Reinvigorating Eye Banking In India

This assessment was requested by:
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I. Summary

India has made great strides in addressing blindness overall but lags in treating corneal blindness due primarily to a lack of transplantable corneal tissue. Awareness campaigns and eye bank development efforts in the past 10 years have shown modest success, with increased transplant surgeries from 7,562 (2002) to 19,089 (2011), a 10% annual increase.[1] This growth rate is far below the Vision 2020 goal of 1 lakh transplants by 2020 to begin to address the estimated 1.0-1.2 million bilateral corneal blind and 5-6 million unilateral corneal blind in India.[2][3]

The assessment of India's current situation highlights several key facts:

- ✓ **More eye banks are not the answer** - Of the 694 registered eye banks, there are only 149 active eye banks and of those only 25 are qualified, per NPCB standards, to operate. The ten largest eye banks account for almost half of all transplants performed.
- ✓ **A few eye banks have found a successful model** – 71% of all growth since 2009 has come from 5 NGO eye banks (Figure 4, Page 7)
- ✓ **Overall tissue utilization is low, with a few exceptions** – Most Indian eye banks are able to utilize only 20-40% of collected tissue for transplants, but a group of eye banks (SightLife Partner Eye Banks) with Hospital Cornea Retrieval Programs are averaging 72% utilization (international levels).
- ✓ **Costs far exceed current government funding –** Total eye bank's cost per transplanted cornea ranges from INR 5,000-12,000. Government funding only covers 20-30% of the cost.
- ✓ **No quality assessment exists –** Eye banks are not required to pass any quality accreditation based on current medical standards, creating health risks for recipients.

The opportunity exists for Indian eye banking to grow rapidly and sustainably to the 2020 goal by leveraging global best practices with the leading eye banks in India. The next section of this paper includes case studies which highlight key lessons and best practices that include:

- ✓ **Hospital Cornea Retrieval Program (HCRP) is a key model for success**
- ✓ **HCRP success is only possible if the eye banks directly recruit, extensively train and effectively manage counselors**
- ✓ **HCRP is most successful through a Public Private Partnership with government hospitals**

The proposed solutions can be implemented with limited NPCB resource or regulatory requirements. The short term recommendations are:

- ✓ **Fund outcomes, not activities** – NPCB funding successful transplanted corneas (versus collections) will motivate growth, efficiency and quality
- ✓ **Require eye bank accreditation** – Third-party evaluation is needed to insure quality
- ✓ **Support PPPs between Government Hospitals and eye bank NGOs** – A proven model, leveraging both parties' strengths

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[1] EBAI Statistics 2002-2011, Eye Bank Association of India

[2] Dandona R, Dandona L. Corneal Blindness in a Southern Indian Population: Need for Health Promotion Strategies. Br J Ophthalmology 2003;87:133-141.

[3] Rajesh S, Sharma N, Vajpayee R. Corneal Blindness - Present Status. Cataract & Refractive Surgery Today 2005; October: 59-61.

- ✓ **Endorse pilot National Cornea Distribution System** – Increase access to corneas with distribution network and longer-term storage media for corneas. The pilot study is currently planned jointly by SightLife and EBAI.

Longer term recommendations include NPCB support of donor registry access and public education.

NPCB has made tremendous progress with the leading cause of blindness, cataract, with a cataract surgery rate (CSR) of almost 5,000 per million. In contrast, corneal blindness lags with a **corneal transplant surgery rate (CTSR) only 16 per million** based on 19,000 surgeries. A specific set of solutions are detailed below which will increase this rate fivefold with limited resources and regulatory changes, restoring sight ultimately to millions of India's corneal blind.

II. Current Situation in India

A. Current Shortage

1. **The Need**: Diseases affecting the cornea are the second leading cause of blindness globally.[4] In India it is estimated to be the third leading cause of blindness, after cataract and glaucoma. Epidemiology studies on blindness causation in India are limited, but estimates of bilateral cornea blindness are 1-1.2 million and unilateral corneal blindness is from 5-6 million, with 50,000 new estimated cases per year. Unlike other major causes of blindness, corneal blindness is significant among children (20% of childhood blindness) and young adults.[5] Causes of corneal damage include: trachoma, infectious keratitis, ocular trauma, traditional eye medicines, and corneal dystrophies.

   The projected corneal transplants required to meet this need was established at a NPCB-EBAI-ORBIS planning session (24th July, 2004) to address the shortage of corneal tissue and develop eye banks. In conjunction with Vision 2020 the goal was established to perform 100,000 transplants annually by 2020. Based on comparisons with countries where corneas are more available (Brazil and US) and India's higher prevalence the ultimate required transplant number is likely closer to 200,000, even with extensive gains in preventative programs.

2. **Surgeon Capacity and Coverage**: Approximately 400 corneal surgeons operate in India, performing an estimated 19,000 transplants in 2011. Overall surgeon capacity is below 50%, due primarily to a lack of tissue (SightLife 2010 survey of surgeons). Forty seven percent of corneal surgeons are in the major metropolitan areas (Mumbai, Delhi, Hyderabad, Chennai, Kolkata and Bangalore) and corneal surgeons are now practicing in only 68 cities across India.

3. **Corneal Supply**: In 2011, 337 eye banks and collection centers in India reported supplying corneas for 19,089 transplants. This is approximately 38% of all corneas collected (approximately 50,000 collections). Based on a mortality rate of 8.2 per thousand (9.2 million deaths annually) total collections were from less than 0.2% of all deaths.[6]

   In comparison, Brazil generated 14,696 transplantable corneas (2011) with utilization of approximately 50% and collections from 1.2% of total deaths.[7] In the United States 67,590 transplantable corneas (2011) were supplied, at 59% utilization (optical tissue only), with collections from 2.2% of total deaths.[8]

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[4] Ibid.

[5] Garg P, Krishna PV, Stratis AK, Gopinathan U. The Value of Corneal Transplantation in Reducing blindness. *Eye* 2005; 19:1106-1114.

[6] 2011 EBAI Statistics, Eye Bank Association of India

[7] 2011 Statistics, Pan American Association of Eye Banks

[8] 2011 Statistics, Eye Bank Association of America

India has the ability to exceed the 1 lakh goal with improvement in tissue utilization to 50% and focused targeting of consenting donors equal to 1% of all deaths. The remaining paper focuses on existing eye bank performance and how to best achieve these results.

B. Eye Banking Trends

1. **Overall Growth:** Total transplantable corneas have increased over the last ten years from 7,562 to 19,089, an average of 10% growth annually. To reach the target of 1 lakh by 2020 average growth would need to accelerate to 20% annually.

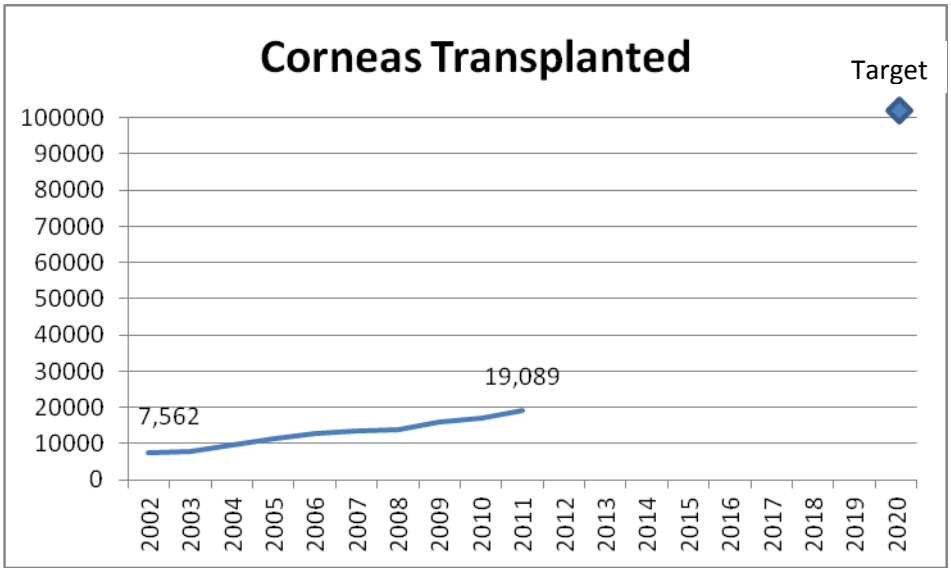

Figure 1. Growth rate of cornea transplants in India over the past 10 years will not lead to reaching the goal of 100,000 transplants annually by 2020

2. **Number of Eye Banks:** Over the last 10 years the number of registered eye banks has grown rapidly from 346 in 2002 to 694 in 2011, with government funding of 15 lakh provided for startup costs. Today, 337 eye banks and collection centres are collecting corneas. Within that group, 149 are active eye banks, with "active" defined as processing and distributing at least one cornea a year. Only 25 of the 149 eye banks are estimated to meet THOA/NPCB's minimum standards, which includes the use of a specular microscope for tissue evaluation. To see a full list of active eye banks and geographic locations see Appendix A.

   The focus of remaining analysis will be on the 149 active eye banks, though evidence that most of these eye banks do not meet NPCB (or international) quality standards is a critical concern to be addressed later.

   The 545 inactive eye banks pose an overall growth barrier, due to inactive eye banks' relationships with hospitals and influential community members limiting access to hospitals and mortuaries for active eye banks.

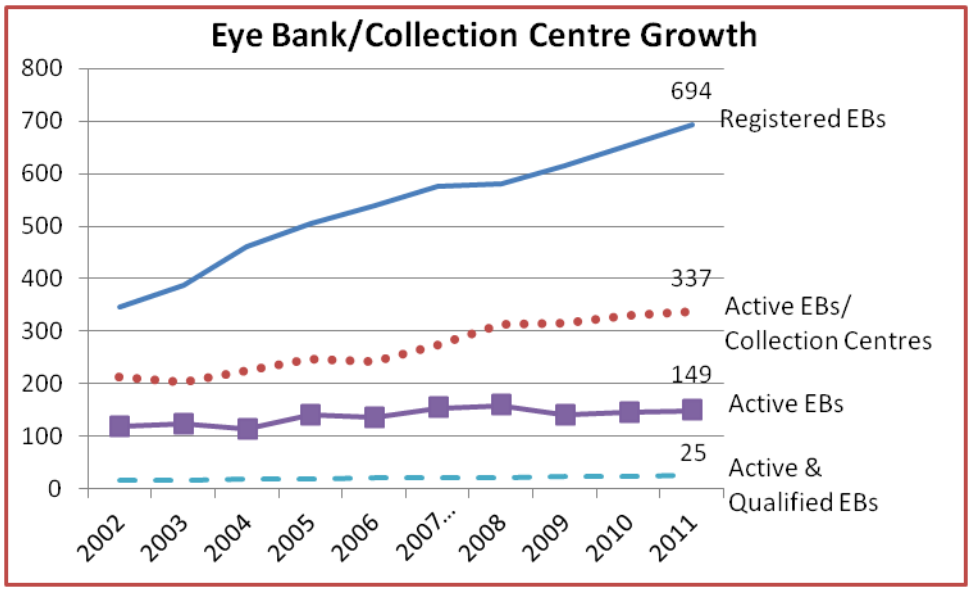

Figure 2. Registered EBs have grown rapidly, but only 21% are "Active" and only 4% are "Active and Qualified" to operate, based on NPCB standards.

3. **Active Eye Banks:** In 2011, 46% of all corneal transplants were supported by the ten largest eye banks. Even more striking is that these ten eye banks represent 76% of the growth in all transplantable corneas from 2009 to 2011. The graph below illustrates eye bank performance based on size, capturing the 149 eye banks generating transplants broken into groups of 10 from the largest eye banks to the smallest and the transplantable corneas total for each group in 2009 and 2011.

