services like immunization, weight measurements, and vitamin distribution faced challenges due to the restrictions imposed to curb the spread of the virus, and perceived as a less necessary service. There was a study that there was some financial minus, such as funds for the mother and children health (MCH) services was not available in 12.6% of community health centers (Puskesmas), with no enough midwives in 17.2% of community health centers, MCH guidelines during the COVID-19 pandemic were not available in 39.6% of community health centers with minimum personal protective equipment for MCH services (Rosita and Tinexcelly, 2021). This problem made the implementation of MCH services facing barriers, including vaccination, body weight measurements and vitamin distribution.

Vaccination is one of the public health concerns in avoiding the infectious disease such as polio, measles diphtheria, yellow fever, and pertussis, with the most cost-effective ways (Ratzan et al., 2019). A systematic review noted the global decline of all type vaccination of 10.8%, with the great decrease in lower-MICs (18.0%) than upper-middle-income countries (upper-MICs) (14.3%) and low-income countries 93.1%). The reduction was seen during the first 3 month of pandemic (Cardoso Pinto et al., 2022). Anthropometry measurements such as body weight and body length/height in children is one of the main tool to assess the nutritional status at the collective and individual levels. This method is low-cost and easy with minimal invasion in children (Bagni et al., 2021). COVID-19 pandemic had cause food insecurity globally due to multiple factors (wage losses, increase in prices, closing markets, decreasing capacity of food production and distribution, disruptions in the supply chain due to lockdown restrictions) (Bagni et al., 2021). So, physical measurements are important as children are at high risk to experience undernutrition. However, COVID-19 pandemic has reduced various 'minimum service Standard's coverages, including child's growth monitoring. Meanwhile, this service is important to determine the specific nutritional interventions in the community. This study was held to investigate the extent to which the COVID-19 pandemic has impacted the delivery of these critical health services to toddlers in Surabaya, highlighting the necessity of understanding and mitigating the pandemic's broader health consequences.

OBJECTIVE

To assess the impact of the COVID-19 pandemic on basic health services for toddlers in Surabaya from 2019 to 2020. Specifically, the study aims to analyze changes in the provision of basic immunizations (Hepatitis B, BCG, polio, Pentabio, and MR), weight measurements, and vitamin A administration

during this period. Through retrospective analysis, the study seeks to determine how the pandemic has influenced these essential health services, which are critical for the growth and development of toddlers.

MATERIAL AND METHODS

Study design

This research employs a retrospective analytic descriptive design with a cross-sectional approach. It examines secondary data to evaluate the impact of the COVID-19 pandemic on immunization, weight measurement, and vitamin A administration to toddlers in Surabaya during 2019-2020.

Data collection

The study uses secondary data from public health centers and the Surabaya health office. It includes data on basic immunizations (Hepatitis B, BCG, polio, Pentabio, MR), weight measurements, and vitamin A administration for toddlers. Data were collected from all districts in Surabaya and analyzed using a total sampling method.

Data analysis

Data processing includes editing, coding, and entry using SPSS. Normality testing was conducted with the Shapiro-Wilk test. Comparative analysis was performed using paired sample T-tests to identify significant differences between groups, with results presented in means and standard deviations.

Ethical consideration

Ethical approval for this study was obtained from the Investment and Integrated One-Stop Service Office, ensuring that the data collection and analysis were performed in accordance with ethical standards for secondary data usage.

RESULTS

The research data were collected from the Surabaya City Health Office, covering 31 districts in the city. The study focused on the number of toddlers who received basic immunizations, underwent weight measurement, and received Vitamin A supplementation. The variables examined include hepatitis B, polio, and pentabio immunizations, as well as weight measurement and Vitamin A administration. The coverage of basic immunizations was calculated by comparing the number of births to the number of toddlers immunized. Similarly, weight measurement and Vitamin A administration were calculated based on the number of toddlers weighed or who received Vitamin A supplements. The study assessed the impact of the COVID-19 pandemic by examining changes in these figures, and statistical analysis was conducted to evaluate the significance of these changes.

