

Trends in HIV prevalence in blood donations in Europe, 1990–2004

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Introduction: The comparison of HIV prevalence among blood donations in European countries provides an indication of the relative safety of the blood supply in different countries and over time.

Methods: Data between 1990 and 2004 on annual numbers of blood donations and HIV prevalence in blood donations were collected from national correspondents in the 52 countries of the World Health Organization European Region. Data are presented for three geographic areas: West, Centre and East.

Results: Since 1990, the number of blood donations has declined by 43% in the East and by 26% in the Centre, while remaining relatively stable in the West. In 2004, the number of blood donations was more than twice as high in the West in comparison with the East and the Centre. Over the same period, HIV prevalence among blood donations increased dramatically in the East, remained stable in the Centre and declined in the West. Since 2001, HIV prevalence levels of more than 10 per 100 000 donations were reported from six countries in the East (with a high of 128/100 000 in Ukraine), whereas in the rest of Europe the reported national HIV prevalence levels were lower than 10/100 000 donations. The prevalence of HIV was much lower among donations from repeat donors than from first-time donors.

Conclusion: In some eastern European countries public health interventions, such as deferring individuals at risk of HIV infection from donating blood and constituting a pool of regular donors, are urgently needed to assure the safety of the blood supply.

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Introduction

In Europe, most blood donations have been screened for HIV since the mid-1980s, when HIV tests became available [1]. Blood donations that are screened positive are discarded and donors found to be infected prevented from ever donating blood again. Nevertheless, a small residual risk of HIV infection through transfusion of undetected infected blood remains during the window period, which occurs shortly after a person is infected and before viral markers of the infection can be detected.

At the global level, the World Health Organization (WHO) has produced policy guidelines for the development of blood transfusion services [2]. At European level, the Council of Europe has published recommendations on blood transfusion safety [3] and the European Commission has issued directives setting standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components in all European Union (EU) member states [4,5] which have been adopted by the European Parliament. Various strategies have been implemented in European countries in order to increase blood safety, including improvement of

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donor selection, attaining national self-sufficiency in the blood supply and, more recently, the introduction of nucleic acid testing (NAT) in many countries [6–12].

Monitoring HIV prevalence among blood donations is a vital tool for evaluating the safety of the blood supply, providing important information with which to implement appropriate public health measures and policies [12–14]. The comparison of European data provides an indication of the relative safety of the blood supply across countries and over time. In this study we assessed the geographic and time trends of HIV prevalence in blood donations in the countries of the WHO European Region.

Methods

We present data on HIV prevalence in blood donations for the WHO European Region for the period 1990 to 2004. These data are presented within three geographic areas: the West (23 countries including the 15 pre-2004 EU member states plus Iceland, Malta, Norway, Switzerland and Israel); the East (the 15 countries of the former Soviet Union) and the Centre (the remaining 14 countries of the WHO European Region) (see Table 1).

Since 1986, EuroHIV has monitored the prevalence of HIV among blood donations in the WHO European Region. National HIV/AIDS correspondents or blood transfusion services have provided, on an annual basis, the number of blood donations screened for HIV and the number of HIV-positive donations and these data have been included in the European HIV Prevalence Database. National data have been reported for all countries except Portugal, where data were provided for three regional blood centres based in the three largest cities (Table 1). Data from Andorra are included in the French national data.

Two countries, Tajikistan and Turkmenistan, did not provide data for the period 2000–2004. The remaining 49 countries of the region contributed at least 1 year of data during the period 2000–2004, most of which (38 countries) reported the latest data for 2004; two countries reported the latest data for 2003, six for 2002, two for 2001 and one for 2000 (Table 1).

The blood donation activity by country and geographic area was calculated for each year as the total number of blood donations per 1000 population aged 20–64 years. As age limits for donating blood vary between countries, the denominator of those aged 20–64 years was chosen to best encompass these variations. HIV prevalence is expressed per 100 000 donations. Four countries reported that data included plasma donations, the proportion of which varied from 26% in Germany to < 1% in Finland (Table 1).

