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Comparative Analysis of Blood Donation Trends in Poland and Ukraine During 2015-2024

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ABSTRACT

Blood donation is a vital part of modern healthcare, providing essential support for surgical procedures, trauma care, oncology, obstetrics and transplant medicine. This study analyses statistical trends in blood donation in Poland between 2015 and 2024, comparing them with available data from Ukraine. Data were obtained from national statistical reports and digital donor registries. Descriptive statistical methods were employed to evaluate the total number of donors, annual donations, population-based donor rates, and contextual factors that influence donor participation. The results show that Poland has maintained a stable blood donation system with around 640,000-651,000 registered donors each year. This system is supported by a centralised organisational structure and long-standing public awareness initiatives. In contrast, Ukraine has seen lower levels of donor participation, with around 450,000-500,000 donors per year. However, wartime mobilisation and civic engagement have significantly boosted blood donation activity in Ukraine. A comparative analysis highlights the impact of organisational models, socio-political conditions and public awareness on donor mobilisation and the stability of the blood supply. The findings suggest that strengthening donor recruitment strategies, expanding digital registries and maintaining continuous awareness campaigns could enhance the resilience and sustainability of national blood transfusion systems.

1. Introduction

Blood donation is an essential part of modern healthcare systems. Adequate supplies of blood and its components are necessary for surgical procedures, trauma care, oncology treatments, obstetric complications and transplantation medicine. As blood and its components participation from voluntary blood donors (Gasparovic Babic et al., 2024; Myers and Collins, 2024). The World Health Organization (WHO) emphasises that voluntary, non-remunerated blood donation is the safest and most sustainable way to maintain a sufficient and safe blood supply worldwide (Dorle et al., 2023; WHO, 2025).

According to international transfusion medicine guidelines, a stable national blood supply generally requires approximately 1-3% of the population to donate blood regularly, although the exact demand varies depending on the population's demographic structure and healthcare needs (WHO, 2001, 2010). In many countries, however, maintaining adequate donor participation remains challenging. Demographic ageing, population mobility and changing social attitudes towards volunteering may affect the long-term stability of blood donation systems (Hyde et al., 2025; Lin et al., 2026; Oesterreicher et al., 2026). Consequently, monitoring national blood donation trends has become an important component of public health planning.

Central and Eastern Europe is a particularly relevant region for comparative analysis, as countries in this region share several historical and socio-economic characteristics, yet have different healthcare systems and donor recruitment strategies. Comparative analyses of blood donation trends can therefore provide valuable insights into the influence of organisational models, public awareness campaigns and socio-political conditions on donor participation and blood supply stability (Siekierska et al., 2023; Gasparovic Babic et al., 2024).

Poland operates a centralised national blood transfusion service. Coordinated by the National Blood Centre, the system comprises 21 Regional Blood Donation and Blood Treatment Centres (Regionalne Centra Krwiodawstwa i Krwiolecznictwa – RCKiK), responsible for donor recruitment, blood collection, laboratory testing and the distribution of blood components to hospitals (Rosiek et al., 2022). While the number of blood donors in Poland has remained relatively stable in recent years, temporary fluctuations were observed during the pandemic due to mobility restrictions and reduced access to donation sites. According to national statistics, the number of blood donors reached approximately 640,200 in 2023, indicating the blood donation system's gradual recovery following the pandemic (Statistics Poland, 2023; Krwiodawcy.org, n.d.).

Ukraine, in contrast, faces additional challenges associated with the transformation of its healthcare system and the large-scale armed conflict that began in 2022. The war has substantially increased demand for blood and blood components, particularly in trauma care, emergency medicine and military healthcare. Despite these difficulties, the development of digital platforms and civic initiatives promoting voluntary blood donation has increased public awareness and donor mobilization (Goniewicz et al.,

2023). The national digital donor registry DonorUA, for example, facilitates communication between donors, blood centres, and medical institutions, thereby improving the efficiency of donor recruitment and emergency blood supply coordination (DonorUA, n.d.).

Due to the significant differences in demographic dynamics, healthcare infrastructure and current socio-political conditions between Poland and Ukraine, a comparative evaluation of blood donation trends could offer valuable insights into the resilience and adaptability of their respective national blood transfusion systems. Understanding these trends is crucial for identifying potential risks to the stability of the blood supply and for developing strategies to strengthen voluntary blood donation systems in the region.

The aim of this study was therefore to analyse statistical trends in blood donation in Poland over the last decade, and to compare these with available data from Ukraine. Despite temporary disruptions such as the pandemic, we hypothesised that the Polish blood donation system has maintained relative stability due to its centralised organisational structure. In contrast, we predicted that Ukraine would experience more dynamic changes in donor participation, associated with wartime mobilisation and increased societal engagement in voluntary blood donation initiatives.

