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Research Article

The epidemiological profile of donors and non-donors of blood in Morocco

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Abstract

Introduction: In Morocco, blood donation is voluntary, anonymous, and voluntary. The promotion of blood donation has evolved favorably thanks to strategies based on the creation of a multi-sector promotion system. The transformation of family donors into voluntary donors and the retention of voluntary donors is the major challenge of the national blood transfusion center.

Materials and methods: This is an analytical quantitative cross-sectional study on a target population made up of 1000 participants. The collection tool was a self-administered, anonymous questionnaire made up of closed questions concerning the socio-demographic profile of the participants, and their knowledge and attitudes about the blood donation operation as well as their motivation and limitations of the donation. The responses were collected and entered by a team of graduate students in sociology. Data were analyzed by SPSS 20 software.

Results: Among the 953 participants, their mean age (Standard Deviation) is 32.56 (12.993) years, with 63.4% of the participants under the age of 34 (n = 429). For data relating to blood donation, 69.3% of the participants thought they did not know the blood group (n = 660), more than 70% thought of the existence of the illegal sale of blood in Morocco (n = 668). 69.3% of the participants think they do not know the blood type (n = 660), more than 70%, though of the existence of the illegal sale of blood in Morocco (n = 668), 70.8% do not know someone who has had or require an organ or tissue transplant (n = 479).

Conclusion: The need for blood is sharply increasing, an enormous shortage hence the need for epidemiological study to highlight the various difficulties that hamper the promotion of blood donation.

Keywords: Blood, transfusion, Blood donation, Promoting blood donation, Faithful donor, Morocco

INTRODUCTION:

Blood is a living tissue that plays an essential role and irreplaceable functions in the human body. Thus a sufficient and secure supply of this biological fluid should be an integral part of any national health policy and a country's health infrastructure. According to the WHO, of the 118.5 million blood donations collected each year worldwide, 40% are collected in high-income countries where only 16% of the world's population live. In Morocco, the national transfusion center denounces the need for more than 1,000 donations per day to be able to meet the needs of patients for blood bags. Despite the authorities' efforts, the blood donations collected do not make it possible to meet all the needs of patients, as well as the associated transfusion safety.

In our context, blood donation is essentially anonymous, voluntary, and voluntary. Donors can be divided into two categories, so-called family donors and voluntary donors. A situation that forces the transfusion centers to promote blood donation, by recruiting more voluntary donors and improving

their degree of loyalty, as well as transforming family donors into voluntary donors.

The promotion of blood donation requires the establishment of several in-depth epidemiological studies on the socio-demographic profile, knowledge, attitudes, and beliefs of the Moroccan population.

MATERIAL AND METHODS:

In this study, to triangulate the information and collect specific information on blood donation and on the constraints of the implementation of this operation in Morocco, we first carried out a benchmark and a non-exhaustive review of the literature in the bibliographic databases, in particular studies published in scientific journals specializing in this field, carried out in different countries. This study of international experiences has enabled us to identify the main factors and constraints influencing this operation and to have a global vision on this subject of great importance.

Second, we adopted a qualitative and quantitative analysis that focused on collecting statistical data from different sources relating to blood donation in Morocco. This analysis made it possible to convert the information collected into figures, to describe, explain and predict the main factors influencing blood donation in our country. This allows an empirical observation and its connection with the conceptual dimension of research and to have an idea of the dominant variables, to prioritize them, and to propose actions for improvement.

To conduct this cross-sectional and descriptive study, we chose to establish interviews that would make it possible to express the individual and collective opinions of Moroccans on blood donation, to gather information on the exact opinions on this subject, and to assess the knowledge and practices in this area. These interviews also focused on socio-demographic information, attitude, and reasons for refusing and/or accepting blood donation.

