

Wharton Global Health Volunteers – Study of Sonapur Project Implementation Phase (2014-2018)

April 2023

Sahil Gupta, Natasha Ramanujam, Matthew Griffith, Gabriela Marques Goncalves, Ananya Dewan, Henre Le

Introduction

Sri Sankaradeva Nethralaya (SSDN) was established in Guwahati, Assam in 1994 by Dr. Harsha Bhattacharjee with the goal of establishing a high quality and comprehensive eye care institution to provide equitable care and access to all people of the Northeast, regardless of their socioeconomic status. While primary health care is the bedrock of their program, SSDN understood that they needed to build a tertiary eye center in order to allow patient referrals from primary care screenings to be escalated and treated.



SSDN's Goals



SSDN's Tertiary Hospital is located in Guwahati, the capital of Assam

While Northeast India has tremendous natural resources, the region is geographically cut off from the rest of India and its population is largely rural, which has resulted in isolation and underdevelopment. As a result, the people of this region face severe challenges in accessing everyday resources, especially healthcare services. On average, Northeast India lags behind the rest of the country across most healthcare indicators, including preventable blindness. Given that the rural population predominantly serve as daily-wage earners in the agricultural sector, blindness from cataracts or other preventable diseases result in an inability to work and earn income, a debilitating position to be in.

In 2014, SSDN set out to launch a pilot program to screen and treat 100% of the population in the Sonapur district in order to create blindness-free villages. The Sonapur Pilot ran from 2014 to 2018, during which, the entire 1.2 lakh population of Sonapur was treated for blindness. The results of the pilot showed tremendous promise, and the learnings will be used to scale SSDNs operations to districts across Assam.



Executive Summary:

Eye healthcare in rural Assam is an extremely challenging problem, but SSDN's devotion to service and organizational sophistication demonstrates a path to solve this issue. We hope WGHV's work serves as a shining endorsement for SSDN as the organization continues to scale and benefit the livelihoods of millions in Northeastern India.

A key deliverable for WGHV was to conduct an economic impact assessment for the Sonapur VC. The summary of this deliverable is detailed below:

- Across 2014-2018, the Sonapur Vision Center surveyed 100% of its 1.18 Lakh residents to assess eye health.
- During this time period, the Sonapur Vision Center treated ~4,300 cataract cases (99% of all cases), resulting in a reduction in blindness prevalence¹ from 3.6% to nearly zero. WGHV estimates that this resulted in a reduction of ~1,500 blind people in Sonapur.
- **WGHV estimates that this will result in a positive GDP impact of ~37 Crore INR (~\$4.7M USD²) per annum. Across the next two decades this will generate ~500 Crore INR (~\$60M USD) of additional GDP for Sonapur.**
 - [Exhibit 1: Project Sonapur – Economic Impact Assessment](#) provides a detailed breakdown on how the WGHV team arrived at these estimates.
 - This figure is conservative, as it does not include positive externalities around improved education, worker productivity, and better health outcomes
- From 2014 to 2018, the Sonapur VC lost ~1.3 Crore as it established itself. This pales in comparison to the positive economic impact created. **Across the next two decades, the Sonapur VC will generate an economic impact that is greater than 350x the cost to establish the vision center.**

The other key deliverable for WGHV was to recommend areas for improvement for SSDN as they continue to scale. The WGHV team proposes four main recommendations for SSDN:

- 1) **Track Additional Impact Metrics:** SSDN's social impact is undeniable, but to effectively and accurately measure the impact, SSDN should start tracking additional metrics for post-op patients and also for patients that have received free or subsidized glasses.
- 2) **Increase Revenue from Vision Centers:** VCs should be self sustained and the more revenue they collect, the more impact initiatives they can take on. There's opportunity for VCs to increase their revenue by increasing foot traffic, expanding product portfolios and creating additional incentives for CHWs

¹ The Government of India and WHO define blindness as 'presenting distance visual acuity less than 3/60 (20/400) in the better eye or limitation of field of vision less than degrees from centre of fixation

² Assumes INR to USD of 82.73 as of March 15, 2023

- 3) **Build out Clear Operating Best Practices for CHWs and Hospital Personnel:** CHWs are SSDN's main asset and are the cornerstone of the operation. Their knowledge, especially of senior CHWs, should be formally captured and best practices should be shared in structured and clear ways.
- 4) **Strengthen Discharge Material for Post-Op:** The WGHV observed the discharge process and observed that (1) 1 facilitator was instructing 20 patients on discharge processes and (2) patients were handed text-based instructions. WGHV recommends using picture-based instructions and having CHWs be more active in administering discharge instructions.

More detail on these recommendations can be found in the Recommendations section of the document.

Project Overview and Methodology:

The Wharton Global Health Volunteers (WGHV) team began consulting with SSDN in October 2022. The structure of the project was that the WGHV team would virtually consult with SSDN from October to December 2022, and in January 2023, the WGHV team would visit SSDN in Assam to see the operations at the flagship hospital in Guwathi and amongst the village based Community Healthcare workers in the Sonapur District. The ultimate goal of WGHV's work was to do an impact assessment of the Sonapur Project and identify areas of improvement as SSDN launches new vision centers across Northeastern India.

From October 2022 to December 2022, WGHV virtually consulted with the SSDN team, with workstreams including an outside in review of SSDN information and data, initial interviews, and a study of the organization's existing cost structure and impact metrics to date.

From January 3rd to 7th 2023, the WGHV team visited the SSDN team in Guwathi. During this visit, the WGHV team split its time between the flagship SSDN hospital in Assam, and several villages in the Sonapur district. Doing so enabled the WGHV team to see a full picture of SSDN's operations, from healthcare workers in Sonapur villages, to delivery of cataract surgeries in the flagship Guwathi hospital.

