




# New blood donors in times of crisis: Increased donation willingness, particularly among people at high risk for attracting SARS-CoV-2

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## Abstract

**Background:** Traditionally, during crises the number of new blood donors increases. However, the current coronavirus disease 2019 (COVID-19) pandemic created additional barriers to donate due to governmental prevention measures and increased personal health risks. In this report, we examined how the pandemic affected new donor registrations in the Netherlands, especially among groups with higher risk profiles for severe COVID-19. Additionally, we explored the role of media for blood donation and new donor registrations.

**Study Design and Methods:** We analyzed new donor registrations and attention for blood donation in newspapers and on social media from January until May 2020, in comparison to the same period in 2017 to 2019.

**Results:** After the introduction of nationwide prevention measures, several peaks in new donor registrations occurred, which coincided with peaks in media attention. Interestingly, people with a higher risk profile for COVID-19 (e.g., due to age or region of residence) were overrepresented among new registrants.

**Discussion:** In sum, the first peak of the current pandemic has led to increased new blood donor registrations, despite the associated increased health risks. Time and future studies will have to tell whether these new donors are one-off 'pandemic' donors or if they will become regular, loyal donors.

## KEYWORDS

blood donors, COVID-19, crisis, pandemic

## 1 | INTRODUCTION

At the moment, an unprecedented situation is occurring all over the globe – the coronavirus disease 2019 (COVID-

19) pandemic. To prevent further spreading of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), governments around the world have urged their citizens to stay at home, limit their social contacts, and keep to

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physical distancing. Due to the large health, social, and economic impact of the preventive measures, the pandemic is a ruling topic in (inter)national newspapers, magazines, on social media,<sup>1</sup> television, scientific preprints and articles (with already over 90,000 hits in PubMed when searching for articles about SARS-CoV-2 or COVID-19), in government communications, and almost all personal and professional communication.

Previous research has shown that crises not only negatively impact societies, but also make people rise up to the occasion and contribute to public goods. For instance, national emergencies have repeatedly encouraged blood donation as a symbol of national solidarity, leading to higher numbers of new blood donors (e.g., 9/11 in the United States,<sup>2,3</sup> bushfires in Australia<sup>4</sup>). Based on this, one might expect higher numbers of new donors during and after the COVID-19 pandemic. Importantly, however, the current COVID-19 pandemic poses a risk for individuals wanting to donate blood, as donating is impossible within the bounds of physical distancing. Thus, the costs of donating for individuals are increased in terms of health risks, which may be a barrier for donors. Indeed, several countries had faced drops in their numbers of donors and donations in the early weeks of the pandemic.<sup>5-7</sup> In China and Iran, for example, blood donors initially canceled their appointments or did not show up at collection sites because of increased worry to acquire SARS-CoV-2.<sup>6,7</sup> Such reactions are in line with previous findings from SARS and avian flu outbreaks that showed that fear of infection deters donors.<sup>8,9</sup> Individual health risk might play a particularly salient role for vulnerable groups,<sup>10,11</sup> such as older donors or donors from regions more affected by COVID-19.

Consequently, blood collection agencies made appeals, emphasizing the need for blood and the safety of the procedure, which creates awareness and may mitigate the barriers (potential) donors could experience by altering perceptions of fear about risks associated to donating during a pandemic. Increasingly, these appeals to donate blood and the more general discussions around blood donation take place online<sup>12</sup> and might increase motivations to (continue to) donate blood.

Taken together, it is unclear whether the response to the COVID-19 pandemic in terms of new blood donor registrations may show a rise similar to earlier emergencies, or a decline because of the increase in health risks this particular crisis holds for the individual donor. In this report, we examine how the current pandemic affects new donor registrations in the Netherlands. In addition, we study whether certain demographic groups and individuals with higher risk profiles for severe COVID-19 are over- or underrepresented in their contribution to the blood supply during the COVID-19 pandemic. Further, we explore whether new donor registrations

are associated with peaks in media attention for blood donation and Sanquin, the Dutch blood supply organization.

