B-PD323
Dissertation

Visual Impairments Beyond the Clinic: Psychological Impact, Accessibility Gaps, and Socioeconomic Barriers to an inclusive world.

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I. Introduction

a) Background of the research

According to the World Health Organisation (WHO), an estimate of 2.2 billion individuals globally are affected by near or distance vision loss. Of these, an approximated 253 million people are classified as “Visually Impaired”, and 36 million of these as “blind (World Health Organization: WHO). The definition of the terms varies slightly in different contexts.

Medically, the WHO defines visually impaired individuals as those who have a visual acuity of less than or equal to 20/200 (what the individual can view at 20ft distance, a normal sighted person can view the same at 200ft) in their better eye, or have a field of vision less than 20 degree. A blind person has a visual acuity worse than 20/400 (what the individual can view at 20ft distance, a normal sighted person can view the same at 400ft) with a field of vision under 10 degrees. For reference, a “normal visual acuity” is 20/20 and “normal field of vision” is around 180-200 degrees. This shows that most people who are visually impaired still have some working vision, the severity differing from person to person.(Kv and Vijayalakshmi, par.5) The current leading causes of legal blindness are Age-Related Macular Degeneration (AMD), cataracts, glaucoma, and diabetic retinopathy, which affects millions around the world.

While there has been tremendous growth and advancements in the diagnosing process, development of aid tools, and in some cases, the treatment of visual impairments, much of the common public’s knowledge stays limited to stereotypical assumptions. The multiple factors of the social, emotional and economical realities which shape the day to day lives of the visually impaired remain hidden and unheard. This in turn results in profound psychological consequences to those who are faced with conditions resulting in vision loss. It comes as a “surprise” or a shock to many, who are not well equipped or educated on the topic to handle it. Many have outdated beliefs of blindness, assuming all blind individuals cannot see at all, and are helpless, which is far from the truth.

Naturally, it can be assumed that the developers of aid tools must have a better understanding of the various considerations that should go into creating impactful products. Every form of vision loss is unique, with differences in symptoms such as the area of vision lost, the severity of vision loss, whether or not the Preferred Retinal Locus (PRL (the point of focus; present in the central vision of a normal sighted person)) has shifted, and more. However, almost all existing interventions and aid tools can be observed trying to tackle “blindness” as a broad target. Although successful for certain cases of low vision, this deems the products as unsuitable for many.

b) Research questions

This dissertation examines how severe vision loss impacts lives, elaborating on both its medical and social dimensions. The paper covers the stigma and limited awareness around vision loss, emphasising on the lack of access to efficient aid and knowledge in various geographic demographics.

The first research objective is to evaluate how severely the day to day lives of the affected individuals are impacted after diagnosis. A severe deterioration or loss of one of our six primary senses is bound to take a huge toll on the way one lives their lives. Learning to adapt to their new reality is a challenge one can only imagine, taking several hits to their state of being. This can range from psychological effects to financial instability and social burdens. The above is delved into through analysing the existing literature on the topic and its gaps, and through interviews conducted with affected individuals.

The next objective is to analyse the roles of stigma and lack of awareness play in the possible delayed detection and prevalent difficulty to accept the loss of a sense. As the onset of most vision loss is not predictable, it is usually sudden. However, the impact is far more grave if the affected individual and their close ones do not truly understand the depth of the world of visual impairments. What is lacking in the public awareness of this issue? Does the socioeconomic aspect of the demographics play a role in the severity of this?