A summary of the work completed by SSDN is below:

- **Facility Visits:**
 - Multiple visits to SSDN flagship hospital in Guwathi. WGHV team observed cataract patient check in process, patient check out process, and CHW trainings and the hospital facilities
 - Site visit to 3 villages in the Sonapur district, including door to door visits to over 10 patients who had been treated by SSDN
 - Site visit to the Sonapur Vision Center
- **29 Interviews Across SSDN and Rural Communities:**
 - 14 Interviews with patients and community members in Sonapur villages
 - 8 Interviews with Community Health Care Workers in Sonapur Villages
 - 7 interviews with SSDN admin and staff at the Guwathi flagship hospital
- **Internal Data Analysis:**
 - Key Performance Indicators for SSDN (e.g. # of patients served, reduction in blindness)
 - Financial Data (revenue and costs for Sonapur Vision Center)

- **Opportunity Mapping and Discussion** with the SSDN team on January 7th
- **Final Report and Recommendation**: Delivered in April 2023 after review with Wharton Faculty

Impressions from Review of SSDN:

After spending time with the SSDN team, the WGHV team left Assam with a greater appreciation of both the challenges SSDN is solving and the incredible impact they have had to date. Some of WGHV's impressions include:

- **Northeastern India is a very challenging health delivery landscape. Low healthcare awareness, low ability to pay, and a dispersed population amongst rough geographical terrain hinders healthcare delivery**
 - Patients find economic costs of treatment (e.g. cost of treatment, travel, forgone daily wages) prohibitively expensive
 - *"I waited till I was completely blind and unable to work before I got treated because I did not want to take time off from work" – Treated Cataract Beneficiary, Barkarasang Village*
 - Northeastern India poses many geographic barriers, making travel and access to healthcare challenges. Examples of barriers include rivers, hills and poor travel infrastructure
 - Myths surrounding village medicine, fears surrounding surgeries and mistrust of outsiders are prevalent in rural India
 - *"Some villagers believe that if they get treated for cataracts, their grandchildren will be born blind" – Sonapur Vision Center Community Healthcare Worker*
- **SSDN possesses an obsession with delivering the highest quality care. The organization aims to have 100% coverage of its populations and only deliver the highest quality care**
 - *"The same doctors that serve paying patients are the same ones that go to rural screening camps to offer free treatments" – SSDN Leadership*
 - *"We strictly adhere to 100% population coverage, because if we do not reach them, they will never be treated..." – SSDN Leadership*
- **SSDN delivers profound impact at micro and macro levels**
 - On a micro level, SSDN enabled patients and family members to lead more dignified and independent lives. This includes allowing both patients and family members to return to work, expand careers and lead independent day to day activities.
 - *"After my father was treated, both of us were able to return to work and he got his independence back" – Son of a treated cataract patient, Kalangpur Village*
 - *"Before surgery, I did not even plan to attend college. Now, I am working to become a teacher" – Pediatric Patient*
 - On a macro level, SSDN increases the size of the participating labor force and a community's income
- **SSDN empowers their community healthcare workers (CHWs)**
 - Community health workers are often provided their first jobs through SSDN, which is a socially empowering experience
 - Continuous training is provided to workers to allow for professional development
 - A dignified salary, with additional bonus opportunities, are provided to economically empower workers

Recommendations for SSDN:

The WGHV team has four primary recommendations for SSDN to implement.

1) Track Additional Impact Metrics:

SSDN's social impact is clear and tangible. During our visits, we came across very inspiring impact stories such as:

- After losing vision due to cataracts, a farmer had to stop working and became dependent on family members. After treatment, he was able to regain independence and earn 400 INR daily.
- A child had developed congenital blindness and was forced to drop out of school. After being cured, she was able to complete her secondary school education, and is now studying to become a school teacher.

The aforementioned stories are anecdotal, but they are not documented nor is their data to demonstrate this.

Moving forward, there is an opportunity for SSDN to track new metrics and effectively measure impact. We suggest SSDN do the following:

- 1) **Develop a post treatment questionnaire** to gather information around family income, need for care and quality of life. See [Exhibit 2](#) for sample questions.
- 2) **Run surveys with all beneficiaries** and integrate that survey with the traditional patient journey. See [Exhibit 3](#) for further details
- 3) **Calculate the economic and social impact of SSDN's operations** based on the data collected. See [Exhibit 4](#) for further details

2) Increase Revenue from Vision Centers:

Increasing revenue generated by VCs will increase sustainability, and these additional funds can be repurposed towards increasing quality of care (e.g. hiring additional staff, upgrading machinery, further subsidization of procedures, etc.)

WGHV believes increasing glasses sales is the most effective lever to increase revenue. For the Sonapur VC, glasses accounted for 90% of revenue generated ([Exhibit 5](#)) and had high gross profit margins of 60%+ ([Exhibit 6](#)), even at subsidized prices.

WGHV suggest SSDN explore increasing Vision Center revenues via the following:

- 1) Provide financial incentives to CHWs for identifying patients with visual impairment. This incentive should not be tied to sales metrics. [Exhibit 7](#) discusses strategies to mitigate incentive misalignment here.
- 2) Explore offering contact lenses as a source of recurring revenue.
- 3) Stock inventories of high-end frames and lenses for patients who desire them.
- 4) Run a promotional campaign to increase foot traffic. [Exhibit 8](#) further details this.

3) **Build out Clear Best Practices for Community Health Workers**

When speaking with CHWs it was not clear how they made decisions and if there were consistent best operating practices (e.g., what to do when a patient refuses treatment, etc.):

- One CHW shared how she would simply continue visiting the house until the patient accepted care
- One CHW shared that she brought multiple CHWs to meet with a refusing patient
- One CHW shared that she brought a patient who had already received care to speak with a refusing patient

All three of these tactics eventually convinced patients but took varying lengths of time (anywhere from 1 month to 3 years). Moving forward, SSDN has an opportunity to outline best practices in order to generate the most efficient results.