## 2 | MATERIALS AND METHODS

### 2.1 | Data and procedures

In the Netherlands, the blood supply is organized by one collection agency (Sanquin) which yearly collects whole blood and plasma of approximately 330,000 non-remunerated donors at 49 fixed and 87 mobile sites throughout the country. Due to the outbreak of the pandemic, Sanquin implemented several measures to ensure the safety of its donors and staff. For instance, an additional triage was established for donors entering the blood collection center to check whether they (or someone in their household) had experienced COVID-related symptoms in the past 14 days. Soon after, this “Corona check” also became available for donors online. To adhere to physical distancing guidelines (1.5 meters), less collection beds were available and opening hours were extended locally and temporarily to accommodate as many donors as possible. Sanquin informed its donors about these measures via a special page and pop-up on its website and via social media messages. New donors may also have come into contact with this information when they registered via the website.

After the start of the COVID-19 pandemic in the Netherlands, Sanquin started to periodically test samples of blood donations on the presence of SARS-CoV-2 antibodies to check for immunity. This was widely discussed in the news, as were Sanquin’s efforts to contribute to PCR testing (for the presence of the virus) for healthcare professionals and to collect convalescent plasma from donors that recovered from COVID-19 within very strict study protocols (in collaboration with university medical centers) for developing medicine(s) for COVID-19 patients. During this first period of the pandemic, PCR testing was not yet available for the majority of the Netherlands, and thus most people with mild symptoms were not tested. For more information about the blood supply and appeals to donors during the first 2 months of the COVID-19 outbreak in the Netherlands, see Langi Sasongko and colleagues.<sup>13</sup>

To retrieve information on new donor registrations, we exported data from the blood bank information system (eProgesa software application; MAK-SYSTEM). This large-scale register contains demographic information on all Dutch whole blood and plasma donors and individual donation behavior, such as registrations, and donations (attempts); including information on the date, time, and location of each donation attempt. From this database, we

extracted new donor registrations for the period between the first week of 2020 (well before the first confirmed COVID-19 case in the Netherlands in week 8) and week 20 (when several virus control measures were [about to be] relaxed). We compared the registration dynamics in 2020 with those in the same period in 2017, 2018, and 2019.

### 2.1.1 | Timeline and measures

We created timelines aggregated on weekly level, reflecting new donor registrations and Sanquin's media appearance in newspapers and on different social media channels. These timelines also display the official number of infections reported by the Dutch government<sup>14</sup> as well as the imposition of the infection prevention measures by the Dutch government.<sup>15,16</sup> New donor registrations were counted as all potential donors who registered to become a blood donor during the study periods (i.e., week 1–20 in 2017, 2018, 2019, and 2020). During the same time periods, we also collected all Dutch regional and national newspaper articles mentioning *Sanquin* (available from the Lexis-Nexis Uni database) and social media messages about Sanquin as well as blood donation more generally. These social media data were collected through Coosto (www.coosto.nl), which has an extensive social media database. We limited our social media data collection to public posts in Dutch on the three largest social media platforms on which Sanquin is most active: Facebook, Instagram, and Twitter. See Appendix S1 for a complete overview of procedures used to obtain relevant newspaper articles and social media posts.

Additionally, we report sex, age group ( $\leq 24$  years, 25–39 years, 40–54 years and  $\geq 55$  years), and province of residence for all newly registered donors (extracted from the Dutch blood donor database).

### 2.1.2 | Data analysis

Descriptive statistics are presented for all newly registered donors, using means ( $M$ ) and standard deviations ( $SD$ ). To test for differences between groups of donors, we used analysis of variance (ANOVA) for continuous and chi square ( $\chi^2$ ) tests for categorical dependent variables.

