



ORIGINAL ARTICLE

Effect of the first year of COVID-19 pandemic on the collection and use of blood components in Colombia monitored through the national haemovigilance system

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Abstract

Objective: This work aimed to establish the effects of the COVID-19 pandemic on blood collection and blood product usage at the end of the first year.

Background: The arrival of SARS-CoV-2 to Colombia on March 6, 2020, triggered closure of borders and mandatory lockdown from March 23, 2020.

Methods/Materials: The Colombian National Institute of Health administers the National database of confirmed cases of SARS-CoV-2 and the National Haemovigilance System. We examined positive SARS-CoV-2 cases identified between March 6, 2020, and March 6, 2021, using positive RT-PCR testing (72.8%) or reactive antigen (27.2%). We also analysed accepted and deferred donors' information provided by 100% of blood banks and transfused patients notified by 83% of health care facilities nationwide, between March 1, 2019, to February 28, 2021.

Results: Colombia registered 2 273 245 SARS-CoV-2 cases. From these, 60 412 people died from COVID-19 (2.7%) and 2 172 418 individuals recovered (95.6%). There were 11 659 216 SARS-CoV-2 processed samples nationwide. People between the ages of 20 and 39 years concentrated 44.4% of the SARS-CoV-2 cases. There were 773 569 blood donations, mainly from a 20-39-year-old population (60.5%). The pandemic caused a reduction of 155 393 blood donations (16.7%) and 51 823 total deferrals (33.7%).

An 18.4% drop in volunteer donors and a 37.3% increase in donations from family/replacements members were observed. There were 399 453 transfused patients and 1 179 895 blood components administered (−8.7% and −13.9% compared to March 2019–February 2020).

Conclusion: Mandatory lockdowns in Colombia decreased blood collection and usage, resulting in a reduction of blood components transfused to individual patients.

KEYWORDS

blood banks, blood donor; blood component, COVID-19, SARS-CoV-2

1 | INTRODUCTION

In December 2019, investigators identified the emergence of a new coronavirus (SARS-CoV-2) in Wuhan, China,¹ which rapidly spread worldwide.² The virus is responsible for causing the coronavirus 19 disease (COVID-19), which was declared a pandemic by the World Health Organisation (WHO) on March 11th, 2020.² On March 6, 2020, the first case of a person positive for SARS-Cov-2 in Colombia was made official.³ On March 21, 2020, the first national death from COVID-19 occurred⁴ and as of March 23, the Colombian government declared the national health emergency, the closure of borders, and mandatory confinement until August 1, 2020,⁵ which helped reduce the basic reproduction number (R_0) from 4.8 to 2.2.⁶ Subsequent research identified the arrival of SARS-CoV-2 to the country predominantly from Europe and North America, with the B1 and B1.5 lineages being the most widespread.⁶

One of the main concerns as mandatory confinements were established in the countries to fight the pandemic was the drop in blood collections and availability.⁷⁻¹⁰ For example, India and China reported a drop in blood donors by more than 67% after the massive suspension of blood donation campaigns.^{11,12} However, several compensatory measures, such as deferrals of elective and non-urgent surgeries, were implemented in hospitals to deal with shortage.^{13,14} These measures have reduced the demand for blood components by up to 84%.^{11,15} Additionally, government entities such as the Food and Drug Administration (FDA) in the United States of America,¹⁶ and the National Institute of Health (Spanish acronym INS) in Colombia¹⁷ modified their criteria for accepting blood donors to improve supply.