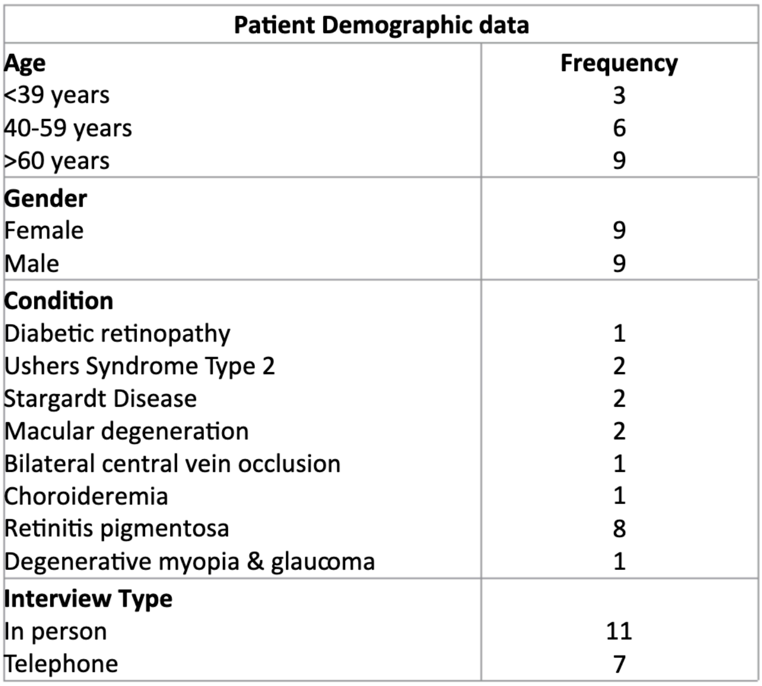
The final objective of the dissertation is to do a thorough market research of assistive technology, aid tools and medical care. This will be done through case studies, exploring three solutions from different financial points. The first product being an expensive and highly technological product type. The second is a more commonly accessible but still technology dependent solution. The final aid tool is a primitive, physical, non-technological product. The purpose of this objective is to understand the extent of the assistance that can be provided by existing interventions. Do they truly help? What is lacking? Does the product’s price point and technology have a significant impact on the demographic that it can help?

The above three research questions broadly cover the factors that silently but gravely impact the lives of affected individuals and how the three intertwine into the resulting situations of many. Their individual and combined roles will be examined thoroughly in this dissertation with proof through primary and secondary research.

II. Literature review

1. Psychological impact of VI and adapting to it

Authors Boagey, Jolly and Ferrey examine the psychological impact the diagnosis of vision loss has on people. 18 semi-structured interviews were conducted and the mean Beck Depression Inventory (BDI) score of participants was 9.6, indicating a “minimal depression” range (Boagey et al.). However, several individuals showcased symptoms of mild to moderate depression, some even described suicidal ideation.



Patient Demographic data	
Age	**Frequency**
<39 years	3
40-59 years	6
>60 years	9
Gender	
Female	9
Male	9
Condition	
Diabetic retinopathy	1
Ushers Syndrome Type 2	2
Stargardt Disease	2
Macular degeneration	2
Bilateral central vein occlusion	1
Choroideremia	1
Retinitis pigmentosa	8
Degenerative myopia & glaucoma	1
Interview Type	
In person	11
Telephone	7

Fig 01: Patient demographic

The researchers’ analysis identified five major themes: denial and acceptance of diagnosis, mental health impact, loss , effect on identity, and thoughts about future, and each theme is elaborated on (Boagey et al.).This work is insightful and can aid in developing better psychological support for the visually impaired. However, its limitation is that it is too generic. There is no focus on a group, be it age, gender, economic position, geographic, etc. It therefore has limited ethnic heterogeneity, and can not be the basis for a universally accepted outcome.

Another study surveyed individuals affected by Leber's Hereditary Optic Neuropathy (LHON), a condition causing the loss of central vision due to a mitochondrial mutation in the optic nerve. The questionnaire was filled by 103 participants aged 13–65 years with the aim of evaluating the psychological effects of severe vision loss in adolescents, young adults, and middle-aged adults (Garcia et al.).