WGHV suggests that SSDN do the following to address this:

- **Build out clear operating practices** for CHWs that create a standard operating procedure across all CHWs. Best practices should reference common problems that CHWs will experience and should outline the most effective tactics for CHWs to use
- Develop a **CHW mentorship program** to help disseminate lessons learned from experienced CHWs to new CHWs
 - New CHWs can rely on their experienced mentor to offer 1:1 guidance
 - New CHWs can shadow their mentor to see what patient interactions look like

4) **Strengthen Discharge Material for Post Operations**

After reviewing material and watching patients receive discharge instructions, we are concerned that the complexity of text-based instructions alongside the ratio of ~1 facilitator to 20 patients may not cultivate optimal patient comprehension. Once patients are sent back home, CHWs need to put a significant amount of effort into ensuring that patients are adhering to discharge instructions due to their lack of comprehension. SSDN can implement picture-based instructions, alongside text-based instructions, in order to enable patients and their at-home caretakers to easily understand how to take care post-surgery while boosting CHW efficiency.

WGHV suggests incorporating picture-based images that describe discharge instructions in addition to the current text-based discharge material. [Exhibit 9](#) details sample images of what discharge material could look like.

Conclusion:

Based on our analysis, WGHV believes that SSDN is already on track to create generational impact within the Northeast region of India, and that the principles identified above will strengthen their efforts in providing eye health to all. Some of our suggestions, such as tracking additional impact metrics, building out best practices for CHWs and hospital personnel, and strengthening post-op discharge material, can be implemented across additional project sites. While some additional research and development will be required, these solutions can significantly improve and increase SSDN's impact.

In addition, we believe that Vision Centers can be used to generate additional revenue by increasing foot traffic and expanding the product portfolio. However, this suggestion comes with the caveat that additional testing and new marketing efforts will be required in order to pilot this strategy. Other considerations include the population surrounding VCs, as a quorum is necessary to make this effort worthwhile.

Nonetheless, we believe that these recommendations and this study highlight tremendous opportunities for SSDN. The Sonapur Pilot project showed that entire districts in India can be cured from preventable blindness, and we look forward to seeing SSDN's model scaled up to areas across the region, and potentially even the country.

Exhibits and Detailed Findings

Exhibit 1: Project Sonapur Economic Impact Assessment

Project Sonapur will result in ~37 Crore of GDP increase in Sonapur per annum. We estimate that this will result in ~500 Crore of economic value generated

Direct Loss of GNI due to Blindness		Economic Productivity of a Blind Person	
Sonapur Average Annual Wage (INR) ¹	182,500	Sonapur Average Annual Wage (INR)	182,500
(x) 2014 Sonapur Blindness Rate ²	1.6%	(x) 2014 Sonapur Blindness Rate	1.6%
(x) Percent of Cataract Patients under 75 ²	84.3%	(x) Sonapur 2018 Population	140,000
(x) Sonapur 2018 Population ²	140,000	(x) % of Blind that are Economically Productive ³	20.0%
(=) Direct Loss of GNI due to Blindness	344,618,400	(x) % of Productivity Levels of Blind Person ⁴	15.0%
(=) Economic Productivity of a Blind Person		12,264,000	
Indirect Loss of GNI due to Blindness		Summary Impact Metrics	
Sonapur Average Annual Wage (INR)	182,500	(+) Direct Loss of GNI due to Blindness	344,618,400
(x) 2014 Sonapur Blindness Rate	1.6%	(+) Indirect Loss of GNI due to Blindness	40,880,000
(x) Sonapur 2018 Population	140,000	(-) Economic Productivity of a Blind Person	(12,264,000)
(x) Percent of Caregiver GNI Loss due to Care of Blind ³	10%	(=) Total Annual Economic Impact of Blindness in Sonapur	373,234,400
(=) Indirect Loss of GNI due to Blindness	40,880,000	(x) Average Number of Lost Working years for Blind Person ²	13.4
		(=) Total Economic Loss due to Blindness	4,986,411,584

1: Based on average daily income of 500 INR for 365 days per WGHV field interviews, 2: Leveraged from SSDN survey data and WGHV analysis, 3: Validated assumption from "Current estimates of the economic burden of blindness and visual impairment in India: A cost of illness study", 2022, 4: Validated assumption from 3 and adjusted for field observations

Exhibit 2: Additional Impact Metrics to Track – Post Treatment Questionnaire

SSDN should develop a 3-5 minute post-treatment questionnaire

Impact to be measured	Sample Questions
Patient's Income	How much were you making before the treatment? How much are you making now?
Family members time spend on care	How much time did family members spend taking care of you right before treatment? Were their working hours reduced because of it?
Additional years in school	Were you going to school before treatment? After treatment, how many additional years do you intend to spend in school?
Quality of life / Quality of sight	How would you rate your sight before treatment (5 options)? How would you rate it now (5 options)? Were you able to perform basic activities before treatment (going to the bathroom, cooking etc)? Are you able to perform those activities now? Has your school performance improved after the treatment (Y/N)?

+ Other questions such as age and occupation should also be included

Exhibit 3: Additional Impact Metrics to Track – Surveys with Beneficiaries

To gather the information on social / economic impact, for both cataract and spectacle patients, SSDN should launch a one-off effort with past beneficiaries and also incorporate the survey to the existing patient journey

Short term:

One-off survey with past beneficiaries

To kick off the analysis on economic and social impact, SSDN should, through regular visits conducted by the CHWs, **run the "Impact Survey"**

Key steps to be taken:

1. **List all past beneficiaries**
2. Identify which ones are still **receiving regular visits** and which ones are not
3. For the ones with regular visits, **ask the CHWs to conduct the survey**

Long term:

New step in the patient journey

Additionally, SSDN should **implement a new step to its patient journey - the "Impact Screening"**

The **"Impact Screening" should be conducted ~6 months post treatment and it should include ALL patients treated:** cataract patients, congenital blindness patients, patients that were given free spectacles etc.

The impact screening should be **conducted by CHWs and the data should be consolidated** by the supervisor / coordinator following the process used in the Screening Survey.