The INS manages the national database of confirmed cases of SARS-CoV-2 (National Registry of Patients and Results, Spanish acronym SISMUESTRAS)¹⁸ that collects and publishes¹⁹ information from 1386 qualified laboratories. Likewise, INS coordinates the country's blood network, formed by 30 public and 53 private blood banks²⁰ that collect 93% whole blood and 7% apheresis annually²¹ and more than 580 health care facilities that transfuse blood.²² The blood donation rate in Colombia changed from 18.5/1000 inhabitants in 1995²³ to 25.1 in 2020.²¹ Likewise, blood donation from family/replacement went from 44.2% in 2005²⁴ to 7.3% in 2020,²¹ while donations from unpaid altruistic volunteers increased from 55.8% in 2005 to 92.7% in 2020. Since 2018 all the actors report the information corresponding to the collection and use of blood, in a single unified national base of blood donors and patients called National Haemovigilance System (Spanish acronym SIHEVI-INS) administered by INS. This work aimed to describe the effect of SARS-CoV-2 new detected cases on the collection and use of blood components in Colombia during the first year of the COVID-19 pandemic.

2 | MATERIALS AND METHODS

2.1 | COVID-19 cases identified in Colombia

It was mandatory for the 1386 laboratories authorised to take samples and diagnose SARS-CoV-2 infection to notify SISMUESTRAS the

results daily. Confirmed cases were considered from samples with a positive RT-PCR test or reactive antigen. We exported the consolidated information between March 6, 2020 and March 6, 2021 according to sex and age from patient's samples.

2.2 | Lockdown restrictions and modifications during the first year of COVID-19 pandemic

On March 23, 2020, there were 1000 new cases, and the government established a national health emergency state with a mandatory lockdown order, including the closure of commercial flights and frontiers. The government defined the first extension of the lockdown order on April 13, 2020 and on April 27, 2020, a second extension. On May 5, 2020, Colombia registered 10 000 new cases. Lockdown restrictions changed after May 17, 2020, and strict confinement was avoided, except in those zones with high rates of infection. However, some limitations prevailed nationwide. On May 25, 2020, the national government established 43 exceptions to mandatory lockdown. The first peak of the pandemic occurred between June 29 to September 13. On September 22, 2020, there was a reopening of international commercial flights. On October 25, 2020, Colombia registered 1 million new cases. The second peak started on November 23, 2020, and lasted until February 4, 2021 and required a new local strict confinement until January 23, 2021. Vaccination started in Colombia on February 17, 2021, initially on 80 years and older population and front-line medical personnel. Thus, we defined six phases for comparison: one: strict lockdown; second: flexibilization of lockdown; third: the first peak of SARS-CoV-2 cases; fourth: Reopening of international borders; fifth: the beginning of the second peak of SARS-CoV-2 cases and sixth: new local lockdown measures and the start of vaccination.

2.3 | Blood donors attended, accepted, and deferred before and during first year of COVID-19 pandemic

Until March 2021, SIHEVI-INS compiled information on all donations made in 100% of the country's blood banks. It is mandatory at the national level that each blood bank consult the unique identification number from a potential donor in SIHEVI-INS,²⁵ before accepting a donation. During 2019–2021 there were 83 blood banks in the country consulting to SIHEVI-INS. Blood banks carried out the donor attendance registry daily. However, blood banks reported the accepted and deferred donors monthly. Therefore, we analysed the number of confirmed cases of COVID-19 and donor attendance to blood banks notified between March 6, 2020 and March 6, 2021. On the other hand, we analysed the accepted and deferred (transient or permanent) donor's rate (accepted or deferred donors / attended potential donors, per 100) between March 1, 2019 and February 29, 2020 (before pandemic) and March 1, 2020 to February 28, 2021 (during pandemic). To evaluate the direct impact of COVID-19



infection on repetitive blood donors we matched the SIHEVI-INS versus SISMUESTRAS databases.

2.4 | Comparison of the national blood transfusions before and during first year of COVID-19 pandemic

SIHEVI-INS received information of blood components transfused to patients in 525 institutions (83% nationwide). As the blood banks, health care facilities that transfused notified events monthly. To compare the change in blood use, we analysed the information in the SIHEVI-INS database between March 1, 2019, and 28 February 2021. The variables included were blood components transfused to patients according to the hospital service, age-range, and sex.