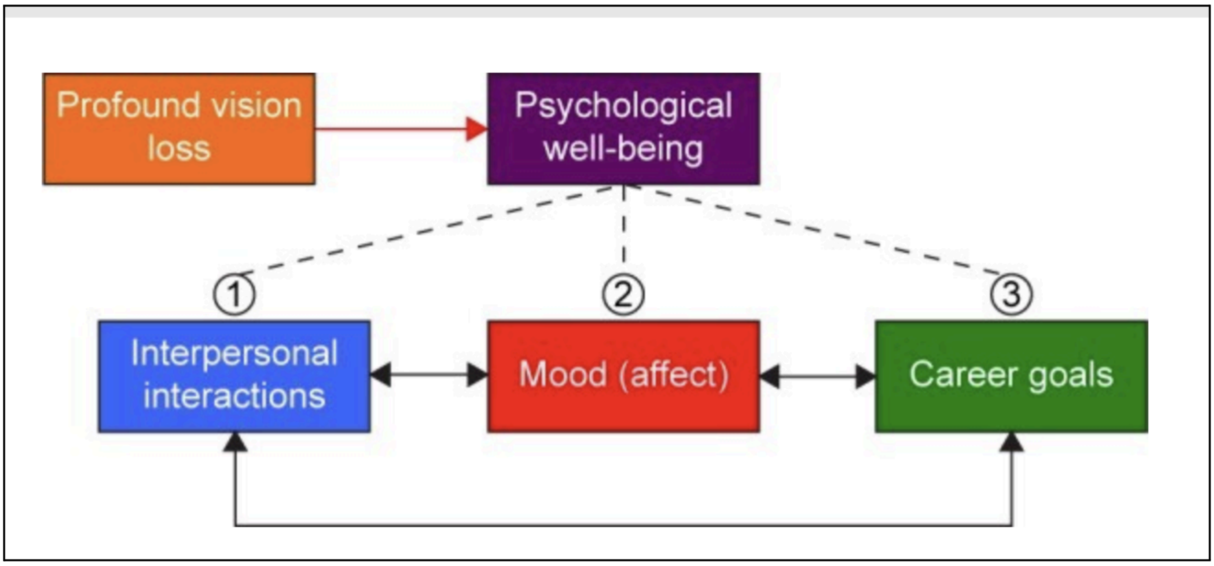


Fig 02: Relations Between Areas Impacted

The results of the study found that almost half the participants met the study's depression criteria after losing their vision, and a majority of participants asserted receiving emotional support from their ophthalmologist (Garcia et al.). Many expressed negative impacts on both their interpersonal interactions and in their goals for their careers. The study also highlights the proportional increase of depression rates with an older age of diagnosis. The higher social well-being index reported from those who do not use any electronic aid tools, as compared to the majority that do (Garcia et al.). This paper gives us incredible insights on the possible co-relation of age and aid tools to the mental well being of the affected.

The above works are insightful, but each study lacked a key aspect of demographics. Although the purpose of the study was served, having a diverse demographic could contribute to a better understanding of the results as it helps give a reference point. Be it diversity in age, condition leading to vision loss or the sample size of participants; none of the above had all three and a comparative study on the missing aspect could further solidify the findings.

2. Lack of awareness about visual impairments

A paper by Assefa,Tolessa and Ferede in 2020 conducted community-based cross-sectional studies with participants picked by systematic random sampling and a sample size of 524 (Assefa et al.). The aim was to assess how much knowledge the parents of young children in Maksegnit, Ethiopia had on childhood blindness (Assefa et al.). It is important to note that the geo-political demographic of the sample size can be classified underdeveloped as Ethiopia is one of the poorest countries, ranked 30th by GDP (Ventura), and is also listed in the United Nations’ list of the least developed countries (“UN List of Least Developed Countries”).

