

# Report on Blood Management System of Nepal & Future Possibilities

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# Executive Summary

Nepal's blood collection and supply process is scattered and mismanaged. Blood banks, which are authorized to conduct off-site voluntary blood donation programs, collect blood from voluntary donors through donation drives with support from different institutions. During blood shortage, onsite replacement donations are done by friends and family of the patient. After the blood is collected, they are tested to confirm safe transfusion to patients. Patients in need of blood and its products, are responsible for arranging blood for medical procedures on their own in almost all hospitals. This leads to chaotic, stressful and emotionally draining blood-search process especially during emergencies. Patients' families need to figure out where the blood banks are located and which one has the blood type they need in stock. Families are responsible for transporting blood bags from the blood bank to the hospital. And that's just the tip of the iceberg. Nepal's blood banks are notorious for being dry and patient's families have the onus of arranging blood donors for the blood type they need. Several blood donor groups have mushroomed over the past years in social media to help find matches for people in need. While this has helped alleviate the immediate stress of finding a starting point to find donors, it has also created a lot of noise and confusion for blood donors - where there are stories of donors receiving over a hundred calls from different resources for the same need.

Most of the blood banks and health care institutions record the information on blood (collection, investigation to dispatch) manually in registers. The current process and data keeping system are very tedious and the same set of information need to be repeatedly written in different registers. Only three institutes/blood bank use digital system (excel, Blood management software) to keep blood records. There is an immediate need of a holistic service with a proper inventory system which could create transparency and proper management of blood and blood supply. End users face many challenges when they are in need of blood. Many expressed the need of search and logistics service for patients in need of blood. End users and all the stakeholders emphasized on the need of a blood management system which they believe is the major factor for blood shortage in Nepal. A proper system will also play a major role in engaging and retaining donors without stressing them out with unsolicited requests.

# Background

National Bureau for Blood Transfusion Service (NBBTS) based at the National Public Health Laboratory (NPHL) is a focal point to regulate Blood Transfusion Service in Nepal. It advocates on Policy, Guidelines, Protocols and SOPs on blood related issues. Under NBBTS, there are different blood banks and health care institutions which collect, store and supply blood and its products to the needy. According to the annual report of NRCS 2074-75, nationwide blood collection of Nepal was 2,62,439 while the supply was for 3,44,933. Despite a huge collection of blood from voluntary donors, there is still a significant number of blood supply that needs to be fulfilled by replacement blood donors in Nepal. There is thus an undeniable possibility of having insufficient volume of blood products at blood banks leaving patients' lives at risk.

Existing blood management system in Nepal is often described as manual, cumbersome and inefficient. But there is no data or report to back up the statement. This research, thus focuses on reviewing and identifying the current state of play of blood management system in health care institutions of Nepal (*phase 1 is kathmandu valley centric*) which could further determine the immediate need for an efficient blood management process.

## Materials and methods

### Blood related organizations

Key informant interview, online survey and direct observation methods were used to gather information on existing blood management system in Nepal. We visited 14 hospitals, Red Cross Blood Bank (Kathmandu, Bhaktapur, Lalitpur and Bharatpur) and met with two Blood Donor's group in Kathmandu valley (Table 1). This included detailed process observation of blood management system and key informant interview with doctors, blood bank in-charge, hospital IT leads and hospital managers. *The research is still ongoing.*

*Table 1: List of organizations and interviewee visited for observation and research on blood management system of Nepal.*

