Attitudes and behaviours of Greeks concerning blood donation: recruitment and retention campaigns should be focused on need rather than altruism

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Background. Blood supplies in Greece are insufficient to meet the high transfusion needs arising from car accidents and treatment of thalassaemia. This study was designed to determine Greeks' opinions about blood donation, in order to identify the reasons for the lack of motivation to donate and allow experts to establish better recruitment campaigns for the enrichment of the donor pool, based on our findings.

Materials and methods. The opinions of randomly selected Greek citizens (n=800) about volunteer blood donation were assessed by means of a standardised, anonymous questionnaire. The results were analysed using the χ^2 test and Spearman's correlation coefficient.

Results. With regards to attitudes towards intention to donate, only 7.1% were indifferent, while 88.0% of the individuals believed that donating blood was an "offer". Reasons for not donating mainly involved safety (36.0%) and fear (24.0%), whereas need (77.9%) was the most fundamental positive motivation. Of the people enrolled in the present study, 10.0% were active donors, 31.3% occasional donors, 15.0% rare donors and 36.6% non-donors.

Discussion. The considerable percentages of occasional and rare donors in comparison with the low proportion of active donors in the Greek donor pool indicates that "need" is a more important motivation for blood donation than altruism in Greece. These results could be useful for establishing advertising campaigns on blood donation and for a more direct approach to the population, aiming for a change in mentality in favour of active blood donation.

Keywords: blood donation, donor characteristics, blood donors.

Introduction

Every year, in Greece (population 10,787,690), hundreds of people need blood products as a consequence of car accidents, routine surgery or treatment of serious diseases, such as thalassaemia and sickle cell disease. On the other hand, only a small percentage (5.6%)[1] of the eligible population currently chooses to donate whole blood on a regular basis. In Greece, the National Blood Centre, founded 7 years ago, is responsible for blood supplies, but the units of blood are collected in hospitals. The blood donation system in Greece has two targets: to maximise the return rate of first-time voluntary blood donors and to transform family donors into volunteer blood donors. However, as in many different countries, the proportion of return donors has not increased and further efforts are needed in order to maintain eligible first-time donors in the donor pool[2].

Major motivations for blood donation have been found to be altruism, awareness of need, sense of social obligation, personal pressure, the need to replace blood used, and increased self-esteem[3,4]. The major reasons for not giving blood have been found to be fear, inconvenience, fear of pain, of fainting, of developing anaemia, fear of weakness and fear of infection[4,5,6]. Finally, as far as concerns negative motivations, additional studies have indicated that the donation procedure may also result in adverse reactions related to the process of collecting blood, but only in a small proportion of blood donors[7,8].

Blood donor profiles can provide transfusion centres with knowledge about their donor population. This type of information is valuable for blood donor recruitment and retention policies[9]. Recruitment and retention programmes explore ways to appeal to social liability

and confirm that being asked to donate is essential in motivating blood donors[10]. Furthermore, exposure to a brief educational brochure can enhance prospective donor confidence and increase the probability of blood donation[11]. In the past two decades, an increasing number of studies have focused on understanding blood donation behaviour and, more specifically, on the willingness to donate blood[12-15]. Researchers have used several theories to gain knowledge and to integrate empirical findings in the context of blood donation behaviour. Of these, the theory of planned behaviour has received considerable support as a cognitive model predicting a wide variety of behaviours, including blood donation behaviour[15-22].

According to an encouraging recent finding of the European Commission (*Eurobarometer*), Greece is among the countries with the most significant increases in blood donation levels between 2002 and 2009 with an increase in donation from 40.0% to 51.0%[23]. Greece is also among the countries with the highest blood donation rate together with Austria, France and the Republic of Cyprus[23].

Encouraged by these findings, this study was designed to determine the opinions and attitudes of Greek citizens about volunteer blood donation. Our data provide knowledge about blood donation in Greece and give additional information about the reasons why people avoid donating blood. These findings could be useful for increasing the current donor pool, for directing recruitment campaigns better and for changing the mentality of the Greek population.