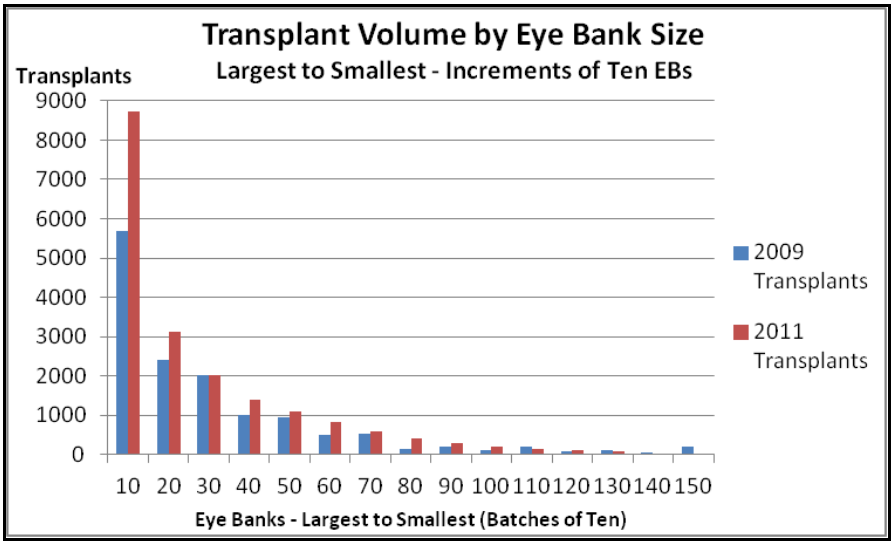

Figure 3. 46% of all transplants in India were supported by the ten largest eye banks.

In addition to the rapid growth of larger eye banks, the graph also illustrates the smallest 100 eye banks average less than 28 corneas a year, a level far below the necessary scale to maintain staff, quality, and infrastructure.

4. **Top Ten Eye Banks:** The ten largest eye banks and their incremental growth of 3,045 transplants from 2009 to 2011 are graphed below. Five eye banks account for 93% of the top ten collective growth (or 71% of total eye banking growth). They are:
    - Ramayamma International Eye Bank (LV Prasad Institute)
    - India Red Cross Society – Dholka
    - Prova Eye Bank (Disha Eye Institute)
    - Drushti Daan Eye Bank, and
    - Eye Bank Association of Kerala

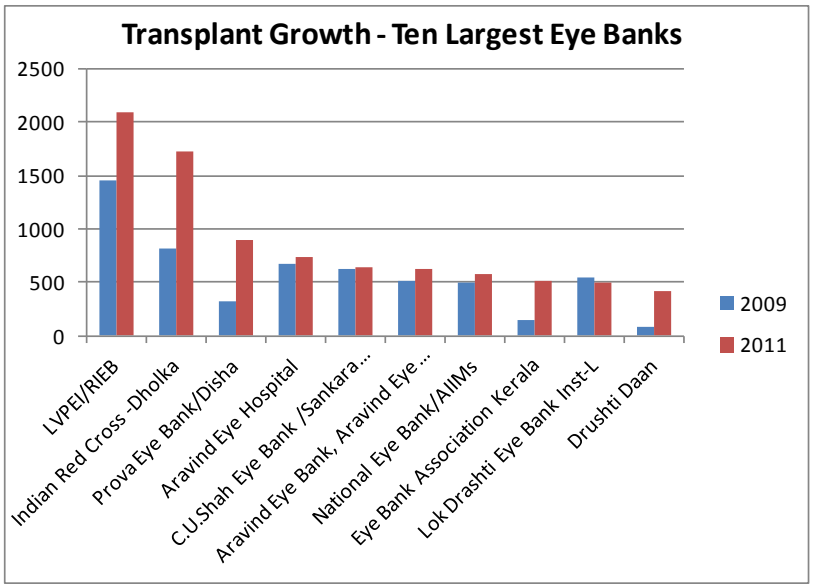

Figure 4. Five eye banks account for 93% of the top 10 EB growth.

The success of these eye banks can be attributed to many of the global best practices outlined in Section III: professional management, hospital-based retrieval programs, driving performance base on transplants, etc. Case studies are provided in Section IV to specifically illustrate India-based models of success.

5. **Tissue Utilization:** Corneal tissue utilization (recovered tissue utilized for transplants) for India is gradually climbing to 40% in recent years (see Figure 5). The variance across eye banks is significant, particularly when the method of collection is compared. Analysis of SightLife partner eye banks demonstrates high utilization of HCRP collected tissue, similar to international utilization rates, while Voluntary collections (estimated) is less than half the HCRP utilization rate (see Figure 6). A number of factors contribute to this variance, but the two major factors are limited to no screening of donors with Voluntary and limited training of staff with Voluntary programs.[9]

[9] EBAI Statistics are the basis for transplant data. NPCB data (http://www.npcb.nic.in/writereaddata/mainlinkFile/File270.pdf), as assessed on 30 July 2012, is the basis for estimated collection data, with data viewed as estimation based on collection timing differences and a variance above EBAI Statistics of 8%-27%, depending on year. SightLife Statistics are the basis for SightLife Partner utilization rates.

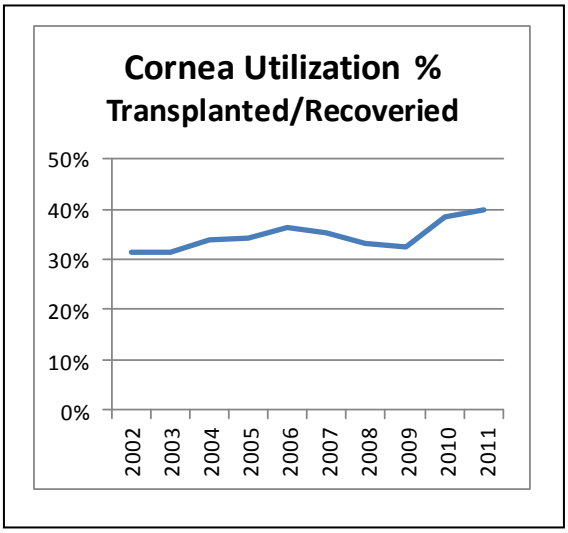

Figure 5. HCRP improving overall utilization

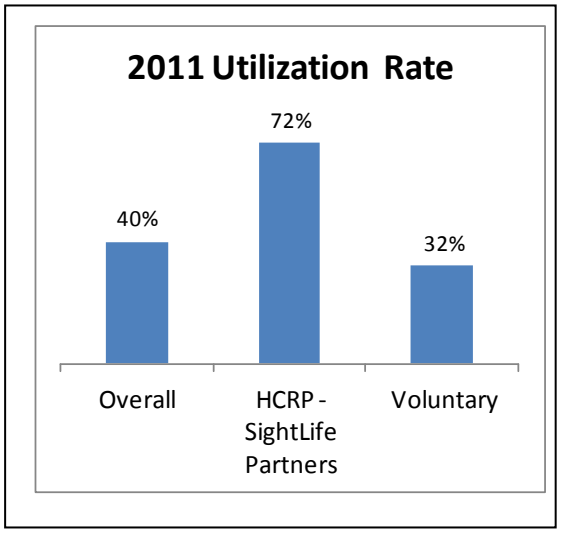

Figure 6. Variance by collection method

C. Eye Banking Financial Sustainability

Indian eye banking currently has limited tracking of the costs involved in operating a successful eye bank and there is limited public education that these costs need to be covered to cover existing operations and to build the required infrastructure to meet India's need for transplantable tissue. SightLife and its partner eye banks have been rigorouSLly tracking and modeling the cost of eye banking in India to determine the fees and public/private funding required to create a sustainable eye banking system. The cost is highly variable by eye bank, based on a number of factors: volume, mix of HCRP/Voluntary, staff productivity, city's cost of living, and expenses covered by a supporting organization. By recognizing all costs and utilizing data from five SightLife Partner eye banks the below analysis (Figure 7) provides a range of costs per cornea at each volume level.

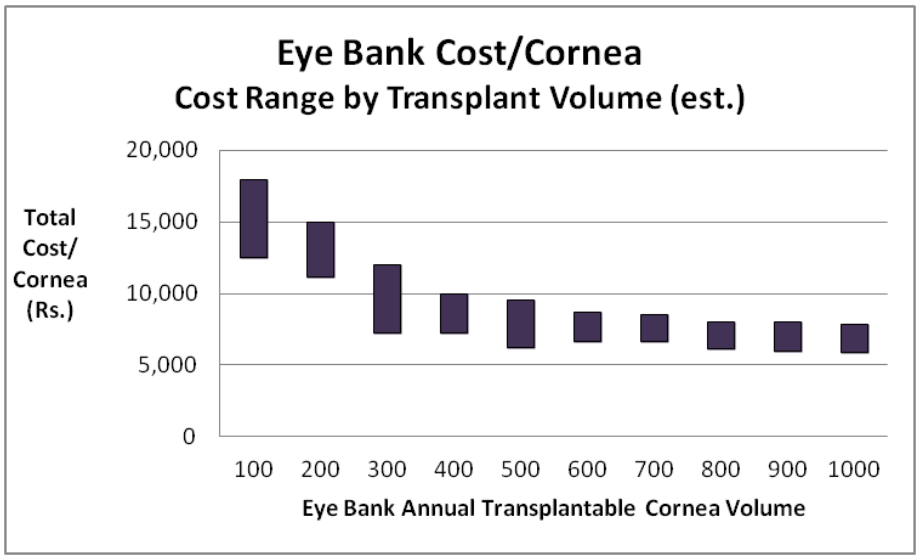

Figure 7. Higher volume eye banks are more cost effective

The high fixed costs of establishing an eye bank (rent, equipment, manager, initial staff, etc.) make the per cornea cost extremely high for small eye banks. Economies of scale are significant, making five hundred transplants the minimum number for an eye bank to be efficient, with continued efficiencies to be gained as the eye bank grows to 1,000 transplants per year.

Current NPCB funding of recoveries (Rs.500 /cornea for collection centres, Rs.750 /cornea for eye banks) covers only 20-30% of total costs and encourages inefficiency and poor utilization of tissue by paying for the activity (recoveries) versus funding the outcome (transplants).

D. Eye Banking Quality

Quality in eye banking is a key concern, due to a lack of current medical standards and no system to inspect and accredit eye banks based on the standards. NPCB medical standards and accreditation requirement exist, but no systems have been established to update standards and implement eye bank accreditation. Eye banks that are part of larger hospitals are subject to National Accreditation Board of Hospitals (NABH) inspections, but the inspection is not specific to eye banking quality specifications. As a result any registered eye bank can currently operate without any third party quality oversight.

The EBAI, with sponsorship from SightLife, Sightsavers and ORBIS, and technical support from SightLife and the Eye Bank Association of America has established a pilot accreditation program based on a draft of updated medical standards. This program is based on the EBAA's accreditation program and customized to India's needs. The pilot was successful, with seven eye banks trained and then accredited to meet international eye bank quality standards. EBAI now has an MOU with the NABH to support all active eye banks in preparing for and achieving accreditation. Outstanding steps remaining include: establishing a Medical Advisory Board (to update standards), implementation of accreditation and enforcing the regulatory requirement that all eye banks must become accredited.

III. Global Best Practices

Global best practices in eye banking are based on information from national and international data sources, in-person site visits, leading eye bank case studies and decades of eye bank management and consulting experience.

A. Hospital-Based Recovery with Public Private Partnerships

Hospital-based cornea recovery program (HCRP) is the standard means of obtaining tissues for leading eye banks around the world. HCRP is a common term in India used to describe eye donations consented through proactive engagement with hospitals and donor families. The program is typically a Public Private Partnership between the eye bank (typically an NGO) and a government hospital. This approach is in contrast to "Voluntary" donations, where eyes are obtained through passive reliance on a deceased person's family calling the eye bank at the time of death.

The basic elements of the HCRP model includes building strong relationships between donor hospitals and the eye bank, and using professionally-trained Eye Donation Counselors (EDCs) to approach family members and request consent for donation immediately after death of the family's loved one. This strategy requires a professional program, with heavy investment in highly-trained staff, which is a challenge for small volunteer-based eye banks. However, in leading eye banks around the world this model is the standard, irrespective of a diverse set of cultural, national, and socio-economic contexts. This model can be seen in the USA, Brazil, Japan, Singapore, India, and other places with strong eye banking. In the USA counseling is now done exclusively via telephone, providing significant additional productivity with counseling staff.