Hospitals	Key person
Alka Hospital	Nabaraj Thapa (In-charge)
BLODAN	Machakaji Maharjan (Treasurer) Bishnu Raj Shrestha (Secretary) Keshav Maharjan (Secretary General)
Grande City Hospital	Bibek Sthapit (Blood Bank In-charge)
Grande Hospital	Dr. Bipin Nepal (Blood Bank incharge) Sabindra Maharjan (Technical officer)
Mediciti Hospital	Dr. Gopi Aryal (Head of Department) Bipul Gautam (Blood Bank In-charge) Manju Gyawali (Doctor)
NRCS Blood Bank, Balkumari	Dr. Manita RajKarnikar (Director) Sanjeev Kumar Yadav (Technical Officer)
NRCS Blood Bank, Bhaktapur	Pratik Chansi (Incharge) Prasuram Pandey (Secretary) Som Pradhan (President- Duwakot Sub branch)
NRCS Blood Bank, Lalitpur	Ratna Byanjankar (Incharge)
NRCS Blood Bank, Bharatpur	Ramesh Kant Poudel (Chief, S. Officer)
Nepal Medical College	Laxman Pokhrel (Lab In-charge)
Nepal Voluntary Blood Donors Society	Premsagar Karmacharya (Chairman)
Nobel Hospital	Ira Lage (Blood Bank In-charge) Krishna Nepali (Hospital Manager)
Paropakar Maternity & Women's Hospital	Parsuram Dahal (Blood Bank, In-charge)
Patan Hospital	Hem S. Subedi (Blood Bank In-charge) Amit Shakya (Doctor)
Teaching Hospital	Nu Maya Gurung (Blood Bank In-charge)
Himal Hospital	Kiran Yogi (Blood Bank In-charge)
Bir Hospital	Nageswor Kashyapati (Blood Bank In-charge)
Dhulikhel Hospital	Surendra Koju (Blood Bank Incharge)

*Table 2: List of organizations and interviewee with whom first meeting is completed but observational visit pending.*

Hospitals	Key person
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Civil Hospital	Simit Sapkota (Doctor)
Gangalal Hospital	

## End Users

We conducted an 105 online public survey to gather end user perception on the existing situation of blood drive system in Nepal and on possible modifications in the system to make it more efficient. Questionnaire used for the survey is provided in Annex.

## Results and Discussion

### Status of Blood Related Organizations in Kathmandu Valley

#### Alka Hospital

##### *Current situation*

*Blood collection:* They collect blood only from onsite blood donations.

*Blood drive process:* Patient in need of blood goes to blood banks to fetch blood or finds donor. If patient want to return blood, they return it back to the blood bank from where they brought it. Most of the unused blood get donated to other patients.

*Laboratory facilities:* Onsite donation, Storage, HIV, HBsAg, HCV, VDRL, Cross matching, grouping, transfusion

*Inventory system:* They keep blood records manually in registers and record blood stock in excel.

##### *Future possibilities*

*Digital Inventory system:* They are trying to move towards digital record keeping but require technical support which is an opportunity for a digital inventory system.

*Logistics Services:* They are interested in providing logistics service to their patients by hiring a third party because of which their patients do not have to worry about blood.

## **Grande City**

### ***Current situation***

*Blood collection:* They collect blood only from onsite donation.

*Blood drive process:* Patients who require blood manages donor or blood units from other blood banks by themselves. They redo the Transfusion Transmitted Infection (TTI) test if patients request for this test. If it is unused, they store it as stock. Stock blood are used for other new patients who need blood but they do not provide it to other hospitals as they get it tested for TTI which is very expensive. Their blood requirement is very low. They do not accept returned blood.

They used to bring 30 to 40 units of blood each day from Red Cross before as stock but they stopped doing it as many of the blood units got wasted.

*Laboratory facilities:* Onsite donation, Storage, HIV, HBsAg, HCV, VDRL, Cross matching, grouping, transfusion

*Inventory system:* They keep info of blood manually in registers but do not keep stock inventory. They only record blood related issues.

### ***Future possibilities***

*Info center:* They stressed on the need to aware doctors on proper blood request for patient which would automatically decrease the burden of blood shortage in Nepal.

*Logistics Services:* Being a service centric organization, they see an opportunity to provide blood delivery service for patients who want it.

## **Grande Hospital**

### ***Current situation***

*Blood collection:* They conduct onsite and offsite donation drives in coordination with different organizations. They have been able to decrease their waste by more than 50% which is a major indicator of their improving their blood management system.