Since 1988, HIV prevalence data in donations from first-time and repeat donors have been collected from those countries able to provide such data. Data from first-time donors include donations from new and candidate donors who are persons whose blood was tested for the first time for HIV within a given blood transfusion service. Data from repeat donors include donations from persons whose blood was previously tested for HIV. The proportion of donations from first-time donors is presented separately for the countries for which data were available (Table 2).

Results

Blood donation activity

Blood donation activity per year, as measured by donations per 1000 population aged 20–64 years in the latest year available during the period 2000–2004, was more than twice as high in the West (85.4 per 1000 population, 22 countries) than in the Centre (39.4 per 1000 population, 14 countries) and in the East (36.5 per 1000 population, 13 of 15 countries) (Table 1).

Since 1990, overall blood donation activity in the West remained relatively stable at around 85 donations per 1000, although a small increase was noted since 2001 (Fig. 1). Differences between countries in the West diminished, with the range in donation activity narrowing from 30–160 per 1000 in 1990 to 60–126 per 1000 in 2004 (detailed data not presented). In contrast, since 1990, blood donation activity has decreased by 43% in the East (seven countries), and by 26% in the Centre (nine countries).

HIV prevalence in blood donations

In 2004 (or the most recent year with data available), the prevalence of HIV was 8.7 per 100 000 blood donations in the WHO European Region, but was much lower in the West (1.7) and the Centre (3.4) than in the East (36.7). HIV prevalence among blood donations varied widely between countries, ranging from zero per 100 000 donations in 11 countries (i.e. no HIV infections detected in blood donations) to 128.4 per 100 000 in Ukraine (Table 1).

In the West, for the most recent year with data available in the period 2000–2004, seven countries reported no HIV-positive donations and the prevalence of HIV was less than 5 per 100 000 donations in 12 countries and higher than 5/100 000 donations in three countries: Spain (5.8), Greece (5.3) and three regional centres of Portugal (10.4) (Table 1). The prevalence of HIV among blood donations has declined steadily since 1990, from 5.2 per 100 000 in 1990 to 1.5 per 100 000 in 2004 (Fig. 2).

In the Centre, three countries reported no HIV-positive donations and the prevalence of HIV was less than 5 per

Table 1. Number of blood donations, donation activity and HIV prevalence among blood donations in 2004 (or latest year available in 2000–2004).

Geographic area and country	Year	Total number of blood donations	Donations per 1000 population (20–64 years)	Number of HIV+ blood donations	HIV+/100 000 blood donations
West^a					
Austria	2004	514 326	101.5	7	1.4
Belgium	2004	747 331	120.4	3	0.4
Denmark	2004	391 910	119.1	3	0.8
Finland	2004	285 794 ^b	89.9	0	0.0
France	2004	2 498 298	68.6	35	1.4
Germany	2004	6 370 671 ^b	125.9	77	1.2
Greece	2002	543 485	79.9	29	5.3
Iceland	2002	15 598	93.6	0	0.0
Ireland	2004	157 346	62.8	1	0.6
Israel	2004	281 879	79.5	3	1.1
Italy	2003	2 104 199	59.0	57	2.7
Luxembourg	2004	21 017	74.3	0	0.0
Malta	2004	15 292	62.3	0	0.0
Monaco	2002	2767	81.1	0	0.0
Netherlands	2004	919 300	91.7	4	0.4
Norway	2004	200 000	73.7	0	0.0
Portugal ^c	2004	115 862	–	12	10.4
San Marino	2004	1078	38.7	0	0.0
Spain	2004	1 610 824	59.2	93	5.8
Sweden	2004	624 900	118.0	2	0.3
Switzerland	2004	377 288	84.6	5	1.3
United Kingdom	2004	2 779 863	78.7	18	0.6
Total West		20 579 028	85.4	349	1.7
Centre					
Albania	2001	14 000	8.6	1	7.1
Bosnia & Herzegovina	2004	42 483	17.4	0	0.0
Bulgaria	2004	152 813	31.5	6	3.9
Croatia	2004	147 802	53.5	4	2.7
Cyprus	2004	46 145	82.5	0	0.0
Czech Republic	2004	514 523 ^b	77.9	1	0.2
Hungary	2004	505 344	79.6	3	0.6
Macedonia, F.Y.R.	2004	54 758	44.1	0	0.0
Poland	2004	1 006 639	41.8	17	1.7
Romania	2004	362 486	27.5	28	7.7
Serbia & Montenegro ^d	2004	230 812	42.1	22	9.5
Slovakia	2002	118 722	35.4	1	0.8
Slovenia	2004	84 684	67.2	2	2.4
Turkey	2004	1 227 085	30.4	68	5.5
Total Centre		4 508 296	39.4	153	3.4
East^e					
Armenia	2004	11 957	7.1	1	8.4
Azerbaijan ^f	2002	26 501	3.0	8	30.2
Belarus	2004	320 530 ^b	53.6	15	4.7
Estonia	2004	62 040	77.5	11	17.7
Georgia	2002	21 720	8.1	6	27.6
Kazakhstan	2003	342 836	40.6	30	8.8
Kyrgyzstan	2001	35 687	14.4	0	0.0
Latvia	2004	71 264	51.2	6	8.4
Lithuania	2004	85 615	42.0	1	1.2
Moldova, Republic of	2004	71 161	27.6	27	37.9
Russian Federation	2004	3 803 488	42.6	889	23.4
Ukraine	2004	941 524	33.0	1209	128.4
Uzbekistan	2000	224 345	19.1	6	2.7
Total East		6 018 668	36.5	2209	36.7
Total WHO European Region		31 105 992		2711	8.7

