

# BloodLytics: Visualising Blood Donation Statistics

Team 1

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## 1 A brief description of what you intended to do at the beginning (phase I submission)

What hinders blood donation participation and how to improve? The project revolves around a detailed analysis of blood donation statistics, including donor demographics, donation frequency, and regional supply-demand imbalances. Sourcing relevant datasets from reputable health organizations and blood banks forms the basis for uncovering barriers to blood donation participation.

Statistical methods are applied, and visualizations like pie charts and bar graphs transform complex data into accessible representations, revealing patterns and disparities. Visualizing this information on a map or a heatmap allows for a quick and intuitive understanding of regions with higher demand.

### 1. Find the areas where blood requirements are more?

Based on the Data from Blood requirements from government data sources, visualizing this information on a map or a heatmap allows for a quick and intuitive understanding of regions with higher demand.

### 2. What is the distribution of blood groups, gender, age groups, and relations among donors and recipients?

Visualizations such as pie charts or bar graphs can offer a clearer representation of the proportion of different attributes, aiding in quick identification of trends or imbalances.

### 3. Frequency of blood donation of a person?

Visualizing the frequency distribution through histograms or line charts allows for a more accessible understanding of donation patterns compared to a raw list of data.

## 2 A brief description of what was done in phase 2, with example visuals.

- **Distribution of different types of Blood donations in World:**

Choropleth Map of the World: Design: Use a world map where each country/region is shaded based on the percentage distribution of a selected blood type (e.g., O+, A-, AB+). Darker shades indicate higher percentages. Interactivity: Dropdown menu or filters to select different blood types for visualization.

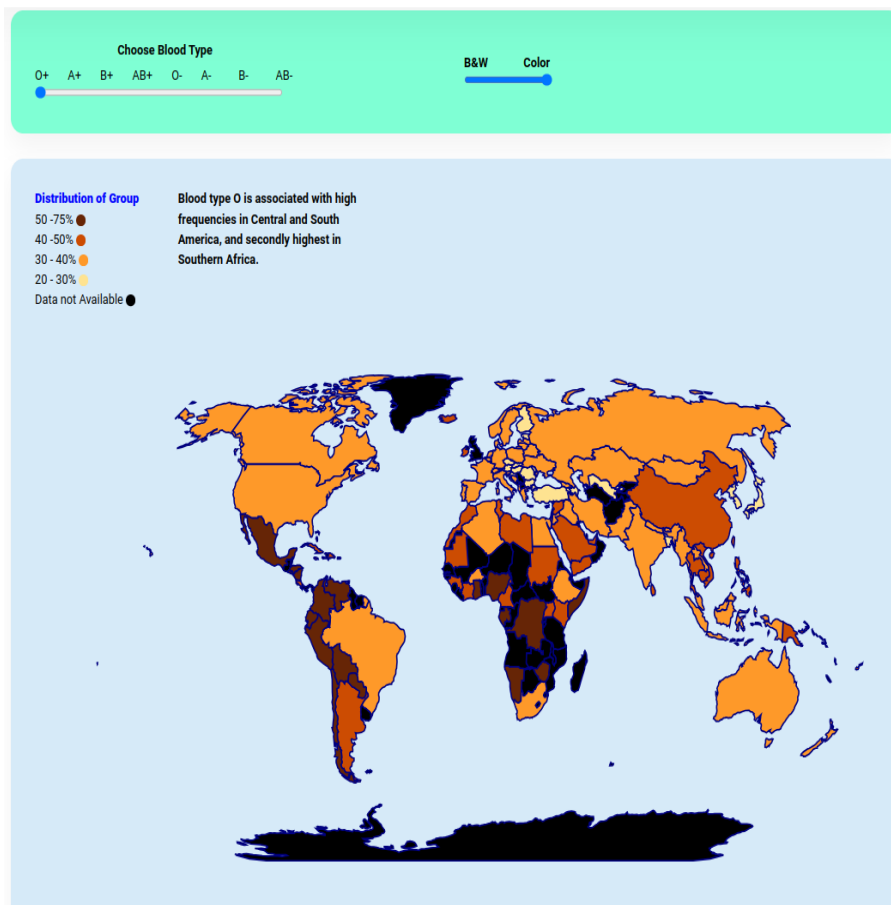


Figure 1: Blood Group O distribution across world

We have also implemented a black and white theme of the above choropleth. Black-and-white maps aid accessibility for color-blind viewers, ensuring inclusive data interpretation.

