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## **The impact of pandemic on donors at PMI Semarang City in 2019-2021**

**Jessica Christanti**

Faculty of Medicine Soegijapranata Catholic University, 50234 Semarang  
Indonesia

Corresponding author email: [jessica@unika.ac.id](mailto:jessica@unika.ac.id)

**Anna Kartika**

Blood Bank Technology Study Program, Binatrada Polytechnic, 50267 Semarang  
Indonesia

**Indra Adi Susianto**

Faculty of Medicine Soegijapranata Catholic University, 50234 Semarang  
Indonesia

**Ariosta**

Faculty of Medicine, Diponegoro University, 50275 Semarang Indonesia

**Abstract**---Globally, the Blood Donor Unit service has had a significant impact during the Coronavirus Disease-19 (COVID-19) pandemic. A significant impact occurred on donor recruitment due to the many considerations for donors during the pandemic. Changes in donor characteristics data before the pandemic and during the pandemic may occur. Therefore, researchers analyzed the impact of the pandemic on donors at Blood Donor Unit (Indonesian Red Cross, Semarang City, 2019 to 2021). Subjects and Methods: A study with a cross sectional design was conducted at Blood Donor Unit PMI Semarang. Secondary data collection consisting of voluntary blood donor form data from 2019 to 2021. The data were analyzed by One-Way Anova and Kruskal-Wallis with SPSS version 25. The study showed a significant decrease in age categories, namely < 18 years, 18-24 years and 25 -44 years and repeat donors in 2021 with 2019 and 2020 with 2019 ( $p < 0.05$ ). There was a significant decrease in first-time donors in 2021 with 2019 and in 2020 with 2019 ( $p < 0.001$ ). However, there was an increase in donors in the >60 year age category in 2020 and 2021 by 18.6% and 42% compared to 2019 although not statistically significant. The pandemic has an impact on the decline in donors < 18 years,

**Keywords**---COVID-19 pandemic, blood donor units, donors, Indonesian red cross, educational institutions.

## Introduction

The Coronavirus Disease-19 (COVID-19) pandemic is different from other health crisis situations. Globally, the Blood Donor Unit (UDD) service experienced a significant impact during the pandemic.(Kandasamy et al., 2022). Significant impacts include a decrease in the number of donors, cancellation of donor organizations, and a decrease in the number of staff due to illness. These impacts lead to higher barriers to donating blood such as the risk of transmission, activity restrictions, fear for unknown reason and so on.(Quee et al., 2022) Diseases experienced by donors such as hepatitis, liver cirrhosis, blood disorders and HIV contribute to the decrease in blood stock. The number of donors worldwide has decreased by 40% to 67% (Miskeen et al., 2021) Research in Makassar found that there was a statistically significant reduction in the need for blood products, and in the number of donors. On the other hand, blood products are still needed in cases of blood disorders, cancer, trauma and emergency surgery during the pandemic.(Putra et al., 2021)

World Health Organization(WHO) developed guidelines for maintaining a safe and adequate supply of blood products during the COVID pandemic. Based on these guidelines, the Health facility system needs to mitigate the potential risk of COVID-19 transmission through donors, manage the need for blood products, ensure uninterrupted supply of material equipment, and provide adequate information for donors, recipients, staff, vendors against transmission risks and the need for monitoring Health protocols. such as social distancing and wearing masks.(Gkirtsou et al., 2022)The Blood Donor Unit of PMI Semarang City strives for WHO guidelines to be implemented both for donors in the Blood Donor Unit and Mobile Unit so that donors do not experience transmission. Changes in the characteristics and number of donors that occur can be input for UDD PMI in formulating preventive strategies in the event of a health crisis in the future. Therefore, researchers analyzed the impact of the pandemic on donors at UDD PMI (Indonesian Red Cross) Semarang City from 2019 to 2021.