## 3 | RESULTS

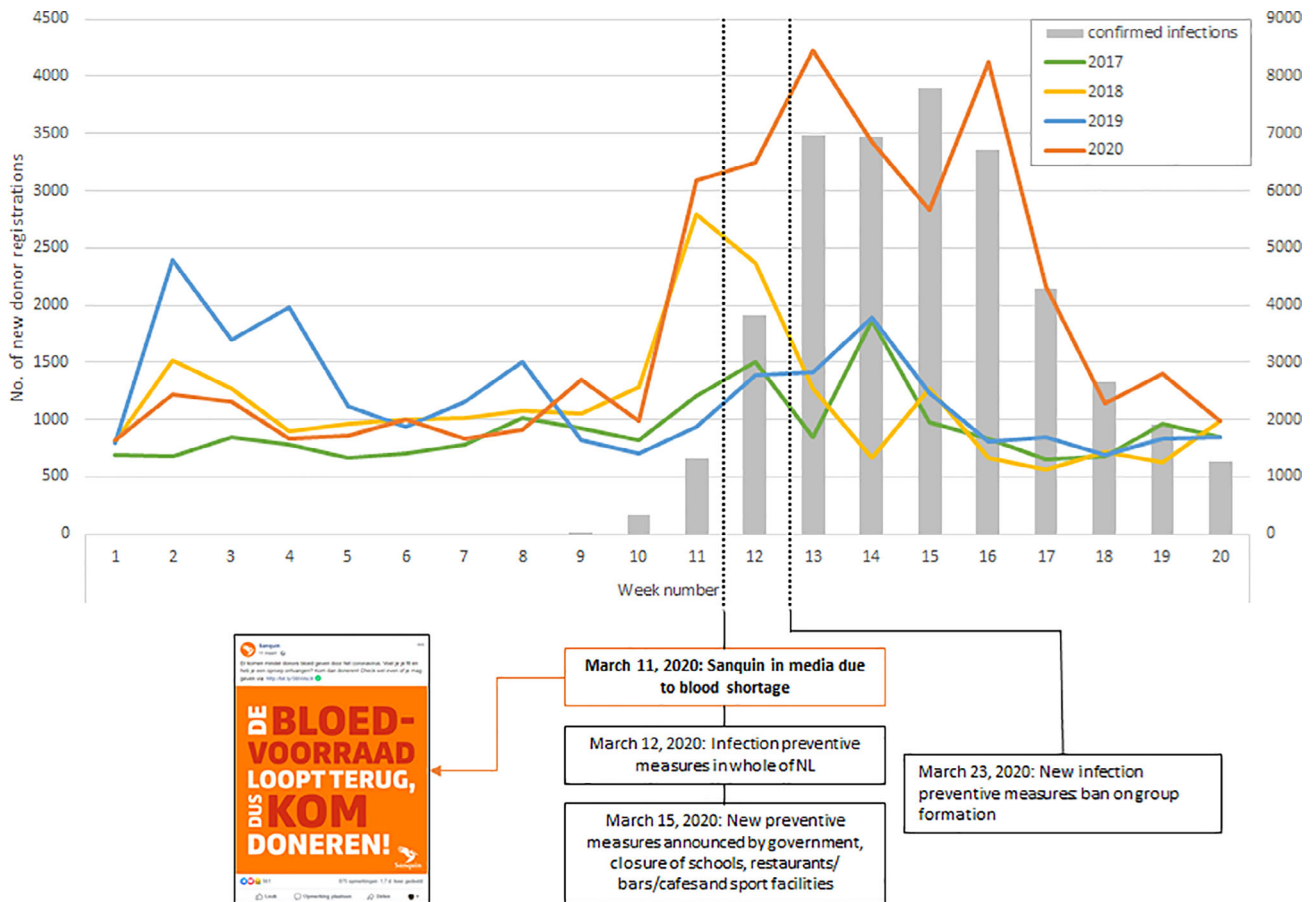
### 3.1 | Donor registrations

While in the first 8 weeks of the year there were more new donor registrations in 2018 and 2019 compared to