The HCRP model is more efficient, scalable, and provides higher quality donors than voluntary donation. The donation potential of large hospitals can be efficiently captured with strong relationships between the eye bank and the hospital given adequate, well-trained staff placed at the hospitals. One eye donation counselor has the potential to spend their entire working hours counseling families and obtaining consent, which fosters specialization and mastery of the skill, and results in efficiency of scale. With better pre-donation medical screening by well-trained counselors, and a ready-and-waiting team of technicians for faster and more skilled tissue recovery and transport to the eye bank, the quality of HCRP donor tissue far surpasses that of voluntary. For the same reasons, the efficiency of HCRP tissue (measured by utilization rate) is typically much higher than that of voluntary tissue. Indian eye banks showed a nearly 20% increase in utilization after starting HCRP in 2004.[10]

[10] (Basak, Srinivasan, Gopinathan, & Ganesh, 2009)

Voluntary donation, where a family member of the deceased takes the initiative to call the eye bank at the time of death, is more common in areas where donation awareness is high. For voluntary donation to be effective, there must be high awareness by the community, and a consciousness by the family member at the time of death and in a state grief to not only remember about the option of donation, but also to have the motivation to find the phone number and call the eye bank, all within a few hours of death. Furthermore, eye banks are discouraged from screening voluntary donors, for fear of offending community members who want to give, and spreading the impression that the eye bank does not need corneas. In the end, corneas are recovered, knowing fully that they have a high risk of not being used, and are discarded at a much higher rate than HCRP corneas.

Voluntary donation can be very expensive – using precious resources to drive far from the eye bank to recover and transport tissue to the eye bank. Voluntary donation can appear cheaper for the eye bank, because it does not require highly-trained eye donation counselors, but it does not have the incentives to scale efficiently, effectively, or with high quality. Therefore, most high volume eye banks around the world have only a small percentage of corneas recovered from voluntary donations.

***Comparison to current practice in India**: Many eye banks in India rely primarily on voluntary donations[11] and this contributes to the low utilization rates overall. In India, there is a myth that India is different from other countries, and "Indians don't want to donate." This may be based on results from voluntary donations. All over the world, people will donate if given the right opportunity at the right time by the right person. Figure 6 shows that HCRP is possible in India, given proper training and professional program structure. The section titled, "Successful Models in India," below, will give more detail on the Ramayamma International Eye Bank example.*

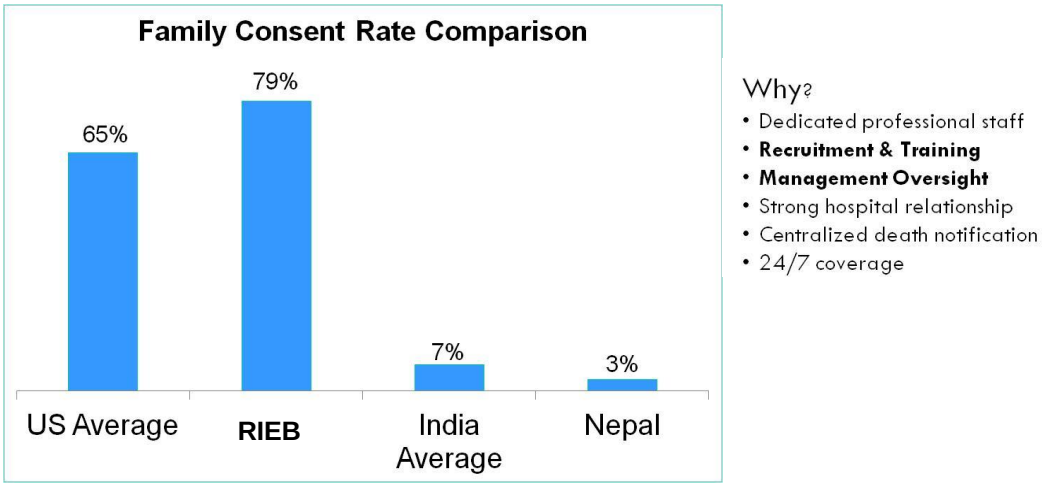

Figure 8. Consent Rate at one leading Indian eye bank is higher than the USA average

[11] (Eye Bank Association of India, 2012)

B. Operational Leaders (non-clinical)

All leading eye banks have full time professional management dedicated solely to the day-to-day operation of the eye bank. The Executive Director (or Manager) has training and professional experience in management, budgeting, employee supervision, etc., giving them the appropriate training and skills to develop a scalable and sustainable eye bank. Internationally, large eye banks can be managed by a Chief Executive Officer (CEO), with graduate business degrees. The Medical Director is a consultant to the eye bank for quality and technical oversight, not an administrative lead. The Medical Director is hired by the Executive Director or Manager or Board to set technical and quality standards.

In independent eye banks the Executive Director or Manager reports to a Board of Trustees. In eye banks which are a part of an institution, it is common that the Medical Director is appointed to oversee the entire eye bank, which relegates the eye bank manager to share management of the eye bank with someone who is neither trained in management, nor dedicated full time to eye bank activities.

***Comparison to current practice in India**: Among the 149 active eye banks in India, fewer than 20 eye bank managers exist, with less than 10 having professional management training. This lack of professional management contributes to small, ineffective eye banks.*

C. Independent Community Based Organizations

Independent, community-based eye banks have shown to be the most effective eye bank organizational structure, in terms of both scalability and sustainability. The ten leading US-based eye banks in terms of volume[12] are all independent, community-based organizations. The top two eye banks in the world, based on volume (SightLife, USA, and Sorocaba, Brazil) are independent, community-based organizations.

An independent, community-based organization is designed to meet community needs, serving the needs of all rather than a select group. In eye banking, this means that the organizational structure is not tied to a "parent" organization or entity, and serves the needs of all surgeons rather than only those of a particular institution or hospital group. An independent, community-based organization is free from a "parent" organization's competing objectives and budgeting concerns. In the context of eye banking, the parent organization is typically an eye care hospital or other multi-specialty hospital, and nearly always has cornea surgeons within the hospital. The vision for growth in these "dependent" eye banks is typically limited to serving the needs of the hospital's surgeons. Once the need for the surgeon's patient base is met, the eye bank has

[12] (Eye Bank Association of America, 2010) (Eye Bank Association of America, 2010)

limited incentive to continue growing. In contrast, the independent eye bank has one clear objective – to meet the patient needs and customer-physician needs of its service area, and must do so within its own financial means. The independent eye bank's service area covers a much broader area, serving the local community (and beyond), rather than a single institution or group of institutions.

The concept of community-based eye banking, in the form of community recovery (cornea recovery from multiple hospitals/sources in service area), and community distribution (sending corneas to all surgeons in service area) is an accepted tenant published in international texts.[13] This prevents "hoarding" of tissue within an organization, and encourages fair and equitable distribution to all surgeons.

SightLife's story includes an illustration of the effects of the influence of a "parent" institute. For its first 30 years, SightLife was a small organization located in the largest and most prestigious university hospital and medical research centre in the region. The eye bank produced enough corneas to supply the surgeons in their university hospital, but had little vision to go beyond that. In the late 1990s, SightLife severed its "child" relationship with the university. The eye bank built relationships with all surgeons in the community and beyond to neighboring states and ultimately international ties – creating a "pull" for more corneas. Within one year, the eye bank responded to that increased demand by professionalizing donor hospital relationships, hiring more staff, and dramatically increasing operations – a trend of growth (and improved utilization) that continues today, 15 years later (see Figure 9).

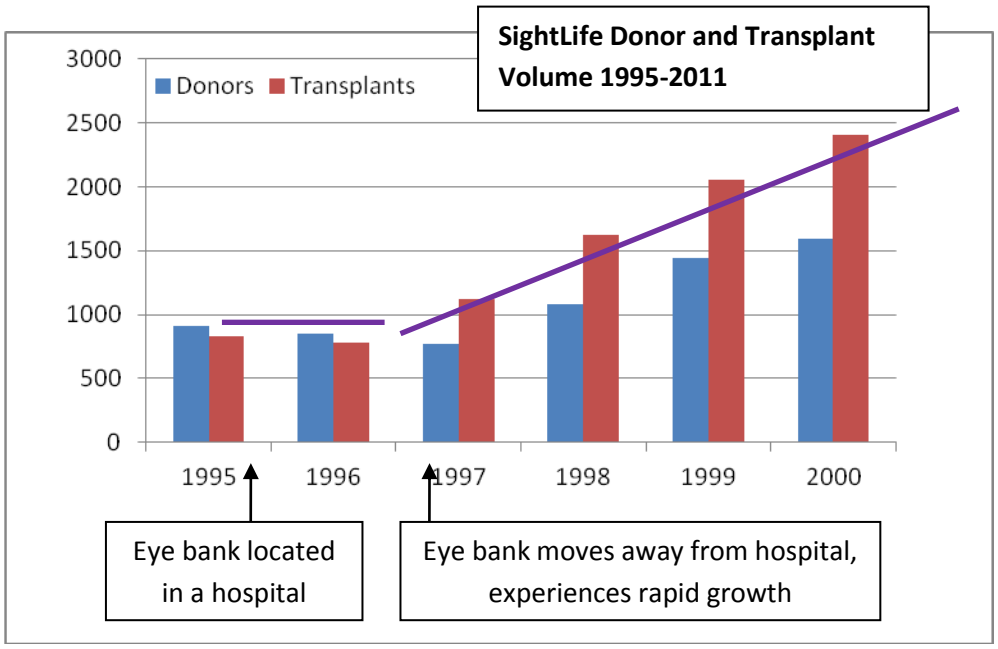

Figure 9. Independence drives growth

[13] (American Academy of Ophthalmology, 2003)

***Comparison to current practice in India**: Most Indian eye banks are a department of a larger institution, requiring competition for resources, focus, and strategic and operational priorities. While initially the support of a larger institute can be helpful to a start-up eye bank, ultimately this structure limits the growth of the dependent eye bank, usually resulting in a plateau of transplantable tissue once the host organization's perceived needs are met.*

D. Sustainable & Equitable Funding

Reliable and performance-driven funding is critical to sustainable and scalable eye banking. Additionally, it is imperative that the funding model supports equitable distribution to all of those in need. The most effective form of funding is where the funding is tied to the outcome, a successful transplant. The eye bank is paid for services in the form of a processing fee per cornea (to cover the costs of consent, recovery, processing, distribution, and management). This provides the appropriate incentive to provide the most efficient processes possible, with scaling up the eye bank's volume key to gaining efficiency. It also reinforces screening of donors prior to recovery, since recovery of tissue that will ultimately be discarded wastes resources. Donor screening increases quality and ensures that time and resources are spent collecting and processing corneas that have a high chance of being used for transplant.

Funding for the processing fee can come from a variety of sources and these sources are key to assuring the equitable distribution of tissue. In many countries the processing fee is considered part of the surgery cost and is covered by private or public insurance. In India NGO-supported eye banks provide up to 40% of corneal surgeries and corneas gratis, building the cost of those gratis corneas into the processing fee for the paying patients. NGO eye banks are also providing government surgeons with gratis corneas, as part of a Public Private Partnership with a government hospital. In all of these successful approaches the processing fee keeps the eye bank financially sustainable.

Figure 10 illustrates the benefit of outcome-based funding (paying for transplants) versus activity-based funding (paying for collections). An eye bank paid on collections has the incentive to collect unacceptable tissue and have lower utilization in order to maximize payments. In contrast, the eye bank paid for transplants has no incentive to waste donor tissue.

