STATUS OF BLOOD SAFETY IN THE WHO AFRICAN REGION

Report of the 2010 Survey

J.B. Tapko, B. Toure and Luis G. Sambo

World Health Organization
REGIONAL OFFICE FOR Africa

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FOREWORD

Blood transfusion services are an indispensable component of any health care delivery system in the world. This is more so in the WHO African Region as the health-related Millennium Development Goals cannot be achieved without adequate supply of safe blood to the population to supplement other efforts and interventions.

Women and children are the ones in greatest need. The highest proportion of blood transfusion in Africa is given to children with severe anaemia resulting from malaria and malnutrition, followed by women with pregnancy-related bleeding. The high maternal mortality rates partly attributed to complications of pregnancy, the high child mortality attributable to severe malarial anaemia, the high mortality due to traffic accidents among others are all an evidence of the magnitude of the unmet need.

The provision of safe blood for transfusion particularly since the advent of HIV/AIDS has not been cheap. It was thought to be affordable only by the developed world as the cost per infection averted through blood transfusion was exorbitant and not affordable given the fragile economies in Africa coupled with competing priorities. Even so, the proponents of cost recovery as a means of financing blood transfusion services argued that the advantages of blood transfusion go to individuals. Obviously, this line of thinking was in total disregard of the externalities associated with averting the spread of HIV and other blood-transmissible infections to the general population.

Through the leadership of WHO, the international community's attention was quickly drawn to the alarmingly high prevalence rates and the magnitude of the HIV epidemic in the WHO African Region in addition to other infections transmissible through blood transfusion. Public funding through donor support and government budgets were then made available to strengthen blood transfusion services as a means to avert the spread of diseases through blood transfusion.

Thanks to the donor community, much investment has been made in blood transfusion services in the WHO African Region over the past 20 years. As a consequence, substantial progress has been made over the years in the organization and management as well as the clinical and technical aspects of blood transfusion services. Furthermore, many Member States have given due attention to strengthening their blood transfusion services.

Based on the WHO strategies and recommendations, many national blood transfusion services established as agencies of the ministries of health developed into successful programmes. The sustainability of these programmes will however require due attention by Member States particularly after the end of external funding. Now is therefore the time to establish sound financing mechanisms for blood transfusion services. Their development as part of health system strengthening within the context of the implementation of the 2008 Ouagadougou Declaration on Primary Health Care may be one way to ensure the consolidation and sustainability of, and universal access to, safe blood transfusion in the Region.

The data presented in this report shows marked improvement in many respects over the years. It also identifies countries that require particular attention by public health

authorities and partners. I hope this report will receive the required attention in order to focus on further improvement, consolidation of the progress made and sustainability of blood transfusion services in the WHO African Region.

Dr Luis G. Sambo
Regional Director

PREFACE

Blood transfusion therapy is an essential component of the practice of modern medicine. Safe and adequate supply of blood is needed in order to save lives because blood is often the only means of survival. It has been known for centuries that blood transfusion can have serious and fatal consequences if it is not practised within set norms and standards. Cognizant of this fact, WHO has adopted a number of resolutions urging Member States to organize their blood services in a manner that will minimize the attendant risks while ensuring adequate and safe blood supplies for their populations.

All the 46 Member States in the WHO African Region are signatories to World Health Assembly Resolution WHA28.72 of May 1975 *on utilization and supply of human blood and blood products*. By that resolution, Member countries committed themselves to promoting the establishment of a safe, efficient, cost-effective and sustainable nationally-coordinated blood transfusion service based on the principles of voluntary non-remunerated blood donation. Furthermore, in 1994, countries of the WHO African Region adopted Regional Committee Resolution AFR/RC44/R12 urging Member States to take urgent action to enact blood policies and mobilize the requisite resources for the development of blood services in central and district hospitals. Subsequently, its Fifty-first session, the Regional Committee adopted a strategy on blood safety with three main objectives: to enhance the collection of blood from voluntary blood donors; to improve the safety of blood and blood products; and to promote appropriate clinical use of blood and blood products.

It is now 37 years since the first World Health Assembly resolution on blood safety and 11 years since the adoption of the strategy for blood safety in the Region. Significant success has been recorded in this area in the African Region. However, much remains to be done in all aspects of blood transfusion services. Furthermore, there are considerable challenges to attainment of the health-related Millennium Development Goals (MDGs), and safe blood supply would contribute immensely in this regard. There is therefore need for the health sector to pool resources together and consolidate efforts to transform resolutions into practical actions so as to enhance the provision of this important aspect of health care in order to improve the quality of the services delivered to the people.

Dr J.B. Tapko
Former Regional Adviser for Blood Safety, WHO African Region

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ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
BTS	Blood Transfusion Service(s)
CAR	Central African Republic
CDC	Centers for Disease Control and Prevention
DRC	Democratic Republic of Congo
EQAS	External Quality Assessment Scheme
GDBS	Global Database on Blood Safety
Hb	Haemoglobin
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
HTLV	Human T Lymphotropic Virus
MDGs	Millennium Development Goals
MoH	Ministry of Health
NBTS	National Blood Transfusion Service(s)
PEPFAR	US President's Emergency Plan for AIDS Relief
SOP	Standard Operating Procedures
TTI	Transfusion-transmissible Infection
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNPOP	United Nation Population Division
VNRBD	Voluntary Non-Remunerated Blood Donors
WHO	World Health Organization
WHO/HQ	Headquarters of WHO

EXECUTIVE SUMMARY

In 2001, the WHO Regional Office for Africa adopted a strategy for blood safety with the aim of improving both the quality and adequacy of blood supply through sustainable implementation of blood transfusion policies in all countries in the Region.

Although reports on the status of blood safety in the WHO African Region in 2004 and 2006 showed improvements in the status of blood transfusion services, weaknesses remained in the areas of organization and management, blood donation, blood screening for transfusion-transmissible infection (TTIs) and appropriate clinical use of blood. Much progress has been made however in strengthening blood transfusion services in Africa, and that will significantly improve the quality of health care delivery in the Region.

This survey was done in order to obtain up-to-date data on blood safety four years after the last survey so as to generate relevant information from Member States to help map out strategies and interventions for improvement, based on a sound evidence base.

The Blood Safety Indicator tool was prepared using key elements of the questionnaire for the Global Database on Blood safety (GDBS). This tool was sent to all Member States for completion by a senior staff of the NBTS or a designated official of the ministry of health. All Member States were requested to provide data for the period from 1 January to 31 December 2010 and to send it back to the Regional Office in Brazzaville for compilation and analysis.

The questions asked included those on administrative matters, facilities for blood collection and supply, blood donors and blood collection, screening for transfusion-transmissible infections, blood component preparation, storage and transportation as well as clinical use of blood and blood components (see Annexes 1 and 2).

Countries were divided into three different groups (Group A, Group B and Group C) based on proportion of voluntary non-remunerated blood donation collected in the period. Group A, Group B and Group C represented countries that had attained 80-100%, 50-79% and <50% of voluntary non-remunerated blood donations (VNRBD) respectively. At the same time, an additional questionnaire related to achievement of the targets set in the Regional Strategy for blood safety was sent to all Members States.

Data was analyzed using Microsoft Excel worksheets 2007 and Microsoft Word 2007. A few countries that did not provide data for some indicators were not considered in the analysis of the indicators concerned.

Out of the 46 Member States that received the two questionnaires, 43 responded on blood safety indicators (see Annex 1) and 36 on achievements of the targets set in the Regional Strategy (see Annex 2). The response rates were therefore 93.4% for the first questionnaire and 78.3% for the second. There were 19 countries in Group A, seven countries in Group B and 17 countries in Group C. Ten countries had reached 100% VNRBD at the time of the survey. The median blood donation rate was 4.3 units /1000 population. The overall deferral rate was 11.7%.

Among the 36 countries that responded to the questionnaire on the achievement of the targets set in the Regional Strategy, 30 had already done a situation analysis, 29 had adopted a policy, 29 were implementing it, and 11 had legislation on blood safety.

A hundred per cent of donations were tested for HIV in 42 out of 43 countries (97.6%), for HBV in 38 out of 43 (88%) countries, for HCV in 36 out of 43 (84%) countries and for syphilis in 37 (86%) countries. In total, the median prevalence of HIV, HBV, HCV and syphilis was 1.2%, 4.3%, 0.9% and 1.2% respectively.

Only 26.9% of centres that reported were using Standard Operating Procedures (SOPs) while 19.1% were participating in EQAS for HIV. Red cell concentrate was the component most commonly prepared by countries followed by fresh frozen plasma. The average proportion of blood and blood components discarded was 11.0% mainly because of TTIs (5.6%). Regarding clinical use of blood, of a total of 4435 hospitals, 478(10.7%) had a hospital transfusion committee and 26.4% were notifying adverse reactions.

Considerable progress has been made in the Region in the last four years. The number of countries with national blood policies and those implementing their policies through strategic plans has also increased although the enactment of enabling legislation remains a matter of concern in most of the countries. Although the progress made differed from country to country, the overall prevalence of TTIs among blood donors has been decreasing over the years. Hence, the proportion of blood discarded due to TTIs has significantly decreased.

The clinical interface of blood transfusion services in Member States needs to be strengthened for further promotion of appropriate clinical use of blood as a means of reducing unnecessary transfusions, enhancing judicious use of a scarce commodity and ensuring ultimate safety of transfused patients.

It is therefore vital to increase technical support and advocacy in Group C countries particularly those that have not yet implemented their blood policies. Finally, despite the progress made, the African Region has yet to meet the required need for blood and blood products.

1. BACKGROUND

In Africa, blood transfusion has been practised since the 1940s and reached rates comparable to the western world especially in the urban areas of some countries, soon after independence.[1] The post-independence period, particularly the 1970s, was characterized by civil war and political instability, leading to a gradual decline of basic social services including health and, for that matter, blood transfusion services which continued to decline in both the adequacy of blood supply and the quality of service. General lack of information on blood transfusion during the 1980s is partly an evidence of this decline.

The realization that HIV could be transmitted through blood transfusion, and that the epidemic was widespread in Africa by the early 1980s, led to a major turning point and prompted urgent action to avert the transmission of infection through blood transfusion. WHO estimated at that time that 5% to 10% of HIV transmission resulted from transfusion of contaminated blood.[2, 3] Under the leadership of WHO, the international community's attention was urgently drawn to the need to help African countries to establish blood transfusion services in order to ensure safe blood supply as a means to prevent blood transfusion-transmitted HIV and other infections.

In September 1994, the WHO Regional Committee for Africa noted with concern that only 10 of the 46 countries could guarantee HIV-free blood transfusion in their health care settings. The Committee therefore adopted Resolution AFR/RC44/R12 urging Member States to "take urgent steps to enact blood safety policies and mobilize resources for the development of infrastructure for blood services in central and district hospitals".[4]

Subsequently, in 2001, the Regional Committee for Africa adopted the Regional strategy for blood safety based on three objectives namely: to assist countries to set up an effective system of recruitment of low-risk donors; to improve the safety of blood and blood products by implementing quality assurance programmes and mapping out effective strategies for screening blood for all TTIs; and to promote appropriate use of blood and blood products by clinicians. The strategy had four targets to be achieved by 2012: (i) all Member States will have carried out a situation analysis of blood transfusion safety; (ii) at least 75% of all countries will have developed, adopted or implemented their national blood policy; (iii) 100% of blood units transfused will be screened beforehand for HIV and other TTIs; and (iv) at least 80% of all donations in all countries of the Region will be voluntary and non-remunerated.[5]

However, universal access to safe blood supply remains a challenge in many countries in sub-Saharan African due to economic instability, civil strife, natural and manmade disasters, and failure to translate government commitment to practical outcomes that would lead to further improvement.