## Method

This study uses a cross sectional approach, using secondary data derived from reports of voluntary blood donors per year at Blood Donor Unit Indonesian, Semarang City from January 2019 to December 2021. This study will focus on analyzing significant differences in the number of voluntary donors based on age group and type of visit. for 3 years. Age groups were divided into groups < 18 years, 18-24 years, 25-44 years, 45-59 years and 60 years. Types of visits are divided into first-time and repeat donors. Data analysis was carried out by SPSS version 25. The number of voluntary donors in 2019, 2020 and 2019 will be tested for data normality according to age subgroups and types of visits. If the data distribution is normal and the variance is the same, a One-Way Annova analysis will be carried out with Bonferroni post hoc. If the data distribution is normal and the variance is different, then we use One-Way Annova Welch



analysis with post hoc Games-Howell. If the data distribution is not normal, a Kruskal Wallis analysis will be carried out. Determination of the year experiencing differences will be done post hoc Kruskal-Wallis with Mann-Whitney on the distribution of data is not normal. The p value < 0.05 indicates a statistically significant difference. (M. Sopiudin Dahlan, 2019)

## Results

All visits to Blood Donor Unit at Semarang Red Cross were analyzed for demographic profiles from 2019, 2020 and 2021 which are described in table 1

Table 1. Demographic Profile of Voluntary Donors

Age group	2019 n = 80,238 , N(%)	2020 n = 68,735 , N(%)	year 2021 n = 61131 , N(%)
< 18 years old	1,773 (2.2)	870 (1.26)	460 (0.75)
18-24 years old	19,131 (23.8)	14,872 (21.64)	13,093 (21.41)
25-44 years old	40,931 (51)	35,712 (51.9)	30,785 (50.36)
45-59 years old	18,253 (22.7)	17,103 (24.8)	16,580 (21.12)
60 years	150 (0.3)	178 (0.4)	213 (6.36)
Gender			
Man	59,469 (74.11)	52,028 (75.69)	43,692 (71.4)
Woman	20,769 (25.89)	16,707 (24.31)	17,439 (28.6)
Type of Visit			
First time	19,127 (23.84)	13,962 (20.32)	13,237 (21.66)
Repeat Donor	61111 (76.16)	54,773 (79.68)	47,894 (78.34)

For 3 years, the 18-24 year age group, male gender and repeat donor visits had the largest proportion of the other groups. The lowest decline for 3 years occurred in the age group except for the age group 60 years, gender and type of visit. The lowest decline occurred in 2021, but the age group 60 years had the highest number of donors compared to the previous year.

Table 2. Impact of the COVID Pandemic on Voluntary Donor Profile

Age group	2020 changes to 2019	Changes in 2021 against 2019
< 18 years old	50.93%	74.06%
18-24 years old	22.26%	31.56%
25-44 years old	12.75%	24.79%
45-59 years old	6.30%	9.17%
60 years	18.67%	42%
Type of Visit		
First time	27%	30.79%
Repeat Donor	12.76%	18.71%

Research shows the dominant proportion of the 25-44 year age group who donated blood in 2019 (before the pandemic), 2020 (pandemic year 1) and 2021 (pandemic year 2) were 51.01%, 51.96%, and 50.36% respectively. There was a significant decrease in visits in 2021 by 30.79% for first donors and 18.7% for

repeat donors. A significant decrease in the age category, namely <18 in 2020 and 2021 by 50.9% and 74.05%, however, there was an increase in donors in the >60 year age category in 2020 and 2021 by 18.6% and 42% compared to 2019 (table 2).

Table 3. Comparison of the Number of Voluntary Donors by Age Group < 18 years for 3 years

Age group	Year	N	median	Min-Max	p
< 18 years old	2019	12	150.5	25-306	0.003
	2020	12	41.5	22-234	
	2021	12	35	18-85	

Kruskal-Wallis test. Mann-Whitney post hoc test: 2021 vs 2020  $p = 0.125$ ; Year 2021 vs 2019  $p = 0.001$ ; Year 2020 vs 2019  $p = 0.028$ . Statistically, there is no difference in the number of voluntary donors < 18 years in 2021 and 2020 ( $p = 0.125$ ), there is a difference in 2021 with 2019 and in 2020 with 2019 ( $p < 0.05$ ) (table 3).

