

# An increase of human immunodeficiency virus infection among blood donor during COVID-19 pandemic

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## ABSTRACT

Human immunodeficiency virus (HIV) is a one of crucial concern to blood safety because of their prolonged presence in the blood. Unsafe blood transfusion from infected donor contribute to spread the virus as well. Indonesia health ministry reported that HIV infection increase significantly in 2019 to 2021, and HIV case diagnose in population still way from the prediction in 2020, only 78.7% cases reported from 90% prediction case. A retrospective cross-sectional study was conducted and collected 51,351 blood donors during COVID-19 pandemic, 2020-2021. Blood sample analyzed using serological methods to detect the present of HIV antibodies. A reactive result of HIV screening from 21,260 donor in 2020 showed 12 donors reactive (0.00056%), while in 2021 from 30,091 donor showed 42 donors reactive (0.142899%) and showed a significant different from 2020 and 2021 (p-value <0.05). The number of reactive donors increase numerously from 2020 to 2021, while total donor also increased. The level of social restriction has contribution of HIV reactive case among blood donor and showed from two years of pandemic with p-value <0.05. A significant increase of HIV infection among blood donor and the effect of restriction level to prevent COVID-19 transmission are clearly show in this study.

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## 1. INTRODUCTION

The safety of blood donations may be affected by donors exposure to transfusion-transmissible infections (TTI) such as human immunodeficiency virus (HIV), hepatitis B, hepatitis C, syphilis caused by treponema pallidum, protozoan-parasite which causing malaria and toxoplasmosis, and other infections through variety of routes. Blood donor selection is the first and important process before the blood component produced [1]–[3]. This regulation happens to prevent and reduce the possibility of virus transmission to recipient. World Health Organization (WHO) recommend to all countries who serve a blood production should have a national policy of blood screening for TTI for the following infection and markers; HIV-1 and HIV-2 should be screening for a combination of antigen-antibody, hepatitis B surface antigen, hepatitis C antigen or a combination of hepatitis C virus (HCV) antigen-antibody, and treponema pallidum antibodies for syphilis [4]. All-inclusive surveillance and control of TTIs among blood donors is crucial to confirming the safety of blood supply, mainly with the affected change for prevalence of TTIs in Indonesia.

Distribution of blood product in Indonesia occurs in outpatient or hospital-based collection facilities and dependent upon limited skillful-staff to collect, process, and distribute donated blood to the healthcare facilities, which manage the blood products. The COVID-19 pandemic led to mandated quarantine in affected areas and general avoidance of hospitals and healthcare facilities to prevent COVID-19

transmission [5]. This affected in a reduction of limited stock of blood donors, as people were afraid to come to the hospital or donation center. A limited blood component collected during regulation of social restriction must follow the TTIs screening. Since the interaction of people who already infected by different pathogen to reach the healthcare also restricted, it induces a possible route of transmission and increase the prevalence of infectious and neglected disease which become another concern at that time, such as HIV infection [6], [7].

In Indonesia, the reported data of HIV among blood donors and recipients post transfusion is limited, the occurrence of HIV infection attributable to blood transfusion is uncertain. Following social restriction regulate to prevent COVID-19, the HIV testing and new diagnose were delayed and hard to apply while much of health facilities focus for isolation and treatment of COVID-19 patients. While trying to protect their health systems and in responding with the global lock down, the economic, social, and non-COVID-19-related health system impact has already taken a great toll on Indonesia. This is observed most acutely for populations living with and at risk of HIV [8]. Indonesia has an existing fast-growing HIV epidemic that is on course to dramatically worsen due COVID-19 restriction protocols.

HIV is a one of crucial concern to blood safety because of their prolonged presence in the blood. The transmission of HIV known through sexual contact, injection practices, and percutaneous exposure through high-risk sexual behaviors, are not the only way to delivers the virus. Unsafe blood transfusion from infected donor contribute to spread the virus as well. HIV infection reportedly reach 21% globally and state as a continued concern worldwide [9]. Blood transfusion is responsible projected 1% of new HIV infections [10]. Indonesia health ministry reported that HIV infection increase significantly in 2019 to 2021, and HIV case diagnose in population still way from the prediction target in 2020, only 78.7% cases reported from 90% prediction case. New HIV cases in Indonesia reach 27,533 cases in 2021 and teenagers dominant the cases (51%) [11].