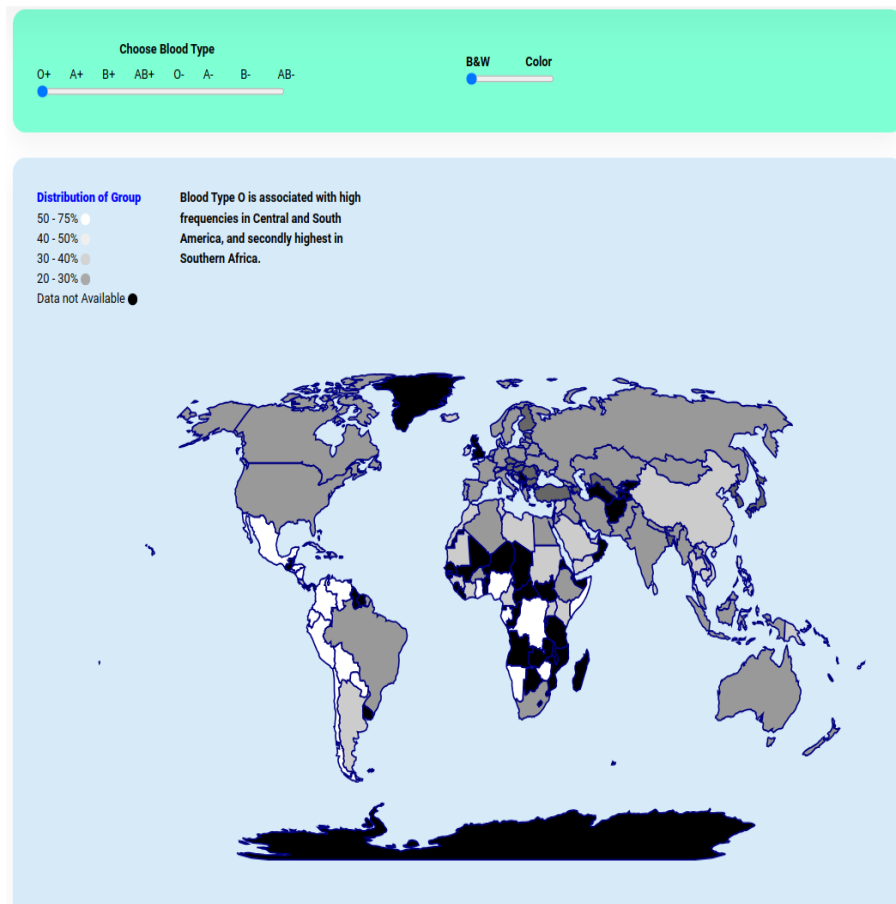


Figure 2: Blood Group O distribution across world (Gray Scale View)

- Horizontal Bar Chart of Different States: Design: Horizontal bar chart with states/territories along the y-axis and the total number of blood units collected along the x-axis. Each bar can be segmented into different colors representing voluntary, family, and replacement donations. Interactivity: Dropdown menu to select the type of donation (voluntary, family, replacement) to dynamically update the bar chart.

- **Choropleth Map of India:**

Design: Use a map of India where each state/territory is shaded based on the total number of blood units collected. Darker shades indicate higher numbers. Interactivity: Tooltip displaying detailed information (total units collected, breakdown by donation type) upon hovering over each state.