2020, this changed after week 10 (cf. Figure 1). After the first infections with SARS-CoV-2 were officially reported in the Netherlands in week 9, the first nationwide infection prevention measures were imposed by the Dutch government (e.g., physical distancing, working from home as much as possible, closing of schools, bars, restaurants, and sports facilities) in week 11. In the same week, Sanquin announced that donors were needed because blood stocks were shrinking. Since then the amount of newly registered donors increased, with peaks in week 13 ( $N = 4226$ ) and 16 ( $N = 4123$ ), while in the same weeks in 2017 to 2019 these numbers were on average 1177 and 767, respectively. After these peaks, the number of new registrations declined and by week 20, when the number of confirmed infections with SARS-CoV-2 had declined and primary schools reopened, they were back to levels comparable to 2017–2019.

Overall, more donors newly registered in the first 20 weeks of 2020 compared to the first 20 weeks of 2017, 2018, and 2019. Compared to 2019 – the highest of the three previous years in terms of new donor registrations – the number of newly registered donors in 2020 grew from 23,997 to 36,573 (+52%), particularly in weeks 11–20 (from 10,885 in 2019 to 26,623 in 2020, +145%). As week 11 marked the first nation-wide infection prevention measures in the Netherlands and Sanquin's appeal for donations, we looked in more detail at the people that registered as new donors between weeks 11–20 (cf. Table 1). The average age of these donors in 2020 was 34.5 ( $SD = 12.4$ ) years, which is older compared to the donors who registered during weeks 11–20 of the previous years ( $M_{2017} = 27.8$ ,  $SD_{2017} = 10.5$ ;  $M_{2018} = 29.6$ ,  $SD_{2018} = 10.7$ ;  $M_{2019} = 28.8$ ,  $SD_{2019} = 10.5$ ),  $F(1, 59,786) = 1,284.20$ ,  $p < .001$ ,  $\eta_p^2 = .06$ . Even though the absolute number of new donor registrations in all age categories in 2020 was higher compared to the three previous years, the increase in registrations was particularly remarkable for the oldest age category. The number of newly registered donors aged 55 or up in 2020 was 2262, which was more than 7 times higher than 320 newly registered donors in 2018 (i.e., the year with the highest number of new donors of the three previous years). Furthermore, the share of the oldest age category among all new registrants increased significantly (i.e., 8.5% in 2020 compared to 2.4%–2.7% for the previous 3 years). The ratio of female versus male new registrants was significantly different in 2020 compared to the other 3 years, as the percentage of female registrants was lower in 2020 (63%) compared to 2017–2019 (67%–69%),  $\chi^2(3) = 227.97$ ,  $p < .001$ .

The Netherlands is divided into 12 provinces, and each of these provinces recorded higher numbers of newly registered donors in weeks 11–20 in 2020



**FIGURE 1** Weekly new donor registrations during January–May in 2017–2019 and 2020. The gray bars indicate the number of confirmed SARS-CoV-2 infections in the Netherlands in that particular week (cf. secondary axis on the right) [Color figure can be viewed at wileyonlinelibrary.com]

**TABLE 1** Age and sex of newly registered donors between week 11–20 in 2017–2019 and 2020

Age	2017			2018			2019			2020		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
≤24	1404	4000	5404	1363	3774	5137	1438	3680	5118	2081	4913	6994
25–39	1205	2144	3349	1591	2917	4508	1474	2392	3866	4495	6502	10,997
40–54	460	887	1347	590	1363	1953	526	1113	1639	2307	4063	6370
≥55	113	151	264	135	185	320	107	155	262	1000	1262	2262
Total	3182	7182	10,364	3679	8239	11,918	3545	7340	10,885	9883	16,740	26,623

compared to the years 2017–2019 (see Table 2). However, the increase in newly registered donors was particularly large in the provinces most affected by COVID-19. For instance, in Noord-Brabant – where the first COVID-19 cases in the Netherlands were found – the number of newly registered donors increased from 1714 in 2018 to 4513 in 2020 (+163%). Similar observations (compared to 2018) were made in the provinces of Zuid-Holland (+125%), Noord-Holland (+151%), Gelderland (+107%), and Limburg (+137%). The provinces in the north(–east

