

Android Application for Blood Donation under Make in India Initiative: A Solution for Creating an Awareness of Blood Donation among Indian Citizens

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Abstract — Availability of required blood group donor and in required amount has become serious social issue in India. In respect with this concern a survey was done on 385 respondents to understand their awareness level regarding Blood donation, its advantages and consequences. The objective behind this study was to understand the current practices and issues in blood donation awareness in Indian Citizens as well as to design & implement compatible mobile application to create and increase blood donation awareness among Indian Citizens. Two Hypotheses were formulated and tested by using SPSS. Google form was created and responses were collected. Random Sampling was used to collect the data from respondents. Both the hypotheses were accepted.

Keywords—Blood Donor, blood bank, blood donation app.

I. INTRODUCTION

Blood donation is a dignified work that consists give and take of blood to the other citizens who are in need of it. Each year four to five crore of blood unit are required in our country but regrettably only 2.5 crore of unit is obtainable. For every 2 seconds one human being requirements blood. Each day our country needs more than 38,000 units of blood. Day by day the need of blood requirement is bigger in numbers. Every individual do have different blood group. Blood cannot be manufactured – it can only come from only donors

The prerequisite for the blood is vital factor in modern medicine and healthcare. Blood managing has been noticed as a tough task in present manual system engages in certain limitations. The job of blood bank common in nature which receives blood from different donors, prepare blood group database and sends the blood to the hospitals as in case of emergencies. In country like India, the blood quantity lacks in measures which comes as barrier for others to save life. To accomplish the requirement of blood and to minimize the communication gap between the receiver and donor this proposed system can be adopted

This paper is organized in flowing sequence: Section II elaborates Literature Review work done previously by research scholars. Section III explains about problem present in existing system. Section IV puts focus on impact of blood donation awareness in Indian citizens. The preface to the proposed application system is focused in Section V. At last, the conclusion, suggestions and the future work is stated in the closing part.

II. LITERATURE REVIEW

Review of literature is concerned to the study of previous research work in the field of chosen research problem and other problems related to blood donation awareness computer based systems. This is one of the most imperative components in the research procedure, which focus on research gaps as well as the research process to a researcher. In order to get associate with the research process, to understand the research gaps in the chosen research problem and earlier research studies associated with blood donation awareness. Study of literature is based blood donation awareness, system designed for increase awareness of blood donation and its advantages or disadvantages.

P. Priya , V. Saranya , S. Shabana , Kavitha Subramani (2014) in their research on “The Optimization of Blood Donor Information and Management System by Technopedia” they proposed web based system which helped to make timely update of important information regarding the donors, acceptor and patients where the administrator access the whole database regarding blood bank system. The system implemented by the research scholars also keep track on available blood with types of groups. If the store of a particular blood group is less than required amount then the system notifies the donor to donate blood. In addition to designed and implemented web application, an android mobile application is proposed for further research to search the donors who are available nearby during the emergency cases in hospitals or as accidents.

SRCN Senanayake, ADAI Gunsekara (2015) published article “Designing an Information System Model for National Blood Bank of Sri Lanka”. Researchers study totally is based on scheming an Information System Model for the National Blood Bank of Sri Lanka to utilize the donation of blood to minimize the existing problems such as limiting early reservations for donations, lack of centralized database to keep the donors' records, low security etc. In this paper, an Information System Model to utilize the Donation of Blood has been designed. The designed model is fully based on an ASP.net web application using the Service Oriented Architecture.

III. A SCENARIO OF BLOOD DONATION

Blood donation saves life and improves healthiness, but many patients who are on demand for blood but they do not get timely access to safe blood. Making available safe and enough blood must be primary part of every nation's health awareness policy. World Health Organization recommends that all such activities related to blood collection, testing,

processing, storage and circulation should be coordinated at the national level through effective communication and integrated blood supply networks. Every nation should have blood management system which should be governed by one national blood management board to promote and support uniformity in implementation of standards and safety of blood.