Table 1. Basic immunization, weight measurement, and vitamin A administration coverage

Variable	Coverage		Differences (%)
	2019 (%)	2020 (%)	
Hepatitis B	97.70	94.37	3.33
BCG	99.53	93.75	5.78
Polio	97.89	92.69	5.19
Pentabio	98.45	94.37	4.08
MR	98.02	94.90	3.12
Weight Measurement	86.01	84.94	1.07
Vitamin A	92.08	92.13	-0.05

In 2019, hepatitis B immunization coverage stood at 97.70%, but this figure decreased to 94.37% in 2020, showing a decline of 3.33%. BCG immunization coverage saw the most significant drop, from 99.53% in 2019 to 93.75% in 2020, representing a 5.78% reduction. Similarly, polio immunization coverage decreased from 97.89% to 92.69%, marking a 5.19% decline. Pentabio immunization also



experienced a decrease, from 98.45% in 2019 to 94.37% in 2020, a reduction of 4.08%. The MR immunization coverage fell from 98.02% in 2019 to 94.90% in 2020, showing a decline of 3.12%. Weight measurement coverage saw a smaller decrease, from 86.01% in 2019 to 84.94% in 2020, down by 1.07%. Vitamin A administration was the only variable that increased slightly, from 92.08% in 2019 to 92.13% in 2020, reflecting a 0.05% rise.

Paired sample T-test analysis revealed that the decrease in hepatitis B immunization coverage was not statistically significant. In contrast, the reductions in BCG, polio, and MR immunization coverage were significant ($p < 0.05$). However, the changes in pentabio immunization, weight measurement, and Vitamin A administration were not statistically significant ($p > 0.05$). Overall, the largest decline was observed in BCG immunization (5.78%), while the smallest decrease occurred in weight measurement (1.07%). Vitamin A administration was the only variable to show a slight increase during the pandemic.

Table 2. Paired sample T-test analysis of basic immunization, weight measurement, and vitamin A administration coverage

Variable	Years	Mean \pm Std. Deviation	Difference Mean \pm Std. Deviation 2019-2020	P Value
Hepatitis B	2019	97.70% \pm 7.16%	3.33% \pm 10.21%	0.079
	2020	94.37% \pm 6.63%		
BCG	2019	99.53% \pm 7.42%	5.78% \pm 11.70%	0.010
	2020	93.75% \pm 5.79%		
Polio	2019	97.89% \pm 4.87%	5.19% \pm 9.09%	0.003
	2020	92.69% \pm 6.82%		
Pentabio	2019	98.45% \pm 4.36%	4.08% \pm 12.69%	0.083
	2020	94.37% \pm 10.72		
MR	2019	98.02% \pm 3.69%	3.12% \pm 5.24%	0.002
	2020	94.90% \pm 4.06%		
Weight Measurement	2019	86.01% \pm 6.64%	1.07% \pm 7.15%	0.411
	2020	84.94% \pm 7.19%		
Vitamin A	2019	92.08% \pm 9.46%	-0.05% \pm 12.77%	0.984
	2020	92.13% \pm 13.68%		

DISCUSSION

COVID-19 pandemic had influenced all aspect of life, especially healthcare services which is the most important line in maintaining the society's health. It unprecedented disruption to global health systems (Palupi et al., 2024). A predictive model suggest the death of 1.2 million children due to the mostly preventable disease, and almost 57,000 of maternal death. It also noted the death due to TB (1.4 million), malaria and NCD, which impacting the life expectation (Tabitha Hrynich, 2020). COVID-19 pandemic also lead on the food insecurity, in the context of availability, access, utilization, and stability, in the region such as Ethiopia, Mali, Nigeria, Uganda, Malawi and Liberia, and also India, in various degree of severity (Bloem and Farris, 2022). This resulting on the decreased of nutritional status, along with life style, such as the reduction of physical activities while sedentary life style and screen time have increased (Nugroho et al., 2022).

In preventable infectious disease, the World Health organisation (WHO) had held a basic immunization program which including four vaccines: BCG (Bacillus Calmette–Guerin), DTP (diphtheria, tetanus toxoid, and pertussis), Pol, and MCV (measles-containing vaccine) which protect against tuberculosis; diphtheria, tetanus, and pertussis; poliomyelitis; and measles (Basu et al., 2023). So, measuring the childhood vaccination is crucial to tract and record the coverage of global vaccine policies and programme implementation (Galles et al., 2021). However, COVID-19 pandemic has disrupt the routine immunization in all age groups in India, while it was an essential health services to prevent the infectious diseases (Kasi et al., 2020).

