

Article / Artigo

## First time blood donors and the pattern of return visits to the public blood bank of Recife

Fábia Michelle Rodrigues de Araújo<sup>1</sup>

Katia Virginia de Oliveira Feliciano<sup>2</sup>

Marina Ferreira de Medeiros Mendes<sup>3</sup>

José Natal Figueiroa<sup>2</sup>

*Objective: To analyze the profile of blood donors in respect to the period of the first donation and their return pattern to the public blood bank of Recife. Method: A retrospective study was performed of the data of 363 donors input to the Blood Bank System Database in the period from January 1, 1998 to June 13, 2008. In the analysis, the median number of donations by gender, age and schooling years were evaluated, as well as the association of the time of the first donation with the gender, age and Rh factor. Additionally, the return pattern of 261 of these donors (excluding 100 first time donors and two for lack of precision as to the date of return) was evaluated. Results: Approximately 77.1% were men, of whom 40.5% were from 25 to 34 years old, 47.7% had completed high school and 54% donated spontaneously. The median number of donations was higher among older men ( $p = 0.000$ ). The participation of women increased in this period (30.6%) compared to 1998-2000 (4.8%), even so most first-time donors were men ( $p = 0.003$ ). Of those who donated five or more times, 43.8% returned for the next donation at an interval of less than six months. More men than women were repeat donors ( $p = 0.011$ ). Conclusions: the great majority of repeat donors (with a time interval between the last two donations of 13 months or less) is still not close to the maximum possible number of annual donations. It is essential to focus on this group who are potentially more receptive to increasing the effectiveness of recruitment.*

**Keywords:** Blood donors; Blood banks

### Introduction

The technological advances that enable highly complex surgical procedures associated with changes in the epidemiological profile of the population, especially with the growth in violence, have increased the need for blood and other transfusion products. According to the World Health Organization (WHO), the minimum number of blood donations in any country is between 3% and 5% of the

population, a quantity that has already been achieved in European countries.

In 1998, the Brazilian Ministry of Health set guidelines and goals for the national blood transfusion which included to collect a number of blood bags equivalent to 3% of the population, with 80% coming from spontaneous donations and to obtain 60% of repeat donations.<sup>(1)</sup> However, the tendency has been for donations to level out at 1.7% of the population.<sup>(2)</sup>

Fundação de Hematologia e Hemoterapia de Pernambuco (Hemope) – Recife (PE), Brazil

<sup>1</sup>Instituto de Medicina Integral Professor Fernando Figueira – Recife (PE), Brazil

<sup>2</sup>Stricto Sensu Post Graduation Course on Maternal-Infant Health, Instituto de Medicina Integral Professor Fernando Figueira – Recife (PE), Brazil

<sup>3</sup>Health Evaluation Study Group Research Council, Instituto de Medicina Integral Professor Fernando Figueira – Recife (PE), Brazil

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**Correspondence:** Fábia Michelle Rodrigues de Araújo

Rua do Futuro, 1150/ apto 206 – Jaqueira

52050-010 – Recife (PE), Brazil

Phone.: (55 81) 99529355

E-mail: fabiamra@yahoo.com.br

In a scenario in which the requirement to increase donations coexists with difficulties to increase the number of regular donors, the demand for higher quality blood products further affects the availability of blood.<sup>(3)</sup> Although it is essential to attract first-time donors, an increase in repeat donors increases the blood supply, improves the quality of blood for recipients and reduces the cost of collection: regular donors consistently have lower serological ineligibility and thus a smaller number of blood bags are discarded after testing.<sup>(4,5)</sup>

International researchers have shown that an analysis of the frequency of donation can be used as a predictor of whether an individual will become a long term repeat donor or not. Accordingly, the time interval between the first and second donation is associated with the total number of donations.<sup>(6-10)</sup> There is a strong association between gender, age, education level and type of donor. These studies are critical to adjust strategies aimed at recruitment and to encourage regular donations in order to maintain a stable, safe and adequate blood supply.<sup>(5,8,10,11)</sup>

Hence the importance of this article which aims to analyze the profile of blood donors in respect to the period of the first donation and the repeat donation pattern in the public blood center of the city of Recife.

