

Literature Review: Understanding the Process and  
Implications of Blood Donations

Connor L. Henney

Interdisciplinary SIP 593  
Information Gathering

Faculty Supervisor:

Dr. Péter Érdi, Ph. D.

Professor of Complex Systems Studies,

Kalamazoo College, Kalamazoo, MI

A paper submitted in partial fulfillment  
of the requirements for the degree of Bachelor of Arts at  
Kalamazoo College

Winter 2024

## **Acknowledgements**

First and foremost, I would like to thank Dr. Peter Érdi for taking a step out of the comfort zone of his research to serve as my mentor while I conducted this project. He was truly a huge help and this certainly wouldn't have been possible without his guidance. Secondly, I would like to thank Kalamazoo College for the opportunity and resources to conduct this research as well as the extensive work that goes into all SIP events. I would also like to acknowledge Google Scholar and The American Red Cross serving as research tools and reference guides. A very special thank you goes out to Octapharma Plasma, Kalamazoo, for allowing me to get an inside scoop on the donation process and to the employees that agreed to be interviewed. Last but certainly not least, I would like to express my gratitude to my Mother, Father and three Sisters for their unwavering support and inspiration to pursue my education.

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## **Abstract**

In today's world, blood donation centers have stringent rules for deferring individuals trying to donate blood. With a myriad of rules for donor eligibility, such as age, weight, and life history, only a select few are even qualified to begin the medical screening process. Before being screened, the donor must arrive with a valid ID, typically containing a photo so the donation center can verify the donor's identity. While being screened, employees check for their vitals and hemoglobin levels. In the case of some donation types, a medical professional checks protein levels and completes a physical examination to ensure health. If a donor has made it through all of these screening steps, they can move on to their donation, typically a whole blood, plasma, or platelet donation. These blood products are then processed, stored, and saved, usually for a transfusion or made into an immunotherapeutic medication. Although donation recipients greatly benefit from blood donations, centers typically have incentives for donors as well. Donor rewards come with the various risks that arise with donating, which begins to limit the pool of individuals who decide to give blood. In addition, demographic trends in the donor pool show which groups are more likely to donate, as well as groups that are unable to donate as a result of the donor eligibility policies. Some policies in place for donating blood may hinder the diversity of the donor pool and blood supply. Changing these policies and directly targeting groups of people as potential donors can improve our blood supply and save lives.

## **Introduction**

Blood is a tissue contained within the human circulatory system, containing different components, used for transporting oxygen and other essential molecules throughout the body (R. Schwartz, 2024). It plays a vital role in the support of cellular growth and intracellular communication, as well as filtering waste products and immune health. The individual components found within the fluid known as blood are: red blood cells, white blood cells, platelets and plasma (R. Schwartz, 2024). Red blood cells are typically in charge of oxygen transportation and are known for bringing the common red color to blood. Being one of the most prominent products within blood, these cells typically account for 40-45% of the actual blood volume (C. Becker, 2023). White blood cells are typically much larger than red blood cells and also play a much different role in our bodies. These cells are responsible for our immune health and physically attack cells they identify as harmful or “not-self” (R. Schwartz, 2024). Accounting for much less of our physical blood volume, these cells make up less than 1% of our blood (A. Felman, & M. Goodwin, 2024). Another component found in blood are platelets, which are our main assistant in the clotting of blood (R. Schwartz, 2024). When someone is cut, platelets are able to collect together at the site of the open wound to prevent further bleeding. The final blood product contained in blood is plasma which is the fluid part of blood and allows for it to flow through blood vessels. This substance is known for the transportation of nutrients as well as hormones and contains antibodies released from B white blood cells (R. Schwartz, 2024). Each of these products are essential for the proper functioning of the human body; however, not everybody has healthy blood (R. Schwartz, 2024). In many cases, medical patients are in dire need of blood transfusions or medication as a result of immunodeficiency. Burn victims, those undergoing various operations and those with organ deficiencies are all examples of people who

are unable to live without medical support (K. Williams, Personal Communication, 2024). This support typically comes in the form of self-less blood donations, which are used in transfusions and medications, to create products to be administered to the recipient patients (A. Felman, & M. Goodwin, 2024). A high demand for medical blood products and a short shelf life creates a bit of an urgency for consistent blood donations (American Red Cross). The urgency and demand for blood donations suggests that we should collect as many donations as possible because of the potential value it has. This urgency is heightened by outdated donation center regulations that further minimize the possible donor pool. An overwhelming number of able people are denied the opportunity to give blood annually as a result of the policies regarding documentation and lifestyle choices. By wrongfully disqualifying these individuals from donating, we minimize the number of donations and diversity of our overall blood supply. These screening steps are unnecessary and limit the volume of blood collected and stored, further hindering its quality.

