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Blood Donation Knowledge Questionnaire (BDKQ-Brazil): analysis of items and application in primary healthcare users

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ABSTRACT

Background: To present the results of the application of the Blood Donation Knowledge Questionnaire in a large and representative sample of users of primary care services in order to extend the evaluation of the metrics of the items and to assess knowledge about blood donation in association with sociodemographic variables.

Method: The Blood Donation Knowledge Questionnaire is composed of 24 items based on blood donation requirements of the Brazilian Ministry of Health and on some popular beliefs and concepts of the Brazilian population regarding the blood donation process. Data collection was carried out in 12 healthcare facilities of Ribeirão Preto, São Paulo. The analysis of items was performed using classical test theory with associations being assessed using the multivariate Tobit regression model.

Results: A total of 1055 individuals participated (79.7% females and a mean age of 40.6 years). Previous blood donation was reported by 246 (23.3%) participants, 669 (63.4%) had never donated, and 140 (13.3%) reported being ineligible to donate blood. This questionnaire is comprised of items considered easy-to-understand, with a facility level of medium to high and generally an adequate capability of discrimination. Higher means of correct answers were detected among females, individuals with more schooling, and subjects who had already donated blood.

Conclusion: The Blood Donation Knowledge Questionnaire is an instrument that aims to measure some general aspects of knowledge regarding blood donation and can be used in different contexts. There is evidence that knowledge of primary healthcare users regarding blood donation is correlated to sex, educational level, and previous blood donation.

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Introduction

While the number of blood transfusions in Brazil is increasing by around 6% per year, the prevalence of voluntary blood donors in Brazil has stabilized[1] with approximately 1.8% of the Brazilian population donating blood in recent years.[1] This rate, however, is far from the goal of the World Health Organization (WHO) which is 3% of the donor population.[2] Reasons for the lack of blood donors in low- to middle-income countries are multifactorial and despite efforts to understand the perceptions, motivation and obstacles about voluntary blood donation, little is known about these factors in the Brazilian context.[3,4]

Knowledge of the general population about donation is considered a determining factor in the decision to donate blood, in particular, in countries where this action is voluntary.[5,6] On the other hand, lack of knowledge about eligibility criteria, the need for blood, and the general blood donation process such as donor safety, quality of service, place of collection, blood usage, together with countless popular beliefs and misconceptions about the donation process, contribute to the low prevalence of voluntary blood donors worldwide.[5,7] According to Kumari and Raina,[6] it is common for individuals with little knowledge about blood donation to rate themselves as ineligible to donate and this misperception can be perpetuated for many years, reducing the percentage of donors. In addition, greater knowledge of the population on this subject contributes to greater security during the process and the quality of the service, motivating new donors and increasing return rates of those already recruited.[8]

The assessment of knowledge about blood donation in the Brazilian general population is still incipient. In addition to the low number of studies with large representative samples, there is no specific instrument to ascertain this knowledge considering the specificities of blood donation in Brazil. Thus, our research group developed a 24-item scale named the Blood Donation Knowledge Questionnaire (BDKQ-Brazil)[9] based on an instrument proposed by Renzaho and Polonsky.[10] BDKQ-Brazil includes questions based on some popular beliefs and notions common to the Brazilian population. Its objective is to evaluate knowledge about the donation process according to blood donation specificities in Brazil based on the requirements of the Brazilian Ministry of Health and some popular beliefs and concepts regarding the donation of blood. BDKQ-Brazil was first published in 2016 in the Brazilian Journal of Hematology and Hemotherapy in the format of a letter to the editor along with its content validity.[9] Subsequently, the scale was applied to a large and representative sample of users of primary healthcare services in the municipality of Ribeirão Preto, São Paulo; the results of which are presented herein.

The Brazilian primary healthcare system focuses on actions for health promotion and disease prevention. Thus, the main reason to perform this study at public healthcare facilities is that many of the users have frequent or regular appointments for basic routine clinical, physical, and laboratorial examinations and preventive visits.[11] Hence, most users are commonly invited to participate in actions to prevent disease and promote health and we believe that many of them could be suitable to donate blood.