## Methods

A retrospective descriptive study was performed of blood donations in the period from 1 January 1997 to 13 June 2008 recorded in the database of the Hemocentro Recife da Fundação de Hematologia e Hemoterapia de Pernambuco (Hemope). The donors of this study are a subsample selected for a cross-sectional investigation conducted between January 21 and May 30 2008, to try to comprehend the perception of the care provided to blood donors at this Blood bank, the only public transfusion service in the metropolitan region of Recife. This study was approved by the Research Ethics Committee of Hemope on 31/10/2007.

From the results of a study conducted at the Blood bank in 2007,<sup>(12)</sup> a sample size of 553 donors was calculated for this cross-sectional study (95% confidence level and 2.5% error) by considering an estimation of 10% discarded blood bags. A sequentially organized list was used for sampling; the nineteenth person from each group, after finishing the donation, was asked to answer a questionnaire, administered by one of the authors, in a room inside the Blood bank. At the end of the data collection period, the final sample consisted of 527 donors all of whom had signed informed consent forms. Forty-three morning and 37 afternoon collection periods were needed to obtain a representative sample.

Forty-four donors refused to participate, two were excluded (one with a visible cognitive problem and one for rejection of bag as it was clinically inadequate) and 13 were lost (agreed to participate but were not found after donation).

Thus the retrospective study involved 363 donors; 164 were excluded because they were donors before the database was installed at the Blood Bank in Recife in December 1997 (the only data for these donors prior to this system was their total number of donations).

It is worth noting that the donors of this subsample were predominantly single, had a family history of donation, donated spontaneously and gave reasons for the current donation similar to the sample of the cross-sectional study. To collect additional data, a specific form was used on which the blood type and dates of donations at this blood center were taken from the Blood Bank database.

The analysis followed the following steps:

(1) Associations of the number of donations with gender, age and schooling were analyzed for the 363 donors who made up this subsample. Additionally, the association between the period of first donation and gender, age at first donation and Rh factor were evaluated;

(2) Of the 363 original donors, 98 first-time donors, who did not return for a second donation by the end of the period used to collect secondary data, were excluded as were two other donors due to inaccuracy of the date of return - for the remaining 263 donors, associations between the interval to the first return, total number of donations, gender, age at first donation, Rh factor and type of donor were investigated;

(3) For the 155 repeat donors identified in this subsample, the time interval between the first and last donations was analyzed using a survival curve.

The definition of the type of donor was defined according to Resolution No. 149/2001 of the National Blood Product Production Information System.<sup>(13)</sup> Repeat donations were classified as a time interval of a maximum of 13 months between the last two donations in the Blood Bank in Recife and sporadic as those who donated just once or at intervals exceeding 13 months. Moreover, a former repeat donor was one who at some point had been a repeat donor at the Blood Bank in Recife.

Significant differences were identified with a 95% confidence level between: (a) medians using the Kruskal-Wallis test; and (b) proportions using the chi-square test. A retrospective cohort of repeat donors available at the end of the secondary data collection period was considered, analyzing of time until the last donation using the Kaplan Meier method.<sup>(14)</sup> Statistical analysis was performed using the Stata 9.2 computer program.

**Results**

Of the 363 donors, 77.1% were male, 53.7% lived in Recife and 40.5% were between 25 and 34 years old, with a statistically significant difference ( $p = 0.023$ ) between the median ages of men (28 years) and women (31 years). A total of 47.7% had completed high school, 7.7% had completed a college course and 0.8% never attended school. Nearly 48% were married or had a stable relationship and 71.4% were economically active. Relatives of 62.3% had previously donated blood and almost two-fifths had received blood transfusions. For 54.0%, the donation was spontaneous and 3.6% were solicited by the Blood Bank (69.2% had Rh negative blood factor). The main reasons given for current donation were requests by friends and relatives (41.0%), time to donate again (33.3%) and solidarity (12.1%) (Table 1).