At the same time, a pre-established questionnaire was completed by each person who participated in the interview. Data were collected on paper and then entered and analyzed on a computer. Qualitative variables were described by their proportion and percentage. A Chi2 test was performed. The binary logistic regression by progressive step (likelihood ratio) was carried out to highlight the predictive factors of the refusal of the blood donation. Data were analyzed by SPSS 20 software.

The questionnaires were completed between 01/01/2020 and 01/09/2020. Out of a total of 1000 questionnaires returned, 953 questionnaires were retained and 47 questionnaires were eliminated.

RESULTS:

A total of 1000 questionnaires were returned, 953 questionnaires were retained and 47 questionnaires were discarded. Among the 953 participants (Table 1), their mean age (Standard Deviation) is 32.56 (12.993) years, with 63.4%

of the participants under the age of 34 (n = 429). More than half of the participants are men (58.1%, n = 393), single people (52.6%, n = 356), of rural origin (50.2%, n = 340), have a secondary and higher education level (65.3%, n = 442), are active (52.1%, n = 353), have medical coverage (65.3%, n = 442) and have never been hospitalized (62.2, n = 421). The majority of participants have already become ill (88.8%, n = 601) and have used medication (89.7%, n = 607). The results from the Chi2 produced to show that for sex, age, disease, hospitalization, and drug use, no statistically significant difference was reported between the group that showed a desire to take a blood donation and those who do not want it. A significant difference was found between the two groups with regard to, marital status (p = 0.038), origin (p = 0.019), level of education (p <0.0001), function (p <0.0001) and medical coverage (p = 0.011).

For data relating to blood donation (Table 2), 69.3% of the participants thought they did not know the blood group (n = 660), more than 70% thought of the existence of the illegal sale of blood in Morocco (n = 668), more than 82% did not know the amount of blood collected from the donor. (n = 782), only 9.7% of participants know the cost of treating a blood bag (n = 9).

Table 3 shows us the factors favoring blood donation, only 29.9% of respondents declared altruism as a factor that promotes blood donation (n = 285), 2% of participants thought of the health benefits of blood donation (n = 19), only 5% claimed awareness of the lack of blood as a source of motivation for donating blood (n = 5).

69.3% of the participants think they do not know the blood type (n = 660), more than 70%, though of the existence of the illegal sale of blood in Morocco (n = 668), 70.8% do not know someone who has had or require an organ or tissue transplant (n = 479), 63.7% have never heard of a stem cell transplant (n = 431) and 57.3% think that the transplant has organs is an effective therapeutic alternative (n = 388).

Table 1: Sociodemographic and clinical characteristics

Variable	Total n = 993		Donor n = 177		Non-donor n = 776		Chi-2 test		
	N	%	N	%	N	%	Chi2	ddl	p
Sex							13.22	1	0.0002
Man	546	57.3	123	69.5	423	54.5			
Women	407	42.7	54	30.5	353	45.5			
Age range							29.574	4	< 0.0001
18 - 24									
25 - 34	356	37.4	35	19.8	321	41.4			
35 - 44	249	26.1	55	31.1	194	25.0			
45 - 59	166	17.4	42	23.7	124	16.0			
> 60	147	15.4	36	20.3	111	14.3			
	35	3.7	9	5.1	26	3.4			
Civil status							24.676	3	< 0.0001
Married									
Single	372	39.0	96	54.2	276	35.6			
Widowers	504	52.9	71	40.1	433	55.8			
	40	4.2	2	1.1	38	4.9			
Divorced	37	3.9	8	4.5	29	3.7			