Materials and methods

The opinions of Greek citizens about volunteer blood donation were assessed by means of a standardised, anonymous questionnaire (not shown). The individuals were randomly selected in several public places in Athens, such as underground train stations and public squares and they were all over 18 years old. The questions of the questionnaire were presented in a multiple choice form and they were based on the most reliable books and published studies on blood transfusion[2,5,6,15-22,24-26]. The participants completed the questionnaires in the presence of the researcher, who would provide all necessary explanations to the participants, both prior to and during completion of the questionnaires. The clarification provided was purely on the interpretation of the questions and the participants' responses were not guided in any way. The questionnaire consisted of multiple choice and rating questions and required approximately 10 minutes to complete. It started with five general questions asking the sex (male or female), age (stratified to ages between 18 and 30, between 31-50, 51-65 and over 65 years old), educational level [primary school education level (level a), higher education level (level b), university degree and master's degree], area of residence (rural or urban) and employment status (unemployed, student, worker or pensioner). The rest of the questions (35 questions) were specific and related to blood donation (scale questions), investigating: whether the respondent was an active blood donor or not, opinions about volunteering and more specifically about voluntary blood donation, the personal gain of voluntary blood donation, positive and negative motivations, the safety of the voluntary blood donation process and finally whether the participant was informed about the safety and personal benefits of the procedure. The validity of the questionnaire was determined by specialists in haematology, transplantation, epidemiology and public health[27].

In general, the questions concerned:

- demographic characteristics (age, sex, nationality, education and area of residence);
- donor and non-donor behaviour (total number of donations, reasons for donating, reasons for not donating, etc.);
- factors that motivate or discourage blood donation (incentives);
- level of knowledge about blood donation and transfusion;
- risk perception (perceived risks, fears);
- attitudes about blood transfusion.

This study was undertaken during the academic year 2009/2010, as a part of a thesis from the laboratory of Haematology Transfusion Medicine in the Department of Medical Laboratories at the Faculty of Health and Caring Professions, of the Technological and Educational Institute of Athens. In detail, from October 2009 to February 2010, 800 questionnaires were anonymously completed from randomly selected people in Athens. Greece has a high urbanisation rate, and Athens is a very big city visited by people from all over the country. Thus the questionnaires also distinguished between individuals whose place of residence was Athens itself (or urban in general) and people who actually resided in provinces (rural residents). The participants were informed that the data would be used for research purposes.

The data from all the returned questionnaires were entered and analysed in Excel, Matlab SPSS (SPSS, Statistical Package for Social Sciences) version 19.0. Both descriptive and inferential statistics were computed. The level of statistical significance was set at $p<0.05$ (χ^2 test and Spearman's correlation coefficient).

Results

Characteristics of the participants

All 800 questionnaires were filled in, in the presence of the researchers, giving a response and return rate of 100%. Regarding gender, 494 out of the 800 participants were females (61.8%), while 306 were males (38.2%). The majority (490 out of 800) were aged between 18 and

30 years old (61.3%), 281 were aged between 31 and 50 years old (35.1%), 25 were aged 51-65 years old (3.1%) and finally, 4 were over 65 years old (0.5%). Regarding the educational level, 38 of 800 (4.8%) had a primary school education (level a), 402 (50.3%) had a higher education (level b), 322 (40.3%) had a university degree and 38 (4.8%) had a master's degree. Regarding the area of residence, 229 (28.6%) were rural residents while 571 out of 800 (71.4%) were urban residents. Finally, 55 (6.9%) were unemployed, 217 (27.1%) were students, 511 (63.9%) were employed and 17 (2.1%) were pensioners.