The objective of this study is to present the results of the application of BDKQ-Brazil in users of primary healthcare services thereby extending the evaluation of the metrics of the items when applied to a large representative sample, and assess knowledge about blood donation and possible associations with sociodemographic and behavioral characteristics.

Methods

Study design, sampling and data collection

A cross-sectional study was conducted of 1055 primary healthcare users at 12 facilities from September 2015 to May 2016. Randomized stratified sampling was adopted. The study was conducted in Ribeirão Preto, which is the eighth largest municipality in São Paulo State with an estimated population of 682,302 in 2017. Ribeirão Preto is considered a technology center and has a high human development index compared to the rest of the country. In addition, the municipality is an important center for health, education, research, business tourism and culture.[12]

To obtain a representative sample of users of primary healthcare services, the 41 healthcare facilities of the municipality were grouped into 12 strata according to two factors: (1) the district in which they are located; (2) the Paulista Social Vulnerability Index (IPVS)[13] prevalent in their area of coverage. The IPVS classifies the census tract sectors in six groups of social vulnerability (very high to low vulnerability) considering socioeconomic dimensions and the family life cycle. Thus, one healthcare facility was selected randomly within each stratum, totaling 12 healthcare facilities in which data collection was performed.

The sample size was calculated considering a confidence coefficient of 95% and an absolute precision of 3% for the estimation of the proportion of blood donors. The number of interviews in each healthcare facility was proportional to the respective population size and number of consultations per month with the total sample size estimated for this study being 1054 interviews.

Three trained interviewers were involved in data collection with the BDKQ-Brazil, a sociodemographic and behavioral questionnaire, and questions about previous donations being applied in a confidential face-to-face interview using paper forms. All potential participants were approached and invited to participate while they were waiting for medical consultations in the waiting rooms of healthcare facilities. The participants were informed about the objectives of the study, expected duration of the interview and the ethical aspects involved. The exclusion criteria adopted were related to age and mental/cognitive disability. Only over 18-year-old subjects, who did not present any impediment to answer the questions, participated in the study. Data were later entered in an online form by a trained member of the research staff with the database being revised routinely to avoid data entry errors.

Regarding blood donation, the participants were questioned about previous donations and ineligibility and were classified as 'already donated', 'never donated', or 'unable to donate blood' (self-declared). In addition, a questionnaire

Table 1 – Answers to the Blood Donation Knowledge Questionnaire (BDKQ-Brazil) by 1055 primary healthcare users.

