Assisted telemedicine services for increasing access to healthcare and reducing carbon footprint

Thiruppuvanam Vision Centre of Aravind Eye Care Hospital, Madurai

GGHH Agenda Goals

- Leadership
- Buildings
- Transportation

Hospital Goal

- To contribute to universal coverage in eye care through assisted telemedicine in satellite vision centres
- To reduce the need for patient travel to energy-intensive tertiary care hospitals.
- To deliver quality care with low carbon footprint.

Progress Achieved

Thiruppuvanam Vision Centre:

- Established a vision centre in a small town without prior ophthalmology services.
- Provided service for over 59,000 patients since 2009
- Incentivized patients to seek earlier treatment for vision problems
- Disseminated IEC materials on eye care and eye safety.
- Trained and hired local women as ophthalmology nurses and provided workplace benefits and job security.
- Reduced 54.3 tCO_2e emissions due to reduced patient travel in 2021

Aravind Eye Care Vision Centres:

- 100 vision centres established in India (in Tamil Nadu and Puducherry) (as of March 2022)
- Services a population of 8,500,000 who had not previously had access to eye care.
- Around 700,000 out-patient visits annually
- 90,000 spectacles dispensed
- 85% patients fully treated on site; only 15% referred to tertiary eye care hospital
- 25,000 cataract surgeries done through referring to tertiary eye care hospital

ISSUE 1 - Lack of access to healthcare

At present, public health infrastructure and services in peri-urban and rural India are lacking or inadequate. This leads to a gap in access to healthcare, especially for marginalized populations. For example, in Thiruppuvanam, a small town in Tamil Nadu, there is a poorly functioning government Community Health Centre without ophthalmology services. The residents in and around Thiruppuvanam practiced basic traditional eye care and did not seek early treatment for treatable eye ailments. The closest eye care hospital was 20km away in the city of Madurai.

Sustainability Strategy Implemented- Assisted telemedicine service

Aravind Eye Care Hospital, Madurai set up a satellite telemedicine centre (called Vision Centre) in Thiruppuvanam. The Vision Centre provides primary eye care to populations within a 5-7 km radius of the town. The centre is staffed with a coordinator and a vision technician. The coordinator manages the administration work and the technician does primary eye tests and care for the patients. Eye examination findings are entered into the electronic medical record system known as **Eye Notes**. In the base hospital in Madurai, the ophthalmologist in the teleophthalmology centre access these records in real-time and provide teleconsultations and referrals as needed. The teleophthalmology centre is staffed with four doctors (three ophthalmology post graduate students and one consultant ophthalmologist)

The vision centre receives 25-30 outpatients in a day. Only 12% of patients are referred to the base hospital in Madurai for tertiary care. Prior to the setting up of the vision centre, home remedies were used by people of Thiruppuvanam to treat infections. Vision conditions like myopia and hypermetropia were left untreated, leading to needless blindness. Due to the presence of the vision centre, patients are getting cured of needless blindness as well as seeking early treatment for infections. The Madurai base hospital provides teleconsultation to 34 other such vision centres in the state.

The service provided at Vision Centres is subsidized to be affordable for peri-urban and rural populations. New patients are given a unique number upon registration. A fee of Rs. 20 (0.27 USD) is charged for a first-time full eye checkup, along with two additional visits which are free of cost. A blood sugar test is also done at Rs 25 (to check for potential diabetes as a causal link to eye ailments). Medicines provided are subsidized at a cost of Rs 50-100 (~ 1USD). Staff ensure regular follow ups for patients, to ensure treatment is complete.

The vision centres are further economical for the patients because they do not have to travel to the base hospital for care, which saves travel costs and ensures no loss of wages and opportunity costs for daily wage workers. Patients of the vision centres spend only 50% of the cost of visiting the base hospital. Further, patients usually visit the base hospital with an attender for company, however half of the patient population at vision centres are able visit individually (saving time and money).

Figure 2 Thiruppuvanam Centre reception

Figure 1 Vision Technician and patient

Figure 3 IEC Materials in the local language Tamil

Figure 5 Base Hospital Teleophthalmology centre

Figure 4 Medical professional on a telemedicine call

ISSUE 2- Climate footprint of healthcare buildings and transport

The modern healthcare sector is carbon intensive, contributing to 4.4% of global emissions. Depending on the location, context, and type of service provided, the footprint of healthcare infrastructure and services varies. Currently, the more complex the service, the greater the carbon emissions. And often, the better the quality of service, the greater the emissions. Long term hospitalization and frequent travel of patients contribute to healthcare emissions (Tsagkaris et al., 2021). It is also predicted that the healthcare sector worldwide will expand, with a 30% increase in building stock in India till 2027 (Kumar et al. 2018). It is imperative that the planning, design and construction of the new spaces are aligned with green building practices. Space utilization should be maximised and only absolutely necessary buildings and infrastructure should be constructed. The need for large, resource intensive buildings should be reduced where possible (Health Care Without Harm, 2021).