Knowledge about blood donation in Greece

Table I summarises the numbers of individuals who answered positively (yes) to the following questions, "Is blood donation a voluntary action?", "Is blood donation a safe process?", "Does blood donation help the recipient and the donor as well?", "Is blood donation a very time-consuming process?" (correlates: age, sex, education, work) ($p<0.05$). The answers to these questions reflect basic knowledge about blood donation. Both donors and non-donors were considered and the results of the present study reveal that both groups were very well informed about the aims and the procedure of blood donation. Specifically, 95.1% replied that blood donation is a volunteer, altruistic action, 73.6% answered that it is a safe process (meaning that it is not considered a harmful or painful experience), while a remarkable 80% of individuals knew that donating blood may improve the health status of the recipient but also that of the donor. This particular question reveals people's knowledge about blood donation being a healthy habit. In contrast, only 15.5% answered that donation is a time-consuming procedure. Thus, 75.5% knew that it is a simple process that takes very little time to be completed. Furthermore, our sample felt that they were quite well informed, since the majority (56.8%, data not shown) believed that more publicity on blood donation is not needed. Nevertheless, the best informed individuals (100%) were pensioners and people aged over 65 years old. It is essential to note that the rates of positive answers were lower from individuals who had a master's degree or were unemployed. Only 31.6% of people with a master's degree knew that blood donation helps both the recipient and the donor, and only 58.2% of unemployed people knew that it was a safe process. Finally, women seem to be better informed than men, but correlations between gender and responses to the questionnaire were found to be statistically insignificant.

Attitudes towards intention to donate

As shown in Table II, attitudes towards intention to donate were strongly correlated with gender, area of residence, employment status and educational level, although no statistically significant correlation was found for age. Indeed, only 7.1% of the participants felt indifferent towards blood donation, while 4.8% considered that they could draw personal gain from blood donation, and the majority of participants (88.0%) believed that it is an action which corresponds to an "offer". Unlike the majority of the sample under study, 32.0% of those who had a master's degree remained indifferent towards blood donation and the motivation of "offering" described above was felt by only 64.0% of this group compared to 88.0% of the overall population under study ($p<0.001$). On the other hand, those who had received only a primary school education were found to have the highest frequency of intention to donate (95.8%) as a personal gift to others and the community.

Negative motivations

Negative motivations were divided into fear, ignorance, indifference, lack of safety of the process, religious beliefs and ethics and were compared with demographic correlations, as summarised in Table III. Of all the above negative motivations, a perceived lack of safety was found to be the most frequent obstacle (36.0%) to blood donation in Greece. On the other hand, religious beliefs and ethics were not obstacles in the decision not to donate. Fear (24.0%) and ignorance (21.0%) were other potential reasons for not donating. In each group of participants, those most frequently concerned about the safety of blood donation were women (36.6%), people aged between 31 to 50 years old (40.2%), urban citizens (40.3%), students (45.4%) and non-donors with a university education (37.4%) ($p<0.05$ in all cases). In more detail, a comparison between the sample of active donors and that of non-donors revealed that, interestingly, even though non-donors cared about patients and blood supplies ($p<0.001$), they did not believe that blood donation is a safe procedure, and subsequently they avoided donating blood by being indifferent ($p<0.002$). Another reason for not donating blood is fear. Women (25.7%), those aged between 51-65 (31.6%), rural residents (35.4%), students (37.2%) and individuals with a primary school education (39.4%) were found to be more afraid of donation than people with a higher level of education. When the overall sample was asked about its attitude toward blood donation, the percentage of those who remained indifferent was 7.1% (n=800, Table I), but it increased up to 17.0% (Table III) when it was analysed in correlation with people's refusal to donate.

Positive motivations

Table IV summarises positive motivations that influence the decision to donate blood in Greece. As shown, positive motivations were divided into curiosity, personal gain (blood tests and medical examinations)

Table I - Correlation between Greek individuals' knowledge and actual blood donation rates.