2.5 | Statistical comparisons

We reported values of analysed variables using the mean and SD or the median and interquartile range 25–75 (IR25-75) when the normality test or equal variance test failed. We made statistical comparisons using T-tests or one-way ANOVA. For all pairwise comparisons we employed the Holm-Sidak test. In case of failure in the normality test or equal variance test, we employed the Mann-Whitney Rank Sum test through SigmaStat 3.11 software.

3 | RESULTS

3.1 | After one year of pandemic, there were 2 273 245 new cases of SARS-CoV-2

At the end of March 6, 2021 there were 2 273 245 new SARS-CoV-2 cases, 60 412 people died from COVID-19 (2.7%), 2 172 418 recovered, 40 415 active cases and 11 659 216 processed samples (72.8% RT-PCR and 27.2% antigen).²⁶ SARS-CoV-2 infection was detected in all age ranges of the population, with a similar distribution by sex (Figure 1A). People between the ages of 20 to 39 years concentrated 44.4% of the cases, although they represent 32.2% of Colombia's total population.²⁷

Before pandemic, there were 928 962 blood donations (Figure 1B). Individuals aged 20 to 39 years contributed 62.8% (median by each year old: 28467 IR25-75: 23491-34 580). After 1 year of pandemic, there were 773 569 blood donations. The 20-39-year-old population contributed 60.5% (median: 24465 IR25-75: 20656-25 875, $p = 0.008$) (Figure 1C). The proportion of donations did not show statistical significance, comparing both periods regarding age (median by each year old before pandemic: 15185 IR25-75: 9406–25 844 versus median during pandemic: 14789 IR25-75: 9456–23 013, $p = 0.380$) and sex of donors (median of female donors by each year old before pandemic: 6872 IR25-75: 4726–12 502 versus during pandemic: 6909 IR25-75: 4725–11 039, $p = 0.421$; median of male donors before

pandemic: 8541 IR25-75:4970–13 620 versus during pandemic: 8066 IR25-75: 4998–11 730, $p = 0.288$). We identified 24 219 individuals who donated blood between March 6, 2020, and March 6, 2021, and who had a positive test for SARS-CoV-2 (3.1% of total donations; frequency of positivity in donations = 1:32). Of these, 1541 people made a blood donation 14 days before or after the virus test was positive.

3.2 | Potential blood donors attended, accepted, and deferred decreased because of mandatory confinements and not due to the number of new cases of SARS-CoV-2

To identify how the mandatory lockdowns impacted the attendance of potential donors to blood banks during the first year of the COVID-19 pandemic in Colombia, we analysed the number of attended donors per week, before, during, and after these measures (Figure 2). We also described the new cases of SARS-CoV-2 identified per week from the registration of the first event (March 6, 2020) until the end of the first year of pandemic (March 6, 2021). During January 13–March 1, 2020, the 83 blood banks reported an average of 34 272 (SD: 1347) potential donors each week. Between March 2 and March 29, 2020, the country went from registering its first SARS-CoV-2 case and death, to 1000 new cases and establishing a national health emergency state with a mandatory lockdown order. While this strict guideline lasted (March 23–May 10, 2020), there was an average weekly attendance of potential donors = 21 902, SD: 3022 (–36.1% compared to January 13–March 1, 2020, $p < 0.001$).

To determine if there was a relationship between the total number of donors attended by blood banks and the number of new SARS-CoV-2 cases registered per week, we compared the average of attended donors when Colombia reported fewer than one new case per week/1000 inhabitants versus more than that. Since March 6, 2020, there were 27 weeks with a rate lower than one (median = 0.203, IR25-75: 0.028 to 0.648) and 26 weeks with more than one (median = 1.237, IR25-75: 1.119–1.562, $p < 0.001$). When the report was less than one new case per week/1000 inhabitants, blood banks notified an average donor attendance per week = 26 451 (SD: 3751.2), while when there were more than that, the attended potential donors were 26 636 (SD: 3784.3), $p = 0.859$.