Exhibit 4: Additional Impact Metrics to Track – Calculate the Economic Impact

Once SSDN gathers all granular information, impact analysis such as the ones exemplified below will be possible on patient-by-patient basis, which can then be aggregated:

Example 1: Improvement in patient income

- **Income pre-treatment:** 200 INR/day
- **Income post-treatment:** 400 INR/day
- **Age:** 60
- **Expected Retirement Age:** 75

$$\text{Impact} = (400 - 200) * (75 - 60) * 260$$

$$\text{Impact} = 780,000 \text{ INR}$$

Example 2: New earning prospects after childhood

- **Projected income pre-treatment:** 0 INR/day
- **Projected income post-treatment:** 400 INR/day
- **Age:** 15
- **Expected Retirement Age:** 75

$$\text{Impact} = (400 - 0) * (75 - 18) * 260$$

$$\text{Impact} = 5,928,000 \text{ INR}$$

Example 3: Reduced working hours for caretakers due to care

- **Time out of work due to family care:** 4 h/day
- **Hourly income:** 50 INR/hour
- **Patient's Age:** 60
- **Expected Retirement Age:** 75

$$\text{Impact} = 4 * 50 * (75 - 60) * 260$$

$$\text{Impact} = 780,000 \text{ INR}$$



All assumptions presented here are *illustrative*. SSDN should **use official indicators to run the calculations**

Exhibit 5: Revenue Build for Sonapur Vision Center

Optical sales account for over 90% of revenue generated by the Sonapur VC

Income Statement of Sonapur Vision Center (INR)

	2014	2015	2016	2017	2018	2019	2020	2021
Income Build								
(+) Consultation	54,690	99,360	128,070	143,100	131,850	136,870	244,100	260,800
(+) Optical Sales	594,466	1,100,583	1,421,027	1,379,649	1,554,623	1,714,800	1,447,663	1,228,539
(=) Total Income	649,156	1,199,943	1,549,097	1,522,749	1,686,473	1,851,670	1,691,763	1,489,339

Exhibit 6: Margin Profile on Optical Sales for the Sonapur Vision Center

Optical sales are a source of profit for the Sonapur Vision Center, with paid spectacles delivering a 62% margin, and overall spectacles delivering a 53% margin

Margin Profile on Optical Sales in Sonapur (2014-2022)

Sales of Spectacles across the Counter	11,045,183
(-) Cost of Spectacles frames, glass and dispensing	(4,200,000)
(=) Gross Profit on Paid Spectacles	6,845,183
% Gross Margins on Paid Spectacles	62%
(-) Cost of Free Spectacles following Cataract Surgery	(939,060)
(=) Gross Profit on Total Spectacles	5,906,123
% Gross Margins on Total Spectacles	53%

Exhibit 7: Strategies to Mitigate Incentive Misalignment on Financial Incentives for CHWs:

Risk	Mitigating Strategy
CHWs may focus on glasses at the expense of cataracts and other more serious diseases	<p><i>Only begin offering incentives for glasses several years after a new VC opens, allowing time for beneficiaries with cataracts and other more serious diseases to be identified and treated first.</i></p> <p><i>Make incentives for glasses small compared to cataracts</i></p>
CHWs may push glasses on individuals who don't really need them	<p><i>Only offer incentives for individuals identified with significant visual impairment (i.e., beyond a threshold to be identified by clinical staff)</i></p> <p><i>Provide the incentive for merely identifying and referring the potential beneficiary, regardless of whether they ultimately purchase any glasses</i></p>

Exhibit 8: Promotional Campaign via Increasing Foot Traffic in VCs

We suggest a campaign that...

Aligns with the SSDN brand	<i>Promotional materials should aim to educate viewers on SSDN's mission and only then go on to say that by purchasing glasses from SSDN, you can support its work. Existing promotional videos can be leveraged for the creation of content</i>
Emphasizes low prices	<i>Materials should inform viewers of SSDN's low fixed prices due to its non-profit status</i>
Utilizes low barrier-to-entry channels	<p><i>Social media advertising through Instagram and Facebook will be cheaper and reach younger individuals who can then spread awareness among the elder generation in their families</i></p> <p><i>CHWs can pass out pamphlets in markets</i></p>
Serves a dual purpose	<i>A promotional campaign will also serve to increase local buy-in and inform potential beneficiaries of SSDN's charitable eye care</i>

Note: Promotional material will need to abide by restrictions in SSDN's charter. If purchasing digital ads is not allowed, the current ongoing promotional methods of distributing flyers, WhatsApp messaging, and posting on SSDN's instagram can be leveraged

Exhibit 9: Samples Images of Picture Based Discharge Material (taken from Noora Health)



Detailed Findings:

1) Social Impact

On the social impact front, the main goal of our research was to answer the following questions: "How has SSDN improved patients' health, earning potential, and/or employment prospects?" and "How has SSDN positively impacted patients' attitudes toward prevention?".

Our analysis focused on the Sonapur project, from its launch phase in 2014 to the current days. Based on the data provided and on the information gathered during our visits, we concluded that SSDN has had a positive impact on the community, having directly and indirectly improved the quality of life and economic prospects of several families. The impact that we have identified is described below, divided into "Quantitative Impact" and "Qualitative Impact", but before we go into detail on the impact, it's critical to understand the baseline of the Sonapur community.

a) Baseline

In 2014, Sonapur VC surveyed 100% of its ~118,000 residents to assess eye health. The survey identified ~4,300 cataract cases and a blindness prevalence of 1.6% among the population.

Additionally, the survey has identified a very low awareness among the population, both in terms of hospital and healthcare services and also cataract treatability, as we can see in exhibits 10 and 11 below.