Correlates		Voluntary action			Safe procedure			Helps donor and recipient			Time-consuming process			Blood Donation Rates (%)						
		%	p	χ^2	%	p	χ^2	%	p	χ^2	%	p	χ^2	ND	ExD	RD	OD	AD	p	χ^2
Gender	female	96.6	0.017	5.725	53.1	0.56*	5.423	83.6	0.001	10.48	16.2	0.491*	0.475	40.5	5.1	15.4	29.6	9.5	0.006	14.6
	male	92.8			58.7			74.2			14.4			30.4	10.5	14.4	34	10.8		
Area of residence	province	91.3	0.001	10.301	65.1	0.001	12.11	69.4	<0.001	22.394	23.6	<0.001	15.996	49.8	10.9	15.7	20.1	3.5	<0.001	48.126
	urban	96.7			77.1			84.2			12.3			31.3	5.6	14.7	35.7	12.6		
Education level	level a	92.1	<0.001	32.815	92.1	0.037	8.5	73.7	<0.001	82.476	50	<0.001	61.199	44.7	5.3	15.8	34.2	0	<0.001	51.374
	level b	92.5			74.1			76.6			19.9			35.8	7.5	13.7	33.3	9.7		
	university	100			70.5			90.7			7.5			36	4	17.4	30.4	12.1		
	master's	84.2			76.3			31.6			2.6			42.1	31.6	7.9	13.2	5.3		
Employment status	unemployed	85.5	0.006	12.778	58.2	0.008	11.75	49.1	<0.001	40.331	40	<0.001	41.451	43.6	0	1.8	36.4	18.2	<0.001	58.928
	student	96.3			69.6			84.8			6.9			33.2	1.4	22.6	28.6	14.3		
	employed	95.5			76.7			80.6			17			38.2	10.2	13.3	31.5	6.8		
	pensioner	100			82.4			100			0			11.8	11.8	11.8	41.2	23.5		
Age	18-30	10.4	0.053*	38.577	69	0.001	15.55	86.5	<0.001	36.161	10.4	<0.001	38.577	36.3	4.1	19.2	30.6	9.8	<0.001	74.249
	31-50	26			80.1			69			26			39.5	12.5	5.7	31.3	11		
	51-65	0			88			72			0			8	0	40	48	4		
	over 65	0			100			100			0			50	50	0	0	0		
Total		95.1			73.6			80			15.5			36.6	7.1	15	31.3	10		

The data are presented for individuals who responded positively to the four questions: "Is blood donation a voluntary action?", "Is donating blood a safe procedure?", "Does donating blood help donors and recipients?", "Is blood donation a time-consuming process?". The individuals are divided according to their blood donation rate into non-donors (ND), previous blood donors (ExD), rare blood donors (RD), occasional blood donors (OD) and active blood donors (AD) (n= 800 individuals). *statistically insignificant value (p>0.05).

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Table II - Attitudes toward donation.

Correlates		Indifferent	Personal gain	Offer		
		%	%	%	p	χ^2
Gender	female	7.9	1.5	83.7	<0.001	31.16
	male	5.8	10.5	85.9		
Area of residence	province	4.9	1.5	93.7	0.006	9.681
	urban	8	6.1	85.9		
Education level	level a	4.2	0	95.8	<0.001	29.57
	level b	7.8	5.7	86.5		
	university	4.5	4.2	91.3		
	master's	32	4	64		
Employment status	unemployed	0	10.9	89.1	0.007	17.74
	student	5.7	2.4	91.9		
	employed	8.8	4.9	86.2		
	pensioner	0	15.4	84.6		
Total		7.1	4.8	88		

Attitudes toward blood donation were collected from question 4; "What is your opinion about becoming a blood donor?" and divided into: unconcerned (answer; "I don't care"), personal gain (answer; "I donate for personal gain") and offer (answer; "offer to other people". In this correlation, age was found to be statistically insignificant ($p>0.05$).

Table III - Negative motivations.