*Blood drive process:* Grande hospital provides blood and its products to its inpatients as well as patients from other hospitals. Blood available at hospital, is investigated and made available to the patient. If the blood is unused, they accept the returned blood only within 24 hours of surgery. If blood is unavailable at hospitals, they have two staff who look after managing blood products for their inpatients.

*Laboratory facilities:* Blood donation (On and offsite), transfusion, Storage, cross matching, HIV, Hepatitis B C, VDRL, Blood group, blood component separation.

*Inventory system:* They have digital inventory system for recording blood information and blood investigation results.

*Logistic Service:* They provide logistic service to their inpatients for blood; patients do not have to run to search for blood.

### ***Future possibilities***

*Donor Data Collection Digital system:* They have the inventory system where they enter every data of donors and blood after donation program. However, availability of a system where they could collect donor info digitally during the donation drive would make the system efficient.

## **Mediciti Hospital**

### ***Current situation***

*Blood collection:* They collect blood through onsite and offsite donation drives.

*Blood drive process:* If blood is available at hospital, they provide it to the patient and if unused, it is kept back in stock.

*Laboratory facilities:* Blood donation (Onsite and offsite), transfusion, Storage, cross matching, HIV, Hepatitis B C, VDRL, Blood group, advanced machines for blood component separation.

*Inventory system:* They have a digital inventory system to keep records of blood. They also keep records manually in registers.

### ***Future possibilities***

*Donor Data Collection Digital system:* They have the inventory system where they enter every data of donors and blood after donation program. However, there's a need for a holistics system where they could collect donor's info digitally during the donation drive would make the system more efficient.

*Logistics Services:* To provide complete blood service to their patients, they look forward to providing delivery and management services for patients who opt for it.

## **Nepal Red Cross Society Blood Bank, Balkumari**

### ***Current situation***

*Blood collection:* They collect blood from onsite and offsite blood donation drives in coordination with other organizations.

*Blood drive process:* Patients in need of blood come to blood banks to fetch blood. If patient want to return blood, they can return it back to the bank before 7 days of expiry date.

*Laboratory facilities:* Onsite and offsite donation, Storage, HIV, HBsAg, HCV, VDRL, Cross matching, Component separation, grouping

*Inventory system:* The records of blood are kept manually in registers. They do not keep stock records.

### ***Future possibilities***

*Info services:* They are focusing on increasing amount of blood collection so are interested in conducting activities to motivate donors.

*Logistics Services:* They are open to hospital to blood bank delivery taking stock blood in bulk rather than individual patient coming for blood. This would make the process more efficient for patients as well as blood bank to manage blood.

## **Nepal Red Cross Society Blood Bank, Lalitpur**

### ***Current situation***

*Blood collection:* They collect blood from offsite and onsite blood donation programs.

*Blood drive process:* Patients in need of blood come to blood banks to fetch blood.

*Laboratory facilities:* Offsite and onsite donation, Storage, HIV, HBsAg, HCV, VDRL, Cross matching, Component separation, grouping

*Inventory system:* They keep blood records in registers and maintain a blood stock in excel.

### ***Future possibilities***

*Digital Data Collection + Inventory system:* They are trying to move towards digital record keeping but require technical support which is an opportunity for a digital inventory system.

## **Nepal Red Cross Society Blood Bank, Bhaktapur**

### ***Current situation***

*Blood collection:* They collect blood from offsite and onsite blood donation programs. They conduct at least one offsite donation program daily. They collect about 4000 pints of blood per month.

*Blood drive process:* Patients in need of blood come to blood banks to fetch blood.

*Laboratory facilities:* Offsite and onsite donation, Storage, HIV, HBsAg, HCV, VDRL, Cross matching, Component separation, grouping

*Inventory system:* They collect blood info manually in registers.

### ***Future possibilities***

*Data Collection + Digital Inventory system:* They want to upgrade to a digital inventory system as they feel it will help them be more efficient. They have a laptop and Wi-Fi facility with which they can start using the *hamro* lifebank system. They have 8 staff members in total to look after overall functioning of this 24 hour blood bank. They need to review their resource structure for a digital upgrade.