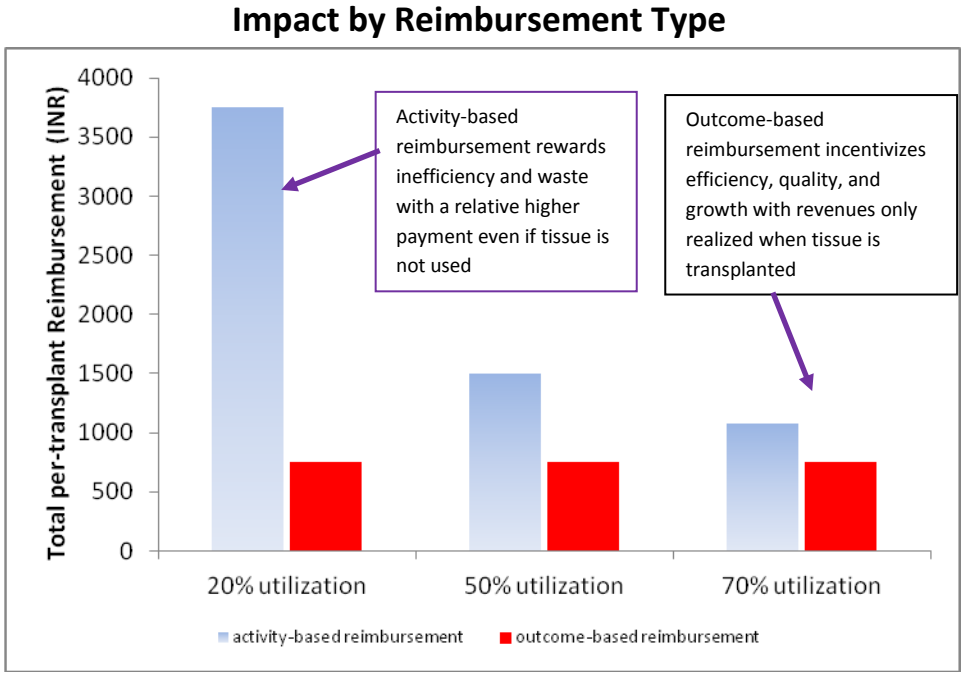

Figure 10. Outcome-based reimbursement incentivizes efficiency and growth[14]

***Comparison to current practice in India**: While some Indian eye banks charge a nominal processing fee, most Indian eye banks seek government funding based on recovery and processing activities, regardless of whether the cornea is transplanted. This encourages recovery of tissue even if it is known or likely that it will not be used, resulting in a high percentage of tissue discards (low utilization rate). This structure encourages recovery of non-transplantable tissue. Some eye banks have a discard rate of more than 80% .[15,16] These eye banks are likely being paid for recovery and processing for each cornea, regardless of whether it was transplanted.*

E. Cornea Distribution Network

An effective cornea distribution network is another crucial component needed in India. Deaths occur sporadically and surgeries fluctuate from day to day, resulting in shortages and excess of tissue on a local level. The best practice solution to this challenge is to connect eye banks to even out the peaks and valleys of donor volume; when one eye bank has a high-volume day (or week), other eye banks may have a low-volume day (or week), and vice versa. The ability for surgeons to source corneas from different eye banks, depending on where the corneas are on

[14] An example of average reimbursement per transplanted cornea, assuming a INR 750 cost per cornea collected

[15] (Aji, 2010)

[16] (Eye Bank Association of India, 2012)

that day, and the ability for eye banks to share corneas when they have more tissue than their local demand, can alleviate this challenge.

Eye banks and surgeons may not be located in same area. Many surgeons are not a part of an institution which has its own eye bank (or an effective eye bank), and may practice in areas which are not near eye banks. In these cases, surgeons must have reliable supply channels. A cornea distribution network allows for more equitable distribution of tissue to where the patients are – especially to more rural areas.

***Comparison to current practice in India**: Most eye banks serve only their local area, and surgeons are used to a lack of cornea availability. Since most eye banks are small in scale, many patients do not have access to corneas, and most rural areas are completely without access to corneas. A distribution network will help to connect second-tier cities and rural areas.*

F. Required Death Notification

The most successful eye donation programs operate in an environment with supportive legal and regulatory systems which encourage cooperation between donor hospitals and eye banks. While strong eye banks exist all over the world, countries with the highest donation rates have legal and regulatory support in the form of timely required death notification, including a penalty for non-compliance.[17] The hospitals are only required to make immediate and timely death notification to, and cooperate with, eye banks. They are not required to allocate resources or provide any funding to donation activities. Required death notification supports the environment of eye banking by mandating that hospitals report every death to eye bank programs. Eye banks, in turn, have the opportunity to assist hospitals to meet compliance by partnering with them to perform the donation activities (screen potential donors, approach families, and surgically recover tissue). It is important to note here that the person approaching the family member should be specifically trained to do so, and have a strong interest in meeting the needs of the family. The best practice includes trained eye donation counselors, employed by the eye bank (not the hospital). The eye bank is best equipped (and incentivized) to train and manage the eye donation counselors, since poor performance affects the eye bank, not the hospital.

***Comparison to current practice in India**: Donor hospitals in India have little incentive to work with eye banks. Hospitals can block eye banks from working in their facility (or from doing so effectively) and from contacting patient families to offer donation opportunities. There is new legiSLIation in India with required request language (legiSLIative rules need to be finalized), but it does not require that the person approaching families is trained in eye donation counseling and employed by an eye bank. Nor is there any penalty for hospital non-compliance.*

[17] (United States Federal Law 42 U.S.C.A. § 1320b-8)

G. Public Education

Best practices in eye banking reveal that public education is a shared role between eye banks and government and/or other NGOs. Eye banks participate or may partner with other organizations (or governments) who specialize in communication and public health or population-based behavior change. Eye banks have the subject matter expertise about eye banking and other organizations have the know-how and competency to reach large-scale audiences. Commonly defined, large-scale public awareness campaigns are not typically an eye bank function or core competency. However, public education can take the form of targeted education integrated in the systems. Through cooperation with local governments, eye banks can incorporate public education about donation with public services. For example, some governments have donor registration integrated with ID cards or drivers licensing. HCRP is also a form of targeted public education, where the eye bank is responsible for educating the potential donor family at the time of death, with relevant and timely information.

Comparison to current practice in India: *Section 2.2 of NPCB Standards on eye banking clearly dictates that it is the eye banks' responsibility to educate the public regarding donation.*[18] *There is no funding attached to this responsibility. No eye bank has professional public health communications staff. Eye banks tend to take up to a month off from operations during the annual "eye donation fortnight" (including two weeks of preparation), resulting in much fewer donors during that time period, and no evidence of net increase in donors in the long-term.*

H. Registry Access

The key to an effective donor registry is not the registry itself, but ***access*** to the registry at the time of death, when the eye donation counselor is approaching the family for donation. Secure, online access for all eye donation counselors is the most cost-effective best practice known. Donation counselors at leading eye banks around the world have access to local registries at any time day or night, every day of the year. When there is a potential donor that they are about to approach, a simple search in the database (including unique identifying information) can show the results of that specific potential donor immediately. That information can be shown to the family members during the conversation about donation, prior to or after recovery. At SightLife, there is a 95% consent rate from families when they are told that that their deceased loved one was registered as a donor. This compares to a 70% consent rate when this information is not available.

In some states in the USA, a statewide database is maintained with donation information from anyone who chooses to register (or pledge). Typically, this database is enhanced with daily updates from the state drivers' license database, which includes donation consent status on

[18] (National Programe for Control of Blindness (NPCB), 2009)

individual licenses. There are checks to assure an accurate database and the ability for any registered individual to remove themselves from the database at anytime.

***Comparison to current practice in India**: Pledge cards and certificates are used for individuals to proclaim their desire to donate upon their passing. The cards/certificates are rarely available to the eye donation counselor at the time of death, and thus cannot be used as consent. Many times, families may not know if their deceased family member has pledged their eyes or not.*

I. Medical Standards and Accreditation

Leading medical standards-setting bodies are committees of corneal surgeons and eye bank managers. The Eye Bank Association of America (EBAA) has the largest and most functional Medical Advisory Board, meeting and updating standards twice yearly through a standard process. Around the world, eye banking standards have been primarily set by copying a version of previouSLIy published EBAA standards. The key to success with the EBAA is the process, and the cooperative and equal-status nature of the physicians and managers, and the inclusion of government regulatory officials (such as the FDA in the USA) on the committee. This is a self-regulated system, where the industry sets and checks its own membership for compliance.

The best practice for assurance of quality is through independent, third-party accreditation. Similar to hospital accreditation, high quality eye banks are kept in compliance with the highest standards through a quality audit of records and direct observation of practices. Experts in eye banking (a Medical Director and a highly-experienced eye bank technician) typically make up the assessment team. Accreditation is effective for one to three years, the duration of the accreditation depending on the score achieved by the eye bank in the inspection.

***Comparison to current practice in India**: NPCB standards are not continually updated by an expert representative committee. There is no assurance that NPCB standards are being followed by any eye bank. Quality is not checked by an independent body.*

IV. Successful Eye Bank Models in India

A. Ramayamma International Eye Bank Case Study

Name of Eye Bank: Ramayamma International Eye Bank (RIEB) **Location:** Hyderabad
HCRP Hospitals: Gandhi Hospital, Osmania General Hospital, and Nizams Institute of Medical Sciences
Best Practices: HCRP thru PPPs, Operational Leadership
Case Summary: Creation of largest eye bank in India based, in part, on the establishment of operational leadership and the continuous improvement and expansion of HCRP.

Key Statistics:	**2010**	**2011**	**Growth %**
Voluntary Transplants & Donation Centres	1250	1350	8%
HCRP Transplants	527	753	43%
Utilization Rate	57%	60%	5%
Total Transplants	1777	2103	18%

Case Detail: Ramayamma International Eye Bank (RIEB) was established in 1989 as a dedicated eye bank for the twin cities of Hyderabad and Secunderabad. From a humble start of supporting 20 transplants in its first year, it has emerged as India's largest eye bank, supporting 2,103 transplants in India (2011). RIEB's corneas come from three sources: Eye Donation Centres (51%), Voluntary (21%), and HCRP (28%). A deeper look at the donor portfolio evolution indicates that HCRP has become the growth engine, due to multiple contributing factors:

1. **Focus on large hospitals with high mortality:** As part of its growth focus, RIEB has established relationships with three large hospitals, with cumulative annual deaths of 9,000-10,000. These hospitals provide support to RIEB staff in the collection of corneas. In turn, RIEB provides over 77% of the transplantable corneas back to the local population of Andhra Pradesh. This symbiotic relationship has helped reduce corneal blindness not only in the state of Andhra Pradesh but also across the country.

2. **Focus on continual counsellor training for improved consent rate:** Through establishment of a regional training centre for Eye Donation Counselors RIEB has built a strong culture of continual learning and improvement. Comprehensive training programs are provided at RIEB for eye donation counselors, technicians, and managers. Staff are frequently sharing best practices with each other, thereby ensuring continuity in learning and efforts. Junior counselors achieve consent rates of over 40% in the first six months on the job, moving to 60% within one year. Senior counsellors maintained an average of 80% in 2011. On-going training programs and continual learning has enabled better understanding of how to deal with difficult situations during counseling.

3. **Establishment of eye bank leadership:** The success of RIEB has also been largely possible through empowerment of staff to operate on day-to-day basis. This has increased the commitment and engagement of key staff members which in turn produces better results for the eye bank. Opportunities for advancement and increased responsibility have been provided for counselors and technicians through establishment of roles like Counselor-cum-technician, Senior Counselor, Team Leader/Hospital In charge, Training Manager, Operations Manager, HCRP Manager, Eye Bank Manager, and Assistant Director. At the organizational apex is an

Executive Director, a non-clinician leader who helps govern RIEB. This provides staff the opportunity to grow professionally, based on annual performance reviews. Salary increases have also been aligned with performance achievement.

4. **Focus on building Hospital Services:** A key factor of RIEB's increasing success within hospitals comes from its continual efforts in building hospital relations at all levels. In addition to their work with grieving families, Eye Donation Counselors also help hospital staff by providing assistance as needed. RIEB also provides support in terms of material resources for hospital facilities in order to gain an integrated relationship with the hospital staff. Further, RIEB organizes workshops for nurses, staff, and doctors on eye donation and eye banking to help them become more actively involved in the support of eye donation. At a senior level, joint celebrations are organized to recognize and honor hospitals, in addition to sharing annual performance results and milestones with hospital management.

Outcomes: RIEB's comprehensive programs and professional management team deliver record level consent rates and EDC productivity levels (Table 8)

HCRP Performance Indicators	2010	2011
Consent Rate	60%	65%
Collection	742	1009
Transplants	527	753
Utilization Rate	71%	75%
# of Eye Donation Counselors	07	10

Table 8. RIEB HCRP Outcomes

Conclusion: RIEB has the highest performing Hospital Cornea Retrieval Program in India, with consent rates that exceed most consent rates around the world. Their comprehensive system of management, training, and hospital services create an environment where this high level of performance is the norm. RIEB, as a training Centre of Excellence, is well positioned to help other eye banks across India and around the world reach a similar level of high performance.

B. Prova Case Study

Eye Bank: Prova Eye Bank **Location:** Barrackpore, West Bengal
HCRP Hospital: R G Kar Medical College and Hospital, Kolkata
Best Practices: HCRP thru PPPs, Operational Leadership, Medical Standards and Accreditation
Case Summary: Growth driven by HCRP partnership with a large government medical college hospital and focus on improving efficiency (utilization).

Key Statistics:	2010	2011	Growth %
Voluntary Transplants	125	175	40%
HCRP Transplants	356	716	101%
Utilization Rate	60%	80%	33%
Total Transplants	481	891	85%

Case Detail: Prova Eye Bank, located in Barrackpore, West Bengal was started in 1997. Prova is one of only seven eye banks accredited by EBAI. Starting in 2004, Prova started a public-private partnership with R. G Kar Medical College and Hospital in Kolkata to conduct eye donation counselor-driven HCRP. R G Kar is a large state government medical college hospital with more than 1200 beds located at a distance of approximately 22 kilometres from Prova.