Correlates		Fear	Ignorance	Indifference	Safety	Religious beliefs	Ethics		
		%	%	%	%	%	%	p	χ^2
Gender	female	25.7	18.2	18.6	36.6	0.9	0.0	0.004	17.54
	male	20.9	27.6	13.8	34.3	2.8	0.8		
Age	18-30	26.8	23.7	13.8	33.8	1.4	0.5	0.003	34
	31-50	18.9	16.2	22.8	40.2	1.9	0.0		
	51-65	31.6	42.1	5.3	21.1	0.0	0.0		
Area of residence	province	35.4	25.8	14.1	24.2	0.5	0.0	<0.001	31.63
	urban	19.4	20	17.9	40.3	2.0	0.4		
Education level	level a	19.6	26.6	7.8	43.1	0.9	0.0	<0.001	86.74
	level b	37.2	9.8	6.6	45.4	1.1	0.0		
	university	18.4	24.7	22.7	32.1	1.6	0.4		
	master's	40	60	0.0	0.0	0.0	0.0		
Employment status	unemployed	39.4	24.2	12.1	24.2	0	0	<0.001	60.02
	student	21.2	25.8	14.9	36.4	1.1	0.6		
	employed	27.4	17.1	17.1	37.4	1.1	0.0		
	pensioner	6.5	12.9	41.9	25.8	12.9	0.0		
Total		24	21	17	36	1.0	1.0		

Negative motivations were divided into fear, ignorance, indifference, safety, religious beliefs, and ethics. All negative motivations were found to be statistically significant within different groups of respondents (694 individuals answered the related questions).

and need. Our data reveal that "need" was the main reason for donating blood (77.9%, n=498). The principal groups of people for whom need was the essential motivation were those with a primary school education (100%), the unemployed (88.0%), pensioners (84.6%), individuals aged between 31-50 years old (80.3%) and women (80.1%). In contrast, those for whom need was not a fundamental positive motivation were people with a master's degree (31.3%, $p<0.001$). For 37.5% of them, curiosity seemed to play an important role, motivating them to becoming active blood donors. As revealed by the present study, personal gain, such as blood tests and clinical examinations, does not ensure that a rare donor or a family donor will be transformed into an

Table IV - Positive motivations.

Correlates		Curiosity	Personal gain*		Need		
			Exam	Doctor			
		%	%	%	%	p	$\chi 2$
Gender	female	13.0	2.3	4.6	80.1	0.004	13.4
	male	8.9	6.8	9.9	74.3		
Age	18-30	12.9	3.8	6.6	76.7		
	31-50	10.6	4.8	4.3	80.3	0.003	19.5
	51-65	0.0	0.0	26.1	73.9		
Area of residence	province	10.6	9.3	5.3	74.8	0.001	15.9
	urban	11.8	1.7	7.2	79.3		
Education level	level a	0.0	0.0	0.0	100		
	level b	9.8	4.9	4.2	81.1	<0.001	35.5
	university	13.0	2.8	9.6	74.6		
	master's	37.5	6.3	25	31.3		
Employment status	unemployed	14.0	0.0	0.0	88		
	student	16.7	3.3	11.7	68.3	0.015	20.5
	employed	9.6	5.0	5.3	80.1		
	pensioner	0.0	0.0	15.4	84.6		
Total		11.4	4.0	6.6	77.9		

Positive motivations were divided into curiosity, personal gain, and need (694 individuals answered the related questions).
*Personal gain is divided into exams (blood tests) and doctor (clinical examination).

active donor. Personal gain was a positive motivation in only a small proportion of the overall sample (10.6%, of whom 4% for blood tests and 6.6% for the clinical examination).

Who donates blood?