Moreover, the African Region does not only have 10% of the global disease burden (World Health Report) but also it has the highest burden of diseases transmissible though blood transfusion. In 2010, the prevalence of HIV infection was 5% among adults, 1.1% for men aged 15–24 and 3.3% for women aged 15–24 years. In total, 67.5% of persons infected by HIV worldwide were living in sub-Saharan Africa.[6]

In addition, the African Region has a high prevalence of hepatitis B infection (10-20%) the carrier state being above 8% in sub-Saharan Africa as a whole.[35] The predominant mode of transmission is horizontal in the early years of life reaching adult prevalence by the age of five years although the causes of transmission in this group are yet to be determined[34]. Infection acquired early in life results in chronic infection and carrier state in 90% of cases.[34] These carriers pose a threat to the safety of blood supply.

Severe anaemia due to road traffic accidents, pregnancy-related hemorrhage, malnutrition and armed conflicts in the Region increases the need for blood transfusion and therefore the risk of transmitting HBV and other blood-borne pathogens through contaminated blood.[7] The risk of HBV transmission by contaminated blood transfusion is higher than that of HIV as reported by some studies.[8]

The prevalence of HCV is also high in Africa, reaching 10% in some areas.[9] People infected with HCV serve as carriers and are at risk of developing chronic liver disease as well as cirrhosis and primary hepatocellular carcinoma. Indeed, it has been estimated that HCV is responsible for 27% of cirrhosis and 25% of hepatocellular carcinoma worldwide.[10]

Of the estimated one million deaths per annum due to malaria worldwide, 90% occur in sub-Saharan Africa claiming more lives on the continent than anywhere else in the world[11] Mortality due to severe malarial anaemia is high in the Region and still poses a major problem for blood safety in Africa.[12] Because of the high endemicity, deferral of donors at risk due to travel, may not be an appropriate prevention strategy to adopt in the African Region compared with the low endemic regions of the world.[8]

With an average of 640 maternal deaths per 100 000 live births in 2008, Africa had the highest maternal mortality rate in the world.[14] Hemorrhage remains the leading cause of maternal death, accounting for approximately one third of deaths in Africa.[19]

2. NTRODUCTION

2.1 Blood Safety

National blood policies are driven by two main principles, namely the adequacy or lack of blood supply and the attendant risks of blood transfusion both immunological and non-immunological including the transfusion of pathogens known to be transmitted through blood transfusion. Moreover, there is always a risk of emerging threats to the safety of blood supply from new infectious diseases.

In addition, the selection of donors with low risk of infection against the backdrop of high prevalence rates of infectious diseases in the general population further increases the risk of transmission in the Region. Unsafe blood transfusion may continue to contribute to the spread of HIV and other blood transfusion-transmissible infections unless stringent measures are taken to reverse the situation.

Blood safety promotion therefore aims at ensuring universal access to quality blood and blood products at an affordable cost both to public authorities and patients. To that end, all stages of the blood transfusion chain should be carried out in such a way as to eliminate these risks. The product must not only be of the right quality but must also be adequate quantitatively to correct the homeostatic defect in the normal physiology of blood for the patient. Safe hospital and bedside practices such as compatibility as well as traceability should be carried out in a manner that ultimately ensures the safety of the patient. Blood transfusion should also be limited only to cases absolutely necessary and be conducted as part of a sustainable programme within the health system. This calls for a well-coordinated blood service with quality systems in all areas as recommended by WHO.

Cognizant of the risks that the collection of blood from family replacement and remunerated donors pose to blood supply, WHO has recommended that Member States develop national blood services based on collection of blood from voluntary non-remunerated blood donors, carry out universal testing of donated blood in accordance with the necessary quality requirements and minimize unnecessary blood transfusions.[5,16] Member countries should therefore phase out family and other types of donations not only to further minimize the risk of disease transmission through contaminated blood, but also to ensure universal and sustainable availability of blood.

2.2 The demand for safe blood in the African Region

WHO estimates that the 46 Member States of the WHO African Region with a total population of 836 969 536 people in 2010 need over eight million units of blood for transfusion per annum. Globally, more than half a million women die each year from complications of pregnancy and childbirth. The most common cause of maternal death is severe bleeding, which contributes to up to 44% of maternal deaths in sub-Saharan Africa.[18] Studies show that up to 50% of transfusions given to children are prompted by malaria-induced anaemia.[19] Other causes prompting blood transfusion include anaemia from sickle-cell disease, malnutrition, road traffic accidents and other forms and causes of injury.

Furthermore, the African Region frequently experiences manmade natural disasters that considerably increase the demand for blood transfusion. Unfortunately, many countries in the Region do not collect enough blood for their populations. Blood donation rates in Africa are generally low, estimated at about 4.15 per 1000 population in 2006 compared with over 30 per 1000 population[20, 21] on average in developed countries. Consequently, although the health systems are not yet developed to the level that would require much blood, most of the countries in the Region collect less than half of the blood needed to meet the transfusion requirements of their populations.

2.3 Challenges in obtaining adequate safe blood

Inadequate implementation of the WHO recommendations requiring Member States to place blood safety at the heart of their health priorities coupled with failure to translate policy commitments and resolutions into practice poses a challenge to universal access of the population in the Region to safe blood supply. Additionally, the area of blood safety is not allocated sufficient human, material and financial

resources for collection and testing of blood from safer blood donors. The acute shortage of trained and dedicated human resources is often cited as one of the main constraints faced by blood transfusion services in the WHO African Region.

In an environment where the prevalence of TTIs is so high as is the case in the Region, the selection of safe blood donors with low risk of infection, routine screening for TTIs in a quality-assured manner and appropriate prescription and use of blood products are all essential to ensure the safety of these products. Unfortunately, these issues have posed challenges to the safety of blood supply in the Region over the years.

Against this background, the WHO Regional Office conducted two surveys in 2004 and 2006 using the questionnaire on the Global Database on Blood Safety (GDBS) in order to obtain detailed data and generate relevant information from Member States regarding the status of blood safety in the Region and to design the appropriate strategies and interventions based on sound evidence.

3. AIMS AND OBJECTIVES

This report aims:

(a) to assess and provide an update on the blood safety situation in Member States of the WHO African Region using data from a survey conducted in 2010;

(b) to monitor the trends and progress in attaining the four targets set in the Regional Strategy for blood safety in the WHO African Region;

(c) to identify the successes, weaknesses and constraints;

(d) to make recommendations to Member States and other stakeholders for consolidating the achievements, and establish mechanisms to bridge the gaps and minimize the constraints.

4. METHODOLOGY

4.1 Tools used in the survey

The Blood Safety Indicator tool was prepared using key elements of the questionnaire on the Global Database on Blood Safety (GDBS). An additional questionnaire was designed to collect data on the achievement of the targets set in the Regional Strategy. Both questionnaires were sent to all the 46 Member States to be filled by a senior staff member of the NBTS or a designated official of the ministry of health. The Blood Safety Indicator tool contained six sections namely: administrative information; facilities for blood collection and supply; blood donors and blood collection; screening for transfusion-transmissible infections; blood component preparation, storage and transportation; and clinical use of blood and blood components.

These sections provide the necessary information on the vital and logical stages of the blood transfusion chain. Each section consists of questions that seek to determine the status of the key indicators of the service provided at that particular stage. The data therefore provide, in qualitative and quantitative terms, an

assessment of the human and infrastructural resources, as well as process and outcome indicators of national blood programmes in Member States.

The questionnaire used to collect data on the achievement of the targets set in the Regional Strategy contained questions on the situation analysis, policy and its implementation, legislative framework, funding, voluntary blood donation, TTI screening and quality management.

4.2 Data collection and sample size

The two sets of questionnaires were sent to all the 46 countries of the WHO African Region through their respective WHO country offices. Countries were requested to provide data for the period from 1 January to 31 December 2010. The data was then sent to the Regional Office in Brazzaville for compilation and analysis.

4.3 Data analysis

Data entry was done using Microsoft Office Access 2007 and was cross-checked for accuracy by several teams. The completion of data entry was followed by comprehensive data cleansing. Data analysis and table preparation were done using Microsoft Excel worksheet 2007 and Microsoft Word 2007 respectively.

The countries were divided into three groups based on their attainment of the targets set in the Regional Strategy on voluntary blood donation: Group A attained at least 80% of VNRBD; Group B attained 50–79% VNRBD; and Group C attained below 50% of VNRBD. For each blood centre, country and/or group of countries, the variables reported or calculated were number, rate, and percentage. The total population of the WHO African Region used for estimates was that defined by UNDP in 2010.[22]

4.4 Data quality

The questionnaires received back from countries were examined by the Blood Safety Team at the WHO Regional Office and headquarters for data errors, appropriateness and quality. Where necessary, countries were requested by phone or by email to provide additional information and clarification on missing or doubtful values.

4.5 Limitations of the survey and data analysis

Some countries did not respond to the survey, hence the details of the status of their blood services could not be obtained. These countries were Angola, Liberia and Seychelles. Another major constraint was the delay in collecting and sending data to the Regional Office, leading to delays in compilation, collation, analysis and publication of the report. A number of countries did not provide answers to all the questions. Whenever data was lacking or inconsistent for a specific parameter, the corresponding country was not considered in the analysis of that particular parameter. Since not all countries reported on every parameter, the number of countries, centres or units of blood transfused for example depended on the number of countries that responded to the particular question.

5. RESULTS

Out of the 46 countries of the WHO African Region that received the questionnaire, 43 submitted responses to the Regional Office, representing a response rate of 93.4%. Three countries namely, Angola, Liberia and Seychelles did not provide any data and could not be included in the analysis.

The total population of the WHO African Region was 836 969 536 while the population of the 43 countries that responded was 813 806 984 (97.2%), based on UNDP estimates of 2010.

5.1 Blood donation and availability

Total number of units of blood collected

The total units of blood collected in the year and the proportion of voluntary blood donations were reported from 43 countries and were analyzed based on the aforementioned three groups of countries. A total of 3 486 192 units of blood were collected ranging from 942 units in Equatorial Guinea with a population of 700 401 to 949 789 units in South Africa with a population of 50 132 817. The number of units of blood donated in each group is indicated in Table 1.

Table 1: Number of blood donations and donation rates per group of countries

Group	Countries (n)	Total blood donation (n)	Population (n)	Donation rate (units /1,000 inhabitants)
Group A	19	1 980 349	437 286 128	4.5
Group B	7	666 783	91 255 989	7.3
Group C	17	839 060	285 264 867	2.9
All countries	43	**3 486 192**	**813 806 984**	**4.3**

The average annual blood donation rate was 4.3 units per 1000 population with a range from 0.2/1000 in Nigeria to 33.8/1000 in Mauritius (Table 2). Only five countries were collecting at least 10 units/1000 population, namely Algeria, Botswana, Congo, Mauritius and South Africa (Table 2).

Table 2: Donation rates in each country

Group A			Group B			Group C		
S/N0	Country	Rate	S/N0	Country	Rate	S/N0	Country	Rate
1.	Benin	6.6	1.	Algeria	11.9	1.	Cameroon	2.7
2.	Botswana	10.0	2.	Cape Verde	5.6	2.	Chad	2.7
3.	Burkina Faso	3.7	3.	Central African Republic	2.5	3.	Comoros	3.7
4.	Burundi	4.4	4.	Malawi	5.5	4.	Congo	10.1
5.	Côte d'Ivoire	4.5	5.	Mozambique	4.7	5.	DRC	4.7
6.	Eritrea	2.8	6.	Sao Tome and Principe	5.4	6.	Equatorial Guinea	0.9
7.	Kenya	3.5	7.	Senegal	4.5	7.	Ethiopia	0.6
8.	Lesotho	2.1				8.	Gabon	8.4
9.	Mauritius	33.8				9.	Gambia	7.2
10.	Namibia	9.6				10.	Ghana	5.4
11.	Nigeria*	0.2				11.	Guinea	2.4
12.	Rwanda	3.6				12.	Guinea-Bissau	2.7
13.	South Africa	18.6				13.	Madagascar	1.2
14.	Swaziland	8.4				14.	Mali	3.1
15.	Togo	5.9				15.	Mauritania	2.5
16.	Uganda	6.0				16.	Niger	3.5
17.	Tanzania	2.7				17.	Sierra Leone	5.2
18.	Zambia	6.8						
19.	Zimbabwe	5.1						

R: rate (units/1,000 of the population);

Type of blood donation

All the 43 countries reported data on the percentage of voluntary non remunerated, family replacement and paid blood donations during 2010. The average proportion of VNRBD was 74.8% ranging from 0% in Equatorial Guinea to 100% in ten countries (Tables 3 and 4). Only the Democratic Republic of Congo (DRC) reported paid donations representing 4.98% of their total donations. Of the 130 830 blood donations reported by Ghana, 84 units (0.06%) were from unknown types of blood donors.