Table 4. Comparison of the Number of Voluntary Donors by Age Group 18-24 years for 3 years

Age group	Year	N	median	Min-Max	p
18-24 years old	2019	12	1655	191-2140	0.002
	2020	12	1177.5	755-1799	
	2021	12	1154	732-1245	

Kruskal-Wallis test. Mann-Whitney post hoc test: 2021 vs 2020  $p = 0.378$ ; Year 2021 vs 2019  $p = 0.001$ ; Year 2020 vs 2019  $p = 0.024$ . Statistically, there was no difference in the number of voluntary donors 18-24 years old in 2021 and 2020 ( $p = 0.378$ ), there was a difference in 2021 with 2019 and in 2020 with 2019 ( $p < 0.05$ ) (table 4).

Table 5. Comparison of the Number of Voluntary Donors by Age Group 25-44 years for 3 years

Age group	Year	N	median	Min-Max	p
25-44 years old	2019	12	3366.5	2600-4295	0.001
	2020	12	3072	2256-3491	
	2021	12	2757.5	317-3238	

Kruskal-Wallis test. Mann-Whitney post hoc test: Years 2021 vs 2020  $p = 0.088$ ; Year 2021 vs 2019  $p = 0.001$ ; Year 2020 vs 2019  $p = 0.011$ . Statistically, there is no difference in the number of voluntary donors 18-24 years old in 2021 and 2020 ( $p = 0.088$ ), there is a difference in 2021 with 2019 and in 2020 with 2019 ( $p < 0.05$ ) (table 5).

Table 6. Comparison of the Number of Voluntary Donors by Age Group 45-59 years for 3 years

Age group	Year	N	mean	SD	p
45-59 years old	2019	12	1521.08	180.91	0.240
	2020	12	1425.25	156.53	
	2021	12	1381.67	256.19	

One Way Anova test. Bonferroni post hoc analysis: 2021 vs 2020  $p=1,000$ ; Year 2021 vs 2019  $p=0.202$ ; Year 2020 vs 2019  $p=0.763$ . Statistically, there is no difference in the number of voluntary donors 45-59 years in 2019, 2020 and 2021 (table 6).

Table 7. Comparison of the Number of Voluntary Donors by Age Group 60 years for 3 years

Age group	Year	N	mean	SD	p
60 years	2019	12	12.5	4.29	0.116
	2020	12	14.83	4.44	
	2021	12	17.75	8.36	

One Way Anova test. Bonferroni post hoc analysis: 2021 vs 2020  $p=0.728$ ; Year 2021 vs 2019  $p=0.119$ ; Year 2020 vs 2019  $p=1,000$ . Statistically, there is no difference in the number of voluntary donors 60 years in 2019, 2020 and 2021 (table 7).

Table 8. Comparison of the Number of Voluntary Donors by First Visit for 3 Years

Type of Visit	Year	N	mean	SD	p
First time	2019	12	1593.92	189.80	<0.001
	2020	12	1163.5	212.94	
	2021	12	1103.08	170.73	

One Way Anova test. Bonferroni post hoc analysis: 2021 vs 2020  $p=1,000$ ; Year 2021 vs 2019  $p<0.001$ ; Year 2020 vs 2019  $p<0.001$ . Statistically, there was no difference in the number of voluntary donors based on the first visit in 2021 and 2020 ( $p=1,000$ ), there was a difference in 2021 with 2019 and in 2020 with 2019 ( $p<0.001$ ) (table 8).

Table 9. Comparison of the Number of Voluntary Donors Based on 3 Years of Repeat Donor Visits

Type of Visit	Year	N	median	Min-Max	p
Repeat Donor	2019	12	5181	3994-5907	0.001
		12	4634.5	3595-5742	
	2020	12	4403.5	2409-4990	
		12	4403.5	2409-4990	



Kruskal-Wallis test. Mann-Whitney post hoc test: Years 2021 vs 2020  $p = 0.260$ ; Year 2021 vs 2019  $p < 0.001$ ; Year 2020 vs 2019  $p = 0.003$ . Statistically, there is no difference in the number of voluntary donors based on repeat donor visits in 2021 and 2020 ( $p = 0.260$ ), there is a difference in 2021 with 2019 and in 2020 with 2019 ( $p < 0.05$ ) (table 9).