Blood donors (Age and gender)

Data obtained from WHO about the gender profile of blood donors clearly puts picture that globally 30% of blood donations are given by women, although this ranges widely. The age profile of blood donors shows that, proportionally, more young people donate blood in low- and middle-income countries than in high-income countries.

Types of blood donors

- Voluntary unpaid
- Family/replacement
- Paid.

Blood Screening

WHO recommends that all blood donations should be screened for infections prior to use. Screening and testing for HIV, hepatitis B, hepatitis C, and syphilis should be mandatory. Blood screening should be performed according to the quality system requirements. Of reporting countries, 13 countries are not able to test all donated blood for 1 or more of the above infections.

Frequency of Blood Types

Table No 1 : Blood Group and its frequency among citizens

Blood Group	Frequency
O+	1 Person in 3
O-	1 Person in 15
A+	1 Person in 3
A-	1 Person in 16
B+	1 Person in 12
B-	1 Person in 67
AB+	1 Person in 29
AB-	1 Person in 167

(Source: Secondary Data)

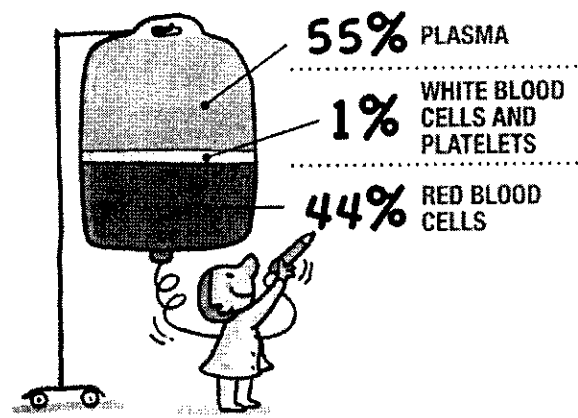
With population of 1.2 billion, India faces a blood shortage of around 3 million units. This difficulty can be sorted out if an additional two percent of Indians donated blood. According to World Health Organization (WHO) details, only nine million units are collected annually, while the need is for twelve million units. Blood banks are having shortage of blood donors. Many camps are organized by NGOs like who search for blood donors and help the needy people. In India more than 1200 (Twelve Hundred) road accidents occurs every day in India. Major 140 million operations, 331 million cancers related treatments like chemotherapy and more than ten million pregnancy complications requires blood transfusion.

Facts about blood and its components

According to World Health Organization report, volume of blood in a human body is around 7 percent of total body weight. An average adult body with a weight of 55 to 81 pounds will contain approximately 4.5 to 5.5 liters of blood. Donors can give either full blood or specific blood components only. The specific blood components given by

donors are – red cells, plasma or platelets – is called apheresis.

Diagram 1.0 Blood Components



IV. RESEARCH PROBLEM

Creating blood donation awareness is the biggest task for India. World Health Organization data clearly shows that demand and supply ration did not match in terms of blood storage. If any citizen in need of blood, first he approached to the relatives then to blood banks. It is experienced from many citizens reply that most of the hospitals never have sufficient blood stock. Value of blood can be understood only by the needy person or patient in hospital. Many problems related to emergency blood requirement, charges incurred to patients from hospitals and blood bank is a major issue in now days.

V. OBJECTIVES OF STUDY

- Research work is undertaken to suffice following objectives
1. To study the current practices and issues in blood donation awareness in Indian Citizens.
 2. To study and analyze the existing computer based systems for blood donation management in nation-wide context.
 3. To design & implement compatible mobile application to create and increase blood donation awareness among Indian Citizens.

VI. HYPOTHESES STATEMENT

1. Blood donation tendency is dependent on age and gender of the respondent.
2. Citizens are not happy with current blood donation awareness program implemented by government.