According to the results of the present study, only 10% of individuals donate on a regular basis (active donors; i.e., those who donate at least twice a year). Within the groups described above, the categories more likely to become active donors were men (10.8%, P=0.006), urban citizens (12.6%, p<0.001), people aged between 31 and 50 years old (11%, p<0.001), people with a university degree (12.1%, p<0.001) and pensioners (23.5%, p<0.001). On the other hand, occasional donors (i.e., those who donate just once a year) formed 31.3% of the sample. The categories that were more likely to be occasional donors were men (34.0%), urban residents (35.7%), individuals aged between 51-65 years old (48%), people with only a primary school education (34.2%), and pensioners (41.2%) (p<0.001). It is worth mentioning that the sample characteristics of occasional and active donors were found to be relative. Additional analysis validated the profile of rare donors (i.e. those who donate once every 2-3 years). Rare donors (15% of the sample) were more likely to be women (15.4%), people aged between 51 and 65 years old (40%), individuals with a university education (17.4%), rural residents (15.7%), and students (22.6%). Of the sample under study, 7.1% stated that they were ex-donors (p<0.001). The majority of the sample (36.6%) stated that they were non-donors. Non-donors were more likely to be women, people aged up to 65 years old, people with a basic educational level, rural residents and the unemployed.

Discussion

The current questionnaire-based research tried to clarify the opinions and behaviours of Greek citizens about voluntary blood donation and to collect information about the reasons why people avoid giving blood. One of the major goals in the field of blood donation is to increase the members of the donor pool. In order to achieve this objective, it is crucial to understand the motivations and barriers to blood donation. While literature focuses on growing populations, only few studies concern small countries such as Greece. Nevertheless, this country plays an essential role in blood donation support in Europe. In the present study, efforts have been made to estimate donation rates in Greece and to determine motivations and barriers towards blood donation, taking into consideration the results of other studies on Greek donors[6,28,29].

In the present study, donors were qualified as active, occasional or rare donors, and in total accounted for 56.3% of the sample (Table I), while only 7.1% (p<0.001) were ex-donors who had stopped donating. The number of people willing to donate because of

an emergent need was found to be extremely high in different subgroups, such as women, individuals aged between 31 and 50 years old, urban residents, the unemployed and people who had a primary school education.

In many previously published studies, the major motivations for people to be active blood donors have been found to be altruistic reasons[30-33]. The results of the present study also show that Greek citizens accept and adopt altruistic behaviour, leading to donation (Tables II and IV), which is in agreement with other previously published studies[6,28,29,34], but that there is more to blood donation than simply altruism.

In other studies involving Norwegian citizens, the participants indicated that they donated for a combination of motives, including some modestly self-regarding motives, rather than only altruism[35]. Furthermore, Iranian citizens adopt altruistic behaviour, but they also donate because of moral duty[36]. Other research in Kenya focused particularly on family replacement donors compared with active blood donors, explaining that the major factor leading to blood donation was that people were asked to[25]. Moreover, the study among Norwegian citizens also described that many of the donors were recruited by relatives and friends[35].

As far as concerns Greek blood donors, the majority of them were found to donate mainly in the case of urgent need (77.9%, $p<0.001$). Furthermore, in a previously reported study about Greek blood donors, it was suggested that rare donors do not have the same motivations for donation as do active blood donors; they seem to be more willing to donate when someone of their close circle has an emergent need[6]. It has also been reported that according to non-donors, a major reason for not having donated blood is the fact that no-one in their close circle was actually in need[6,29,34]. It is not, therefore, just altruism that influences the decision of Greeks to donate, and further investigation of "donation in case of need" could help clarify the real motivations of the Greek population in order to design better and more effective recruitment campaigns. Several other studies have mentioned the significance of donating in case of need, in situations of national emergency. A typical example is that of the USA in 2001, which inspired people to donate blood for the first time and when people of both sexes in certain age groups were more likely to become repeat donors[2], although the percentage of those who finally became repeat blood donors was not increased. Thus, when a sort of "need" seems to be the main motivation, it is not easy to transform first-time donors into repeat ones. A more delicate approach needs to be used, taking into consideration the psychological profile of these donors. The motivations which influence somebody's decision to give blood for the first time tend to differ greatly from those shaping the choice to make repeat donations and, furthermore, they are likely to change over time[3]. In addition to previously reported studies that focused on the psychology of blood donors and the transformation of their act from a simple habit to self-identity as a donor[14], the present study shows that as far as Greeks are concerned, the argument which tends to be more beneficial is the consideration of blood donation as an offer to the public (88%, $p<0.007$) even though only 10% of them were actually active donors. Another reason for focusing on the psychology of blood donors is that most of the Greek citizens who were questioned for this study had already participated in other voluntary activities once or more (question 2, 61.9%, $p<0.001$; data not shown). This type of behaviour corresponds to the volunteering behavioural pattern of blood donors and, more precisely, to that of non-remunerated blood donors.