Several countries implemented variations of social distancing restrictions aimed to disrupt the spread of the COVID-19, local quarantine and banning social activities to extreme lockdown. This regulation interrupted various of health support for other health concern, include the support facility for people with HIV or higher risk. Several countries with extreme COVID-19 cases close the border and lockdown which affects health services. A big manufacture produce antiretroviral (ARV) in India faced difficulty to get its raw material overseas due the blockage of international shipping and directly affect the ARV stock in others country and raising the cost. Indonesia is one of the countries affected by the delay process of ARV during pandemic. Data shows during four month of COVID-19 discovered in Indonesia, the incidence of new HIV cases increase in 23 areas [5]. Increasing HIV cases also founded in several countries and become a major concern of WHO about the difficulty to assess HIV medicine impacted by COVID-19 social distancing regulation and focusing their financial support of health programme on COVID-19 mitigation than others. Based on modelling study expected that HIV cases increase during pandemic and post-pandemic. Hogan on his research estimated over 10% HIV-related death increase compare to if COVID-19 do not occur for five years period, and impacted by the interruption of ARV distribution [12]. A similar model conducted in sub-Saharan Africa predict over 500,000 HIV-related death if there is a disruption of ARV supply for six month [13].

As the increase of HIV cases at early COVID-19 pandemic in Indonesia, screening for HIV infection must be done strictly from the beginning of blood donation process include recruiting of low-risk donor, pre-donation counselling and filling anamnesis form associated with TTIs risk factor [6]. Blood donor unit of Indonesian Red Cross must follow the guidance of TTIs screening using reliable methods; rapid diagnostic test (RDT), enzyme-linked immunosorbent assay (ELISA), chemiluminescent immunoassay (CHLIA) and nucleic acid test (NAT). The result of TTIs screening interpreted into 3 categories: non-reactive, initial reactive, and indeterminant [4]. Blood product allow to distribute if only the TTIs screening show non-reactive result for all infections. Blood donor selection is the first important act in the process of ensuring blood safety as belief can supports to significantly decrease risk through the deferral and donation periods of any individuals or groups individuals with identified risks that may be related with infection [14].

However, there are several areas including the current study area in which seroprevalence remain untouched. Therefore, this study was aimed to determine the seroprevalence of HIV cases among blood donors and the effect of restriction protocol for HIV reactive at blood donation unit of Bojonegoro, East Java Province, Indonesia. Understanding these concerns may potentially contribute to the evaluation, implementation and mitigation of HIV cases during COVID-19 pandemic.

## 2. METHOD

A retrospective cross-sectional study conducted to determine the seroprevalence of HIV among voluntary blood donors at the Indonesia Red Cross Bojonegoro Indonesia from January 2020 to December 2021. Records of 51,351 blood donors were collected and reviewed by using a checklist from registration book and pass the donor selection criteria. The year 2020 and 2021 was selected because there was a crucial change in blood collection following COVID-19 pandemic which affected the mobility and social contact. Screening for HIV was

done by using several methods, there are RDT, ELISA, and CHLIA. The methods used depend on the availability of the reagents in blood donation unit. Test protocol and result interpretation were done according to the manufacturer instruction. Quantitative data was processed and analyzed using the statistical package SPSS version 16.0. Frequency distribution, percentages and summary statistics were used to describe the study population.

### 3. RESULTS AND DISCUSSION

The COVID-19 pandemic required a large-scale social restriction globally, so does in Indonesia. Attempting a social restriction in one of the largest population countries was a challenge that was controlled the best possible way [15], [16]. The advisory about voluntary blood donation was also issued during the regulation strictly applied. Our study was aimed to analyzing HIV infection among blood donor related issues to assess the trends in TTIs in two consecutive years of COVID-19 pandemic, 2020 and 2021. We examined the occurrence of HIV infections among blood donors in Bojonegoro, Indonesia by serological methods and compared the result. Most of the blood donors have donated voluntarily in the blood donation camps or building organized by blood donor unit of Indonesia Red Cross, Bojonegoro. Screening of TTIs for blood donor in Bojonegoro showed a significant different from 2020 and 2021 (p-value <0.05) and showed in Table 1. A reactive result of HIV screening from 21,260 donor in 2020 showed 12 donors reactive (0.000564%), while in 2021 from 30,091 donor showed 42 donors reactive (0.142899%). The number of reactive donors increase numerously from 2020 to 2021, while total donor also increased. Prevalence of HIV cases among blood donor is less than 1% and indicate as low-prevalence, however the significant increase of new diagnose at blood donation unit as a screening method be an alarm for its disease control.