VII. SCOPE OF STUDY

The geographical scope of present study is not limited to any area, Taluka, city, state. This research problem is considered for every Indian Citizen. The conceptual scope of study is confined to Blood types, problems faced by Indian citizens in blood requirement and psychology of people towards blood donation. The researcher used various statistical tools for data analysis.

- a. **Conceptual Scope:** The conceptual scope is focusing on blood donation process, blood group types, and problems in blood donation.
- b. **Analytical Scope:** The data collected is analyzed with the help of statistical tools Excel and SPSS.

VIII. SIGNIFICANCE OF STUDY

1. It will help every Indian citizen to get blood of any group in emergency.
2. This study will help all blood banks and hospitals to keep blood in storage with large scale.

IX. RESEARCH METHODOLOGY

The study is descriptive inferential in nature and data is collected by using survey method..

Instrument: A structured schedule is prepared for collecting data from Indian citizens of every age group; and personally administered by the researcher to solicit information from the sample..

DATA COLLECTION

- **Primary Data:** The researcher has used structured questionnaire to collect primary data. Data regarding user’s opinion on blood donation, its awareness and importance in day to day life.
- **Secondary Data:** The necessary secondary data such as concepts of blood, its components & group types has been collected from sources like documents, libraries, magazines, published reports, published sources such as journals, books, articles, Research papers, library and web sites.

SAMPLE DESIGN

Researchers have used simple random sampling method for data collection and sample size is 385 as population for study. Data is collected from various cities and states of India.

DATA ANALYSIS

The data collected from primary and secondary sources is analyzed by using statistical tools viz. Percentage, measures of central tendency.

Table No 2: Gender Vs. Age

Gender	Upto 20	21 - 30	31-40	41 - 50	51 and Above	Total
Male	30 13.1%	81 35.4%	79 34.5%	26 11.4%	13 5.7%	229 100.0 %
Female	33 46.2%	17 29.5%	10 17.3%	2 3.2%	3 3.8%	156 100.0 %

(Source: Primary Data)

From the above table it is observed that around 60% of the respondents were the male respondents and 40% were the

female respondents. In this survey Youth respondents i.e. up to the age of 30 were 42%.

Table No.3: Gender showing various blood groups

Gender	A+	A-	B+	B-	AB+	O+	O-	Dont Know	Total
Male	35 15.3%	6 2.6%	54 23.6%	14 6.1%	38 16.6%	67 29.3%	5 2.2%	10 4.4%	229 100.0 %
Female	21 13.5%	2 1.3%	50 32.1%	10 6.4%	12 7.7%	44 28.2%	9 5.8%	8 5.1%	156 100.0 %
Total	56 14.5%	8 2.1%	104 27.0%	24 6.2%	50 13.0%	111 28.8%	14 3.6%	18 4.7%	385 100.0 %

(Source: Primary Data)

Above table insights on Gender and various blood groups. Table shows that A+, B+ & O+ are having maximum frequency and found more as compare to other blood group. AB- blood group is rarest rare blood group and it was not observed in the survey.

Table No.4: Have you donated blood ever? (Gender-Wise)

Gender	Yes	No	Total
Male	112 48.9%	117 51.1%	229 100.0%
Female	16 10.3%	140 89.7%	156 100.0%
Total	128 33.2%	257 66.8%	385 100.0%

(Source: Primary Data)

Above table reflects the data on gender wise blood donation. Surprisingly it is observed that only 33% of the respondent donated the blood and around 67% of the respondents have not yet donated blood ever in their life. It shows huge unwillingness to donate the blood amongst the respondents.

Table No.5: Have you donated blood ever? (Age-Wise)

Age	Yes	No
Upto 20	13 (12.7%)	89 (87.3%)
21 - 30	40 (31.5%)	87 (68.5%)
31-40	60 (56.6%)	46 (43.4%)
41 - 50	9 (29.0%)	22 (71.0%)
51 and Above	6 (31.6%)	13 (68.4%)

(Source: Primary Data)

Above table insights on age-wise blood donation. Out of total 33% of the blood donor it is observed that around 45% of the donor belongs up to the age of 30 years and 55% of the donor

belongs to the above age of 31. This reflects that blood donation amongst youth is marginally less than Middle age & old age donor.