*Info Center:* Bhaktapur RC Blood bank and RC branch at Duwakot both are concerned on need of motivating individuals to donate blood. Also, development of awareness in doctors on requesting proper amount and blood components according to need is a must for efficient management of blood.

## **Nepal Red Cross Society Blood Bank, Bharatpur**

### ***Current situation***

*Blood collection:* They collect blood from offsite and onsite blood donation programs. They conduct about 300 blood donation events per year through which they collect about 15000 pints of blood per year.

*Blood drive process:* For easy access of blood to in-patients of major hospitals of Chitwan, Bharatpur Cancer Hospital and Chitwan Medical College, Bharatpur Red Cross has set a separate blood dispatch unit at the hospital itself. Other patients in need of blood go to Bharatpur Red Cross to fetch blood.

*Laboratory facilities:* Offsite and onsite donation, Storage, HIV, HBsAg, HCV, VDRL, Cross matching, Component separation, grouping

*Inventory system:* They collect blood info manually in registers. Their billing system is also manual which is then transferred in excel.

### ***Future possibilities***

*Data Collection + Digital Inventory system:* They want to upgrade to digital data keeping system from blood collection to supply including billing of the blood pouch. They have a desktop and Wi-Fi facility with which they can start using the *hamro* lifebank system. They have a staff to maintain digital records of their billings who can be a resource for initial usage

of the system. Installing inventory system at first phase is recommended and they can enter the donor data in the inventory itself after returning from donation program.

## **NMC Hospital**

### ***Current situation***

*Blood collection:* They do not collect blood.

*Blood drive process:* Patient in need of blood visits blood banks to fetch blood or finds donor. If patient wants to return blood, they return it back to the blood bank from where they brought it.

*Laboratory facilities:* Transfusion, Storage, cross matching, HIV, HBsAg, HCV, VDRL, Blood group.

*Blood requirements:* 10 to 20 pints per day approx.

*Inventory system:* Records of blood pouches brought from blood banks are kept in registers. A preliminary system for blood inventory is existing but is not used. Records of blood in stock is not maintained due to low staff number.

### ***Future possibilities***

*Digital Inventory system:* They are positive about adopting digital system but they are not being able to do so due to inefficient and inadequate staff and a technically challenging system. Thus a user-friendly system and change management is very important.

## **Nobel Hospital**

### ***Current situation***

#### *Blood collection*

They are licensed to conduct onsite and offsite donation drives. They conduct at least one blood donation program in a week.

#### *Blood drive process*

Nobel hospital provides blood and its products to its inpatients as well as patients from other hospitals. If the issued blood is unused, they accept the returned blood only within 24 hours of surgery. If blood is unavailable at hospital they manage blood for patient from other banks via phone calls. They provide ambulance service, if needed, to their inpatient for fetching blood.

#### *Laboratory facilities*

Blood donation (On and offsite), transfusion, Storage, cross matching, HIV, Hepatitis B C, VDRL, Blood group, blood component separation, Apheresis.

*Inventory system:* Information of blood collected from onsite, offsite donation or brought from other banks, investigation results including cross matching are recorded manually in registers.

#### ***Future possibilities***

*Digital Donor Data Collection + Inventory system:* Manual system of data keeping has been obsolete and they are ready to accept the digital inventory system but fear of insufficient resources and behavior change are a huge challenge.

*Info center:* They have been routing information on blood to public verbally. They mentioned that they have to spend about 10 to 20 mins to aware an individual on the blood info thus having informative tools for public awareness would be helpful for them.

*Logistics Services:* Nobel managed ambulance for inpatient who request for the transportation service. However, they didn't have any delivery system of blood to patient or hospitals.

## **Paropakar Maternity & Women's Hospital**

#### ***Current situation***

*Blood collection:* They collect blood only from onsite donation programs.