## **Methods**

- Written response interviews were given to three different employees at Octapharma plasma, donation center in Kalamazoo, Michigan.
- Peer-reviewed research papers gathered from Kalamazoo College Library databases were examined.
- Peer- reviewed documents from Google Scholar were examined.
- The American Red Cross Website was utilized for information regarding blood donations.
- World Health Organization guidelines were referenced during research.

- Sources were collaborated together to depict the most accurate representation of the blood donation procedure possible, while keeping information vague enough to account for variation between center procedures and donation type.
- The utilization and importance of donations was assessed followed by the risks and incentives for individuals to give their blood.
- Typical demographic trends in donors are recognized as well as absences in donor populations
- All aspects were assessed in conclusion, and simple solutions were made for some lingering issues with current blood donation practices.

### **Donor Eligibility**

The first and most important question when contemplating if someone should make the commitment to donate their blood, is if they are in fact eligible to do so. Donation centers have a strict set of guidelines in place to ensure the safety of not only the individual donating their blood, but also the recipient of the donation. Different types of donations also have slightly differing qualifications to separate you as an eligible donor. One immediate difference in eligibility requirements to donate is the minimum age and weight in which donors can begin giving blood. Whole blood donations and platelet donations can be completed if the donor is 110 lbs and the ages of either 17 or 16 with the consent of a guardian in most U.S. states (American Red Cross). Power red donations however, require that the donor is 17 years of age and 130 lbs in many states, even requiring that female donors are 19 years of age and 150 lbs before donating (American Red Cross). In order to donate plasma, it is required that the donor is 18 years of age

and 110 lbs before allowing them to donate (K. Williams, Personal Communication, 2024). Donor appearance is a factor that is often overlooked but will hinder an individual from being able to donate. In plasma donation centers, donors may be deferred for inappropriate behavior, hygiene and behavior (R. Roach, Personal Communication, 2024). Another cause of immediate deferral from plasma donation centers is a recent incarceration of greater than 72 hours (K. Williams, Personal Communication, 2024). Additional factors that could lead to the ineligibility of a donor are medical conditions. Recent surgeries as well as having artificial joints are specific medical conditions that would lead to the temporary or permanent deferral of a donor (K. Williams, Personal Communication, 2024). Finally, the presence of a blood-borne infection such as hepatitis or HIV in the donor's blood will permanently defer them from donating blood (R. Roach, Personal Communication, 2024). The rules that are in place are largely there to protect the donor and ensure they are physically suitable to donate their blood. They also serve as a quality control for the integrity of the blood supply, to ensure the products being given to the recipient will be safe and effective.

### **Donation Process**

If a prospective donor meets the initial requirements to donate blood, they will then proceed to the donation process. Before the prospect donates, they must also provide the donation center with a valid I.D. so they are able to identify the donor. The process then consists of a rigorous screening process, followed by the physical donation and the processing of the blood products. Once processed, these blood products will be stored in freezers and saved for future use.

## **Identification Documents**

The donation process is a rigorous system that's length is dependent on a multitude of variables. The first and biggest determining variable of this length is being a new or returning donor to that particular center. Typically, if a person has previously donated at a location, that donation center will keep a record of necessary documentation allowing for an expedited process. According to the American Red Cross, this may be in the form of donor cards given by many centers, to donors, to quickly identify each returning donor (American Red Cross). For new donors looking at donating whole blood, power red, or platelets, the first form of documentation necessary to donate any type of blood is a proper form of identification. The I.D. is preferably in the form of a state issued driver's license, passport or other identification documents containing a photo (American Red Cross). If whole blood donors are unable to provide the donation center with one of these forms of identification, they are typically required to then show two secondary forms of identification. These secondary forms are most commonly bank cards, vehicle registration or other documents containing your legal name but no photo (American Red Cross). For plasma donations, a slew of identification documents for new donors are needed in order to ensure a proper and safe donation. In addition to needing a form of photo I.D., donors must also bring a valid social security card (or copy) along with 2 pieces of mail addressed to the donor's current residence (R. Roach, Personal Communication, 2024). After a donor has provided the center with the proper paperwork for identification, the donation center saves that information for following donations and the donor is moved along to the next step of the donation process.