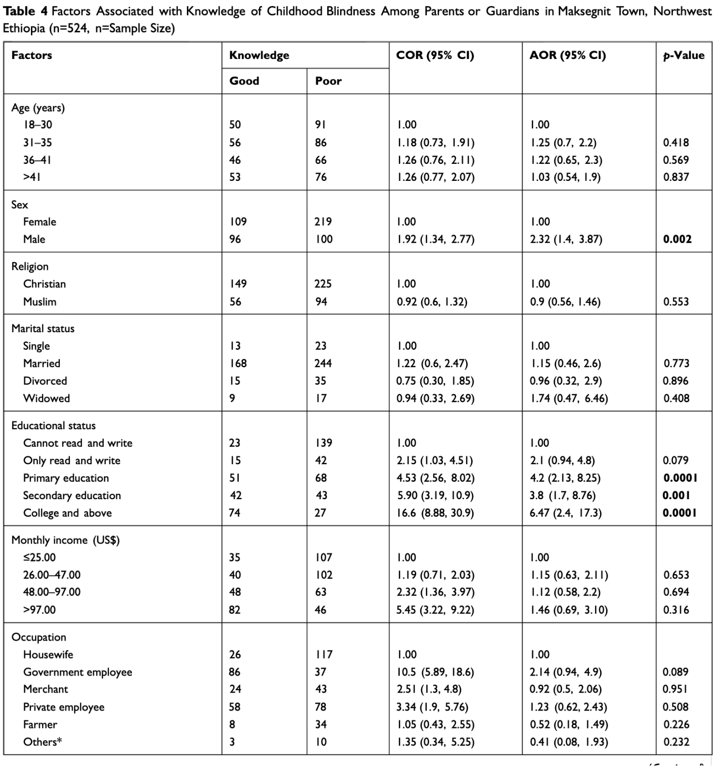
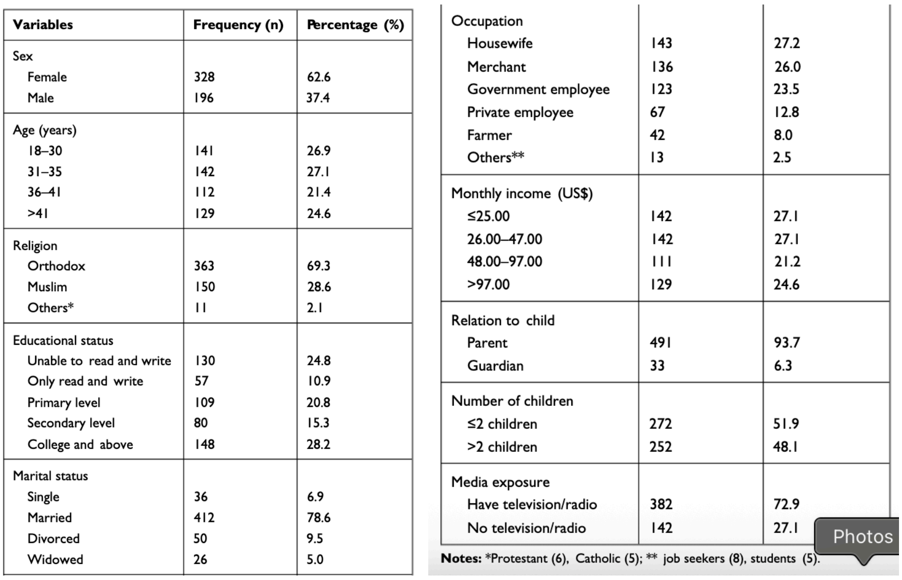


Table 4 Factors Associated with Knowledge of Childhood Blindness Among Parents or Guardians in Maksegnit Town, Northwest Ethiopia (n=524, n=Sample Size)

Factors	**Knowledge**		**COR (95% CI)**	**AOR (95% CI)**	***p*-Value**
	Good	**Poor**			
Age (years)					
18–30	50	91	1.00	1.00	
31–35	56	86	1.18 (0.73, 1.91)	1.25 (0.7, 2.2)	0.418
36–41	46	66	1.26 (0.76, 2.11)	1.22 (0.65, 2.3)	0.569
>41	53	76	1.26 (0.77, 2.07)	1.03 (0.54, 1.9)	0.837
Sex					
Female	109	219	1.00	1.00	
Male	96	100	1.92 (1.34, 2.77)	2.32 (1.4, 3.87)	**0.002**
Religion					
Christian	149	225	1.00	1.00	
Muslim	56	94	0.92 (0.6, 1.32)	0.9 (0.56, 1.46)	0.553
Marital status					
Single	13	23	1.00	1.00	
Married	168	244	1.22 (0.6, 2.47)	1.15 (0.46, 2.6)	0.773
Divorced	15	35	0.75 (0.30, 1.85)	0.96 (0.32, 2.9)	0.896
Widowed	9	17	0.94 (0.33, 2.69)	1.74 (0.47, 6.46)	0.408
Educational status					
Cannot read and write	23	139	1.00	1.00	
Only read and write	15	42	2.15 (1.03, 4.51)	2.1 (0.94, 4.8)	0.079
Primary education	51	68	4.53 (2.56, 8.02)	4.2 (2.13, 8.25)	**0.0001**
Secondary education	42	43	5.90 (3.19, 10.9)	3.8 (1.7, 8.76)	**0.001**
College and above	74	27	16.6 (8.88, 30.9)	6.47 (2.4, 17.3)	**0.0001**
Monthly income (US$)					
≤25.00	35	107	1.00	1.00	
26.00–47.00	40	102	1.19 (0.71, 2.03)	1.15 (0.63, 2.11)	0.653
48.00–97.00	48	63	2.32 (1.36, 3.97)	1.12 (0.58, 2.2)	0.694
>97.00	82	46	5.45 (3.22, 9.22)	1.46 (0.69, 3.10)	0.316
Occupation					
Housewife	26	117	1.00	1.00	
Government employee	86	37	10.5 (5.89, 18.6)	2.14 (0.94, 4.9)	0.089
Merchant	24	43	2.51 (1.3, 4.8)	0.92 (0.5, 2.06)	0.951
Private employee	58	78	3.34 (1.9, 5.76)	1.23 (0.62, 2.43)	0.508
Farmer	8	34	1.05 (0.43, 2.55)	0.52 (0.18, 1.49)	0.226
Others*	3	10	1.35 (0.34, 5.25)	0.41 (0.08, 1.93)	0.232