*Blood drive process:* If blood is available at hospital, they crossmatch with patient's blood sample and provide to patient. If unavailable, patient party manages it from other banks or donors.

*Laboratory facilities:* Blood donation (Onsite), transfusion, storage, HIV, Hepatitis B C, VDRL, cross matching, Blood grouping

*Inventory system:* Information of blood and blood products are kept manually in registers.

### ***Future possibilities***

*Digital Inventory system:* They want to upgrade their process with a digital inventory system.

*Info service:* They strongly seek support for increasing their regular donors and its database.

*Donation event management:* They want to push off-site donor camps with digital data collection process.

## **Patan Hospital**

### ***Current situation***

*Blood collection:* They collect blood only from onsite donation programs.

*Blood drive process:* If blood is available at hospital, they crossmatch with patient's blood sample and provide to patient. If blood is unused, they keep it back in stock. If unavailable, patient party manages it from other banks or donors.

*Laboratory facilities:* Blood donation (Onsite), transfusion, storage, HIV, Hepatitis B C, VDRL, cross matching, Blood grouping

*Inventory system:* Information of blood and blood products are kept manually in registers. They are positive in sharing their inventory and it is recommended to have provision where Red Cross and other blood banks can have access of each other's inventory.

### ***Future possibilities***

*Digital Inventory system:* They are keeping digital records of only investigation results which indicates their interest in digital record keeping. However, due to problems faced previously for integrating digital inventory system like low server capacity, they are lagging behind. They are open to trying out a holistic inventory system.

*Logistics Services:* They have not provided any type of logistic services for patients seeking for blood but they are positive about the idea as an option for patients.

*Info Center:* They spend a lot of time verbally sharing blood info to individuals thus having informative tools for public awareness would be helpful for them.

## **Teaching Hospital**

### ***Current situation***

*Blood collection:* They are allowed to conduct both onsite and offsite donation but they conduct only onsite donations because they do not have enough staff for offsite donations. Blood requirements at Teaching is 150 pints per day approx.

*Blood drive process:* If blood is available at hospital, they crossmatch with patient's blood sample and provide it to the patient. If blood is unavailable at hospital, patient brings blood from other banks patient or blood donors. Teaching does not take blood in return as returned blood are of low quality due to poor maintenance of cold chain.

*Laboratory facilities:* Blood donation (On and offsite), transfusion, Storage, cross matching, HIV, Hepatitis B C, VDRL, Blood group, blood component separation.

*Inventory system:* Information of blood including investigation results are recorded manually in registers. They used to keep record of stock blood before but due to lack of manpower it is not maintained at present.

### ***Future possibilities***

*Digital system:* They do not have any digital system for recording data on blood. Thus there is an opportunity for efficient data management system. Also, they shared that the existing monthly report submission process has been challenging. If there is a better process and system for this, they would like to use it.

## **Bir Hospital**

### ***Current situation***

*Blood collection and supply:* They conduct only onsite blood donation. They collect about 600 pints of blood every year however, their blood requirements is around 1300 pints per month. They collect required blood from other blood banks nearby. Also, there is wastage of about 6 to 20 pints of blood every month. Cost of each blood packet is NPR 700.

*Blood drive process:* They have 5 staffs in total dedicated for blood bank. Most of the required blood is managed by replacement donation or from blood banks nearby. If blood is available at hospital, they crossmatch with patient's blood sample and provide it to the patient. If blood is unavailable at hospital, patient brings blood from other banks. They do not take blood in return.

*Laboratory facilities:* Blood donation (On site), transfusion, Storage, cross matching, HIV, Hepatitis B C, VDRL, Blood group.

*Inventory system:* Information of blood including investigation results are recorded manually in registers.

### ***Future possibilities***

*Digital system:* They record all the data in registers; computer is only used to type and send monthly report to the concerned authority. They need to be motivated to use the latest technology available to the fullest which can help them be more efficient.