Indeed, incentives such as payment were found to be unnecessary for Greek citizens (58%, $P=0.01$; data not shown). As has also been found in other previously reported studies, in European countries, such as the UK, payment of blood donors would not necessarily increase the number of donors[5]. In contrast, in Lithuania, where the heath care system relies on paid blood donors in 92% of cases, non-remunerated donation may affect the motivation and retention of donors[37]. Other incentives, such as a day off work, have been shown to increase blood donor rates in Italy[24]. Such an incentive also exists in the Greek army. In other studies, health indicators encourage non-donors and first-time donors to donate or donate more frequently[38]. However, for the Greeks, health care screening and clinical examination interested only a small subgroup, who would donate for personal gain (Table IV). A new tendency that has appeared is that young Greeks (from 18 to 30 years old), whether students or with a master's degree, expressed their willingness to donate blood out of curiosity (Table IV). Remarkably, in the present study, curiosity was found to be the strongest reason for potentially donating among people with a master's degree and non-donation status, whereas it was underrepresented among active, occasional and rare donors, despite the return rate of blood donors not being related to age or educational level[39]. This curiosity also tends to reveal the lack of knowledge of people with a master's degree about the benefits of blood donation. It is interesting that a population that appears highly knowledgeable and states being well informed on the questionnaires seems not to know the beneficial role of blood donation for the health of the donor. This could be due either to a particular state of mind, in which people with high qualifications often think that they know all there is to know on a particular subject even if it is not their domain, or simply

to their indifference, as they stated, probably because they have invested all of their time and interest in their academic studies and professional career. On the other hand, people with a primary school education are the group with the strongest intention to donate as a gift to others and to the community. This is surely not due to the fact that these people have less ambition and more free time but probably to their age and life experiences, since people with a primary school education are, as a group, older and have been through difficult periods of need in their lifetime.

According to a previously reported study, the typical demographic characteristics of active donors were: being white, married, college-educated and male[40]. In a previous study in Greeks, donors were more likely to be men than women, students and military recruits than professionals and scientists, and people with greater knowledge regarding donation[28]. In the present study active donors were more likely to be men, people aged between 31 and 50 years old, urban citizens, pensioners or unemployed and, contrary to previous studies, people who had a university education. Furthermore, it seems that active donors are fully informed about blood donation, in contrast to their information level 15 years ago[28].

Studies in other countries found that factors that seem to be associated with donation are ethnicity, education, gender, age and nativity, and that there are disparities between donors and non-donors[24,37]. In this study, urban citizens were more likely to be active donors than were rural ones and men donated more than women, despite the fact that females were found to be more informed. This last observation is in agreement with the findings in several other studies in European countries, such as Norway[35]. Moreover, "multi-gallon donors" (who donate large amounts of blood each year) are more likely to be males[9]. Dutch citizens with higher economic status appeared to be multi-gallon donors[9]. In corollary, in Norway, unemployed people were underrepresented among active donors[35]. However, in Greece, most donors tended to be unemployed (56.4%, $p<0.001$), but a possible explanation for this finding may be the current economic crisis and the dramatic increase of unemployment rates, which would bias the study's findings. Religious beliefs and ethics were not found to affect the decision to donate blood in Greece, unlike in countries such as Iran[36,41,42] or Trinidad and Tobago, where many religious beliefs are a barrier to blood donation[43]. Finally, in this study Greeks aged 31-50 years old appeared to donate more and more frequently, in agreement with previously reported results from Greece[28-29]. As far as concerns non-donors, these have been found to be more likely not to donate because of fear of needles, pain, discomfort, etc.[40]. These are also the most important reasons for avoiding blood donation in Greece. Regarding safety, other studies suggest that blood donation paraphernalia can increase anxiety and deter donors from donating blood[44]. In the present study a fundamental reason for not donating blood was found to be lack of trust in/safety of the health care system (36%, $p<0.005$). Other less important reasons were ignorance and indifference, probably because of the lack of awareness concerning the increased need of blood.