Fig 03: Table showing the factors associated with knowledge

As shown in Fig 03, study concluded that less than half of the participants had "good" knowledge of childhood blindness. Those who did possess the knowledge were associated with one or more of the following factors: gender, educational status, knowing the location of the child eye care centre and participation in an eye care campaign (Assefa et al.).



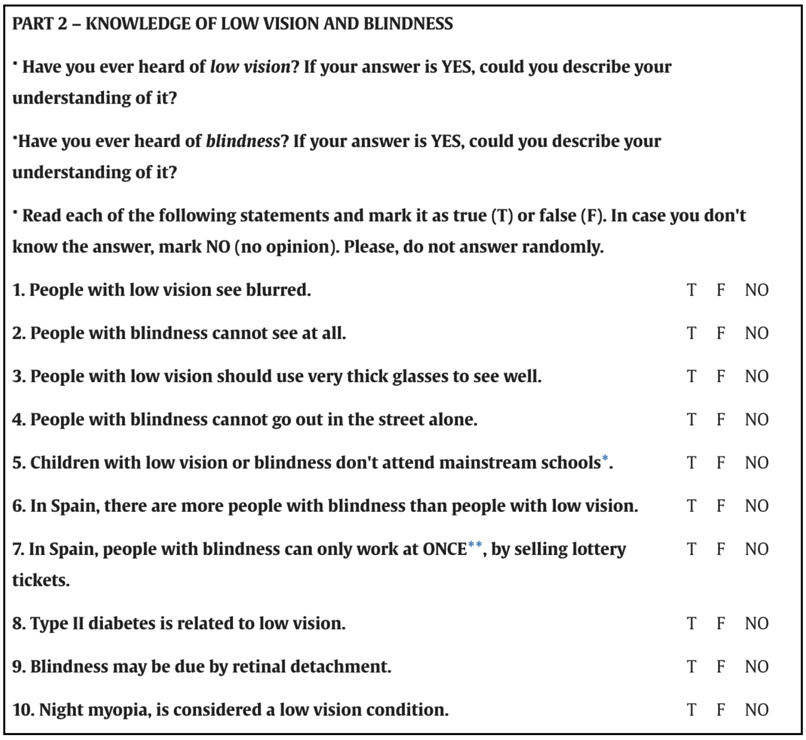
Variables	Frequency (n)	Percentage (%)
Sex		
Female	328	62.6
Male	196	37.4
Age (years)		
18–30	141	26.9
31–35	142	27.1
36–41	112	21.4
>41	129	24.6
Religion		
Orthodox	363	69.3
Muslim	150	28.6
Others*	11	2.1
Educational status		
Unable to read and write	130	24.8
Only read and write	57	10.9
Primary level	109	20.8
Secondary level	80	15.3
College and above	148	28.2
Marital status		
Single	36	6.9
Married	412	78.6
Divorced	50	9.5
Widowed	26	5.0
Occupation		
Housewife	143	27.2
Merchant	136	26.0
Government employee	123	23.5
Private employee	67	12.8
Farmer	42	8.0
Others**	13	2.5
Monthly income (US$)		
≤25.00	142	27.1
26.00–47.00	142	27.1
48.00–97.00	111	21.2
>97.00	129	24.6
Relation to child		
Parent	491	93.7
Guardian	33	6.3
Number of children		
≤2 children	272	51.9
>2 children	252	48.1
Media exposure		
Have television/radio	382	72.9
No television/radio	142	27.1

Notes: *Protestant (6), Catholic (5); ** job seekers (8), students (5).