	English	Answers[a]	Total	
			n	%
1	Do you know your blood type?	No	448	42.5
		Yes	**607**	**57.5**
2	In order to be able to donate blood, what is the minimum weight that a person needs to have?	40 kg	61	5.8
		50 kg	**516**	**48.9**
		60 kg	251	23.8
		I don't know	227	21.5
3	Is all donated blood tested in order to verify if it has any disease that can be transmitted to others?	No	69	6.5
		Yes	986	93.5
4	Can under 16-years-old individuals donate blood?	**No**	**854**	**81.0**
		Yes	100	9.5
		I don't know	100	9.5
5	Can pregnant women donate blood?	**No**	**806**	**76.4**
		Yes	48	4.5
		I don't know	201	19.1
6	Can a person who has diabetes or high blood pressure donate blood?	**No**	**937**	**88.8**
		Yes	23	2.2
		I don't know	95	9.0
7	Can a person who has or has had any type of cancer donate blood?	**No**	**895**	**84.8**
		Yes	22	2.1
		I don't know	138	13.1
8	Can women who are menstruating donate blood?	No	401	38.1
		Yes	**330**	**31.3**
		I don't know	323	30.6
9	Is there a maximum age for blood donation?	No	205	19.4
		Yes	**651**	**61.7**
		I don't know	199	18.9
10	Can women who are breastfeeding donate blood?	**No**	**504**	**47.8**
		Yes	285	27.0
		I don't know	266	25.2
11	Is the blood from only one donor enough for one person who needs blood?	No	740	70.2
		Yes	**204**	**19.3**
		I don't know	111	10.5
12	When people need to receive blood, do they have to pay?	**No**	**1033**	**97.9**
		Yes	22	2.1
		I don't know	–	–
13	Does donated blood have to be used within 24 h after donation, otherwise it is not good anymore?	**No**	**745**	**70.7**
		Yes	117	11.1
		I don't know	191	18.1
14	Can a person acquire a disease by donating blood?	**No**	**749**	**71.0**
		Yes	251	23.8
		I don't know	55	5.2
15	If the blood donor is male, can he donate every 2 months, and can women donate every 3 months.	No	215	20.4
		Yes	**498**	**47.2**
		I don't know	342	32.4
16	In Brazil, is it allowed by law to pay a person to donate blood?	**No**	**971**	**92.0**
		Yes	23	2.2
		I don't know	61	5.6
17	When someone donates blood, does the amount of blood in the human body return to what it was before within 24–48 h?	No	58	5.5
		Yes	**834**	**79.1**
		I don't know	163	15.4
18	If a donor has a fever on the day of donation, can he donate blood?	**No**	**828**	**78.5**
		Yes	61	5.8
		I don't know	166	15.7
19	Does donating blood make you lose or gain weight?	Lose weight	11	1.0
		Gain weight	13	1.2
		Neither	**975**	**92.4**
		I don't know	56	5.3
20	The capacity of a little coffee cup is 50 mL. When a person donates blood, the equivalent to how many coffee cups are taken?	2–4	49	4.6
		5–8	92	8.7
		9–10	**202**	**19.2**
		11–20	118	11.2
		I don't know	594	56.3

– Table 1 (Continued)				
	English	Answers[a]	Total	
			n	%
21	After a person enters in the donation room to donate blood, how long is the blood donation process?	**20 min**	**372**	**35.3**
		40 m to 1 h	254	24.1
		More than 1 h	28	2.6
		I don't know	401	38.0
22	In order to donate blood, should the donor be fasting?	**No**	**487**	**46.2**
		Yes	106	10.1
		I don't know	460	43.7
23	Can smokers donate blood?	No	290	27.5
		Yes	**587**	**55.7**
		I don't know	177	16.8
24	Does donating blood thicken or thin the blood?	Thin	87	8.3
		Thicken	79	7.5
		Neither	**745**	**70.6**
		I don't know	143	13.6

[a] The correct answer for each question is highlighted in bold type.

with sociodemographic questions including sex, age, marital status, socioeconomic class, educational level and self-perception of health was also applied. The participants were classified by socioeconomic levels – monthly family income (socioeconomic classes: A, B, C and D/E) and schooling (illiterate, elementary, middle school, high school, and higher education) according to the Brazilian Economic Classification Criteria (ABEP).[14]

Analysis of items of the BDKQ-Brazil and associations

The classification of the participants regarding performance in the instrument was conducted according to the Kelley[15] proposal that considers the top 27% and the bottom 27% of the participants in the instrument to estimate the cut-off points. In the case of the BDKQ-Brazil (24 items), the cut-off points adopted for the classification of participants with the best and worst performances were ≥19 correct answers and ≤13 correct answers, respectively. The quality of items of the BDKQ-Brazil was assessed using classical test theory taking the difficulty and discrimination index as parameters.[16] For the facility index, the degree of facility of items was estimated by the proportion of correct answers; each item can be classified as 'very easy' (proportion of right answers from 80 to 100%), 'easy' (60–80%), 'average difficulty' (40–60%), 'difficult' (20–40%) and 'very difficult' (0–20%). The discrimination index allows an analysis of how effectively each item can discriminate the respondents who had the best and the worst performances when answering the instrument. In other words, the greater the difference in the proportion of correct answers among the participants with the best and the worst performance, the greater the power of discrimination of the item. Results from 0 to 30% in the discrimination index represent a weak discrimination, from 30 to 60% a moderate discrimination and from 60 to 100% a strong discrimination.[17] Thus, the purpose of this analysis is to identify easy items (most likely to be answered correctly) that have a high discriminatory power.