Table No.6: How often you donate blood?

Gender	One Time in a Year	Two Times in a Year	Three Times in a Year	Four Times in a Year	If someone is in need	Never Donate	Total
Male	87 38.0%	22 9.6%	6 2.6%	6 2.6%	42 18.3%	66 28.8%	229 100.0%
Female	12 7.7%	5 3.2%	3 1.9%	0 .0%	17 10.9%	119 76.3%	156 100.0%
Total	99 25.7%	27 7.0%	9 2.3%	6 1.6%	59 15.3%	185 48.1%	385 100.0%

(Source: Primary Data)

Frequency of blood donation is shown in the above table. Maximum i.e. 25% of the respondents donate the blood once in a year followed by 15% of the donor donate the blood whenever its an case of urgency. Three times and four times blood donor are hardly observed in a survey.

Table No.7: Reasons for Unwillingness towards blood donation?

Reasons	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
I am scared of needles	32 8.3%	72 18.7%	176 45.7%	47 12.2%	58 15.1%	385 100.0%
Others are donating enough	15 3.9%	51 13.2%	209 54.3%	65 16.9%	45 11.7%	385 100.0%
I am not allowed to give blood due to medical reasons	23 6.0%	44 11.4%	201 52.2%	52 13.5%	65 16.9%	385 100.0%
I feel unwell during and after blood donation	29 7.5%	71 18.4%	186 48.3%	48 12.5%	51 13.2%	385 100.0%
Religious Reasons	6 1.6%	25 6.5%	218 56.6%	57 14.8%	79 20.5%	385 100.0%
My blood type is not in demand	11 2.9%	50 13.0%	211 54.8%	45 11.7%	68 17.7%	385 100.0%
I'm afraid of catching a disease	26 6.8%	52 13.5%	195 50.6%	55 14.3%	57 14.8%	385 100.0%
Government has not taken good initiatives	46 11.9%	78 20.3%	197 51.2%	35 9.1%	29 7.5%	385 100.0%

(Compiled by Researcher)

This table gives very important information as it finds the reasons for not donating the blood. The major reasons for the not donating blood is respondents are not happy with the initiatives taken by government to aware the blood donation (32%) followed by respondents are scared of needles (27%), Respondents feel unwell during and after blood donation (26%), respondents are afraid of catching any disease (20.5%), Due to medical reason 17.5% Respondents do not donate the blood, 17% of the respondents feels that others are donating blood enough, 16% of respondents says that their blood group is not in demand, where as 8% of the respondents strongly agree that religion is the reason for not donating the blood.

Table No.8: Reasons of Blood Donation

Gender	Contribution towards society	To burn calories	Reduces extra iron levels in body	Generates new blood in body	Total
Male	162 70.7%	9 3.9%	5 2.2%	53 23.1%	229 100.0%
Female	122 78.2%	3 1.9%	0 .0%	31 19.9%	156 100.0%

Above table shows that 73% of the respondents donate the blood considers social responsibility as a reason, where as 22% of the respondents donate the blood for generating new and fresh blood.

Table No.9: Does blood donation have any medical benefits

Gender	Yes	No	Total
Male	197 86.0%	32 14.0%	229 100.0%
Female	126 80.8%	30 19.2%	156 100.0%
Total	323 83.9%	62 16.1%	385 100.0%

(Source: Primary Data)

This table shows that around 84% of the respondents believe that blood donation has medical benefits and 16% of the respondents say that it does not have any medical benefits. Despite of knowing the medical benefits of blood donation, percentage of blood donation amongst people is very less.