## **Himal Hospital**

### ***Current situation***

#### *Blood collection*

They are licensed to conduct onsite and offsite donation drives with support from various organizers.

#### *Blood drive process*

They provide blood and its products to all patients from all hospitals. If the issued blood is unused, they accept the returned blood only within 48 hours of dispatch.

#### *Laboratory facilities*

Blood donation (On and offsite), transfusion, Storage, cross matching, HIV, Hepatitis B C, VDRL, Blood group, Blood component separation.

*Inventory system:* Information of blood collected from onsite, offsite donation or brought from other banks, investigation results including cross matching are recorded manually in registers. They keep stocks of blood in paper everyday.

### ***Future possibilities***

*Digital Donor Data Collection + Inventory system:* They are a new blood bank and are ready to adopt new management or technical system to make themselves efficient.

## **Dhulikhel Hospital**

### ***Current situation***

#### *Blood collection*

They conduct both onsite and offsite donation drives. Since they are a hospital based blood bank they have a demand of only 200 to 300 pints every month. Thus they conduct only one to two donation camps each month with only 50 to 100 target donors.

#### *Blood drive process*

They provide blood and its products to all patients from all hospitals. If the issued blood is unused, they accept the returned blood only within 24 hours of dispatch. Each pint of blood cost NPR 800.

#### *Laboratory facilities*

Blood donation (On and offsite), transfusion, Storage, cross matching, HIV, Hepatitis B C, VDRL, Blood group, Blood component separation (PRBC, PRP and PC).

#### *Inventory system*

Information of blood collected from onsite, offsite donation or brought from other banks, investigation results including cross matching are recorded manually in registers. They keep

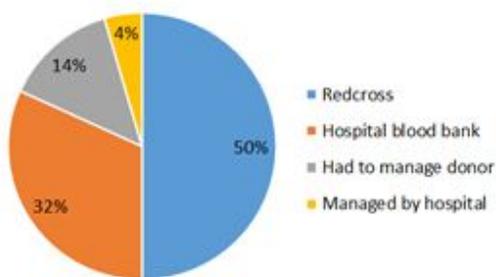
stocks of blood with blood bag number every day in register. They digitise donor details and blood dispatch info in excel everyday.

### **Future possibilities**

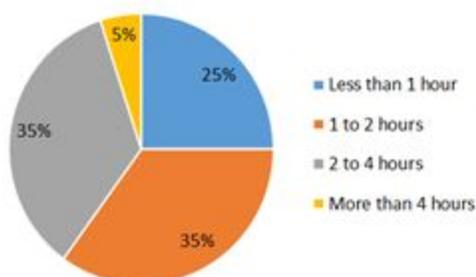
*Digital Donor Data Collection + Inventory system:* They have a robust record keeping system of blood info and plan to move towards digital inventory system. They are ready to adopt a digital system to make themselves more efficient.

## **End User Survey Analysis**

Out of the 105 respondents (56 male, 49 female), 50% of them managed blood from hospitals during need. Most of the respondents collected and transported blood within 1 to 2 hours. Only 38% of the respondents claim to have transfused the blood to patients. Finding out where to go, connecting with blood bank and transporting or delivering blood to hospital were the most difficult part for patient party during blood need. 68 % of respondents were ready to use blood delivery system however, only 65 % of them expressed their willingness on paying for the delivery service. Charts of results obtained from the survey of 105 individuals are presented below.



*Fig 1: Where did you get blood from?*



*Fig 2: How much time did you spend to find and transport the blood to the hospital?*

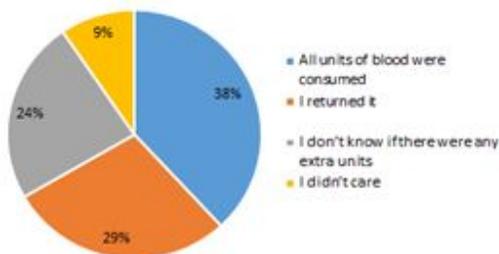


Fig 3: What did you do with unused units of blood?