The answers of each item in the BDKQ-Brazil were analyzed according to sex and previous blood donation using the chi-square test. The analysis of associations considering sociodemographic/behavioral variables, previous blood donation and the means of correct answers of the instrument was performed using a multivariate Tobit regression model.[18] The Tobit model is a regression model in which the dependent variable is truncated from below or above or both. In this case, the number of correct answers in the instrument is a variable ranging from 0 to 24. All analyses were performed using the SAS software, version 9.4 (SAS Institute).

Ethical considerations

This study was approved by the Ethics Committee on Human Research of the Hospital das Clínicas in Ribeirão Preto (CAAE: 38148814.2.0000.5440), and data collection in health facilities was approved by the Ribeirão Preto Municipal Health Department. Only adult individuals (≥18 years) who agreed and signed informed consent forms participated in the study. The questionnaires were stored separately from the informed consent terms to ensure participants' anonymity during data processing.

Results

A total of 1055 primary healthcare users (80.7% of the total invited) answered all the questions of the questionnaire and were included in the study. The sample was composed of 841 (79.7%) females with a mean age of 45.1 years [standard deviation (SD): 15.3] and 214 (20.3%) males with a mean age of 39.5 years (SD: 14.9). Of the participants, 669 (63.4%) had never donated blood, 246 (23.3%) had already donated blood, and 140 (13.3%) declared themselves unable to donate blood.

Table 1 shows the study participants' answers of the BDKQ-Brazil. The vast majority of the participants (n = 1003; 97.9%) replied that people do no pay to receive blood transfusions, 986 (93.5%) answered that all donated blood is tested for infectious diseases and only 607 (57.5%) declared to be aware of their blood type. In addition, a large number of participants (56.3%) stated that they did not know how much blood is taken in each blood donation and 38.0% did not know how long the blood donation process takes.

Table 2 – Quality of items of BDKQ-Brazil according to facility and discrimination indexes obtained using classical test theory for the sample of primary healthcare users (*n* = 1055).

Item	Worst (%)	Best (%)	Discrimination index (%)	Facility index (%)
1	34.08	80.71	46.63[a]	57.54
2	20.6	76.4	55.80[a]	48.91
3	85.77	98.21	12.44	93.46[a]
4	64.79	92.14	27.35	80.95[a]
5	55.43	88.21	32.78[a]	76.4[a]
6	82.77	93.21	10.44	88.82[a]
7	77.15	92.5	15.35	84.83[a]
8	13.48	48.57	35.09[a]	31.28
9	39.33	77.86	38.53[a]	61.71[a]
10	28.46	68.21	39.75[a]	47.77
11	13.11	26.43	13.32	19.34
12	95.88	99.64	3.76	97.90[a]
13	43.45	91.79	48.34[a]	70.62[a]
14	55.81	86.07	30.26[a]	71.00[a]
15	23.6	74.29	50.69[a]	47.2
16	82.77	98.57	15.8	92.04[a]
17	52.81	92.5	39.69[a]	79.05[a]
18	61.42	91.79	30.37[a]	78.48[a]
19	79.4	98.93	19.53	92.42[a]
20	6.74	36.79	30.05[a]	19.15
21	11.99	61.43	49.44[a]	35.26
22	18.35	76.79	58.44[a]	46.16
23	31.46	78.57	47.11[a]	55.64
24	47.19	93.21	46.02[a]	70.62[a]

[a] Items with higher discrimination and/or facility index. The best items were those classified as "easy or very easy" in the facility index (cutoff point ≥60), and with a discrimination power classified as moderate to high (cutoff point ≥30).