Exhibit 10: Awareness of Any Hospital among the general Sonapur population:

Awareness of Any Hospital Type Among General Population

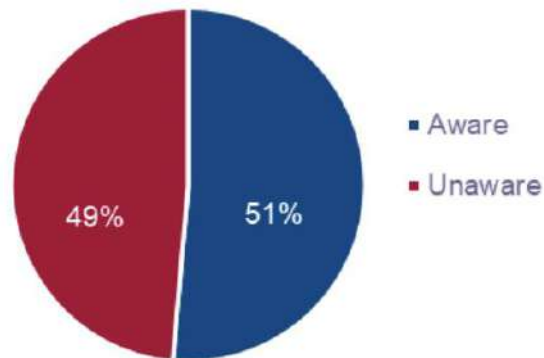
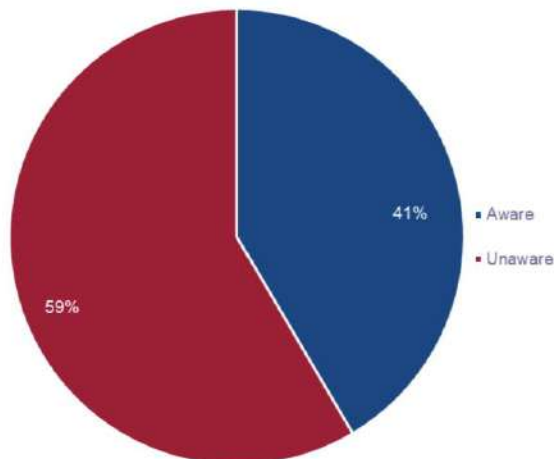


Exhibit 11: Awareness Among Households with At Least One Cataract:

Awareness Among Households with At Least One Cataract



As we can see in the exhibits, only 51% of the general population was aware of any type of hospital, and the numbers did not change significantly among those with cataracts or blindness. Among those aware of any hospital type, government hospitals had the most awareness at 60% and only 20% of the general population is aware of any non-government hospital.

Considering cataract treatability awareness, as seen in Exhibit 11, the survey identified only 41% awareness among households with at least one member with a cataract. Among the general population including households without cataracts, only 35% awareness was identified.

Attached to the low hospital awareness, the survey also captured important information regarding the utilization of healthcare services in the region, especially regarding natal and pediatric utilization. As seen in Exhibit 1, There is low utilization of prenatal and antenatal care, but high immunization rates among and enrollment in Anganwari centers among children 0-5.

Exhibit 11: Utilization of General Healthcare Services

Utilization of General Healthcare Services	
% of Women Using Pre-Natal Care	14%
% of Women Using Ante-Natal Care	9%
% of Children Aged 0-5 Immunized	87%
% of Children Aged 0-5 in Anganwari Centers	78%
% of Children Aged 0-5 Received Supplemental Food	64%

The survey conducted provides us a great picture of the situation of Sonapur previous to the project implementation - high level of cataract incidence, low awareness and low utilization rate, a challenging context for SSDN.

b) Quantitative Impact

The focus in the years that followed was to treat the cases identified. In the next 4 years, SSDN treated ~4.250 cases, 99% of all cataract cases, and declared the Sonapur coverage area free from preventable blindness and it is estimated that this resulted in a reduction of ~1,500 blind people in Sonapur.

As we can see in Exhibit 12, in its initial phase, the Sonapur project posted a net loss of ~1.4 Crore. This translates to a cost of ~3,300 INR per cataract case treated and ~9,500 INR per reduction in blind population.

Exhibit 12: Summary of the Initial Sonapur Project (2014-2018)

Summary of the Initial Sonapur Project (2014-2018)⁽¹⁾	
2014 Survey - Total Population	117,680
2018 Survey - Total Population	140,000
Treatment of Cataracts	
Total Cataract Detected	4,307
% Prevalance of Cataract within Population	3.7%
Cataract Surgery Performed	4,250
% of Cataract Treated	99%
Prevalance of Blindness Reduction	
Prevalance of Blindness in 2014	1.60%
Prevalance of Blindness in 2018	<0.3%
Reduction in Blind Population Estimate	1,463
Net Spend per Impact Metric	
Total Sonapur Net (Loss)	(13,913,917)
Net Loss / Cataract Surgery Performed	(3,274)
Net Loss / Reduction in Blind Population	(9,511)

However, the investment yielded extensive returns for the Sonapur community. Considering the economic prospects of the local population, we can estimate a 37 Crore INR of GDP Output was added annually to Sonapur due to the treatment of blind patients. This result considers both the direct and indirect impact, the direct impact is related to the fact that several patients, once curated from blindness are able to go back to work and generate income; additionally, indirectly, the cure also frees up time from other members of the family that were previously dedicating time to take care of the patient, this available time, often, is also relocated to working activities.

Important to notice that the economic and social impact is even higher when we consider pediatric patients. Blind children struggle in school due to lack of accommodations, giving back sight improves school performance and introduces the opportunity for higher-earning careers, which will lead to better outcomes for decades.

c) Qualitative Impact

In addition to the economical impact described above, the Sonapur project also led to better quality of life for its patients and the workers involved in the project. We have identifies the following qualitative impacts that can be associated with the project:

i. Health Care Workers and Volunteers Empowerment

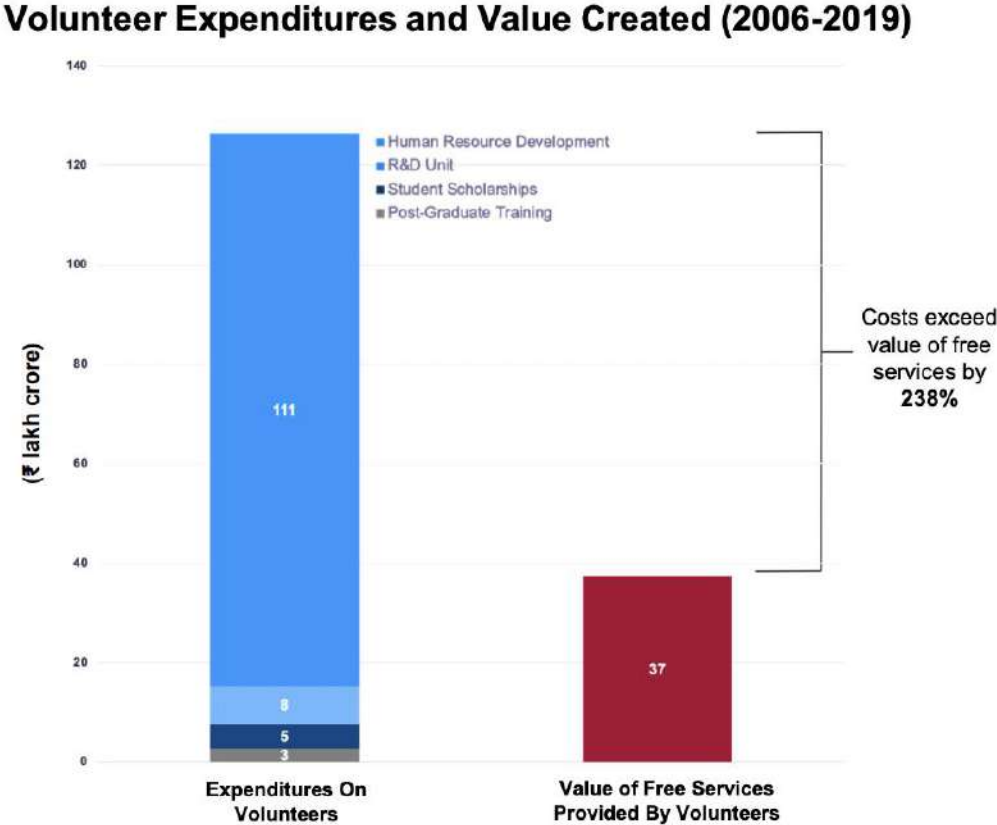
SSDN empowers CHWs by providing them with their first jobs, providing steady income streams, and offering them the opportunity to serve their community. A pipeline of skilled healthcare providers is being nurtured, with all the top eye care doctors in the North East having spent time at SSDN

Additionally, SSDN and the Sonapur project have positively impacted volunteers involved in the project. As we can see in Exhibit 13, SSDN has invested over ~137 lakh crore INR in volunteers. Human resource development constitutes the vast majority of expenditures on volunteers, which comes from creating training programs for graduates of surgery and medicine across India.

Such volunteers, consisting mainly of students and community workers, provided 2,304,492 hours of free service. The value of their free services not only include labor, but relevant costs such as consumable, infrastructure, and transportation.

Ultimately, SSDN invests far more into the training and education of volunteers/students than the value created in free services within Assam. However, this training would be expected to generate value across the country as students relocate after training.

Exhibit 13: Volunteer Expenditures and Value Created



ii. Improvement in overall awareness and on hygiene habits

We also observed that strong advocacy through word of mouth has been cultivated through treated patients encouraging untreated patients to pursue care, which serves to raise health awareness and combat mistrust.

Additionally, lasting eye hygiene preservation and preventative behaviors have been communicated to patients, with adherence attempted to be reinforced by continuous engagement with community health workers. Such measures have strongly impacted the life of the community and led to a better quality of life.

2) Operational Efficiency

There are two primary motivating questions behind our research into operational efficiency. First, how directly do SSDN's expenditures affect positive social impact? Second, how cost-effective are expenditures? Between 2014 and 2018, the Sonapur project incurred total expenses of **2.935 Crore INR** and generated revenues amounting to **52.6%** of expenses. Although the project posted a financial loss of **~1.3 Crore INR** during this time, these expenses generated substantial social impact and economic growth for the region. As discussed in the executive summary above, WGHV conservatively estimates that these expenditures will result in the generation of **~37 Crore INR (~\$4.7M USD)³ per annum** in economic value, equivalent to **~500 Crore INR (~\$60M USD)** of additional GDP for Sonapur over the next two decades.⁴

Comparing total expenditures to economic value generated provides a high-level overview of the efficiency of the Sonapur project. This calculation reveals that from 2014-2018, **every rupee spent on the Sonapur project generated over 63 rupees of economic value** for the region, and will continue to generate additional value beyond 2018. From this perspective, the project was hugely efficient and the answer to the first motivating question is that expenditures directly contributed to positive social and economic change. The primary mechanisms by which the project generated economic growth are: (1) allowing the formerly blind to either return to work or increase their economic productivity, and (2) reducing the burden on caregivers to the formerly blind thereby allowing them to resume work or increase their economic productivity. See Exhibit 1 for a full breakdown of the calculation of economic impact. The rest of this section provides detailed breakdowns of the Sonapur project's sources of revenue and total expenditures.

Revenues

From 2014-2018, the Sonapur project generated 1.54 Crore INR in revenues, enough to offset ~53% of total expenditures. This revenue came from two primary sources: (1) government partial reimbursement of surgery costs, and (2) optical sales. See Exhibit 14 below for a full breakdown of revenue.

³ Assumes INR to USD of 82.73 as of March 15, 2023

⁴ See Exhibit 1 for detailed breakdown of this calculation

Exhibit 14: Sonapur Project Revenue Breakdown (2014-2018)

Income and Expenditure Statement of Sonapur Project	
<i>From January 2014 to October 2018</i>	
Income Build	
Consultations	511,170
Optical Sales	5,434,300
Reimbursement of Surgery	8,420,000
Indirect Income from Paying Surgery	1,077,240
(=) Total Income	15,442,710
<u>% of Total Income</u>	
<i>Consultations</i>	3%
<i>Optical Sales</i>	35%
<i>Reimbursement of Surgery</i>	55%
<i>Indirect Income from Paying Surgery</i>	7%
<u>% of Total Expenditure</u>	
<i>Consultations</i>	2%
<i>Optical Sales</i>	19%
<i>Reimbursement of Surgery</i>	29%
<i>Indirect Income from Paying Surgery</i>	4%

Reimbursement of surgery drives the bulk of income for Project Sonapur (55%). This consists of a 2,000 INR per surgery reimbursement from the National Programme for Control of Blindness, which amounts to 1,750 INR net of payments to ASHA volunteer workers. The next largest source of revenue is optical sales from the Sonapur VC, which generated 35% of revenue. See Exhibit 19 in the Appendix for an income statement for the Sonapur VC from 2014-2021.