Table 1. A reactive number of HIV among blood donor

No.	Year	N	Reactive	%
1	2020	21,260	12	0.0005644
2	2021	30,091	43	0.142899
	Total	51,351	55	0.10716

There may be several reasons for low prevalence of HIV in our blood bank such as strict pre-donation counseling and exclusion of high-risk individuals, low prevalence of HIV in our region and missing of donors in window period. If blood donors came mainly from low-risk targeted public, the possibility of window period transmission can be minimized [5]. Majority countries not discovered yet the impact of COVID-19 for increasing of HIV among blood donor. The research conducted in blood bank of Colombia shows the incidence HIV among blood donor significantly increased, while other TTIs screening decreased (hepatitis B and hepatitis C virus) [17]. Similar results in Canada found and suggestion to reduce the spreading of COVID-19 directly increased the HIV cases [18]. Those concern also found in India which seroprevalence of HIV during pandemic clearly shows difference before and during pandemic, 0.03% in 2019, 0.05% in 2020, and 0.09% in 2021 [19], [20]. Some modelling conducted in China predicted HIV cases increased between 5-14% caused by pandemic [21], [22]. Restriction level and HIV cases in blood donor showed in Figure 1.

COVID-19 pandemic has led to many serious issues about its impact on transfusion services and especially how to ensure a stable blood supply amid coronavirus concerns. The Government has taken different procedures to control the spread of this infection such as complete restriction of all activities except essentials. The application of restrictions is limited based on COVID-19 incidences were active cases, death rates, cure rates and area priority for controlling COVID-19.

In Indonesia, social restriction was not a prohibition on activities but a limitation for society activities and focusing for reducing the transmission. The target do not become new clusters of increasing COVID-19 cases. Indonesia restriction regulates several things: i) reorganize activities at workplaces with work from home (WFH) to 75% and strictly applied the health protocol; ii) online teaching and learning activities; iii) the essential sectors related to health service and logistic distribution allow to operate 100% by rearrangement operational hours, capacities, and maintaining strict health protocols; iv) limiting the operational hours in shopping centers until 19.00 local time, while activity on site is a maximum of 25%, and ordering food permitted via take away or delivery only; v) allow construction activities to operate 100% with the implementation of stricter health protocol; vi) religious activities on specific place allow 50% capacity limit and should be done by applied health protocols; vii) public facilities and socio-cultural activities are temporarily on hold; and viii) public transportation are arranged its capacity and operating hours [23].

The activities during restriction periode allowed by Indonesia government showed in Figure 2. Social restriction categories into 4 level which permit different amounts of activities; level 1 permit 25% WFH and

75% outside activities allowed applying health protocol, 50% activities allow on level 2 of social restriction, level 3 forced 75% activities been handle from home, and level 4 describe as a total restriction which 100% WFH and decide no social interactions [23], [24]. The level of social restriction has contribution of HIV reactive case among blood donor and showed from two years of pandemic with p-value <0.05. It describes a higher level of social restriction contribute more HIV reactive cases among blood donor.

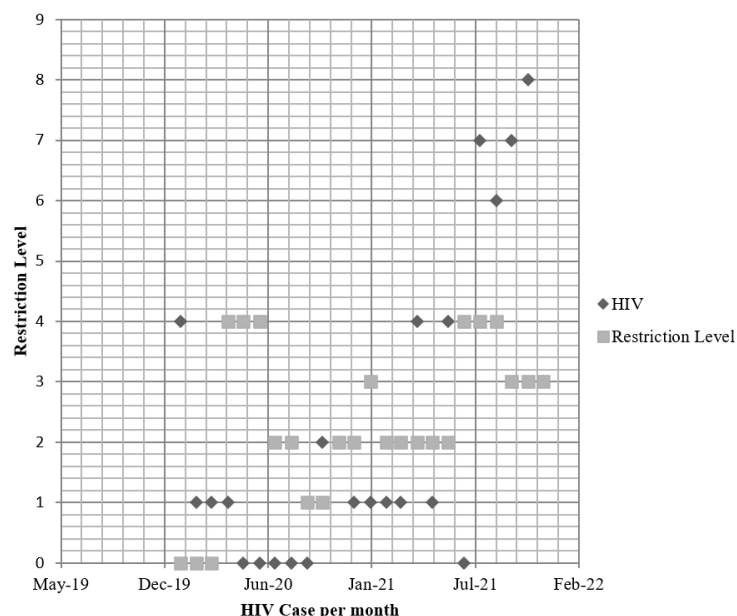


Figure 1. HIV reactive cases and restriction level (2020-2021)