To establish the potential donors' outcomes, we analysed acceptance and deferral rates (including suspicion of SARS-CoV-2 infection), Table 1. According to the type of donor, there was an 18.4% drop in unpaid altruistic volunteers and a 37.3% increase in total donations from family members or replacements (Table A1).

3.3 | COVID-19 pandemic reduced the ratio of average blood components transfused per patient from 3.15 to 2.95

Before pandemic 437 599 patients received a total of 1 371 166 blood components, which represented an average of 3.15 blood

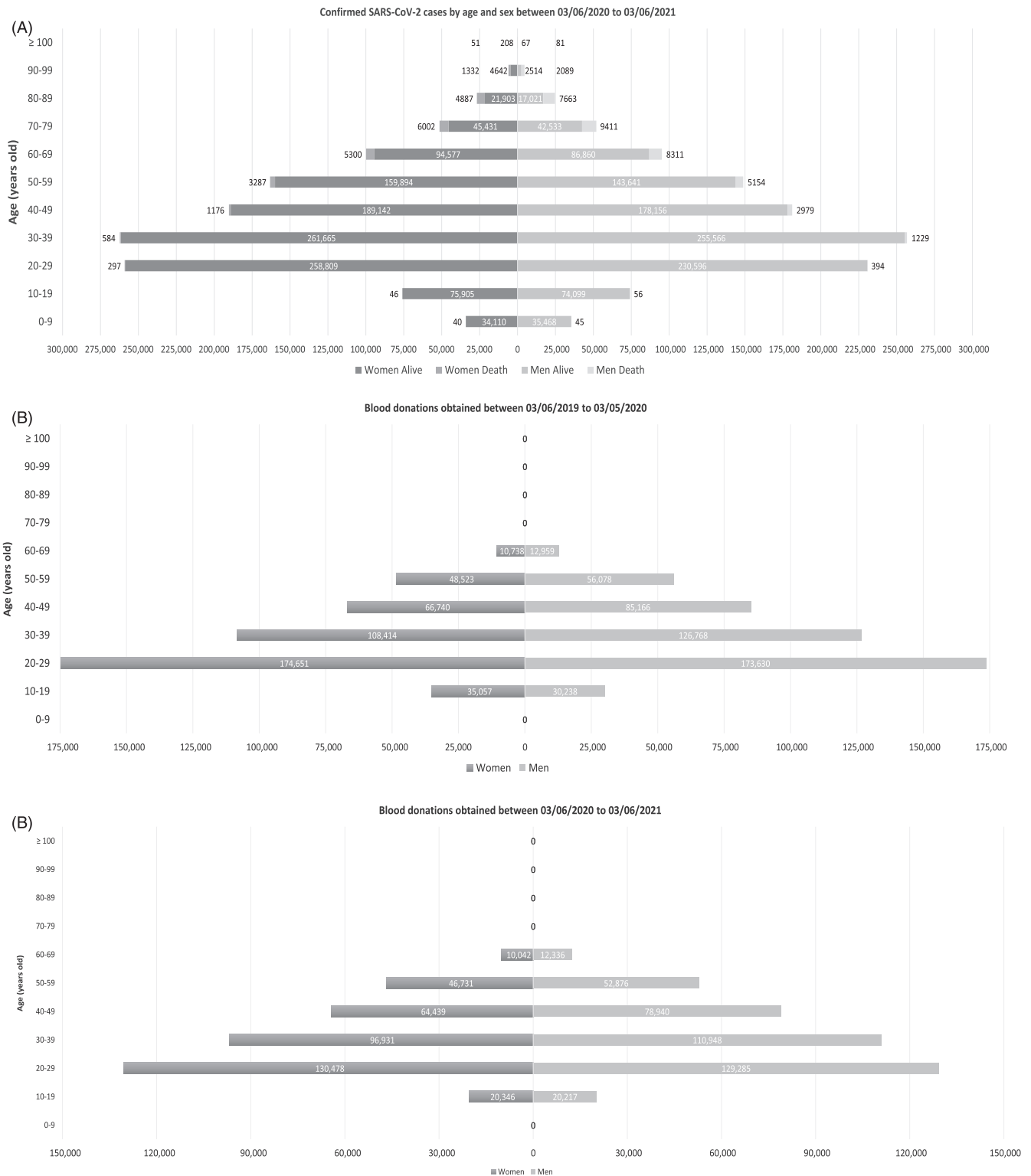


FIGURE 1 Confirmed SARS-CoV-2 cases and blood donations based on sex and age

components per person (Table 2). In the March 2020–February 2021 period, 399 515 transfused patients were notified, and 1 179 901 blood components administered or an average of 2.95 blood components transfused per person. Therefore, there was an 8.7% decrease in the total number of transfused patients ($p = 0.010$), and a 13.9%

reduction in the number of blood components administered ($p < 0.001$).

Regarding the type of blood components transfused in March 2020–February 2021 period, 57.8% corresponded to red blood cells, 21.3% to platelets, and 15.6% to plasma. Compared to March 2019–

February 2020, these data represented a reduction of -13.3% , -13.9% , and -17.1% ($p < 0.001$) respectively.

To evaluate changes in the ordering and delivery of red blood cell (RBC) units before and during the first year COVID-19 pandemic, we compared the number of units requested by transfusion services and the number of units delivered by blood banks. Before the pandemic, transfusion services requested a median of 65 558 RCB units monthly (IR25-75: 63960-67 636), while during the pandemic, there