Optical sales are highly effective at generating revenue to fund continuing operations and improve sustainability, generating gross margins of 62% for each pair of spectacles sold. After accounting for spectacles provided free of charge to patients in need, optical sales still generated margins over 50%. As discussed more thoroughly in our primary recommendations above, further expenditures aimed at increasing foot traffic and sales at the Sonapur and other Vision Centers will greatly contribute to building sustainable operations. Overall, SSDN should aim to continue growing the percentage of costs that are able to be offset directly through revenue-generating activities over time. See Exhibit 15 below for a breakdown of gross margins on optical sales.

Exhibit 15: Margin Profile on Optical Sales (2014-2022)

Margin Profile on Optical Sales in Sonapur (2014-2022)	
Sales of Spectacles across the Counter	11,045,183
(-) Cost of Spectacles frames, glass and dispensing	(4,200,000)
(=) Gross Profit on Paid Spectacles	6,845,183
% Gross Margins on Paid Spectacles	62%
(-) Cost of Free Spectacles following Cataract Surgery	(939,060)
(=) Gross Profit on Total Spectacles	5,906,123
% Gross Margins on Total Spectacles	53%

Expenditures

SSDN spent **2.9356 Crore INR** in total on the Sonapur project between 2014-2018. It should be noted that it is central to SSDN's mission not to cut any corners when it comes to both the medical care and the accommodation of its free patients. Understandably, therefore, medical consumables and accommodation are significant cost drivers for the Sonapur project. Medical consumables accounted for 22% of total expenditures, and food and lodging for patients comprised 14%. The vast majority of manpower expenses were towards medical consultants, surgeons, and fellows whose labor is essential to the success of each surgery. From the perspective of only spending on essentials, SSDN's expenditures are highly efficient. Non-essential costs were kept to a minimum, and administrative expenses accounted for only 2% of total expenditures. Exhibit 16 below shows the full breakdown of expenses.

Exhibit 16: Breakdown of Sonapur Project Expenditures

Income and Expenditure Statement of Sonapur Project		
<i>From January 2014 to October 2018</i>		
Expense Build		% of Total Expenses
Consultants / Surgeons / Fellows	4,443,889	15%
OT Assistance and Other Indirect Manpower Costs	1,801,880	6%
Other (e.g. Optometrist, Secretary, Driver, Helper, Co-ordinator)	452,809	2%
(=) Total Manpower Costs	6,698,578	23%
Transportation for Conducting Camp	559,930	2%
Patients Transportation from Camp Area to SSDN	2,248,140	8%
Training Cost	273,486	1%
(=) Total Travelling Expenses	3,081,556	10%
Food Expenses (in camp area)	282,070	1%
Food Expenses (in base hospital)	1,431,400	5%
Cost of Accommodation	2,526,000	9%
(=) Total Cost of Accommodation	4,239,470	14%
Publicity (Photo & Video, leaflets, banners)	210,500	1%
Printing & Stationery	395,740	1%
Courier, Data Entry, & Other Sundry Expenses in Base Hospital	126,300	0%
(=) Total Administrative Expenses	732,540	2%
Electricity Expenses	126,300	0%
Cost of Infrastructure, Equipments & Other	3,578,500	12%
(=) Total Hospital Running & Maintenance	3,704,800	13%
(=) Total Consumables & Medicines	6,382,360	22%
Cost of Operative Spectacles	631,500	2%
Optical Purchase for Vision Centre	1,962,900	7%
Vision Centre Maintenance Cost (e.g. Electricity, Telephone)	249,708	1%
Salary of Vision Centre Staffs	1,269,000	4%
Rent for Sonapur Vision Centre	404,215	1%
(=) Total Vision Centre Expenses	4,517,323	15%
Total Expenses	29,356,627	

The high degree of efficiency of the Vision Center should be noted. In total, the Sonapur Vision Center cost ~4.5M INR, but generated nearly 6M INR in revenue through optical sales and consultation. The Vision Center more than paid for itself, and revenues generated from it could be put toward subsidizing the costs of medical care. The percentage of expenses on medically essential items increases when excluding the self-offsetting costs of the Vision Center. The Sonapur project's data supports the efficiency of the hub-and-spoke model adopted by SSDN.

The highest-impact activity of the Sonapur Project was the provision of free cataract surgeries. SSDN covers the cost of every step of the journey for the patient, providing them with free transportation, food, and overnight lodging for their surgery. As with the Sonapur project overall, non-essential costs were minimized, and administrative expenses consist of just 3% of the total cost to provide a cataract surgery. The cost of medical consumables for each surgery is 1,516 INR, and SSDN receives 1,750 INR net in government reimbursements for each surgery, roughly covering the cost of consumables. Exhibit 17 below shows the full breakdown of expenses associated with each cataract surgery.

Exhibit 17: Breakdown of Cataract Surgery Cost

Cost of Cataract Surgery per Unit		
	INR	% of Total
Consultants/Surgeons/Fellows	1,056	18%
Optometrist (Rs.19000/- pm)	21	0%
Secretary (Rs.30000/-pm)	33	1%
Driver (Rs.2000/-Pm)	22	0%
Helper (Rs.8000/-pm)	9	0%
Project Co-ordinators (Rs.10000)	22	0%
OT Assistance and Other Indirect Manpower Cost	428	7%
(=) Total Manpower Costs	1,591	27%
Transportation for conducting Camp	133	2%
Patients Transportation from camp area to SSDN	534	9%
Training Cost	65	1%
(=) Total Travelling Expenses	732	12%
Food expenses (In camp area)	67	1%
Food Expenses (in base hospital)	340	6%
Cost of Accomodation	600	10%
(=) Total Food & Lodging Expenses	1,007	17%
Publicity (Photo & Video documentation , leaflet & cost of Banner)	50	1%
Sundry Expenses in base hospital	30	1%
Printing & Stationery	94	2%
(=) Total Administrative Expenses	174	3%
Electricity Expenses	30	1%
Infrastructure and equipment maintenance cost	850	14%
(=) Total Hospital Running & Maintenance	880	15%
Consumables & Medicines	1,516	26%
Total	5,900	100%