Origin							14.939	2	0.001
Urban									
Semi-urban	289	30.3	75	42.4	214	27.6			
Rural	199	20.9	32	18.1	167	21.5			
No answer	464	48.7	70	39.5	394	50.8			
	1	0.1	0	0	1	0.1			
Level of study							35.648	5	< 0.0001
Without level									
Quranic and preschool									
Fundamental (1st cycle)	71	7.5	2	1.1	69	8.9			
Fundamental (2nd cycle)	23	2.4	2	1.1	21	2.7			
Secondary	82	8.6	7	4.0	75	9.7			
Superior	141	14.8	16	9.0	125	16.1			
	163	17.1	33	18.6	130	16.8			
	473	49.6	117	66.1	356	45.9			
Function							112.339	7	< 0.0001
Self-employed (artisans, traders and farmers)									
Managers and higher intellectual professions									
Intermediate professions									
Employees	153	16.1	22	12.4	131	16.9			
Workers	58	6.1	33	18.6	25	3.2			
Students	112	11.8	33	18.6	79	10.2			
Retirees	102	10.7	33	18.6	69	8.9			
Inactive	68	7.1	15	8.5	53	6.8			
No answer	276	29.0	25	14.1	251	32.3			
	9	0.9	2	1.1	7	0.9			
	156	16.4	10	5.6	146	18.8			
	19	2	4	2.3	15	1.9			
Sector							16.995	2	0.0002
Public									
Semi public	174	18.3	67	37.9	107	13.8			
Private	48	5.0	15	8.5	33	4.3			
No answer	279	29.3	58	32.8	221	28.5			
	452	47.4	37	20.9	415	53.5			
Do you have medical coverage?							43.928	1	< 0.0001
No									
Yes	325	34.1	98	55.4	227	29.3			
No answer	623	65.4	78	44.1	545	70.2			
	5	0.5	1	0.6	4	0.5			
Have you ever been hospitalized?							3.515	2	0.172
No									
Yes	590	61.9	100	56.5	490	63.1			
No answer	350	36.7	73	41.2	277	35.7			
	13	1.4	4	2.3	9	1.2			
Have you ever been followed for an illness?							0.005	1	0.943
No									
Yes	106	11.1	20	11.3	86	11.1			
No answer	845	88.7	157	88.7	688	88.7			
	2	0.2	0	0	2	0.3			
Have you ever used drug treatments?							0.002	1	0.967
No									
Yes	96	10.1	18	10.2	78	10.1			
No answer	856	89.8	159	89.8	697	89.8			
	1	0.1	0	0	1	0.1			

Table 2: Data relating to blood donation

Variable	Total n = 993		Donor n = 177		Non-donor n = 776		Chi-2 test		
	N	%	N	%	N	%	Chi2	ddl	p
Knowledge of the blood group?							285.371	1	< 0.0001
No	660	69.3	29	16.4	631	81.3			
Yes	293	30.7	148	83.6	145	18.7			
Is there in our context the illegal sale of blood?							3.613	2	0.164
Yes									
No	668	70.1	129	72.9	539	69.5			
I do not know	93	9.8	21	11.9	72	9.3			
No answer	190	19.9	27	15.3	163	21.0			
	2	0.2	0	0	2	0.3			
How much blood is taken?							8.378	2	0.015
200 cm3									
450 cm3	164	17.2	57	32.2	107	13.8			
1000 cm3	171	17.9	85	48.0	86	11.1			
No answer	13	1.4	4	2.3	9	1.2			
	605	63.5	31	17.5	574	74.0			
Do we have enough blood in the blood banks?							1.804	1	0.179
Yes									
No	210	22.0	33	18.6	177	22.8			
No answer	659	69.2	131	74.0	528	68.0			
	84	8.8	13	7.3	71	9.1			
What is the cost of testing a single blood bag?							8.002	2	0.018
0 DH									
0 to 400 DH	51	5.4	9	5.1	42	5.4			
400-1000 DH	189	19.8	73	41.2	116	14.9			
No answer	92	9.7	34	19.2	58	7.5			
	621	65.2	61	34.5	560	72.2			
Have you ever heard of Bloodmate?							41.355	3	< 0.0001
Never heard									
Heard	39	4.1	1	0.6	38	4.9			
Heard a few	283	29.7	48	27.1	235	30.3			
Heard a lot	265	27.8	27	15.3	238	30.7			
No answer	353	37.0	100	56.5	253	32.6			
	13	1.4	1	0.6	12	1.5			