were 64 568 (IR25-75: 58054-68 923, $p = 0.583$). In terms of units delivered before pandemic, blood banks reported monthly an average of 60 628 (SD:2539) and 52 272 (SD: 5632) during pandemic, $p < 0.001$. Therefore, the index delivered/requested RBC changed from 91.5% (SD: 3.1%) in 2019–2020 to 83.9% (SD: 3.2%) in 2020–2021 ($p < 0.001$). Regarding the plasma component, while in 2019–2020 the ratio between delivered / requested plasma was 93.1% (SD: 1.6%) in 2020–2021 was 91.6% (SD: 1.0%), $p = 0.017$. We also found a statistically significant differences in the ratio between delivered / requested platelets: it was 95.5%

(IR25-75: 94.3%–96.1%) in 2019–2020 and 94.3% (IR25-75: 93.8%–5–95.0%) in 2020–2021 period $p = 0.04$.

To establish whether all hospital services reduced the number of patients and blood components used, we compared the results reported by each medical specialty before and during pandemic (Table 3). We identified that oncology, neonatology and burn unit, increased 7.9% the number of patients seen during pandemic (Figure 3). In contrast, the remaining 21 specialties presented an interannual variation of -16.7% .

Finally, we established whether there were changes in the number of transfused patients based on sex and age before and during the pandemic. In the 2020–2021 period, the population aged 0–1 years received 26 108 blood components (54.8% male), between 2 and 14 years: 18442 (53.8% male); between 15 and 64 years: 216134 (54.9% female), and those over 64 years: 138769 (51.7% male). Compared with the pre-pandemic period, all age groups showed a decrease: -11.6% , -20.8% , -6.1% , and -10.2% respectively. According to the sex of the recipients, during the pandemic 51.6% were women versus 52.4% before the pandemic ($p = 0.885$).