Only 33 countries provided data on the number of blood donations per donor per year. The average in these countries was 1.2 donations, ranging from 1 to 2.2 donations.

Table 3: Number of donations and type of donation per group

Group	Type of donation				
	VNRBD n(%)	***Family replacement donation n (%)***	***Paid donation n (%)***	***Unknown type n (%)***	***All types of donation n (%)***
Group A	1 920 800 (97.0)	18 567 (3.0)	0(0.0)	0 (0.0)	1 980 349 (100)
Group B	411 422 (61.7)	255 361 (38.3)	0 (0.0)	0 (0.0)	666 783 (100)
Group C	234 495 (27.9)	588 422 (70.1)	16 059 (1.9)	84 (0.1)	839 060 (100)
All countries	**2 607 699 (74.8)**	**862 350 (24.7)**	**16 059 (0.4)**	**84 (0.1)**	**3 486 192 (100)**

Table 4: Percentage of voluntary non-remunerated blood donations in each country

Group A			Group B			Group C		
S/N0	**Country**	**%**	**S/N0**	**Country**	**%**	**S/N0**	**Country**	**%**
1.	Benin	92.1	1.	Algeria	60.0	1.	Cameroon	10.0
2.	Botswana	100	2.	Cape Verde	77.3	2.	Chad	4.7
3.	Burkina Faso	100	3.	Central African Republic	68.0	3.	Comoros	15.7
4.	Burundi	99.9	4.	Malawi	57.3	4.	Congo	35.5
5.	Côte d'Ivoire	100	5.	Mozambique	61.2	5.	Democratic Republic of Congo	35.0
6.	Eritrea	88.4	6.	Sao Tome and Principe	53.4	6.	Equatorial Guinea	0.0
7.	Kenya	100	7.	Senegal	79.4	7.	Ethiopia	23.5
8.	Lesotho	93.8				8.	Gabon	30.0
9.	Mauritius	88.6				9.	Gambia	24.1
10.	Namibia	100				10.	Ghana	27.1
11.	*Nigeria	94.2				11.	Guinea	14.7
12.	Rwanda	100				12.	Guinea-Bissau	19.9
13.	South Africa	100				13.	Madagascar	18.4
14.	Swaziland	100				14.	Mali	30.4
15.	Togo	98.3				15.	Mauritania	31.3
16.	Uganda	100				16.	Niger	36.3
17.	Tanzania	94.9				17.	Sierra Leone	9.7
18.	Zambia	99.9						
19.	Zimbabwe	100						

**This represents blood collected from the 16 stand-alone blood centres in Nigeria only.*

Of the 3 486 192 donations in the 43 countries, 23 264 (0.7%) were collected by aphaeresis in seven countries, namely Algeria, Botswana, Central African Republic (CAR), Mauritius, Namibia, South Africa and Zimbabwe (Table 5). The proportion of blood donations collected using aphaeresis ranged from 0.13% in Mauritius to 2.2% in South Africa.

Table 5: Number and percentage of donations per type of collection

Type of blood donation	**Type of blood collection**		
	Whole blood n (%)	***Aphaeresis n (%)***	***All types of collection n (%)***
VNRBD *n (%)*	2 585 184 (74.2)	22 515 (0.6)	2 607 699 (74.8)
Family replacement blood donation *n (%)*	861 601 (24.6)	749 (0.1)	862 350 (24.7)
Paid donation *n (%)*	16 059 (0.4)	0 (0.0)	16 059 (0.4)
Unknown *n (%)*	84 (0.1)	0 (0.0)	84 (0.1)
All types of donation n *(%)*	**3 462 928 (99.3)**	**23 264 (0.7)**	**3 486 192 (100)**

Blood donor deferral rate and reasons

Thirty-six countries reported data on blood donor deferral. For a total of 3 179 480 blood donations reported, 425 780 blood donors were deferred for various reasons. The average deferral rate was 11.7%, ranging from 1.8% in Burundi to 64.3% in Eritrea. The summary of deferred donation per reason per group of countries is shown in Table 6.

Table 6: Blood donor deferral rate and reasons for deferral in each group

		Group of countries			All countries
		Group A	Group B	Group C	
		Deferral rate (%)	Deferral rate (%)	Deferral rate (%)	Deferral rate (%)
Reasons for deferral	Low weight	0.9	0.6	0.3	0.7
	Low haemoglobin	1.5	1.1	1.6	1.4
	Other medical conditions	1.8	6.0	3.1	3.0
	High-risk behaviour	0.8	0.1	1.7	0.8
	Travel	0.1	0.1	0.0	0.1
	Other reasons	I7.8	3.5	2.1	5.7
	All reasons	**12.9**	**11.4**	**8.8**	**11.7**

5.2 Facilities for blood collection and supply

The 43 countries reported the existence of 1728 blood centres (Table 7) of which 1492 (86.3%) provided data used for this report (Table 8). Out of these, 131 centres (8.7%) were stand-alone while 1362 (91.3%) were hospital-based. The questionnaire did not specify whether these centres were part of the hospital administration or were just located in the hospital premises.

Table 7: Number and type of blood transfusion centres in the countries

Group	Type of blood centre in the country		
	Stand alone n (%)	***Hospital-based n (%)***	***All types of centre n(%)***
Group A	84 (46.6)	96 (53.4)	**180 (100)**
Group B	9 (2.2)	391 (97.8)	**400 (100)**
Group C	38 (3.3)	1110 (96.7)	**1148 (100)**
All countries	**131 (7.6)**	**1597 (92.4)**	**1728 (100)**

Table 8: Number and type of blood transfusion centres that provided data in the report

Group of countries	Type of blood centre in the report		
	Stand-alone centres n (%)	***Hospital-based centres n (%)***	***All types of centres* n (%)**
Group A	84 (59.6)	57 (40.4)	**141 (100)**
Group B	9 (2.2)	391 (97.8)	**400 (100)**
Group C	37 (3.9)	914 (96.1)	**951 (100)**
All countries	**130 (8.7)**	**1362 (91.3)**	**1492 (100)**

5.3 Achievement of the targets set in the Regional Strategy

Thirty-six countries responded to questions related to the achievement of the targets set in the Regional Strategy. The ten countries that did not respond were not included in the analysis. Among the 36 countries, 30 had already made a situation analysis, 29 had adopted and were implementing a national blood policy. Of these, 11 countries had a legislation.

5.4 Screening for transfusion-transmissible infections

Centres performing blood screening

Out of the 43 countries that provided data, 42 reported the existence of 1492 blood centres that provided answers concerning the screening of blood for TTIs. Out of these centres, 1276 (85.5%) were performing screening of blood donations for TTIs (Table 9).

Table 9: Number and percentage of blood centres performing laboratory screening of blood donations for TTIs per group of countries

Group	Centres in report *(n)*	Centres that perform screening *n (%)*
Group A	141	114 (80.8)
Group B	400	211 (52.7)
Group C	951	951 (100)
All countries	**1492**	**1726 (85.5%)**

The number of centres performing blood donation screening for HIV, HBV, HCV, and syphilis in each country is indicated in Table 10 below.

Table 10: Number and percentage of blood centres performing laboratory screening of blood donations for TTIs per country

Group A			**Group B**			**Group C**		
Country	**Centre in report (n)**	**Centre performing screening n(%)**	**Country**	**Centre in report (n)**	**Centre performing screening n(%)**	**Country**	**Centre in report (n)**	**Centre performing screening n(%)**
Benin	38	38(100)	Algeria	187	187(100)	Cameroon	15	15(100)
Botswana	2	2(100)	Cape Verde	5	5(100)	Chad	43	43(100)
Burkina Faso	4	4(100)	CAR	2	2(100)	Comoros	5	5(100)
Burundi	7	7(100)	Malawi	38	36 (94 .7)	Congo	23	23(100)
Côte d'Ivoire	14	2 (14.3)	Mozambique	149	149(100)	DRC	577	577(100)
Eritrea	1	1(100)	Sao Tome and Principe	1	1(100)	Equatorial Guinea	3	3(100)
Kenya	6	6(100)	Senegal	18	18(100)	Ethiopia	14	14(100)
Lesotho	1	1(100)				Gabon	1	1(100)
Mauritius	1	1(100)				Gambia	7	7(100)
Namibia	1	1(100)				Ghana	155	155(100)
Nigeria*	16	16(100)				Guinea	19	19(100)
Rwanda	3	2(100)				Guinea-Bissau	7	7(100)
South Africa	11	3(27.3)				Madagascar	42	42(100)
Swaziland	1	1(100)				Mali	7	7(100)
Togo	4	4(100)				Mauritania	1	1(100)
Uganda	7	7(100)				Niger	5	5(100)
Tanzania	7	7(100)				Sierra Leone	27	27(100)
Zambia	9	9(100)						
Zimbabwe	8	1(12.5)						

TTIs screening

Forty-three countries reported data on TTIs screening. With the exception of the Democratic Republic of Congo, 42 of them (97.6%) were screening hundred per cent of blood donations for HIV, 38 (88.3%) screened for HBV, 36 (83.7%) for HCV and 37 (86.0%) for syphilis (Tables 11 and 12).

Table 11: Number of countries testing 100% of blood donations for various TTIs

Group	Countries (n)	Transfusion transmissible infections			
		HIV	HBV	HCV	Syphilis
Group A	19	19	19	19	18
Group B	7	7	6	6	6
Group C	17	16	13	11	13
All countries	**43**	**42**	**38**	**36**	**37**

One country, DRC was testing less than 100% for HIV, compared with five countries that tested for HBV, seven for HCV, and six for syphilis (Table 12).

Table 12: Proportion of units tested in countries screening less than 100% of blood donations for at least one TTI

Group	Countries	Transfusion Transmissible Infections			
		HIV (%)	***HBV (%)***	***HCV (%)***	***Syphilis (%)***
Group A	Togo	100	100	100	**91.8**
Group B	Malawi	-100	**99.9**	**63.9**	**99.9**
Group C	Cameroon	-100	**99.7**	**98.6**	**98.5**
	Chad	-100	**99.8**	**94.0**	**98.1**
	Comoros	-100	100	**83.1**	100
	DRC	**99.0**	**96.0**	**84.0**	**92.0**
	Guinea	100	**93.3**	**68.9**	**88.8**
	Niger	100	100	91.8	100

Table 13 shows the total number of units and the percentage of blood tested for the major TTIs. Some countries were testing their donations for malaria. They included Malawi (68.3%), Sao Tome and Principe (60.3%) and Sierra Leone 16.2%). Gabon was testing all its blood donations for HTLV. The prevalence of HTLV was 0.36% in Gabon and there was no data on the prevalence of malaria in Sao Tome and Pr1ncipe while this was 0.33% in Malawi and reportedly 0% in Sierra Leone.

Table 13: Number and proportion of units of blood tested for TTIs in each group of countries

Group	Total donations (n)	Units Tested for Transfusion Transmissible Infections			
		HIV n(%)	***HBV n(%)***	***HCV n(%)***	***Syphilis n(%)***
Group A	1 980 349	1 980 349 (100)	1 980 349 (100)	1 980 349(100)	1 977 561 (99.8)
Group B	666 783	666 783 (100)	666 762 (99.9)	640 614 (96.1)	666 743 (99.9)
Group C	839 060	835 855 (99.6)	815 601 (97.2)	762 506 (90.9)	799 254 (95.2)
All countries	**3 486 192**	**3 482 987 (99.9)**	**3 462 712 (99.3)**	**3 383 469 (97.0)**	**3 443 568 (98.8)**

Percentage of blood units reactive to TTIs

All the 43 countries, except Cameroon and Gambia, provided data on TTIs reactivity or /positivity. Seventeen countries were performing confirmatory tests for HIV, 12 for HBV, 10 for HCV and 11 for syphilis. The median percentage of blood units reactive to TTIs was 1.2% for HIV, 4.3% for HBV, 0.9% HCV and 1.2% for syphilis. Table 14 shows the median proportion and the range in each group.