Table 3: Factors that promote blood donation

Factors that promote blood donation	Total n = 993		Donor n = 177		Non-donor n = 818		Chi-2 test		
	N	%	N	%	N	%	Chi2	ddl	p
Altruism or public benevolence							10.974	1	0.001
No	146	15.3	71	40.1	75	9.7			
Yes	285	29.9	92	52.0	193	24.9			
No answer	522	54.8	14	7.9	508	65.5			
Social responsibility / Social commitment							27.943	1	< 0.0001
No	379	39.8	37	20.9	253	32.6			
Yes	52	5.5	126	71.2	15	1.9			

No answer	522	54.8	14	7.9	508	65.5			
Responsibility to relatives / friends							0.032	1	0.858
No	398	41.8	151	85.3	247	31.8			
Yes	33	3.5	12	6.8	21	2.7			
No answer	522	54.8	14	7.9	508	65.5			
Motivation through the blood bank campaign							2.373	1	0.123
No	427	44.8	160	90.4	267	34.4			
Yes	4	0.4	3	1.7	1	.1			
No answer	522	54.8	14	7.9	508	65.5			
Military service							6.227	1	0.013
No	421	44.2	163	92.1	258	33.2			
Yes	10	1.0	0	0.0	10	1.3			
No answer	522	54.8	14	7.9	508	65.5			
Checkup							0.021	1	0.886
No	421	44.2	159	89.8	262	33.8			
Yes	10	1.0	4	2.3	6	0.8			
No answer	522	54.8	14	7.9	508	65.5			
Test VIH / hépatite (pour les tests biologiques)							0.683	1	0.409
Non	426	44.7	162	91.5	264	34.0			
Oui	5	.5	1	.6	4	.5			
No Answer	522	54.8	14	7.9	508	65.5			
Awareness of lack of blood							1.058	1	0.304
No	426	44.7	3	1.7	266	34.3			
Yes	5	.5	160	90.4	2	0.3			
No answer	522	54.8	14	7.9	508	65.5			
Health benefits of donating blood							0.155	1	0.694
No	412	43.2	155	87.6	257	33.1			
Yes	19	2.0	8	4.5	11	1.4			
No answer	522	54.8	14	7.9	508	65.5			
Another reason							0.684	2	0.710
No	423	44.4	160	90.4	263	33.9			
Yes	8	0.8	3	1.7	5	0.6			
No answer	522	54.8	14	7.9	508	65.5			

Table 4: Factors that prevent blood donation

Factors that prevent blood donation	Total n = 993		Blood Donor n = 177		Non-donor n = 776		Chi-2 test		
	N	%	N	%	N	%	Chi2	ddl	p
Fear of fainting or other complications (needle reactions)							19.21	1	< 0.000
No	704	73.9	44	24.9	660	85.1	7		1
Yes	80	8.4	16	9.0	64	8.2			
No answer	169	17.7	117	66.1	52	6.7			