The number of donations was statistically associated to gender and age ( $p < 0.001$ ). The median number of donations for men was three (range: 1-19 donations).

Table 1. Sociodemographic characteristics, history of donation/transfusion among family and friends, type and reasons for the current donation given by blood donors

Characteristics of donors	n	%
Gender		
Male	280	77.1
Female	83	22.9
Age (years)		
18-24	108	29.7
25-34	147	40.5
35-44	68	18.7
≥ 45	40	11.1
Schooling (years)		
None	3	1.9
1-4	19	5.2
5-8	70	19.3
9-11	206	56.7
≥ 12	65	17.9
Resident of the city of Recife	195	53.7
Married/stable relationship	174	48.0
Employed	259	71.4
Relatives already donated blood	226	62.3
Relatives already had transfusion	144	39.8
Current blood donation		
Spontaneous	196	54.0
Replacement	154	42.4
Convocation	13	3.6
What motivated this donation		
Friends/relatives	149	41.0
Time to return	121	33.3
Solidarity	44	12.1
Campaign	27	7.4
Others	22	6.2

However for women the median was two donations (range: 1-7 donations). The frequency of donations was higher with age; donors between 45 and 54 years old donating the most with a median of 4.5 donations (range: 1-19 donations). There was a statistically insignificant increase in donations with schooling; donors who had between 9 and 11 years of formal education donated the most with a median of three donations (range: 1-19 donations).

When the first donation is considered (Table 2), a significantly higher number of the first-time donors in 2007 and 2008 were male compared to first-time donors between 1998 and 2000 ( $p = 0.003$ ). The frequency of first-time donors aged between 18 and 34 remained at around 78.2% over the study period with the 18- to 24-year-old age group being the largest (48.4%). Between 2001 and 2003 there was a decrease in the proportion of first-time donors with Rh negative blood; this level has remained relatively stable since then without statistically significant changes.

Around a third of donors who donated at least two times returned within six months after their index donation (Table 3). For a significantly high proportion ( $p = 0.011$ ) of those who donated five or more times, the first return occurred within six months (43.8%) and only 32.7% of this group had not returned within 12 months. Among those who only donated twice, many returned to donate after periods of 19 months or more (47.3%). The time of the first return was not associated to the gender, although more men (35.2%) compared with women (25.5%) returned within six months.

The time of the first return (Table 3) was not associated with age at first donation or with the Rh factor, although a higher percentage of donors with the Rh negative blood factor returned within six months. The type of donor was associated with the time of first return ( $p = 0.000$ ). For 43.9% of repeat donors, the first return occurred within six months, with only 28.4% of this group not returning within 12 months. All sporadic donors returned after 12 months. Those who had already been repeat donors at some time first returned in a similar time period as repeat donors.

A significantly greater percentage ( $p = 0.011$ ) of men (63.3%) were repeat donors compared to women (43.1%). Sporadic donations were twice as common among women (35.3%) than men (17.6%). Both men and women had similar patterns with regard to having been, at some point, repeat donors. There was no association between donor type and Rh factor.

Regarding the time of the last return of repeat donors (Figure 1), the y-axis represents the value of the survival function, i.e. the probability that a donor does not return for his last donation in each time interval measured in months (x-axis). The likelihood that a repeat donor does not return in six months is 89.7%; this drops to 76.1% at 12 months. According to the results, at two years approximately

Table 2. Gender, age at first donation and Rh factor, according to the period of the first blood donation