Table 14: Median percentage and range of blood units reactive to TTIs

Group	Transfusion-transmissible infection reactivity			
	HIV (%)	***HBV (%)***	***HCV (%)***	***Syphilis (%)***
Group A	1.1 [0.1-4.8]	2.9 [0.1-10.1]	0.9 [0.02-5.3]	0.4 [0.0-1.7]
Group B	0.7 [0.3-6.8]	3.1 [0.6-11.1]	0.7 [0.4-1.9]	0.6 [0.4-2.5]
Group C	2.2 [0.0-29.1]	7.1 [0.0-23.7]	1.2 [0.0-3.8]	1.5 [0.0-29.5]
All countries	**1.2 [0.0-29.1]**	**4.3 [0.0-23.7]**	**0.9 [0.0-5.3]**	**1.2 [0.0-29.5]**

Confirmatory tests were performed in 9 out of 19 (47.3%) countries in Group A for HIV compared with three countries out of seven (42.8%) in Group B and five countries out of 17 (29.4%) in Group C. For HBV, seven countries (36.8%) in Group A were performing confirmatory tests compared with 2 (28.6%) in Group B and 3 (17.6%) in Group C. For HCV, seven countries(36.8%) in Group A, one country (14.2%) in Group B and one country (5.9%) in Group C were performing this test. For syphilis, seven countries (31.6%) were performing confirmatory tests in Group A compared with 2 (28.6%) in Group B and 3 (17.6%) in Group C. Details of the percentage of blood donations reactive to/confirmed for TTIs per country are reported in Tables 15a, 15b, and 15c below.

Table 15a: Percentage of blood units reactive to/with confirmed TTIs in Group A

Group A	**Transfusion-transmissible infections**							
	HIV (%)		HBV(%)		HCV (%)		Syphilis (%)	
	Reactive	*Confirmed*	*Reactive*	*Confirmed*	*Reactive*	*Confirmed*	*Reactive*	*Confirmed*
Benin	0.9	0.1	7.1	1.0	2.2	0.2	1.7	0.2
Botswana	3.6	0.9	2.9	-	0.3	-	0.2	0.1
Burkina Faso	1.8	-	10.1	-	5.3	-	1.3	-
Burundi	0.4	-	2.7	-	1.3	-	0.1	-
Côte d'Ivoire	0.6	0.5	5.1	-	1.7	-	0.9	-
Eritrea	1.2	-	2.8	-	0.6	-	1.0	-
Kenya	0.9	-	2.0	-	0.8	-	0.2	-
Lesotho	3.1	-	0.9	-	0.7	-	0.4	-
Mauritius	0.1	0.04	0.2	0.1	0.6	0.4	0.1	0.1
Namibia	0.4	-	0.8	-	0.1	-	0.2	-
Nigeria	2.0	-	8.2	-	2.5	-	0.4	-
Rwanda	0.3	-	1.9	-	1.1	-	1.3	-
South Africa	0.2	0.2	0.1	0.1	0.02	0.0	0.2	0.1
Swaziland	2.0	2.0	3.0	3.0	0.3	0.2	0.0	0.0
Togo	1.1	0.3	6.1	0.7	2.0	0.5	0.8	-
Uganda	1.2	0.9	4.0	2.6	3.2	1.6	0.1	0.1
Tanzania	1.2	-	5.3	-	0.6	-	0.4	-
Zambia	4.8	-	6.8	-	1.0	-	0.8	-
Zimbabwe	0.7	0.7	1.0	0.9	0.3	0.3	0.7	0.7
All countries of Group A	**0.8**	**-**	**2.3**	**-**	**0.9**	**-**	**0.4**	**-**

Table 15b: Percentage of blood units reactive to/with confirmed TTIs in Group B

Group B	Transfusion-transmissible infections							
	HIV (%)		HBV(%)		HCV (%)		Syphilis (%)	
	Reactive	*Confirmed*	*Reactive*	*Confirmed*	*Reactive*	*Confirmed*	*Reactive*	*Confirmed*
Algeria	0.3	0.05	0.9	0.4	0.5	0.2	0.6	0.3
Cape Verde	0.4	0.1	2.1	2.0	0.4	-	0.4	0.4
Central African Republic	0.7	-	0.6	-	0.5	-	0.6	-
Malawi	2.3	-	3.1	-	1.9	-	1.2	-
Mozambique	6.8	-	6.0	-	0.8	-	0.7	-
Sao Tome and Principe	1.0	0.7	7.4	-	1.7	-	2.5	-
Senegal	0.2	-	11.1	-	0.7	-	0.4	-
All countries of Group B	**1.6**	-	**2.8**	-	**0.7**	-	**1.2**	-

Table 15c: Percentage of blood units reactive/with confirmed TTIs in Group C

Group C	Transfusion-transmissible infections							
	HIV (%)		HBV(%)		HCV (%)		Syphilis (%)	
	Reactive	*Confirmed*	*Reactive*	*Confirmed*	*Reactive*	*Confirmed*	*Reactive*	*Confirmed*
Cameroon	-	-	-	-	-	-	-	-
Chad	2.7	-	10.1	-	0.5	-	1.2	-
Comoros	0.0	-	4.7	4.3	3.5	-	2.7	2.3
Congo	2.8	2.1	7.1	-	1.9	-	5.1	-
DRC	2.8	-	4.0	-	1.9	-	1.2	-
Equatorial Guinea	29.1	-	15.4	-	3.8	-	29.5	-
Ethiopia	1.9	-	5.1	-	0.6	-	0.1	-
Gabon	1.2	-	3.1	-	0.5	-	4.7	-
Gambia	1.1	1.1	NR	-	NR	-	NR	-
Ghana	1.9	-	5.1	-	1.0	-	0.6	-
Guinea	4.0	-	10.5	-	0.5	-	0.5	-
Guinea-Bissau	0.0	-	0.0	-	0.0	-	0.0	-
Madagascar	0.5	0.0	4.0	-	0.7	-	1.9	-
Mali	2.7	-	14.0	-	2.1	-	0.5	-
Mauritania	1.0	0.2	23.7	23.7	1.2	-	3.3	3.3
Niger	2.2	-	12.4	-	1.6	-	1.5	-
Sierra Leone	3.7	3.6	11.6	11.6	2.2	2.2	2.0	2.0
All countries of Group C	**2.3**	-	**6.1**	-	**1.4**	-	**1.3**	-

Quality assurance in TTI testing

Out of the 43 countries, 27 reported that a proportion of their blood donations were screened in a quality-assured manner. The average proportion of blood donations screened in a quality assured manner for the four TTIs was 95.3% for HIV, 88.9% for HBV, 90.1% for HCV and 79.9% for syphilis. Details of the proportions in each group of countries are shown in Table 16.

Table 16: Reported proportion of blood donations that underwent quality-assured screening in each group

Group	Countries (n)	Proportion of blood donations screened in a quality assured manner (%)			
		HIV	HBV	HCV	Syphilis
Group A	13	99.2	93.4	93.4	85.2
Group B	3	100	75.9	95.3	73.8
Group C	11	84.9	80.1	80.4	67.8
All countries	**27**	95.3	88.9	90.1	79.9

Thirty-three countries out of the 43 provided answers regarding the number and proportion of centres using SOPs and/or participating in an EQAS for different TTIs. Among the 1050 centres that reported on this parameter, a total of 283 centres (26.9%) were using SOPs while 201 centres (19.1%) were participating in EQAS for HIV, 82 (7.8%) for HBV, 82 (7.8%) for HCV and 56 (5.3%) for syphilis (Table 17).

Table 17: Number and proportion of centres reported as using SOPs and participating in EQAS

Group	Countries (n)	Centres in report (n)	Centres using SOPs n (%)	Centres participating in EQA n (%)			
				HIV	HBV	HCV	Syphilis
Group A	16	101	64 (64.3)	40 (39.6)	31 (30.7)	31 (30.7)	18 (17.8)
Group B	5	59	54 (91.5)	53 (89.8)	20 (33.9)	20 (33.9)	18 (30.5)
Group C	12	890	164 (18.4)	108 (12.1)	31 (3.5)	31 (3.5)	20 (2.2)
All countries	**33**	**1050**	**283 (26.9)**	**201 (19.1)**	**82 (7.8)**	**82 (7.8)**	**56 (5.3)**

5.5 Blood component preparation, storage and transportation

Blood component preparation

A total of 40 out of the 43 countries reported that they prepared blood components. Red cell concentrates were being prepared in 35 of the 40 countries while platelets and fresh frozen plasma were prepared in 27 and 30 countries respectively. Table 18 presents the number of countries in each group according to the type of blood component prepared.

Table 18: Number of countries preparing blood components in each group

Group	Country (n)	Blood components			
		Red Cells (n)	***Platelets (n)***	***FFP (n)***	***Cryoprecipitate (n)***
Group A	19	17	15	15	**5**
Group B	7	7	4	5	**3**
Group C	17	11	8	10	**3**
All countries	**43**	**35**	**27**	**30**	**11**

Out of 1397 centres, 440 (31.5%) were preparing blood components while 227 (19.8%) prepared paediatrics units. The number and percentage of blood centres in each group of countries that prepared blood components and small paediatric blood units is reported in Table 19.

Table 19: Number and percentage of centres reported as preparing blood components and paediatric units

Group	Countries (n)	Centres in the report (n)	Centres preparing blood components n(%)	Centres preparing paediatrics units n(%)
Group A	17	139	61 (43.9)	75 (53.9)
Group B	7	400	331 (82.7)	157 (39.2)
Group C	13	858	48 (5.6)	45 (5.2)
All countries	**37**	**1397**	**440 (31.5)**	**277 (19.8)**

Blood components preparation (total blood components prepared)

Out of 3 427 851 blood donations, 2 068 174 (60.3%) were separated into components. The proportion of countries separating 100% of blood donations was 5.3% in Group A, 14.3% in Group B and 11.8% in Group C. Table 21 shows the proportion of donations separated in each country. Only Algeria, Botswana, Mauritius, Namibia, South Africa and Zimbabwe prepared blood components through aphaeresis procedures.

Table 20: Number and percentage of blood components prepared in each group

Group	Countries (n)	Total donations (n)	Whole blood units separated in components n (%)	Red cell preparations n (%)	Other preparations* n (%)
Group A	18	1 954 844	1 372 638 (70.2)	1 292 087 (66.1)	1 182 659 (60.5)
Group B	7	665 012	489 439 (73.6)	487 143 (73.2)	235 821 (35.5)
Group C	15	807 995	206 097 (25.5)	198 102 (24.5)	40 175 (5.0)
All countries	**40**	**3 427 851**	**2 068 174 (60.3)**	**1 977 332 (57.7)**	**1 458 655 (42.5)**

** Other preparations included platelets, fresh frozen plasma, plasma and cryoprecipitate*

Table 21: Proportion of blood collection separated into components in each country

Group A			Group B			Group C		
S/N0	**Country**	**%**	**S/N0**	**Country**	**%**	**S/N0**	**Country**	**%**
1.	Benin	39.2	1.	Algeria	9.0	1.	Cameroon	2.8
2.	Botswana	99.0	2.	Cape Verde	87.1	2.	Chad	0.0
3.	Burkina Faso	98.4	3.	Central African Republic	100	3.	Comoros**	NR
4.	Burundi	13.4	4.	Malawi	4.8	4.	Congo	20.5
5.	Côte d'Ivoire	86.2	5.	Mozambique	99.5	5.	DRC	45.0
6.	Eritrea	48.0	6.	Sao Tome and Principe	85.2	6.	Equatorial Guinea	NR
7.	Kenya	30.8	7.	Senegal	20.5	7.	Ethiopia	16.5
8.	Lesotho	NR				8.	Gabon	100
9.	Mauritius	47.6				9.	Gambia	0.0
10.	Namibia	98.7				10.	Ghana	2.6
11.	Nigeria*	0.0				11.	Guinea	0.4
12.	Rwanda	58.2				12.	Guinea-Bissau	NR
13.	South Africa	98.1				13.	Madagascar	38.6
14.	Swaziland	100				14.	Mali	30.4
15.	Togo	72.2				15.	Mauritania	100
16.	Uganda	60.0				18.	Niger	7.2
17.	Tanzania	1.7				19.	Sierra Leone	0.0
18.	Zambia	2.0						
19.	Zimbabwe	22.3						

**Only data from Abuja blood centre have been considered in this analysis.*
***NR: No response.*

Reasons for discarding blood and blood components

Thirty-eight countries reported data on the reasons why blood and blood components were discarded: 18 in Group A, 6 in Group B and 14 in Group C. Out of the 3 223 529 blood donations collected in these countries, 356 137 (11.0%) were discarded. The main reason why these blood donations were discarded was TTIs (Table 22).