2. Literature Review

Previous research has focused on the development and organisation of blood donation systems in Poland and Ukraine, including the level of donor participation and the functioning of national blood transfusion services. Particular attention has been paid to the functioning of blood donation systems in European countries and the challenges associated with maintaining sufficient donor participation.

2.1 Blood donation system in Poland

Research on blood donation in Poland mainly focuses on the organisational structure of the national blood transfusion service and the factors supporting stable donor participation. According to Rosiek et al. (2022), the Polish blood donation system operates as a centralized network coordinated by the National Blood Centre and regional blood donation centres responsible for blood collection and distribution. This organisational structure contributes to the effective coordination of donor recruitment and blood supply management.

Other studies also highlight the role of regular donation campaigns, institutional support and cooperation with educational institutions in maintaining voluntary blood donation in Poland (Siekierska et al., 2023). These mechanisms help ensure a relatively stable number of donors and maintain an adequate national blood supply.

2.2 Blood donation system in Ukraine

Studies on blood donation in Ukraine have identified several structural and organisational challenges affecting the development of the national blood service. According to Khomenko (2022), statistical analysis of blood donation indicators between 2012 and 2020 revealed a significant decline in the number of donors and blood collection volumes. The study also reported a reduction in the number of blood transfusion centres and medical institutions involved in blood collection.

Recent reports indicate that digital platforms and civic initiatives have become increasingly important in donor mobilisation in Ukraine. In particular, the DonorUA platform facilitates communication between donors and healthcare institutions, improving the coordination of blood donation activities and increasing public awareness of voluntary blood donation.

3. Methodology

3.1 Data sources

The statistical data used in this study were obtained from several official, publicly accessible sources. The primary dataset for Poland was derived from annual national reports on blood donation and haemotherapy published by the National Blood Centre and the Regional Blood Donation and Blood Treatment Centres (RCKiK) (Krwiodawcy.org, n.d.; Statistics Poland, 2023). These centres constitute Poland's official blood transfusion service. Additional statistical information was obtained from publicly available databases of national statistical institutions and health authorities, as well as reports on the operation of the national blood donation system.

Data for Ukraine were collected from public health reports, national and regional donor registries and analytical materials prepared by blood donation organisations and civic initiatives that support voluntary blood donation. This includes digital donor coordination platforms (DonorUA, n.d.). Only aggregated, publicly available statistical data were used in this study; therefore, no individual donor information or personal data were analysed.

The analysis covered the period 2015–2024, depending on the availability and completeness of national statistical data. This timeframe enabled an assessment of long-term trends in blood donation systems as well as the identification of potential disruptions related to major external factors, including the COVID-19 pandemic and the military conflict that began in 2022.

3.2 Data analysis

Several key indicators describing the functioning of national blood donation systems were analysed. These included the total number of registered blood donors, the annual number of blood donations and changes in donor participation over time. Population-based indicators, such as the number of donors per 1,000 inhabitants, were also considered to enable comparisons between countries of different sizes.

The analysis also incorporated contextual factors that could affect blood donation activity, such as demographic trends, public health crises, organisational aspects of national blood services and social engagement in voluntary health initiatives.

Descriptive statistical methods were used to analyse the collected data and identify temporal trends and fluctuations in donor participation during the analysed period. Descriptive indicators such as absolute numbers, percentage changes and time-series comparisons were used to present the dynamics of blood donation activity.

Furthermore, a comparative analysis of Poland and Ukraine was conducted using relative indicators and contextual interpretation of healthcare system characteristics, demographic structures and social factors influencing voluntary blood donation. This analytical approach was primarily exploratory and descriptive, focusing on identifying patterns and differences in national blood donation trends rather than testing causal relationships.

4. Findings

4.1 Blood donation trends in Poland.

Over the past decade, Poland has maintained a relatively stable number of blood donors, experiencing only moderate fluctuations. According to national statistics published by the National Blood Centre and the annual reports of the Polish Blood Transfusion Service, the number of registered donors remained within a relatively narrow range during the analysed period (Krwiodawcy.org, n.d.). The following values illustrate the general trend: 2015 – 630,385, 2016 – 596,480, 2017 – 588,436, 2018 – 590,656, 2019 – 591,181, 2020 – 570,077, 2021 – 615,927, 2022 – 622,071, 2023 – 640,200.

The process of blood donation and the subsequent laboratory processing of collected blood components are carried out in specialised blood transfusion centres. Examples of these procedures at the Regional Blood Donation and Blood Treatment Centre (RCKiK) in Słupsk, Poland are presented in Figures 1 and 2.

