



كلية الطب
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Blood donation in Marrakech and regions

THESIS

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BY

Mr. **Salaheddine MASFAR**

Born on February 10th 1997 in Marrakech

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JURY

Ms. **N. EL IDRISI SLITINE**

Professor of Paediatrics

PRESIDENT

Mr. **M.AIT AMEUR**

Professor of Haematology

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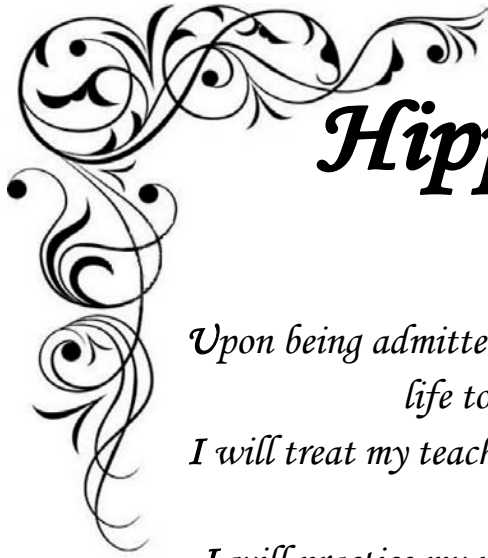
Mr. **K. HAROU**

Professor of Obstetrics and Gynecology

JUDGE

بِسْمِ الرَّحْمَنِ الرَّحِيمِ

رَبِّ أَوْزَعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ
الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَى وَالِدَيَّ
وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ
وَأَصْلِحْ لِي فِي ذُرِّيَّتِي
إِنِّي تُبْتُ إِلَيْكَ وَإِنِّي مِنَ الْمُسْلِمِينَ



Hippocratic Oath

*Upon being admitted to the medical profession, I pledge my
life to the service of humanity.*

*I will treat my teachers with the respect and gratitude they
deserve.*

I will practice my profession with conscience and dignity.

The health of my patients will be my first goal.

I will not betray the secrets entrusted to me.

*I will maintain by all means in my power the honor and
noble traditions of the medical profession.*

The physicians will be my brothers.

*No consideration of religion, nationality, race, political and
social considerations will come between my duty and my
patient.*

*I will maintain strict respect for human life from the
moment of conception.*

*Even under threat, I will not use my medical knowledge in
a manner contrary to the laws of humanity.*

I pledge this freely and on my honor.

Declaration of Geneva, 1948.



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EL KHAYARI Mina	Medical resuscitation	ZYANI Mohammad	Internal medicine
EL MGHARI TABIB Ghizlane	Endocrinology and metabolic diseases		

Associate professors

Last and First Name	Speciality	Last and First Name	Speciality
ABDOU Abdessamad	Cardiovascular Surgery	HAZMIRI Fatima Ezzahra	Histology-embryology-cytogenetics
ABIR Badreddine	Stomatology and maxillofacial surgery	JANAH Hicham	Pneumo-phtisiology
ADARMOUCH Latifa	Community medicine (preventive medicine,	KADDOURI Said	Internal medicine

	public health and hygiene)		
AIT BATAHAR Salma	Pneumo-phthisiology	LAFFINTI Mahmoud Amine	Psychiatry
ALAOUI Hassan	Anaesthesia – resuscitation	LAHKIM Mohammed	General surgery
ALJALIL Abdelfattah	Otolaryngology	MARGAD Omar	Traumato-orthopaedics
ARABI Hafid	Physical medicine and functional rehabilitation	MESSAOUDI Redouane	Ophthalmology
ARSALANE Adil	Thoracic surgery	MLIHA TOUATI Mohammed	Otolaryngology
ASSERRAJI Mohammed	Nephrology	MOUHSINE Abdelilah	Radiology
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GHAZI Mirieme	Rheumatology	ZIDANE Moulay Abdelfettah	Thoracic surgery
HAMMOUNE Nabil	Radiology		

Assistant Professors

Last and First Name	Speciality	Last and First Name	Speciality
AABBASSI Bouchra	Psychiatry	EL JADI Hamza	Endocrinology and metabolic diseases
ABALLA Najoua	Paediatric surgery	EL-QADIRY Rabiyy	Paediatric
ABDELFETTAH Youness	Re-education and functional rehabilitation	FASSI Fihri Mohamed jawad	General surgery
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CHETOUI Abdelkhalek	Cardiology	ROUKHSI Redouane	Radiology
CHETTATI Mariam	Nephrology	SAHRAOUI Houssam Eddine	Anaesthesia and resuscitation
DAMI Abdallah	Legal medicine	SALLAHI Hicham	Traumatology- orthopaedics
DARFAOUI Mouna	Radiotherapy	SAYAGH Sanae	Hematologic
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EL AMIRI Moulay Ahmed	Bio-organic coordination chemistry	SIRBOU Rachid	Emergency and disaster Medicine

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ELBAZ Meriem	Paediatric	WARDA Karima	Microbiology
EL FADLI Mohammed	Medical Oncology	YAHYAOUI Hicham	Haematology
EL FAKIRI Karima	Paediatric	YANISSE Siham	Galenic pharmacy
EL GAMRANI Younes	Gastro-enterology	ZBITOU Mohamed Anas	Cardiology
EL HAKKOUNI Awatif	Parasitology-mycology	ZIRAOUI Oualid	Therapeutic chemistry
ELJAMILI Mohammed	Cardiology	ZOUIA Btissam	Radiology
EL KHASSOUI Amine	Paediatric surgery	ZOUIZRA Zahira	Cardiovascular Surgery
ELOUARDI Youssef	Anaesthesia and resuscitation		

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DEDICATIONS

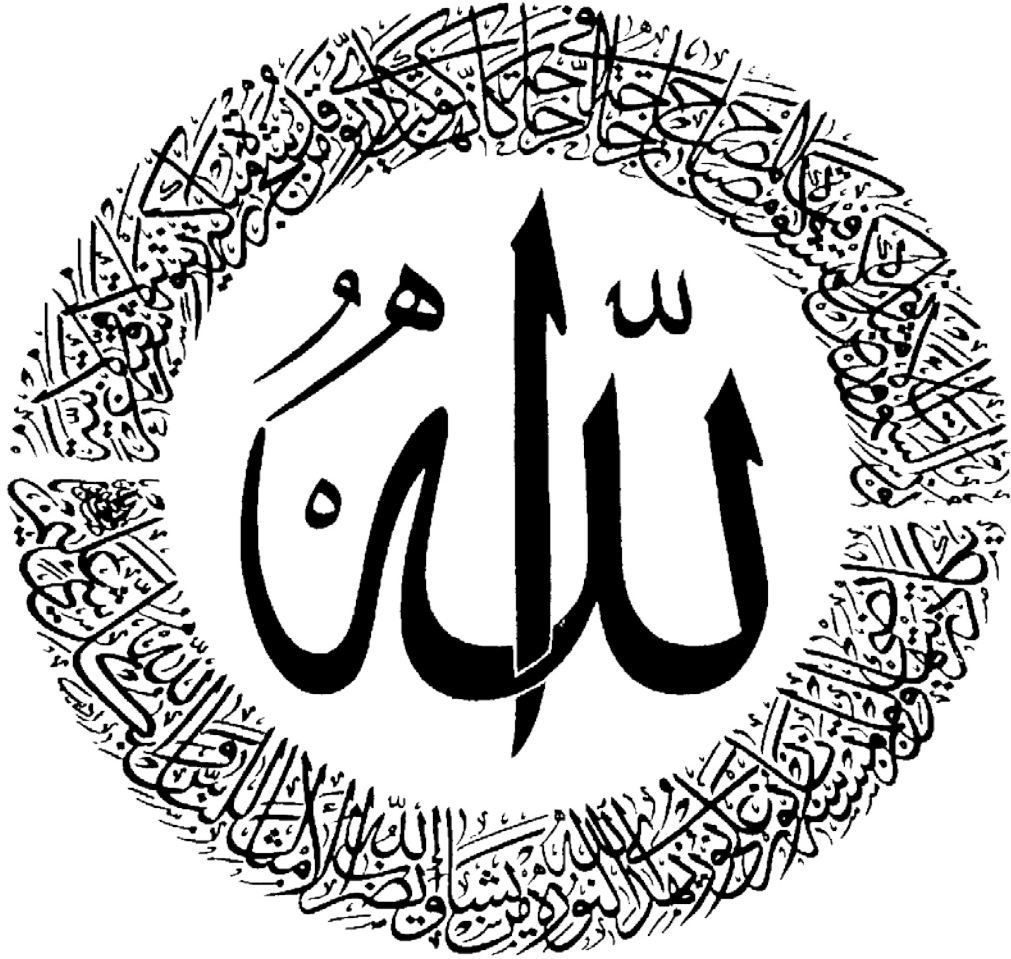


I must fully admit my gratitude to all the people who supported me during my journey, who knew how to lift me up to reach my goal.

It is with love, respect and gratitude that



I dedicate this thesis...



To the good Lord,

Almighty who inspired me and guided me in the right path.

I owe what I have become to you.

Praise and thanks for your clemency and mercy.

*To the best parents in the world; no matter what I say,
I will never be able to express my gratitude;
May Allah protect you, grant you good health and long life, so that
together we may enjoy the fruits of this work that is yours, and so that
I may return a minimum of what I owe you.*

Thank you for your valiant blessings, thank you for always supporting and encouraging me.

To my dearest mother Asma EL BOUDALI

*To the sweetest and most wonderful mother of all.
To a person who has given me everything without
counting the cost. No tribute can convey the love,
devotion and respect I have for you.*

*No dedication could be eloquent enough to express what
you deserve for all the sacrifices you have given me since my birth.*

*Without you, I am nothing, but thanks to you
I am becoming a doctor.*

*I pray God to give you health and to help me reward
you for all your sacrifices.*

*I dedicate this thesis to you, which is only the fruit
of your advice and encouragement.*

*Your prayers have been a great support for me throughout my studies.
On this day I hope to fulfil one of your dreams, dear mother and gentle
creature, knowing that nothing I could do or say could equal what you
have given me.*

*I hope with all my heart that on this day you are proud of me.
May God Almighty protect you from harm, give you long life, health and
happiness so that I can give you back a little of what I owe you.*

I love you very much MOM...

To My Dearest Father Lahcen MASFAR

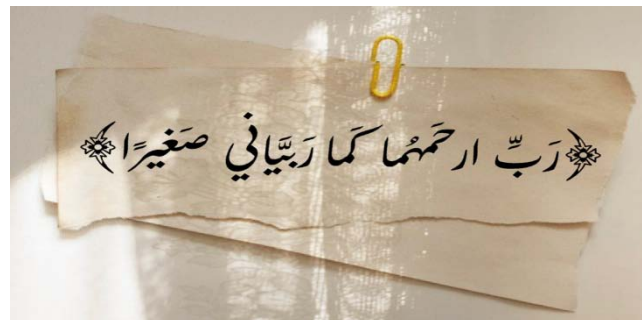
*All the words in the world cannot express the immense love I feel for you, nor
the deep gratitude I feel for all the efforts and sacrifices you have constantly
made for my education and well-being.*

*I hope that I have fulfilled the hopes that you have placed in me for my
education and well-being.*

*I hope that I have fulfilled the hopes you had for me and that today I have
fulfilled one of your most precious dreams.*

*I pay tribute to you with this modest work as a token of my eternal gratitude
and infinite love.*

*May God Almighty keep you and give you health, happiness and long life so
that you remain the torch that lights up my path*



To the memory of my maternal grandfather Abdellah ELBOUDALI

I still remember the joy in your eyes the day you knew I had been accepted to medical school and that you had been calling me doctor Salaheddine since the very first day. Your passing was a hard pill to swallow for all the family; we miss your laugh, your jokes and your stories.

I knew how you would be proud of me in this day, your grandson Da-ali has finally made it.

May your soul rest in peace

Love you

To the memory of my paternal grandparents Fatima MASFAR and Ahmed MASFAR

I thank God for having been able to grow up by your side because you have adorned my childhood with so many memories and laughs that are enough for more than one life!

I miss your prayers and kind kisses.

May your souls rest in peace.

May God the Almighty shower you with holy mercy.

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Thank you for the joy you bring me, thank you very much for your support, your help and your generosity which have been for me a source of courage and confidence.

You have always supported me throughout my journey. May we remain united and faithful to the education we have received. May GOD, the Almighty, preserve you from evil; fill you with health and happiness

Love you bro

To my little sister Ihssane

You're the flower of our house, the spark that brightened our life

We love you Ihssane, i am very proud of you and you know that whatever you do your big bro is always here for you

To my large family: my maternal grandmother DILALI Khadija, my uncles and my aunts, to all my lovely cousins

I would have liked to be able to mention each one by name. Thank you for your encouragement and support throughout the years. In recognition of the great affection you have shown me and for the gratitude and sincere love I have for you. May our ties always remain strong and may GOD bring us happiness and help us to fulfil all our wishes. I love you all.

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I wish always the best for you, love you bro

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I will always treasure our memories.

I pray for you and hope God will aid and look after you.

**To Mrs Samira FEZZANI and all the staff of the regional
transfusion centre of Marrakech**

*I thank you very much for your help, your precious time and your support; I
express my high consideration and deep respect to you*

**To all my teachers who have passed on their knowledge to me,
from kindergarten until today...**

**To all those whose forgetfulness of the pen is not that of the
heart.**

**To all those who have the difficult task of relieving the human
being,**

To try to give him physical, psychic and moral well-being.

To all the patients...

May God help us to alleviate your suffering...



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IDRISSI SLITINE**

Professor of Paediatrics at the Faculty of Medicine and Pharmacy of Marrakech.

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Please accept, dear Professor, the testimony of our deepest gratitude for the great honour you have done us by chairing our thesis.

Please accept the testimony of my gratitude and the assurance of my respectful feelings

**TO OUR MASTER AND SUPERVISOR PROFESSOR MUSTAPHA
AIT AMEUR**

Associate Professor of Haematology

You have granted us a great honour and privilege by accepting to direct our work. May your seriousness, your precious recommendations, your competence and your rigorous work be for us an example to follow.

I thank you infinitely, dear Master, for having devoted to this work a part of your precious time and for having guided me with rigour and benevolence. I am very proud to have learned from you and I hope I have lived up to your expectations.

Please accept, dear master, in this work the assurance of my esteem and my deep respect

TO OUR MASTER AND JUDGE PROFESSOR KARAM HAROU

Professor of gynecology-obstetrics at CHU Mohamed VI in Marrakech

You have done me the honour of accepting to be a member of this honourable jury and I thank you for the trust you have placed in me.

You have always given me the warmest welcome despite your professional obligations.

Please accept, dear Master, the assurance of our respect and our great gratitude.



ABBREVIATIONS



List of abbreviations

2-3 DPG	: 2-3 diphosphoglycerate
ATP	: Adenosine triphosphate
BB	: Blood Bank
BD	: Blood donation
BT	: Blood transfusion
BTC	: Blood Transfusion Center
CMV	: Cytomegalovirus
CPD	: (citrate, phosphate, dextrose)
EBA	: European Blood Alliance
EBV	: Epstein-Barr virus
EDTA tubes	: Ethylene Diamine Tetra Acetic acid tubes
FFP	: fresh frozen plasma
HIV	: Human immunodeficiency virus
HLA	: Human leukocyte antigens
HTLV	: Human T-lymphotropic virus
ISBT	: International society of blood transfusion
K.A.P	: knowledge, attitude and practice
LBP	: labile blood products
NBTHC	: The National Blood Transfusion and Haematology Centre
NS	: Non significant
RBC	: Red blood cells concentrate
RTCM	: The regional blood transfusion centre of Marrakech
S	: significant
SAGM	: (saline, adenine, glucose, mannitol)
TA	: Transfusion Antenna
TPHA	: Treponema pallidum hemagglutination assay
VFI	: Volunteer functions inventory
WB	: Whole blood
WHO	: World Health Organization



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INTRODUCTION



Blood is the most important, precious gift that a healthy person can offer to a needy individual. It is vitally important for human beings and plays a lifesaving role in the treatment of thousands of patients daily. The advances in medical services have improved the treatment of different diseases especially the management of trauma and different surgical procedures. But, since 1818, when the first human to human transfusion was recorded by the British obstetrician and physiologist James Blundel[1], who injected a patient suffering from internal bleeding with blood from several donors, science failed to find a blood substitute[2].

As a result, the need for blood donation and transfusion never stops, and it affects as all. In numbers, eight out of ten people need blood or blood products at some time in their lives; one out of every ten patients in hospital requires blood transfusion. The number of blood donations that patients receive depends on their medical condition. Although an average of three donations is transfused to a patient, some patients require many more[3].

In Morocco, starting with history, the first blood transfusion centre was founded in Fez by the Doctor Commander J. Julliard in 1943, then in Casablanca on 1948, and followed by the creation of the National Blood Transfusion Centre in Rabat during 1956.[4]

Since that time, Morocco as a developing country faced multiple challenges, in one hand dealing with the limited resources to promote blood donation, maintain and recruit the safest blood donors and on the other hand to keep up with the increasing demands on blood units, due to high level of maternal mortality, frequent injuries and the rapid evolution of health and patient's care structure[5].

Adding to that, the national transfusion centre denounces the need for more than 1000 donations per day to meet the needs of patients for blood bags.[6] Late studies show that only 0.9 % of the population is donating blood with 0.8 % in the Marrakech-Safi region[7], while the World Health Organization(WHO) recommends donation by at least 1% of a country's population to be generally sufficient and meet a country's basic requirements for safe blood[8].

Also, in accordance with recommendations by the WHO, a transfusion service should rely as far as possible on voluntary, non-remunerated repeat donors[6]. That leads us to another

particular situation in our country, which the high number of replacement or family donors. A case that forces the transfusion centres to promote blood donation, by recruiting more voluntary donors and improving their degree of loyalty, as well as transforming family donors into voluntary donors.

Few studies have investigated the motives that lead healthy individuals to give blood without financial compensation and, furthermore, to become repeat donors [7]. Studies of volunteer, non-remunerated donors are very important now in our country to build modern transfusion systems with a high degree of safeguard against transmissible diseases, and to recruit and maintain voluntary donors.

So our main objective is to identify the causes of the shortage of labile blood products in the Marrakech-Safi region. Therefore, we conducted a survey to evaluate the knowledge and beliefs of the population in terms of blood donation, and study the factors that lead them to donate or on the contrary that stops them from it.

We conducted another survey within the regional blood transfusion centre of Marrakech (RTCM) to evaluate the knowledge of the medical and paramedical staff in terms of blood donation practice, to establish the needs in terms of training and improvement of practices, as a secondary goal of our study.



*POPULATION
AND
METHODS*



I. Type of study

We conducted a descriptive, cross-sectional, K.A.P study on blood and non-blood donors over a 4 months period from January to April 2022.

In addition, we carried out a cross-sectional study on the blood donation practices of 20 staff members (medical and paramedical) at the regional blood transfusion centre of Marrakech (RTCM).

II. Target population and sample

Our sample consisted of active blood donors and non-donors in Marrakech-Safi region (annex 1) and health care workers at the RTCM (annex 2).

1. Inclusion criteria :

The criteria for inclusion of our study subject were:

- Resident in Marrakech-Safi region (annex 1)
- Healthcare worker at the RTCM (annex 2)

2. Exclusion criteria :

- Person under 18 years old (annex 1)
- Administration staff (annex 2)

III. The survey :

The four page questionnaire (annex 1) contained 14 items, including:

- Socio-demographic information

- Attitude and motivation towards blood donation
- Knowledge test
- Donor evaluation of the Blood Transfusion Centre service

The questions on motivation targeted only donors with previous donation experience. The statements on motives were primarily based on the volunteer functions inventory (VFI) elaborated by Clary [8], and was modified to adapt our population and its cultural specifications.

The VFI was designed with the dual purpose of providing researchers with a useful measurement of volunteerism and helping the administrators of voluntary organizations to manage human resources.

The VFI seemed well suited to mapping the multi-motivational underpinnings of voluntary blood donation. The original inventory measures six primary factors that serve as motives for individuals to volunteer:

- value
- understanding
- career
- social
- esteem
- protective

Motives relating to improving one's professional career were considered to be irrelevant to blood donation and were therefore not included in our questionnaire. We also considered the 'protective' motives of the VFI (escape own troubles, personal problems, etc.) for volunteering as having little relevance to blood donation.

We added in our survey religion as a motive to study if there is a positive relation between religiousness and blood donation.

Thus, plus religion, only four VFI factors of motivation ('value', 'social', 'esteem' and 'understanding') were included in our questionnaire :[8]

- **Value:** motives refer to altruistic and empathic reasons for volunteering (e.g. helping others, compassion, important cause).
- **Social:** reasons reflect the normative influence of friends, family, or a social group that motivates people to volunteer.
- **Esteem:** represents reasons for volunteering in order to feel better about oneself (e.g. feel better about myself, feel important) by helping others.
- **Understanding:** refers to positive experiences associated with volunteering (e.g. 'explore own strengths', 'learn from experience').

The personnel questionnaire (annex 2) was designed to assess the knowledge and awareness of the professionals in the centre and to analyze the activities carried out and the methodologies practiced in the centre. Briefly, the questionnaire composed of 18 questions had two sections.

- demographics
- Knowledge evaluation.

The two surveys were prepared after a literature review of similar studies and the framework was derived from the WHO manual Methodological guidelines for socio-cultural studies on blood donation issues.[9]

IV. Data collection

The data collection for the first study (annex 1) was established in two methods:

- Self administrated targeting active blood donors in the RTCM and mobile blood collection units, with the help of the Nakhil blood donors association.
- online survey that targeted all the population (blood and non-blood donors)

We realized a flow chart to resume the results of the data collection of the first study:

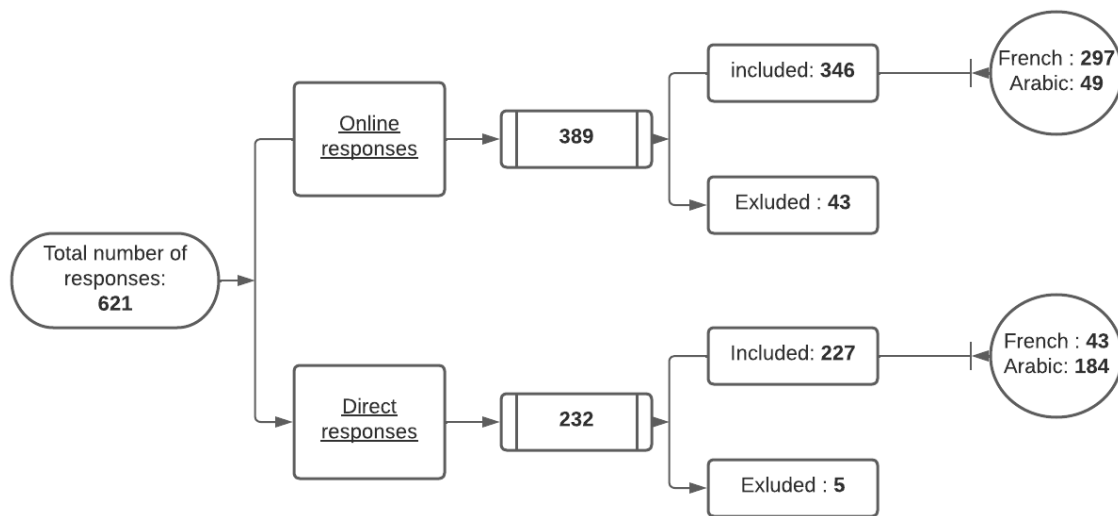


Figure 1: Flow chart of the first study

For the second study (annex 2), the questionnaire was administered by direct hand-over.

V. Data entry and analysis:

Statistical analysis of the data was performed using SPSS (Statistical Package for the Social Sciences) version 21 software.

The data entry of texts, tables and graphs was done on Microsoft® 2010 software.

Statistical analysis used the Chi-square test for frequency comparison within subgroups.

Statistical tests were considered significant for a p value < 0.05.

VI. Ethical considerations

We obtained free, oral and informed consent from the participants in the survey.

Confidentiality and anonymity of the patients were respected.