TABLE 3 Blood components transfused to patients per specialty. March 2019–February 2020 and March 2020–February 2021 periods

Specialty	Transfused BC		TP		BC/TP 2019–2020	BC/PTP 2020–2021
	2019–2020	2020–2021	2019–2020	2020–2021		
Adults ICU	363.539	331.825	76.587	75.518	4.7	4.4
Emergencies	236.882	181.191	93.903	75.534	2.5	2.4
Internal Medicine	202.246	187.876	68.886	65.668	2.9	2.9
General Surgery	114.930	90.324	41.126	36.525	2.8	2.5
Haematology	70.856	62.811	11.941	10.331	5.9	6.1
Paediatrics*	64.127	52.137	23.528	21.296	2.7	2.4
Others	61.944	57.787	25.184	23.869	2.5	2.4
Cardiothoracic Surgery	49.140	30.493	7.762	6.228	6.3	4.9
Oncology	43.607	43.626	14.901	16.757	2.9	2.6
Gynaecology	34.974	28.398	18.545	16.880	1.9	1.7
Neonates*	31.077	28.413	20.117	21.377	1.5	1.3
Adult intermediate care unit	22.297	21.022	6.579	5.644	3.4	3.7
Obstetrics	18.721	15.833	9.047	8.714	2.1	1.8
Orthopaedics	15.564	12.342	6.695	5.043	2.3	2.4
Transplants	9.500	7.393	1.302	1.210	7.3	6.1
Ambulatory	8.429	7.190	3.137	2.905	2.7	2.5
Renal Unit	4.287	4.062	2.526	1.275	1.7	3.2
Gastroenterology	3.796	3.507	1.281	1.119	3.0	3.1
Vascular surgery	3.576	3.149	798	640	4.5	4.9
Neurosurgery	3.419	3.141	1.129	917	3.0	3.4
Urology	3.381	2.702	1.193	966	2.8	2.8
Burned Unit	1.954	1.894	450	473	4,3	4.0
Chronic care unit	1.933	2.118	425	332	4.5	6.4
Plastic surgery	987	661	557	232	1.8	2.8
Total	1.371.166	1.179.895	437.599	399.453	3.1	3.0

*Includes Intermediate and intensive care units.

Abbreviations: BC, blood components; Px, transfused patients.



FIGURE 3 Variation in blood components transfused to patients: March–February 2019–2020 versus 2020–2021

4 | DISCUSSION

Our findings demonstrate that Colombians between the ages of 20–39 constituted the population with the highest frequency of infection by SARS-CoV-2 during the first year of COVID-19 pandemic and the same age population represented the country's primary blood source. US Centers for Disease Control indicated that people between 18–39 years old represented 39% of all COVID-19 infections,²⁸ compared to 47.4% of Colombian people of the same age.¹⁹ Recently Marcus remarked on the generation gap identified in the US, where young blood donors did not replace older ones, particularly in times of pandemic where donations decreased and the demand for blood increased.²⁹ Similarly, Chandler et al., identified that the mean age of blood donors in seven European countries during the COVID-19 crisis was 42 years.⁹ These results suggest that Colombian blood donors were younger than their peers in North America and Europe.

We identified a 36.1% decrease in the assistance of potential donors to blood banks nationwide after the state of emergency declaration, which partially recovered by 24.7% after reopening sectors, but that resulted at the end of 2020 in a drop of accepted donors of 13.8%. Chandler et al. remarked large interruptions to donation activity may have stark consequences for healthcare systems and should be avoided.⁹ Our analysis of changes in blood donation at different phases of the pandemic (Figure 2) demonstrated the factor that had an effect in reducing the attendance of blood donors was the first mandatory strict confinement ($p < 0,001$). The other phases of the pandemic did not show statistically significant differences, indicating that blood banks and donors adapted to the new circumstances regardless of the number of new SARS-CoV-2 cases. Al-Riyami et al. reported a reduction in blood availability between 26–50% in 15 countries of the Mediterranean region mainly by cancellation of blood drives and social distancing/lockdowns.¹⁰ Wang et al. revealed that in Zhejiang province during the pandemic, 96.1% of donors surveyed were unwilling to donate.¹² The most frequent reasons were fear of infection (81.2%) and weak immunological defences (14.1%) causing a

drop in the collection of 67%. Rafiee et al. reported that the 26% decrease in blood donation in Iran was not due to an increase in deferrals due to COVID-19 but to a reduction in the number of voluntary donors who attended the collection centers because of mobility restrictions.³⁰ The WHO suggested in July 2020 a temporary deferral to potential blood donors exposed to SARS-CoV-2 for 14 days.¹⁴ In other places an extending time from 28 to 56 days was applied.³¹ Colombia, defined a 28-day deferral from April until October 2020 and 14 days thereafter. To date, we do not know if part of the lower donor collection in our country could be due to potential donors' fear of becoming infected. However, because we did not find a relationship between the number of newly detected cases of the virus and blood donors' care, neither a correlation with an increase in total deferrals, these hypotheses seem unlikely.