Variable (n=363)	Period of first donation (year)								p-value
	1998-2000 (N=42)		2001-2003 (N=82)		2004-2006 (N=92)		2007-2008(*) (N=147)		
	n°	%	n°	%	n°	%	n°	%	
Gender									
Male	40	95.2	67	81.7	71	77.2	102	69.4	0.003
Female	2	4.8	15	18.3	21	22.8	45	30.6	
Age (years)									
18-24	20	47.6	45	54.1	41	44.6	70	47.6	0.632
25-34	12	28.6	20	24.4	34	36.9	42	28.6	
35-44	7	16.7	10	12.2	14	15.2	25	17.0	
≥ 45	3	7.1	7	9.3	3	3.3	8	6.8	
Rh factor									
Positive	34	80.9	72	87.8	81	88.0	131	89.1	0.564
Negative	8	19.1	10	12.2	11	12.0	16	10.9	

(\*) até 13 de junho de 2008

Table 3. Interval of first return by total number of donations, gender, age at first donation, Rh factor and the pattern of donations of donors who donated at least two times

Variable (n=261*)	Months								p-value
	≤ 6		7-12		13-18		≥ 19		
	n°	%	n°	%	n°	%	n°	%	
Total number of donations									
2	16	21.6	13	17.6	10	13.5	35	47.3	0.011
3	9	24.3	12	32.5	6	16.2	10	27.0	
4	10	32.3	7	22.5	3	9.7	11	35.5	
≥ 5	52	43.8	28	23.5	14	11.7	25	21.0	
Gender									
Male	74	35.2	43	20.5	26	12.4	67	31.9	0.218
Female	13	25.5	17	33.3	7	13.6	14	27.6	
Age (years)									
18-24	47	35.4	24	18.0	16	12.0	46	34.6	0.436
25-34	23	29.5	20	25.6	11	14.1	24	30.8	
35-44	11	30.6	12	33.3	6	16.7	7	19.4	
≥ 45	6	42.8	4	28.6	0	0.00	4	28.6	
Rh factor									
Positive	70	30.7	55	24.1	30	13.2	73	32.0	0.127
Negative	17	51.6	5	15.1	3	9.1	8	24.2	
Type of donor									
Repetition	68	43.9	43	27.7	14	9.1	30	19.3	0.000
Sporadic	0	0.00	0	0.00	12	21.8	43	78.2	
Was repetition	19	37.3	17	33.3	7	13.7	8	15.7	

\* Excluídos dois doadores por imprecisão da data do retorno

61.3% of donors will not have returned. Of the total number of donors in the study, 36.8% had a donation time frame exceeding 60 months. The maximum repeat interval was 120 months.

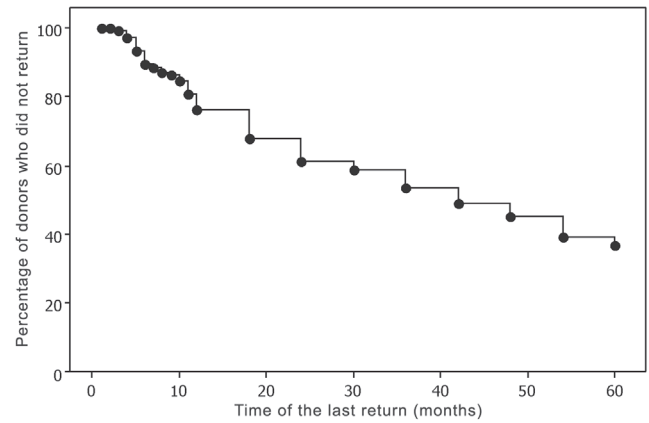


Figure 1. Analysis of time of the last return of repeat donors using the Kaplan-Meier method

### Discussion

This study identified donor profiles similar to national<sup>(15)</sup> and local studies<sup>(16)</sup> including one performed in 2007 in the Blood Bank of Recife:<sup>(12)</sup> the volunteer donor is generally male, aged between 25 and 44 years, completed high school; and the donation is spontaneous, because of a request of a friend or relative who is in need of blood and solidarity. Additionally, there is a high rate of repeat donations. A significant number of donors reported that family members had needed transfusions or had donated blood. Relatives and friends, as shown by several authors,<sup>(3,11,15-17)</sup> have proved crucial in convincing people to make the first donation and to continue to donate.