Since 2004, there has been major shift in the R G Kar HCRP collection processes which have contributed to dramatic growth. This includes:

1. In-situ recovery method – started 2005, replacing whole globe recovery, reducing donor family objections to disfigurement and improved utilization and quality
2. Eye bank manager hired in 2010 - efficient operations management led by a dedicated professional eye bank manager
3. Improved donor screening - Thorough screening of cases before approach and recovery has reduced unsuitable corneas entering the collection pool.
4. EBAI accreditation – Prova's achievement of accreditation improved processes and quality management

In addition, an increase in lamellar surgeries is providing better utilization of tissue.

Outcomes: The result has been a compounded annual growth rate (CAGR) of 34% at RG KAR (Figure 15), which contributed a majority of the growth at Prova. Even more impressive is that in the 2009-2011 period, when collections grew by 35% CAGR, transplants grew by 67% CAGR (Figure 16).

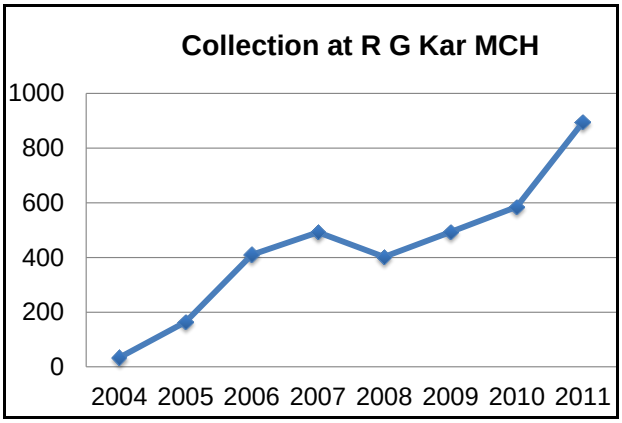

Figure 15. Collections at R G Kar MCH

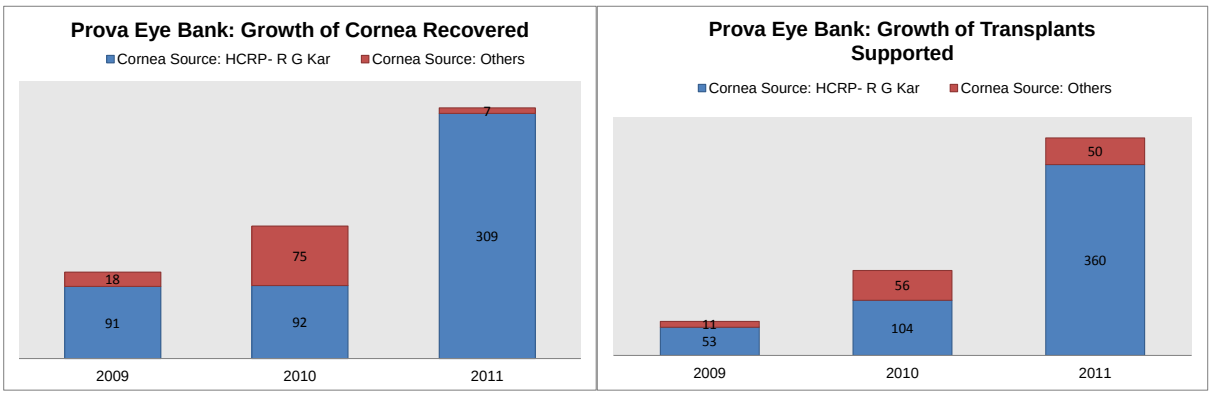

Figure 16. Growth in collections and transplants at Prova from 2009 to 2011

A major factor of the dramatic growth in transplants has been the utilization rate or efficiency improvement. In fact, the utilization rate has improved by 30 percentage points over the last couple of years catapulting Prova into the 80%+ overall utilization bracket.

Conclusion: Prova's rapid growth has been based on leveraging a number of best practices. Prova has developed a strong public-private partnership with RG Kar MCH. A professional eye bank manager assures continuous improvement in the eye bank operations and accreditation continues to improve their quality processes. Prova provides a strong model for eye banks across India.

C. Delhi Pilot Project – Phase I

Eye Banks: National Eye Bank (NEB) RP Centre, AIIMS **Location:** Delhi
Dr. Shroff's Charitable Eye Hospital Eye Bank (SCEH)
HCRP Hospitals: AIIMS, Maharaj Agrasen Hospital, Jaipur Golden Hospital and Saroj Hospital
Best Practice: HCRP thru PPPs
Case Summary: Creating a successful public-private partnership between two eye banks to share resources and collectively address operational challenges with cornea recovery at major Delhi/NCR hospitals.

Key Statistics (Combined Eye Banks):	2010	2011	Growth %
Voluntary Transplants & donation centres	378	474	25%
HCRP Transplants	202	284	41%
Utilization Rate	60.5%	60.3%	0%
Total Transplants	580	758	31%

Case Detail: Despite the presence of large mortality government hospitals in the region and strong HCRP potential, Delhi/NCR had not been able to effectively implement and maintain a successful HCRP program. Key challenges included a lack of common, centralized and coordinated efforts, optimal sharing of resources, and trained management and staff.
A public-private partnership (Delhi Eye Banking Pilot Study- Phase I*)* was initiated between NEB, SCEH and SightLife (January 30, 2011) in order to:

1. Assess the potential for HCRP in Delhi
2. Identify synergies between various public and private organizations
3. Improve tissue quality
4. Explore the potential of a joint community-based HCRP-focused eye bank in Delhi

Initial assessment of HCRP potential (Table 1) confirmed the potential for high volume HCRP in the hospitals, with additional potential of accessing up to 30,000 hospital deaths in Delhi.

Hospital Name	Estimated Annual Mortality[19]	Supporting Eye Bank
AIIMS	6,900	NEB
Maharaj Agrasen/Jaipur Golden/Saroj	2,500	SCEH
Approximate Total	**8,900**	

Table 1: Mortality at HCRP Hospitals in Delhi/NCR, 2010

The synergies of a Public Private Partnership, as represented by AIIMS and SCEH in this pilot, are outlined below (Table 2.), where shared resources and strengths of the organizations allow for improved outcomes. Together they have a set of capabilities that do not exist separately.

[19] Actual Hospital Data and SCEH Eye Bank Statistics, 2010

Key Parameters for a Successful HCRP	SCEH	NEB
Large donor population	-	★
Effective HCRP staff: ability to hire, retain and promote	★	-
Ability to evaluate and process corneas	-	★
Tissue quality standards and protocols	-	★
Ability to hire and manage a professional Eye Bank Manager	★	-
Ability to respond to rapid change	★	-
Financial ability to resource a project	★	★

Table 2: Synergies of a Public Private Partnership (PPP)

By utilizing the synergies of the PPP and implementing best practices, the AIIMS-SCEH partnership instituted a set of significant changes during the eleven month pilot. Some of the most significant improvements were:

- Staffing improvements: identified staff leadership gaps, posted seasoned SCEH eye donation counselors at AIIMS, created team rotation,; and identified better hospital shift hours
- Centralized the death reporting location
- Trained hospital staff to increase their support of eye donation
- Effectively collected and analyzed data to improve decision-making, i.e., Ward Mortality and Notification analysis, overall Notification Rate, Approach Rate, and Consent Rate
- Approval from Commissioner of Police to retrieve corneas in Medico-Legal cases (MLC)
- Effective salary planning and benefits monitoring of eye donation counselors
- Efficient distribution of collected corneas, prioritized for recipients with highest medical need

Outcomes: As a result of this partnership and the above steps overall HCRP performance improved significantly, with combined HCRP transplants increasing from 202 (2010) to 284 (2011), a 41% increase. The year-over-year results are conservative, with the PPP primarily in effect the second half of 2011. Results were largely driven by improved counselor performance at NEB, with their consent rate improving from 14% to 30%. SCEH's decrease in HCRP collections was due to two of its senior eye donation counselors being assigned to NEB for the Pilot Study. Utilization of tissue was improved overall, due to improved donor screening and tissue evaluation training.

HCRP Performance Indicators	SCEH (2010)	SCEH (2011)	NEB (2010)	NEB (2011)
Consent Rate	12%	12%	14%	30%
Collection	156	114	186	276
Transplants	69	78	133	206
Utilization Rate	44%	68%	71%	75%
# of Eye Donation Counselors	3	2	2	4[20]

Table 3: PPP Pilot Outcomes

[20] AIIM EDC staff was 4 Full Time Equivalents: 2 AIIMS EDCs (Jan-Oct), 1 AIIMS EDC (Nov-Dec), 2 SCEH EDCs (May-Dec) and 5 WHO EDCs (Aug-Sept).

When the pilot results are reviewed in the context of NEB's and SCEH's historical performance (Figure 11), with the inclusion of Voluntary collections, it is clear that this small pilot has already had an important impact on the overall performance of these eye banks.

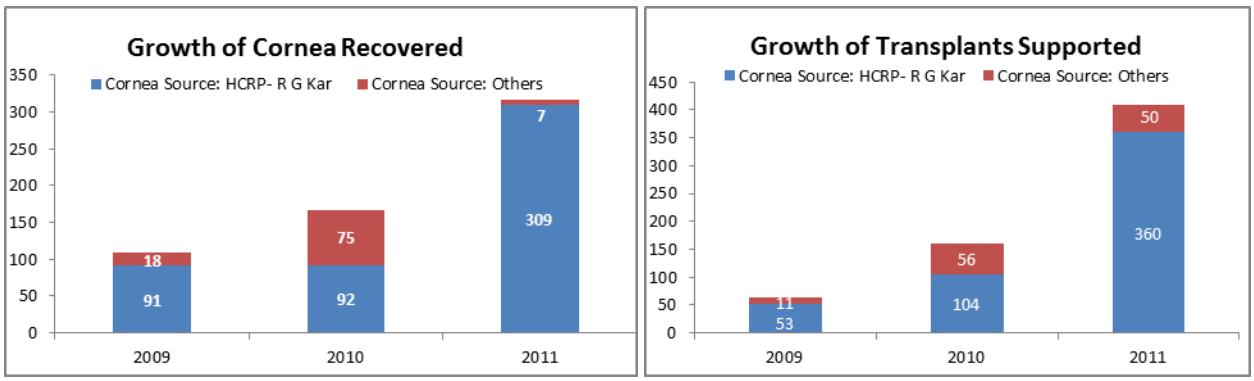

Figure 11: Cornea Collection and Transplants for NEB and SCEH, 2005-2011

Conclusion: NEB and SCEH, with SightLife support, created a successful public-private partnership to pool their unique resources and collectively address the challenges associated with cornea recovery at major Delhi/NCR hospitals. The result was a dramatic increase in the availability of corneas through HCRP. Success of this project will pave the way to create a consolidated, scalable, and financially sustainable community eye bank for Delhi/NCR.

D. Drushti Daan Case Study

Eye Bank: Drushti Daan Eye Bank (DDEB) **Location:** Bhubaneswar, Orissa
HCRP Hospital: SCB Medical College, Cuttack-RIO Cuttack
Best Practice: HCRP thru PPPs
Case Summary: Effective HCRP program leads to successful cornea recovery from rural population base with low donation awareness

Key Statistics:	2010	2011	Growth %
Voluntary Transplants	23	25	9%
HCRP Transplants	159	400	152%
Utilization Rate	73%	81%	8pts
Total Transplants	182	425	134%

Case Detail: The state of Orissa has a total population of 41.9 million, with 83% residing in rural areas[21]. In 2011 only 599 corneas were collected (459 transplants) in Orissa[22]. DDEB was established in 2002 and has partnered since 2007 with LV Prasad Eye Institute (Bhubaneswar). It is the primary eye bank in Orissa, with a successful public-private partnership with SCB Medical College, Cuttack (RIO, Orissa). SCB Medical College is a local medical hub for the entire region and has approximately 6,000 deaths annually.

[21] Govt. of India Census 2011

[22] EBAI 2011 Eye Bank Statistics Report

The breakdown of the medical college donors (Figure 12) highlights that the majority (77%) of donors from SCB Medical College were medico-legal cases (MLC), i.e., corneas collected from the mortuary[6].