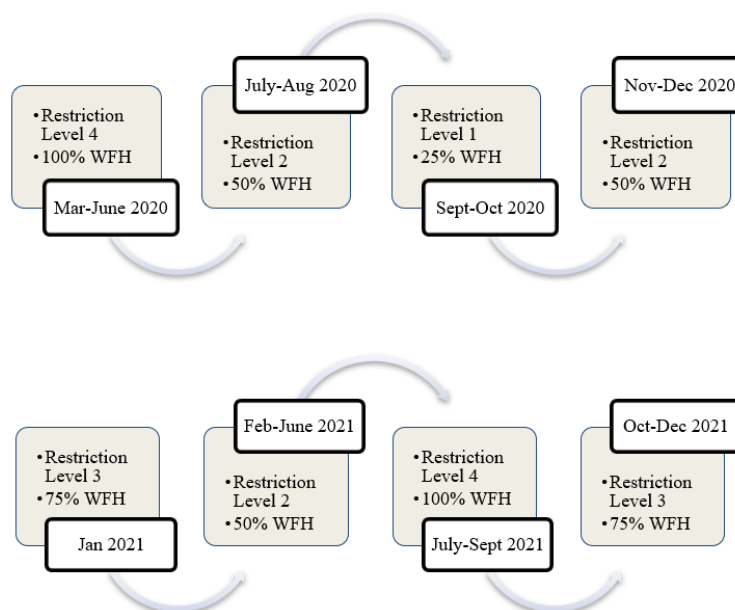


Figure 2. Implementation of social restriction (2020-2021)

Challenging HIV to well maintain during pandemic focused on several issue; accessible facilities for HIV testing and diagnose, antiviral therapy (ART) delayed, distribution of ARV drugs due to lockdown and traffic control during pandemic. During the COVID-19 restriction regulation, most infectious disease expert, globally, continued to provide healthcare services to both HIV and COVID-19 patients, while at the beginning of pandemic afraid of an inadequate stock of drugs being available and accessible. In contrast, limitation of

social mobility and export import activities give great impacts for HIV drug distribution and health facilities program for HIV control in Indonesia [15], [20], [25].

In response to prevent COVID-19 transmission, Indonesia have consolidated social distancing, stay at home, hygiene policies, and country lockdown strategies to restrict transmission and protect health care services. Indonesia not allowed foreigners to enter and have recently restricted travel between provinces for all citizen in efforts to stop internal mobility and eliminate its transmission between borders [26] an unexpected issue has silently appeared in Indonesia from the COVID-19 pandemic, and engrained discrimination and stigma against people living with HIV/acquired immunodeficiency syndrome (AIDS) (PLHIV), and a disruption in accessing the life-saving ARV treatments [7], [27]. The ARV supply chain in Indonesia was not close to reaching its targets. About 6.1% of PLHIV received ART, while expert predicts distribution cost increased 10-25%. ARV stock management and distribution weakened by the restriction of social mobility during prevention systems of COVID-19 transmission [28] Most significantly, country lockdowns from India have stopped the supply chain of ART into Indonesia which India is the first-line ART distribution to Indonesia. This issue should handle wisely by Indonesia Health Ministry to avoid people living with HIV stopping ART treatment. The limited ART stock during pandemic lead patients unable to treat and accelerate the current fast-growing HIV epidemic [29].

WHO has stated its concerns that access ART is clearly impacted by COVID-19 and focused the global health funding to mitigate the damage [4]. Several studies have aimed to predict through several methods of this impact. Research remodeled and estimated an issue HIV-related over five years would be increase significantly and reach 10% compared there were no COVID-19 pandemic. Through this modelling, the biggest impact coming from disruption of ART during pandemic and HIV-testing/new diagnose cannot reach all prediction cases [12] Another study in sub-Saharan concluded that such actions might result in extraordinary difficulties among at risk segments of society to access health services, safety food during treatment, and the potential for physical distancing measures to increase the social isolation of people living with HIV and AIDS [9], [30], [31]. This study suggest that prevention of HIV and AIDS combination have negatively affected by COVID-19. HIV diagnosis procedure and linkage with treatment have seen the largest short-term consequences, with numbers of blood donor tested HIV reactive can affects safe blood supply. This research funding is important which proven that COVID-19 pandemic led to directly impacted to other health concern which is became a major infectious disease before the COVID-19 pandemic stated.

#### 4. CONCLUSION

COVID 19 pandemic has led to many serious issues about its impact on transfusion services and especially how to ensure a stable blood supply in current health life-threaten. The Government has taken different procedures to control the spread of COVID-19 such as complete restriction of all activities except essentials. This regulation have significant impact to other infectious diseases transmission, HIV infection is one of increasing cases during 2020-2021. Its condition can affect blood supply which must be follow a very strict criteria, non-reactive for TTI.

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