Sustainability Strategy Implemented- Low carbon infrastructure for quality healthcare

At Thiruppuvanam, the Vision Centre was established in an already existing housing complex. Aravind Eye Care rents the property to run the Vision Centre. In this way, Aravind Eye Care has prevented the construction of a new building for providing healthcare. Energy use is minimal- lighting and ceiling fans, as well as medical equipment. Since there is no consistent power supply in the area, inverters are used for backup. 10 vision centres of Aravind Eye Care are equipped with solar power. The Thiruppuvanam centre is yet to get solar. Patients travel within 7 km to the vision centre, and only those who require tertiary care (~12% of patients) travel 20 km to the Madurai base hospital by public buses. The quality of service provided in the vision centres is the same as provided at the base hospital, but in a less energy

intensive building. In Thiruppuvanam, since there was no prior eye hospital in the area, patient travel for primary eye care has increased, but the need to travel longer distance to the base hospital for tertiary eye care has reduced.

Reduction in Carbon footprint due to reduced patient travel (2021): Thiruppuvanam

Total Outpatient Visits: 9590

Specialty cases referred to base hospital: 590

Trips avoided to base hospital: 8553kms (40 km two-way)

Emissions saved by trips avoided:

54.3 tCO_2e

Other measures that reduce the carbon footprint of the vision centre are:

- The use of electronic medical records since 2008 has saved paper usage
- Spectacles are now ordered online. Initially, spectacle orders were placed to the base hospitals and the frames transported to the vision centres; but now they are directly delivered to the vision centres, reducing delivery travel.
- During COVID, gloves used by the staff were initially replaced every 3 hours, but were reduced to daily replacement, thereby reducing waste generation. Through this, **732 less gloves were used** during the period.

Implementation Process

While setting up vision centres, a demographic study is conducted first, to assess the socio-economic status of the location. Vision Centres are established in areas only where there are no prior ophthalmology services - public or private. Once the location is selected and the facility is set up, three days of intensive outreach is done to spread awareness of the facility.

- Thiruppuvanam has a large community of people in the brick work profession, and hence brick factories were targeted to spread awareness. In other communities, door to door outreach was also done.

- It took Rs 1,250,000 (16,500 USD) to set up the Vision Centre and takes Rs 606,595 (7800 USD) to run annually.
- Equipment for the facility is sourced from Aravind's own equipment manufacturing plant which is nearby (Aurolab), thus reducing costs and carbon footprint of procurement. Aurolab manufactures affordable intra-ocular lenses, medications and ophthalmic equipment. It has 12% of the global market in intra-ocular lenses. It also practices many sustainable initiatives in the eye care supply chain. Some medication provided to patients is also from Aurolab.
- Aravind Eye Care prioritizes hiring of local women for all their operations. Over 80% of staff are women from nearby areas who are intensively trained for two years in various skill sets that will be used in ophthalmic care giving process. They are called midlevel ophthalmic personnel (MLOP). When needed, these staff are trained and re-posted in vision centres. Aravind ensures continued employment for their staff even in the case of relocation (which happens often after marriage).

Next Steps

Aravind Eye Care plans to expand their assisted telemedicine services to reach 150 vision centres across Tamil Nadu, Puducherry, Andhra Pradesh. They also run a consultancy and training organization known as LAICO (Lions Aravind Institute of Community Ophthalmology). LAICO works with 350+ eye hospitals globally on capacity building and sharing best practices in eye care. Aravind is working on their sustainability practices- they aim to reduce single used plastics in the centre, optimize the use of equipment by ensuring maintenance, and pilot and scale solar power in vision centres. Aravind eye care is also planning to implement AI for glaucoma and diabetic retinopathy treatment.

Links:

Aravind Eye Care System: https://aravind.org/

Vision Centres: https://aravind.org/vision-centre/

Aurolab Equipment and medicine manufacturing: https://www.aurolab.com/index.asp

LAICO: https://laico.org/

Health and Environment Leadership Platform: https://www.ceh.org.in/activities/help/about/

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