Table 22: Proportion and causes of discarded blood and blood components in each group

Group	Total donation (n)	Causes of discarded blood and blood components						
		Incomplete collection (%)	TTIs (%)	Expiry (%)	Storage problems (%)	Transport problems (%)	Processing problems (%)	All causes (%)
Group A	1 884 919	1.2	4.3	2.8	0.1	0.1	0.9	**9.4**
Group B	559 729	3.2	4.4	6.2	0.1	0.0	2.6	**16.5**
Group C	778 881	0.8	9.3	0.4	0.3	0.2	0.1	**11.1**
All countries	**3 223 529**	**1.4**	**5.6**	**2.9**	**0.1**	**0.1**	**0.9**	**11.0**

Storage and transportation of blood

A total of 1112 out of 1492 (74.5%) centres reported that they had temperature-monitored cold chain facilities for blood storage, while only 773 out of 1492 (51.8%) centres reported that they had a temperature-monitored transportation system for

blood. Table 23 shows the number and percentage of blood centres in each group with cold chain facilities for storage and transportation of blood.

Table 23: Number and percentage of centres having blood cold chain facilities for storage and transportation of blood

Group	Countries (n)	Centres in report (n)	Centres storing blood in temperature-monitored equipment (n)	Centres transporting blood in temperature-monitored cold boxes (n)
Group A	19	141	103 (73.0)	71 (50.3)
Group B	7	400	327 (81.7)	54 (13.5)
Group C	17	951	682 (71.7)	648 (68.1)
All countries	**43**	**1492**	**1112 (74.5)**	**773 (51.8)**

5.6 Clinical use of blood

Out of 43 countries that responded, 36 provided answers to questions on clinical use of blood. Of the total of 4697 hospitals, 4435 hospitals were reported as performing blood transfusion, 478 (10.7%) had a Hospital Transfusion Committee (HTC), 59 (1.3%) had a system for monitoring clinical transfusion practice, and 1172 (26.4%) had a mechanism for reporting adverse transfusion events and reactions. Details for each group of countries are reported in Table 24.

Table 24: Number of hospitals monitoring clinical use of blood in each group

Group	Countries (n)	Total hospitals (n)	Hospitals with a HTC* n(%)	Hospitals performing clinical audits n (%)	Hospitals notifying adverse reactions n(%)
Group A	14	2509	370 (14.7)	17 (0.7)	943 (37.6)
Group B	7	1441	101 (7.0)	42 (2.9)	222 (15.4)
Group C	15	485	7 (1.4)	0 (0.0)	7 (1.4)
All countries	**36**	**4435**	**478 (10.7)**	**59 (1.3)**	**1172 (26.4)**

Out of 43 countries, 39 countries reported on blood transfusions. Of the 3 558 481 blood units collected in these countries, 3 279 863 were reported as transfused. The number of blood units transfused as whole blood was 1 154 512 (35.2%), 1 712 088 (52.2%) as red cell concentrates, and 196 792 (6.0%) for fresh frozen plasma (FFP). Thirteen countries reported that they transfused less than 25% of their blood as whole blood.

Red cell preparations were the most transfused blood component in Group A and Group B countries with a frequency of 60.0% and 56.5% respectively, while whole blood was mainly transfused in Group C (70.7%) (Table 25).

Table 25: Proportion of blood transfusions in blood components according to group of countries

Group	Countries (n)	Total donation (n)	Transfusion reported	Proportion of transfused blood components (%)						
				Whole blood (%)	*RCC (%)*	*Platelet, WBD (%)*	*Platelet aphaeresis (%)*	*FFP (%)*	*Plasma (%)*	*Cryop. (%)*
Group A	18	1 944 138	2 227 928	26.8	60.0	2.3	1.2	6.6	1.9	**0.9**
Group B	5	506 426	555 884	19.4	56.5	13.8	0.3	9.8	0.01	**0.02**
Group C	16	829 299	774 669	70.7	26.5	1.2	0.0	1.3	0.06	**0.02**
All countries	**39**	3 279 863	3 558 481	**35.2**	**52.2**	**3.8**	**0.8**	**6.0**	**1.2**	**0.6**

WBD: whole blood derivatives; FFP: fresh frozen plasma; Cryop: cryoprecipiate; RCC: red cell concentrate

Of the 36 countries that monitored clinical use of blood, only 17 countries reported data on incidents and reactions following blood transfusion from a total of 1 013 719 patients who were transfused. Out of these, 905 had severe incidents and reactions. Seven of the 17 countries did not respond regarding severe incidents or reactions. Details per country are reported in Table 26.

Table 26: Number of severe incidents and reactions reported by 17 countries

S/No	Country	Patients Transfused (n)	Severe incidents/reactions(n)	Frequency (/1,000 patients transfused)
1.	Benin	65 171	NR	NA
2.	Burkina Faso	20 218	0	0.0
3.	Comoros	2140	NR	NA
4.	Congo	15 672	3	1.9
5.	DRC	193 309	214	11.0
6.	Gabon	11 646	NR	NA
7.	Ghana	20 740	10	4.8
8.	Guinea	12 453	0	0.0
9.	Guinea-Bissau	1722	0	0.0
10.	Madagascar	1083	NR	NA
11.	Mozambique	121 316	NR	NA
12.	Namibia	12 026	20	16.6
13.	Niger	33 737	NR	NA
14.	Sao Tome and Principe	1061	0	0.0
15.	South Africa	403 715	658	16.3
16.	Swaziland	9499	0	0.0
17.	Zambia	90 211	NR	NA

NR: No response. NA: Not applicable

6. DISCUSSION

6.1 The Blood Safety Indicator tool used in the 2010 survey

Over the years, WHO has been collecting data using the Global Database on Blood Safety (GDBS) questionnaire every two years. A decision was reached to collect comprehensive data every two years using the detailed GDBS questionnaire and, in between the two years, to use an abbreviated form focusing on major indicators that could demonstrate the progress made in improving the organization and management as well as technical areas and safety of blood supply in Member States. The tool used in collecting data in 2010 was thus the abbreviated form of the GDBS questionnaire. The clear and concise questions in the tool were selected so as to ensure closer monitoring and evaluation of the blood safety programmes in the WHO Member States without losing the required detail that would jeopardize timely intervention.

Although there might have been incomplete answers to some questions, the response rate was comparable with that in 2006 when 44 out of the 46 countries responded while only Angola and Seychelles dropped out in 2010. The reasons why these two countries did not respond need to be ascertained to prevent a repeat of the same in subsequent surveys. Liberia has consistently not responded since 2004 and this may call for some customized approach such as fielding a specific mission to that country or engaging the Blood Safety focal point in the WHO country office.

For the first time, deferral rate and reasons for deferral as well as the frequency of adverse reactions in transfused patients were part of the questions asked to countries. This was an improvement on the previous questionnaires. However, TTI prevalence rate per donor type was not captured by the current tool. This information is important while advocating for phasing out paid and replacement donation types as well as monitoring the effectiveness of donor retention strategies.

Three countries did not participate in this survey. Some countries did not provide all the data required. For instance, only 16 blood centres in the report provided data on the number of blood donations in Nigeria. The data from hospital-based centres in this country was not provided.

Generally, only a limited amount of data was reported on clinical use of blood, particularly on adverse events and transfusion reactions. This reflects the level of development of the clinical interface and the linkage between blood centres and hospitals, which requires much effort to improve.

As in the previous surveys, some answers did not reflect the situation on the ground in a few countries when compared with observations made during other WHO missions to these countries. For example, Cameroon has not provided data on TTI prevalence in all the three surveys, despite its availability. Although there are shortcomings, interesting and useful information was provided.

The tool will require minor revision to capture data on prevalence per donor type. This may need inserting the required formulae in the tool so that it can be generated automatically. Additionally, the issues of organization and management of blood

transfusion services still need close monitoring in the WHO African Region and should therefore be included in the questionnaire.

Mechanisms for obtaining missing data should be established to minimize the risk of not ascertaining the true situation in some countries and, hence, in the Region. For example, there is no data to use as a basis for accurate assessment of the current blood safety situation in Liberia which remains unknown except data obtained through other means. It cannot be deduced that the situation in Angola or Seychelles has improved or deteriorated since the last survey. Likewise, data from Nigeria does not reflect the situation in the whole country. It is also inconceivable that Nigeria, with a population of 167 million, could have a total collection of only 36 211 units, which represent a reduction by 463 779 units compared with units reported in 2006. These countries apparently facing challenges in data collection and reporting need to be given more attention and support so as to improve the situation in the subsequent surveys.

6.2 Blood donation

Total blood units collected

The total number of blood donations increased from 3 191 808 units to 3 486 192 units for a population of 769 717 000 in 2006 and a population of 813 806 984 in 2010 respectively. Going by the WHO standard of collecting at least 10 units of blood per 1000 population as the amount of blood required for blood transfusion needs per country per year, there was a shortfall of 4 651 871 units of blood collected compared with the target for the Region in 2010. The shortfall, however, differs from country to country and 10 countries have attained the target. Since blood has a very short shelf-life, collecting enough units per year implies that these countries have improved their blood sourcing systems to ensure sustainable collection throughout the year. Considering the level of health system development in many countries in Africa, 1o/1000 is more often an overestimation of the actual need. For example a country like Ethiopia, with a population of over 80 million and less than 20 000 hospital beds in total, will therefore require 800 000 units of blood. This implies 40 units per bed per year, which may be an overestimation of what is actually required, given the current level of development of the health system.

The average annual blood donation rate decreased from 5.1 units/1000 population in 2004 to 4.1/1000 in 2006 but increased to 4.3/1000 in 2010.[20] The average donation rate shows that 24 countries collected more than 4.3 units/1000 population compared with 16 that had exceeded this rate in 2006 (see Table 2, AFRO database on blood safety).

Only five countries were collecting at least 10 units/1000 population as recommended by WHO.[5] In this group, Congo was the only new country that attained the target, while Namibia has not maintained the required donation rate. Although anecdotal, it could very well be that their current blood supply meets their current transfusion requirements and there is a balance between supply and demand at less than 1% of the population. The details of this finding need to be examined as the approach could provide some best practice to be emulated in other countries.

Blood units collected by type of donation

The number of countries in Group A remained the same at 19, while it increased from four to seven in Group B and dropped from 21 to 17 in Group C. Of the four countries in Group B in 2006, Mauritius and Eritrea improved their voluntary blood donations and moved from Group B to Group A, Seychelles did not respond to the questionnaire and Mozambique remained in the same group. Central African Republic, Malawi and Senegal moved from Group A to Group B probably due to improved coverage and quality of reporting. Sao Tome and Principe moved from Group C to Group B. Nigeria moved from Group C to Group A. However, data from Nigeria was not representative of the country's situation as it was received from only 16 centres that provided data. Algeria and Cape Verde moved from Group C to Group B. Thus although there are changes in the number of countries in the groups they are not necessarily the same countries in these groups as in the 2006 report. The absolute number of units collected from voluntary blood donors increased from 2 469 693 in 2006 to 2 607 699 units in 2010 although the overall average voluntary blood collections decreased from 77.3% in 2006 to 74.8% in 2010.