Hepatitis B Immunization

The study revealed a decline in the coverage of basic hepatitis B immunization for toddlers in Surabaya by 3.33% from 2019 to 2020. In 2019, the immunization rate was 97.70%, which decreased to 94.37% in 2020. This drop is consistent with other studies in Texas (Nuzhath et al., 2021) and Gambia (Osei et al., 2020) where similar declines have been reported due to the COVID-19 pandemic, as medical staff and resources were concentrated for COVID-19. Not only that, there was a vaccine shortages due to lockdown along with minimum personal protective equipment (PPE) for staff, worsen with parent refusal due to fear for COVID-19 infections disrupt the Expanded Programme on Immunization (EPI) in African countries (Chandir et al., 2020; Mansour et al., 2021; Mbunge, 2020). A mathematic model predicts the pattern of HBV chronic infection will raised to 36,342–395,594 in the Western Pacific Region (WPR), and 9,793–502,047 in the African Region (AFR), and the predicting death due to HBV were estimated of 7,150–80,302 in the WPR and 1,177–67,727 in the AFR. To prevent this, it is needed the sustained immunization service and implementing catch-up vaccination (Kabore et al., 2022). The COVID-19 pandemic in Egypt also disrupted the healthcare services, in which all healthcare staff and hospital resources were focused for combating the crisis during the COVID-19 pandemic. This situation affecting the management other infectious diseases, including viral hepatitis. Also, similar with other country, social distancing and restrictive measures, affecting the medical services, especially those patients with hepatitis, such as medications and vaccines (Elsharkawy et al., 2023).

A little controversial phenomenon was seen in China, in which the monthly average reduction on Hepatitis B epidemic of 26% during the first three months of COVID-19 pandemic in 2020, and continue to reduce by 17% within the first six months, and 10% in the whole year of 2020. This means that COVID-19 pandemic had a positive effect in reducing the hepatitis B cases (He et al., 2024). However the study using the Bayesian structural time series (BSTS) model, in which the possibility of household infection also high. It was suggest that COVID-19 may impacted the pattern of other infectious disease (Baker et al., 2020). other country with different situation was noted in US, in which the neonatal hepatitis B vaccination rate were not compromised due to COVID-19 pandemic, with no significant different of vaccination rate: 91.6% of neonates born from 11/01/2018 to the coverage rate of 90.9 % in 06/30/3031. The unvaccinated neonates including: prematurity (BW <2 kg), low Apgar scores (<7), marriage status, non-Hispanic white race, having commercial insurance, or English as their preferred language (Dugovich et al., 2023). Even there was an increased in severe acute hepatitis in children since early 2021, with the total number over 1,000 in July 2022, which was intriguing, as not caused by the common hepatitis A-E viruses (Palupi et al., 2024). There was increased cases of hepatitis with jaundice in children aged 5-14 years old in Indonesia (Hokinson et al., 2022).

BCG Immunization

During COVID-19, BCG vaccination was hoped to restrain the SARS-CoV-2 spreading, even this vaccine was used to combat tuberculosis (TB). But the inducement of both humoral and adaptive immunities was considered as an alternative therapy for COVID-19 (Malik et al., 2020), as seen in an RCT study: BCG group displayed infectious disease symptoms and lesser severity and fewer infectious disease events per patient, including COVID-19 with no related systemic adverse effects (Faustman et al., 2022). The reason why BCG was beneficial as it has non-specific effects (off-target) on the immune systems with a wide range of protection against infection (Curtis et al., 2020; Goodridge et al., 2016; Pollard et al., 2017). A study in Japan noted that the high coverage BCG vaccination in the past (1999-2012) negative correlation with the prevalent of SARS-CoV-2, especially the vaccination at 2004 (Kinoshita and Tanaka, 2020). However, in Surabaya, there was a significant decrease in the BCG immunization rate by 5.78%, from 99.53% in 2019 to 93.75% in 2020. Similar declines in BCG immunization have been observed globally, especially in regions like Africa (Buonsenso et al., 2020) and India (Summan et al., 2023), where the pandemic severely disrupted healthcare services. As the result this reduction, Brazil reporting a total of 1,458 cases of pulmonary and extrapulmonary TB in children under 1 year old during 2020-2024, or the average of 486 cases per year (Procianoy et al., 2024). The disruption of BCG vaccination coverage due to COVID-19 pandemic gave a rise of



estimating model: an estimated of 25% BCG vaccination reduction globally resulting in an additional 886 (0.5%) paediatric TB deaths during 3-months of BCG vaccination disruption, with 100% catch-up. The worse ones when it disrupted in 6 month with no catch-up: an additional 33,074 (17%) deaths due to TB (Shaikh et al., 2021).