The history of donations in this study shows that more women donated blood and that 18- and 24-year-olds continue to be the largest group of first-time donors. Despite the limitations caused by the fact that this study evaluated donors available at a given point in time,<sup>(18)</sup> the behavior of the participants is similar to the trend observed in the literature in respect to gender and age at first donation.<sup>(6,8,9)</sup> Certainly, there has been an increase in the number of female blood donors as was a government goal in 1998.<sup>(1)</sup>

Moreover, existing knowledge about the relationship between donor age at first donation and the frequency of recurrence was reinforced, with older donors having a higher total number of donations.<sup>(6,8)</sup> For Sampaio<sup>(19)</sup> the progressive aging of the Brazilian population will make older donors even more important in maintaining blood supply. In line with this statement, in December 2002 the maximum age limit for blood donation increased in Brazil from 60 to 65 years old.<sup>(20)</sup>

As in other studies,<sup>(6,8,9)</sup> the gender did not significantly affect the time of the first return, although a higher proportion of men returned earlier. However, the

relationship between the pattern of return and gender of donors reiterated what has already been observed that men become repeat donors significantly more frequently than women, who normally donate sporadically.<sup>(6,9)</sup> Additionally, the type of Rh factor was not associated with the age at first donation or the behavior of return. It is possible that the use of existing donors used in this study to analyze characteristics of the return behavior, while gathering important information on donations, may have obscured smaller differences.

In the USA, repeat donations of Rh negative individuals are significantly greater than Rh positive subjects; this is attributed to strong recruitment campaign.<sup>(6)</sup> A challenge for blood banks is to increase the number of Rh negative donors as this, the rarest blood type, is only found in around 15% of the population.<sup>(21)</sup> Regardless of the Rh factor, there is a need to make an effort every day to maintain the stock of blood bags by spontaneous donation, which includes direct contact with registered donors in order to meet specific needs. In this study sample, a high proportion of the small percentage of donors asked to donate blood had negative Rh factor.

The similarity of the results of this study with international investigations should be noted; an early return for the second donation is associated with the total number of returns and in particular with the status of regular donor.<sup>(6,8,9)</sup>

Ownby et al.<sup>(6)</sup> extended these findings showing that the time to the next return is strongly conditioned by the average period between previous returns. This, in the opinion of these authors, is an aspect that suggests that donors should be encouraged to return as soon as they meet the eligibility criteria for blood donation. This is a particularly valuable suggestion in Brazil, where the demand for a higher hemoglobin count makes the challenge to convert potential donors to donors in reality and ensure that they return on a regular basis is even more difficult.<sup>(22)</sup>

For Suárez et al.,<sup>(11)</sup> the few studies published on regular donors actually identified a small number of repeat donors. Despite the significant percentage of donors that returned, the survival curve showed that the intervals between donations can be large, which means that every year it is necessary to attract new donors to adequately fill, in both quantity and quality, the increasing demand for blood.

According to research by the Brazilian Ministry of Health in 2004, 53.5% and 52.6% of donors respectively in the country and in the northeastern region, had donated five or more times in their lives, indicating a high rate of multiple donations.<sup>(15)</sup> In the current study, around 45.6% of participants had donated five or more times. A substantial proportion of donors either stop to donate or become inactive donors.<sup>(6-10)</sup>

Although an effort is needed to win over first-time blood donors, most strategies are systematically developed to encourage donors to return to donate more regularly.<sup>(6,8-11)</sup> Hence, specific subgroups need to be identified as there are differences in behavior of first-time, first-return and regular donors.<sup>(8)</sup>

Schreiber et al.<sup>(8)</sup> believe it is essential to focus on repeat donors with a history of regular donations, who would potentially be more responsive, thereby increasing the effectiveness of recruitment. These authors stated that the vast majority of donors donated less than two times per year, when a maximum of four donations is allowed for men. They also believe that a substantial increase in donations would be achieved with a relatively small decrease of no returns.