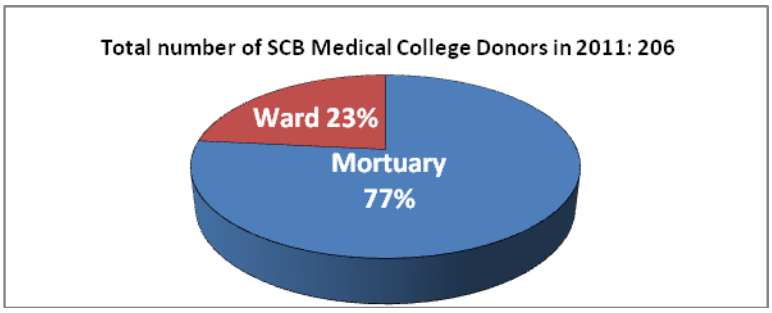

Figure 12 Importance of both Ward and Mortuary Donors

DDEB developed effective relationships with key staff, including: mortuary staff, forensic doctors, and the police. These relationships enabled DDEB staff to not only provide effective and timely support to donor families but also raise their awareness levels and motivate them to give the gift of sight and donate the corneas of their deceased family member.

The ability of DDEB counselors to raise awareness and gain consent, even with populations that have low donation awareness, is illustrated in Figure 13. DDEB quickly gained significant consent amongst SCB Medical College donor families who hail from not only Cuttack (26%) but also from neighboring rural and tribal areas (74%)[23].

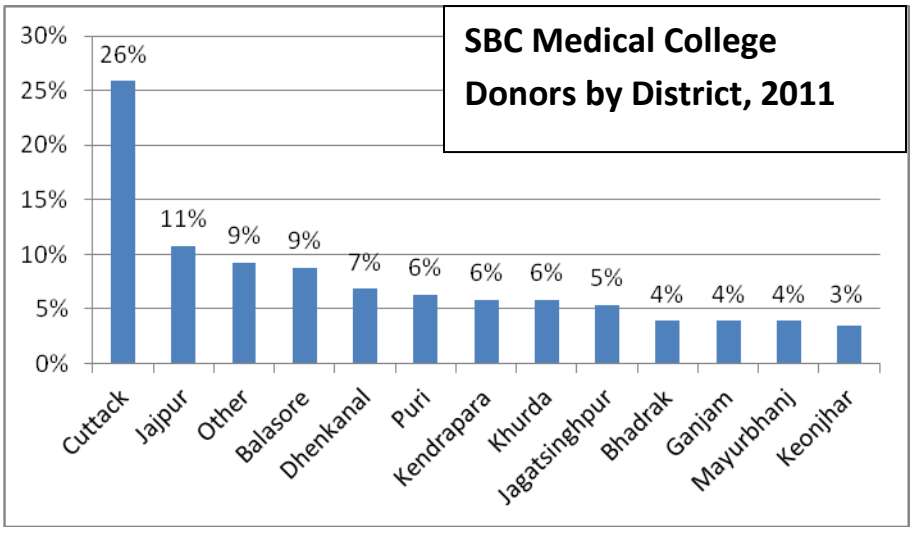

Figure 13: HCRP is effective in both high and low donor awareness areas.

Outcomes: The management of DDEB's relationship with SCB Medical College and the development of its counselors have been key to DDEB's success with HCRP (Table 4). HCRP transplants increased 41% in 2011, driven by total donors and improved utilization of tissue.

[23] DDEB Eye Bank Statistics Report 2011

HCRP Performance Indicators	2010	2011
Consent Rate	15%	23%
Collection	251	522
Transplants	182	425
Utilization Rate	73%	81%
# of Eye Donation Counselors	8	8

Table 4: DDEB HCRP Outcomes

Overall results continue to improve (Figure 14) as the DDEB partnership with SCB continues to flourish, with a 108% growth rate in transplants in 2011.

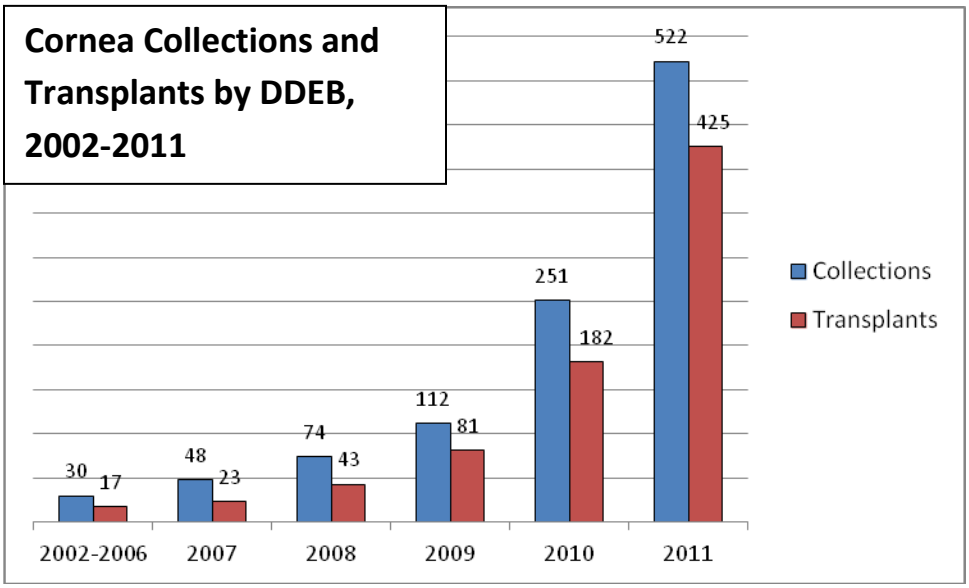

Figure 14. Success of HCRP drives rapid growth

Conclusion: DDEB has built an effective HCRP through a successful public-private partnership with SCB Medical College. DDEB's success is notable, particularly for its success with donor families from rural areas. It validates the hypothesis that donor families from areas with limited awareness activities can both be made aware and be motivated to donate the corneas of their deceased family member at the time of death; a model that can be replicated across the country.

E. EBSR Case Study

Eye Bank: Eye Bank Society of Rajasthan (EBSR)

Location: Jaipur (with chapters in Ajmer, Jodhpur, Udaipur, Bhilwara, Kota)

HCRP Hospital: SMS Hospital in Jaipur

Best Practices: HCRP thru PPPs, Sustainable & Equitable Funding, Independent/Community-based, Operational Leaders

Case Summary:

1. Successful PPP with RIO in Jaipur and other hospitals in the state
2. Centralized processing and distribution in Jaipur with chapter-based approach to conduct recovery programs in multiple cities in the state of Rajasthan

Key Statistics:	2010	2011	Growth %
Voluntary Transplants	155	189	22%
HCRP Transplants	262	276	5%
Utilization Rate	66%	50%	-24%
Total Transplants	417	465	12%

Case Detail: Eye Bank Society of Rajasthan (EBSR) established their eye bank in Jaipur in 2005, with the objective of enabling more people to see in the state and elsewhere. EBSR models many best practices and it has emerged as one of the most successful independent community eye banks in India.

The EBSR Board is comprised of eminent local community members who share a passion for restoring sight through eye banking. As a result, the governing body includes people with diverse experiences, skill sets, and networks. Being community driven, EBSR has benefitted from greater opportunities in pooling together and deploying resources, creating and nurturing relationships and the combined social outreach of members coming from different spheres of public life.

The Board has separated the responsibilities for operational and clinical leadership of the Eye Bank. A professional, well-trained eye bank manager provides dedicated operational management. The Medical Director provides clinical leadership and focuses on setting the quality and evaluation standards. These two positions work closely together and maintain a continuous communication channel.

EBSR has an extremely successful collaboration with RIO/ SMS Hospital, Jaipur. In their collaboration, EBSR conducts an eye donation counsellor-driven HCRP program specifically targeted at the mortuary and is responsible for counselling of families, recovery of corneas for consented cases, cornea evaluation, quality assurance and all documentation. SMS Hospital is responsible for serology testing. EBSR provides the Ophthalmology Department of the hospital with as many corneas as is needed by them for transplants and shares with the hospital the NPCB grant received for collections.

EBSR's effective relationship building with the police department and mortuary staff, and their professional expertise in managing HCRP operations have led to steady growth in transplants from mortuary collections. This growth has been shared with SMS in the form of corneas to support transplants making SMS Hospital one of the leading RIOs for cornea transplants.

Over the years EBSR has expanded to other main cities of Rajasthan through local chapters. Chapter locations were chosen based on relationships which could be developed with a local hospital to serve as technical support and as a HCRP centre. Each chapter is autonomous. The relationship is formalized through an MOU.

Interestingly, EBSR didn't create new eye banks in each city; rather Jaipur continues as the main chapter and maintains the functions of a full-fledged eye bank (Table 5). The other chapters send their collected corneas to Jaipur where the remaining downstream processes are conducted. This allows chapters spread across the state to take advantage of maximized resource utilisation through a variety of centralized and localized activities:

Centralized (done at Jaipur Chapter)	Localized (done at every chapter)
• Tissue Processing (cornea excision from whole globe) • Tissue Evaluation • Tissue Distribution	• HCRP and Voluntary Cornea Recovery • Recruitment of Counsellors and Technicians • Public Awareness Programs • Fundraising

• Professional Development of Staff • Management of Projects and Programs	

Table 5: Centralized and Localized Activities of EBSR

Capital intensive functions are centralized in Jaipur whereas the relationship-oriented collection activities are decentralized (Table 6). A similar model is used for operational funding of EBSR chapters.

Centralized (funded by Jaipur Chapter)	Decentralized (funded by each Chapter)
• Salary of counsellors and technicians • Training of staff • Storage media • Cornea recovery kits • Cornea packing materials eg. ice packs	• Honorarium of local doctors • Transportation (recovery and dispatch to Jaipur) • Awareness campaigns • Chapter corpus

Table 6. Centralized and Localized/Decentralized Funding

In addition to optimizing costs, this model has better utilization of human resources and network elements like surgeon relationships and distribution logistics – all of which have multiplied the impact that any chapter is able to accomplish individually. Being independent and not having the support of a large parent institution forced EBSR to innovate in organizational structure and create an operating model based on achieving optimum efficiency.

A symbiotic relationship exists between EBSR chapters and their key local hospitals with HCRP. The ophthalmology department of the local hospital receives corneas from EBSR (processed, evaluated, and transported from Jaipur) as needed for their transplant patients. The NPCB grant for cornea collection is shared between the local chapter and the local hospital eye bank. Over the years EBSR has helped to increase cornea recovery penetration which has successfully met the expanding demand in Rajasthan.

EBSR has a tiered processing fee structure for corneas. Corneas distributed outside the state of Rajasthan are charged full processing fees. Corneas distributed within the state are charged 37.5% lower processing fee compared to out of state distributed corneas. All corneas distributed to government hospitals and for non-paying patients (i.e. patients who are unable to pay for services) are free of any charge. Using this model of result-based, equitable funding EBSR is on track to become a self-sustained eye bank within five years.

Outcomes: EBSR has a demonstrated history of innovation and results with its independent network structure and community focus, resulting in strong historical growth and 43% transplant growth in 2011. Symbiotic relationships with their partner hospitals are reflected in the gratis provision of corneas back to the hospitals' surgeons (Figure 17 and Table 7). Chapter hospitals have their needs met, while EBSR and their chapters have continued to expand to serve those in need in Rajasthan and beyond.