I don't have enough information about the blood donation process							4.151	1	0.042
No	695	72.9	58	32.8	637	82.1			
Yes	89	9.3	2	1.1	87	11.2			
No answer	169	17.7	117	66.1	52	6.7			
Deterioration of health after a donation							1.172	1	0.279
No	699	73.3	56	31.6	643	82.9			
Yes	85	8.9	4	2.3	81	10.4			
No answer	169	17.7	117	66.1	52	6.7			
Possibility of contracting HIV / viral hepatitis							1.401	1	0.237
No	772	81.0	58	32.8	714	92.0			
Yes	12	1.3	2	1.1	10	1.3			
No answer	169	17.7	117	66.1	52	6.7			
No one asked me to donate blood							11.403	1	0.001
No	590	61.9	56	31.6	534	68.8			
Yes	194	20.4	4	2.3	190	24.5			
No answer	169	17.7	117	66.1	52	6.7			
I never thought of doing that							3.26	1	0.071
No	705	74.0	58	32.8	647	83.4			
Yes	79	8.3	2	1.1	77	9.9			
No answer	169	17.7	117	66.1	52	6.7			
Due to illness (such as diabetes, kidney disease)							0.726	1	0.394
No	692	72.6	55	31.1	637	82.1			
Yes	92	9.7	5	2.8	87	11.2			
No answer	169	17.7	117	66.1	52	6.7			
Not enough time to donate blood, no transportation to go to a blood donation center.							3.917	1	0.048
No	755	79.2	55	31.1	700	90.2			
Yes	29	3.0	5	2.8	24	3.1			
No answer	169	17.7	117	66.1	52	6.7			
Insecurity							0.51	1	0.475
No	769	80.7	59	33.3	710	91.5			
Yes	16	1.7	2	1.1	14	1.8			
No answer	168	17.6	116	65.5	52	6.7			
I don't trust the healthcare system							6.533	1	0.011
No	684	71.8	46	26.0	638	82.2			
Yes	100	10.5	14	7.9	86	11.1			
No answer	169	17.7	117	66.1	52	6.7			
The same service will not be provided to me if necessary							15.342	1	< 0.0001
No	778	81.6	57	32.2	721	92.9			
Yes	6	0.6	3	1.7	3	0.4			
No answer	169	17.7	117	66.1	52	6.7			

DISCUSSION:

For nearly a century, blood and its derivatives have been used effectively for therapeutic purposes in humans. It is for over fifty years that many laboratories around the world have attempted to develop substitutes. The history of blood transfusion in Morocco began in 1943 with the creation of the 1st blood transfusion center (CTS) in Fez by the Doctor Commandant J. Julliard, then in Casablanca in 1948, and the creation of the national blood transfusion center. (CNTS) in Rabat in 1956. Blood transfusion is organized by the national blood transfusion center, under the supervision of the Ministry of Health.¹

Law No. 03-94 relating to the donation, collection, and use of human blood and decrees No. 2-94-20 of November 16, 1995, and 2-96-421 of November 20, 1996, taken for its application, as well as orders and circulars are the main regulatory references governing transfusion in Morocco. The practice of transfusion is governed by regulations allowing the protection of the rights and the safety of the donor and the recipient.^{1,2}

Blood transfusion (TS) is a therapeutic act that consists of administering whole blood or one of its cellular or plasma components (red blood cells, platelets, fresh frozen plasma, cryoprecipitate), from one or more healthy subjects called "donors." "To a sick subject called a" recipient".³ Currently, Morocco needs 1,000 daily donations to be able to meet the needs of patients for blood bags. Nationally, the total donation in 2019 was 334,510. Blood donation is voluntary and free (Law 03-94). The promotion of blood donation has developed favorably over the past ten years, thanks to a strategy based on the creation of a multi-sector promotion system.⁴

The promotion of donation is the only method to date that makes it possible to maintain the stock of labile blood products through the recruitment and retention of blood donors, in countries based on voluntary and voluntary blood donation.

This present study has focused on several elements allowing to have a global and specific vision of the causes of refusal and acceptance of blood donation in Morocco. Therefore, a more in-depth analysis is called for in this study, it is to analyze socio-demographic characteristics, data relating to blood donation, factors that favor blood donation as well as those that prevent this procedure.

In our study, Out of 1000 people participating in the survey, only 177 people have ever donated blood, a rate of 18.57% of the total number of respondents. The majority of blood donors were men (69.5%) this value is confirmed by a Tunisian study which had a percentage of 81% of men⁵. In addition, in Europe, there is a slight female predominance 52% and 53.82% in France and Germany respectively.^{6,7}

Relative to the age of the study participants, this is an average age (Standard Deviation) of 32.56 (12.993) years, with 63.4% of the participants being under 34 years of age. A result was well confirmed by the Tunisian study conducted by Ben Amor in 2009, in which more than 45.7% of donors were between 18-28 years old⁵. This age parameter did not show a statistically significant difference between the group that showed a willingness to donate blood and those who did not.