These authors also highlight the need to study the frequency at which first-time donors with distinct demographic profiles return to donate and investigate the reasons why half of first-time donors only donate once. One should not ignore the knowledge about the determinants of regular donations. The habit and previous experience are considered relevant factors that impact on the return behavior of blood donors.<sup>(10,16,22)</sup>

For Masser et al.,<sup>(23)</sup> habit is insufficient to ensure regular donation though it is an essential step in the transition for a first-time donor to become a repeat donor. The importance of the perception of donors of transfusion services is also worth a mention.

Ludwig and Robinson<sup>(5)</sup> argue that perception is influenced by the trust placed in a service, with the responsibility and competence of professionals, the access and the attendance of the unit, as well as communication, being important components of donor satisfaction.

In a setting where one goal is to increase repeat donations of women<sup>(1)</sup> it is important to remember differences in gender. The relationship between gender and satisfaction of users is controversial, but some studies have found that women have a greater critical capacity,<sup>(24)</sup> which may affect their evaluations of the experience of donation.

From another perspective, Santos & Condeço<sup>(25)</sup> point out the different roles of the genders in regard to the division of responsibilities and tasks at home and the possible effects on blood donation.

Note that the relationship between the application of more rigid eligibility criteria and the tendency of donations to level out can cause, in the short term, a situation similar to in the USA,<sup>(8,9)</sup> a drop of the donor population. One must remember that in Brazil there is a chronic deficit in the number of blood donors to meet the demand for transfusions and that the strategies adopted to attract donors do not produce the desired results. A change in this scenario also means devoting attention to monitoring the sociodemographic



profile and donor return pattern, which is essential to identify donor groups that are more likely to become repeat donors and prioritize the issues requiring transformative action in the daily work of recruitment, attendance and retention of donors.

Given the numerous difficulties encountered by blood banks to maintain adequate stocks of blood through first-time or repeat donors, this work shows the profile of donors who return to donate, demonstrating that it is essential to focus on this potentially more receptive group in order to increase the effectiveness of recruitment.

### Resumo

*Objetivo: Analisar o perfil dos doadores de sangue conforme o período da primeira doação e comportamento de retorno no hemocentro público do Recife. Métodos: Estudo retrospectivo com 363 doadores, no qual se utilizou o banco de dados do Sistema de Banco de Sangue (SBS) referente ao período de 01 de janeiro de 1998 a 13 de junho de 2008. Na análise avaliaram-se a mediana do número de doações por sexo, idade e escolaridade, além da associação entre o período da primeira doação e o sexo, idade à primeira doação e fator Rh. Para 261 (excluídos 100 doadores de primeira vez e dois por imprecisão da data do retorno), o comportamento de retorno. Resultados: Aproximadamente 77,1% eram homens, 40,5% entre 25-34 anos de idade, 47,7% haviam completado o segundo grau e 54% doaram espontaneamente. A mediana do número de doações foi maior entre os homens ( $p=0,000$ ) mais velhos ( $p=0,000$ ). A participação feminina cresceu no período atual (30,6%) em comparação a 1998-2000 (4,8%), mas o percentual superior dos doadores de primeira vez era referente a homem ( $p=0,003$ ). Daqueles que doaram cinco ou mais vezes, 43,8% retornaram para próxima doação com intervalo menor que seis meses. Prevaleceu o sexo masculino entre doadores de repetição ( $p=0,011$ ). Conclusões: A grande maioria dos doadores de repetição (intervalo de tempo entre as duas últimas doações igual ou inferior a 13 meses) ainda não está próximo do número máximo de doação anual. É fundamental concentrar a atenção neste grupo potencialmente mais receptivo para aumentar efetividade do recrutamento.*

**Descritores:** Doadores de sangue; Bancos de sangue

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