WHO, World Health Organization.

^aData from Andorra are included in French national data.^bProportion of plasma donations: Belarus 7.6%, Czech Republic 14%, Finland 0.2%, Germany 26%.^cData from regional blood centres in the three main cities (Coimbra, Lisbon and Oporto); do not represent the country as a whole.^dExcluding data from Kosovo.^eData unavailable from Tajikistan and Turkmenistan.^fData for 2001 and 2002 combined.

Table 2. Proportion of blood donations from first-time donors, number of HIV+ donations and HIV prevalence among donations from first-time and repeat donors in 2004 (or latest year available).

Geographic area and country	Year	Proportion of donations from first-time donors (%)	Donations from first-time donors		Donations from repeat donors	
			No. HIV	HIV+/100 000	No. HIV	HIV+/100 000
West						
Belgium	2004	7	1	1.9	2	0.3
Denmark	2004	9	1	2.8	2	0.6
Finland	2004	6	0	0.0	0	0.0
France	2004	15	15	4.0	20	0.9
Germany	2004	8	25	4.8	52	0.9
Greece ^a	2002	19	19	18.1	2	1.0
Italy	2003	12	24	9.4	33	1.8
Ireland	2004	12	1	5.5	0	0.0
Luxembourg	2004	4	0	0.0	0	0.0
Malta	2002	20	0	0.0	0	0.0
Monaco	2001	8	0	0.0	0	0.0
Netherlands	2004	5	0	0.0	4	0.5
Sweden	2004	6	0	0.0	2	0.3
Switzerland	2004	5	0	0.0	5	1.4
United Kingdom	2004	11	7	2.3	11	0.4
Total West		10		5.0		0.8
Centre						
Croatia ^b	2003	12	2	11.0	4	2.8
Poland	2004	16	15	9.1	2	0.2
Romania	2001	19	26	36.8	9	3.1
Serbia & Montenegro ^c	2002	2	1	18.0	1	11.4
Slovenia	2001	13	0	0.0	0	0.0
Total Centre		15		16.3		1.2
Total WHO						
European Region						
				6.5		0.9

WHO, World Health Organization.

^aPartial data only.

^bData for Zagreb city and Zagreb county (25% of the population).

^cData available for Montenegro only.