## **Donor Screening**

The ensuing step to providing identification documents is the donation screening process, in place for the safety of both donors and recipients and to maintain the integrity of the blood supply. This process differs slightly between types of donations but for the most part, the process is fairly similar. In the cases of both whole blood donations and plasma donations, the process begins with a detailed questionnaire that assesses the donor's medical history, travel history, and potential risk behaviors (American Red Cross). Following this, a medical screener weighs the donor to ensure they are above the minimum weight, checks vital signs such as blood pressure and temperature and checks hemoglobin levels (K. Ehresmann, 2020). Although this typically concludes the screening process for whole blood donations, the plasma donation has a few extra steps as a part of their standard operating procedures. In addition to these factors, plasma donations check the overall protein levels in plasma to quickly assess overall health (Cherney, 2017). New and returning plasma donors in the United States are also required to undergo an annual physical assessment from the center's formally trained physician substitute (K. Williams, Personal Communication, 2024). Finally, the last step of the screening process that is taken with first time donors only, and then periodically thereafter, is to take samples of the blood. These samples are taken in order to get a profile of the proteins in the actual plasma, looking particularly for harmful pathogens, as well as looking for helpful antibodies (Cherney, 2017). Only once all of these screening steps have been completed for a plasma donor, is a person able to proceed to the physical donation process.

## **Blood Donation**

After registration and the health screening process to ensure eligibility, donors are brought to the donation floor and seated in a reclined chair or bed. Once seated, the donor is typically greeted by a trained phlebotomist who will verify the donor's identity, and continue on with sterilizing the venipuncture site. The sterilization tool most often used for sanitation of the venipuncture site is 70% isopropyl alcohol but common replacements such as Iodine have been known to be used (World Health Organization, 2010). Alcohol or Iodine is usually applied to the site over the span of 30 seconds, giving the solutions time to dry before the needle penetrates the skin and vein barriers (World Health Organization, 2010). Once the needle is physically in the donor's arm, the donation begins and the donor assists the flow of the blood out of their vein by opening and closing a fist (World Health Organization, 2010). During any donation process, phlebotomists remain within close proximity of the donors to assist with any type of reaction that might be occurring as a result of blood exiting the body (World Health Organization, 2010). The length of the donation process is highly dependent on which type of donation is occurring. The shortest type of donation is whole blood donations which usually only last about 8-10 minutes from the time the venipuncture occurs to the time the unit of blood is collected (American Red Cross). Platelet, Plasma and Power Red donations all take much longer due to the fact that they are apheresis processes in which small amounts of whole blood are extracted by a machine, and is spun in a centrifuge to separate the desired product (Mayo Clinic Staff, 2023). The products that are not being donated are then administered back into the donor's vein along with anticoagulants to ensure the fluidity of the blood as it moves through tubing (World Health Organization, 2010). When an apheresis procedure is complete, a bag of saline is also administered back into the donor with the remaining blood products from their final draw cycle

(World Health Organization, 2010). At this point for plasma donors, the entire process is complete, they are able to have the needle removed from their arm and are wrapped up with medical bandage and a gauze (World Health Organization, 2010). Individuals giving whole blood are not getting any blood products back from the unit they are donating, so it is protocol for the donor to be offered snacks and a beverage post-donation (American Red Cross). They are able to enjoy these treats in a designated recovery area until they are feeling well enough to confidently leave the donation center. Although the donation process is completed for the donor, the journey of the blood donation to its final destination has just begun. Now that the donation center is in possession of the blood or blood product, it must go through extensive processing before the blood is usable.

### **Blood Processing**

The final step of the blood donation process, occurs behind the doors of a lab and doesn't involve the donor being present. The way in which the donations are processed, like all other steps of the donation, is determined by the product that has been received from the donor. The most lengthy type of donation to process, whole blood, has one extra step as it is typically spun in a centrifuge to separate the blood products (American Red Cross). Once spun down into separate fluids, each one is further processed into the desired product that will be used for a myriad of different things. Red blood cells and platelets for instance, can be leuko-reduced, decreasing the possibility of the donation recipient having an adverse reaction to the transfusion (American Red Cross). Another example of how blood products are altered is by processing plasma into components like cryoprecipitate, which helps aid in the clotting of the blood for the recipient (Wong, J., & Dennington, P., 2017). Sometimes, not much is needed to process the

blood at all, as the components of raw plasma can be used to make medication for immunotherapy (Wong, J., & Dennington, P., 2017). Regardless of the type of donation, all blood products are frozen to ensure the integrity of the blood's safety for the recipient (American Red Cross). Concurrently with the donation being processed, the samples that were taken as a part of screening are taken to a lab to be tested for blood type as well as any harmful pathogens (American Red Cross). Blood type is an important type of the donation process because the compatibility of the donor's blood to the recipient is entirely dependent on that result. As for the protein sample, if evidence of harmful pathogens are detected in the blood, the donation center and donor are both notified immediately (American Red Cross). The donation center is then responsible for discarding that donation in an area designated for biohazardous waste (American Red Cross). Donations that are pathogen free are stored in the freezers at the donation center until they are ready to be shipped off to their next destination.