Figure 1: Blood donation procedure using an automated blood collection system at the Regional Blood Donation and Blood Treatment Centre (RCKiK) in Słupsk, Poland. Source: author's photograph, 2025

The data indicate a gradual decline between 2016 and 2017, followed by a period of relative stabilisation between 2017 and 2019. A more pronounced decrease was recorded in 2020, which coincided with the global pandemic and the introduction of public health restrictions that limited mobility and temporarily reduced access to blood donation sites. However, the Polish blood donation system demonstrated a rapid recovery in subsequent years. The number of donors increased significantly in 2021, suggesting that blood donation centres had adapted effectively through organisational adjustments, safety protocols and targeted donor recruitment campaigns (Krwiodawcy.org, n.d.; Narodowe Centrum Krwi, 2022).

In 2023, approximately 640,200 donors provided over 1.5 million donations of whole blood and blood components, representing a 5.2% increase compared to the previous year. This increase reflects the return of regular donors following the pandemic and the successful recruitment of new voluntary donors. The continued expansion of donation campaigns, mobile blood collection units and awareness initiatives has also helped to maintain donor participation (Statistics Poland, 2023; Siekierska et al., 2023).

Further growth was observed in 2024, when the number of donors reached around 651,400, confirming the gradual strengthening of the national blood donation system. Expressed relative to population size, this equates to around 16-17 donors per 1,000 people, placing Poland within the range observed in many European countries with stable voluntary blood donation systems (Narodowe Centrum Krwi, 2024). The Polish blood donation system is a highly structured, centralized network that has demonstrated resilience, particularly in managing to satisfy national demand for blood components without imports, with over 1.5 million donations collected in 2023. While the system shows organizational stability during normal periods, recent audits by the Supreme Audit Office (NIK) indicate it remains sensitive to, or vulnerable during, emergency situations (Supreme Audit Office of Poland, 2024).

Figure 2: Collected blood units prepared for further laboratory processing at the Regional Blood Donation and Blood Treatment Centre (RCKiK) in Słupsk, Poland. Source: author's photograph, 2025

4.2. Blood donation in Ukraine.

Unlike Poland, Ukraine has a different pattern of blood donation development due to systemic, demographic and geopolitical factors. According to national statistics and reports from donor organisations, around 450,000-500,000 people donate blood each year in Ukraine, although the number of regular or active donors is much lower (DonorUA, n.d.). For instance, around 320,000 active donors were recorded in 2020, which is a relatively low rate by European standards (Table 1).

Table 1: Blood donation indicators per population (Poland vs Ukraine)

Indicator	Poland	Ukraine
Estimated annual donors (2023-2024)	640-651 thousand (≈ 16–17 donors per 1,000 inhabitants)	~450-500 thousand annually (below global recommended minimum)
Population‑based rate	~1.6-1.7% of population	<1% of population recommended
Trend	Stable and increasing post‑pandemic	Historically lower but increased during war
Donor contribution to national supply	~1.5+ million donations/year	~14,000+ donations reported via DonorUA in 2023 (~7,000 L)
Digital mobilisation	Moderate use of registry + campaigns	Strong reliance on digital platforms like DonorUA (150,000+ registered donors)

Source: compiled by the authors based on national statistical reports.

International public health recommendations state that at least 1% of the population should donate blood regularly to ensure a stable national blood supply. However, many developed healthcare systems aim for 2-3% donor participation (WHO, 2010; Guglielmetti Mugion et al., 2021). Ukraine has historically remained below this recommended threshold, periodically resulting in shortages of blood components in certain regions. These limitations have been associated with structural challenges in the healthcare system, an uneven distribution of blood donation centres and lower levels of public awareness regarding voluntary blood donation (Ukrainian Red Cross Society, n.d.).

However, in recent years, several digital and civic initiatives have played a significant role in increasing the number of donors and improving communication between donors and medical institutions (DonorUA, n.d.). One of the most prominent of these initiatives is the DonorUA digital platform, which connects potential donors with hospitals and blood collection centres, providing real-time information on blood demand. Over several years of operation, the DonorUA platform has registered more than 160,000 donors, and the associated community has collectively donated over 29,000 litres of blood (Table 2).

Table 2: Organizational models of blood transfusion services (Poland vs Ukraine)

Feature	Poland	Ukraine
Organizational model	Centralized national system	Mixed system: centralized infrastructure + civic/volunteer support
Primary coordinating authority	National Blood Centre + 21 Regional Blood Donation and Treatment Centres (RCKiKs)	Ministry of Health oversight + volunteer NGOs/digital platforms
Donor recruitment methods	Institutional campaigns, mobile units, workplace/university drives	Civic initiatives, emergency campaigns, digital registry (DonorUA)
Use of digital platforms	Traditional + emerging digital outreach	High reliance on digital platforms for donor matching (DonorUA)
Response to emergencies	Organized via official channels	Boosted by volunteer mobilisation due to war
Integration with healthcare	Fully integrated into national healthcare	Partial integration + supplementary NGO networks

Source: compiled by the authors.