The quality of items of the BDKQ-Brazil according to facility and discrimination indices obtained in classical test theory are shown in Table 2. Items 5, 9, 13, 14, 17, 18, and 24 were distinguished by the two indices as easy to very easy results with a power of discrimination from moderate to strong.

The distribution of answers of the primary healthcare users varied depending on sex and previous blood donations (Table 3). A higher frequency of correct answers to questions such as blood type, donor weight, blood donation during the menstrual period, disease acquired from blood donation, and payment to receive blood transfusion was observed among females. On the other hand, men tended to have a higher frequency of correct answers to the questions evaluating the amount of blood donated, duration of the blood collection process and blood donation by smokers. Participants who had already donated blood had a higher frequency of correct answers to the questions evaluating blood type, minimum weight, time interval between donations, weight gain or loss with blood donation, volume of donated blood, time spent for blood donation, fasting before donation, and thickness or thinness of the blood after donation. The participants who described themselves as unable to donate blood had a higher frequency of correct answers to the question of maximum donation age. Finally, among those who never donated blood, the frequency of correct answers on acquiring disease from blood donation was higher.

The study of associations considering the mean numbers of correct answers in the BDKQ-Brazil and sociodemographic and behavioral variables are presented in Table 4. Differences in mean numbers were associated with sex, educational level and previous blood donations. Females, study participants with more schooling and those who had already donated blood presented higher numbers of correct answers. No associations of mean numbers of correct answers were found for marital status, socioeconomic class, age group and self-perception of health.

Discussion

The BDQK-Brazil is an original instrument that aims to measure and validate general blood donation knowledge among primary healthcare users.[9] The results of this study show that the instrument is comprised of easy-to-understand questions with an adequate discrimination capability, which suggests that it can be used in many settings, including for donors and non-donors, and in different social and educational levels. Higher mean numbers of correct answers were associated with being female, having a higher educational level and previously donating blood.

Higher mean numbers of correct answers were observed among participants who had already donated blood. Donors presented greater knowledge on the blood donation process and lower mean numbers for answers about misconceptions compared to non-donors. It was expected that blood donors would present better knowledge regarding blood donation compared to non-donors,[8] and the results of this study have provided evidence for this. If this had not happened, the discrimination power of the BDKQ-Brazil would have been dubious.

Although a higher prevalence of males among blood donors is characteristic in Brazil,[3,19] females presented higher mean numbers of correct answers in this study. However, it can be observed that women had more correct answers for questions related to health and general knowledge such as blood type, donor weight, blood donation during menstrual, acquiring disease from blood donation and payment to receive blood. On the other hand, male donors had more correct answers for questions related to the blood donation process and eligibility, such as the volume of blood donated, the duration of the blood donation process and the eligibility of smokers. The results of this study corroborate the concept that blood donors have more knowledge about the donation process.[5,20] Previous studies in the Brazilian population showed that individuals with high educational levels are more likely to donate blood,[4,21,22] which justifies the number of correct answers according to the educational level of the participants.

In the current sample, levels of blood donation knowledge varied from moderate to high; most items were answered correctly by many participants. However, nearly one third of the study participants incorrectly answered the item on acquiring disease through blood donation. This information as well as other common misconceptions observed in this study are very important and should be discussed in respect to donor recruitment strategies in future campaigns promoted by blood banks.