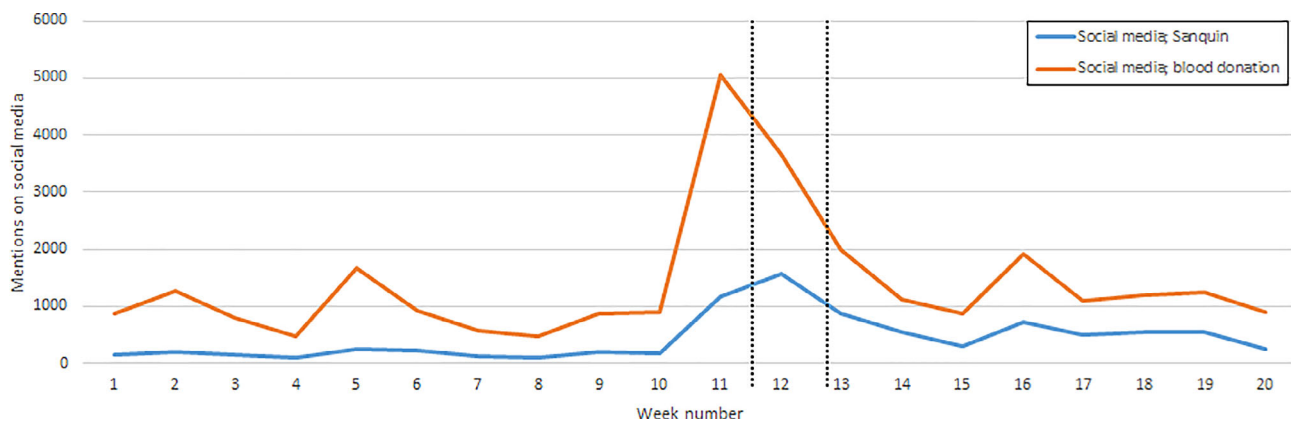
and south-west of the Netherlands (Drenthe, Groningen, Friesland, Zeeland) had much less COVID-19 cases and also showed less pronounced increases in new donor registrations (+49–78% in 2020 compared to 2018).

### 3.2 | Media attention

Figure 2 displays the number of posts that mentioned Sanquin and/or blood donation on Facebook, Twitter, and

Province	2017	2018	2019	2020	Infections
Drenthe	213	280	226	416	498
Flevoland	164	168	159	212	875
Friesland	436	467	469	776	596
Gelderland	1318	1449	1373	2998	5585
Groningen	531	586	532	1046	345
Limburg	487	684	604	1622	4542
Noord-Brabant	1389	1714	1540	4513	8823
Noord-Holland	1545	1927	1756	4843	6434
Overijssel	1018	1096	951	2150	2912
Utrecht	928	1041	898	2547	3348
Zeeland	135	183	138	276	641
Zuid-Holland	2200	2323	2239	5224	9428
Total	10,364	11,918	10,885	26,623	44,027

**TABLE 2** New donor registrations between week 11–20 in 2017–2020 by province, as well as the number of confirmed SARS-CoV-2 infections in weeks 9–20 of 2020 by province