Table No.10: In emergency, within how much time you get blood

Gender	Less than 1 Hour	Between 1 to 2 Hours	Between 2 to 4 Hours	More than 4 Hours	Total
Male	86 37.6%	63 27.5%	55 24.0%	25 10.9%	229 100.0%
Female	74 47.4%	39 25.0%	38 24.4%	5 3.2%	156 100.0%
Total	160 41.6%	102 26.5%	93 24.2%	30 7.8%	385 100.0%

(Source: Primary Data)

Above table describes the time period to get the blood in emergency timing. 41% Respondents says that blood will be available in less than 1 hour and around 27% respondents get blood within 2 hours. But others gets blood very late in emergency time as it crosses the time of more than 2 hours.

Table No.11: Have you heard about any Blood Donation Awareness Mobile App?

Gender	Yes	No	Total
Male	42 18.3%	187 81.7%	229 100.0%
Female	31 19.9%	125 80.1%	156 100.0%
Total	73 19.0%	312 81.0%	385 100.0%

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	45.822 ^a	4	0.021
Likelihood Ratio	47.436	4	0.022

(Source: Primary Data)

Above table reflects the data on awareness of Mobile app. Very few i.e. 19% of the respondents are aware about Blood donation mobile app. Surprisingly 73% respondents are not aware about blood donation awareness app. It shows that utmost necessity of steps to be taken for making aware the people for the emerging service like blood donation awareness application.

Table No.12: Do you think such Mobile App will be useful for society?

Gender	Yes, Absolutely Useful	Can't Say	3	Total
Male	167 72.9%	51 22.3%	11 4.8%	229 100.0%
Female	130 83.3%	24 15.4%	2 1.3%	156 100.0%
Total	297 77.1%	75 19.5%	13 3.4%	385 100.0%

(Source: Primary Data)

Table no. 12 states that 77% of the respondents says such mobile app will be very useful where as only 4% of the respondents says that it may not that much useful. This table itself shows the requirement of such mobile application which is very vital in case of emergency.

HYPOTHESES TESTING

H1: Blood donation tendency is dependent on age and gender of the respondent.

Table No.13: Age Vs Blood donation

Factors	N	Perce nt	N	Perce nt	N	Perce nt
Age * Have you ever donate blood	385	100.0%	0	.0%	385	100.0%

Table No.14: Chi-Square test for Hypotheses 1

Table No.15: Age Vs Blood donation

Factors	N	Perce nt	N	Perce nt	N	Perce nt
Gender * Have you ever donate blood	385	100.0%	0	.0%	385	100.0%

Table No.16: Chi-Square test for Hypotheses 1

Chi-Square Test	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	62.462 ^a	1	0.023
Likelihood Ratio	69.128	1	0.023

To test the hypothesis Chi-Square test was used. In this test two factors were taken in to consideration i.e. Age and Blood donation as well as Gender and Blood donation. 385 samples were tested with the confidence level 95% and degree of freedom 1. Test was run on SPSS. P value for first factor i.e. Age and blood donation was 0.02 which is less than 0.05 and for Gender and Blood donation P value is 0.023 again which is less than 0.05. As both the P values are less than 0.05 hence it approves the Hypothesis and rejects the null hypothesis.

H2: Citizens are not happy with current blood donation awareness program implemented by government

Table No.17: Chi-Square test for Hypotheses 2

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.566 ^a	4	.032
Likelihood Ratio	10.449	4	.034

Table No.18: Table showing frequency about Govt initiatives in blood donation awareness

Govt has not taken good initiatives	Frequency	Percent	Valid Percent
Strongly Agree	46	11.9	11.9
Agree	168	43.63	43.63
Neutral	107	27.79	27.79
Disagree	35	9.1	9.1
Strongly Disagree	29	7.5	7.5
Total	385	100.0	100.0

Hypotheses 2 was tested with the chi-square test and frequency distribution table. Chi square was tested with the respondents and their opinion towards Governments