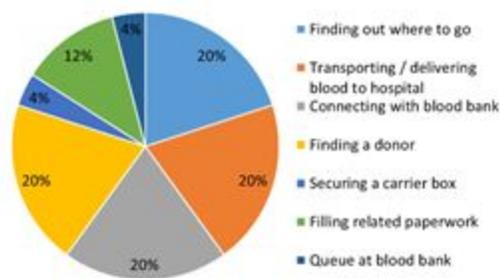


Fig 4: What part of the process was the most difficult/frustrating?

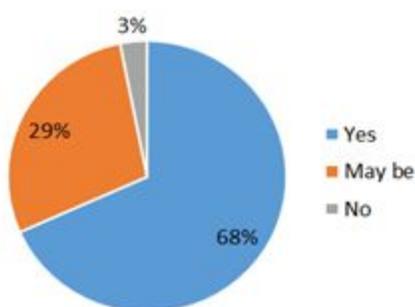


Fig 5: If there was a blood search and dispatch system, would you use it?

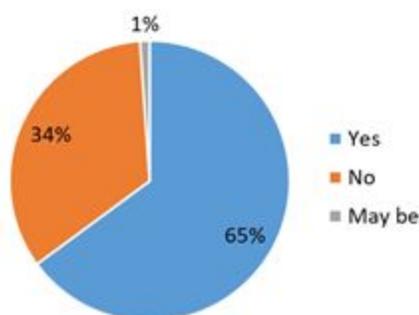


Fig 6: Willingness to pay for delivery service.

## Conclusion

So far, the study concludes that most of the blood related organizations in Kathmandu are collecting blood data manually in registers while only a handful keep stock record in excel and digital inventory system. Also, end users are facing serious problems when they are in need of blood, keeping lives at high risk. An efficient blood management system - *technology and education/awareness* - is potentially a big solution to minimize the chaos that blood banks and end users are facing in today's context. It will also play a major role in managing, engaging and retaining donors without stressing them out with unsolicited calls. Thus, there is an immediate need of a proper data collection, inventory and dispatch system which could create transparency and proper management of blood and blood supply.

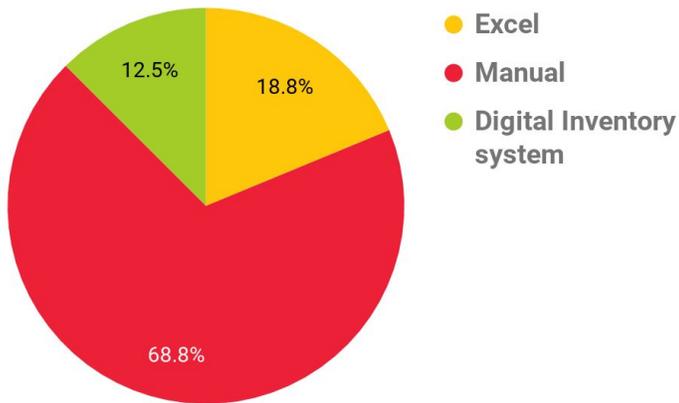
# ANNEX

Table 3: Blood bank analysis on the basis of their inventory system, info center and blood logistics services