A quite pleasing finding is that a large number of the participants enrolled in the study stated that they were occasional donors (31.3%, $p<0.001$). Thorough examination of occasional donation in other countries revealed that the techniques used globally in order to attract donors are educational campaigns, the use of media, and other methods that provide better information about donation[11,35]. A study from the Netherlands also proposed providing information to political leaders in order to achieve public awareness[9]. In a recent study, the German Red Cross Blood Service relied heavily on volunteers to recruit new donors, and advertising was usually conducted as part of a *pro bono* campaign[45]. Furthermore, a study from Ohio University showed that exposure to a brief educational brochure can enhance the confidence of prospective donors and increase the likelihood that people voluntarily give blood[11]. In the present study the subjects who were more likely to donate were people with a university level education, who were also found to be better informed about blood donation. A novel feature was that people with a master's degree, although they had a higher level of education, were less informed about blood donation. However, knowledge about blood donation should be divided into two categories: one concerning education from school (independently of informational status regarding donation) and the other concerning the informational status about blood donation. After a thorough examination, it was safe to conclude that females, urban citizens, people with a high-school education, pensioners, and individuals aged over 51 years old were likely to be better informed about blood donation. In view of these results one can understand that donating blood or not does not depend, in Greece, on having sufficient knowledge about the donation procedure. It is a well-thought choice affected by the factors mentioned above. Although individuals were well informed about donation, the main criteria that determined the final decision on whether or not to donate seemed to be safety and fear. Hence, the information campaigns used in other countries to increase the donor pool would not be effective in Greece. Other type of approaches should be used, based on tackling potential donors' fears for the greater good, making the public aware of the importance of their actions, and putting great emphasis on the fact that the nation

needs everyone's contribution so that people can receive appropriate health care.

Conclusions

To conclude, in some ways the characteristics of Greek donors correspond to the typical pattern of blood donors described in literature, but they do have certain particularities. Even though they are very informed about blood donation, very few tend to donate actively. Indeed, according to the present questionnaire-based survey, only 10% of the sample of 800 people were active donors, which seems consistent with observations in most countries, in which only a small percentage of the population actually donates blood. Moreover, only 50% of the blood supplies in Greece are from voluntary blood donors (the other 50% are provided by family or replacement donors), whose main motivation for giving blood seems to be "need". Future recruitment campaigns should, therefore, be focused mainly on the fact that blood donation is a "need" for everyone, since the person in need today might be a relative or a friend but tomorrow could be a stranger or the donor himself. Information campaigns focusing on "need" rather than altruism may bring about better results in the recruitment of new blood donors and, in particular, in the transformation of occasional donors to active donors. Finally, different blood donor groups require specific approaches and inactive donors should be re-activated[46,47]. As for non-donors, we believe that they could become active donors after extensive briefing. Information from the Ministry of Health and Hellenic Society of Blood Transfusion regarding the safety of the procedure could help non-donors resolve their main concerns, thus encouraging them to donate blood and converting them into active donors.

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Authorship contribution

Aikaterini A. Kalargirou and Apostolos I. Beloukas contributed equally to this work and take first authorship together. Aikaterini A. Kalargirou distributed the questionnaires and wrote the manuscript. Apostolos I. Beloukas analysed the data. Alexandra G. Kosma, Christina I. Nanou and Maria I. Sarid distributed the questionnaires and collected data. Apostolos I. Beloukas and Anastasios G. Kriebardis designed and supervised the study and the manuscript's preparation and submission.

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