RESULTS



I. Attitude, knowledge and motivation of the population towards blood donation:

A total of 621 filled the questionnaires, 573 were retained while 48 were discarded for not meeting the criteria.

1. Epidemiological profile :

1.1. Age :

The youngest patient was 18 years old and the oldest was 67 years old for an average age of 30.21 years (+/-10.6).

We observe that The (18-30 yo) age group was the most presented among our population compared (64.08 %) compared to the group (> 60 yo) with (0,7 %)

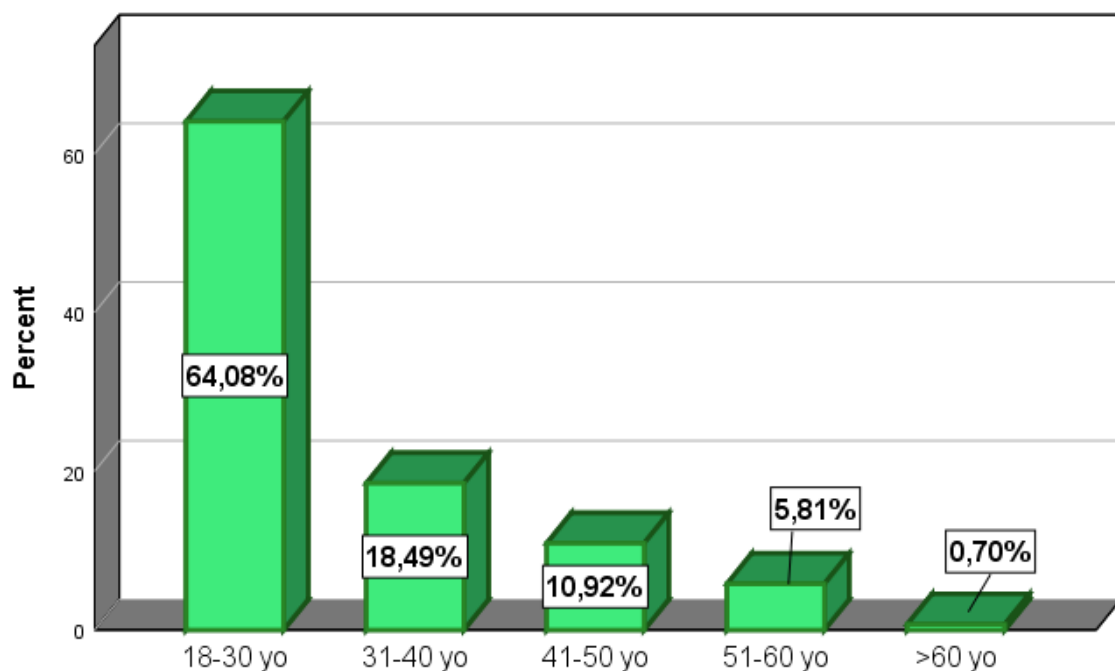


Figure 2: Distribution of patients by age group

1.2. Gender :

Our series included 330 women (57,6%) and 243 men (42,4%) for a sex ratio of 0,74 .

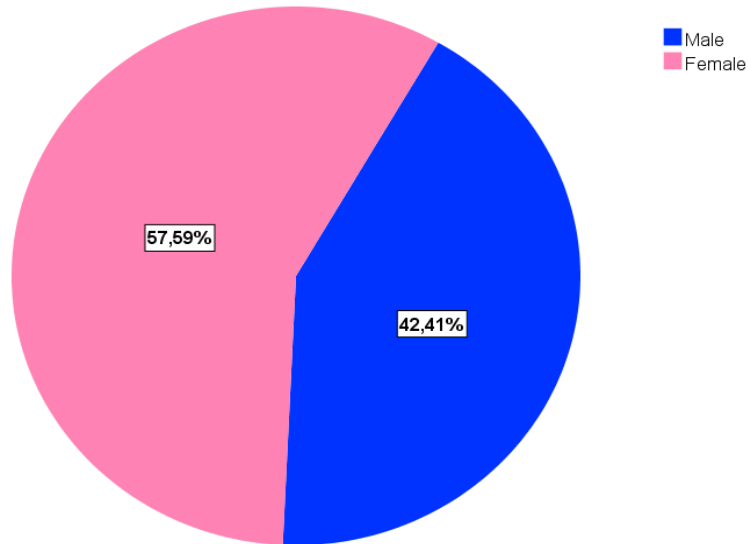


Figure 3: Distribution of patients by gender

1.3. Education level :

In our study:

- 25 participants had a primary school education level
- 39 participants had a secondary school education level
- 67 participants studied up to high school
- 422 participants had university course
- 19 participants were none educated

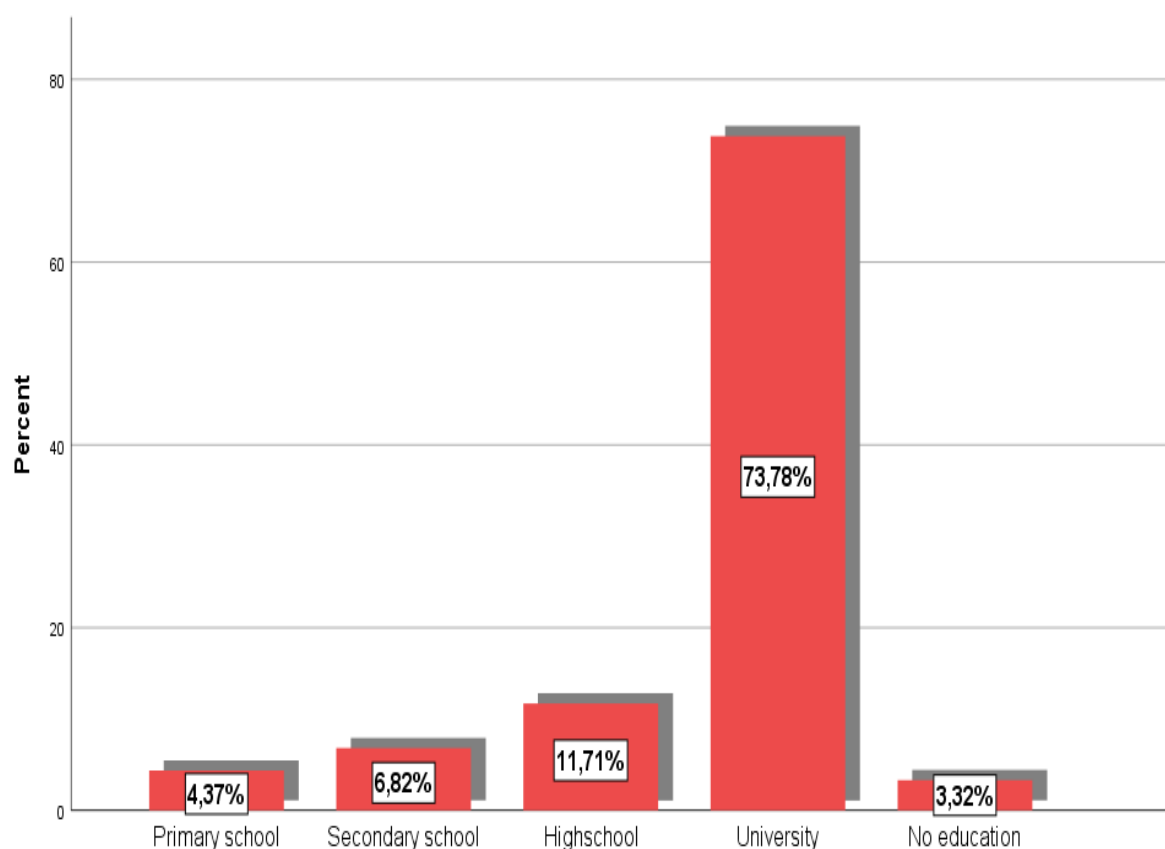


Figure 4: Distribution of the population by education level

1.4. Donation history :

a. Distribution of donors and non-donors :

In our study, 288 (49.7%) of the population report having given blood at least once in their lives, and 285 (50.3%) reports never having given blood in their lives.

Board I: have you ever donated blood?

	Frequency	Percent
Donors	288	50,3 %
Non-donors	285	49,7 %

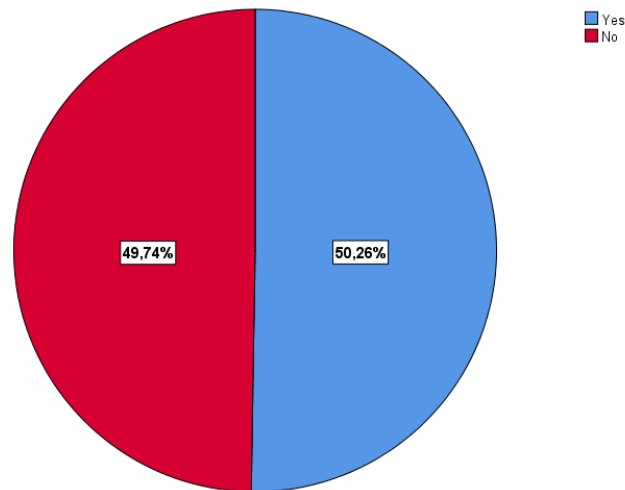


Figure 5: Have you ever donated blood?

We note that our **female** participants outnumbered men among the **non-donors** (67% vs 33%).

Board II: distribution of donors and non-donors by gender

	Male	Female
Donors	149	139
Non-donors	94	191

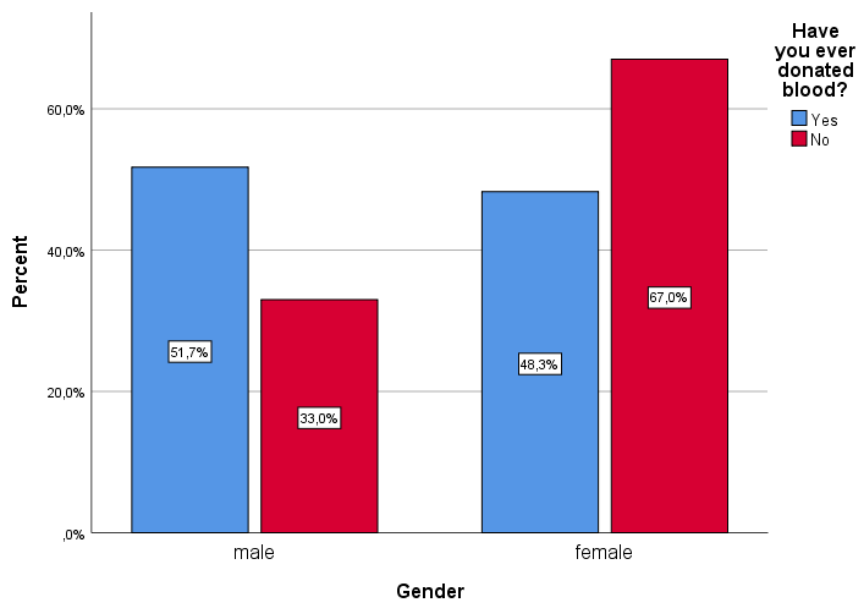


Figure 6: Distribution of donors and non-donors by gender

b. Number of donations :

The number of previous donations ranged from 1–70 with most of the participants being first time donors 73 (26.1%), and we note that 8 (0.02 %) of the donors didn't answer the question.

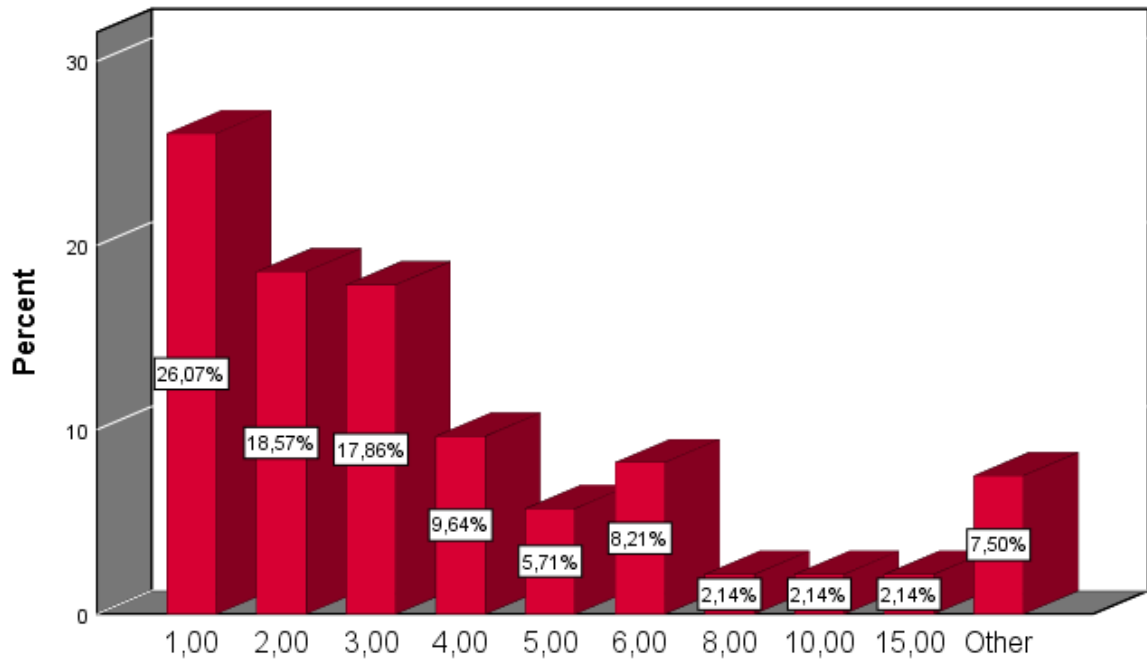


Figure 7: How many donations have you made?

We observe in our study that in most of the population, 119 (39.3%) donors give blood in a non-specific manner. As for regular donors, who are defined as individuals who donate at least two times a year[7], we found that 63 (22%) meet the criteria.

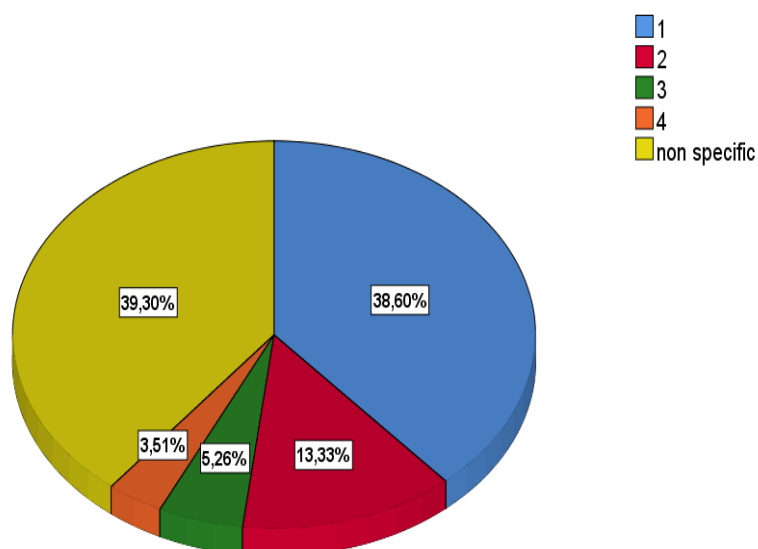


Figure 8: How many times do you donate per year?

c. Recruitment location :

Blood donors were asked to state the place of their **first donation**, leading to the important question about the recruitment method. We note that most of the population donated in a **mobile unit 54.5 % (152)**

Board III: Where did you have your first donation?

	Frequency	Percent
Blood transfusion center	127	44,1 %
Mobile blood donation units	152	52,8 %
No response	9	3,1 %

We note that most of the **first donations** were **voluntary 90.2 %**.

Board IV: was your donation voluntary or a replacement?

	Frequency	Percent
Volunteer	260	90,2 %
Replacement	20	6,9 %
No response	8	2,9 %

■ volunteer
■ replacement

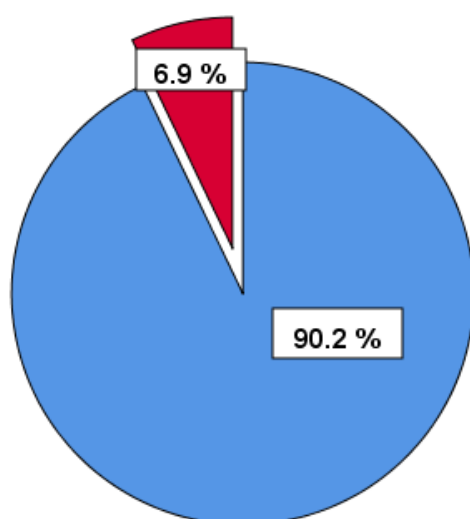


Figure 9: Was your donation voluntary or a replacement ?

2. Attitude and motivation :

2.1. Motives for donating blood :

The main reasons that lead the population to donate blood are **Value 88,2 %** (I worry about others, I like to serve people, I give blood because it is important to help patients), **esteem 54,4 %** (Blood donation is a very important cause for me, Donating blood makes me feel important) and **Religion 54 %** (My religion motivates me to donate blood).

Board V: which of these reasons motivates you to give blood?

	Frequency	Percent	Percent of cases
Esteem	148	21,4 %	54,4 %
understanding	118	17,1 %	43,4 %
Social	37	5,4 %	13,6 %
Value	240	34,8 %	88,2 %
Religion	147	21,3 %	54 %

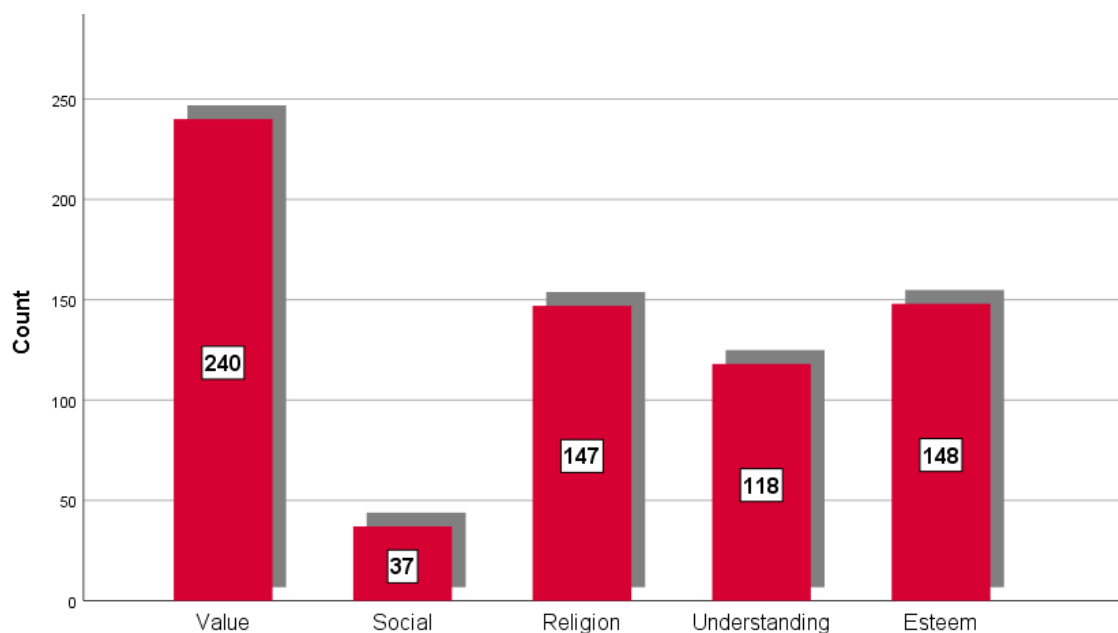


Figure 10: Which of these reasons motivates you to give blood?

2.2. Reasons that prevents regular donation :

We noted that 99 (30.7 %) person express that **time** was there main obstacle to donate blood more regularly, while also 96 (29.7%) found that **the donation site is far from home or workplace**.

Board VI: Which of these reasons prevents you from coming back regularly to give blood?

	Frequency	Percent
Forgetfulness	59	18,3 %
Lack of time	99	30,7 %
Complications after donation	14	4,3 %
Illness	37	11,5 %
Donation site is far from home or workplace	96	29,7 %
Others	18	5,6 %

2.3. Reasons stopping people from donating blood :

We notice in our study that **illness** was the main reason (29.6 %) that prevents people to donate, followed by (18.6%) of the population expressed that lack of time was their obstacle toward donation. In comparison (0.6%) thought blood donation isn't necessary.

Board VII: Which of these reasons prevents you from donating blood?

	Frequency	Percent
Fear	58	17,7 %
Lack of time	61	18,6 %
Illness	97	29,6 %
Donation site is unknown	36	11 %
Donation site is far from home or work place	29	8,8 %
Lack of information about blood donation	36	11 %
Blood donation isn't necessary	2	0,6 %
Others	9	2,7 %

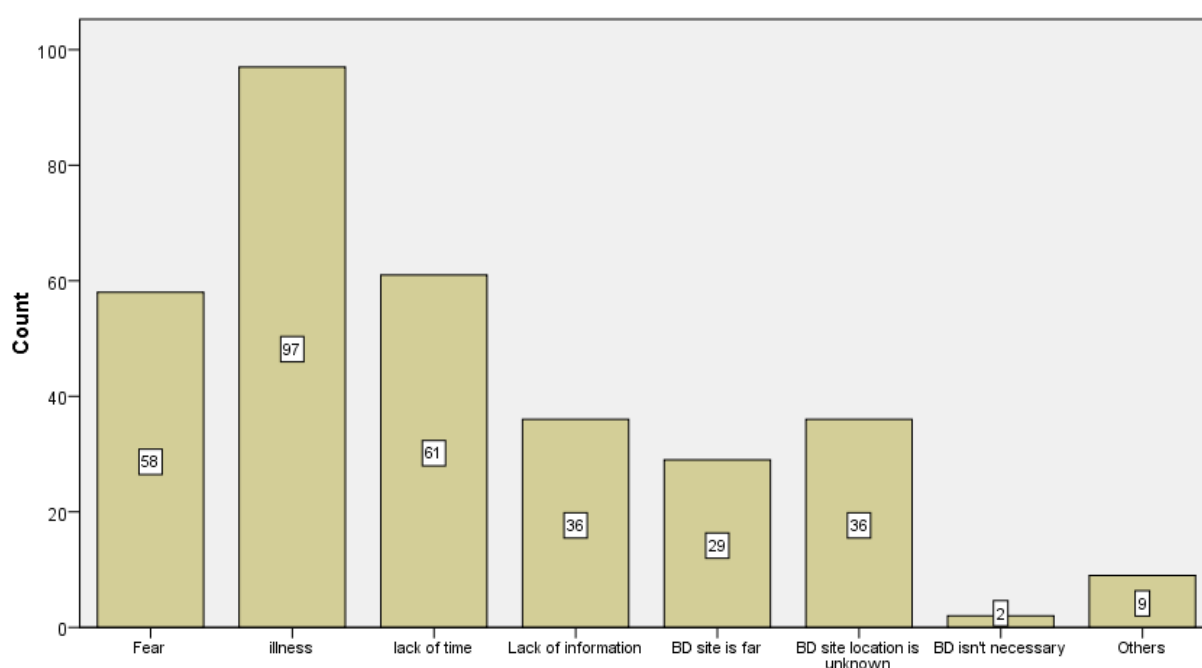


Figure 11: Which of these reasons prevents you from donating blood?

3. knowledge testing of blood donors and non-donors :

The knowledge survey was constructed based on two themes, test the **general knowledge** of the population and also review common myths and **misconceptions** regarding the blood donation practice.

It consists of 13 items and requires “true”, “false” or “unaware” responses.

3.1. General knowledge:

In our population, 425 persons (73,7%) thought that there is a need for blood in the city, while 10 (1,7%) didn't and 113 persons (19,7%) were unaware of the situation.

Board VIII: Is there a need for blood in your city?