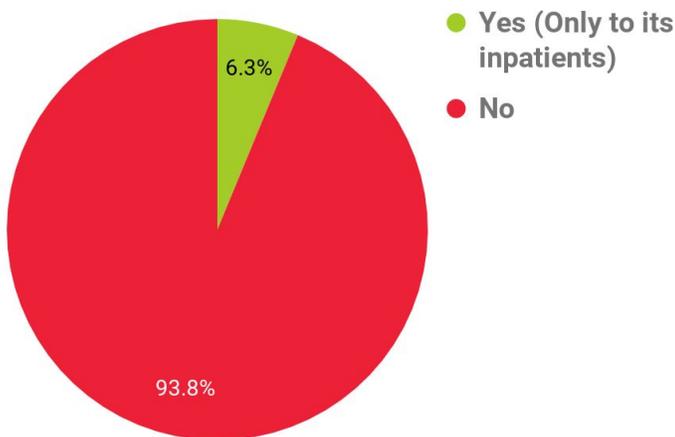
Blood bank/ Hospital	Inventory system	Info Center	Blood Logistic Services
Alka Hospital	Excel	No	No
Grande City Hospital	Manual	No	No
Grande Hospital	Digital	No	Yes, only to its inpatients
Mediciti Hospital	Digital	No	No
Nepal Medical College	Manual	No	No
Nobel Hospital	Manual	No	Yes, only to its inpatients if required
NRCS, Balkumari	Manual	No	No
NRCS, Bhaktapur	Manual	No	No
NRCS, Lalitpur	Excel (Partial)	No	No
NRCS, Bharatpur	Manual	No	No
Paropakar Maternity & Women's Hospital	Manual	No	No
Patan Hospital	Manual	No	No
Teaching Hospital	Manual	No	No
Himal Hospital	Manual	No	No
Bir Hospital	Manual	No	No
Dhulikhel Hospital	Manual + Excel	No	No

# Charts showing blood inventory system and logistic service provided by Blood banks

## Blood Inventory System



## Blood Delivery Service of Hospitals



**Some photos from the research and visits:**

BLOOD GROUPING REGISTER							
Date	S. No.	Name	Age/Sex	Group No.	CPUSA Blood No.	Blood Group	Remarks
15/11/17	1	Prakash Kumar Bhandari	35/M	101	101	B+	
15/11/17	2	Prakash Kumar Bhandari	35/M	102	102	B+	
15/11/17	3	Prakash Kumar Bhandari	35/M	103	103	B+	
15/11/17	4	Prakash Kumar Bhandari	35/M	104	104	B+	
15/11/17	5	Prakash Kumar Bhandari	35/M	105	105	B+	
15/11/17	6	Prakash Kumar Bhandari	35/M	106	106	B+	
15/11/17	7	Prakash Kumar Bhandari	35/M	107	107	B+	
15/11/17	8	Prakash Kumar Bhandari	35/M	108	108	B+	
15/11/17	9	Prakash Kumar Bhandari	35/M	109	109	B+	
15/11/17	10	Prakash Kumar Bhandari	35/M	110	110	B+	

**Fig 7: Donors' Blood grouping Register of a blood bank**



**Fig 8: Meeting with Bhaktapur Red Cross Blood Bank**



**Fig 9: Meeting with Mediciti Hospital**



**Fig 10: Meeting with different stakeholders of blood in Nepal at NPHL**

Sl. No.	Name	Address	Phone No.	Remarks
1	Prakash Kumar Bhandari	...	...	...
2	Prakash Kumar Bhandari	...	...	...
3	Prakash Kumar Bhandari	...	...	...
4	Prakash Kumar Bhandari	...	...	...
5	Prakash Kumar Bhandari	...	...	...
6	Prakash Kumar Bhandari	...	...	...
7	Prakash Kumar Bhandari	...	...	...
8	Prakash Kumar Bhandari	...	...	...
9	Prakash Kumar Bhandari	...	...	...
10	Prakash Kumar Bhandari	...	...	...

**Fig 11: Sample of record keeping of blood supply**

Sl. No.	Name	Address	Phone No.	Remarks
1	Prakash Kumar Bhandari	...	...	...
2	Prakash Kumar Bhandari	...	...	...
3	Prakash Kumar Bhandari	...	...	...
4	Prakash Kumar Bhandari	...	...	...
5	Prakash Kumar Bhandari	...	...	...
6	Prakash Kumar Bhandari	...	...	...
7	Prakash Kumar Bhandari	...	...	...
8	Prakash Kumar Bhandari	...	...	...
9	Prakash Kumar Bhandari	...	...	...
10	Prakash Kumar Bhandari	...	...	...

**Fig 12: Blood data recorded in excel**



**Fig 13: Observation visit at Paropakar Maternity and Women's Hospital**