### **Donation Uses and Importance**

Donations collected and saved by centers have a plethora of uses and serve a crucial role in the healthcare system worldwide. Not only are these donations important, it is essential that there are continuous donations all year. Due to the continuous demand for blood transfusions, there is a need to manage the whole process of supplying blood from blood donors (S. AlZu'bi, et al., 2022). One of the primary uses of these donations stems from hospitals and their need for blood volume. In hospitals, blood donations are often required to supplement patients with blood during medical surgeries and critical operations (S. AlZu'bi, et al., 2022). Another common use of blood donations, is used in various manners to aid cancer patients or patients with blood diseases (A. Aucoin, 2016). Additionally, patients with anemia and other medical problems such

as heart, liver and kidney disease account for 19% and 13% of blood donation respectively (A. Aucoin, 2016). Patients with burns and also bleeding or clotting issues are also treated with blood donations in the form of transfusions (K. Williams, Personal Communication, 2024). Transfusions aren't the only way that patients benefit from blood donations. Octapharma Plasma Inc. in particular is a plasma donation center that specializes in developing medications from their donations (R. Roach, Personal Communication, 2024). More specifically, this corporation uses their donations to make immunotherapeutic medications like Wilate, Octaplas and Albumin Human (K. Williams, Personal Communication, 2024). Donations, in general, are utilized by patients in a myriad of different ways. Between transfusions for medical reasons, and medication taken by immunocompromised patients, it is certain that these donations are essential. The blood given by selfless donors is a lifeline for countless patients whose lives depend on them.

### **Donor Incentives**

An aspect of the donation process that is most commonly forgotten is the positive impacts it has on the individual giving the donation. The incentives for donating blood stretch further than just the warm feeling of helping someone else, but can also be monetary as well. Financial Incentives are most commonly offered within the context of plasma donations, with some centers providing money to encourage their donors.(C. Niza, et at., 2013). This information was confirmed while talking to a phlebotomist from a donation center in Kalamazoo, Michigan. Although donors at that center are not compensated for their physical donations, they are compensated for their time spent in the donation center (K. Williams, 2024). While monetary compensations for blood donations are great incentives for some to donate, others prefer the moral value it brings. It is even argued that altruistic blood donations produce superior products

in terms of blood quality (C. Niza, et al., 2013). Regardless of the incentive to donate, motivational factors to give blood improve donor turnout and overall blood supply.

### **Donor Risks**

Although there are certainly many benefits to giving blood, for the donor and recipient alike, donating isn't entirely risk free. There are medical risks associated with donating blood that arise as a result of a reaction to the process itself or withholding information during the screening process. Much of the donation screening process is based on donor discretion; however, it is important to provide the donation center with accurate information to ensure the safety of the donor and quality of the blood (R. Roach, Personal Communication, 2024). When incorrect information is shared with medical professionals at donation centers, they are unable to properly assess your health and eligibility to donate for safety purposes. Although not the only contributing factor, dishonesty during screening can be causal for one of the most common donor reactions, a vasovagal reaction (Bravo, M. et al., 2011). Another one of the most common reactions that happens with donors while giving blood is known as a citrate reaction. Citrate reactions occur in response to the body receiving anticoagulant, which acts as a blood thinner for smooth flow during the donation (V. Arunachalam, et al. 2021). Lastly, donors have been known to have had venipuncture sites from donations become infected or inflamed for various causes. It has been reported that infections from blood donations may be increased by a particular protein known as LGI that is commonly found on the arms of infected donors (K. Kaspersen, et al., 2016). The risks identified here are certainly not the only risks associated with donating blood, but are the most prominent risks posed to most donors.

## **Donation Demographics**

In general, blood donors come from diverse backgrounds, spanning various ages, genders, ethnicities, and socioeconomic statuses. While there is no single demographic profile of a blood donor, there are certain trends that emerge. The first trend we see not only in the US, but in the majority of the world is the age distribution of donors. As described by America's Blood Centers, ages 16-18 contributed to 11.2% of all US blood donations while ages 19-24 contributed to 8.6% of all donations (America's Blood Center, 2022). Concurrently, ages 25-64 contribute to an overwhelming 63.2% of all donations while anyone older than 65 contributes to 16.1% of U.S. blood donations (America's Blood Center, 2022). As people age and mature, it is clear that the population that is frequently donating is not linear.