	Frequency	Percent
Yes	425	73,9 %
No	10	1,7 %
I don't know	113	19,7 %
No response	27	4,7 %

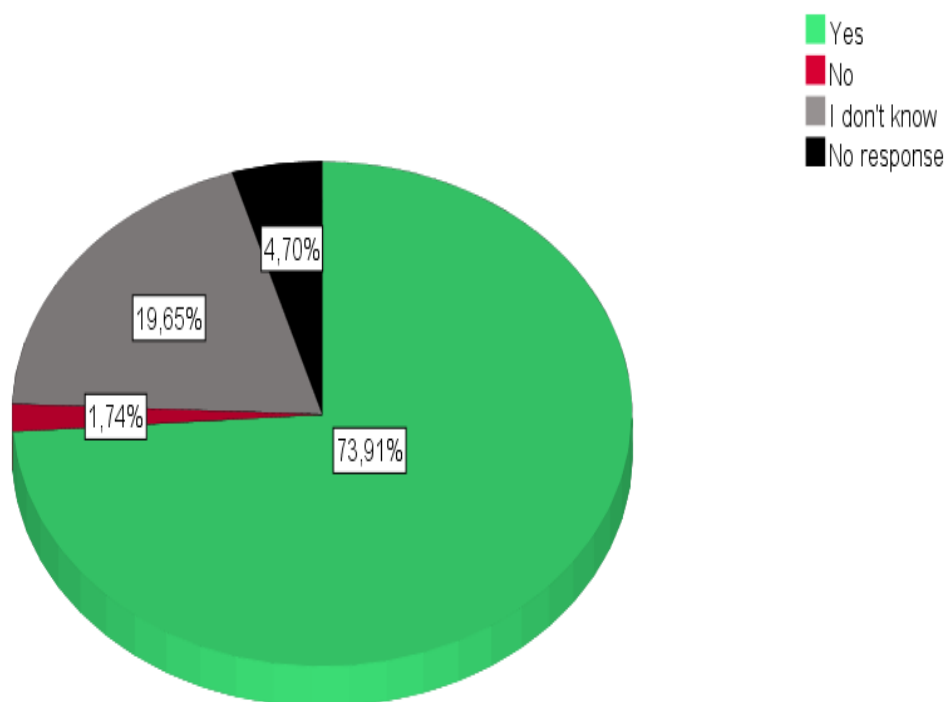


Figure 12: Is there a need for blood in your city?

93 of the respondents (16,2%) answered that a person under 18 can donate, and 340 respondents (59,1%) answered that he can't.

Board IX: Can a person under 18 years of age donate blood?

	Frequency	Percent
Yes	93	16,2 %
No	340	59,1 %
I don't know	103	17,9 %
No response	39	6,8 %

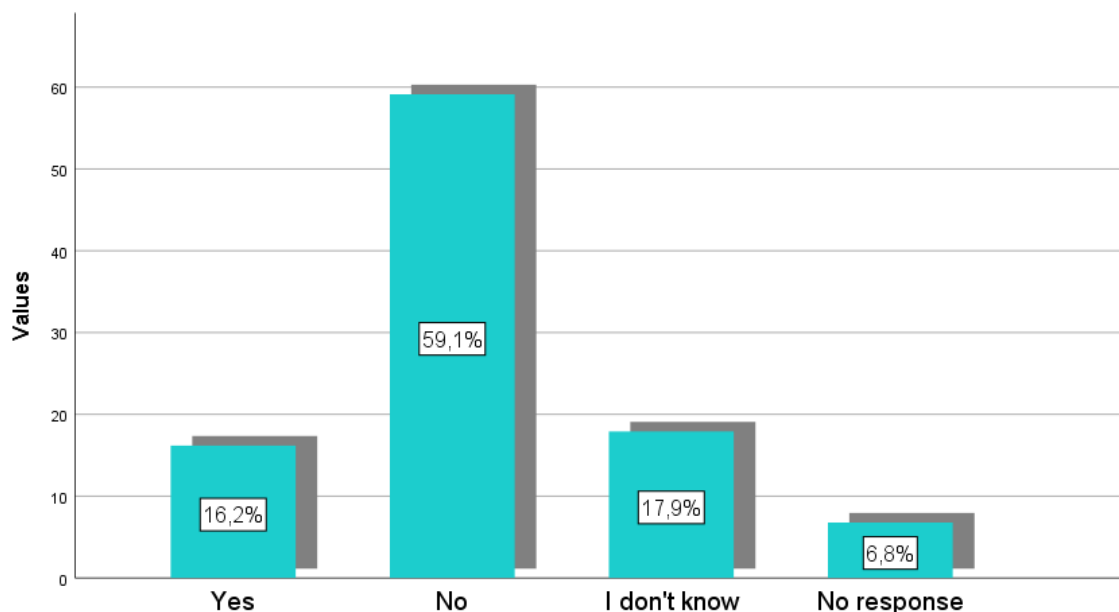


Figure 13: Can a person under 18 years of age donate blood?

In our study, the majority of the respondents 387 (67,3%) thought that a pregnant women can't donate.

Board X: Can pregnant women donate blood?

	Frequency	Percent
Yes	24	4,2%
No	387	67,3%
I don't know	128	22,3%
No response	36	6,3%

231 individuals (40,2%) answered that breastfeeding is a contraindication to donation, and 182 individuals (31,7%) are unaware.

Board XI: Can women who are breastfeeding give blood?

	Frequency	Percent
Yes	98	17 %
No	231	40,2 %
I don't know	182	31,7 %
No response	64	11,1 %

The major part of the population 171 (79.2%) thought that all blood donations are HIV tested, while 3 people (1.4%) thought not.

Board XII: Are all blood donations HIV tested?

	Frequency	Percent
Yes	425	73,9 %
No	11	1,9 %
I don't know	75	13 %
No response	64	11,1 %

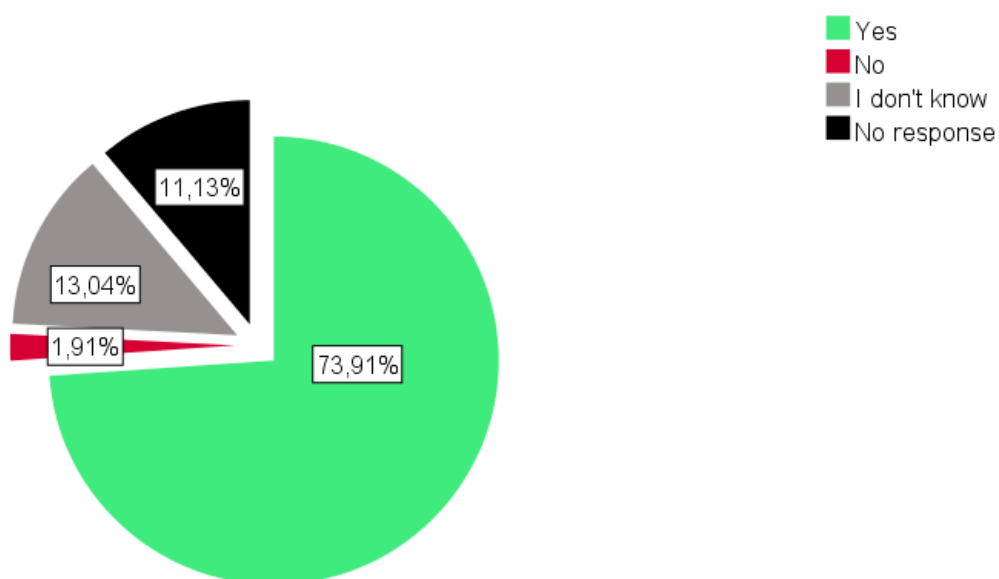


Figure 14: Are all blood donations HIV tested?

For the inter donation interval, 385 respondents (67 %) answered that the time interval for donation is 3 months for men and 4 months for women, 48 respondents (7.9%) said no and 81 (14,1%) were unaware of the interval.

Board XIII: You can donate blood every 3 months (men) or 4 months (women)

	Frequency	Percent
Yes	385	67 %
No	48	8,3 %
I don't know	81	14,1 %
No response	61	10,6 %

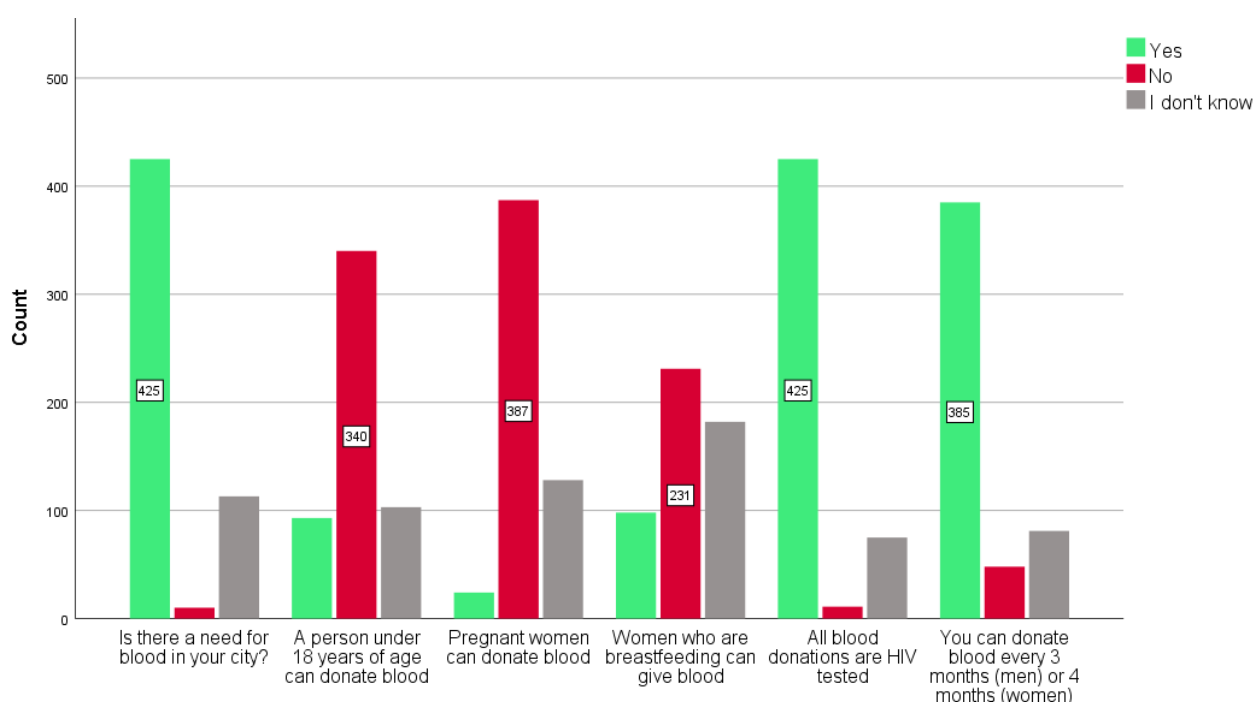


Figure 15: Results of the general knowledge test

3.2. Misconceptions :

In our study, the majority of the population 314 (54,6%) thought that menstruating woman can't donate blood and 73 of the respondents (12,7%) thought that they can.

Board XIV: can a menstruating woman donate blood?

	Frequency	Percent
Yes	73	12,7 %
No	314	54,6 %
I don't know	134	23,3 %
No response	54	9,4 %

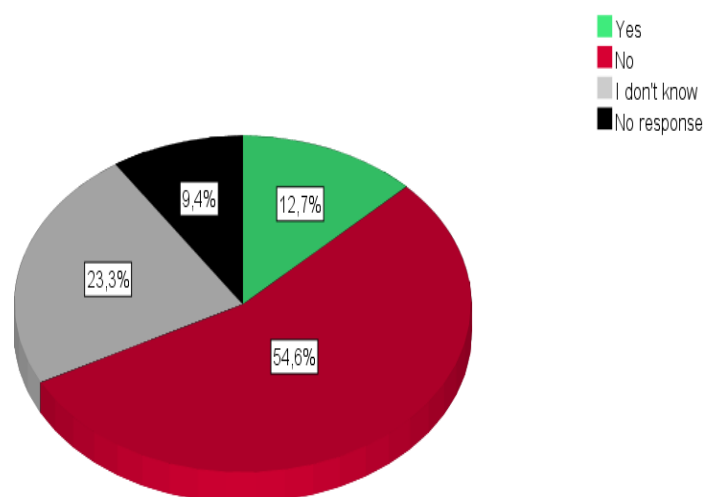


Figure 16: Can a menstruating woman donate blood?

For smoking and donation, the main part of the respondents 286 (49,5%) think that it's not a contraindication and 119 of the respondents (20,7%) didn't know the answer.

Board XV: can you donate blood after smoking?

	Frequency	Percent
Yes	286	49,5 %
No	105	18,3 %
I don't know	119	20,7 %
No response	65	11,3 %

The majority 210 (36,5%) believe that people with tattoos can never give blood, 183 people (31,8%) believe they can and 121 people (21%) didn't know the answer.

Board XVI: are people with tattoos never able to give blood?

	Frequency	Percent
Yes	210	36,5 %
No	183	31,8 %
I don't know	121	21 %
No response	61	10,6 %

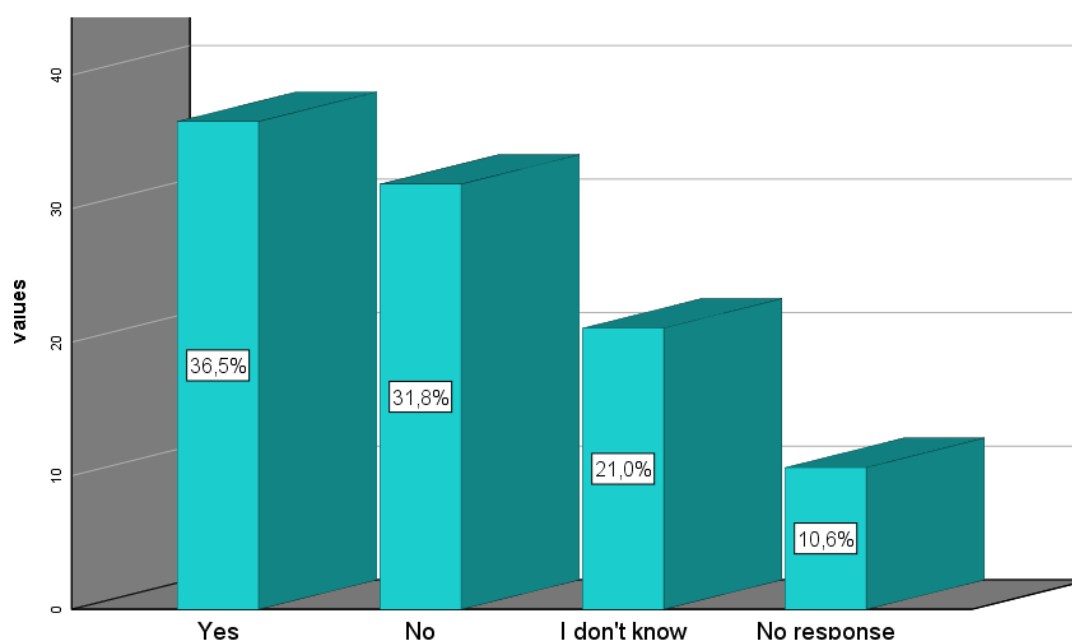


Figure 17: Are people with tattoos never able to give blood?

In our study, 339 individuals (59%) think that you should eat before donating, 100 persons (17,4%) think not and 75 persons were unaware of the answer.

Board XVII: You must eat before donating

	Frequency	Percent
Yes	339	59 %
No	100	17,4 %
I don't know	75	13 %
No response	61	10,6 %

As for the vitiligo as a contraindication to blood donation, the majority of the people 232 (40,3%) were unable to answer, 175 people (30.4%) think that people with vitiligo can donate and 108 people (18,8%) think not.

Board XVIII: can you give blood if you have vitiligo?

	Frequency	Percent
Yes	175	30,4 %
No	108	18,8 %
I don't know	232	40,3 %
No response	60	10,4 %

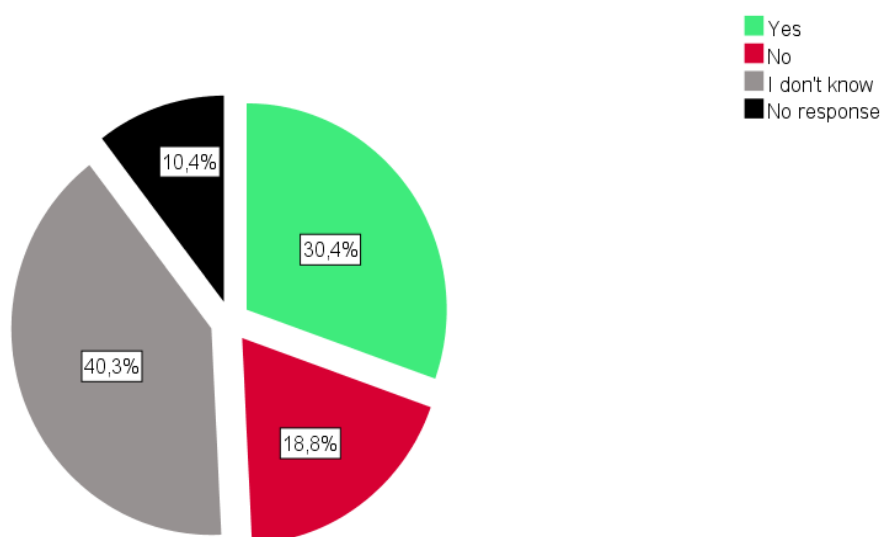


Figure 18: Can you give blood if you have vitiligo?

The majority of the respondents 331 (57,6%) believe that blood isn't sold, 92 of the respondents (16%) believe that it is sold and 81 respondents (14,1%) didn't know the answer.

Board XIX: do you think that blood is sold?

	Frequency	Percent
Yes	92	16 %
No	331	57,6 %
I don't know	81	14,1 %
No response	71	12,3 %

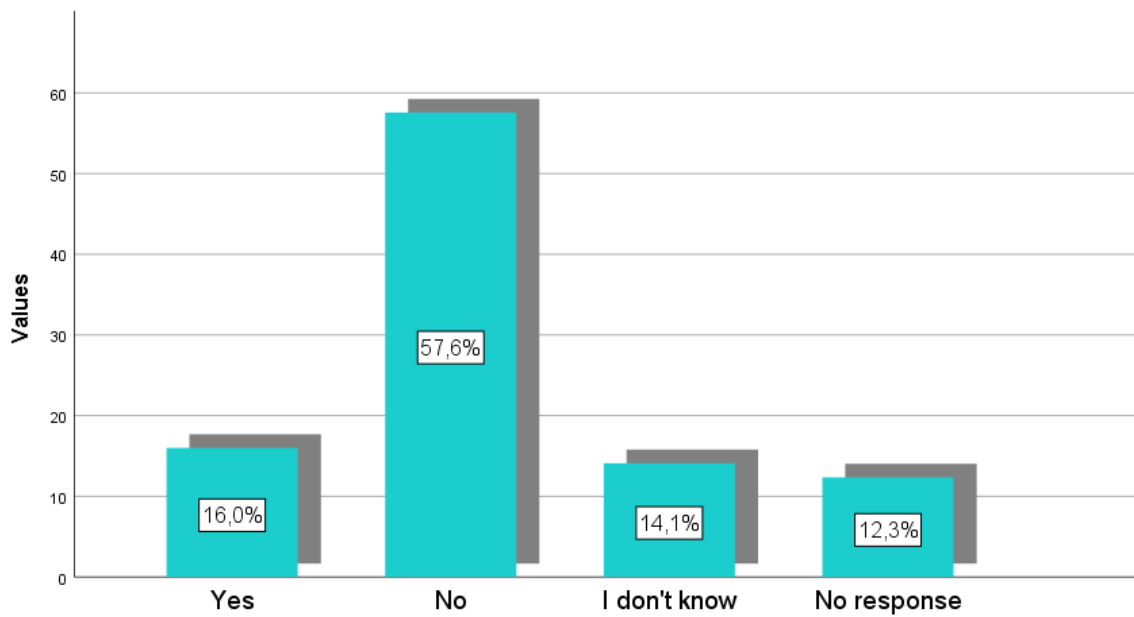


Figure 19: Do you think that blood is sold?

11 respondents (5.1%) believe that blood donation present health risks, while the majority 195 (90.3%) didn't think it present any risk.

Board XX: does blood donation present health risks?

	frequency	Percent
Yes	63	11 %
False	425	73,9 %
I don't know	24	4,2 %
No response	63	11 %

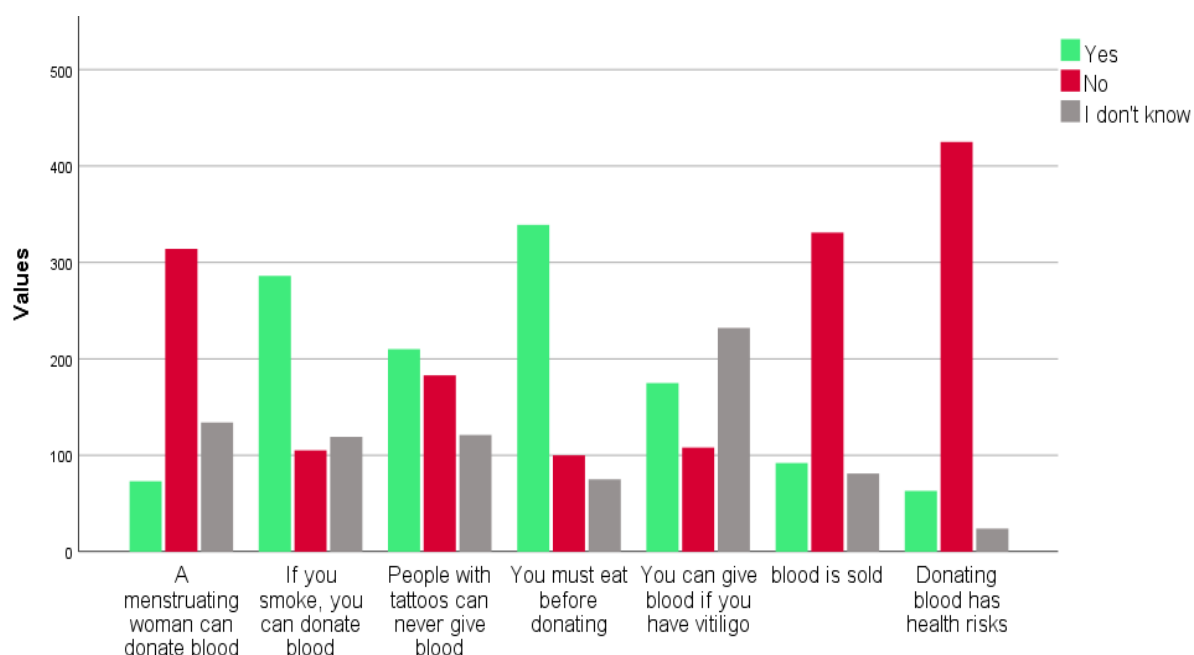


Figure 20: Results of the test about blood donation misconceptions

4. Donor evaluation of the regional blood transfusion centre of Marrakech :

Using a Likert scale in our survey to rate the satisfaction level of blood donors regarding the service presented in the RTCM, we observe that most of the donors 213 (73.9%) were satisfied (very satisfied or satisfied), while only 10 (3.9%) expressed that they were not at all satisfied.

Board XXI: How satisfied are you with your experience at the blood center?