100 000 donations in all countries except Albania (7.1), Serbia and Montenegro (9.5), Romania (7.7) and Turkey (5.5) (Table 1). The prevalence of HIV among blood donations has remained stable since 1990, with overall levels ranging between 1.3 and 3.5 per 100 000 donations (Fig. 2).

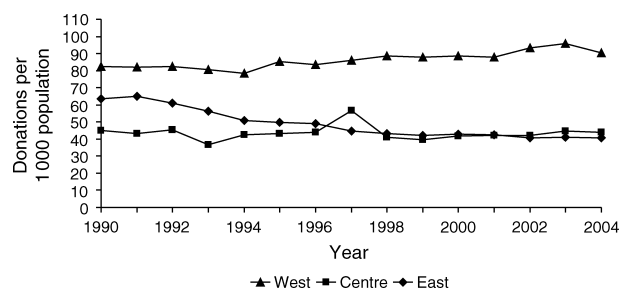


Fig. 1. Blood donation activity by geographic area, 1990–2004, WHO European Region. West: Austria, Denmark, Finland, France, Germany, Ireland, Luxembourg, Malta, Norway, Spain, Sweden, Switzerland, United Kingdom; Centre: Bulgaria, Croatia, Czech Republic, Hungary, F.Y.R. of Macedonia, Poland, Serbia & Montenegro, Slovenia, Turkey; East: Belarus, Estonia, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine.

In the East, only one country (Kyrgyzstan) reported no HIV-positive donations and six countries reported an HIV prevalence higher than 10 per 100 000, ranging from 17.7 per 100 000 donations in Estonia to a high of 128.4 per 100 000 in Ukraine (Table 1). Overall HIV prevalence among blood donations has increased rapidly since the

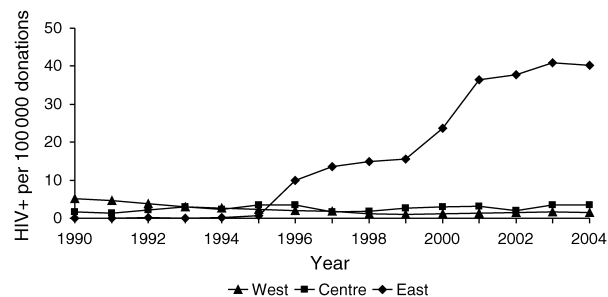


Fig. 2. HIV prevalence among blood donations by geographic area, 1990–2004, WHO European Region. West: Austria, Denmark, Finland, France, Germany, Ireland, Luxembourg, Malta, Norway, Spain, Sweden, Switzerland, United Kingdom; Centre: Bulgaria, Croatia, Czech Republic, F.Y.R. of Macedonia, Poland, Serbia & Montenegro, Slovenia, Turkey; East: Belarus, Estonia, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine.

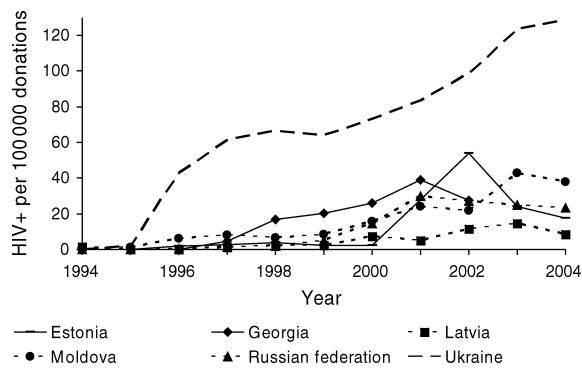


Fig. 3. HIV prevalence among blood donations in selected countries in the East, 1994–2004, WHO European Region.

mid-1990s, from 0.6 per 100 000 donations in 1995 to over 40.3 in 2004 (Fig. 2). The earliest and largest increase was in Ukraine, where levels increased from 2.1 per 100 000 donations in 1995 to 128.4 in 2004 (Fig. 3). In Georgia and the Republic of Moldova, increases in HIV prevalence began later (in 1997 and 2000, respectively) and reached peaks of respectively, 38.9 (in 2001) and 43.0 (in 2003) per 100 000 donations (Fig. 3). In the Russian Federation, HIV prevalence doubled between 1999 and 2000 and again in 2001, to reach 29.7 per 100 000, but has since remained stable (Fig. 3). In Estonia, the prevalence of HIV reached a peak of 54 per 100 000 blood donations in 2002 before decreasing to 17.7 in 2004.