Progress in voluntary blood donation varies from year to year in many countries. For instance, Cape Verde made the best progress, increasing the proportion of VNRBD from 35% in 2006 to 77.3% in 2010, which represents a steady increase from 53% in 2004. It is of particular interest to note that Central African Republic declined from 100% to 68% VNRBD as well as Chad, Cameroon and Ghana whose proportion of VNRBD decreased from 15% to 4.7%, 25% to 10%, and 43% to 27.1% respectively. Although this could be attributed to better data collection and analysis by the said countries, the exact cause should be ascertained so as to design remedial measures to avert further decline.

Paid donations were reported only in the Democratic Republic of the Congo, representing a small proportion (4.98%) of their total collections. Anecdotal evidence indicates a system of surrogate family members presenting themselves for donation with the motive of receiving payment in return. These types of donors are usually found hovering around hospital premises and are indistinguishable from genuine family replacement blood donors. Among these types of donors, neither the safety of the donor nor that of the recipient can be guaranteed.

Whole blood donation was the predominant type while aphaeresis donation represented only 0.7% of all donations. This depicts the level of development of blood transfusion services in Africa whose priorities and focus are mainly geared towards securing an adequate number of voluntary blood donations and sound organizational capacities amid the financial constraints that go with the use of the required technologies and expertise as aphaeresis would allow.

Deferral rate and reasons for donor deferral

The mean deferral rate was 11.8%, ranging from 1.8% in Burundi to 64.3% in Eritrea. It was clearly higher in Group A (12.9%) than in Group B (11.4%) and Group C (8.8%). These results may be due to a more rigorous medical selection in Group A. The deferral rate of 64.3% in Eritrea is alarmingly high and might be restricting and eliminating eligible donors. However, considering the reactive rates for TTIs, this may not necessarily be the case. For example Eritrea has a prevalence rate of 1.2% for

HIV while Burundi has 0.4% with a deferral rate of only 1.8%. The level of evidence used in the development of blood donor selection criteria remains mainly an expert opinion. Most of the questionnaires and risk factors used during medical selection of blood donors therefore have not yet been validated by epidemiological studies.[24] Studies therefore need to be conducted to secure better evidence in setting the criteria for eligibility.

Countries did not provide the required details about the reasons for deferral as expected; most of the donors were deferred for "other reasons or medical conditions" in 8.7% out of 11.7%. The fact that only 1.4% was deferred for low haemoglobin is questionable since anaemia is frequently reported in 10%-30% of cases among African blood donors.[27-29] The methods used in these studies and those used in screening for selection of blood donors are different and thus not comparable.

6.3 Facilities for blood collection and supply

A huge proportion of centres (86.3%) in the countries were covered in the report. Thus, data analyzed in this report generally reflect the situation of blood safety in the WHO African Region. Only 131 of 1492 centres were stand-alone with hospital-based centres predominating. The proportion of stand-alone centres was 59% in Group A as compared with 2.2% and 3.9% in Group B and Group C respectively. There is also evidence of better policy implementation in Group A countries as evidenced by the level of achievement of regional targets. This raises a number of concerns in the area of organization and management particularly the coordination of services in the other groups especially Group C. One would wonder whether the hospital centres are part of hospital establishments as part of hospital laboratories or are part of the national blood transfusion service just located in hospitals. Whatever the case might be, it would be better to analyse this particular situation on a case-by-case basis and recommend interventions specific to each country.

6.4 Screening for transfusion-transmissible infections

Centres performing screening of donated blood

The proportion of centres performing the screening of blood donations in the 42 countries was 85.1%, ranging from 52.7% in Group B to 100% in Group C. Of these centres three out of 11, one out of eight and two out of 14, representing South Africa, Zimbabwe and Cote D'Ivoire respectively, had the lowest number of centres performing screening of blood compared with the total number of centres in the country. Historically, these countries started with a large number of centres performing TTI screening and evolved over time to consolidate to a few centres. This of course goes with improvement of the requisite infrastructure like effective transportation of samples and communication of results. On the other hand Mozambique, for example, has 149 centres each of which performs TTI testing. The situation ranges between these two extremes and requires customized recommendations and approach taking political, economic and other realities into consideration while promoting the quality of services in these countries. Current priority should however be put on refining the testing algorithms and reducing the number of testing centres through better organization, management and coordination.

Blood donation screened for TTIs

Much progress has been made in the area of screening for TTIs. A total of 42 countries out of 43 (97.6%) that responded were testing 100% of their donations for HIV in 2010. There is an improvement when this proportion is compared with 92.5% of countries (37 out of 40) in 2004 and 95.2% of countries (40 out of 42) in 2006. Concerning HBV and HCV, 88.3% and 83.7% of countries were testing 100% of their donations respectively. The proportions were 78% and 49% in 2004 compared with 83% and 59% in 2006. These results show an improvement for HBV testing and a marked improvement for HCV. Only 3486 units of blood were not screened for HIV in 2010 as compared with 70 000 in 2006,[3,20] marking a tremendous improvement in the coverage of testing for this disease marker. Although coverage of testing for HBV, HCV and syphilis has improved since the previous two surveys, there is still need to find appropriate strategies and strive for 100% coverage in all countries.

The fate of the 3486 units not screened against HIV is not known and may or may not have been transfused and this information needs to be ascertained in subsequent surveys so as to assess the risk of transmission in the affected countries.

Observation in countries shows that the failure to screen 100% of units against TTIs is due to frequent stocks outage for kits and supplies in some countries while in others testing for some of these diseases is not done due to economic constraints. There is therefore need to improve the coverage of testing in countries through building capacity to ensure continuous availability of the required equipment and supplies through improved procurement procedures and stock management.

Proportion of blood units reactive to/positive for TTIs

In general the frequency of TTIs among blood donors remained lower than in the general population in all groups and in countries with high burden of diseases transmitted through blood transfusion in accordance with WHO recommendations and strategies. For example Botswana, South Africa and Swaziland have maintained their prevalence well below that of the general population as indicated in Tables 16 a, b and c compared with their national prevalence data. This was however marked in countries that rely on and have used strategies to promote the recruitment and retention of voluntary blood donors.

There continues to be a generally higher burden of HBV infection among West African blood donors than in the other parts of the Region. As in 2006, the frequency of HBsAg is very high (> 10%) in some countries of West Africa and Central Africa such as Burkina Faso, Chad, Equatorial Guinea, Guinea, Mali, Mauritania, Niger, Senegal, and Sierra Leone. A higher proportion of blood units reactive to HCV is also noted in most of these countries as well as in Group C as reported in previous studies.[8,25] Côte d'Ivoire has shown a tremendous improvement in lowering the prevalence of HCV among its blood donors from 11.96% in 2006 to 1.7% in 2010. The strategies employed could help improve the situation in other countries with the same high burden of disease. HTLV continues to be isolated in Gabon and more structured epidemiological studies are required to elucidate the epidemiology of the disease in order to reduce its spread within and outside the country.

The frequency of TTIs in Equatorial Guinea compared with its neighbouring countries is alarmingly high. HIV stands at 29.1%, HBV at 15.4 and syphilis at 29.5%. Interestingly it is only in this country that the prevalence of HIV and syphilis are comparable and, if true, it would support the postulate that syphilis is a surrogate marker of high risk sexual behavior that would signify exposure to HIV infection. Mozambique too has a high frequency of HIV among blood donors unlike countries in the same subregion that have maintained a lower level of frequency of HIV among their blood donors compared with the general population, by employing proven strategies to achieve this. These countries need particular attention in organization and management of their blood services in enhancing the recruitment and retention of voluntary blood donors from low-risk populations.

The proportions of blood units reactive to/positive for TTIs in 2010 were higher in Group C than in Group A and Group B, indicating that Group C countries are collecting blood from high-risk blood donors. Compared with 2006, the median prevalence of blood units reactive to/positive for HIV and for HBV decreased from 1.9% to 1.2% and from 6.1% to 4.2% respectively. However, for HCV and syphilis, this prevalence increased from 0.7% to 0.9% and from 0.5% to 1.2% respectively.

This is dependent on a number of factors beyond the scope of this report such as the algorithms employed, the test kits on the market, validation of the test kits, storage and lack of skilled human resource, among others.

It is also a concern that Cameroon has not reported on the frequency of TTIs in the three consecutive surveys, probably due to fragmented, uncoordinated hospital-based blood transfusion services and lack of conducive data management system. The country needs to be supported to organize credible blood services. Interestingly, Cameroon reportedly has a blood policy supported by ratified legislation.

Among the countries that performed confirmatory tests, the percentages of true positives were generally lower than the percentages of reactive rates in these same countries except in Cote d'Ivoire, South Africa and Zimbabwe where the results of screening and confirmatory tests are almost similar. Confirmatory testing is important not only in facilitating post-donation counseling of blood donors for purposes of referral for further management at specialized centres but also in ensuring effective deferral of positive blood donors. Moreover confirmation of test results enables re-inclusion of donors deferred for false reactivity. Loss of donors with false positive results is costly to blood transfusion services.

Screening of donations in a quality-assured manner

In this report as defined by the tool, a centre is said to be testing blood in a quality-assured manner if it employs documented SOPs and participates in an external quality assessment scheme. It is therefore possible to use SOPs without participating in an EQAS and vice-versa. Furthermore, this could be done for some of the disease markers but not for all the four recommended in the Region. Thus, making a general conclusion that a country conducts quality-assured testing can be challenging.

The report also shows that understanding the term 'testing in quality-assured manner' poses a challenge in a number of countries. For instance, 95.3% of blood centres reported screening- for HIV in a quality-assured manner while only 19.1% of

blood centres were using SOPs and participating in an EQAS for HIV testing. In 2010, 33 countries out of 43 (76.7%) reported participating in EQAS compared with 16 countries out of 42 (30.1%) in 2006[20]. The number and proportion of centres using the SOPs and participating in EQAS in Group C were lower compared with Groups A and B. Out of the 951 centres performing screening in Group C, only 201, 8282 and 56 participated in EQAS for HIV, HBV, HCV and syphilis respectively. This, once again, demonstrates the importance of having a coordinated system with few numbers of centres performing testing. Quality-assured testing therefore correlates with the categorization of countries.

6.5 Blood component preparation, storage and transportation

Countries and centres performing blood component preparation

The total number of blood units converted into components was 2 068 174, representing 60% of the total number collected in the countries that reported blood component production. There was however no significant increase in the number of countries preparing various components over the years. Thirty-seven of the 43 countries (86.0%) had centres preparing blood components and pediatric units. The number of countries preparing red cell concentrates was 35 out of 37 compared with 29 out of 40 in 2004 and 32 out of 42 in 2006. The number of countries preparing platelet concentrates was 27 out of 43 compared with 29 out of 40 in 2004 and 25 out of 42 countries in 2006. The number of countries preparing FFP was 30 in 2010 compared with 29 in 2006. Among the categories, 16 prepared components in Group A, while Groups B and C had only three and 10 countries respectively. There is therefore a slight increase in the number of countries preparing components except for FFP.

Among the 43 countries, Groups A and B had a greater proportion of centres preparing blood components in 2010 compared with Group C. Therefore, countries whose blood programmes are organized along voluntary blood donations organize better component production programmes as their collections are not patient-based, unplanned and more often not centred around emergencies.[3,20] Factors responsible for low component production in countries should be established to ensure improvement and appropriate clinical use of blood and to optimize the use of the converted units.

Blood component preparation

The number of units of blood separated into components was not investigated in the survey in 2006 and thus it is not possible to compare the two surveys in this regard. The variability of blood components as indicated above and the amount separated into components at 60% of total collections are substancial considering the capacities existing within countries. Component production enables optimal use of each unit of blood and ensures the replacement of only that component responsible for homeostatic defect in the physiology of the patient's blood. Implementation of this modern blood transfusion practice will be further enhanced with the production of more blood components in the Region.

Of the 440 centres that prepared components, only 227 (19.8%) prepared paediatric packs (Table 18). There is therefore need to increase the number of paediatric

preparations considering that a sizeable proportion of blood transfusions in the Region are actually given to this group of patients. It is not uncommon during supervisory visits to countries to find a portion of a unit of blood being transfused to one child while the rest of the unit is discarded. Some hospitals even store the remaining parts of the blood unit even after violation of the sterile-closed system, making the unit susceptible to acquiring infection. This leads to much wastage and increases the risk of bacterial and other infections to patients.