	Frequency	Percent
Very satisfying	105	36,4 %
Satisfying	108	37,5 %
Slightly satisfying	29	10 %
Not satisfying	6	2 %
Not at all satisfying	10	3,4 %
No response	30	10,7 %

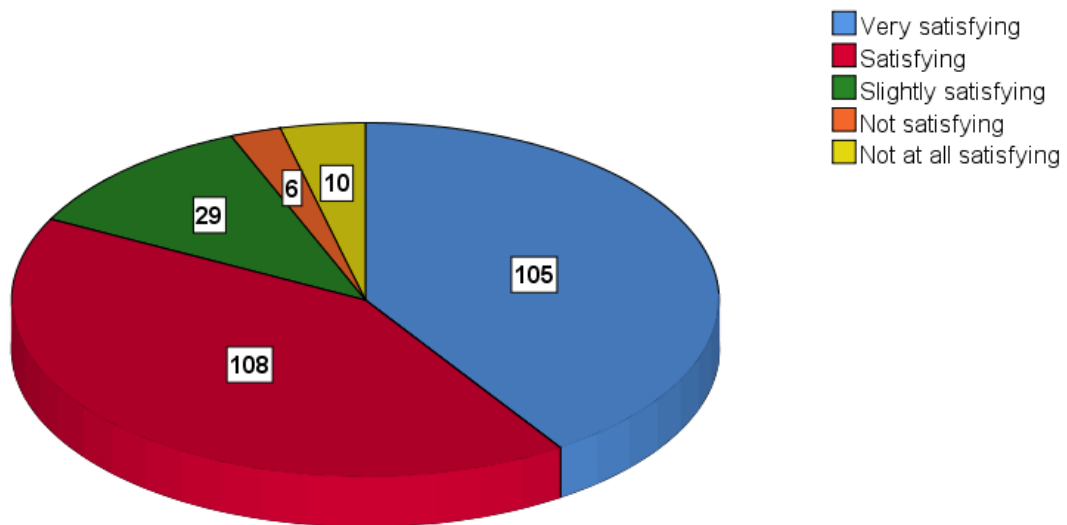


Figure 21: How satisfied are you with your experience at the blood centre?

Donors provided additional comments for the open-ended question regarding their suggestions on how to improve the experience in the blood transfusion centre, and the most common suggestions were:

- Increasing blood donation sites and the organization of more mobile collections, to face the problem of distance.
- Adding an online donation appointment.
- Improve the donor reception service.
- More medical staff should participate in blood donation activities
- Update the awareness program to face the lack of information on the subject.
- More parking spaces in the centre.
- Regular donors and family should have easy access to blood when needed.
- Computer access to blood test results without mobilizing to the centre.
- Improve the refreshments.
- Improve the organization inside the centre to reduce the time required to donate.
- Lengthening the operation hours and having teams that work on weekends.

5. Correlation between gender and donation :

We found that our female participants outnumbered men among the non-donors (67% vs 33%)

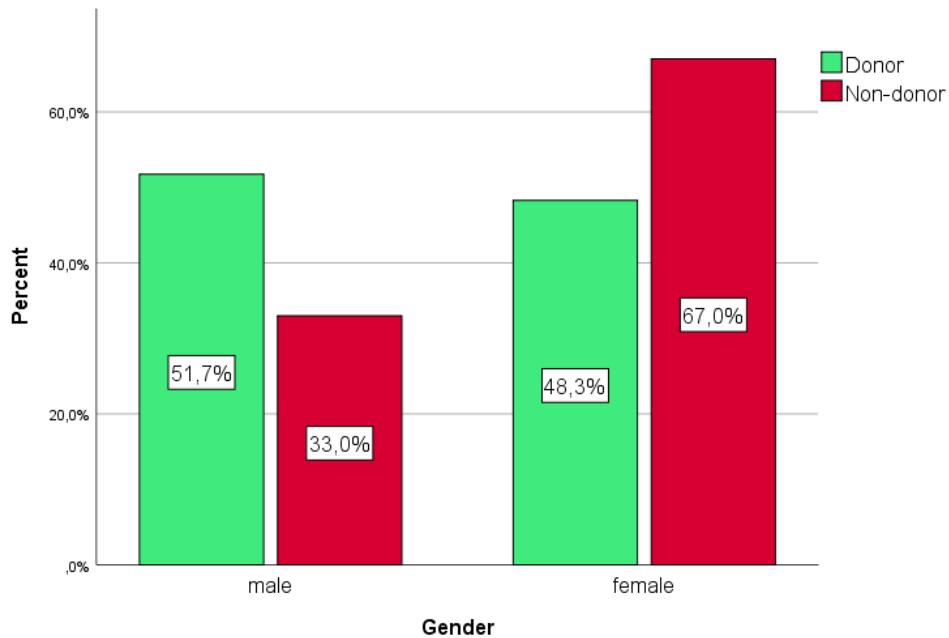


Figure 22: Distribution of donors and non-donors by gender

Board XXII: correlation between gender and donation

	Gender		P value
	Male	Female	
Donors	51,7%	48,3%	p= 0,000006
Non donors	33%	67%	

There is a S relationship between gender and donation, $X^2(1,N=573)= 20,62$, $p<0,05$.

Men are more likely to donate than females (51,7% to 48,3%).

6. Correlation between education level and donation:

There is a NS negative relationship between level of education and donation ($p>0.05$).

Board XXIII: correlation between education level and donation

	Education level					P value
	No education	Primary education	Secondary school	High school	University	
Donor	1,5%	1,5%	3,6%	5,4%	37,9%	0,323199
Non-donor	1,7%	2,8%	3,1%	6,2%	35,8%	

7. Correlation between knowledge and donation

Board XXIV: comparison between donor and non-donors knowledge test results

		Donor	Non-donor
Is there a need for blood in your city?	Correct	226	199
	False	6	4
	Unaware	40	73
Can a person under 18 donate blood?	Correct	189	151
	False	41	52
	Unaware	37	66
Can pregnant women donate blood?	Correct	205	182
	False	7	17
	Unaware	57	71
Can a menstruating woman donate blood?	Correct	29	44
	False	180	134
	Unaware	55	79
Can women donate blood when breastfeeding?	Correct	131	100
	False	37	61
	Unaware	86	96
Do all blood donations get HIV tested?	Correct	212	213
	False	7	4
	Unaware	37	38
You can donate blood every 3 months (men) or 4 months (women)?	Correct	211	174
	False	26	22
	Unaware	22	59
Can you donate blood if you smoke?	Correct	141	145
	False	61	44
	Unaware	50	69
People with tattoos can never give blood?	Correct	88	95
	False	115	95
	Unaware	55	66

		Donor	Non-donor
You must eat before donating	Correct	206	133
	False	29	71
	Unaware	22	53
You can donate blood if you have vitiligo?	Correct	81	94
	False	60	48
	Unaware	116	116
Blood is sold	Correct	173	158
	False	41	51
	Unaware	40	41
Blood donation has health risks	Correct	214	211
	False	29	34
	Unaware	15	9

Board XXV: correlation between knowledge and donation

	Correct	False	Unaware	P value
Donor	2106	639	632	0,000409
	62,4 %	18,9 %	18,7 %	
Non-donor	1899	637	836	
	56,3 %	18,7 %	24,8 %	

There is a S relationship between donation and knowledge level, $X^2(2, N=6749)= 39,04$, $p<0,05$.

Blood donors are more knowledgeable than non-blood donors (62,4% vs 56,3%)

II. Evaluation of the healthcare workers knowledge at the regional blood transfusion centre of Marrakech regarding the practice of blood donation:

In our study, we evaluated the knowledge of 20 members of the medical and Para-medical staff in RTCM including 12 laboratory technicians, 4 nurses, 2 doctors and 2 secretaries. Of which, 19 (95%) had received former blood transfusion training.

Board XXVI: Members of the medical and paramedical staff who received the questionnaire

	Frequency	Percentage
Doctor	2	10 %
Nurse	4	20 %
Laboratory technician	12	60 %
Secretary	2	10 %

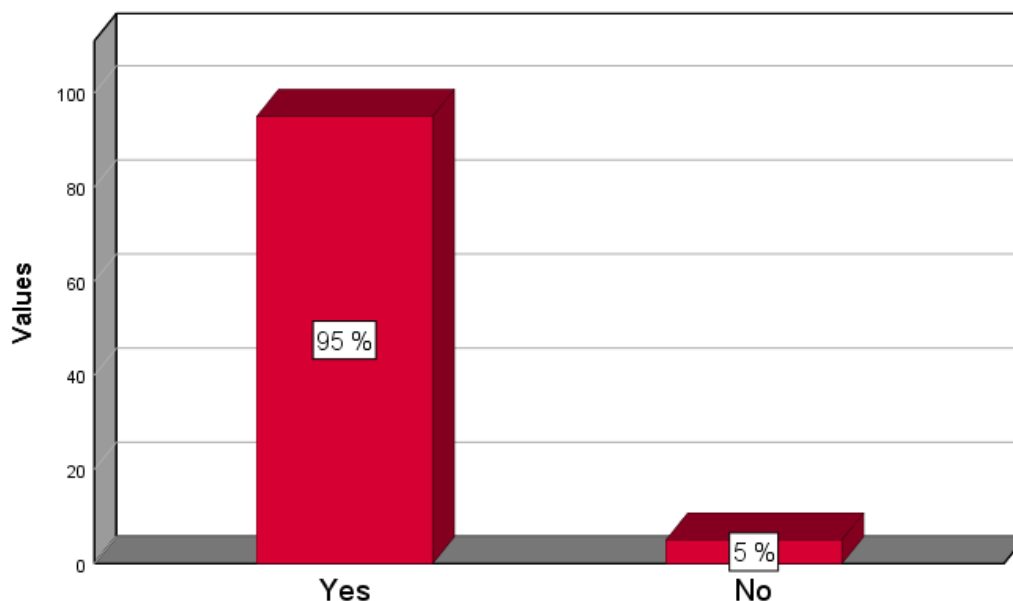


Figure 23: Have you ever received training on blood transfusion?

1. Demographic profile :

1.1. Age:

The youngest participant was 22 years old and the oldest was 62 years old for an average age of 34,9 years (+/-13,4).

We observe that the age range (20–30 years) was the most represented in our population (55%) compared to the group (>60 years) with (5%).

Board XXVII: age groups of the participants

	Frequency	Percentage
20-30 yo	11	55 %
31-40 yo	1	5 %
41-50 yo	4	20 %
51-60 yo	2	10 %
> 60 yo	1	5 %
No response	1	5 %

1.2. Gender :

Our group included 16 women (80%) and 4 men (20%), for a sex ratio of 0,25.

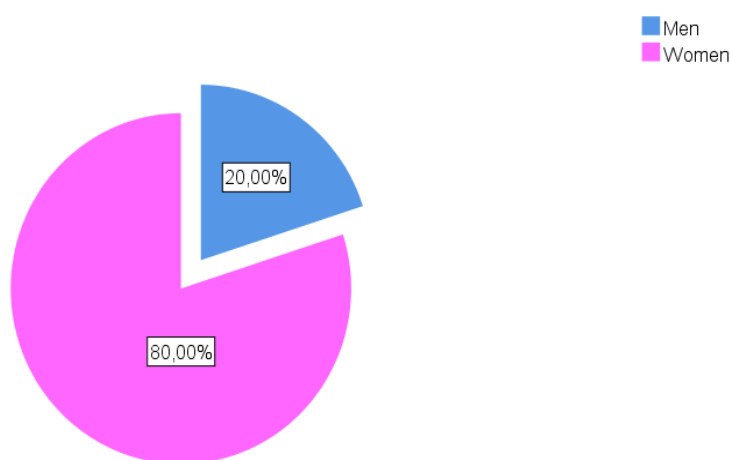


Figure 24: Distribution of participants by gender

1.3. Years of experience:

The minimum experience length was 7 months and the maximum was 22 years of experience, with an average of 7,5 years +/- (7,8)

The most presented group was (1-5) years of experience with 40%.

Board XXVIII: how many years have you worked at the center?

	Frequency	Percentage
<1 year	4	20 %
1-5 years	8	40 %
6-10 years	1	5 %
11-15 years	3	15 %
> 15 years	4	20 %

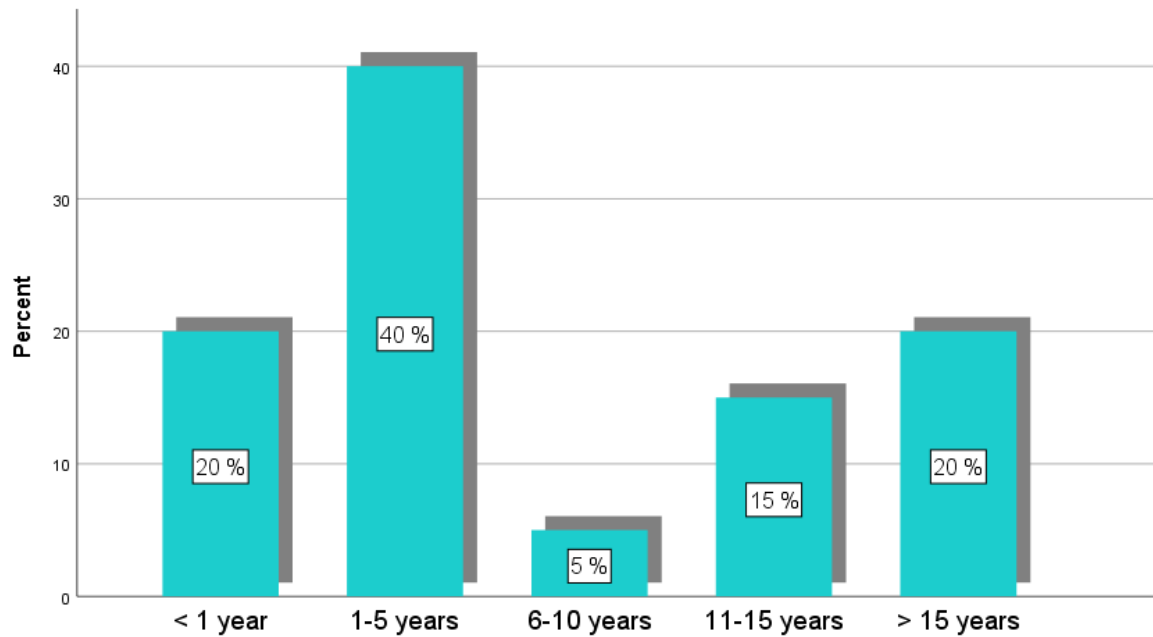


Figure 25: How many years have you worked at the center?

2. Knowledge evaluation:

2.1. Donor selection :

a. **Most secure donor:**

15 % of the respondents said that the most secure type of donor is the replacement donor, while for 80 %; the most secure one is the voluntary donor.

Board XXIX: What is the most secure type of donor?

	Frequency	percentage
Voluntary donor	16	80 %
Replacement donor	3	15 %
No answer	1	5 %

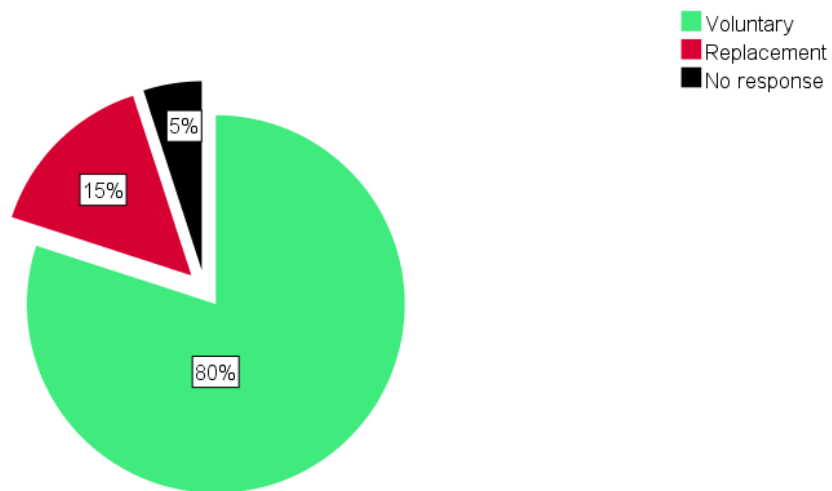


Figure 26: What is the most secure type of donor?

b. Weight limit:

Most of the participants 55 % expressed that the weight limit to donate blood is 50 kg.

Board XXX: What is the minimum weight required to donate blood?

	Frequency	Percentage
50 kg	11	55 %
55 kg	8	40 %
60 kg	-	-
No answer	1	5 %

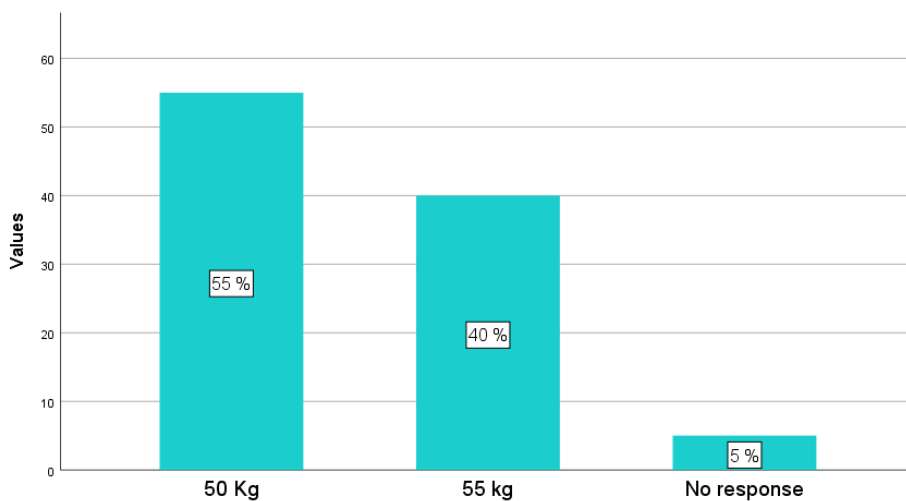


Figure 27: What is the minimum weight required to donate blood?

c. age requirement:

80% of participants responded that 18 is the right age to start donating blood and 60% said that 60 is the highest age required.

Board XXXI: How old do you have to be to give blood?

		Frequency	Percentage
Lower age limit	17 yo	1	5 %
	18 yo	17	85 %
	19 yo	1	5 %
Upper age limit	60 yo	12	60 %
	62 yo	2	10 %
	65 yo	5	25 %
	No response	1	5 %

d. Inter-donation interval:

95 % of the healthcare personnel indicated that men can donate blood each 3 months, while 75 % said that the time required between donations for women is 4 months.

Board XXXII: What is the minimum interval between donations?

		Frequency	percentage
Men	3 months	19	95 %
	4 months	1	5 %
	5 months	-	-
Women	3 months	3	15 %
	4 months	15	75 %
	5 months	2	10 %

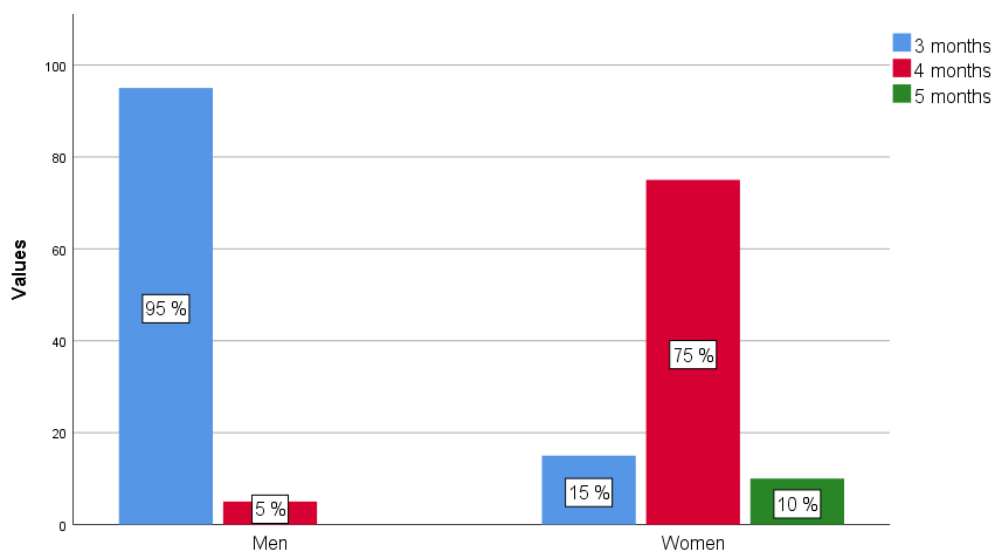


Figure 28: What is the minimum interval between donations?

e. Blood pressure:

Most of the respondents 35 % expressed that the minimal BP required to donate is 110/70 mmHg.

For the maximal BP, the majority with 55 % expressed that the limit is 140/90 mmHg.

Board XXXIII: What is the blood pressure limit to donate?

		Frequency	Percentage
Minimal blood pressure	90/50 mmHg	5	25 %
	100/50 mmHg	5	25 %
	110/70 mmHg	7	35 %
	No response	3	15 %
Maximal blood pressure	130/80 mmHg	6	30 %
	140/90 mmHg	11	55 %
	150/100 mmHg	-	-
	No response	3	15 %

2.2. Blood collection:

a. Quantity of blood collected:

Most of the participants 80 % expressed that the optimal quantity of blood withdrawn during a whole blood donation is 450 ml.

Board XXXIV: what is the optimal quantity of blood collected during a donation?

	Frequency	Percentage
450 ml	16	80 %
550 ml	2	10 %
650 ml	1	5 %
No response	1	5%

b. Adverse effects and course of action:

For the most frequent adverse effect during the donation, 85 % of the health care workers expressed that the answer is the hematoma, while 10 % thought that it is the perforation of an artery.

Board XXXV: What is the most common adverse effect during donation?

	Frequency	percentage
Hematoma	17	85 %
Vaso-vagal reaction	1	5 %
Perforation of an artery	2	10 %

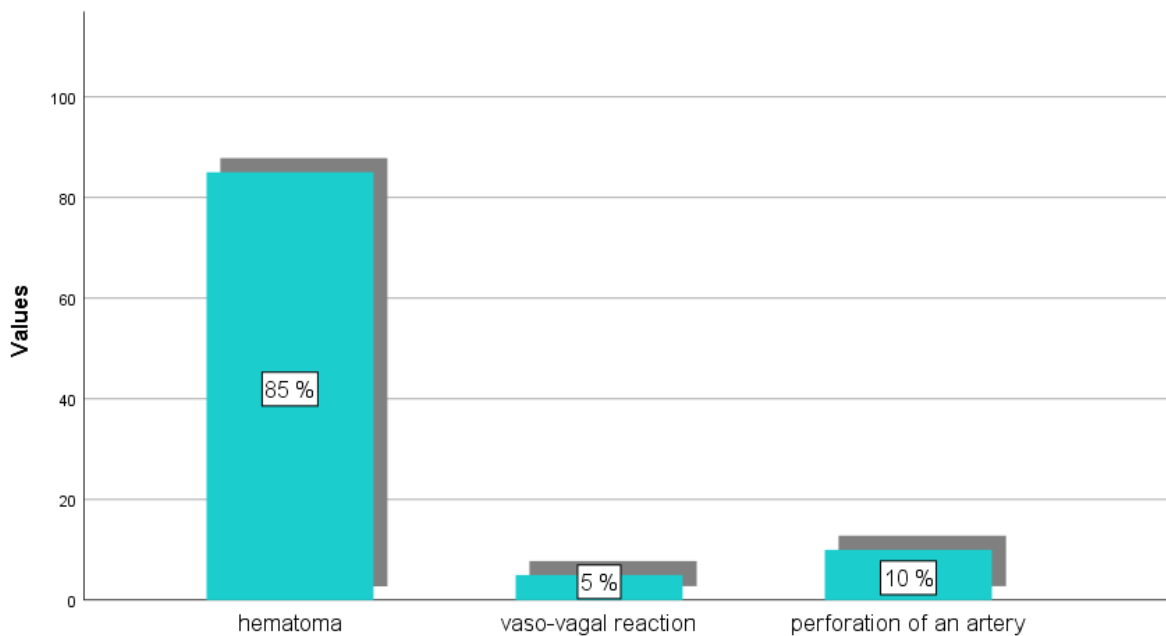


Figure 29: What is the most common adverse effect during donation?

For the course of action to be taken in case of adverse effects, we posed two questions, what should be done if the donor faints during the collection and the steps to be taken in case of an hematoma in the arm of the donor.

Most of the participants 55 % didn't answer these questions; as some of them expressed that it is out of their field of experience.

As for the other answers, we resumed them in this board.

Board XXXVI: What will you do if the donor present a adverse effect during the collection ?

		Frequency	Percentage
Hematoma	Apply pressure with a compress and put some ice.	9	45 %
	Put some ice, prescribe anti-inflammatory drugs	2	10 %
	No response	9	45 %
Vaso-vagal reaction	Stop the collection, recline the seat and give the donor something to drink	8	40 %
	Call the doctor	3	15 %
	No response	9	45 %

2.3. Blood preparation and storage:

a. Blood testing:

For the tubes required for blood tests, 90 % expressed that it should be EDTA tubes.