	Item/subject	Answers[a]	Females		Males		p	Never donated		Unable to donate		Already donated		p
			n	%	n	%		n	%	n	%	n	%	
1	Blood type	No	337	40.1	111	51.9	<0.01	324	48.4	65	46.4	59	24.0	<0.01
		Yes	**504**	**59.9**	**103**	**48.1**		**345**	**51.6**	**75**	**53.6**	**187**	**76.0**	
2	Weight	40 kg	44	5.2	17	7.9	0.04	30	4.5	10	7.1	21	8.5	<0.01
		50 kg	**429**	**51.0**	**87**	**10.7**		**308**	**46.0**	**65**	**46.4**	**143**	**58.1**	
		60 kg	193	23.0	58	27.1		145	21.7	45	32.1	61	24.8	
		I don't know	175	20.8	52	24.3		186	27.8	20	14.3	21	8.5	
3	Blood tests	No	55	6.5	14	6.5	0.99	52	7.8	6	4.3	11	4.5	0.10
		Yes	**786**	**93.5**	**200**	**93.5**		**617**	**92.2**	**134**	**95.7**	**235**	**95.5**	
4	Minimum age for donation	**No**	**684**	**81.4**	**170**	**79.4**	0.80	550	82.4	108	77.2	196	79.7	0.07
		Yes	78	9.3	22	10.3		51	7.6	17	12.1	32	13.0	
		I don't know	78	9.3	22	10.3		67	10.0	15	10.7	18	7.3	
5	Pregnancy	**No**	**650**	**77.3**	**156**	**72.9**	0.13	505	75.5	110	78.6	191	77.6	0.79
		Yes	33	3.9	15	7.0		32	4.8	4	2.9	12	4.9	
		I don't know	158	18.8	43	20.1		132	19.7	26	18.6	43	17.5	
6	Diabetes and high blood pressure	**No**	**752**	**89.4**	**185**	**86.4**	0.35	594	88.8	123	87.9	220	89.4	0.51
		Yes	16	1.9	7	3.3		15	2.2	1	0.7	7	2.9	
		I don't know	73	8.7	22	10.3		60	9.0	16	11.4	19	7.7	
7	Cancer	**No**	**719**	**85.5**	**176**	**82.2**	0.45	576	86.1	122	87.2	197	80.1	0.14
		Yes	16	1.9	6	2.8		13	1.9	1	0.7	8	3.2	
		I don't know	106	12.6	32	15.0		80	12.0	17	12.1	41	16.7	
8	Menstruation	No	287	34.2	114	53.3	<0.01	253	37.9	52	37.2	96	39.0	0.54
		Yes	**291**	**34.6**	**39**	**18.2**		**210**	**31.4**	**38**	**27.1**	**82**	**33.3**	
		I don't know	262	31.2	61	28.5		205	30.7	50	35.7	68	27.7	
9	Maximum age for donation	No	169	20.1	36	16.8	0.12	138	20.6	20	14.3	47	19.1	<0.01
		Yes	**506**	**60.2**	**145**	**67.8**		**382**	**57.1**	**103**	**73.6**	**166**	**67.5**	
		I don't know	166	19.7	33	15.4		149	22.3	17	12.1	33	13.4	
10	Breast-feeding	**No**	**414**	**49.2**	**90**	**42.1**	0.17	299	44.7	74	52.9	131	53.2	0.07
		Yes	222	26.4	63	29.4		189	28.2	31	22.1	65	26.4	
		I don't know	205	24.4	61	28.5		181	27.1	35	25.0	50	20.3	
11	Volume demand	No	585	69.6	155	72.4	0.70	464	69.4	94	67.1	182	74.0	0.44
		Yes	**165**	**19.6**	**39**	**18.2**		**133**	**19.9**	**27**	**19.3**	**44**	**17.9**	
		I don't know	91	10.8	20	9.4		72	10.8	19	13.6	20	8.1	
12	Pay for transfusion	**No**	**825**	**98.1**	**208**	**97.2**	0.41	654	97.8	138	98.6	241	98.0	0.83
		Yes	16	1.9	6	2.8		15	2.2	2	1.4	5	2.0	
13	Blood durability	No	587	70.0	158	73.8	0.17	459	68.7	99	70.7	187	76.3	0.21
		Yes	**101**	**12.0**	**16**	**7.5**		**81**	**12.1**	**13**	**9.3**	**23**	**9.4**	
		I don't know	151	18.0	40	18.7		128	19.2	28	20.0	35	14.3	
14	Acquire disease in blood donation	**No**	**619**	**73.6**	**130**	**60.8**	<0.01	494	73.9	89	63.6	166	67.5	<0.01
		Yes	176	20.9	75	35.0		134	20.0	46	32.9	71	28.9	
		I don't know	46	5.5	9	4.2		41	6.1	5	3.5	9	3.6	
15	Period between donations	No	167	19.9	48	22.4	0.09	133	19.9	25	17.8	57	23.2	<0.01
		Yes	**388**	**46.1**	**110**	**51.4**		**278**	**41.5**	**74**	**52.9**	**146**	**59.3**	
		I don't know	286	34.0	56	26.2		258	38.6	41	29.3	43	17.5	