Countries therefore need to be supported to improve their blood component production and the preparation of paediatric packs to effectively improve appropriate clinical use of blood and avoid wastage of a scarce resource while averting the risk of contamination associated with an open unit of blood.

Causes of discard of blood and blood components

In this report, the leading cause of discard of blood is reactivity to markers of infections transmitted through blood transfusion. However, the proportion of blood units discarded for TTIs decreased from 9.3% in 2006 to 7.5% in 2010 (Table 22). The proportion of discarded blood units was higher in Group C in which countries depend mainly on family replacement donations unlike countries of Groups A and Group B. This further underscores the need to invest in the collection of blood from low-risk blood donors which remains the foundation of any safe blood supply system. Other major causes of discard of blood units observed are collection of insufficient volumes, outdating, and problems of processing. These problems are encountered in Groups A and B because of the level of development of their blood transfusion services and practices. It also shows deficiencies in the process of blood collection, blood components preparation and stock management in Group C countries. This underscores the need to target staff training and capacity building in component preparation and inventory management in Group C countries.

Storage and transportation of blood

Maintaining a cold chain from vein to vein and keeping blood at the stipulated storage temperatures and conditions are mandatory if blood should be viable, efficacious and safe at the time of use. There is an increase in the number of countries reporting that more than 50% of their blood transfusion centres had optimal conditions for storage and transportation of blood. This was the case in 34 out of 43 countries in 2010 compared with 25 out of 43 countries in 2006.

For blood transportation, the number of countries was 21 out of 43 in 2010 compared with 11 out of 39 in 2006. Despite this increase, the proportion of countries having facilities for transportation of blood products is still low. Except for platelets and plasma-derived products, blood collected must be kept at 2–10°C during transportation and stored between 2°C and 6°C until its use. Freezing of red blood cells causes haemolysis, releasing free haemoglobin that is toxic to the kidneys and other organs.[31, 32] There is need to improve the capacity of blood centres in cold chain maintenance in all countries and to ensure proper storage and transportation so as to prevent the deterioration of blood and blood components.

6.6 Clinical use of blood

Although the question was asked differently in 2010, the percentage of blood transfused as red cell concentrate was 52.2%, i.e., higher in Group A (60%) and Group B (56.5%) countries and minimal in Group C (26.5%) countries. This is an improvement compared with 2006 when only 24 countries transfused more than 75% as whole blood.

Generally, the arrangements required to secure a sound clinical interface were not well developed in many countries. Only 478 of 4435 (10.7%) hospitals that performed blood transfusions had a hospital transfusion committee. Meanwhile, only 59 hospitals (1.3%) performed audits on blood transfusion and only 26% (1172) reported incidents and reactions after blood transfusion. There were 905 incidents reported from four countries out of the 17 that responded to the question on incidents. Thus, reporting on the outcome of a transfused unit of blood and the fate of the transfused patient is still a challenge in many countries in the Region and needs to be improved. Establishment of HTCs and other mechanisms of reporting and linkage between hospitals and blood centres should be explored and enhanced.

For instance, observation during WHO missions show that some blood centres in Burkina Faso (Group A) reported significant improvement in adverse reaction notification, a practice that needs to be emulated by other countries.

6.7 Achievement of the targets set in the Regional Strategy

The results of previous and current surveys showed a slow progress in situation analysis in countries of the WHO African Region. In 2010, 30 countries out of 36 (83,3%) had already analyzed their blood safety situation.

This report indicated that the number of countries implementing a blood policy increased from 23 out of 42 (54.7%) in 2006 to 29 out of 43 (67.4%) in 2010. As in the previous report, only 11 countries had adopted appropriate legislation to enforce the provisions of the policies under the law. The slow progress in adopting and implementing legislation needs to be addressed to encourage national governments, regardless of the group of countries concerned since that seems to be unrelated to the proportion of voluntary blood donations.

There was substantial improvement in screening for HIV and other transfusion-transmissible infections in 2010. However, the target of 100% of blood units screened for HIV and other transfusion-transmissible infections has yet to be attained by all the countries in the Region: 1 country is still screening less than 100% of blood units for HIV, five countries for HBV, seven for HCV and six for syphilis. This in itself increases the risk of transmission of these diseases through blood transfusion.

Concerning the fourth target of the Regional Strategy, some countries have significantly improved the collection of blood from VNRBD while others are making negative progress. The number of countries that have exceeded 80% of VNRBD did not change: 19 countries out of 42 in 2006 compared with 19 countries out of 43 in 2010. This is true despite the huge amounts of external resources that have been invested in blood transfusion services in the Region. The reasons for this anomaly may vary from country to country but mainly hinge on poor governance structures for

blood transfusion services, which is simply not a main focus of interest of the funding agencies. This also reflects the status of the entire health system in some of the countries.

Countries should be supported to bridge the remaining gaps in attaining of the regional targets on blood safety.

6.8. Gaps and constraining factors

Despite the progress made, there are still major gaps to be bridged including low policy implementation rate; poor coordination of blood services in many countries; lack of regulation; collection of blood from family replacement donors as only 20 countries have achieved the target of 80% of blood donations collected from voluntary donors; and shortage of blood mostly in rural areas. Screening of all units of blood collected for all major TTIs has still to be achieved in some countries and the quality management programme based on established norms and standards needs to be strengthened. In addition, very few countries have established a functional haemovigilance system.

These gaps are mainly due to the following constraints: lack of policy commitment in a few countries despite the development and adoption of national policies; low government funding and reliance on external funding; lack of human resources; high staff turnover, lack of career prospects for BTS staffs; lack of adequate infrastructures and equipment; and lack of incentives for BTS staff. Poor management procedures, coupled with poor management capacities, impact negatively on blood services. Finally, the absence of reliable data collection systems and poor monitoring and evaluation programmes lead to missed opportunities to identify gaps and to address them properly.

7. CONCLUSION

There has been much improvement in the status of blood safety in the WHO African Region since the ministers of health, gathered at the Regional Committee, passed the required resolution and adopted the Regional Strategy on blood safety in 1994 and 2001 respectively. Much focus and attention have been given to improving blood transfusion services in Member States with the support of development partners. Consequently, the organization and management of blood transfusion services as well as the availability and safety of blood have improved tremendously in a number of countries.

However, many countries continue to face challenges both in managerial and technical areas. The challenges include lack of or poor coordination at national level, the problem of collecting blood in sufficient quantity from low-risk donors, partial screening of blood collected for some of the TTIs, lack of adequate storage and transportation facilities, inappropriate use of blood and poor quality systems. Consequently these countries have yet to reach the minimum requirements for providing quality blood transfusion services for their populations.

Most of the countries that have established well-structured and functional national blood services in the Region are today facing issues of sustainability particularly at the expiry of external funding. Governments should allocate sufficient funding for the

blood services and establish mechanisms to consolidate the gains and continue to improve the safety, availability and accessibility of blood and blood products to patients.

The year 2012 marks the end of the period for attaining the targets set in the Regional Strategy for blood safety. Many countries are still far from achieving some of the targets. The results of this survey should be used to identify gaps in Member States and map out strategies and specific and effective interventions that will help bridge those gaps.

8. RECOMMENDATIONS

To WHO:

1. Provide feedback on the findings of this survey report to the relevant authorities, partners and implementers.
2. Revise the blood safety indicators questionnaire, taking into account the comments and proposals made in this report in order to improve the relevance and quality of data collected for use in monitoring and evaluating progress and to guide future policies and plans.
3. Organize a forum to discuss the tool and the findings and recommendations of the surveys.
4. Support Member States to adopt and implement appropriate systems and technologies for day-to-day data and information collection.
5. Organize independent surveys and missions to selected countries to cross-check the accuracy of the data reported.
6. Support the Member States to bridge the gaps identified at country level taking into consideration their specific needs.
7. Intensify advocacy and technical support in countries of Group C especially in those that have not yet implemented their policy.
8. Increase advocacy with national governments and funding agencies for allocation of more resources to national blood transfusion services.
9. Propose a discussion paper on the findings of this report at the next Regional Committee meeting.

To countries

1. Adopt conducive organizational structures to ensure the provision of quality service as well as improve the capacity of staff for effective management, monitoring and evaluation of the blood transfusion services.
2. Provide reliable and accurate data by improving the coordination of data collection between blood centres, hospitals and ministries of health.
3. Explore the sustainability options for blood transfusion services and, where possible, minimize reliance on donor funding.
4. Support blood policies with the requisite legislation and enact them into national laws.

5. Enhance public awareness to increase voluntary blood donations.
6. Establish and/or strengthen effective quality management systems in blood transfusion services.
7. Promote the establishment of strong and well-articulated national hemovigilance systems or strengthen them where they already exist.
8. Provide sufficient human, material and financial resources to the blood transfusion services and ensure their sustainability through proven mechanisms.

To National Blood Transfusion Services

1. Strive to increase the number of units collected per 1000 population in order to meet national demand for blood.
2. Make all efforts to phase out family replacement and other high-risk donations in order to improve the quality of blood supply.
3. Ensure 100% testing of all blood units for HIV 1 and 2, HBV, HCV and syphilis and improve the quality of testing for these TTIs.
4. Identify training gaps and enhance the training of appropriate personnel while mapping out strategies to retain them in BTS.

9. REFERENCES

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ANNEX 1: Blood Safety Indicators 2010, Global Database on Blood Safety

Collection of Blood Safety Indicators for the period January 2010–December 2010

The WHO programme on Blood Transfusion Safety would appreciate your kind cooperation in completing this form, which is designed to obtain information on key blood safety indicators on your country. Information on Blood Safety Indicators will be collected annually for the WHO Global Database on Blood Safety (GDBS). A more detailed questionnaire will be used for data collection on a three-yearly basis.

The GDBS was established by WHO to address global concerns about the availability, safety, and accessibility of blood for transfusion. It covers the four major components of the integrated strategy for blood safety advocated by WHO:

- The establishment of well-organized, nationally-coordinated blood transfusion services with quality systems in all areas;
- The collection of blood only from voluntary non-remunerated blood donors from low-risk populations;
- The screening of all donated blood for transfusion-transmissible infections, including HIV, hepatitis B and C, syphilis and other infectious agents, blood grouping and compatibility testing; and
- A reduction in unnecessary transfusions through the safe and appropriate use of blood.

The objective of collecting and analysing blood safety indicators from the Member States of WHO is to allow WHO to assess the global situation of blood safety, monitor trends and progress, and identify countries that require support and technical assistance.

Information on the indicators provided by countries will be published on the WHO web site at:
http://www.who.int/bloodsafety/global_database.

Blood Safety Indicators 2010

The information on these indicators should be completed by an authorized person in the Ministry of Health or the National Blood Transfusion Service. Please provide details of the person who completes the form so that WHO can contact him or her, if necessary, for clarification and further information. The form should report indicators for the period January–December 2010. If calendar year information is not available please provide information for the nearest 12 month period (e.g. Apr 2010– Mar 2011), and indicate the period covered on the form. Please give information relating to your country as a whole, if possible. At the end of each section, please provide any additional information and comments that you think may be useful for interpreting the data.

Before completing this form, please refer to the accompanying example of a completed Blood Safety Indicators form. This gives guidance on reporting the indicators, including the formulae that are used for calculating some of the indicators. The electronic version of the form will automatically calculate proportions or ratios as numerical data are entered. For the automatic calculations, it is assumed that data on each indicator are from the same subset of blood centres covered by the report. If this assumption is not valid and a different denominator should be used for correct calculation of a specific proportion or ratio, please provide the necessary information in the 'comments' box at the end of the section (citing the

serial number of the indicator). Appropriate adjustment will be made on the basis of the comments when data is compiled and analysed.

Returning the Indicators Form

When you have completed this form, please return it to the WHO country office in your country by **15 August 2011**. Please also send a copy to:

- WHO Regional Office
- WHO headquarters.