A nationwide survey in Indonesia reported that TB case notification rate declined by 26% (case notification rate ratio 0.74, 95% CI 0.72–0.77) and treatment coverage declined by 11% (treatment coverage ratio 0.89, 95% CI 0.88–0.90), but there was no significant increase in all-cause mortality (all-cause mortality rate ratio 0.97, 95% CI 0.91–1.04) compared with the pre-pandemic period. All those situation was a high COVID-19 incidence rate, fewer primary health centres, a very low number of doctors (Surendra et al., 2023). While a study in East Java noted a sharp decline in the diagnosis and treatment of TB, which caused by lockdowns, overburdened healthcare facilities, fear of seeking medical attention, and the repurposing of TB resources to address the COVID-19 crisis. This made a lack of TB notification due to the failure of the health system (reduction of 19.9% from 2018-2019 to 2020-2021), and increased by 31.9% during 2022-2023 for nearly all subgroups (Palupi et al., 2024).

Polio Immunization

Polio vaccination coverage in Indonesia has not yet reach its maximum, even if it is one of “recommended” vaccine for all children. However its coverage was associated with mother’s age 15–24 years old, secondary education level, wealth quintile, visit to a health facility, and current employment before COVID-19 pandemic (Mediarti et al., 2020). Polio vaccine is one of live attenuated vaccines (LAV) that hypothesises had a beneficial, non-specific effects of protecting against vaccine-unrelated infections, including COVID-19. Polio vaccine such as BCG, had the broad effects of specific live attenuated vaccines on the host immune system, relying on heterologous lymphocyte responses and induction of trained immunity (Aaby et al., 2023). However our findings stated that polio immunization coverage dropped by 5.19% during the pandemic, going from 97.89% in 2019 to 92.69% in 2020. Research in countries like Africa, Pakistan, and India has also shown comparable declines in polio immunization rates, further emphasizing the widespread impact of COVID-19 on vaccination programs (Buonsenso et al., 2020; Chandir et al., 2020; Summan et al., 2023). The cause of this reduction due to the reduction on supply chain, and several restriction to prevent COVID-19 infections, such as stopping the healthcare service (Rodo et al., 2022).

A reported study with the effort to supply polio vaccine during 2019-2020 in 28 countries showed a reduction on global acute flaccid paralysis (AFP) cases by 34% in the critical areas of the African and Eastern Mediterranean regions. While at the end of september 2020, there was an outbreaks of wild poliovirus type 1 (WPV1) transmission in Afghanistan and Pakistan (Burkholder et al., 2020). Also, Niger (Dinleyici et al., 2021). The polio outbreaks in Afghanistan was happen in a polio free area due to polio vaccination was stopped or neglected, as the government still facing COVID-19 spreading, and estimated there will be a surge of polio case in unvaccinated or inaccessible area (Ahmadi et al., 2020). In Indonesia, the outbreak of polio was reported in 2022 (Pidie Regency, Aceh) and 2023 (Solo, Central Java) in the form of poliomyelitis, which then responded by the goverment with a simultaneous vaccination program with the coverage of 95% (Sari et al., 2024).

Pentabio Immunization

The pentabio immunization rate fell by 4.08% during the pandemic, from 98.45% in 2019 to 94.37% in 2020. This trend mirrors findings from similar studies conducted in Africa and Pakistan, where pentabio immunization was similarly affected (Buonsenso et al., 2020; Chandir et al., 2020). A study in East Java noted that the coverage of Pentabio 1, Pentabio 2 and measles was more than 95%, especially in red zone area (most infected area of COVID-19) (Payeng, 2020), but this study did not compared with the situation before COVID-19 pandemic. The global coverage of of diphtheria, tetanus toxoid and pertussis (DTP1) was 89-90%, DTP (DTP3), polio vaccine, and MCV (MCV1) were estimated to be in the range between 84% and 86% during 2010–2019. During COVID-19 pandemic, it was reported that DTP3 was reduced, ranged from 86% in 2019 to 83% in 2020 and 81% in 2021. The part-vaccination of MCV reported that 24.7 million children unvaccinated over the last 2 year, while the population

coverage of MCV2 was dropped from 86% to 83% in 2020 and 81% in 2021. HPV immunizations suffered a reduction by ~9% (Basu et al., 2023).