Table 3 – Distribution of answer to the BDKQ-Brazil of primary healthcare users according to sex and blood donation practice.

	Item/subject	Answers[a]	Females		Males		p	Never donated		Unable to donate		Already donated		p
			n	%	n	%		n	%	n	%	n	%	
16	Payment for blood donors	**No**	**784**	**93.2**	**187**	**87.4**	<0.01	**610**	**91.2**	**130**	**92.8**	**231**	**93.9**	0.15
		Yes	11	1.3	12	5.6		12	1.8	5	3.6	6	2.4	
		I don't know	46	5.5	15	7.0		47	7.0	5	3.6	9	3.7	
17	Blood volume replacement	No	39	4.6	19	8.9	0.05	31	4.6	7	5.0	20	8.1	<0.01
		Yes	**669**	**79.6**	**165**	**77.1**		**520**	**77.7**	**107**	**76.4**	**207**	**84.2**	
		I don't know	133	15.8	30	14.0		118	17.6	26	18.6	19	7.7	
18	Fever	**No**	**662**	**78.7**	**166**	**77.6**	0.94	**521**	**77.9**	**111**	**79.3**	**196**	**79.7**	0.69
		Yes	48	5.7	13	6.1		38	5.7	6	4.3	17	6.9	
		I don't know	131	15.6	25	16.3		110	16.4	23	16.4	33	13.4	
19	Gain or lose weight	Lose weight	7	0.8	4	1.9	0.05	8	1.2	3	2.1	0	-	0.03
		Gain weight	7	0.8	6	2.8		7	1.0	2	1.4	4	1.6	
		Neither	**784**	**93.3**	**191**	**89.2**		**608**	**90.9**	**131**	**93.6**	**236**	**95.9**	
		I don't know	43	5.1	13	6.1		46	6.9	4	2.9	6	2.4	
20	Volume of blood donated	2–4	37	4.4	12	5.6	<0.01	34	5.1	3	2.1	12	4.9	<0.01
		5–8	66	7.8	26	12.1		39	5.8	12	8.6	41	16.7	
		9–10	**152**	**18.1**	**50**	**23.4**		**84**	**12.6**	**26**	**18.6**	**92**	**37.4**	
		11–20	84	10.0	34	15.9		72	10.8	14	10.0	32	13.0	
		I don't know	502	56.7	92	43.0		440	65.8	85	60.7	69	28.0	
21	Time spent during donation	**20 min**	**262**	**31.1**	**110**	**51.4**	<0.01	**160**	**23.9**	**40**	**28.6**	**172**	**69.9**	<0.01
		40 m to 1 hour	214	25.5	40	18.7		176	26.3	31	22.1	47	19.1	
		More than 1 h	25	3.0	3	1.4		22	3.3	4	2.9	2	0.8	
		I don't know	340	40.4	61	28.5		311	46.5	65	46.4	25	10.2	
22	Fasting before donation	**No**	**399**	**47.5**	**88**	**41.3**	0.09	**265**	**39.6**	**65**	**46.4**	**157**	**64.3**	<0.01
		Yes	88	10.5	18	8.5		318	47.5	61	43.6	81	33.2	
		I don't know	353	42.0	107	50.2		86	12.9	14	10.0	6	2.5	
23	Smokers and blood donation	No	248	29.5	42	19.6	<0.01	223	33.4	35	25.0	32	13.0	<0.01
		Yes	**439**	**52.3**	**148**	**69.2**		**330**	**49.4**	**77**	**55.0**	**180**	**73.2**	
		I don't know	153	18.2	24	11.2		115	17.2	28	20.0	34	13.8	
24	Thicken or thin the blood	Thin	66	7.9	21	9.8	0.72	55	8.2	17	12.1	15	6.1	<0.01
		Thicken	61	7.2	18	8.4		48	7.2	10	7.1	21	8.5	
		Neither	**599**	**71.3**	**146**	**68.2**		**451**	**67.5**	**101**	**72.2**	**193**	**78.5**	
		I don't know	114	13.6	29	13.6		114	17.1	12	8.6	17	6.9	