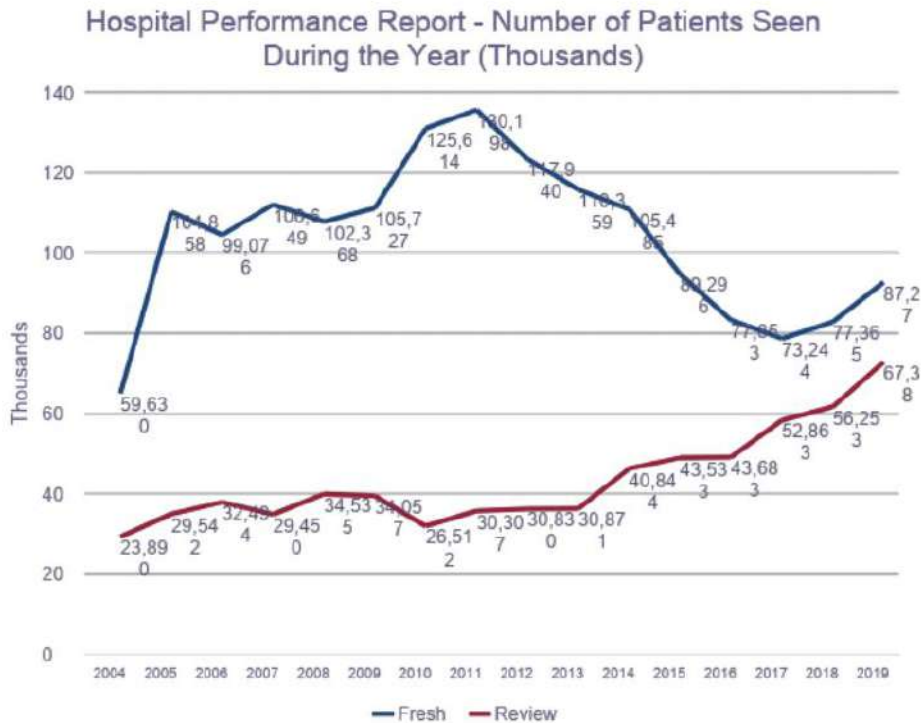
As discussed above, although the total cost of cataract surgery is 5,900 INR, when considering the revenue that the Sonapur VC generates to offset these costs, on a per capita basis the net expenditure for SSDN was just ~3,300 INR to treat a cataract and ~9,500 INR to treat blindness.

3) Strategic Opportunities

On the strategic opportunities front, the main goal of our research was to answer the following questions: "What are the critical components that make the SSDN care delivery model successful? And what could be changed?" and "Is there an opportunity to change the SSDN care delivery model based on the village?"

Based on our initial interviews, our emerging hypothesis is that SSDN success is highly rooted on service accessibility and capillary (hub and spoke model) and this is supported by the hospital performance report, as we can see in Exhibit 18.

Exhibit 18: Hospital Performance Report



From 2015 onwards, the new Vision Centers started to receive an increasing number of patients, reducing the number of patients that start their journey at the hospital. The hospital, as a consequence, started to see an increasing number of "Review" patients as patients that required longer and more specific care would then go to the Hospital after a first assessment in the vision center. This trend was a clear evidence of the success of the hub and spoke model as it allows higher specialization of the hospital that can focus its resources on complex and high demanding cases, better accessibility for the population that can rely on Vision Centers for basic care and initial assessment and overall reduction of unnecessary logistic cost.

The hub and spoke model, therefore, seems a success and it seems to be helping SSDN in its mission; but awareness, on the other hand, is something that has emerged as a potential challenge. Additionally, building trust with the community and improving the conversion rates also seems to be challenges to SSDN in some specific locations.

Based on that, in addition to the initiatives and recommendations already mentioned in this report, we believe SSD should consider the following: improve standard operating procedures to incorporate best practices for CHWs, leverage patient stories and experiences to serve as a catalyst for word of mouth adoption, and identify KOLs in initial survey phase to gain support and map our potential challenging patients. We will discuss each separately.

- a) Improve Standard Operating Procedures to incorporate best practices for CHWs

CHWs bring trust and local lived-experience to the work they do, but can likely be more efficient in working with those who initially refuse treatment by leveraging tactics that

have been found to be successful with other patients. Instead of having each CHW use a different approach, we recommend using a standard set of guidelines that CHWs are trained on that can be used in difficult settings.

- b) Leverage patient stories and experiences to serve as a catalyst for word of mouth adoption

Patients who have already received care can instill trust in new patients, which is important given the context that SSDN operates in. When entering a new village, we recommend bringing prior patients to meet with members of the new village to share their experience.

- c) Identify KOLs in initial survey phase to gain support and map out potential challenging patients

KOLs (i.e., Village Heads) will have insight into what challenges currently exist within the community and can help identify how changes in care delivery model should be approached. They can also help prepare CHWs on which patients may be more challenging to convince into receiving treatment

Exhibit 19: Sonapur Vision Center Income Statement (2014-2021)

Income Statement of Sonapur Vision Center (INR)								
	2014	2015	2016	2017	2018	2019	2020	2021
Income Build								
(+) Consultation	54,690	99,360	128,070	143,100	131,850	136,870	244,100	260,800
(+) Optical Sales	594,466	1,100,583	1,421,027	1,379,649	1,554,623	1,714,800	1,447,663	1,228,539
(=) Total Income	649,156	1,199,943	1,549,097	1,522,749	1,686,473	1,851,670	1,691,763	1,489,339
% YoY Growth								
Consultation		82%	29%	12%	-8%	4%	78%	7%
Optical Sales		85%	29%	-3%	13%	10%	-16%	-15%
Total		85%	29%	-2%	11%	10%	-9%	-12%