Nationality is another demographic that significantly affects the percentage of individuals that are choosing to donate their blood. In a 2018 survey conducted by Ipsos, they found that of 20 countries, Saudi Arabia and India had the highest percentage of people agreeing that they frequently give blood at 58% and 52% of the population respectively (N. McCarthy, 2017). Japan and Russia are among the lowest of those surveyed with only 11% and 16% of the population saying they frequently donate, respectively (N. McCarthy, 2017). Italy, France and the United States land near the middle of the list of countries surveyed, all having 23% of their populations claiming to frequently donate blood (N. McCarthy, 2017). Additionally, in many low and middle income countries, the blood supply is described as critically inadequate (N. Mathew 2021). Furthermore, the deferral demographic of donors can alter depending on the country of the donation. In the United States, it is most common for a donor to be deferred from a plasma donation center as a result of unsafe blood pressure for donation or a failure of a different vital

test (R. Roach, Personal Communication, 2024). This being the reason for deferral from donation is not the same in all countries. In Tanzania for example, more than one tenth of the population is deferred from donating blood due to latent or active infections, often HIV or HBV (D. Valerian, et, al.) Various trends arise when looking at the global scope of blood donations and which countries are participating.

As mentioned, donor deferral is an important aspect of the process that has consequential results for the demographics of individuals donating blood as well. Firstly, as stated by the American Red Cross Organization, a valid state-issued I.D. must be presented before donating (American Red Cross). Naturally, those living in any country without citizenship are typically disqualified from giving their blood. Statistics provided by the U.S. Census Bureau, The U.S. The Department of Homeland Security and others estimate that this accounts for roughly 10 million individuals living in the United States in 2024 (J. Batalova, 2024). Moreover, there are low-income individuals unable to donate blood as homeless people often face extensive barriers to even obtain a form of identification (Wiltz, 2017). With such large populations of people unable to donate, a trend of blood donors arises based on their socio-economic status.

Finally, a prominent demographic trend that is commonly evident in blood donations is the deferral of men who have sex with men (MSM). Canada for instance is a country who has laws in place for MSM to be deferred from donating blood for at least 3 months (J. Armstrong, et al., 2022). Although they are deferred from doing so, 69% of individuals surveyed by this same study indicated that they would be interested in donating their blood (J. Armstrong, et al., 2022). In the United States, there was a ban on MSM from blood donations until 2023 when the FDA had finally revised the outdated rule (N. Comerford, 2023). More specifically, Nebraska changed their donation policy from being strictly sexuality based, to a slightly more lifestyle choice

based. The questionnaire completed by all donors now asks if participants have strictly participated in anal sex in the past 3 months rather than asking if the donor has had sex with a man in that time (J. Ebberts, 2023). The lack of donors self-identifying as homosexual, creates a clear demographic trend in who is actually donating blood.

### **Discussion:**

The decision to donate blood is guided by a complex interplay of eligibility, incentives and the willingness to make a positive impact. This courageous decision is often rejected though, as a result of underlying risks associated with donating blood. These components intertwine and blur the lines for why there may be a shortage of donations. This dilemma is further complicated when considering if sheer volume of donations, or quality of blood supply is more crucial. Regardless of which is truly more important, some policies currently in place for donor eligibility are outdated and limiting to the overall blood supply. Not only do these regulations hinder the possible volume of donations, they also minimize diversity in the blood supply, affecting the overall quality. By having a large group of people unable to donate as a result of identifying as a homosexual male, we are severely limiting our access to individuals willing to give their blood. Furthermore, having extensive populations of individuals living in the United States unable to donate blood as a result of documentation restricts the volume of blood we have at our disposal. Less blood donations consequently means we have less access to rare types of blood as well as less potentially life-saving antibodies. Diversity in a blood supply is essential to ensure that all patients, regardless of blood type or need, have sufficient access to blood. One simple way we can begin to correct these policies is to continue educating about blood-borne illnesses and how they are spread by risk behavior rather than sexuality. In the case of those

deferred for documentation, a system should be in place to help these individuals attain an I.D. or address validating them to donate. If an individual is willing to spare their own blood for the well being of others, they should be fully entitled to do so. Strict regulations for donor eligibility on the grounds of sexuality or documentation are unnecessary given that each donation is screened for infectious diseases. These policies only impair the quality and volume of the blood supply, jeopardizing the lives of those in need.

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