The contact details of all WHO country offices are available on the WHO web site: http://www.who.int/countries

If there is no WHO country office in your country, please send the completed form directly to the appropriate WHO Regional Office at the address given in Annex 2, with a copy to WHO headquarters at the following address:

Blood Transfusion Safety
Department of Essential Health Technologies
World Health Organization
20 Avenue Appia
CH-1211 Geneva 27
Switzerland
Fax: +41 22 791 4836
E-mail: bloodsafety@who.int

World Health Organization

Blood Safety Indicators 2010

Global Database on Blood Safety

Administrative Information	
Date of report	
Country	
Name	
Title	
Position	
Organization	
Address	
Telephonenumber	
Fax number	
E-mail	
Period covered by report	
Total population	
(give year and source)	

A Facilities forBlood Collection andSupply	
1 Number of blood centres in the country[1]	
1.1 Stand-alone blood centres	
1.2 Hospital-based blood centres	
1.3 Total	
2 Number of blood centres covered in the report	
2.1 Stand-alone blood centres	
2.2 Hospital-based blood centres	
2.3 Total	
Comments	

[1] Please refer to the definition of 'blood centre' in Annex 1. Any facilities that collect and supply blood, including those based in hospitals, should be categorized as blood centres and counted. Blood banks that **ONLY** store, check compatibility and issue blood should not be categorized as blood centres.

B Blood Donors and Blood Collection

3	Number of blood **donors** who donated blood during the reporting period (excluding autologous donors)[2]			
		Whole blood (a)	Through apheresis procedure (b)	Total (c)
3.1	Total number of donors who donated			
3.2	Number of voluntary non-remunerated donors who donated			

4	Number and % of **donations** collected during the reporting period (excluding autologous donations), by type of donation				
		Whole blood (a)	Apheresis[3](b)	Total (c)	Percent
4.1	Voluntary non-remunerated donations				%
4.2	Family / replacement donations				%
4.3	Paid donations				%
4.4	Others				
	Please specify other donations				
4.5	Total donations				%

5	Number of deferrals, by reason for deferral	
5.1	Low weight	
5.2	Low haemoglobin	
5.3	Other medical conditions	
5.4	High-risk behaviour	
5.5	Travel	
5.6	Other reasons	
	Please specify other reasons	
5.7	Total number of deferrals	
5.8	% of total deferrals	%
6	Whole blood donation rate	
6.1	Whole blood donations per 1000 population	
6.2	If this report does not cover all blood donations that were actually collected in your country, please estimate the percentage of the donations or of the population that is covered by this report[4]	
6.3	Adjusted whole blood donations per 1000 population	
7	Donation : donor ratio (average frequency of donations per donor) for voluntary non-remunerated whole blood	

[2] The number of individual donors who donated blood during the reporting period is required. Donors who donated on more than one occasion in the reporting period should only be counted once. For example, if one blood donor donated 3 times during the reporting period, the number of donors counted should be 1 rather than 3. Registered donors who have not donated blood during the reporting period should **NOT** be counted.

[3] When multiple blood components (such as platelets and plasma) are collected through one apheresis procedure, this should be counted as only 1 donation.

[4] This information is used to generate an adjusted blood donation rate per thousand population, when less than 100% of blood donations collected in the country are reported through this questionnaire. If all blood donations are accounted for, the figure is 100%; otherwise, provide an estimate of the percentage of the donations or of the population that is covered.

donors	
Comments	

C Screening for Transfusion-Transmissible Infections

	Number	Percent
8 Number and % of blood centres that perform laboratory screening of blood donationsfor transfusion-transmissible infections		

9 Number and % of **donations** (whole blood and apheresis) screened for transfusion-transmissible infections (TTIs)

TTI markers	Number[5]	Percent[6]
9.1 HIV		%
9.2 HBV		%
9.3 HCV		%
9.4 Syphilis		%
9.5 Chagas disease		%
9.6 Malaria		%
9.7 HTLV I/II		%
9.8 Other		%
Please specify other TTI marker		

10 Details of blood centres/laboratories where testing for TTIs is performed: number of donations tested, use of standard operating procedures (SOPs) and participation in External Quality Assessment (EQA)

Blood centre/ laboratory ID	Total donations	Transfusion-transmissible infections								
		No. of donations screened for TTIs				SOPs used	Participate in EQA			
		HIV	HBV	HCV	Syphilis		HIV	HBV	HCV	Syphilis
Total										

11 Number and % of **donations** screened for TTIs in a quality-assured manner

	Total number of donations screened/tested in a quality-assured manner	% of donations screened/ tested in a quality-assured manner
11.1 HIV		
11.2 HBV		
11.3 HCV		
11.4 Syphilis		

12 Number and % of **donations** that were reactive in the screening test and/or positive in the confirmatory test

TTI markers	Screening test reactive (a)	Confirmatory test positive (b)[7]

5 Please leave the cell blank if the test is not mandatory. Use the figure zero only to indicate that no donations were screened for a specified TTI marker which is required according to national policy/standards.

6 The denominator used for automatic calculation of the percentage is the total number of donations (4.5c), including whole blood donations and donations through apheresis procedures. If a particular denominator should be used for accurate calculation, please give this in the 'Comments' box.

7 Complete only if confirmatory testing is performed. Leave the box blank if confirmatory testing is not performed.

	Number	Percentage	Number	Percentage
12.1 HIV		%		%
12.2 HBV		%		%
12.3 HCV		%		%
12.4 Syphilis		%		%
12.5 Chagas disease		%		%
12.6 Malaria		%		%
12.7 HTLV I/II		%		%
12.8 Other		%		%
Please specify other TTI marker				
Comments				

D Blood Component Preparation, Storage and Transportation

	Number	Percentage
13 Number and % of blood centres that prepare blood components		%
14 Number and % of blood centres that prepare small paediatric blood units		%
15 Number and % of whole blood donations separated into components		%
16 Number of **units** of blood components prepared from whole blood[8]		
16.1 Red cell preparations		
16.2 Platelet concentrates[9]		
16.3 Fresh Frozen Plasma		
16.4 Plasma		
16.5 Cryoprecipitate		
17 Number of **units** of blood components prepared through apheresis procedures[10]		
17.1 Apheresis red cells		
17.2 Apheresis platelets[11]		
17.3 Apheresis plasma		

	Number	Percentage
18 Number and % of whole blood donations/red cell components discarded, by cause		
18.1 Incomplete collection		%
18.2 TTIs		
18.3 Date expiry		%
18.4 Storage problems		%

[8] If units of whole blood used for component preparation are not 450 ml, please indicate the volume that is used in your country in the 'Comments' box.

[9] If platelet concentrates are pooled, the total number of the original platelet concentrates that were pooled should be counted. For example, if 6 units of platelet concentrates were pooled into one bag, this should be counted as 6 platelet concentrates rather than 1.

[10] When a single apheresis procedure produces more than one type of component (e.g. plasma and platelets), all units of components should be counted.

[11] One unit of apheresis platelets usually contains 200–450 x 10^9 platelets.

18.5 Transportation problems		
18.5 Processing problems		%
18.6 Total		%
19 Number and % of blood centres that **store** blood and blood components in temperature-monitored equipment		%
20 Number and % of blood centres that **transport** blood and blood components in temperature-monitored equipment		%
Comments		

E Clinical Use of Blood and Blood Components

21 Number of hospitals in the country that perform blood transfusion[12]		
22 Number and % of hospitals performing blood transfusion that have or participate in:	Number	Percent
22.1 Hospital transfusion committee		%
22.2 Clinical audits[13]		%
22.3 Mechanism for reporting adverse transfusion incidents and reactions		%
23 Number of **units** of each of the following blood and blood components transfused/issued (excluding autologous blood units) in the country		
23.1 Whole blood		
23.2 Red cells		
23.3 Platelet, whole blood-derived		
23.4 Platelet, apheresis		
23.5 Fresh frozen plasma		
23.6 Plasma		
23.7 Cryoprecipitate		
24 Number of patients transfused in the country[14]		
25 Number of **serious** adverse transfusion incidents and reactions reported in the country		
25.1 Serious adverse transfusion incidents[15]		
25.2 Serious adverse transfusion reactions[16]		
25.3 Total (incidents and reactions)		
Comments		

[12] Please provide national data if it is available. If partial data is provided, please give coverage information in the 'Comments' box.

[13] Please refer to the definition of 'clinical audit' in Annex 1.

[14] Please provide national data if it is available. If partial data is provided, please give coverage information in the 'Comments' box.

[15] Please refer to the definition of 'serious adverse incident' in Annex 1.

[16] Please refer to the definition of 'serious adverse reaction' in Annex 1.

DEFINITIONS

For the purposes of data collection through this form, the following definitions should be used in answering the questions.

Blood centre: A facility that carries out all or part of the activities for donor recruitment, blood collection (whole blood and, in some cases, apheresis), testing for transfusion-transmissible infections and blood groups, processing into blood components, storage, distribution to hospital blood banks within a defined region, and liaison with clinical services. Blood centres may be stand alone or hospital-based. The following should **NOT** be categorized as blood centres:

- Mobile or fixed blood collection sites/rooms that are operated as part of a blood centre.
- Hospital blood banks that only store, check compatibility and issue screened blood.

Blood donors

- **Voluntary non-remunerated blood donor**: A person who donates blood (and plasma or cellular components) of his/her own free will and receives no payment for it, either in the form of cash, or in kind which could be considered a substitute for money.
- **Family/replacement blood donor**: A person who gives a replacement unit of blood only when a family member or friend requires transfusion.
- **Paid "donor"**: A "donor" who gives blood for money or other form of payment.
- **Autologous donor**: A patient who donates his/her blood to be stored and reinfused, if needed, during surgery.

Clinical Audit: A quality improvement process that seeks to improve patient care and outcomes through systematic review of the use of transfused blood components against transfusion guidelines and the implementation of change..The aim of this process is to create a culture of delivering a quality service to patients and improve medical care on a continuous basis.

External quality assessment (EQA): The external assessment of a laboratory's performance using samples of known, but undisclosed, content and comparison with the performance of other laboratories. An external quality assessment scheme is a recognized scheme for organizing EQA. This can be a local scheme or may be organized at national, regional or international levels.

Fresh Frozen Plasma (FFP): A component prepared from whole blood or from plasma collected by apheresis frozen to a temperature that will maintain the labile coagulation factors in a functional state.

Quality-assured testing: For the purpose of data collection, testing in a quality-assured manner is defined as "testing performed in a laboratory that:

- Uses documented standard operating procedures
- Participates in an external quality assessment scheme".

Serious adverse incident: A case where the patient is transfused with a blood component that did not meet all the requirements for a suitable transfusion for that patient, or was intended for another patient and that might lead to death or a life-threatening, disabling or incapacitating condition or which results in, or prolongs, hospitalization or morbidity.

A serious adverse incident may be due to transfusion errors or to deviations from standard operating procedures or hospital policies that have led to mistransfusion. It may or may not lead to a serious adverse reaction.

Serious adverse reaction: An undesirable response or effect in a patient associated with the administration of blood or blood components that is fatal, life-threatening, disabling or incapacitating or which results in, or prolongs, hospitalization or morbidity.

Standard operating procedure (SOP): Written instructions for the performance of a specific procedure in a standardized manner.

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ANNEX 2: Questionnaire on the achievement of the targets set in the Regional Strategy

Regional strategy for blood safety: achievement of targets set by Member States

Country:
Name of the national focal person:
Date:
Signature:

	Regional Strategy Target	Response	Comments
01	Situation analysis done (Yes or No)		
02	National Blood Policy adopted (Yes or No)		
03	National Blood Policy is being implemented (Yes or No)		
04	Legislation is adopted (Yes or No)		
05	Legislation is being implemented (Yes or No)		
06	Percentage of units of blood collected screened for various TTIs		
07	Percentage of voluntary non remunerated blood donors in the country (%)		
08	Quality management programme is in place in BTS (yes or no)		
09	Annual budget allocated by MOH to Blood Transfusion Services (amount in US$ and percentage)		
10	General comments on progress made during the last 10 years with special emphasis on the main achievements and challenges	NB: Add additional page if necessary	