Data on HIV prevalence in blood donations from first-time and repeat donors for the period 2001–2004 were reported for 20 countries: 15 in the West and five in the Centre, but none in the East (Table 2). Overall, donations from first-time donors accounted for 10% of all donations in the West and 15% in the Centre; this proportion ranged from 2% in Montenegro to 20% in Malta. The overall HIV seropositivity per 100 000 donations was higher in donations from first-time donors (6.5 per 100 000) than from repeat donors (0.9 per 100 000).

In the West, HIV prevalence among first-time donors was 5.2 per 100 000 donations, seven countries reported no HIV-positive donations and the highest prevalence was 18.1 per 100 000 donations (Greece). HIV prevalence among donations from repeat donors was 0.8 per 100 000 donations, no positive donations were reported in five countries and the highest prevalence was 1.8 per 100 000 in Italy (Table 2).

In the Centre (data from five countries only), the prevalence among first-time donors was more than three times that of the West (16.3 per 100 000 donations) and the highest prevalence was reported in Romania (36.8 per 100 000). HIV prevalence among donations from repeat donors was nearly 50% higher than in the West (1.2 per 100 000 donations); only one country (Slovenia) reported no HIV-positive donations and the

highest prevalence was 11.4 per 100 000 donations in Montenegro (Table 2).

Discussion

In the West and the Centre, prevalence of HIV in blood donations has remained low (< 10 per 100 000 donations) and stable in recent years, indicating a low risk of HIV-infected donations entering the blood supply. In contrast, rapid increases in the prevalence of HIV in blood donations have been reported from many countries of the East, and most notably from Ukraine. These increases in HIV prevalence in blood donations have paralleled the increased transmission of HIV in this region, mainly among injecting drug users [15]. HIV outbreaks have been reported in several countries including Belarus, Estonia, Kazakhstan, Latvia, the Republic of Moldova, the Russian Federation and Ukraine [16–20]. The increase in HIV prevalence among blood donations reflects the intensified HIV transmission in donor source populations in these countries and is a cause for concern in assuring the safety of blood transfusions.

The most critical component of blood safety is the screening of blood for infectious agents. However, some countries have experienced difficulties in ensuring the proper screening for HIV of all donations, often due to economic constraints [21–23]. Nonetheless, few cases of HIV infection transmitted through blood transfusion have been reported from eastern European countries [15,23,24], although a recent outbreak in Kazakhstan has been linked to blood transfusions [25].

Another important component of blood safety is the selection of donors. In many countries of the East, family replacement or paid donations [21,26,27], which are at increased risk of HIV infection [28], are often used. Furthermore, blood services may, paradoxically, attract some individuals at increased risk of HIV as studies have shown that the primary objective of a certain proportion of persons donating blood is to test for HIV [29]. Therefore, the lack of voluntary counselling and testing facilities in the East may contribute to the prevalence of HIV in blood donations as blood centres may serve as unofficial HIV testing sites [30,31]. In contrast, countries in the West have adopted a strict list of donor deferral criteria that have been formally included in an EU directive [4,5]. In the West, persons with high risk behaviour have been excluded from donating blood for more than two decades, including permanent deferral of men who have sex with men in many countries [32], although this ban has recently been lifted in Portugal [33] and discussions are ongoing in other European countries [34,35].

The maintenance of a pool of regular donors is yet another important component of assuring blood safety.

HIV prevalence among first-time donors is generally higher than that among repeat donors who, in order to remain on the list of donors, have to be HIV negative. Those donors, who are initially HIV negative and subsequently found to be positive, will have acquired their infection since their last donation. In both the West and the Centre, there is evidence of significantly less HIV-infected blood donations provided by repeat donors, stressing the importance of sustaining a pool of regular donors. However, the maintenance of a pool of regular donors requires considerable resources, which some health care systems in transition may not be able to provide.