## Discussion

The entire world is experiencing health and socio-economic disruption due to the COVID-19 pandemic. Significant impacts occur in health services, especially in terms of maintaining the security of supply and demand for blood products. Several countries such as Saudi Arabia, Canada, America, Malaysia and China reported a decrease in the number of blood donors. The decline was dominated by misinformation and misperceptions such as restrictions on activities and concerns about transmission risk during blood donation so that donor visits to Blood Donor Unit decreased. (Loua et al., 2021).

This study found that there was a decrease in voluntary blood donor visits in 2020 by 14.3% with 2021 by 23.8% against 2019. This is slightly different from research in Iran that there was a decrease in voluntary blood donor visits by 23.74% higher than in Semarang City. The declaration of COVID cases in Iran occurred on 19<sup>th</sup> February 2020 and 2<sup>nd</sup> March 2020 in Indonesia. This difference is due to the fact that each country has regulations such as social and physical restrictions, restrictions on activities in essential and non-essential sectors. (Rafiee et al., 2021)

The gender of voluntary donors during 2019, 2020, and 2021 is still dominated by men compared to women. This finding contrasts with previous studies in the Philippines and in Iran where female gender predominated during the pandemic. The COVID-19 pandemic affects women emotionally and emotionally to respond to the need for blood products through notifications on social media. (Rafiee et al., 2021; Raphael Basilio et al., 2021)

The decrease in visits at the age of <18 years, 18-24 years and 25-44 years in this study to the number in 2019. Based on statistical analysis it was found a significant decrease between 2021 against 2019 and 2020 against 2019 for the three age groups. The decrease in first-time visits in this study reached 27% in 2020 and 30.79% in 2021 against 2019. Based on statistical analysis, it was found that there was a significant difference in 2021 vs 2019 and 2020 vs 2019 with  $p < 0.001$ . Similar findings occurred in the United States that the age group < 18 years, 18-24 years, and 25-44 years experienced a significant decrease. The decrease was due to changes in learning methods in schools and universities from offline learning to online so that both schools and universities closed people's access to make visits. The same thing happened in several other essential and non-essential sectors. Therefore, the implementation of blood donation in the essential and non-essential sectors has been canceled. Voluntary donors at that time had difficulty in making donations because they were infected with SARS-CoV-2 and were afraid to carry out gathering activities so that it had an impact on visits at UDD. (Gammon et al., 2021)

This study is different from conditions in Iran, the first donor visit, the age group < 18 years, 18-24 years and 45-54 years experienced a significant increase compared to 2019. This was due to the closure of all educational institutions and universities due to the pandemic in Iran and information that the attack rate in the young age group is low so that the young age group is encouraged to do voluntary blood donation at UDD. Changes in donor recruitment strategies in Iran such as advocacy for donors, online blood donor registration system, collaboration with the Thalassemia and Hemophilia Foundation to help meet the transfusion needs of thalassemia and hemophilia patients by increasing public awareness and recruitment of voluntary blood donors.(Rafiee et al., 2021)A similar study in the Netherlands showed the same thing that during the pandemic (in 2020) donors for the first time reached their highest level compared to 2019 and 2018 after the announcement of a shortage of blood products.(Spekman et al., 2021)

The increase in the number of donors aged > 60 years by 2021 reached the highest number in this study. This increase was in line with an increase in the production of convalescence plasma. Individuals who successfully survive the impact of the pandemic have a strong motivation to help communities in need of blood products.(Spekman et al., 2021)The limitations of this study are still secondary and further investigation is needed regarding motivation, service satisfaction and community attitudes towards blood donation services before the pandemic and during the pandemic.

### Conclusion

The pandemic has resulted in a significant decline in donors < 18 years, 18-24 years, and 25-44 years, so that it requires revitalization and hearings of educational institutions from elementary schools, universities, essential and non-essential sectors to carry out blood donor activities and socialize the importance of donors. blood in their respective institutions.

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