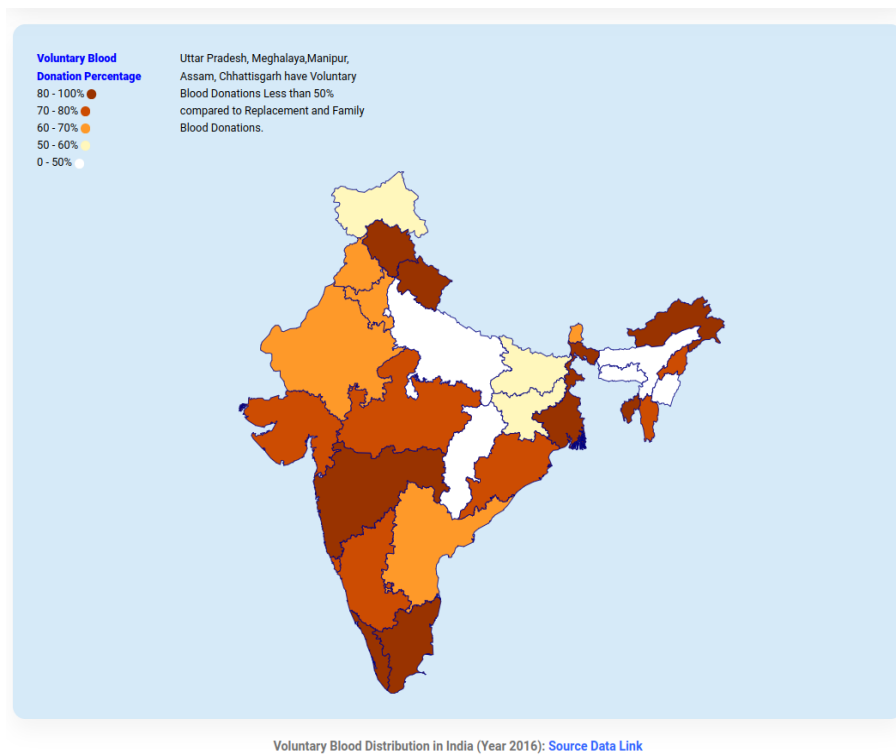


Figure 3: Voluntary Blood Donations in India Percentages

### 3 A brief description of visual encodings, navigation, animation, colors, etc., that were used in your visualization and why

- **Accessibility and clarity:** Linear color scaling in black and white graph enhances clarity and accessibility, ensuring consistent and aesthetically pleasing representation of complex information.
- **Storytelling:** Blood Origins - Tracing the Evolution and Diversity of Blood Types and Donations in India Through Graphical Analysis.
- **Interactivity:** Interactive percentage adjustment enhances graph comprehension, tailoring insights to user preferences for improved understanding.
  - **Filtering:** Allowing users to filter and sort data dynamically can help them explore different aspects of the dataset and uncover insights.
  - **Hover Effects:** Providing additional information or details on hover can enhance interactivity and engagement.
- **Navigation:** Included Side by Side visualisations which are related to each other so that easy comparisons can be made.

## 4 What specific tasks can be done with your visualization, and why?

- Plotting ABO blood group across different countries helps identify where each blood type emerged, providing insights into their geographical distribution and evolution.
- Using a slope graph, areas with higher blood donation rates compared to requirements and vice versa can be identified, aiding in understanding regions with greater blood supply-demand imbalances.
- Distribution of different types of blood donations across Indian states can be visualized through a choropleth map or pie chart, offering insights into regional disparities and donation patterns.
- Analyzing demographic information such as age, gender, and location in correlation with donation rates can reveal trends and potential influencing factors, aiding in targeted awareness campaigns and outreach efforts.
- By visualizing the operations listed in bar charts, it becomes easier to understand where donated blood is utilized, providing insights into the utilization patterns and healthcare needs of different regions.
- Sourcing data of surveys from popular organisations with individuals who have not donated blood can reveal reasons such as fear of needles, lack of awareness, or misconceptions about eligibility criteria, aiding in targeted educational campaigns to address barriers to donation.