Levels of HIV prevalence in blood donations also depend on the stage of the HIV epidemic. At the very peak of the epidemic, when HIV transmission is the most intensive, there is a large proportion of HIV-infected people who have not yet been diagnosed with HIV and potentially can donate blood while unaware of their serostatus. When the epidemic is established, more people will have been tested and consequently the proportion of those who do not know their status decreases.

When screening of blood donations for HIV was started in the West in the mid-1980s, high numbers of HIV-positive donations were reported in some countries (e.g. France, Italy, Spain), which reflected the cumulated numbers of HIV-infected blood donors infected before the initiation of HIV testing [36]. In countries of the East, the prevalence in blood donations reflected trends of new HIV infections. In Estonia and Russian Federation, the peaks of positive HIV donations mirrored the peaks of new HIV diagnoses [14]. UNAIDS estimates that HIV prevalence among the general population is higher than 1% in two countries of the East (Ukraine at 1.4% and Estonia at 1.1%) and higher than 0.5% in another three: Russian Federation, Latvia, and Republic of Moldova [37]. Unsurprisingly, a high HIV prevalence was observed in both the general population and blood donations in those countries. Although HIV prevalence in blood donations is much lower than in the general population, donor selection criteria are not effective enough, allowing a substantial number of persons at risk of HIV infection to donate blood.

Furthermore, the probability of HIV transmission by blood transfusion depends also on infected blood being donated during the window period. The proportion of HIV-infected individuals who are in the window period will be higher in countries with intense on-going HIV transmission. Several, mostly western, European countries have implemented HIV NAT, which decreases the residual risk of such positive HIV donations entering the blood supply [6–11]. However, as the residual risk in the West is very low, the relative gain of this expensive technique is of limited benefit [38]. On the other hand, in some countries of the East (e.g. Ukraine), with high levels

of HIV-infected blood donations and recent epidemics, this approach, following appropriate evaluations of cost-effectiveness, could offer more advantage in identifying recently infected blood donations not yet detectable by the usual screening methods.

We have reported the number of HIV-positive donations per 100 000 in order to assess the risk of HIV transmission through blood transfusion, while comparing levels of HIV infection among blood donations over time and across Europe. This measure is dependent not only on the proportion of first-time donors, which varies both by country and over time, but also on the frequency of donations made by repeat donors. Recent guidelines, effective from July 2005 and applicable to EU countries only, recommend that HIV prevalence should be reported among first-time donors and HIV incidence among repeat donors [13]. However, since information on first-time and repeat donors is not available for many countries from Central and Eastern Europe [12], HIV prevalence among donations has been employed here. Country health authorities, especially in the East, should endeavour to improve the data collected, preferably according to recent guidelines [13], so as to better evaluate the success of measures to encourage repeat donors, thereby contributing to the safety of the blood supply.

Donor selection policies and the ratio of repeat versus first-time donors, the evolution and differences in screening tests and algorithms as well as the relevant contribution of plasma donations should be considered when comparing the trends between countries and over time. In some eastern European countries, due to economic reasons, screening tests and confirmation algorithms may have changed, although this is likely to have only a small impact on reported prevalence. The inclusion of data from plasma donations will increase the denominator and thus underestimate HIV prevalence, although the proportion of such donations remains very low in all but a few countries.

The control of transfusion-transmitted infectious diseases is an important public health issue. Much attention has been paid and resources allocated to ensure the safety of blood in the West. In contrast, large increases in the prevalence of HIV in blood donations have been observed in the East reflecting severe HIV epidemics in those countries. The safety of the blood supply in the East urgently needs to be improved by the implementation of specific measures. These measures should include improvement of donor selection, notably maintaining a pool of regular donors and expanding voluntary non-paid donations, enhanced screening of donations with the most sensitive tests and development of general HIV preventive services such as voluntary counselling and testing sites. To achieve these objectives, not only scientific, but also strong political and financial commitment needs to be provided by national and international bodies.

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