Liliia Khomenko's study (2022) analyses the level of Ukraine's provision of donor blood and its components under relatively stable conditions during the period 2012-2020. The statistical analysis reveals a significant decline in the national blood donation system. During this period, the number of donors fell by almost half, while plasma collection decreased by around 30%, and whole blood collection by 56.8%. At the same time, the blood service infrastructure also weakened: the number of blood transfusion centres fell by 42.6%, transfusion departments in medical institutions by 43.7%, and the number of hospitals involved in blood collection by 15.1%. These trends indicate a gradual deterioration of Ukraine's blood service system even before the recent military conflict.

Despite these negative trends, national reports suggest that healthcare institutions were largely supplied with blood components in 2020. The needs of healthcare facilities were met to the following degrees: 91.1% for donor blood, 94.6% for plasma and 88.9% for erythrocyte mass. Meanwhile, the supply of platelets even exceeded the planned level. However, when evaluated according to the recommendations of the World Health Organization (WHO), the situation appears much more critical. The WHO recommends approximately 33 blood donations per 1,000 people, but Ukraine reported only around 11 donations per 1,000 people in 2020. This equates to a shortage of around 952,546 donations, equivalent to around 66% of the level recommended by the WHO.

A similar gap is observed in the indicator of blood collected per capita. According to WHO recommendations, the amount of blood collected should reach 12–15 ml per person per year, whereas in Ukraine it was only around 5.3 ml in 2020. This indicates a deficit of over half the recommended level. The study concludes that substantial differences exist between national planning indicators and international standards for assessing blood supply. Therefore, the author emphasises the need to develop a unified system of indicators that reflect the real needs of the healthcare system (Khomenko, 2022).

Despite these challenges, recent developments have significantly altered the blood donation landscape in Ukraine. Notably, the large-scale invasion in 2022 dramatically increased demand for blood and blood components due to the significant number of injured civilians and military personnel requiring urgent medical treatment. This has resulted in a remarkable increase in public awareness and civic engagement in voluntary blood donation. Numerous national and local donation campaigns have been organised, often through social media, volunteer organisations and digital donor registries. These initiatives have mobilised new donors and strengthened community solidarity in support of the healthcare system (DonorUA, n.d.).

Another important difference between the two countries concerns the infrastructure and recruitment mechanisms for donors. Poland has a centralised blood collection system which is fully integrated into the national healthcare network and supported by well-established institutional structures. Regular donation campaigns, mobile blood collection units and collaboration with educational institutions, workplaces and the military help to maintain a stable donor base (Rosiek et al., 2024). In contrast, Ukraine is increasingly relying on flexible, community-based approaches to donor mobilisation. Volunteer networks, non-governmental organisations and digital platforms, such as online donor registries and mobile applications, play an important role in connecting donors with hospitals and blood collection centres (DonorUA, n.d.).

Despite these organisational and structural differences, both countries demonstrate strong social engagement in blood donation. In Poland, voluntary non-remunerated blood donation is the well-established dominant model, supported by institutional frameworks and national awareness campaigns. Regular donors, including members of voluntary blood donor clubs and honourary donor programmes, represent an important component of the Polish blood donation system (Makowicz et al., 2022; Siekierska et al., 2023). In Ukraine, however, community-driven initiatives, volunteer movements and digital registries have become the main drivers of donor recruitment and coordination. The rapid mobilisation of donors during wartime illustrates the significant role of civic solidarity and social responsibility in maintaining the national blood supply in times of crisis (DonorUA, n.d.) (Tables 1 & 2).

Thus, comparing Poland and Ukraine highlights how different organisational models and socio-political contexts can shape national blood donation systems, despite a shared foundation of voluntary donor participation. Understanding these differences could help to develop more effective strategies for strengthening blood donation systems, particularly in countries facing demographic changes, public health emergencies or geopolitical instability.

5. Conclusions

Poland has a stable and well-structured blood donation system, with around 640,000-650,000 donors each year. The number of donors in Poland increased slightly after the pandemic, indicating recovery and sustained public engagement.

In contrast, Ukraine has historically experienced lower donor participation relative to its population size, with around 500,000 people donating blood each year. The ongoing war has significantly increased demand for blood in Ukraine, stimulating the development of civic and digital donor initiatives.

A comparative analysis suggests that improving donor recruitment strategies, digital registries and public awareness campaigns could further enhance blood donation systems in both countries.

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