## **5 Who are the users for your visualization, and what questions get answered with this visualization?**

### **1. Users of the visualization:**

- (a) Government (Ministry of Health and Family Welfare)
- (b) Blood Banks
- (c) Blood Donors
- (d) Healthcare Professionals
- (e) Public
- (f) Policy Makers

### **2. Questions get answered with this visualization?**

- (a) Find where the particular blood type is emerged? And How they are related with other continents?
- (b) Find the areas where blood requirements are more?
- (c) What is the distribution of different types of blood donations across indian states?
- (d) How does demographic information such as age, gender, and location correlate with donation rates?
- (e) Where did the donated Blood used?
- (f) Find the districts with no blood banks or donations availability?
- (g) Reasons for not donating the blood?

## 6 Data sets on which you tested the visualization.

These datasets in BloodLytics encompass a wide range of information about different blood types, donations across different regions. Here's an elaboration on each aspect:

### Distribution of Blood Types by Countries:

**ABO and Rh blood type distribution by country & dependency (population averages)**





Country/Dependency	Population <sup>[1]</sup>	O+	A+	B+	AB+	O-	A-	B-	AB-
 Albania <sup>[2]</sup>	3,074,579	34.1%	31.2%	14.5%	5.2%	6.0%	5.5%	2.6%	0.9%
 Algeria <sup>[3]</sup>	43,576,691	40.0%	30.0%	15.0%	4.25%	6.6%	2.3%	1.1%	0.75%
 Argentina <sup>[4]</sup>	45,479,118	48.9%	31.54%	8.0%	2.45%	4.9%	3.16%	0.8%	0.25%
 Armenia <sup>[5]</sup>	3,021,324	29.0%	46.3%	12.0%	5.6%	2.0%	3.7%	1.0%	0.4%

Figure 4: Blood group distribution across the world

The dataset provides a comprehensive overview of the distribution of various blood types across different regions worldwide. The accompanying figure illustrates the percentage distribution of ABO and Rh blood types (including O+, A+, B+, AB+, O-, A-, B-, AB-) globally. This information is crucial for understanding the prevalence of different blood types in populations around the world, which is essential for medical research, transfusion medicine, and healthcare planning.

Dataset Source: [Link](#)

### Geographical Distribution of Blood Donations in India

The dataset presents percentages of replacement, voluntary, and family blood donations across states in India. It details the distribution of blood acquisition methods, highlighting the proportion of donations acquired through replacement, voluntary initiatives, and familial contributions in each region, aiding in understanding blood donation practices nationwide.



Data Item Across State Wise ( Blood Unit Collected during January to June, 2021)

	Section 1 : Blood Units collected during the Month-->Sub Section A								Total
	Voluntary Blood Donor				Family Blood Donor		Replacement Blood Donation		
	Blood Donation at Blood Bank		Blood Donation at Voluntary Blood Donation Camps		Blood Donation at Blood Bank		Blood Donation at Blood Bank		
	Male Donors (A)	Female Donors (B)	Male Donors (C)	Female Donors (D)	Male Donors (A)	Female Donors (B)	Male Donors (A)	Female Donors (B)	
India	1637485	39703	1715532	139503	304285	7937	1113806	25130	4983381
Andaman & Nicobar Islands	1184	44	461	23	0	0	70	0	1782
Andhra Pradesh	113128	1101	35027	692	13313	39	37254	136	200690
Arunachal Pradesh	779	54	370	134	0	0	523	31	1891
Assam	31023	444	3259	325	12968	336	34684	580	83619

Figure 5: Blood group distribution across the world

Dataset Sources: Link 1, Link 2

## Reason for Not Donating Blood:

The dataset provides reasons for not donating blood, motivations, and misconceptions about blood donation, along with percentages for each category. It includes reasons like fear of needles or medical procedures, health concerns, motivations including altruism, community impact, or personal connection to a cause, and misconceptions might involve fears of health risks or painful procedures. Additionally, the dataset covers respondents' attitudes towards blood donation, with percentages indicating both positive ("yes") and negative ("no") inclinations. This comprehensive dataset offers insights into factors influencing blood donation behavior, shedding light on areas for education and intervention to increase donation rates.