Board XXXVII: What tubes are used to perform the blood tests during the collection?

	Frequency	Percentage
EDTA tubes	18	90 %
No response	2	10 %

Regarding mandatory tests required to be performed in the blood bags in our country, 90% (18) of those surveyed said that they are:

- ABO blood groups with Rhesus system
- HIV

- Hepatitis B and C
- syphilis

While 10% (2) didn't answer the question.

b. Blood storage:

We asked the personnel working in the centre about the required temperature to store blood during a mobile collect, both right after collection and during the shipping of the blood bag.

Most of the respondents thought that the ideal temperature was (2-6) °C after the collection (70%) and (2-10)°C during the shipping (60%).

Board XXXVIII: What is the ideal storage temperature for whole blood during mobile collection?

		Frequency	Percentage
After collection	0-2 °C	-	-
	2-6 °C	14	70 %
	6-10 °C	1	5 %
	No response	5	25 %
During the shipping	0-2 °C	-	-
	2-10 °C	12	60 %
	10-15 °C	3	15 %
	No response	5	25 %



DISCUSSION



I. Generality :

1. Definition of blood transfusion :

Blood transfusion (BT) consists of administering blood or one of its components (red blood cells, granulocytes, plasma, proteins) from one or more subjects called "donors", to one or more sick subjects called "recipients".

Transfusion of labile blood products (LBP) is a frequent therapeutic procedure in haematology as in other medical and surgical specialties.[10]

The provision of products must comply with the rules of good transfusion practice: collection, preparation, biological qualification, distribution and clinical indications. Compliance with these rules is an absolute necessity.[11]

2. Transfusion history :

Blood transfusion (BT), that is the transference of blood from the circulation of one individual to that of another for practical therapeutic purposes, is of relatively recent origin. Although it only became a routine practical possibility during and shortly after the Second World War, the concept of the infusion of blood has a much longer history.[12]

Before considering the possibility of transfusion, it was necessary to understand and describe the blood circulation and its physiology. Ibn Al Nafis(1210–1288), the Syrian doctor was the first to describe in his book "Commentary on Anatomy in Avicenna's Canon "–1242 the pulmonary circulation and considered that blood had to go from the right heart, through the lungs where "it mixes with air" and then goes to the left heart, 300 years before William Harvey.[13] The English physician, who then completed his work by describing the whole blood circulation in his book "de motu cordis" in 1628 [14].



Figure 30: Portrait of Ibn Al-Nafis [15]

- Intravenous injections :

Advocating the use of blood as a vehicle for drugs, the Englishman Christopher Wren (1632–1723), astronomer and architect, who carried out the first experiments in 1656 of intravenous injections in animals. These "infusions first concerned opium and various liquid substances, Wren analyzed the physiological consequences. His compatriot Richard Lower (1631–1691), physician and anatomist continued these experiments and conceived the idea of injecting intravenous injection, no longer of drugs, but of blood, from one animal from one animal to another, wondering if the bloods of different animals could not be mixed without any agitation between their parts".

At the same time, German physicians, in particular Johann Daniel Major (1634–1693), were conducting various researches, both on the technique of intravenous injection and on the therapeutic effects of the drugs used. They were thus the first intravenous injections in humans.[16]

- Animal transfusion :

It was in the 17 century, more specifically in 1666, an English doctor by the name of Richard Lower (1631–1691) reported the first successful transfusion between two animals; He

withdrew blood from a dog to the point of hemorrhagic shock, and then transfused the animal with blood from a larger dog.[17]

- Animal to human transfusion (xenotransfusion) :

The first BT in humans was performed by the Frenchman Jean Baptiste Denis (1643–1704) in 1667; the receiver was a boy, fifteen years of age who has been bled twenty times in two months following a long-term fever, he received eight ounces of arterial blood from a lamb bled at the carotid artery. This first therapeutic transfusion corrected the anaemic effect of the repeated bleedings, so it was a xenotransfusion without harmful consequences, notably immunological, and was followed by a slow and real improvement of the general state. [16]

However, the practice was subsequently abandoned for hundreds of years after the death of one of Denis's patients.[18]

- Human to human transfusion :

James Blundell (1790–1878), the English physician carried out his first human BT in 1818, on a man dying of cancer of the stomach; his condition improved for some hours, but he died 56 hours afterwards.

Afterwards came the first dramatic success. In 1825 Blundell was called to a woman dying of post-partum haemorrhage. Two ounces of blood were transfused from her husband, the patient rallied and survived.

In all, Blundell transfused ten cases with five successes, these five included four examples of post-partum bleeding and a boy in shock after amputation of his leg. The donors were either the patient's husband or attending doctors. Blundell wrote: 'After undergoing the usual ordeal of neglect, opposition and ridicule, the operation will hereafter be admitted into general practice' [1]



Figure 31: method using of the gravitator [19]

3. Blood transfusion chain :

The blood supply chain activities include collecting, testing, processing, and distributing blood (and its derivatives) from donors to patients for emergencies, surgical or routine medical treatments. These activities can be divided into 4 main levels of:

- Collection
- Production
- Inventory
- Distribution[20]

This chain begins by collecting blood from donors; then, it is stored and processed as a complete blood unit to remove red blood cells from other products, such as plasma and platelets; next, blood products are stored as inventory in the blood bank of a blood transfusion centre, finalizing it for distribution.[21]

Finally, hospitals, according to the predicted demand, place their orders to the blood centres; then, the received blood is tested and, after the cross matching process, in case of compatibility, blood units are used for the particular patient.[22]

4. The organization of blood transfusion in Morocco :[23]

4.1. Regulatory Basis for transfusion practice :

Transfusion practice is governed by regulations that protect the rights and safety of the donor and the recipient. Law n° 03-94 on the donation, collection and use of human blood and decrees n° 2-94-20 of November 16 1995 and 2-96-421 of November 20 1996 taken for its application are the main regulatory references governing transfusion in Morocco. It is based on:

- ❖ Blood donation is a free voluntary act
- ❖ A health assessment done by a doctor is mandatory before any donation
- ❖ The blood donated must be subjected to biological analysis and detection of contagious diseases.
- ❖ The transfusion of blood or its derivatives can only take place on medical prescription, in a health care space and in compliance with the rules of hemovigilance.
- ❖ Transfusion safety is the direct responsibility of the Ministry of Health.

4.2. the general organization of blood transfusion in Morocco :

In Morocco, BT is a regulated medical activity. It is organized by the National Blood Transfusion Centre, under the supervision of the Ministry of Health.

It is the only organization in Morocco authorized to collect and distribute labile blood products.

The system is composed of 16 regional blood transfusion centres, 13 blood banks and 30 transfusion antennas; all grouped under the name of Regional Blood Transfusion Centre (RTC).

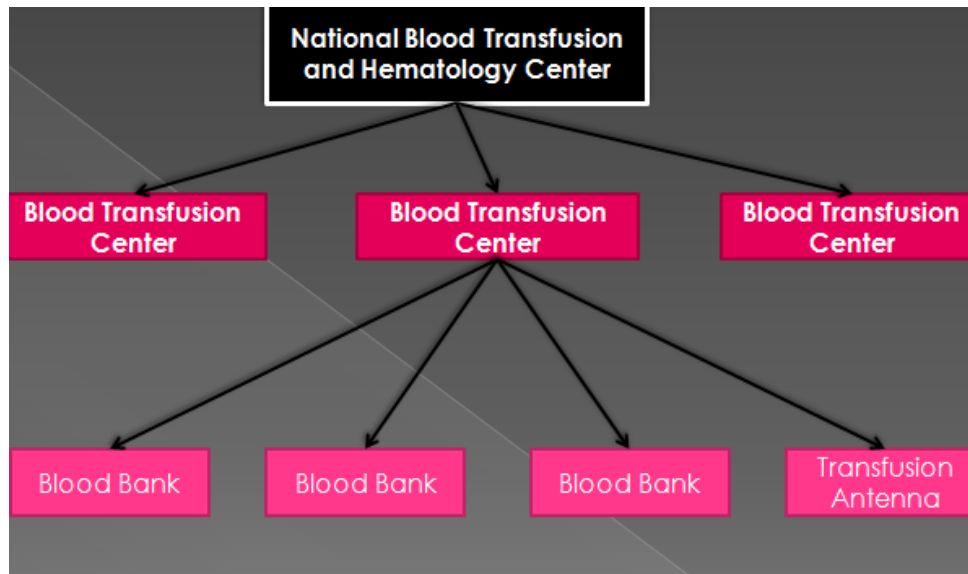


Figure 32: Functional organization of transfusion

a. The National Blood Transfusion and Haematology Centre (NBTHC):

The NBTHC is placed under the direction of hospitals and ambulatory care[24]. It is also in charge of:

- ❖ the implementation of the national blood transfusion policy
- ❖ developing a program to promote blood donation
- ❖ Continuous training
- ❖ The supply of equipment and fungibles to the BTC, BB and TA,
- ❖ The production or acquisition of reagents and stable blood derivatives

The national quality and hemovigilance policy is one of the priorities of the NBTHC. Thus, a quality control laboratory was created in 1995.

A national quality assurance committee is also in place and an internal audit program is conducted annually by the NBTHC.

b. Blood Transfusion Centre (BTC):

The BTC is placed under the authority of the medical delegation[24]. It is responsible for:

- Promotion of blood donation

- The collection and qualification of LBP from collections organized at the centre, by the mobile teams and also those carried out by the blood banks
- The grouping of patients who are candidates for transfusion
- The responsibility for any medical follow-up of the donor

A quality manager is identified at the level of each and works in collaboration with the national quality assurance manager.

Today, each BTC is responsible for ensuring its own supply of LBPs as well as that of the BBs and TAs under its responsibility.

He must also communicate each day the detailed situation according to a defined model of his stock according to the type of product and the blood group to the delegates of the Ministry of Health and the directors of the hospitals.[25]

c. Blood Bank (BB):

The BBs are responsible, under the responsibility of a doctor competent in blood transfusion[24], for:

- Storing and supplying patients with the necessary LBPs, prepared and delivered by the BTCs
- Organizing blood collections; Sending the collected blood to the BTC for the preparation of LBP and compulsory examinations
- The immuno-hematological assessments of patients
- Providing an emergency service[26]

d. Transfusion Antenna (TA):

The TAs are responsible, under the responsibility of a doctor competent in BT[24], for:

- Storing and supplying patients with the necessary LBPs, prepared and delivered by the BTC.
- Performing immuno-hematological tests on patients.

Board XXXIX: National Blood Transfusion Network[23]

Blood transfusion center	Blood bank	Transfusion antenna
Agadir	- Taroudant - Tiznit	- Assa zag - Guelmim - Tata
Al hoceima		
Beni mellal		Azilal
Casablanca	- Khouribga - Mohammadia - settat	- Bejaad - Dakhla - Oud zem
El Jadida		
Errachidia		Midelt
Fès	Taza	- Boulmane - Sefrou - Taounate
Laayoune		- Boujdoure - Smara - Tan-tan
Marrakech	- El Kalaa - Essaouira	- Chichaoua - Benguerir - Tahannaout - Tamellalt
Meknes	Khenifra	- Azrou/Ifrane - Sidi Kacem
Ouarzazate		Zagora
Oujda	Nador	- Bouarfa - Taourirt - Berkane
Rabat	Kenitra	- Benslimane - Khemisset - Ouezzane - Souk Larba
Safi		
Tanger	Larache	- Assilah - Ksar Lakbir
Tetouan	Chefchaoune	

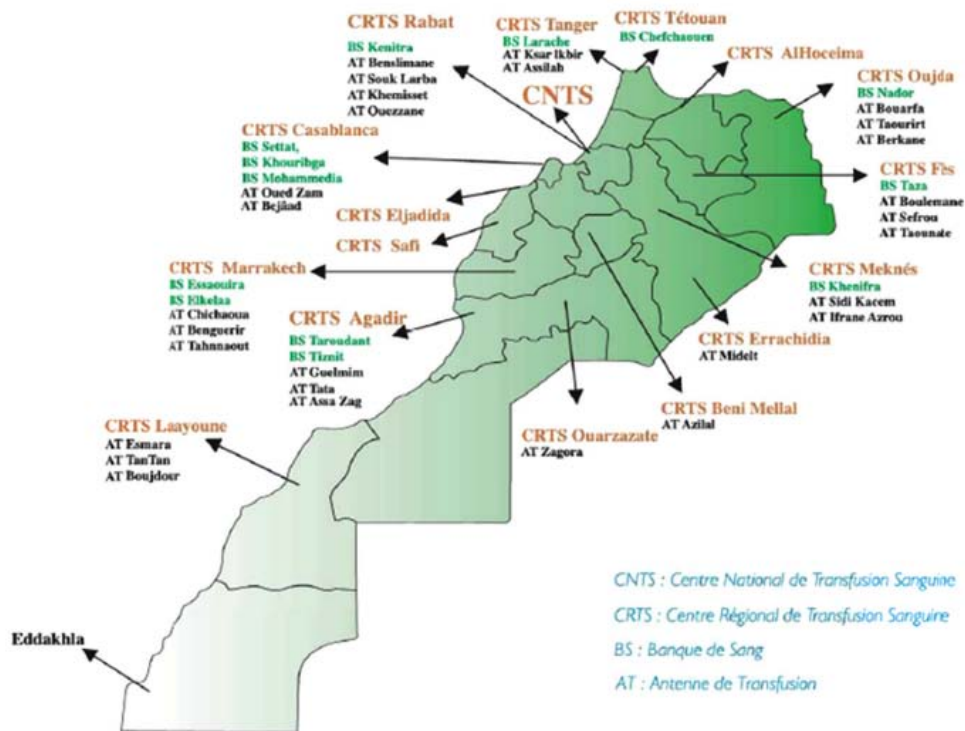


Figure 33: National blood transfusion network in Morocco. [26]

II. Blood donation : between theory and practice

Blood donation (BD) refers to the process of collecting, testing, preparing and storing blood and blood components, in order to use it for therapeutic purposes.

1. Blood donor selection :

The primary responsibility of a BT service is to provide a safe, sufficient and timely supply of blood and blood products. That's why we should ensure that the act of BD is safe and causes no harm to the donor.

It should build and maintain a pool of safe, voluntary non-remunerated blood donors and take all necessary steps to ensure that the products derived from donated blood are efficacious

for the recipient, with a minimal risk of any infection that could be transmitted through transfusion[27].

a. Rules of blood donation :

In Morocco, following the law n° 3-94 of 18 July 1995 [28], and the recommendations of all international authorities (WHO, Council of Europe, ISBT, EBA)[29], blood donation must be :

- Voluntary: no pressure of any kind should be exerted on the donor, who should express his consent to the donation in all freedom and conscience.
- Non-remunerated : BD must be free
- Anonymous: the identity of the donor and the recipient should be unknown, except in case of therapeutic necessity.

b. Steps of blood donation :



Figure 34: Steps of blood donation[30]

b.1. Donor registration :

Donor registration is now computerized and paperless, due to the implementation of new software called 'ePROGESA'.

This solution had significantly improved blood collection activities and reinforced the safety of activities by tracing the blood products and derivatives from collection to distribution.

The donor candidate is welcomed by a BTC secretary who registers his or her information:

- Identity
- National identity code
- Voluntary or replacement donation

The donor then takes a pre-donation survey which is a very important step in the BD selection process.

It plays a role in raising donor awareness by assisting him in deciding whether to self-defer; it may also assist him to return if he understand the reason why he should not donate blood on this occasion.[31]

The information provided by the donor can then be further elaborated on during the medical interview.

ب- إذا كنت تنتمي لإحدى الفئات التالية نرجو منك أن لا تبرع بدمك أبدا

(1) إذا كنت إذا تعرضت لحقن دم في الماضي

(2) إذا كنت تعاني من الرض

(3) إذا كنت تعاني من داء فقدان المناعة المكتسبة السيدا

(4) إذا كنت تعاني من داء التهاب كبي

(5) إذا كنت قمت بزراعة منطوق نعرف بانتشار البرداء (اللازيا)

ت - إذا كنت حامل لأحد الأمراض وضع علامة

(1) ارتفاع في الضغط الدموي

(2) داء السكري

(3) مرض الربو

(4) مرض في القلب أو الكلي أو الرئتين ...

(5) مرض عصبي أو اضطراب عصبي (مثل نوبات الصرع)

(6) اضطرابات نفسية

(7) مرض المعرطان حتى ولو تم علاجه

ج- إذا كنت مصغيا بالتحالات التالية

(1) إذا أقيمت بالكلترا على الأقل لمدة سنة ما بين 1980 - 1996

(2) إذا كنت تستعمل مواد صخرية عن طريق الوريد

(3) إذا كانت لديك علاقات جنسية متعددة دون استعمال العازل الطبي

(4) إذا كانت لديك علاقات جنسية مع ذكور آخرين

(5) إذا أجريت لك عملية زرع القرنية (Cornée)

(6) إذا أجريت لك عملية زرع الحافية (غلاف الدماغ)

(7) إذا تلقيت علاج بهرمون النمو قبل 1986

شكرا لتفضلتك بقرءاء هذه الاستمارة

ROYAUME DU MAROC
MINISTÈRE DE LA SANTÉ
CENTRE REGIONAL
DE TRANSFUSION SANGUINE


 المملكة المغربية
 وزارة الصحة
 المركز الجهوي
 لتحالفن الدم

استمارة حول موانع التبرع بالدم

استمارة قبل التبرع مهينة للقاء الطبي
تريد التبرع بدمك لشكرا لتفضلتك بذلك
المرجو قراءة هذه الاستمارة لضمان أمن تبرعك وكذلك أمن المريض الذي سيحفظ بدمك

أ- إذا كنت تنتمي لإحدى الفئات التالية نرجو منك تأجيل تبرعك حسب الفترة الميمنة

(1) التلقيح ، انتظار ثلاث أسابيع

(2) حقن بمصل من أصل حيواني (مثال مصل ضد الكزاز مصل ضد سم العقرب) ،
انتظار أسبوعين

(3) علاج مصلي من أصل بشري
- مضاد الغلوبولين من أصل بشري (Anti D) ، انتظار ثلاث أشهر
- مضاد الغلوبولين من أصل بشري للكزاز ، انتظار ثلاث أشهر

(4) إذا كنت نزعمت أو عالجت إحدى الأسنان ، انتظار أربعة أشهر

(5) إذا كنت تعرضت (حجامة) أو حلققت بروس أو شفرة عند حلاق ، انتظار أربعة أشهر

(6) إذا أجريت لك عملية جراحية بدون حقن ، انتظار أربعة أشهر

(7) إذا كنت تعرضت بواسطة حقن مستعملة ، انتظار أربعة أشهر

(8) إذا كنت تعرضت لاستئصال في الأنبوب الهضمي (تنظير لبيفي) أو في القولون (تنظير القولون) ، انتظار أربعة أشهر

(9) تعرضت لإسهال ، انتظار شهر واحد

(10) في حالة متاعبة علاج ضد التهاب حاد ، انتظار أسبوع بعد نهاية العلاج

(11) في حالة وضع ثقب في الأذن (وضع أقران) ، انتظار أربعة أشهر

(12) في حال وضعك للوشم ، انتظار أربعة أشهر

Figure 35: Pre donation survey

b.2. Pre-donation medical exam:

Each collection must be preceded by a medical examination of the donor, consisting of a medical interview and a clinical examination.[26]

The objective is to identify situations where there is a risk of poor tolerance of the donation for the donor, or a risk of contamination by transfusion for the patient.

❖ Medical interview :

The medical interview carried out by a doctor is very important to ensure the safety of both the donor and the recipient.

For this interview to be effective, the donor must participate in all sincerity and must not omit any information to the doctor. This strictly confidential interview covers the main infectious risks: bacterial risk, risk of a viral disease that can be transmitted sexually or by blood, risk of having contracted a tropical virus or parasite during a trip, etc...

❖ Medical exam :

The clinical examination of the donor includes an assessment of the general condition, measurement of the donor's blood pressure and body mass.

At this point, the doctor may or may not agree to the donation.

If there is no contraindication, the doctor gives the donor a unique identifier using an alphanumeric code that would be attached to the donor identifier, primary blood collection bag, its corresponding satellite bags and the blood sample tubes.

b.3. Blood collection:

Collection is also an important step in the care of the donor; the personnel must ensure smooth running and surveillance of the collection.[32]

We can resume it in 6 steps :[33]

- ❖ Identify the donor and label the collection bag and test tubes
- ❖ Choice of the vein :

Choose a fairly large and firm vein, preferably in the antecubital fossa, in an area free of skin lesions and scars. Then, place a tourniquet to make the veins pop.

Ask the donor to open and close the hand once or twice.

❖ Disinfection of the skin :

The WHO recommends using a product containing 2% chlorhexidine gluconate in 70% isopropyl alcohol.

Cover the entire area and ensure that the skin is in contact with the disinfectant for at least 30 seconds. Then, allow the area to dry completely for at least 30 seconds.

❖ Perform venipuncture :

Perform venipuncture by gently entering the vein. Then, release the tourniquet when the blood flow is established or, at the latest, after two minutes.

Ask the donor to slowly open and close his or her fist every 10–12 seconds during collection.

❖ Supervise the donor and the BD :

Monitor the donor and the puncture site closely throughout the donation process. Watch for:

- Sweating, pallor, or complaints expressing weakness, which may precede fainting.
- A hematoma at the puncture site.
- Changes in blood flow that may indicate that the needle has moved in the vein and needs to be repositioned.

Every 30 seconds during donation, gently mix the collected blood with anticoagulant, either manually or by continuous mechanical mixing

- ❖ Remove the needle and collect the samples



Figure 36: Blood collection [34]

b.4. Refreshments:

After the collection, the donor is given a rest period, during which a snack is offered.

This time is intended to extend the donor's surveillance after the donation.

Some advices should be given to the donor:

- ✓ Take a break for at least 20 minutes. Do not drive a vehicle after giving blood.
- ✓ Have snacks and juice.
- ✓ Have a meal that contains a lot of protein like chicken, fish, egg, etc.
- ✓ Do not do heavy work, such as jogging, gymnastics, dancing, carrying heavy goods...

c. Adverse reactions of blood donation:[35] [33]

Reactions that may arise from donating blood are generally benign, but can lead to disaffection for the donation.

Approximately one third of whole-blood donors have an adverse physical event during or after whole-BD. In most cases, it is a minor event [36].

And it is more frequent in females, youth and first time donors.[37]

We can divide the reactions into two groups:

❖ Local:

- Local nerve damage
- Arterial puncture
- Hematoma
- Sore arm
- Local allergy to antiseptic solution, gauze or tape.
- Local infection
- Thrombosis

❖ Systemic :

- fatigue
- Vasovagal reactions
- Iron depletion

b.5. Vasovagal reaction :

The vasovagal reaction is the development of arteriolar dilatation (vaso) and inappropriate cardiac slowing (vagal) leading to arterial hypotension with or without loss of consciousness (syncope). The reaction reflects autonomic neural changes.[38]

There are approximately 25 non-syncopal vasovagal reactions for every syncopal reaction.[39]

Most non-syncopal vasovagal reactions occur on the BD bed toward the end of the phlebotomy or immediately after the phlebotomy. Syncopal reactions, in contrast, occur more often after the donor has stood up.[40]

- Symptoms: Fixed gaze, sighs, pallor or sweating, weak pulse, hypotonia, vomiting, tetany, incontinence, loss of consciousness, convulsions (rare).
- Frequency: 1 % (more frequent in first time donors 1.7 %)

- Cause: Anxiety, hypovolemia and other associated causes (hypoglycemia, dehydration, lack of sleep), atmosphere of the donation room (hot or humid)
- Treatment:
 - Benign vasovagal reaction :
 - Discontinue donation
 - Recline the seat (Trendelenburg position)
 - Loosen the clothes
 - Monitor blood pressure and pulse
 - Reassure the donor
 - Give the donor something to drink
 - Severe vasovagal reaction:
 - Call a doctor
 - Remove the phlebotomy needle
 - If the donor loses consciousness, place him/her in the lateral position and ensure that the airway is clear.
 - Recline the seat (Trendelenburg position)
 - Protect the donor from falling off the seat
 - Cardiopulmonary resuscitation (CPR) is rarely ever needed
 - Monitor blood pressure and pulse until donor recovery
- Advice to the donor :
 - Benign vasovagal reaction:

The person can donate blood, but should be deferred if he presents another syncope.