The results of the survey also showed that more than half of the participants are single (52.6%), and those of rural origin (50.2%), as well as people who have a secondary and higher education level (65.3%). This initial analysis indicated that 52.1% of study participants are active, and those with medical coverage are 65.3% and those who have never been hospitalized are 62.2%. Likewise, the majority of participants

have already fallen ill (88.8%) and have already used medication (89.7%).

The results from the Chi2 produced show that for sex, age, disease, hospitalization, and drug use, no statistically significant difference was reported between the group that showed a desire to take donate blood and those who do not want it.

However, a significant difference was found between the two groups with regard to, marital status ($p = 0.038$), rural and urban origin ($p = 0.019$), level of education ($p < 0.0001$), function ($p < 0.0001$) and medical coverage ($p = 0.011$). In Spain and the United States, no differences were found likely to donate between people in rural and urban areas.^{8,9}

data relating to general knowledge about blood donation, these are elements related in particular to good communication and awareness-raising practices on this subject, they have shown that 69.3% of participants do not know their blood type, think that organ donation should be free, 82.1% do not know the amount of blood collected during a blood donation, 70.1% believed in the existence of the illegal sale of blood in public hospitals and over 69% believed that Morocco has an insufficient blood supply. This finding confirms the presence of a great lack of communication education in blood donation, as well as the need to set up an awareness campaign through social networks with the active participation of the various stakeholders in the blood donation. national press.

Our study also discussed other important parameters motivating blood donation in Morocco more than 71% of donors were motivated by their commitment and social responsibility, and 90.4% of donors were aware of the lack of blood supply. In Ben Amr's study, the motivations among voluntary donors are mostly mass movements for students, or as a result of an emotional charge conveyed by the information and image of the Israeli invasion of Gaza or the United States. Lebanon or the American one in Iraq, for example.⁵

By studying altruism as a motivation for donating blood, Bolle and Otto found no difference in the level of altruism between donors and non-donors.¹⁰ Stutzer and Goette said that participants who were aware of the need for blood were more likely to donate at the next blood drive than those who did not.¹¹

Several factors contributed to the revocation and refusal of blood donation by the Moroccan population, in our study we observed that more than 85% of non-donors presented fear of fainting and a reaction to the needle, 68.8% said that no one asked them to donate blood, 82.2% did not trust the health system and 92.9% thought that they will not have the same reward service within hospitals. Several studies have explored the role of adverse effects on donor status and behavior; they have observed that donors who have experienced an adverse event have shown lower rates of return than donors who have not experienced an adverse event.^{12,13}

The reluctance to donate voluntarily was justified by the absence of reasons in 51% of cases, the absence of conviction in volunteering blood donation among (22.05%), the lack of availability (free time) (13.37 %), accessibility to sampling sites (7.57%), fear of injections or blood (4.01%).⁵

In addition to individual characteristics, context also plays a role in the behavior of blood donors. One study found that children raised in a 'family of blood donors were more likely to become donors themselves¹⁴. This type of so-called contextual characteristics completely differentiates from characteristics linked to the individual, namely their level of

education, their urban or rural origin, their profession, and also characteristics linked to the health system, namely the transfusion center, the quality of service, blood collection schedule, etc.

Staff in charge of blood collection should always be warm, attentive, and efficient.¹⁵ He must provide and communicate precise information about the operation of the blood donation as well as the rest before and after the donation to prevent discomfort during or during the donation. The responsible team should also try to motivate and raise awareness to preserve loyal donors and retain large numbers of voluntary donors.

Despite the progress made in terms of knowledge of the epidemiological profile of donors and non-donors and the increase in the number of blood drives. The effort should be focused not only on the number of donations collected but above all on the "quality" of donors. The sponsorship of future blood donors, the creation of blood donor associations and rare groups is a matter for civil society.