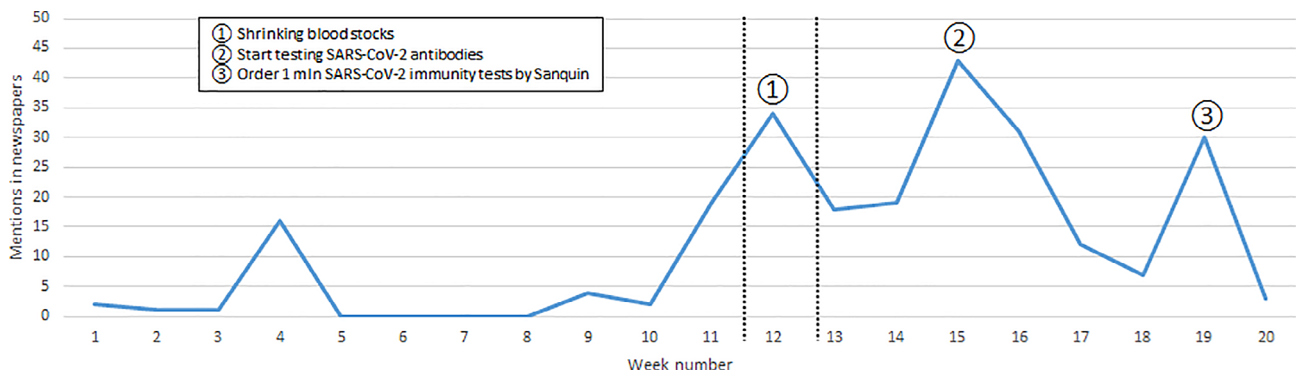
**FIGURE 2** Mentions of ‘Sanquin’ or ‘blood donation’ in social media posts in January–May 2020. Dotted horizontal lines represent imposition of infection prevention measures by the Dutch government (cf. Figure 1) [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

Instagram in the first 20 weeks of 2017–2020. Of the 27,814 messages about blood donation, 4345 (15.6%) were from Sanquin. Of these messages by Sanquin, the large majority (4258, or 98%) were replies to other users’ posts (e.g., replies to questions about eligibility). The 8808 messages about Sanquin contained 361 (4.1%) messages that were from Sanquin, 334 (93%) consisted of replies to other users’ posts. Only a very small proportion of all social media messages thus consisted of original posts from Sanquin, and the content of these posts were the same across the different social media platforms. The main peak in social media messages in 2020 is observed during weeks 11 and 12, when Sanquin called for donations due to blood shortages. A smaller peak is observed in week 16 of 2020, after Sanquin announced (in week 15) that they would be testing for SARS-CoV-2 antibodies during specific weeks and Sanquin announced to help with PCR testing for COVID-19 cases (in week 16). These social media peaks appear to precede the peaks in new donor registrations.

The first peak in mentions of Sanquin in newspapers in 2020 coincides with the first social media peak, in week 11–12 (Figure 3). The second peak appeared in week 15, which was related to the announcement that Sanquin had started to measure SARS-CoV-2 antibodies in donor blood, just before a peak in new donor registrations in week 16. Finally, newspapers’ attention for Sanquin peaked again in week 19 and was related to the announcement that Sanquin received a large number of tests for measuring SARS-CoV-2 antibodies. This last peak appears to coincide with a minor uptick in the number of new donor registrations (week 19 in Figure 1).

#### 4 | DISCUSSION

Even though blood donation during a pandemic might pose a health risk for the individual donor due to the inability to keep physical distance during the donation



**FIGURE 3** Mentions of ‘Sanquin’ in newspapers (both national and regional) in January–May 2020. Dotted horizontal lines represent imposition of infection prevention measures by the Dutch government (cf. Figure 1) [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

procedure, our results show a large increase of new donors registrations, suggesting the motivations outweigh this health risk. Remarkably, individuals at higher risk of attracting SARS-CoV-2 appeared to be particularly well-represented among new registrants, such as older people and people from areas of the Netherlands that were affected most (in terms of COVID-19 cases) during the early stages of the pandemic. The peaks in new donor registrations seemed to coincide with peaks in (social) media attention for blood donation in general and for Sanquin in particular.