- Severe vasovagal reaction:

The person should not donate blood anymore.

b.6. Hematoma:

- Frequency: 2–3 %
- Cause: failed Venipuncture, puncture of the skin at too great an angle and exit of the vein, perforation of the vein on two occasions during donation, insufficient tension after donation.
- Treatment:
 - Apply a compress with pressure
 - Ask the donor to move his arm freely, but avoid heavy loads
 - Apologize, reassure the donor

b.7. Delayed syncope :

Occurs 1–4 hours after donation, usually outside the transfusion center

- Frequency: 1/10.000
- Cause: Physical stress, insufficient fluid intake, unknown cause
- Treatment:
 - Provide warm drinks or water prior to BD
 - Provide auditory or visual distraction and minimize pain and stress during the BD.
- Advice for donor :

Can donate blood, but should be excluded if the phenomena occurs another time.

b.8. Artery perforation :

Rarely, an experienced phlebotomist will accidentally puncture the artery instead of the vein. The Problem can be detected by observing that the collected blood is bright red, flowing rapidly and the needle moving with each heart contraction.

- Frequency: 1/30.000–50.000
- Cause: The anatomical position of the brachial artery is sometimes very close to that of the vein

- Treatment:
 - Discontinue donation or continue it if the problem is identified near the end of the donation
 - Apply firm pressure (nurse or medical staff) for at least 15 minutes
 - Apply a pressure bandage and check radial pulse
 - Inform and reassure the donor that this puncture is unlikely to have any serious consequences, but that significant bruising may appear and that healing can take 10–14 days.

b.9. Nerve injury: [41]

- Symptoms: Pain, paresthesia, weakness (of the fingers, wrist, grip strength, elbow movements)
- Frequency: 30–70/100.000
- Cause:
 - Direct trauma to the nerve by venipuncture
 - Indirect nerve injury usually secondary to hematoma formation, but may also be caused by inflammation or infection associated with venipuncture.
- Treatment:
 - Recovery is generally spontaneous and rapid, within 24 hours (in some rare cases, it can take up to 6 months)
 - Refer the donor to the doctor to explain the situation and reassure him.
 - Refer the donor to a neurologist if the lesion is significant.

b.10. Iron depletion:

1 mL of blood consists of 0.5 mg of iron. Thus, a unit of blood (450mL) contains nearly 250 mg of iron, representing about 30% of the average body iron stores in males and nearly 80% in females.[42]

This explains why iron depletion is mostly observed in long-term regular donors. [43]
therefore, Iron supplementation is recommended to all regular blood donors and female donors in particular to prevent the shrinking donor pool due to iron deficiency.[44]

b.11. post donation stroke:

Boynton and Taylor described 10 donor deaths after 7,000,000 whole BD during World War II that occurred in close temporal proximity to the whole BD. It was determined that the incidence was lower than that expected for the general population. It is believed that most proximal deaths are incidentally related to BD.[45]

Regarding our evaluation of knowledge of the health care workers at the RTCM (annex 2), we recall that most of the participants 45 % haven't answered the questions or had wrong answers (10 % in case of hematoma and 15 % if it's a vaso-vagal reaction) regarding the treatment of the adverse effects during the collection .

Only 45 % and 40 % of the respondents had given right answers for the course of action in case of hematoma and vaso-vagal reaction respectively.

In comparison with other results, we mention the study carried out by Raj Bharath Rudrappan on 107 healthcare workers working in blood banks, he found out that 98 % gave correct answers regarding the care of the donor in case of a vaso-vagal reaction and 74 % gave correct answers of the care in case of hematoma.[46]

In another study, this time regarding 397 healthcare workers from blood centres in India, 61,7 % of the respondents gave correct answers for the actions to be taken in case of donor reaction.[47]

We note that we have low scores on this subject in comparison with what we found in the literature, this result may be explained by the fact that the vast majority of our respondents were laboratory technicians 60 %.

Board XL: comparison of the correct answers regarding treatment of the donor in case of reaction with the literature

		Our study	Raj[46]	Anju Dubey[47]
Treatment of adverse reactions	Hematoma	45 %	74 %	61 %
	Vaso-vagal reaction	40 %	98 %	

d. Blood donation benefits:

To overcome the problem of finding blood donors, one of the most important recommendations is to find new health benefits of BD.

In 1981, the iron hypothesis was presented. It is founded on the fact that the higher incidence of heart disease in men and postmenopausal women compared to the incidence in premenopausal women results from higher levels of stored iron in these two groups.[48]

In 1998, Salonen and co-workers supported the hypothesis by reporting that blood donation reduced the risk of myocardial infarction due to iron depletion, they found that the risk was reduced by 88% among a prospective cohort of 2862 Finnish males followed by a mean of 9 years. One man (0.7%) out of 153 men who had donated blood in 24 months preceding the baseline examination experienced an acute myocardial infarction from 1984 to 1995, whereas 316 men (12.5%) of 2,529 non-blood donors had an acute myocardial infarction.[49]

Other studies submerged In support of the iron hypothesis, as Meyers and his co-workers, suggested that blood donation among non smoking men in their study was associated with a reduced risk of cardiovascular events.[50]

But to this day, the relationship between iron status and atherosclerosis has been a topic of debate in the literature. Despite years of research, there is no agreement regarding the causal relationship.[51-53]

Additional health benefits have been reported:

- Individuals with type II diabetes presented improved glycemic control after BD, but the mechanism is still unknown. [54]
- BD removes oxidants and decreases oxidative stress by elevating antioxidant enzymes such as superoxide dismutase.[55]

e. Contraindications of Blood donation : [31]

- Age limit :
 - Usually 18 to 65 years
- Asthma :
 - Accept provided asymptomatic on maintenance dose of non-steroid medication
 - Defer for 14 days after full recovery from acute exacerbation
 - Defer for 14 days after completion of oral or injected steroid
- Acupuncture :
 - Defer for 12 months following last procedure
- Alcohol :
 - Accept if no signs of intoxication
- Allergy :
 - Accept if symptom free
 - Defer permanently if history of anaphylaxis
- Antibiotics :
 - Accept 14 days after completion of treatment
 - Accept if on long-term antibiotics for acne
- Blood transfusion :
 - Defer recipient of blood and blood products for 12 months following transfusion
 - Defer permanently if on regular treatment with plasma-derived coagulation factors
- Burns:
 - Accept if fully healed
- Dementia:
 - Defer permanently
- Dental treatment

- Accept 24 hours after simple procedures and 7 days after extraction or endodontic procedures
- Diabetes
 - Accept diabetes mellitus controlled by diet or oral medication with no history of orthostatic hypotension and no evidence of infection, neuropathy or vascular disease
 - Defer permanently if requires insulin treatment or has complications with multi-organ involvement
- Diarrhea :
 - Accept 14 days after full recovery and completion of therapy, including antibiotics
 - Accept chronic diarrhea due to irritable bowel syndrome without debility; otherwise defer
 - Defer for 28 days if symptoms suggestive of *Yersinia enterocolitica*
- Drug use :
 - Defer permanently individuals with a history of injecting drug use
 - Non-injected drugs : accept if no sign of intoxication
- Epilepsy :
 - Accept if off medication and seizure-free for 3 years
- Fever :
 - Defer until 14 days of full recovery
- Frequency of donation :
 - For whole blood, minimum of 12 weeks for males, 16 weeks for females
 - Defer for 12 months following full recovery.
- Hypertension
 - Accept stable uncomplicated hypertension controlled by medication
 - Defer if recently started or changed anti-hypertensive medication until 28 days after blood pressure stabilized

- Defer permanently if hypertensive heart or renal disease
 - Infections
- Accept 14 days after full recovery and completion of antibiotic treatment
- Defer for 28 days following full recovery and completion of treatment if symptoms suggestive of infection with :
salmonella, campylobacter, streptococcus or staphylococcus
 - Malabsorption syndromes
- Defer permanently except fully treated coeliac disease
 - Medications
- ❖ **Accept**
 - Individuals taking long-term low-dose antibiotics for acne
- ❖ **Defer**
 - Individuals taking prescribed treatment with injected medications, including self-administration, based on the underlying condition for which the medication is taken
 - Individuals who have taken the following medications (150):
 - Aspirin: defer for 5 days
 - Other NSAIDs: defer for 48 hours
 - Acitretin: defer for 3 years
 - Isotretinoin: defer for 28 days
 - Dutasteride: defer for 6 months
 - Finasteride: defer for 28 days
 - Antibiotics for acute infections: defer for 14 days after completion of treatment
- ❖ **Defer permanently**
 - Individuals treated with human pituitary-derived growth hormone because of case reports of transmission of iatrogenic Creutzfeldt-Jakob disease
 - Menstruation
 - Accept

- Piercing
- Defer for 12 months following last acupuncture, piercing, tattoo, scarification or invasive cosmetic procedure
- Pregnancy and lactation
- Defer during pregnancy and lactation and up to 6 months following delivery or termination
- Sex workers
- Defer permanently
- Skin diseases
- Accept mild common skin disease (e.g. acne, eczema, psoriasis) if lesions not infected, venepuncture site is unaffected
- Defer if generalized skin disease and on systemic medication
- Defer if contagious skin disease
- Defer permanently if systemic disease affecting skin (e.g. scleroderma, systemic lupus erythematosus, dermatomyositis, systemic cutaneous amyloidosis)
- Stroke
- Defer permanently
- Thyroid disorders
- **Accept** if benign disorder and euthyroid (with or without treatment)
- **Defer** if under investigation for thyroid disease, if hyper- or hypo-thyroid, or with a history of malignant thyroid tumors
- **Defer permanently** if history of thyrotoxicosis due to Graves' disease
- Tuberculosis
- Defer for 2 years following confirmation of cure
- Vitiligo
- Accept
- Weight

- Accept if donor weight at least 50 kg

The deferral of a donor is not only unpleasant for the donor, but it also results in a loss of time and money of the transfusion centre.

This can show why it is so important to study deferral factors and the knowledge of the population as well as health care personnel on this topic.

We will discuss first the results of the healthcare personnel survey (annex 2) that are resumed in this board.

Board XLI: health care workers' knowledge about reasons for donation deferral and comparison with the literature

		Our study	Anju Dubey [47]	Shreedevi [56]
Minimum weight		55 %	65,9 %	-
Lower age limit		85 %	92,2 %	86 %
Upper age limit		60 %		
Inter donation interval	Men	95 %	68,1 %	84 %
	Women	75 %		
Blood pressure	Minimal	25 %	62 %	-
	Maximal	55 %		-

We note that most of the questions were answered correctly by the majority of the respondents, and the results were in line with what we found in the literature, except for the blood pressure question were only 25 % knew the correct answer for the minimal limit.

The results we found may be explained by the fact that 95 % of the participants had former training regarding blood transfusion.

While in the study carried out by Anju, only 19,9 % of the participants received former training on blood transfusion.[47]

f. Distribution of labile blood products :

The LBPs distribution is a key step of the transfusion chain. Its aim is to supply the writer of the prescription and the patient with the best product at the best time.

**CENTRE REGIONAL DE TRANSFUSION SANGUINE
ORDONNANCE MEDICALE**

ETABLISSEMENT DE SOINS Nom : N° 00066255 /08
Code : Date :

Identité du patient		Demande d'analyses	
Nom :		Groupe ABO Rhésus : 1e Détermination <input type="checkbox"/>	
Nom de jeune fille :		Groupe ABO : 2e Détermination <input type="checkbox"/>	
Prénoms :		Phénotype érythrocytaire Rhésus, Kell <input type="checkbox"/>	
Né(e) le : Sexe M <input type="checkbox"/> F <input type="checkbox"/>		Recherche d'Agglutinines irrégulières (RAI) <input type="checkbox"/>	
Poids :		Test de Coombs Direct : (TDC) <input type="checkbox"/>	
N° : Chambre -# :		Date et heure du prélèvement :	
Diagnostic : _____			
-TDC : Résultats		Date :	
-R.A.I. : Résultats		Date :	
- Si nouveau né groupe ABO Rhésus de la mère :			
- Injection d'immunoglobulines anti D		Non <input type="checkbox"/>	Oui <input type="checkbox"/> Date :
Demande de Produits Sanguins Labiles			
Groupe sanguin : _____			
Concentré de Globules Rouge : (1 unité : 150 ml)		Concentré de Plaquettes :	
Nombre d'unité : <input type="checkbox"/>		Nombre d'unité : <input type="checkbox"/>	
Standard <input type="checkbox"/>		Standard <input type="checkbox"/>	
Qualifiés <input type="checkbox"/>		Aphérèse <input type="checkbox"/>	
- Compatibles <input type="checkbox"/> Deleucocytés <input type="checkbox"/>		- Deleucocytés <input type="checkbox"/>	
- Phénotypés <input type="checkbox"/> Irradiés <input type="checkbox"/>		- Irradiés <input type="checkbox"/>	
Plasma Frais Congelé : Nombre d'unités		(1 unité : 200 ml)	
Indications :			
<input type="checkbox"/> Coagulation intravasculaire disséminée,			
<input type="checkbox"/> Purpura Thrombotique Thrombopénique			
<input type="checkbox"/> Hémorragie par déficit en facteur de coagulation en l'absence de produits spécifiques			

N.B : Les résultats du dernier hémogramme sont exigés

Date et heure prévues de la transfusion : ____/____/____

Observation :

Cachet et signature du Médecin

Figure 37: Labile blood product request card

The transfer of blood, plasma, red blood cells and platelet cells results in the payment of a fee to cover the cost of operations carried out to collect the blood, perform laboratory tests, preserve, process and package the product.

The composition and prices of stable blood derivatives are presented in accordance with the decrees and orders published in the official bulletin.[57]

Board XLII: prices of stable blood derivatives [57]

Products	Prices (MAD)
Whole blood	360.00
Red cell concentrate (RCC)	360.00
Platelet concentrate	298.00
Fresh frozen plasma	298.00
Leuko-reduced RCC	509.00
Irradiated RCC	820.00
Leuko-reduced and irradiated RCC	970.00
Phenotyped RCC	590.00
Hemapheresis cytapheresis	3033.00
Erythrapheresis	2938.00
Human albumin solution (20%)	520.00
Immunoglobuline : - 5g/100ml	1130.00
- 10 g/200ml	4800.00
Factor VIII : - 500 UI/5ml	2300.00
- 1000 UI/10ml	2950.00
Factor IX : - 500 UI/10ml	1970.00
- 1000 UI/20ml	3920.00

In our research on the knowledge of the population (annex1), one of the most important questions was if the blood is sold. We found that 16 % of the population thought that the blood is sold and 14,1 % were unaware of the answer, while the majority 57,6 % thought that it's not sold, which is in accordance with the results found by Yassine Samouh, in his study that targeted two hundred and ten Moroccan high school students, only 13% said that it is possible to buy and sell blood in our country.

Our results though are different from those found in a research article by Issam Jandou and his colleagues[58], in which over 70% of the 1,000 participants believed that illegal blood sales existed in Morocco.

In foreign studies, we mention the experience of both Togo and Iran[59, 60], where respectively 14.63% and 26.5% of non-donors believe that blood is sold.

Our results could be explained by the High-level education of our population (73,8% had university-level education)

2. Testing and processing :

2.1. Collection :

The collection system is formed by Quadruple blood bag CPD SAGM:

- ✓ Primary bag (350/450 ml) contains CPD (citrate, phosphate, dextrose) as an anticoagulant for whole blood
- ✓ First satellite bag(300 ml) for 42 days red cell storage , contains SAG-M (saline, adenine, glucose, mannitol) as an additive solution
- ✓ Second satellite bag (300 ml) for platelet storage for 5 days
- ✓ Third satellite bag (300 ml)
- ✓ The bags contain an integrated leukocyte reduction filter for red blood cells.

Samplings are collected simultaneously for blood tests in 2 EDTA tubes. [61]

The anticoagulant and storage solution in the blood bag contains useful nutriment during the storage of the blood and prevents coagulation. Red blood cells can only transport and deliver oxygen only if they remain viable.

The most important substances for maintaining viability of red blood cells are glucose and adenosine triphosphate (ATP). It is essential to maintain the balance between ATP, 2-3 diphosphoglycerate (2-3 DPG) glucose and pH. As for the CPD, it's one of the most commonly used anticoagulants/conservatives. Dextrose and adenine help red blood cells to retain their ATP during storage and citrate is the anticoagulant that prevents the clot from forming.[62]

2.2. Blood preparation:

The preparation process should start soon after the BD in order to maximize its clinical value for future transfusion recipients, and we can sum it up in three steps:

- **Separation of the different components of the blood :**

The separation of a unit of whole blood (WB) has first some requirements:

- ❖ Weight of the unit should be between : 320-550 ml
- ❖ Verification of blood bags codes

- ❖ The unit must cool down, reaching ambient temperature to reduce the risk of haemolysis in centrifugation.

The WB is centrifuged to obtain the different layers of blood components (red blood cells, plasma and platelets). After centrifugation, the WB bags are pressed in order to keep only the red blood cells at the bottom of the bag, thus obtaining red blood cells concentrates (RBC).

The other components are recovered from the other bags in the collection kit to produce, if necessary, mixed platelets and plasma.

The recovered plasma is frozen and the platelets will be mixed with 4 or 5 other donors of the same group in order to make pooled platelets.

- **Leukocyte depletion :**

RBCs are filtered immediately after the centrifugation using an integrated leukocyte reduction filter that blocks the passage of the white blood cells.

Leukocyte depletion prevents HLA alloimmunization [63] (the presence of anti-HLA leads to platelet inefficiency and transfusion shivering/fever reactions), prevents transmission of intra-leukocyte viruses such as CMV, EBV, and HTLV, prevents bacterial risk (*Yersinia enterocolitica*) and prevents the risk of transmission of Non-Conventional Pathogens.[64]

Leukocyte depletion currently is systematic

- **Conservation :**

- RBCs are preserved in a SAGM solution for 42 days. This preservation solution allows preserving the metabolism of red blood cells, to maintain the integrity of the red blood cell membrane and the level of 2-3 DPG, to adjust the hematocrit, to reduce viscosity and haemolysis in the bags. These bags are stored between 2 and 6°C to reduce bacterial risks.
- Therapeutic plasmas are stored at a temperature less than or equal to -25°C for a maximum of one year after the date of collection.

- Standard platelet concentrates in a preservation solution that contains 65% and 35% plasma. The solution can be Intersol (Fenwal), T-Sol (Fenwal), SSP or SSP+ (MacoPharma). This preservative solution is composed of citrate, which neutralizes the activation of coagulation, acetate (metabolic substrate) and saline, to maintain osmotic pressure in the platelet bag.

Platelet concentrates are stored in constant agitation, for a maximum of 7 days at 20°C to 24°C. This temperature guarantees the effectiveness of transfusions, but increases the risk of bacterial proliferation during storage.

2.3. Biological qualification :

The primary goal of the blood donation screening is to distribute blood products free of any known pathogens and to inform the donor in case of a positive test. It is positioned in the transfusion chain at two levels: organizational and safety.[65]

a. Immunoassays :

Immunoassays are assay systems available in several formats that may be used to detect antibody, antigen or a combination of the two.

a.1. ABO blood groups :

Blood grouping operations are carried by an automated analyzer.

A determination is based on two realizations performed with two batches of reagents, two batches of test red blood cells done by one technician.

We use necessarily two tests that's should be coherent:

- Globular test of Beth Vincent: it's an agglutination test for red blood cells with serum tests to detect antigens A and B
- Plasmatic test of Simonin: it detects anti-A and anti-B antibodies using reagent red blood cells.

Check:

This step is very important and it is conducted manually by an examiner, who does the two essays in an opaline plate.

a.2. Rh system :

The Rh system is conducted in laboratory temperature (22°C), where we search for the antigen D using the direct agglutination test between the antigen D present in the blood sample and the serum test that contains the antibodies.

a.3. RH2, RH3, RH4, RH5 and kell1 erythrocyte phenotyping :

It consisted in searching for RH and K system antigens expressed on the membrane of the red blood cell, using antibodies of known specificity. It included the study of antigens: C (RH2), E (RH3), c (RH4), e (RH5), K (kell) using monoclonal and/or polyclonal reagents.

Rhesus phenotyping (C, c, E, e) is performed on gel cards at 22°C laboratory temperature.

a.4. Irregular antibodies screening

The principle and objective of this test is to detect irregular red blood cell antibodies in an individual by reacting his or her serum with the panel's red blood cells using the indirect Coombs test.

Additional immunological qualification may be required in other clinical situations. . The RBC is thus said to be "phenotyped" when the Cc, Ee and K antigens have been determined. The phenotype is said to be extended when other systems have been studied (Duffy, Kidd, MNS, Lewis...). These products are indicated in immunized patients and in polytransfused patients.[66]

b. Screening for transmitted blood infections :

To minimize the risk of the transmission of infection through the route of transfusion, screening of all blood donations should be mandatory for the following infections and using the following markers:

- HIV 1 and HIV 2: screening for both HIV antigen and antibody
- Hepatitis B: screening for HVB surface antigen HBS
- Hepatitis C: screening for both HVC antigen and antibody
- Syphilis: TPHA test.

In our knowledge evaluation on healthcare workers the RTCM, 90 % of the respondents knew exactly the mandatory tests performed in our country. Our results are in accordance with the results of Shreedevi and his study on 100 healthcare workers in blood centers, where 89% knew the mandatory tests performed on the blood bag of the donor.[56]

Lower results were found in another study, where only 68,4 % knew the tests.[47]

3. Blood donation types :

3.1. Whole blood donation :

This is the most common form of blood sampling.

- Volume withdrawn: 450–500 ml
- Time required: 10 minutes
- Minimum interval between donations: 12 weeks for males, 16 weeks for females [31]
- Storage : 2–6°C, 21–35 days[67]
- Donor losses :
 - 250 to 280 ml of plasma,
 - 15 to 20 g of protein
 - 200 mg of iron
 - 1 to 2 g/l of hemoglobin

- Donor recovery :

The volumetric recovery is 40 to 80 ml/hour and erythrocyte compensation takes place within 3 weeks [11]

Transfusion of whole blood is currently abandoned. Although controversial, it is still used in complex pediatric cases primarily to decrease donor exposure and in military combat due to lack of available platelet products[68].

Actually, it has been replaced by LBP, they are obtained by centrifugation techniques or aphaeresis, as most patients only require one component (red cells, platelets, or plasma).[23]

a. Red cell concentrate (RCC):

- Volume : 250–300 ml
- Storage : 2–6 °C, 42 days
- Characteristics : [69]
 - Red cells: 200 ml
 - Plasma: 80 ml
 - Hematocrit: 50–70%.
 - Hemoglobin > 45 g/unit
 - White blood cells near $5 \cdot 10^9$
- Indication : severe anemia
- Product modification :

Red cells and other blood products can be modified to decrease the adverse effects of transfusion, including the transmission of disease, and facilitate the availability of rare products. Blood product modifications include leuko-reduced, irradiated, frozen volume reduced, and washed products.[67]

- **Leuko-reduced RCC:**

- ❖ Characteristics: white blood cells < 10^6
- ❖ Storage: 2–6 °C, 42 days

- ❖ Indication: Reduce chills and hyperthermia reactions, reduce transmission of Cytomegalovirus and reduce HLA immunization

- **Irradiated RCC:**

- ❖ Characteristics: Irradiation 25–50 Gy
- ❖ Storage: 2–6 °C, 14 days
- ❖ Indication: prevention of transfusion associated graft vs. host disease

- **washed RCC:**

- ❖ Characteristics: Less than 0.5 gr of extracellular proteins
- ❖ Storage: 2–6 °C, 6 hours
- ❖ Indications: IgA Deficiency, Neonatal Allo-immune Thrombocytopenic Purpura, Severe allergic reactions to transfusion

b. Platelet concentrate :

- Volume : 200–350 ml (comes from the mixture of 4 to 6 platelet units)[70]
- Characteristics: 240–360 $\times 10^9$ of platelets in a unit
- Storage: 20–24 °C, 5 days with constant horizontal agitation
- Indication: Prevention or treatment of a bleeding syndrome related to a central thrombocytopenia

c. Fresh frozen plasma (FFP) :

- Volume: 200 ml
- Characteristics : factor VIII= 0.7 UI/ml
- Storage: –25 °C, 1 year

Thawed FFP should be transfused as soon as possible (within 6 hours at the latest) and kept at a temperature between +2 and +8°C. Refreezing is not permitted.