An estimated study stated that 30.0 million of children misses the DTP3, and 27.2 million missed MCV1 doses, which meant that an additional 8.5 million children not routinely vaccinated with DTP3 and an additional 8.9 million children not routinely vaccinated with MCV1 due to the COVID-19 pandemic, with the peak incidence of April 2020 (Chard et al., 2020). Due to the disruption in vaccination services, China reporting the positive rate and testing number of pertussis during January 2023 to May 2024 among patient with acute respiratory tract infection, even the incidence reached its peak in March by 23.59% of positive rate. Sadly the relative rate was high in in the 5 to 17 age group, peaking at age of 10 years old (Wang et al., 2024). It was also reported that since COVID-19 pandemic, pertussis has been fluctuating in china, with the annual peaks in August (winter). Even the cases were increased to be 538 in February 2023 to 1,512 by June, then doubled monthly, reaching 6,410 in November and 9126 in December. The cases remained persist in February 2024 (17,105) (Hu et al., 2024). Other reported the increment of pertussis cases in several countries in Europe due to the increased population susceptibility as the result of lack of immune stimulation during the COVID-19 pandemic (Khalil et al., 2024). It was suspected that the increases of pertussis cases may be influenced by the natural cyclic nature of the disease, increased *Bordetella pertussis* (Bp) activity in older children and adults, and the genetic divergence of circulating Bp strains from vaccine antigens (Principi et al., 2024). Similar phenomenon also seen in Pakistan, in which there were the re-emergence of Diphtheria after the COVID-19 pandemic which surpassing all the country, with the total cases of 996, resulting in 124 deaths were recorded from all provinces of Pakistan (Salman et al., 2024).

MR Immunization

The study reported a 3.12% reduction in MR immunization coverage from 98.03% in 2019 to 94.90% in 2020. This decline is consistent with global reports on the pandemic's effect on MR vaccine distribution (Buonsenso et al., 2020; Chandir et al., 2020). A reported from UK noted that the timely receipt of MMR fell by 4.0%, from 79.2% (before COVID-19 pandemic) to 75.2% (during COVID-19 pandemic) (Firman et al., 2022). Indonesia reported an outbreak on 2022, with the incidence of measles of 29 per million cases due to vaccination services disruption during COVID-19. The government responded with national vaccination campaign, and approximately 26 million children (an estimated 73% of the target population) received a combined measles- and rubella-containing vaccine during supplementary immunization activities completed in 32 provinces (Chacko et al., 2023). India reported that out of the total admitted cases 4,893, there were 657 cases of measles with prevalence is 13.4% (Patel et al., 2023). Japan, has been reporting an outbreak of rubella, and suggested due to the the introduction of routine rubella immunization along with COVID-19 pandemic (Otani et al., 2023).

Weight Measurement

The percentage of toddlers undergoing weight measurement dropped by 1.07% from 86.01% in 2019 to 84.94% in 2020. This reduction alligned with other studies and is attributed to parental concerns about COVID-19 exposure during clinic visits (Aryawati, 2022). A study held in Bandung, in one of public health center, also found similar situation, in which body weight measurements were diminished for several months during COVID-19 pandemic, and restarted at August 2020, even with the challenging situation (Sekarani et al., 2023).

Several study reporting the BMI increment during COVID-19 pandemic, especially those with obesity (Kurt et al., 2023). Also, $\Delta\text{BMI}_{\text{adj}}$ accelerated most in ages 8–12 and least in ages 15–17 (Brooks et al., 2021), other reported a significant increase in the weight percentile values of children aged 48-59 months in all three years (Kurt et al., 2023). However, a study in Cawang, Jakarta showed the prevalent of wasting (8 children of 72 families), due to jobloss and low socio-economic (Yusuf et al., 2022). During COVID-19 pandemic, medical doctors using telemedicine for visiting the patients. However, the activity held in primary health care (Puskesmas), which the main task was counselling, anthropometric measurements for children and immunisation, these activity can't be done virtually. So,



to made the minimal health service for the public health must be enrolled, the healthcare staff must apply health protocols when communicating and providing health service to the mothers and toddlers (Migang and Migang, 2022).