[a] The correct answer for each question is highlighted in bold type.

Table 4 – Mean numbers of correct answers of primary healthcare users (n = 1055) by sociodemographic and behavioral variables (BDKQ-Brazil).

Variable	Categories	n	Correct answers			
			Mean	Standard deviation	Minimum–maximum	p-value (a)
Sex	Female	841	15.5	3.2	4–23	<0.01
	Male	214	15.2	3.3	3–22	Ref.
Marital status	Married	648	15.5	3.2	4–23	0.14
	Divorced	107	15.7	2.7	8–22	0.21
	Single	247	15.4	3.3	3–23	0.26
	Widowed	53	14.5	3.1	8–22	Ref.
Socioeconomic class[a]	A or B1	65	16.1	3.5	4–22	0.35
	B2	290	16.0	3.1	4–23	0.13
	C1	368	15.5	3.2	3–23	0.28
	C2	235	15.0	3.4	4–22	0.66
	D or E	97	14.3	2.6	7–21	Ref.
Age groups (years)	Under 25	188	14.9	3.3	3–22	0.27
	26–30	132	15.3	3.3	4–21	0.84
	31–40	250	15.9	3.0	8–23	0.26
	41–50	173	15.7	3.2	8–22	0.18
	51–60	164	15.8	3.4	4–23	0.08
	>60	148	15.0	2.9	6–22	Ref.
Educational level[b]	Illiterate	130	14.2	3.0	5–22	<0.01
	Elementary school	61	14.3	2.9	6–20	<0.01
	Middle school	221	15.2	3.4	4–23	<0.01
	High school	517	15.7	3.1	3–23	0.02
	Higher education	126	16.8	3.0	9–22	Ref.
Self-perception of health	Good	735	15.6	3.2	3–23	0.07
	Regular	280	15.1	3.3	4–23	0.27
	Poor	40	14.7	3.1	8–20	Ref.
Blood donation practice	Never donated	669	14.9	3.2	3–23	<0.01
	Unable to donate	140	15.5	3.0	8–22	<0.01
	Already donated	246	17.1	2.9	6–23	Ref.

(a) Multivariate Tobit regression model.

[a] A/B1 (R$ 15,071.00 or USD 4739.00); B2 (R$ 4852.00 or USD 1526.00); C1 (R$ 2705.00 or USD 851.00); C2 (R$1625.00 or USD 511.00); D or E (R$ 728.00 or USD 229.00).

[b] Elementary school (preschool to 4th grade); middle school (5th grade to 8th grade); high school (secondary education – 3 years).

A limitation of this study is regarding the higher number of women in the sample of primary healthcare users. However, this is a characteristic of the population who seek healthcare services in Brazil.[23] Although, in this study the rate of women was higher than expected, we understand that this is an important opportunity to increase knowledge about blood donation among individuals who have never been to a blood bank, an under-studied population in the field of transfusion epidemiology.

The BDKQ-Brazil is an original instrument that aims to measure general aspects of knowledge about blood donation that can be used in many contexts. There is evidence that greater knowledge regarding blood donation is associated with sex, educational level and previous blood donation in primary healthcare users. We strongly suggest that BDKQ-Brazil should be applied aiming to improve the instrument and its adaptation for distinct populations, as well as to fill the gap in the scientific literature in the field of blood donation epidemiology.

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Conflicts of interest

The authors declare no conflicts of interest.

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