- Indication: coagulation factor deficiencies, thrombotic thrombocytopenic purpura, hemolytic uremic syndrome in adults.
- Product modification :

It is the only labile product that is currently secured against the risk of transmission of infectious agents (secured by quarantine or viral attenuation).[71]

- **Viral attenuated FFP:**

The unit is treated by a solvent-detergent; it is used to reduce concentration of lipid-protein enveloped viruses, notably hepatitis B and C viruses and retroviruses.

- **Secured FFP (Security by quarantine) :**

The product is released only after a new verification of the donor's biological status on a sample taken at least 120 days after the donation.

3.2. Aphaeresis :

It's a procedure in which blood of the patient or donor is passed through a medical device which separates one or more components of blood and returns the remainder with or without extracorporeal treatment or replacement of the separated component[72].

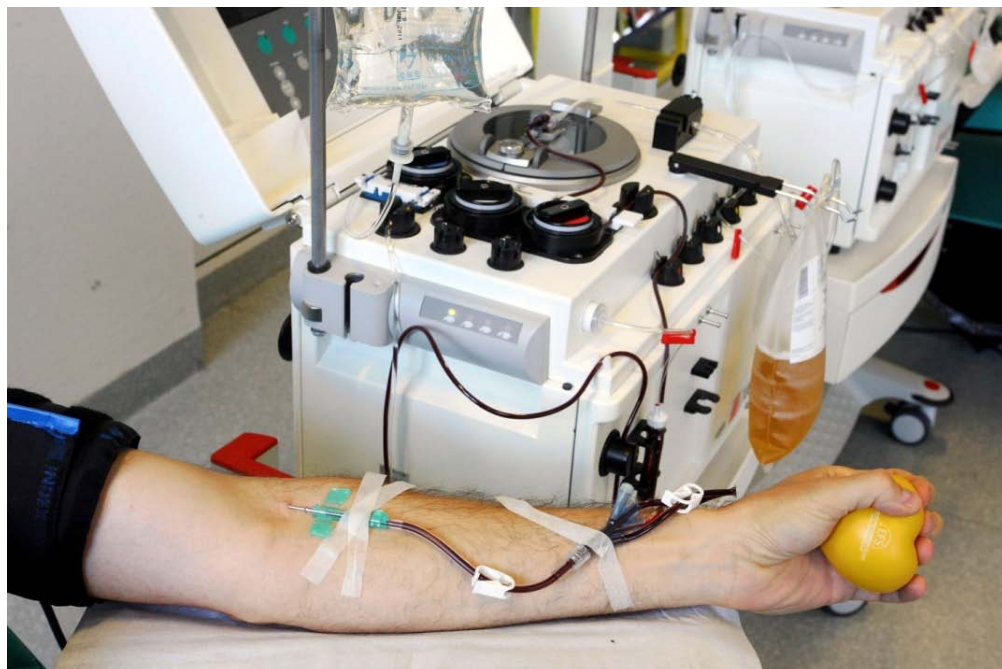


Figure 38: Aphaeresis donation

a. Plasma donation

- Maximum volume withdrawn: 300 ml
- Time required: 45 minutes
- Minimum interval between donations: 2 weeks
- Storage : 1 year if frozen, 24 hrs if maintained at 1–6°C [67]

b. Platelet donation:

- Maximum volume withdrawn: 300 ml
- Time required: 60–90 minutes
- Minimum interval between donations: 4 weeks
- Storage : 22–26 °C (room temp) with constant horizontal agitation, 1 to 5 days depending on the collection system [67]

c. Red blood cell donation:

- Maximum volume withdrawn: 300 ml
- Time required: 30 minutes
- Minimum interval between donations: 16 weeks
- Storage : 21–35 days

d. Granulocyte donation:

- Maximum volume withdrawn: 300 ml
- Time required: 120–240 minutes (4–5 days in a row)
- Pre-donation Medication: corticosteroids (dexamethasone) with/or growth factor (G-CSF) [73]
- Storage : 20–24 °C, 1 day [74]

e. Hematopoietic stem cell donation :

- Maximum volume withdrawn: 300 ml
- Time required: 180–240 minutes (1–3 days in a row)
- Pre-donation medication: growth factor (neuropogen, G-CSF) or chemotherapy (cytoxan, cyclophosphamide)[75]

4. Attitude towards blood donation :

4.1. Socio demographics:

The average age found in our series (30.2 years) is the same to that reported by Thelma T. Gonzalez (30 years)[76] and M. A. Olaiya (33.3 years)[77].

The respondents age were ranged between 18 and 60 years, and the respondents were divided into five age groups, the (18–30 yo) age group was the most dominant in our population 64%. Same findings were reported by J. Ou–Yang 68% (18–30 yo) [78]and K.–K. Agbovi (18–37 Yo) 66,6%.[60]

But A. H. Misje reported that the most dominant age group was (36–45 Yo) 28%.[79]

Women slightly outnumbered men in our study (330 vs 243) with a sex ration of 0,74.

Board XLIII: Comparison of our average age and sex ratio with the literature

Study	Our study	T. Gonzalez	M. A. Olaiya	J. Ou–Yang	K.–K. Agbovi	A. H. Misje	H. Javadzadeh Shahshahani
Country	Morocco	Brazil	Nigeria	China	Togo	Norway	Iran
Sex ratio	0,74	1,09	0,98	1,01	1,56	1,12	1
Age average	30.2	30	33.3	–	–	–	–

In our study, 3.3% of the patients were illiterate, 4.3% had a primary level, 6.8% had a secondary level, 11.7% had a high school level, and 73.7% had a university level education, which is consistent with the results of the studies of J. Ou–Yang [74] and M. A. Olaiya [73] where the majority had a university level with 42.4% and 36.1% of the respondents respectively.

4.2. Motives

Knowing the motives of blood donation is clearly important for recruiting donors, blood collection and publicity of the blood drive.

What drives the people in Marrakech–Safi region to donate? was the question we tried to answer in our research using the volunteer functions inventory elaborated by Clary.[8]

We discovered that the main reason people donate is “value” 88,2 % (I worry about others, I like to serve people, I give blood because it’s important to help patients). Often referred to as altruism in research, it can be understood as when volunteering, a person expresses their values in a meaningful way and receives satisfaction from knowing that their service is a true expression of those values[8]. That idea of helping others and saving their lives and getting inner joy and satisfaction by it can let us understand why 54 % of the respondents refer to “religion” as a motivating factor. The believer can be happy when he acts with altruism, one of the greatest virtues of Islam, as we find in the Holy Quran “And whoever saves one, it is as if he had saved mankind entirely” (Al-Ma'idah [5] : 32)

Our results are in line with other studies, we mention first J. Ou-Yang[78], in his study on 1034 persons from Guangzhou china, 68,3 % thought that helping patients was their main objective from donation. In another research, A. H. Misje[79] found that in 2114 participants, 89% agreed strongly or partly to the statements of value-orientated motive. Another study in Brazil[76], showed that over 80% of the persons presenting for blood donation, the most important motivation factor was altruism.

Other motivational factors were expressed, “esteem” 54,5 % (blood donation is a very important cause to me, donation makes me feel important) and “understanding” 43,4% (I believe that donating blood is beneficial to my own health, I receive a free medical examination, donating blood is a way to make new friends).

Esteem represents a way in which volunteering is undertaken for the specific purpose of making one feel better about himself.

Volunteering serves an esteem function to the extent that it enhances a person’s esteem by making the person feel needed and important.

Understanding for others, can be understood when volunteering serves as a function that satisfies the desire to understand the people whom one serves, the organization for which one volunteer, or oneself. Volunteering satisfies such a person's desire to learn for the sake of learning[8].

We can group the two factors in self-interest, esteem being a moral factor and understanding as a material one.

In J. Ou-Yang study[78], self-interest was only material, it's was an important motivator, as 65,5 % and 43,8 % of respondents were motivated respectively by donation health benefits and getting a free check for blood type.

In another study done by Olaiyan[77], Nigerian donors were mainly motivated by self-interest as 92,9 % donated because of the benefits they will obtain.

Misje[79] explored both the "esteem" and "understanding" factors by using the volunteer functions inventory as well, he found that 44,7% of the Norwegians donors were motivated by "esteem", while only 25.2% expressed that "understanding" was a motivator.

In Gonzalez study[76], only 22.7% of the population were motivated by self-interest to donate.

In our study, we have discovered that "Social" 13,6% (My friends think that donating blood is an important activity, my family encourages me to donate blood, my friends donate blood) as a motivator for blood donation was the weakest among all others.

It can be identified when donors volunteer in order to satisfy a social function. For them, volunteering is a reflection of the normative influence of friends, family, or a social group whom they hold in esteem[8].

Our results were in line with J. Ou-Yang study[78], as only 3,8 % of the donors were motivated by the social factor (under pressure from society or company, being persuaded by a friend).

In other researches, the social factor was an important reason to donate. Misje[79] found that 34,9% of the donors were motivated by family and friends, and also Gonzalez[76] with 32% of his population.

In summary, this study has shown that in Marrakech-Safi region people donate mainly for altruistic reasons; which was consistent with the studies mentioned.

However, the weakest motivation factor was "social", as family and friends don't play a major part in donation. (3awd)

4.3. Reasons for irregular donation:

Regular donors are defined as individuals who donate at least two times a year[7]. In our study, we found that only 22% meet the criteria, while the majority donated in a non specific way 39,3% or only once a year 38,6%.

Given the importance of regular voluntary blood donors, who are the safest donors because they have been educated on how to stay healthy and lead a lifestyle free from the risk of contracting serious infections, we asked our respondents what reasons made them irregular blood donors.

We found that the main reason was lack of time 30.1%. This can be explained by the fact that the working hours of the blood center are the same in the companies and with the absence of time-off work when the volunteer wants to donate; donating in the center seems to be very difficult for the workers.

In addition, 29,3% of blood donors said that blood donation site is far from their home or workplace, as only one donation site is present in Marrakech.

Also, 18.3% stated that they forget to return in time to donate; this problem can be explained by the absence of a reminding system in the center.

The remaining reasons for irregularity of donation were health problems 11,5% and complications caused by blood donation 4.3%.

In comparison with our results, we mention a study carried out by the Munich blood bank [76], in which 88 potential donors were surveyed to find out the main reasons for their retention. The main reason reported was health problems with 42%, it was followed by lack of time 30%.

4.4. Factors that prevents donation:

In the 621 people that responded to the survey, nearly half of them 49,7% never donated blood.

So, to improve the effectiveness of donor recruitment and retention programs, a better understanding of the reasons that prevent people from donating is needed.

In our research, the principal cause that stopped donation was the perception of poor health 29,6%, it can be explained by the criteria of selection of blood donors and the contraindications to the donation used in the center that are not in line with the current scientific recommendations[31].

In addition, 18,6 % of the non-donors expressed that the lack of time was their main obstacle. We can relate it as we mentioned before to the work hours of the center.

Also, fear was a barrier for donation to 17,7% of the respondents.

11% of the participants stated that they didn't know the donation site, and that they lacked information about blood donation, this can show us that more work should be done on the promotion.

Finally, only 0.6% stated that they believe blood donation is not necessary, which shows us that there is a positive attitude towards blood donation in the Marrakech-Safi region.

Our results are very similar to those of other studies done by Yang and Kuruvatti , but we should mention that different findings were reported, which may be explained by the use of multiple questionnaires and cultural variations between different populations.

Board XLIV: factors that prevents blood donation according to the literature

	illness	Lack of time	Fear	Donation site is unknown	Lack of information	Donation site is far from home or workplace	Blood donation isn't necessary
Our study	29,6%	18,6%	17,7%	11%	11%	8,8%	0,6%
J. Ou-Yang[78]	33,1%	12%	20,9%	-	16,5%	9,8%	-
J. Kuruvatti[80]	25,7%	9,1%	11,5%	-	4,4%	2,9%	-
K.-K. Agbovi[60]	-	-	21,5%	-	25,3%	-	-
V. Wiwanitkit[81]	-	-	85,6%	-	-	-	-
H. Javadzadeh Shahshahani[82]	-	27,6%	13,5%	-	-	-	3,1%

4.5. Knowledge level regarding blood donation:

The study showed that the level of knowledge of the population about blood donation and deferral factors was relatively good (59 % of the answers were correct) but the awareness level of certain deferral factors was low. Less than half of the population under study knew that lactation was a deferral factor only 12,6 % were aware that menstruation isn't a contraindication to blood donation.

The results of this research indicate that blood donors generally have better knowledge regarding blood donation than non-donors, since we have noted that they had 62,4% correct answers compared to non blood donors with 56,3%.

Thus, better knowledge about blood donation is positively associated with the act of giving blood and there is a significant relationship between the two factors (p -value=0,0004).

Our results are in accordance with what Lorna Kwai Ping Suen found in his study of 542 students at the University of Honk Kong, blood donors scored higher on the knowledge test than non-blood donors[83]. Another study in China of 1,280 people tested their knowledge and attitudes toward blood donation; it found that donors had a better knowledge of the donation process.[84]

Board XLV: correct response rate according to the literature

	Our study	Hong Kong[83]	China [84]	Iran [82]
Need for blood	73,9 %	-	-	-
Minimum age requirement	59,1 %	77,5 %	50,1 %	44,8 %
Pregnancy and donation	67,3 %	78,2 %	-	41,6 %
Lactating women and donation	40,2 %	38,3 %	-	
Menstruation and blood donation	12,7 %	49,2 %	-	-
Time interval between 2 donations	67 %	-	44,1 %	74,1 %
Investigations on donated blood (HIV)	73,9 %	87,8 %	77,8 %	95,5 %
Smoking and donation	49,7 %	72,3 %	-	-
Tattooing and donation	31,8 %	-	-	-
Vitiligo and donation	30,4 %	-	-	-
Blood donation present a health risk	73,9 %	-	-	-
Blood is sold	57,6 %	-	-	-



RECOMMENDATIONS



All of the flaws that we were able to identify regarding blood donation led us to develop several proposals that we have grouped together in the form of a theoretical and practical model to be followed, which we hope will make it possible to overcome these dysfunctions.

1. Promotion of blood donation :

In 2012, the director of the national blood transfusion centre Mohamed Benajiba and his co-workers presented the first national blood donation program, it defined a promotion policy, with its main objective being the limitation of replacement donors and striving for 100 % volunteer donations.

Despite the important work done, we continue to see an important number of replacement donors in the centre, shortage of daily donors and lack of information regarding blood donation.

We then propose some solutions:

- New recruitment methods using social media, television, radio, billboard advertisement, newspaper, web blogging, and cell phone. With the main goal of raising the awareness of blood donations among the general population, including the relationship between donation and health, requirements for donating blood and usage of the donated blood.
- Public awareness campaigns and donor education materials should be based on a well-researched assessment of the needs for information by the public and should address common fears or misconceptions that may deter people from donating blood.
- Healthy family replacement donors should be encouraged to become voluntary unpaid donors. By reminding them of how their loved ones have benefited from the gift of blood, they may recognize how regular voluntary blood donation will benefit other people's loved ones.

- Particular attention should be given to youth donor retention strategies as this form the basis of a stable pool of blood donors for the future.
- Professionalism in the handling and care of blood donors by staff will encourage the donor public to become regular blood donors as they will have confidence that the blood donation process is safe and their blood will be used appropriately. This will in turn attract new donors to come forward and donate blood

2. Support effective partnerships :

An effective blood donor program involves mobilization at both the grassroots and national levels; support from community leaders is vital in attracting sufficient numbers of low-risk, voluntary, unpaid blood donors.

Schools, colleges and universities are natural partners in reaching young people and encouraging them to commit to becoming regular blood donors. Involving the private sector brings access to customers, staff and the families of staff members.

BD associations will help bring the message about voluntary blood donation to new audiences but also provide increased opportunities for blood donation sessions in the community at mobile and static sites.

Doctors and nurses are also key partners who can motivate the families and friends of patients who have received a transfusion to become regular voluntary blood donors.

Celebrities and government officials should participate in blood donation to lend 'star power' to the events.

In 2013, his majesty the king Mohamed IV performed the inauguration of the Regional Blood Transfusion Centre of Fez where he donated his blood. A gesture that marks the launch of the national blood donation campaign which took place from 8 to 24 March[85]. This royal donation aims to raise awareness of the importance and vitality of blood donation, to give an example to the Moroccan population.



Figure 39: His majesty the king Mohamed IV donating blood[85]

3. Incentives for regular donors:

In every country, to ensure an adequate supply of blood at all times, regular voluntary blood donors are the safest donors because they have been educated about how to stay healthy and lead lifestyles that are free from the risk of acquiring serious infections.

In our study, we found that only 22 % of the populations were regular donors.

In our case, we think that provision of incentives would be an effective method to recruit more regular donors.

The subject of donation and incentives was always a subject of debate, with one major concern is that incentives affect blood safety by attracting at-risk donors who may conceal risk behaviours in order to obtain incentives and that incentives may discourage regular donors who primarily donate for altruistic reasons[86]

Other studies showed that provision of incentives motivates citizens to donate blood, increase blood donation rates and that individuals are willing to accept incentives for blood donation.[87]

Accepting incentives, therefore, might not necessarily interfere with the idea of blood donation as a good deed and an act of solidarity.

In general, rewards should not be tied to material goods (e.g., monetary compensation) so that there is no conflict with ethical values.

So to raise the number of regular donors in the blood transfusion centre, we recommend that several incentives should be presented to each donor after his second donation:

- Small gifts
- Medical free tests (diabetes, cholesterol...)
- Blood credit that allows the donor or his direct relatives to receive a blood bag for free when needed
- Donor Card that shows the recognition of the centre towards his contribution

4. actualization of legal texts :

The criteria of selection of the blood donors and the contraindications to the donation in our country aren't in line with the current scientific requirements.

That can explain why 54 % on the population in study thought that menstruation is a contraindication to blood donation.

Therefore, to improve the number of daily of donors and decrease referrals of suitable persons for donation, actualization of legal texts is a priority in our country.

5. Prevent adverse reaction of collection :

Despite widespread public belief in the importance of blood donation, recruitment is often undercut by concerns about practical issues such as negative worries about adverse reaction of blood donation

In our study we found that adverse reactions prevented 4,3 % of the population to donate blood more regularly.

Presentation of useful coping strategies might help not only maintains current volunteers but encourage new people to give blood.

We suggest a number of approaches that have been evaluated in the literature that reduce vasovagal reactions:

- Increase hydration by presenting water to the donor before donation[88]
- Train health workers on interpersonal skills to provide extra social support for the donors [89]
- Ask the donors to breathe both shallowly and slowly during the collection [90]

6. Change the pre-donation questionnaire :

We observed that the questionnaire was ignored in the RTCM; while the WHO recommends that the completion of the survey for all blood donors is mandatory [31], also we think that the donors must be informed of the importance of the questionnaire, the significance of the questions and the need to provide accurate information.

For the questionnaire content, we think that it needs to be updated to match the current scientific requirements.

We propose this new survey:

English version:

- Your complete honesty in answering all questions is essential for your safety and the safety of the patients who receive your blood.
- All information you provide is confidential
- Please read carefully and tick ✓ yes or no. if you are uncertain of any answer leave the box blank.

Board XLVI: pre-donation survey

A. Your health	Yes	No
1. Are you feeling well today?		
2. Are you diagnosed with a chronic disease?		
3. Have you ever had any hospital investigation or tests or operations?		
4. Have you taken any prescribed medicines or other treatments?		
5. In the last 48 hours , have you taken any anti-inflammatory drug		
6. In the last 5 days , have you taken any aspirin?		
7. In the last 2 weeks , have you taken any antibiotics?		
8. In the last week , have you received a dental treatment?		
9. In the last 6 months , have you been pregnant or pregnant at present?		
10. In the last 3 months , have you donated blood?		
11. Did you faint or had any health problems after your last donation?		
B. Risks of infections		
12. In the last 2 weeks , have you had an illness, infection or fever or do you think you have one now?		
13. In the last 4 weeks , have you had diarrhea?		
14. In the last 4 weeks , have you been in contact with anyone with an infectious disease?		
15. In the last 8 weeks , have you had any vaccinations?		
16. In the last 4 months , have you :		
17. Had acupuncture?		
18. Had a tattoo?		
19. Had cutting therapie?		
20. Had ear, face or body piercing?		
21. Had an endoscopy?		
22. Have you tested positive for HIV or do you think you may be HIV positive?		
23. Have you ever had hepatitis B or C or you think you have one now?		
24. Have you ever injected yourself with illegal or non prescribed drugs?		
25. In the last 12 months , have you had sex with:		
26. Anyone HIV positive;		
27. Anyone with hepatitis B; hepatitis C or HTLV;		
28. Anyone who has ever injected drugs;		
29. Anyone who has ever been payed for sex:		
30. Have you ever been diagnosed with a sexual transmitted infection disease?		
31. Have you ever had a blood transfusion		

Use this area for additional questions :

.....

French version:

- Votre totale honnêteté en répondant à toutes les questions est essentielle pour votre sécurité et celle des patients qui reçoivent votre sang.
- Toutes les informations que vous fournissez sont confidentielles
- Veuillez lire attentivement et cocher ✓ oui ou non. Si vous n'êtes pas sûr d'une réponse, laissez la case vide.

Tableau XLVII: questionnaire pré-don

A. Ta santé	Oui	Non
1. Sentiez-vous bien aujourd'hui ?		
2. Vous êtes atteint d'une maladie chronique ?		
3. Avez-vous déjà subi des examens, des tests ou des opérations à l'hôpital ?		
4. Prenez-vous des médicaments prescrits ou d'autres traitements ?		
5. Au cours des dernières 48 heures , avez-vous pris un médicament anti-inflammatoire ?		
6. Au cours des 5 derniers jours , avez-vous pris de l'aspirine ?		
7. Au cours des 2 dernières semaines , avez-vous pris des antibiotiques ?		
8. Au cours de la semaine dernière , avez-vous reçu un traitement dentaire ?		
9. Au cours des 6 derniers mois , avez-vous été enceinte ou êtes-vous actuellement enceinte ?		
10. Au cours des 3 derniers mois , avez-vous donné votre sang ?		
11. Vous êtes-vous évanoui ou avez-vous eu des problèmes de santé après votre dernier don ?		
B. Risques d'infections		
12. Au cours des deux dernières semaines , avez-vous eu une maladie, une infection ou de la fièvre ou pensez-vous en avoir une maintenant ?		
13. Au cours des 4 dernières semaines , avez-vous eu de la diarrhée ?		
14. Au cours des 4 dernières semaines , avez-vous été en contact avec une personne atteinte d'une maladie infectieuse ?		
15. Au cours des 8 dernières semaines , avez-vous reçu des vaccins ?		
16. Au cours des 4 derniers mois , avez-vous :		

17. fait de l'acupuncture ?		
18. Fait un tatouage ?		
19. Ai eu une Hijama ?		
20. A eu un piercing à l'oreille, au visage ou au corps ?		
21. Avez-vous subi une endoscopie ?		
22. Avez-vous subi un test de dépistage du VIH ou pensez-vous être séropositif ?		
23. Avez-vous déjà eu une hépatite B ou C ou pensez-vous en avoir une maintenant ?		
24. Vous êtes-vous déjà injecté des drogues illégales ou non prescrites ?		
25. Au cours des 12 derniers mois , avez-vous eu des rapports sexuels avec :		
26. Quelqu'un de VIH positif;		
27. Une personne atteinte de l'hépatite B, de l'hépatite C ou du HTLV;		
28. Toute personne ayant déjà injecté des drogues;		
29. Toute personne qui a déjà été payée pour des rapports sexuels;		
30. Avez-vous déjà été diagnostiqué(e) comme ayant une maladie infectieuse sexuellement transmissible ?		
31. Avez-vous déjà eu une transfusion sanguine		
Utilisez cette zone pour des questions supplémentaires		
:.....		
:.....		
:.....		
:.....		