CONCLUSION:

In Morocco, the needs for blood and blood products are important and tend to increase. With less than 400,000 thousand donors per year, and despite the rationalization of donation, several thousand blood donations are still needed every year to deal with different medical or surgical situations.

In this context of strong demand, blood collection is, therefore, a major issue for the public authorities and communication campaigns are regularly implemented to raise awareness among citizens to recruit more voluntary blood donors as well as ensure their subsequent loyalty.

REFERENCES :

1. Benkirane M, R. Hadeif, H. Zahid, M. Naji Transfusion sanguine au Maroc : expérience du CTS de l'hôpital militaire de Rabat. Posters, Transfusion Clinique et Biologique, 2009; 16(3):283-349. <https://doi.org/10.1016/j.tracbi.2009.04.009>
2. Harif M, Loukhamas L. La transfusion sanguine à l'usage du praticien Edition 2013.
3. Jaulin P, Lefrère JJ, Histoire de la transfusion sanguine : Les premières transfusions sanguines en France (1667- 1668).

Elsevier Masson SAS, Transfusion Clinique et Biologique 2010; 17:205-217. <https://doi.org/10.1016/j.tracbi.2010.05.001>

4. Amraou NE, Benajiba M. La promotion de don de sang est une responsabilité de société. Centre national de transfusion sanguine et d'hématologie (CNTSH), Rabat, Maroc. Transfusion Clinique et Biologique. 2019. <https://doi.org/10.1016/j.tracbi.2019.06.263>
5. Ben Amor I, Rekek T, Hentati N, Fki H, Kharrat F, Gargouri J. Facteurs influençant la prévalence de l'antigène HBs chez les donneurs de sang tunisiens. Étude à propos de 275 300 donneurs de sang. Transfus Clin Biol 2009; 16:283
6. Établissement français de sang. Rapport d'activité 2011.
7. Offergeld R, Ritter S, Hamouda O. HIV-, HCV-, HBV- und syphilissurveillance unter blutspendern in Deutschland 2008-2010. Bundesgesundheitsbl 2012; 55:907-13. <https://doi.org/10.1007/s00103-012-1516-1>
8. Gillum RF, Masters KS. Religiousness and blood donation: findings from a national survey. J Health Psychol 2010; 15:163-72. <https://doi.org/10.1177/1359105309345171>
9. Abásolo I, Tsuchiya A. Blood donation as a public good: an empirical investigation of the free rider problem. Eur J Health Econ 2014; 15:313-21. <https://doi.org/10.1007/s10198-013-0496-x>
10. Bolle F, Otto PE. A price is a signal: on intrinsic motivation, crowding-out, and crowding-in. Kyklos 2010; 63:9-22. <https://doi.org/10.1111/j.1467-6435.2010.00458.x>
11. Stutzer A, Goette L, Zehnder M. Active decisions and prosocial behaviour: a field experiment on blood donation. Econ J 2011; 121: 476-93. <https://doi.org/10.1111/j.1468-0297.2011.02477.x>
12. France CR, France JL, Carlson B, et al. Fear of blood draws, vasovagal reactions, and retention among high school donors. Transfusion 2014; 54:918-24. <https://doi.org/10.1111/trf.12368>
13. Veldhuizen IJT, Atsma F, Van Dongen A, de Kort WLAM. Adverse reactions, psychological factors, and their effect on the donor retention in men and women. Transfusion 2012; 52:1871-9. <https://doi.org/10.1111/j.1537-2995.2011.03551.x>
14. Pedersen OB, Axel SA, Rostgaard K, et al. The heritability of blood donation: a population-based nationwide twin study. Transfusion 2015; 55:2169-74. <https://doi.org/10.1111/trf.13086>
15. Ministère de la Santé publique, République tunisienne. Circulaire 49/05 du 13 juin 2005 relative à la sécurité transfusionnelle.