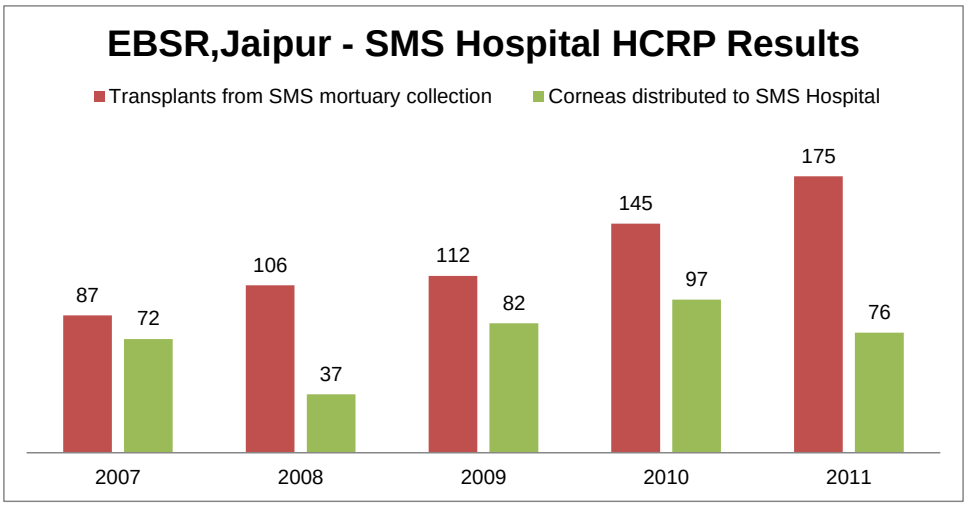

Figure 17: SMS Transplantable Corneas – Total and Distributed to SMS Surgeons

Distribution from Jaipur of Corneas Received from other Chapters					
	2007	**2008**	**2009**	**2010**	**2011**
Sent back for transplants at Chapter hospitals	49	35	54	41	45
Transplants in rest of Rajasthan	0	0	1	16	38
Transplants in other parts of India	1	0	4	26	69
Total Transplants	50	35	59	83	152

Table 7: Distribution of EBSR Chapters' corneas

V. Recommendations to NPCB – A Framework for Success in India

A. Short-Term

1. Change the NPCB Funding Approach

Currently, NPCB funding is provided for collections of eyes (Rs.1500 pair for eye banks/Rs. 1000 pair for collection centres). This is funding of an activity (collections), versus an outcome (transplantable tissue), resulting in inefficiency in the system and low utilization of tissue, as it encourages collection and processing of tissue that is not suitable for transplant.

It is recommended that NPCB fund transplanted tissue, not collected tissue. Transplanted corneas are the best measurement of eye bank performance, and funding transplanted corneas will drive growth in transplants and improved utilization of tissue. It is recommended that the NPCB subsidize the cost of transplanted tissue with funding of 5,000 Rs. per transplanted cornea. The cost at 19,000 surgeries would be 950 lakh and increases government subsidy from 20-30% to 60-70% of total costs.

It is also recommended that NPCB discontinue one-time funding (Rs 15 Lakhs) of new eye banks. Overall, India does not need more eye banks. There are almost 700 registered eye banks in India. What is needed are eye banks committed to growth and the capability to hire professional management and staff and establish HCRP programs. Forty to fifty eye banks, providing over 2,000 transplants each, can meet the needs of India. If NPCB desires to continue non-recurring eye bank funding, it is recommended that it be provided to both qualified existing and new eye banks, but only after a state by state needs assessment and submittal of a community-based feasibility plan by the requesting eye banks.

It is recommended the NPCB subsidize transplant surgeries of bilateral blind. As corneal tissue becomes more available, surgical capacity for those who cannot afford to pay will become an issue. Bilateral corneal blind patients lack the resources to pay for their surgeries and their need is only partially addressed by government surgeons and NGO's gratis programs.

2. Support Public Private Partnerships

The NPCB's history of active support for PPPs is foundational for the success of eye banking in India. Most successful eye banks, both in India and globally, depend on a close partnership between government organizations and NGOs, where the government provides access to its hospitals and NGO eye banks run the HCRP programs within the hospitals. This is done by establishing an MOU for a specific amount of time.

NPCB can provide direction to government hospitals to shift them from the traditional government eye bank structure to this more effective PPP model in order to gain greater results from the potential donor population. Specifically SightLife and EBAI propose to work with the NPCB to target specific Regional Institutes of Ophthalmology (RIO) and their associated state hospitals for new PPPs.

3. Endorse National Cornea Distribution System

Effective utilization of transplantable corneas requires effective matching and distribution of tissue to patients and surgeons that can utilize the tissue in a timely fashion. SightLife, with support from Bausch and Lomb, is offering to provide subsidized Optisol, a storage media that extends storage to two weeks. Additionally, SightLife and EBAI are piloting a distribution network to assure tissue not needed locally is sent to prioritized patients in areas where corneas are not available. A central directive will be required to cover policies set by some states, e.g., Maharashtra, not to allow tissue to go out of the state. Also the utilization of non-transplantable tissues for medical education/training/research must be officially endorsed.

It is requested that the NPCB provide formal endorsement of this distribution system pilot under the auspices of the EBAI and SightLife.

It is requested that NPCB waive the duty fee on this subsidized Optisol to help make distribution feasible. See attached proposal.

4. Require Accreditation Compliance

NPCB published Medical Standards requires eye bank accreditation, but no accreditation system exists. SightLife and EBAI have jointly developed updated Eye Banking Medical Standards and an accreditation program to ensure that Indian eye banks meet international standards. EBAI and NABH have signed an agreement to implement the accreditation program.

It is recommended that the NPCB make Accreditation a requirement for all eye banks. This will address both a lack of quality standards and the presence of eye banks that currently exist in name only, allowing only active and committed eye banks to grow. Once Accreditation is established NPCB should provide grants to accredited eye banks only.

Additionally, it is recommended that NPCB endorse a panel of medical and non-medical eye banking experts to provide regular updates to Eye Bank Medical Standards, to ensure international standards are maintained.

B. Long-Term

1. Establish On-line Government Donor Registration

The current system of potential donors filling out pledge cards is ineffective, due to a lack of access to the information at the time of death. It is most appropriate for the government to take the role of establishing a centralized, web-based system for registration and for secure, online access to that information by individual eye banks. **It is recommended that the NPCB take a lead role in this effort or identify an organization/agency that is given mandate to build and monitor this.** Further study is required for a specific recommendation.

2. Provide NPCB Sponsored Public Education

Individual eye banks lack the resources, the competencies, and the scale to effectively provide public awareness campaigns. No funding is provided for awareness campaigns and eye bank operations are negatively impacted when resources are shifted to awareness campaigns. In developed countries, most awareness activities are publicly

sponsored and the benefits collectively shared between recognized eye banks. **It is recommended that the NPCB take a lead role in public education in the coming years**. The EBAI and SightLife can support planning of this PPP strategy.

Thank you for giving us the opportunity to share the challenges and the solutions to reinvigorating eye banking in India. We look forward with working with NPCB to eliminate treatable corneal blindness in India and making it a model for the rest of the world.

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Appendix A.

EBAI Statistical Summary - By States and Union Territories

Includes All Reporting Eye Banks with 1 or more transplant annually

Note: Collections may not include collections from contributing collection centres, so utilization rates are not applicable

= 1 of 10 largest eye banks

State	Name of the Eye Bank	Location	2009 Collections	2009 Transplants	2011 Collections	2011 Transplants	2009-2011 Transplant Growth
Aizawl	Mizoram Eye Bank	Aizawl	2	2	28	10	8
Andhra Pradesh	Ramayamma International Eye Bank	Hyderabad	1590	1453	1731	2099	646
Andhra Pradesh	Mohsin Eye Bank (VEBART Trust) Ins	Visakhapatnam	220	193	298	260	67
Andhra Pradesh	Chiranjeevi Eye & Blood Bank Inst-L	Hyderabad	194	310	42	183	-127
Andhra Pradesh	Badam Balakrishna Eye Bank	Kakinada	133	125	191	134	9
Andhra Pradesh	Sankara Eye Hospital	Guntur		0	62	62	62
Andhra Pradesh	Vasan Eye Bank	Hyderabad		0	10	29	29
Andhra Pradesh	Modern Eye Hospital & Research Cent	Nellore	131	6	423	23	17
Andhra Pradesh	Goutami Eye Donation Centre	Rajahmundry	26	15	16	16	1
Andhra Pradesh	O.E.U. Lions Eye Hospital Inst-L	Vizianagaram	0	10	0	1	-9
Andhra Pradesh	Swetcha Gora Eye Bank	Vijayawada	76	8	0	0	-8
Andhra Pradesh	Dr. Ranga Reddy Lions Eye Hospital	Secunderabad	12	4	5	0	-4
Assam	Sri Sankaradeva Nethralaya	Guwahati	59	66	117	94	28
Assam	Jeuti Eye Bank Inst-L	Jorhat	98	96	84	64	-32
Assam	Lions Drishti Eye Bank	Dibrugarh	6	2	24	9	7
Assam	Assam Medical College & Hospital	Dibrugarh		0	4	4	4
Chandigarh	PGIMER Inst-L	Chandigarh	332	236	300	187	-49
Chandigarh	City Eye Bank Dr. Ashok Sharma's Co	Chandigarh		0	149	139	139
Chandigarh	Govt. Medical College Hospital, Sector	Chandigarh	56	72	77	95	23
Chandigarh	Bharat Vikas Parishad Madhav Eye Ba	Chandigarh		0	13	5	5
Chattisgarh	MGM Eye Institute	Raipur	92	45	76	47	2
Chattisgarh	Pt. J.N.M. Medical College	Raipur	30	20	20	10	-10
Delhi	National Eye Bank Inst-L	Delhi	278	498	694	577	79
Delhi	Dr. Shroff's Charity Eye Hospital	Delhi	300	154	569	262	108
Delhi	Guru Nanak Eye Bank Inst-L	Delhi	234	130	288	141	11
Delhi	A.Edward Maumenee Eye Bank Inst-L	Delhi	405	165	321	117	-48
Delhi	Sewa Eye Bank Inst-L	Delhi	91	59	63	58	-1
Delhi	Rotary Central Eye Bank Inst-L	Delhi	70	26	53	15	-11
Delhi	Guru Gobind Singh International Eye B	Delhi	62	32	34	14	-18
Goa	Rotary Club of Panaji Eye Bank Trust	Panaji	4	4	6	2	-2
Gujarat	Indian Red Cross Society -Dholka Brar	Ahmedabad	1624	818	2312	1734	916
Gujarat	Lok Drashti Eye Bank Inst-L	Surat	1312	540	1226	497	-43
Gujarat	M & J Institute of Ophthalmology, Civil	Ahmedabad	670	340	636	197	-143
Gujarat	Rotary Eye Institute (Sant Punit Chaks	Navasari	664	185	651	147	-38
Gujarat	Nagri Eye Research Foundation	Nagri (Ahmd.)	0	192	234	146	-46
Gujarat	ASO Palov Eye Bank	Ahmedabad	44	131	34	124	-7
Gujarat	Darshini Eye Bank (Cornea Foundation	Ahmedabad	76	72	131	111	39
Gujarat	Medical Care Centre Trust Inst-L	Vadodara	322	105	307	90	-15
Gujarat	Indian Red Cross Society -Bhavnagar E	Bhavnagar	0	0	316	38	38
Gujarat	Surat Municipal Institute of Medical Ed	Surat	10	37	124	24	-13
Gujarat	Shivananda Mission (Saurashtra Centra	Virnagar	0	32	11	24	-8
Gujarat	Eye Bank - D.B.C.S. Bhavnagar	Bhavnagar		0	16	19	19
Gujarat	Jyoti Eye Bank	Visnagar	10	1	32	17	16
Gujarat	Government Medical College-Surat Eye	Surat	8	8	57	15	7
Gujarat	Sewa Rural	Jhagadia	2	33	0	7	-26
Gujarat	Shree Swaminarayan Gurukul Hospital	Rajkot	87	26	4	4	-22
Gujarat	Kadam Eye Bank	Vadodara		0	6	4	4
Gujarat	P.D.U. Medical College	Rajkot	210	61	0	0	-61
Gujarat	Diva Eye Institute	Ahmedabad	36	27	0	0	-27
Gujarat	Dr. Indumati T. Patel Eye Bank	Vadodara	122	16	218	0	-16
Haryana	Poojaneeya Mata Kartar Kaur Ji Interna	Sirsa	717	308	1619	426	118
Haryana	Sanjivni Eye & Madicare Centre	Ambala City		0	0	269	269
Haryana	Department of Ophthalmology, P.T.B.D	Rohtak	139	109	183	130	21

Appendix A. (Continued)

EBAI Statistical Summary - By States and Union Territories

Includes All Reporting Eye Banks with 1 or more transplant annually

Note: Collections may not include collections from contributing collection centres, so utilization rates are not applicable