Our results showed that although the total number of potential donors attending blood banks was reduced during the pandemic, the donation acceptance rate was on average 2.8% higher. Likewise, voluntary non-remunerated blood donors decreased by 18.4% compared to March 2019–February 2020. On the contrary, family/replacement blood donors grew 37.3%. However, this increase was not enough to offset total donations, which fell 16.7%. We also identified a 2.5% and 0.3% reduction in temporary and permanent rate deferrals respectively, indicating a more flexible blood donor selection process. Similarly, Al-Riyami et al. reported some centers in Eastern Mediterranean Region had to alter the blood donor eligibility criteria to meet demands.¹⁰ Even during the COVID-19 pandemic, Colombia guaranteed 92.0% of its collection from unpaid altruistic volunteer donors, unlike Nigeria, where 61.7% of donations came from paid donors and 30.6% from family or replacement donors.³² Colombia's 2020–2021 results changed the trend maintained the last 12 years, where the number of altruistic volunteer donors increased by 37.9% (reaching 94.9% of the total in 2019), and family/replacement donors fell to 5.1% and contradict the WHO's recommendations about encouraging voluntary unpaid altruistic donation and reducing family/replacement donations to diminish transfusion-transmitted infections.^{33,34} In 2018 and 2019, Colombia reported four

cases of HIV transmitted by transfusion caused by donors in the viral window period in which the donor selection mechanisms failed.^{35,36} We do not know if the flexibility identified in the selection process due to the lack of donors will translate into a higher risk of transfusion-transmitted infections.

We reported 1541 people who donated blood 14 days before or after testing positive for SARS-CoV-2. This behaviour suggests a failure in the donor selection mechanisms, despite international recommendations issued to avoid blood donations before this time.¹⁴ We identified these donors through the interoperability of two databases managed by the INS. Nevertheless, the identification was not timely to prevent blood donations from these infected individuals. Seroprevalence of IgG Anti-SARS-CoV-2 among Blood Donors of 0.1–13%^{37–39} has been reported during the COVID-19 pandemic, as it can be difficult to identify the infection in asymptomatic individuals. However, it is intriguing that the 1541 donors identified in this study omitted information about taking a test for the virus during the infectivity period. There are multiple behaviours and motivations for donating blood.⁴⁰ One of them is test-seeking behaviour, with a prevalence of 1%–9%.^{41,42} We do not know the reasons that motivated these individuals to omit relevant information. Perhaps they thought the blood bank would perform an additional test to confirm infection, or they did not perceive the risk of attending the collection centers and infecting, so further research is warranted. Although Angiotensin-converting enzyme 2 (ACE2) was identified as a functional receptor for SARS-CoV-2, its abundance in blood cells is low.⁴³ To date, there are no cases of SARS-CoV-2 infection transmitted by transfusion.^{38,44,45} However, it is unknown whether the viral genetic material contained in blood bags can modify the appearance of adverse reactions to transfusion.