Arabic version:

- صدقك التام في الإجابة على جميع الأسئلة ضروري لسلامتك وسلامة المرضى الذين يتلقون دمك
- جميع المعلومات التي تقدمها سرية.
- يرجى القراءة بعناية و وضع علامة ✓ امام نعم أم لا. إذا لم تكن متأكدًا من إجابتك ، فاترك المربع فارغًا .

صحتك	نعم	لا
1. هل تحس بنفسك بصحة جيدة اليوم؟		
2. هل أنت مصاب بمرض مزمن؟		
3. هل سبق لك إجراء أي فحوصات أو اختبارات أو عمليات في المستشفى؟		
4. هل تتناول أي أدوية موصوفة أو علاجات أخرى؟		
5. خلال الـ 48 ساعة الماضية ، هل تناولت أي دواء مضاد للالتهابات؟		
6. في الأيام الخمسة الماضية ، هل تناولت الأسبرين؟		
7. في الأسبوعين الماضيين ، هل تناولت أي مضادات حيوية؟		
8. في الأسبوع الماضي ، هل تلقيت أي علاج للأسنان؟		
9. في الأشهر الستة الماضية ، هل كنت حاملاً أو حامل حالياً؟		
10. في الأشهر الثلاثة الماضية ، هل تبرعت بالدم؟		
11. هل فقدت الوعي أو عانيت من أي مشاكل صحية بعد تبرعك الأخير؟		
مخاطر العدوى		
12. في الأسبوعين الماضيين ، هل أصبت بأي مرض أو عدوى أو حمى أو تعتقد أنك مصاب به الآن؟		
13. في الأسابيع الأربعة الماضية ، هل أصبت بالإسهال؟		
14. في الأسابيع الأربعة الماضية ، هل كنت على اتصال بشخص يعاني من مرض معد؟		
15. في الأسابيع الثمانية الماضية ، هل تلقيت أي لقاحات؟		
16. في الأشهر الأربعة الماضية ، هل قمت بما يلي:		
17. تلقيت الوخز بالإبر؟		
18. هل حصلت على وشم؟		
19. قمت بالحجامة؟		
20. هل حصلت على ثقب في الأذن أو الوجه أو في الجسم؟		
21. هل خضعت للتنظير؟		
22. هل تم اختبار فيروس نقص المناعة البشرية لديك أو تعتقد أنك مصاب بفيروس نقص المناعة البشرية؟		
23. هل سبق أن أصبت بالتهاب الكبد B أو C أو تعتقد أنك مصاب به الآن؟		
24. هل سبق لك حقن عقاقير غير مشروعة أو غير موصوفة؟		
25. خلال الاثني عشر شهراً الماضية ، مارست الجنس مع:		
26. شخص مصاب بفيروس نقص المناعة البشرية ؛		
27. شخص مصاب بالتهاب الكبد B أو التهاب الكبد C أو HTLV ؛		
28. أي شخص سبق له حقن المخدرات ؛		
29. أي شخص حصل على أجر مقابل ممارسة الجنس ؛		
30. هل سبق أن تم تشخيصك بمرض معدٍ ينتقل عن طريق الاتصال الجنسي؟		
31. هل تلقيت حقن دم في الماضي ؟		
استخدم هذه المنطقة لمزيد من الأسئلة :		
.....		
.....		
.....		
.....		

7. Blood donation mobile application :

The past decade has witnessed an exceptional growth in communication technologies, especially manifested in the widespread use and expanding capabilities of mobile devices such as smart phones and tablets.

That introduced as to e-health that is based on providing health care via electronic means. It's is a new perspective as regards global health which aims to improve health care service delivery to people. [91]

And with the constant demand to expand the blood donor pool to include more youth and first time donors, and due to the importance of continued donor engagement, blood donor mobile apps were created.

Blood donor apps on portable devices have the potential to mobilize donors in response to demand quickly, provide customized support and efficient scheduling for individual donors, and reduce the resources required for donor recruitment

Recently published reports have examined 169 free blood donation mobile apps already in existence as of 2014. They play a role in :[92]

- Schedule an appointment for donation
- Finding donors
- Finding BD centres
- Record the donation history of the user.
- Provide the user with information related to a blood centre
- Provide information about the blood donation process
- Calculate the date on which the user may donate blood based on the date of her/his last donation.

A number of problems that stops people from donating can be prevented by the use of a mobile application.

With 18.6% of non-donors in our study reporting lack of time as the biggest barrier to donating blood, the implementation of a mobile app has become a necessity to make blood donation faster.

8. donor invitation :

We have found that 77,9% of the donors in our research were irregular donors and with one of the main reasons being forgetfulness 18,3%. We recommend then the creation of a reminding system which is the donor invitations.

Donor invitation is when blood establishments send invitations to registered and eligible donors requesting them to make a donation.[93]

We request that blood centres use telephone, text message, email, and online message systems to invite repeat donors to donate, especially during blood shortage season (summer, winter, and national holidays).

The studies have showed that the use of donor invitation has greatly improved the likelihood of the prospective donor to donate and improved donor retention.[94]

9. Suggested continuing education for health professionals:

9.1. Target audience :

Professionals working in the RTCM, already working in the establishment and having benefited or not from training at the time of their integration. This continuous training must be renewed every 2 to 3 years for each agent concerned.

9.2. Objectives

Having a knowledgeable and skilled workforce to ensure the quality, safety and efficiency of blood and blood products

9.3. Schedule:

Minimum 1h30 to 2h per week for 6 months

9.4. Content:

Based on the following:

- Donor selection:
 - Deferral reasons of blood donation
 - Clinical monitoring of adverse events
 - Treatments of adverse events
- Blood preparation and storage

10. Recommendations of the donors:

The Donors that participated in our study provided their suggestions on how to improve the experience in the blood transfusion centre, we think that they are very important and the most common suggestions were:

- Increasing blood donation sites and the organization of more mobile collections, to face the problem of distance.
- Adding an online donation appointment.
- Improve the donor reception service.
- More medical staff should participate in blood donation activities
- Update the awareness program to face the lack of information on the subject.
- More parking spaces in the centre.
- Regular donors and family should have easy access to blood when needed.
- Computer access to blood test results without mobilizing to the centre.
- Improve the refreshments.
- Improve the organization inside the centre to reduce the time required to donate.
- Lengthening the operation hours and having teams that work on weekends.



CONCLUSION



The study we conducted is both a descriptive and evaluative study of knowledge, attitude and motivation of the Marrakech–Safi population over the blood donation, plus an assessment of knowledge among healthcare workers in the regional blood transfusion centre of Marrakech.

In summary, knowing both donor and non–donor characteristics and understanding factors associated with donations is critical for recruiting and retaining sustainable donors to meet the clinical needs for blood transfusion. The present study revealed that helping patients and religion were the major motives for donating blood, but there were also other self–interest motives. On the other hand, self–perception of poor health was the major reason of not donating.

The study allowed us also to highlight several anomalies concerning the knowledge and practical management of an act of care often trivialized by health professionals and whose consequences of a bad realization are sometimes harmful.

It seems that the continuous training of the personnel involved in this procedure as well as the modelling of a scheme for carrying out this act, are the guarantee of a better optimization of this daily practice.

We believe the results provide useful insights that can be used to develop plans to encourage current donors to donate more often, to motivate eligible individuals to donate to meet the country's transfusion needs

It is hoped that the present study would stimulate further investigations on the association between donor and non–donor characteristics, as well as between various factors that affect blood donation, ultimately ensuring the availability of a sufficient and safe clinical blood supply.



ANNEXES



❖ **Annex 1:**

The survey of blood and non-blood donors in Marrakech-Safi region

1. **Vous acceptez à participer à l'enquête ?**

Oui

Non

2. **Quel est votre âge ?**

.....

3. **Quel est votre sexe ?**

Femme

Homme

4. **Où habitez-vous ?**

.....

5. **Quel est votre niveau d'éducation ?**

Primaire

Collège

Lycée

Université

Analphabète

6. Avez-vous déjà fais un don de sang ?

Oui

Non

Si non, veuillez passer directement à la question numéro 12.

7. Si oui, Combien avez-vous fait de dons ?

.....

8. Combien de fois faites-vous des dons par an ?

1 fois

2 fois

3 fois

4 fois

Non spécifique

9. Où avez-vous fait votre premier don ?

Collecte fixe (centre de transfusion sanguine)

Collecte mobile (école, mosquée, association....)

10. Votre don était-il ?

Volontaire

Remplacement (don malade)

11. Laquelle ou lesquelles de ces raisons vous motivent à donnez votre sang ?

- Le don du sang est une cause très importante pour moi
- Le don de sang me fait sentir important
- Le don de sang est un moyen de se faire de nouveaux amis
- Je pense que le don de sang est bénéfique pour ma propre santé
- Je bénéficie d'un examen médical gratuit
- Mes amis pensent que le don de sang est une activité importante
- Ma famille m'encourage à faire des dons de sang
- Mes amis font des dons de sang
- Je m'inquiète pour les autres
- J'aime servir les gens
- Ma religion me motive à donner mon sang
- Je donne mon sang parce qu'il est important d'aider les patients
- Autre :

.....
.....

12. Si vous ne reveniez pas régulièrement au centre de transfusion pour donner votre sang, laquelle ou lesquelles de ses raisons vous en empêchent ?

- J'oubli de revenir
- Je n'ai pas le temps
- Le centre de transfusion est loin du domicile ou du lieu de travail
- Je suis malade
- Je ne reviens pas à cause des effets secondaires du don
- Autre :

.....
.....

13. Si vous n'avez jamais donné votre sang, laquelle ou lesquelles de ces raisons vous en empêchent ?

- J'ai peur (aiguilles, sang, stérilité...)
- Je n'ai pas le temps
- Je suis malade
- Je ne sais pas où
- Le centre de transfusion sanguine est loin du domicile ou du lieu de travail
- Ma religion m'interdit de faire les dons de sang
- Je n'ai pas assez d'informations sur le don de sang
- Le don du sang n'est pas nécessaire
- Autre :

.....

14. Répondez aux questions suivantes :

	Oui	Non	Je ne sais pas
Y a-t-il un besoin de sang dans votre ville ?			
Une personne de moins de 18 ans peut donner son sang			
Les femmes enceintes peuvent donner du sang			
Les femmes en période de menstruation peuvent donner leur sang			
Les femmes en période d'allaitement peuvent donner leur sang			
Tous les dons de sang sont soumis à un test de dépistage du VIH			
Vous pouvez donner votre sang chaque 3 mois (homme) ou 4 mois (femme).			
Si vous fumez, vous pouvez donner votre sang			

Les personnes tatouées ne peuvent jamais donner leur sang			
Vous devez manger avant le don			
Vous pouvez donner votre sang si vous êtes atteint de vitiligo (البرص)			
Le sang est vendu			
Le don de sang présente des risques pour la santé			

15. Quel est le niveau de satisfaction par rapport à votre expérience au centre de transfusion sanguine ?

- Très satisfaisant
- Satisfaisant
- Peu satisfaisant
- Pas satisfaisant
- Pas du tout satisfaisant

16. A votre avis, comment peut on améliorer votre expérience au centre de transfusion sanguine ?

.....

.....

❖ **Annex 2 :**

Survey of the healthcare workers at the CRTM

1. **Vous acceptez à participer à l'enquête ?**

Oui

Non

2. **Quel est votre âge ?**

.....

3. **Quel est votre sexe ?**

Femme

Homme

4. **Quel est votre type de travail dans le centre ?**

.....

5. **Combien d'années travaillez-vous dans le centre ?**

.....

6. **Avez-vous déjà profité d'une formation sur la transfusion sanguine ?**

Oui

Non

Veillez répondre aux questions suivantes

7. **Quel est le poids minimum requis pour donner le sang ?**

45 kg

50 kg

55 kg

8. **Quel est l'âge requis pour donner le sang ?**

Minimum :

17 ans

18 ans

19 ans

Maximum :

60 ans

62 ans

65 ans

9. Quel est l'intervalle minimum à respecter entre les dons ?

Homme : 3 mois

4 mois

5 mois

Femme : 3 mois

4 mois

5 mois

10. Quelle est la pression artérielle limite à respecter pour faire un don ?

Minimale :

90/50 mmHg

100/60 mmHg

110/70 mmHg

Maximale :

130/80 mmHg

140/90 mmHg

150/100 mmHg

11. Quel est le type de donneur le plus sécurisé ?

Volontaire

Remplacement (famille)

12. Quelle est la quantité optimale de sang collectée au cours du don ?

450 ml

550 ml

650 ml

13. Quel est l'effet adverse le plus fréquent au cours du don ?

Hématome

Réaction vaso-vagale

Perforation d'une artère

Lésion nerveuse

14. Quelle est votre conduite à tenir en cas d'hématome au site de la ponction ?

.....
.....
.....

15. Que ferez-vous si le donneur s'évanouit au cours du prélèvement sanguin ?

.....
.....
.....

16. Quelle est la température de stockage idéale du sang total au cours d'une collecte mobile?

- Après le prélèvement :

(0-2) °C

(2-6) °C

(6-10) °C

- Du transport :

(0-2) °C

(2-10) °C

(10-15) °C

17. Quels sont les tubes utilisés pour réaliser les tests sanguins au cours du prélèvement ?

.....
.....

18. Quelles sont les tests obligatoires à effectuer sur la poche sanguine ?

.....
.....



ABSTRACTS



Résumé :

Introduction : Le sang est le don le plus important et le plus précieux qu'une personne en bonne santé puisse offrir à un individu dans une situation difficile. Il joue un rôle vital dans le traitement de milliers de patients chaque jour. Par conséquent, le besoin de don et de transfusion de sang ne cesse jamais.

Le centre national de transfusion du Maroc dénonce la nécessité de plus de 1000 dons par jour pour répondre aux besoins des patients en poches de sang. Des études récentes montrent que seulement 0,9 % de la population donne son sang, dont 0,8 % dans la région de Marrakech-Safi, alors que l'Organisation mondiale de la santé recommande que le don soit effectué par au moins 1 % de la population d'un pays pour être généralement suffisant et répondre aux exigences de base d'un pays en matière de sécurité du sang.

Objectifs : Identifier les causes de la pénurie de produits sanguins labiles dans la région de Marrakech-Safi et établir les besoins en matière de formation et d'amélioration des pratiques du personnel médical et paramédical au sein du centre régional de transfusion sanguine de Marrakech (CRTS).

Matériel et méthodes : Nous avons mené une étude descriptive transversale sur les donateurs de sang et les non-donneurs sur une période de 4 mois, de janvier à avril 2022, ainsi qu'une étude transversale sur les pratiques de don de sang de 20 membres du personnel du CRTS.

Les données ont été collectées à l'aide de deux questionnaires, le premier destiné à la population a été auto-administré et partagé en ligne, et le second qui ciblait le personnel du centre a été auto-administré. L'analyse des données a ensuite été réalisée à l'aide du logiciel SPSS (Statistical Package for the Social Sciences) © 21.0.

Résultats : Parmi les 621 questionnaires collectés, 573 questionnaires étaient valides pour cette analyse, dont 288 donneurs et 285 non-donneurs. Les résultats ont révélé que l'aide aux malades (n = 240, 88,2%) était le principal objectif du don de sang, et que la mauvaise perception de santé (n = 97, 29,6%) était la principale raison de ne pas donner. La plupart des donneurs 213 (73,9%) étaient satisfaits du service présenté dans le CRTS. Nous avons trouvé une relation significative entre le don et la connaissance et le sexe et le don, car les donneurs de sang sont plus informés que les non-donneurs (62,4% contre 56,3%) et aussi les hommes sont plus susceptibles de donner que les femmes (51,7% contre 48,3%).

En ce qui concerne l'étude visant le personnel du CRTS, notre groupe comprenait 16 femmes (80 %) et 4 hommes (20 %), l'âge moyen de nos participants est de 34,9 ans (+/-13,4), la durée minimale d'expérience était de 7 mois et le maximum était de 22 ans d'expérience, avec une moyenne de 7,5 ans +/- (7,8), 95 % des participants avaient une formation antérieure concernant la transfusion sanguine.

Dans notre évaluation des connaissances sur les personnels de santé du CRTS, 90 % des répondants connaissaient exactement les tests obligatoires effectués dans notre pays, nous notons que les questions sur les contres indications du don ont été répondues correctement par la majorité des répondants.

Conclusion : En résumé, nous pensons que les résultats apporteront des informations utiles qui pourront être utilisées pour élaborer des plans visant à encourager les donneurs actuels à donner plus souvent et à inciter les personnes admissibles à donner afin de répondre aux besoins transfusionnels du pays.

Abstract:

Introduction: Blood is the most important, precious gift that a healthy person can offer to a needy individual. It and plays a lifesaving role in the treatment of thousands of patients daily. As a result, the need for blood donation and transfusion never stops. The national transfusion centre in Morocco denounces the need for more than 1000 donations per day to meet the needs of patients for blood bags. Late studies show that only 0.9 % of the population is donating blood with 0.8 % in the Marrakech–Safi region, while the World Health Organization recommends donation by at least 1% of a country's population to be generally sufficient and meet a country's basic requirements for safe blood.

Objectives: Identify the causes of the shortage of labile blood products in the Marrakech–Safi region and establish the needs in terms of training and improvement of practices of the medical and paramedical staff within the regional blood transfusion centre of Marrakech (RTCM)

Materiel and methods: We conducted a descriptive, cross-sectional study on blood and non-blood donors over a 4 months period from January to April 2022. In addition; we carried out a cross-sectional study on the blood donation practices of 20 staff members at the RTCM.

Data were collected using two surveys, the first one aimed for the population was self administrated and shared online, and the second one that targeted the healthcare workers was self administrated. Then analysis of the data was performed using the software SPSS (Statistical Package for the Social Sciences) © 21.0.

Results: Among the 621 questionnaires collected, 573 questionnaires were valid for this analysis, including 288 donors and 285 non-donors. Results revealed that helping patients ($n = 240$, 88,2%) was the main objective of blood donation, and illness ($n = 97$, 29,6%) was the main reason for not donating. Most of the donors 213 (73.9%) were satisfied with the service

presented in the RTCM. We found a significant relation between donation and knowledge and gender and donation, as the blood donors are more knowledgeable than non-blood donors (62,4% vs 56,3%) and also males are more likely to donate than females (51,7% to 48,3%).

Regarding the study aimed at the personnel of the RTCM, Our group included 16 women (80%) and 4 men (20%), the average age of our participants is 34,9 years (+/-13,4), The minimum experience length was 7 months and the maximum was 22 years of experience, with an average of 7,5 years +/- (7,8), 95 % of the participants had former training regarding blood transfusion.

In our knowledge evaluation on healthcare workers at the RTCM, 90 % of the respondents knew exactly the mandatory tests performed in our country, we note that the questions about deferral reasons were answered correctly by the majority of the respondents.

Conclusion: In summary, we believe that the results will provide useful insights that can be used to develop plans to encourage current donors to donate more often and to encourage eligible individuals to donate in order to meet the country's transfusion needs.

ملخص

مقدمة: الدم هو أهم وأثمن هدية يمكن أن يقدمها الشخص السليم للمريض في موقف صعب، إنه يلعب دوراً حيوياً في علاج آلاف المرضى كل يوم. لذلك، فإن الحاجة إلى التبرع بالدم وحقته لا تنتهي أبداً.

يحدد المركز الوطني المغربي للدم بالحاجة إلى أكثر من 1000 تبرع يوميا لتلبية احتياجات المرضى من أكياس الدم. تشير الدراسات الحديثة إلى أن 0.9% فقط من السكان يتبرعون بالدم، بما في ذلك 0.8% في منطقة مراكش-أسفي، بينما توصي منظمة الصحة العالمية بأن يتم التبرع من قبل 1% على الأقل من سكان البلد ليكون كافياً بشكل عام لتلبية احتياجات متطلبات الدم الأساسية للبلد.

الأهداف: التعرف على أسباب النقص في إكياس الدم في منطقة مراكش-أسفي وتحديد الاحتياجات من حيث التدريب وتحسين ممارسات الطاقم الطبي والمساعدين الطبيين داخل مركز حقن الدم الإقليمي في مراكش

المواد والطرق: أجرينا دراسة مقطعية وصفية للمتبرعين بالدم وغير المتبرعين على مدى 4 أشهر، من يناير إلى أبريل 2022، بالإضافة إلى دراسة مقطعية لممارسات التبرع بالدم لعشرين عضواً من الطاقم الطبي والمساعدين الطبيين داخل مركز حقن الدم الإقليمي في مراكش

تم جمع البيانات باستخدام استبيانيين، الأول مخصص للسكان تم تسليمه يدوياً ومشاركته عبر الإنترنت، والثاني الذي يستهدف موظفي المركز تم تسليمه يدوياً. ثم تم إجراء تحليل البيانات باستخدام برنامج

النتائج: من بين 621 استبياناً تم جمعها، كان 573 استبياناً صالحاً لهذا التحليل، بما في ذلك 288 متبرعا و 285 من غير المتبرعين. أظهرت النتائج أن مساعدة المرضى (العدد = 240، 88.2%) كان الهدف الرئيسي للتبرع بالدم، وأن المرض (العدد = 97، 29.6%) كان السبب الرئيسي لعدم العطاء. أعرب 213 (73.9%) من المانحين عن رضاهم عن الخدمة المقدمة في المركز. وجدنا علاقة مهمة بين التبرع والمعرفة والجنس والتبرع، حيث أن المتبرعين بالدم أكثر دراية من غير المتبرعين (62.4% مقابل 56.3%) وأيضاً الرجال هم أكثر رغبة للتبرع مقارنة بالنساء (51.7% مقابل 48.3%).

حول الدراسة الثانية التي تستهدف موظفي الصحة بالمركز، مجموعتنا تحتوي على 16 امرأة (80%) و 4 رجال (20%)، متوسط عمر المشاركين لدينا هو 34.9 سنة (+13.4)، الحد الأدنى لمدة الخبرة 7 أشهر والحد الأقصى 22 عاماً بمتوسط 7.5 سنوات (+7.8)، 95% من المشاركين تلقوا تدريباً سابقاً في مجال حقن الدم.

في تقييمنا لمعرفة العاملين الصحيين في المركز، كان 90% من المستجيبين يعرفون بالضبط الاختبارات الإلزامية التي تجرى في بلدنا، ونلاحظ أن الأسئلة المتعلقة بموانع التبرع تمت الإجابة عليها بشكل صحيح من قبل غالبية المستجيبين.

الخلاصة: باختصار، نعتقد أن النتائج ستوفر معلومات مفيدة يمكن استخدامها لتطوير خطط لتشجيع المتبرعين الحاليين على التبرع في كثير من الأحيان وتشجيع الأفراد المؤهلين للتبرع من أجل تلبية احتياجات تحاقن الدم في البلاد.



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قسم الطبيب

أقسم بالله العظيم

أن أراقب الله في مهنتي.

وأن أصون حياة الإنسان في كافة أطوارها في كل الظروف
والأحوال باذلاً وسعي في إنقاذها من الهلاك والمرض

والألم والقلق.

وأن أحفظ للناس كرامتهم، وأستر عورتهم، وأكتم سرهم.

وأن أكون على الدوام من وسائل رحمة الله، باذلاً رعايتي الطبية للقريب والبعيد،
للصالح والطالح، والصديق والعدو.

وأن أثابر على طلب العلم، وأسخره لنفع الإنسان لا لأذاه.

وأن أوقر من علمني، وأعلم من يصغرنني، وأكون أخاً لكل زميل في المهنة الطبية
متعاونين على البر والتقوى.

وأن تكون حياتي مصداق إيماني في سري وعلايتي، نقيّة مما يُشِينها تجاه
الله ورسوله والمؤمنين.

والله على ما أقول شهيدا

التبرع بالدم في مراكش و نواحيها

الأطروحة

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الرئيس

ن. الإدريسي سليطين
أستاذة في طب الأطفال

السيدة

المشرف

م. أيت عمور
أستاذ مبرز في علوم الدم

السيد

الحكم

ك. هرو
أستاذ في طب النساء و التوليد

السيد