= 1 of 10 largest eye banks

State	Name of the Eye Bank	Location	2009 Collections	2009 Transplants	2011 Collections	2011 Transplants	2009-2011 Transplant Growth
Haryana	Niramaya Eye Bank	Gurgaon	125	62	212	73	11
Haryana	Lions Eye Bank Sirsa Inst-A	Sirsa	69	43	66	26	-17
Haryana	Madhav Netra Bank	Karnal		0	360	21	21
Haryana	Jeevan Eye Bank Inst-L	Hisar	18	6	16	5	-1
Haryana	Shanti Smriti Shri Madhav Eye Bank	Narwana		0	6	4	4
Haryana	Madhav Netra Bank	Ambala City	0	155	54	2	-153
HIMACHAL PRADESH	IGMC Eye Bank	Shimla		0	14	12	12
Jharkhand	Dr.Kashyap Memorial Eye Bank Inst-L	Ranchi	22	17	15	11	-6
Jharkhand	Roshini -Jamshedpur Inst-A	Jamshedpur	9	5	13	11	6
Karnataka	Lions International Eye Bank Inst-L	Bangalore	925	246	945	224	-22
Karnataka	Narayana Netralaya Inst-L	Bangalore	542	193	495	195	2
Karnataka	Kishinchand Chellaram Eye Bank Inst-	Bangalore	175	149	186	173	24
Karnataka	Sankara Eye Hospital	Bangalore	20	8	115	94	86
Karnataka	M.M. Joshi Eye Institute (Sh. G.M.EB	Hubli		0	118	83	83
Karnataka	Sankara Eye Hospital -Eye Bank) *NE	Shimoga	26	8	172	43	35
Karnataka	Shankar Anand Singh Eye Bank (New)	Bangalore		0	144	43	43
Karnataka	Father Muller's Hospital	Mangalore	14	8	54	35	27
Karnataka	Shraddha Eye Bank	Bangalore	52	23	112	33	10
Karnataka	Nithya Jyothi VIMS Eye Bank	Bellary		0	22	21	21
Karnataka	M.S. Ramaiah Memorial Eye Bank	Bangalore		0	32	12	12
Karnataka	Lions Nayana Eye Bank	Davangere		0	4	7	7
Karnataka	Shekar Nethralaya Inst-L (Vasudeva M	Bangalore	14	2	24	6	4
Karnataka	Kasturba Medical College(O.E.U. Instt.	Manipal	36	7	14	5	-2
Karnataka	ESIC Model Hospital, Rajajinagar	Bangalore		0	8	5	5
Karnataka	Eye Bank-Basveshwara Hospital	Gulbarga		0	4	3	3
Karnataka	KIMS Hospital	Bangalore	64	11	74	2	-9
Karnataka	Dr. B.R. Ambedkar Medical College &	Bangalore		0	2	1	1
Karnataka	Padmabhushan Dr. M.C. Modi Charitat	Bangalore	34	34	18	0	-34
Karnataka	Prabha Eye Clinic Eye Bank	Bangalore	64	23	0	0	-23
Karnataka	Shimoga Mid Town Rotary Charity Fou	Shimoga	82	14	0	0	-14
Karnataka	Jagadguru Sri Shivarathreeshwara Hos	Mysore	22	11	0	0	-11
Karnataka	B.V.V.Eye Bank & Cornea Grafting Ce	Bagalkot	30	6	0	0	-6
Karnataka	Vydehi Institute of Medical Sciences &	Bangalore	1	1	0	0	-1
Kerala	Eye Bank Association Kerala	Angamally	948	148	1245	517	369
Kerala	Govt. Ophthalmic Hospital	Thiruvananthapuram	44	21	57	36	15
Kerala	Medical College Hospital	Kozhikode	24	14	56	24	10
Kerala	Comtrust Eye Care Society	Calicut	72	28	72	23	-5
Kerala	Ahalia Eye Bank-(A.F.E.H)	Palakkad	6	0	14	3	3
Kerala	Dr. SMCSI Medical College	Thiruvananthapuram	0	0	2	1	1
Madhyapradesh	M.K. International Eye Bank	Indore	0	0	436	292	292
Madhyapradesh	Gomabai Netralaya & Research Centre	Neemuch	256	55	226	99	44
Madhyapradesh	Sewa Sadan Eye Hospital (Trust)	Bhopal	92	76	122	88	12
Madhyapradesh	R.D. Gard Medical College	Ujjain		0	16	10	10
Madhyapradesh	Sri Sadguru Seva Sangh Trust	Chitrakoot	12	30	0	0	-30
Madhyapradesh	Indore Eye Hospital Society	Indore	57	15	0	0	-15
Madhyapradesh	Kashyap Rotary Eye Bank	Ratlam	30	2	0	0	-2
Maharashtra	EBCRC	Mumbai	952	527	1010	393	-134
Maharashtra	Shri Ganapati Netralaya	Jalna	128	128	179	241	113
Maharashtra	H.V. Desai Eye Hospital-PBMA's	Pune	338	182	601	234	52
Maharashtra	Sahiya Matrushree Gomtiben Ratanshi	Thane-W	258	159	299	213	54
Maharashtra	Rotary Eye Bank, Borivali-East	Mumbai		0	264	144	144
Maharashtra	Laxmi Eye Bank	Panvel		0	115	86	86
Maharashtra	Venu Madhav Eye Bank	Pune	194	58	264	77	19

Appendix A. (Continued)

EBAI Statistical Summary - By States and Union Territories

Includes All Reporting Eye Banks with 1 or more transplant annually

Note: Collections may not include collections from contributing collection centres, so utilization rates are not applicable

= 1 of 10 largest eye banks

State	Name of the Eye Bank	Location	2009 Collections	2009 Transplants	2011 Collections	2011 Transplants	2009-2011 Transplant Growth
Maharashtra	Mahatme Eye Bank & Eye Hospital	Nagpur	147	37	162	60	23
Maharashtra	International Eye Bank of Pune	Pune	210	59	236	34	-25
Maharashtra	Drashti Eye Bank-Netra Seva Foundati	Sangli	44	23	58	31	8
Maharashtra	PCMC Aditya Jyot Eye Bank (ABMH),	Pune		0	102	29	29
Maharashtra	NKP Salve Inst. Of Medical Sci. Lata M	Nagpur	4	4	124	21	17
Maharashtra	Lotus Hospitals Trust (opp- Juhu Bus T	Mumbai	22	0	60	20	20
Maharashtra	Govt. Medical College, Aurangabad	Aurangabad	38	22	28	17	-5
Maharashtra	Armed Forces Medical College(AFMC)	Pune	71	28	58	15	-13
Maharashtra	Madhav Netra Pedhi	Nagpur	426	55	196	14	-41
Maharashtra	Rural Medical College Pravara Rural Ey	Loni		0	32	12	12
Maharashtra	Sewa Roshni Eye Bank	Mumbai	145	8	104	9	1
Maharashtra	Madhav Netra Pedhi (Vivekanand Eye I	Kolhapur	22	4	10	4	0
Maharashtra	Gokhale Eye Bank	Mumbai	12	12	8	2	-10
Maharashtra	Shroff Eye Bank	Mumbai		0	2	2	2
Maharashtra	BSES Municipal General Hospital	Mumbai	0	0	12	1	1
Maharashtra	Dr. Vikhe Patil Memorial Eye Bank	Ahmednagar		0	2	1	1
Maharashtra	Lions Parasmal Kocheta Eye Bank(Lio	Miraj	125	90	0	0	-90
Maharashtra	Sushil Eye Bank	Nashik	26	78	0	0	-78
Maharashtra	Janakalyan Eye Bank	Pune	148	64	0	0	-64
Maharashtra	Tulsi Hospitals Ltd.	Nashik	73	41	0	0	-41
Maharashtra	INHS Asvini	Mumbai	0	1	0	0	-1
Orissa	Drushti Daan	Bhubaneswar	112	86	522	426	340
Orissa	Eye Bank-MKCG Medical College	Berhampur		0	76	33	33
Pondicherry	Aravind Eye Hospital	Pondicherry	422	169	982	214	45
Pondicherry	Jothi Eye Care Centre	Pondicherry	134	68	95	51	-17
Pondicherry	JIPMER	Pondicherry	76	22	138	31	9
Punjab	Punarjot Eye Bank of Punjab	Ludhiana	775	682	593	391	-291
Punjab	Sri Guru Harkrishan Sahib Charitable E	Sohana	0	114	12	105	-9
Punjab	Eye Bank Rejindra Hospital	Patiala	21	21	64	34	13
Rajasthan	Eye Bank Society of Rajasthan	Jaipur	269	218	536	328	110
Rajasthan	Sri Jagdamba Charitable Eye Hospital	Sri Ganganagar	384	194	321	118	-76
Rajasthan	Ramsnehi Eye Bank	Bhilwara	323	154	126	0	-154
Rajasthan	Alakh Nayan Mandir	Udaipur	20	5	0	0	-5
Tamilnadu	Aravind Eye Hospital	Madurai	526	670	351	733	63
Tamilnadu	C.U.Shah Eye Bank /Sankara Netralay	Chennai	1121	633	1140	637	4
Tamilnadu	Aravind Eye Bank, Aravind Eye Hospit	Coimbatore	1163	519	1141	620	101
Tamilnadu	Lions Eye Bank Trust Distt. 324 A1	Chennai	774	188	418	272	84
Tamilnadu	Aravind Eye Hospital	Tirunelveli Jn.	44	39	78	200	161
Tamilnadu	Eye Research Centre (Dr. Agarwal Eye	Chennai	185	142	154	149	7
Tamilnadu	Vasan Eye Bank (PEC), Saidapet	Chennai		0	82	143	143
Tamilnadu	Sankara Eye Bank	Coimbatore	443	182	318	121	-61
Tamilnadu	Lotus Eye Bank	Coimbatore	55	56	198	66	10
Tamilnadu	Pammal Sankara Eye Bank, Sankara I	Chennai	60	9	90	62	53
Tamilnadu	Institute of Ophthalmology	Tiruchirapalli	580	143	148	61	-82
Tamilnadu	Natraj Hospital Eye Bank	Coimbatore	149	58	144	58	0
Tamilnadu	Sri Ramachandra Eye Bank, Medical C	Chennai	120	23	174	36	13
Tamilnadu	The Eye Foundation	Coimbatore	39	19	40	16	-3
Tamilnadu	Nagercoil Eye Bank	Nagercoil	0	0	72	14	14
Tamilnadu	Arasan Eye Bank	Erode	968	28	300	6	-22
Tamilnadu	A.G.Eye Hospital	Tiruchirapalli	300	49	0	0	-49
Tamilnadu	Govt. Rajaji Hospital - Eye Bank - GRH	Madurai	22	9	0	0	-9
Tamilnadu	P.S.G.Institute of Medical Sciences	Coimbatore	1	1	0	0	-1
Uttar Pradesh	ICARE Charitable Eye Hospital	Noida	120	77	165	107	30

Appendix A. (Continued)

EBAI Statistical Summary - By States and Union Territories

Includes All Reporting Eye Banks with 1 or more transplant annually

Note: Collections may not include collections from contributing collection centres, so utilization rates are not applicable

			= 1 of 10 largest eye banks				2009-2011
			2009	2009	2011	2011	Transplant
State	Name of the Eye Bank	Location	Collections	Transplants	Collections	Transplants	Growth
Uttar Pradesh	LLRM Medical College, Meerut Eye Ba	Meerut	56	85	76	78	-7
Uttar Pradesh	CL Gupta Eye Bank	Moradabad	29	29	98	76	47
Uttar Pradesh	King George's Medical University	Lucknow		0	61	51	51
Uttar Pradesh	S.N. Medical College	Agra		0	120	45	45
Uttar Pradesh	Lucknow Eye Bank	Lucknow	44	39	48	37	-2
Uttar Pradesh	Sitapur Eye Hospital	Sitapur		0	28	15	15
Uttar Pradesh	Shri Ram Murti Smarak Trust	Bareilly	14	14	14	11	-3
Uttar Pradesh	Varanasi Eye Bank Society	Varanasi	100	99	0	0	-99
Uttaranchal	Himalayan Institute Hospital Trust	Dehradun	10	10	2	2	-8
West Bengal	Prova Eye Bank	Barrackpore	629	322	1113	892	570
West Bengal	Regional Institute of Ophthalmology	Kolkata		0	888	110	110
West Bengal	Atul Ballav Eye Bank (NRS Medical Co	Kolkata	35	22	134	97	75
West Bengal	Siliguri Lions Eye Bank	Siliguri	0	0	46	42	42
West Bengal	Vanmukta Eye Bank	Kolkata	234	40	100	11	-29
West Bengal	Rotary Narayana Nethralaya eye bank	Kolkata	22	9	11	11	2
West Bengal	Uttar Dinajpur Eye Bank & Blind Welfa	Raiganj	4	5	0	0	-5
			28719	**15101**	36291	19093	**4068**