In this study, we showed an 8.7% decrease in the total number of transfused patients and a 13.9% reduction in the number of blood components administered during the first year of COVID-19 pandemic compared 1 year before, which led to the ratio of blood components administered per patient to go from 3.1 to 3.0. Velazquez and colleagues found a 17.6% reduction in transfusion requirements at the Ramon y Cajal hospital in Madrid compared to 2019.⁴⁶ Wang et al. informed a drop of 25.1% in blood components use during the SARS-CoV-2 pandemic, compared to 2019.¹² These authors highlighted that there were administrative measures to restrict clinical demand for blood, such as autologous transfusions, postponing elective surgical procedures, and restrictive transfusion strategies. An AABB hospital-based members survey revealed similar strategies implemented in the US.⁴⁷ A total of 53.8% of respondents have implemented inventory management strategies to address this shortage. Among triggers for cancelling surgeries or procedures in US, the most common reasons were the availability of ICU beds, blood availability, and the COVID-19 case burden.⁴⁸ The number of institutions that reported an increase in blood waste inventories doubled due to changes related to COVID-19.⁴⁹ At the Ramon y Cajal hospital in Madrid the demand for blood in surgery fell 50.2% during the pandemic, while the ICU grew by 116%. Haematology and oncology did not show variations.⁴⁶

We identified a statistically significant drop in both supply and demand for all blood components during the pandemic, especially

RBC units since the second half of 2020. We also found the greatest variation in blood components transfused per patient at transplantation and cardiothoracic surgery services. It was impossible to know these patients' clinical outcomes; then, we could not define whether the reduction in blood components per patient (especially RBC units) impacted their morbidity and mortality. However, multiple systematic reviews have shown in various settings that restrictive versus liberal blood use does not negatively affect 30-day survival.^{50–52} Additional studies are warranted to determine this effect.

In conclusion, this work showed that SARS-CoV-2 infection was detected in all age ranges of the population. However, people between the ages of 20 to 39 years concentrated 44.4% of the cases. People of the same age represented the country's primary blood source (60.5%). Additionally, this work demonstrated it was the lockdown implementation at the national level and not the number of new cases of SARS-CoV-2 that reduced 17% blood collection in the country. Blood shortage produced an 8.7% decrease in the total number of transfused patients and a 13.9% reduction of blood components administered. The identification of accepted donations from people with a SARS-CoV-2 positive test during their infectious period demands to accelerate the measures to incorporate information from multiple databases of public health importance for decisions of acceptance or deferral of donors.

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CONFLICT OF INTEREST

The authors have no competing interests.

AUTHOR CONTRIBUTIONS

Conceptualization; María-Isabel Bermúdez-Forero and Michel-Andrés García-Otálora Data curation: Jonathan-Andrés Soto-Viáfara, Paula-Andrea Gardeazábal-Acuña, and Diego-Alexander Anzola-Samudio; Formal analysis: María-Isabel Bermúdez-Forero, Paula-Andrea Gardeazábal-Acuña and Michel-Andrés García-Otálora Funding acquisition: María-Isabel Bermúdez-Forero; Writing - review & editing: María-Isabel Bermúdez-Forero, Paula-Andrea Gardeazábal-Acuña and Michel-Andrés García-Otálora.

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APPENDIX A

Month	Voluntary unpaid			Family/replacement		
	2019-2020	2020-2021	%	2019-2020	2020-2021	%
March	74 836	58 466	-21.9%	3941	3099	-21.4%
April	72 814	44 352	-39.1%	3633	1988	-45.3%
May	79 618	49 744	-37.5%	4024	4333	7.7%
June	69 258	53 360	-23.0%	3668	5751	56.8%
July	77 625	56 896	-26.7%	3851	6934	80.1%
August	72 513	59 195	-18.4%	3989	5380	34.9%
September	73 998	64 857	-12.4%	3663	6270	71.2%
October	76 215	67 868	-11.0%	3319	6219	87.4%
November	68 845	66 927	-2.8%	3075	4725	53.7%
December	65 552	66 359	1.2%	3298	5239	58.9%
January	74 799	64 820	-13.3%	4759	6073	27.6%
February	75 282	65 975	-12.4%	3773	5757	52.6%
Total	881 355	718 819	-18.4%	44 993	61 768	37.3%

TABLE A1 Accepted blood donations according to type of donor. Comparison before and during the pandemic