In the context of the global COVID-19 pandemic, blood collection agencies around the world are operating under unprecedented conditions. The already vulnerable balance between supply and demand has been further challenged during the past months, balancing preventive measures to decrease the spread of the coronavirus with collecting enough blood to keep up with routine procedures and ongoing demands. Although the Netherlands, like many other countries, postponed non-urgent patient care (including surgery) during the acute pandemic phase, blood banks needed to keep their stocks at an appropriate level and hence continued to call for new donors and donations.<sup>17,18</sup> General awareness for blood donation has increased enormously with the COVID-19 pandemic. Many blood banks had started to test donations for SARS-CoV-2 antibodies to monitor the spread of the virus across regions and countries<sup>19,20</sup> and started to collect convalescent plasmas of recovered COVID-19 patients for possible treatments and therapies. As we have shown here, these developments were widely discussed in Dutch regional and national newspapers and on social media.

This increased awareness for blood donation, together with all media attention around COVID-19 as a public health challenge and associated safety measures, apparently encouraged many to register as a blood donor.

Compared to the years before, the number of new donors that registered during the acute pandemic phase (weeks 11–20) more than doubled. Similar large increases in new donor registrations have been found elsewhere, e.g., Denmark, Italy, and some regions in the US.<sup>21</sup> While the total number of active blood donors in the Netherlands has been decreasing from more than 400,000 donors in 2010 to about 330,000 donors in 2018,<sup>20</sup> the COVID-19 pandemic led to great increases in new donor registrations. The urgent call for blood and increased media attention for Sanquin may have contributed to these new donor registrations. Attention for blood banks and blood donation in different media may be an important factor in explaining why some countries succeeded in attracting large numbers of new donors<sup>21</sup> whereas other countries mainly observed cancellations and no-shows.<sup>6,7</sup>

With regard to individual risk for contracting SARS-CoV-2, we made some remarkable observations. For instance, we found that the share of older people (ages 55 and up) among new donor registrations increased from 2.4% in 2017 to 2.7% in 2019 to 8.5% in 2020, in spite of the fact that older age is a known risk factor for more severe COVID-19.<sup>22</sup> Similarly, the large majority and the biggest increase of newly registered donors (compared to the previous year) came from the regions of the country most affected by COVID-19. Hence, higher individual risks of attracting the virus did not prevent these people from contributing to the blood supply. One could speculate that these individuals have encountered the consequences of the COVID-19 pandemic more closely than others, which motivated them more to contribute to society during unprecedented times and also made them more aware of the need for blood. Another option is that some of these new donors registered hoping that they would be tested for antibodies (i.e., test-seeking behavior). Unfortunately, new donor motivations are not

registered in detail, making it impossible to determine whether test-seeking for COVID-19 actually occurred. However, the first peak in new donor registrations took place before Sanquin announced they would be testing for antibodies (to assess herd immunity), and Sanquin clearly and repeatedly stressed that donors would not receive the test results. This indicates that at least part of the newly registered donors did not register out of test-seeking motivations. Still, further research is needed to better understand the role that test-seeking may have played among motivations for new donors to register during (the first phase of) the pandemic.

To conclude, the COVID-19 pandemic, a public health crisis with enormous societal impact, seems to have motivated many individuals in the Netherlands, in particular those at an increased risk of exposure to SARS-CoV-2 or developing more severe COVID-19, to register for blood and plasma donation. They probably did so out of a motivation to contribute to the public good and public health. This was potentially triggered by increased (social) media attention for Sanquin and for blood and (convalescent) plasma donation. Time and future studies will have to tell whether these new donors are one-off 'pandemic' donors or if they will become regular, loyal donors.

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## AUTHOR CONTRIBUTIONS

FAQ, SR, FJP, and MLCS analyzed the data. All authors designed and ran the study, wrote the manuscript and critically revised and approved the final version.


## CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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### SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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