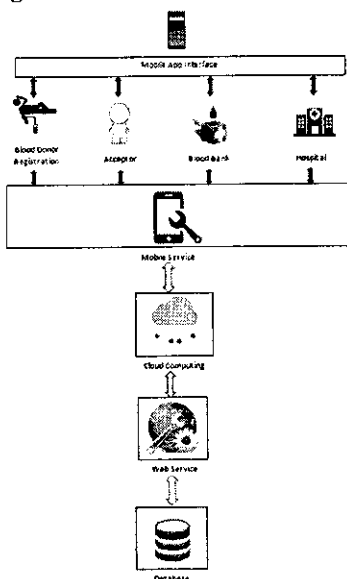
initiative. 5 point likert scale was used to collect the feedback of the respondent. As P value is 0.032 which is less than table value i.e.0.05. Hence it rejects the null hypotheses and accepts the alternative hypotheses.

X. FRAMEWORK FOR MOBILE APP

Proposed framework for blood donor mobile app mainly consists of modules Blood donor, Acceptor, blood bank and hospital. Module functionality is as follows:

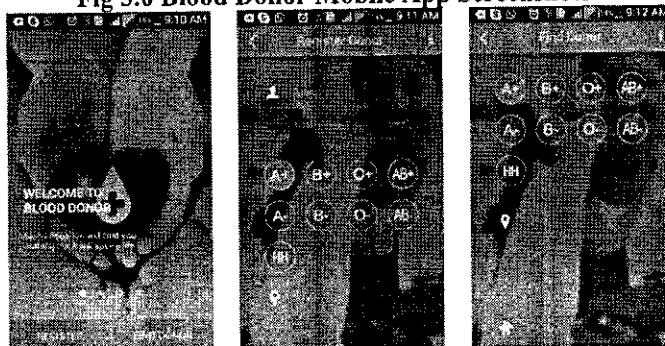
1. **Blood donor:** When any citizen requires blood, he/she has to register profile with fields viz. name, occupation, blood group, state, city, pincode, email id and mobile number.
2. **Acceptor:** In emergency of patient, acceptor will select option “Find Donor” from mobile app. He/she has to enter required blood group, state, city, area and most important pincode as mandatory field in addition with his name and contact number. Once enters the details, the donors will receive notification in app and parallelly acceptor will receive list of donors in that area nearby one to two kilometers.
3. **Blood bank:** All registered blood banks will be visible for donors and acceptors on GPS. Blood bank will get all donors database from admin of mobile application.
4. **Hospital:** All registered hospitals with their emergency numbers will be visible for donors and acceptors on GPS in case of emergency.

Fig 2.0 Framework for Blood Donor App



Above figure shows designed framework for blood donation app. It mainly revolves around web services written in java and secure cloud. Here secure cloud means private cloud. Backend database is totally designed in MYSQL which is very user friendly.

Fig 3.0 Blood Donor Mobile App Screenshots



Above figure shows real view or display of mobile app. It is Published on Google Play Store. As shown in figure, it is observed that, in addition to main eight blood groups, there exists ninth blood group naming “HH” which is found is found in 1 of 10,000 individuals in India and 1 in a million people in Europe.

X: CONCLUSION

As blood cannot be manufactured and it can be made available by donors, so Blood Donation Awareness is become a key word in emergency i.e. medical services. Most of the respondents are not fully aware about the advantages as well as consequences which lead to unwillingness to blood donation and unavailability of blood in emergency time. Initiative should be taken at rigorous mode by government to bring efficiency in availability of blood to recipients. Youth participation in blood donation should be increased especially male youth as their share is very less as compare to other age group blood donors.

Blood donation awareness mobile application is become the today’s necessity through which blood donor information can be available on fingertips. Even Rarest blood donor may be available within a one minutes search and will save life of many people. There is a bigger scope for such application in medical services which are considered as very emergency services.

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