Dataset Sources: Link 1, Link 2

<i>Reasons for not donating blood, motivations &amp; misconceptions</i>	<i>%</i>
<i>Reasons for not donating blood</i>	
Unknown Fear	7
Unaware of collection facility	4
Don't have enough time to donate	3
Concerned about sterility of equipments	11

Figure 6: Reasons for Not Donating the Blood

### Donated Blood Utilisation for different Clinical Demands:

The dataset comprises records of blood donations and requirements across various states in India. It encompasses information regarding the supply of donated blood units as well as the demand for blood units in different regions, aiding in the analysis and management of blood distribution systems.

Estimated national clinical demand.				
Study data n-251				
Specialty	Number of beds	Clinical demand in whole blood units	Beds	Estimated national demand in whole blood units* (95% CI)
Medicine	20,779	195,434	639,641	<b>6,015,910</b> (6,012,223–6,019, 597)
Surgery	15,469	132,370	476,159	<b>4,074,654</b> (4,071,294–4,078,014)
Obstetrics & Gynaecology	8,817	106,312	271,411	<b>3,272,529</b> (3,269,405–3,275,652)
Pediatrics	6,497	40,511	199,987	<b>1,247,022</b> (1,244,929–1,249,115)
Total	<b>51,562</b>	<b>474,627</b>	<b>1,587,198</b>	<b>14,610,116</b> (14,597,852–14,622,378)

Figure 7: Different Clinical Demand for donated Blood

Dataset Source: [Link](#)

Dataset Source: [Link](#)

## 7 What can your visualisation not do? Limitations:

- **Inability to Capture Human Factors:** Visualizations may not fully capture the human factors influencing behavior, such as socio-economic status, cultural beliefs, or individual preferences. Understanding these factors often requires to get more clear reasons, misconceptions and awareness in the people.
- **Limited Context:** Visualizations provide a snapshot of data at a specific point in time and may not capture the dynamic nature of phenomena. They may lack context regarding historical trends, cultural factors, or policy changes that influence the observed patterns. As in the case of the Voluntary Blood Donations the first map data is 2016 year and second map data is 2021 year data. And there is lot of changes between this regions.
- **Limited Scope of Data:** Visualizations are limited by the data available for analysis. They may not capture all relevant factors or variables that could impact the phenomena under study, potentially leading to incomplete or inaccurate conclusions. As in the case of the Clinical Demand usage, the data is not clearly mentioned about how the received blood used by the given demand.

## 8 Link to the YouTube Video:

- Phase 2: <https://youtu.be/nkydSQRsNBQ>
- Phase 3: <https://youtu.be/56BK5iPwMwY>

## 9 Link to the code:

<https://github.com/hemanth-sunkireddy/BloodLytics>

## 10 Link to the website:

<https://hemanth-sunkireddy.github.io/BloodLytics>

## 11 Contributions

- Hemanth (2022101005): Visualizations (Distribution of Blood Types by Countries, Geographical Distribution of Blood Donations in India, Blood Utilization in Medical Procedures), User interface for website, data collection, report, presentation, Youtube Video
- Bharath (2022101044): Visualizations (Reason for Not donating the Blood, Blood Donations vs Requirements, Geographical Distribution of Blood Donations in India), data collection, report, presentation, Youtube Video
- Jagankrishna (2022101002): Visualizations (Distribution of Blood Types by Countries, Blood Utilization in Medical Procedures), Report, Youtube Video