Vitamin A Administration

Unlike the other variables, there was a 0.05% increase in vitamin A supplementation from 92.08% in 2019 to 92.13% in 2020. Though minor, this increase similar to other study and suggests that certain health services were maintained despite the pandemic's challenges (Bayu Purnama et al., 2021). However, a reported noted the service disruption with the consequences of decline in vitamin A supplementation's coverage in 2020, and the worst declines were in the first half year of the pandemic. Estimated 134 million children missed the vitamin A supplementation on at least one doses (Hasman et al., 2021). Similar evidence as seen in this paper concerning vitamin A supplementation coverage was seen in several region in Sub-Saharan region, in which the coverage was increased in Burkina Faso (82.2–93.1 %), Côte d'Ivoire (90.3–93.3 %) and Mali (76.1–79.3 %), and decreased in Guinea (86.0 % to 81.7 %). The coverage was associated with the area (rural/urban), age and COVID-19 severity status (Baker et al., 2023). In South Africa, COVID-19 pandemic had significantly declined the clinic attendances, hospital admission, and basic services. However several basic services such as immunisation were soon recovered, but other basic services such as vitamin A supplementation, deworming and food supplementation remaining low, with the consequences of the increment of neonatal death by 47% in May 2020, with unknown reason (Jensen and McKerrow, 2020).

Immunization Program During COVID-19

A meta analysis study noted there were a decreased on children's vaccination during COVID-19 pandemic in Indonesia (18.57 ± 12.87 at 2019 vs. 11.36 ± 9.47 at 2020) (Maghfuroh et al., 2022). Throughout the pandemic, basic immunization services remained a priority. However, challenges such as parental fears, government restrictions, and the unavailability of routine immunization services led to a general decline in immunization coverage across Surabaya. Similar situation also seen in India, with the maximum reduction of 87% during April 2020, 67% in May 2020, and 33% in June 2020, as the consequence of limited medical surces and public health infrastructure, and used them for the provision of COVID-19 care and management (Arulmohi et al., 2017). As the consequences, there was a significant disruption in the outpatient services, especially in operation of clinics for immunization and noncommunicable diseases (Garg et al., 2020). A study in Indonesia noted the disruption of childhood vaccination due to the stop of vaccination service, and delayed the vaccination for a compulsory vaccination shot (Fahriani et al., 2021). Brazil reporting the vaccines coverage rate (VCR) in 2021 of 70% for most vaccines in all country due to the difficulties in accesing the health services (Domingues et al., 2023).

It was needed an urgent action to provide incomplete vaccination in children with catch-up vaccinations that were missed during the pandemic, restore national vaccination coverage to pre-pandemic levels, strengthen immunization programs to build resiliency to withstand future unforeseen public health events, and further improve coverage to protect children from vaccine-preventable diseases (Chard et al., 2020).

Limitations

One limitation of this study is the reliance on secondary data from health centers, which may not fully capture the informal health practices that occurred during the pandemic. Furthermore, the data was limited to official health facilities, potentially missing children who did not visit these centers due to lockdowns or parental fear of COVID-19 exposure. Additionally, the study does not account for variations in healthcare access across different socioeconomic groups, which could have influenced the results. The study also focuses on a relatively short time frame (2019-2020), which may not reflect longer-term effects of the pandemic on child health services.

CONCLUSION

The research concludes that the COVID-19 pandemic had a significant impact on the healthcare services provided to toddlers in Surabaya during 2019-2020. There was a notable decrease in the provision of basic immunizations, including hepatitis B, BCG, polio, Pentabio, and MR vaccinations. Similarly, a decline in weight measurement services for toddlers was observed. However, the only positive trend was an increase in the administration of vitamin A to toddlers during the same period. This suggests that while the pandemic negatively affected several essential health services, efforts to ensure vitamin A distribution remained somewhat resilient.

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Conflict of Interest

The author declares no conflict of interest.

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Ethical Clearance

This study was approved by the Investment and Integrated One-Stop Service Office, with the license number of 072/30807/436.7.2/2022. Patient confidentiality and privacy were rigorously maintained throughout the study. All identifiable information, including names, addresses, and contact details, was removed from the medical records before analysis.

Author Contribution

All authors have contributed to all processes in this research, including preparation, data gathering and analysis, drafting and approval for publication of this manuscript.

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