Fig 04 and 05: Social and economic demographics of the study participants

As seen in the tables of Fig 04 and 05, a huge portion of the participants surveyed have a very low income and little to no literacy (Assefa et al.). This study is remarkably strong as it talks of the factors of awareness about blindness in an area with a predominantly underprivileged demographic. However, it is still in a specific geo-political demographic, and there is no comparative study in a more metropolitan location to truly understand the severity of the gap in knowledge and the extent of the impact of a location demographic's socio-economic status.

Another study conducted by Lupón, Cardona and Armayones explored the laymen's knowledge of the topics of blindness and low vision, challenging the readability of information available online. 103 participants from Catalonia, Spain, of various ages (above 16), sexes and education levels participated in the survey.

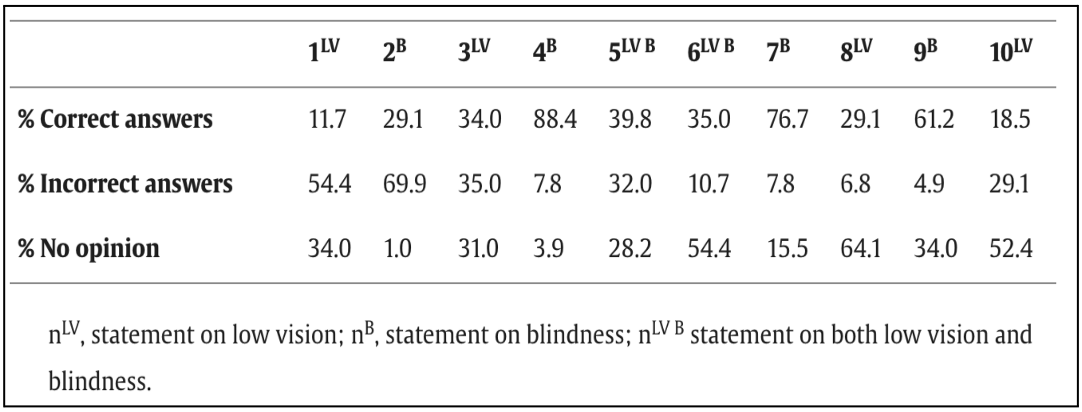


PART 2 – KNOWLEDGE OF LOW VISION AND BLINDNESS

- **Have you ever heard of *low vision*? If your answer is YES, could you describe your understanding of it?**
- **Have you ever heard of *blindness*? If your answer is YES, could you describe your understanding of it?**
- **Read each of the following statements and mark it as true (T) or false (F). In case you don't know the answer, mark NO (no opinion). Please, do not answer randomly.**

1. People with low vision see blurred.	T	F	NO
2. People with blindness cannot see at all.	T	F	NO
3. People with low vision should use very thick glasses to see well.	T	F	NO
4. People with blindness cannot go out in the street alone.	T	F	NO
5. Children with low vision or blindness don't attend mainstream schools*.	T	F	NO
6. In Spain, there are more people with blindness than people with low vision.	T	F	NO
7. In Spain, people with blindness can only work at ONCE, by selling lottery tickets.**	T	F	NO
8. Type II diabetes is related to low vision.	T	F	NO
9. Blindness may be due by retinal detachment.	T	F	NO
10. Night myopia, is considered a low vision condition.	T	F	NO

Fig 06: Survey True or False Questions



	1^{LV}	2^{B}	3^{LV}	4^{B}	$5^{LV\,B}$	$6^{LV\,B}$	7^{B}	8^{LV}	9^{B}	10^{LV}
% Correct answers	11.7	29.1	34.0	88.4	39.8	35.0	76.7	29.1	61.2	18.5
% Incorrect answers	54.4	69.9	35.0	7.8	32.0	10.7	7.8	6.8	4.9	29.1
% No opinion	34.0	1.0	31.0	3.9	28.2	54.4	15.5	64.1	34.0	52.4

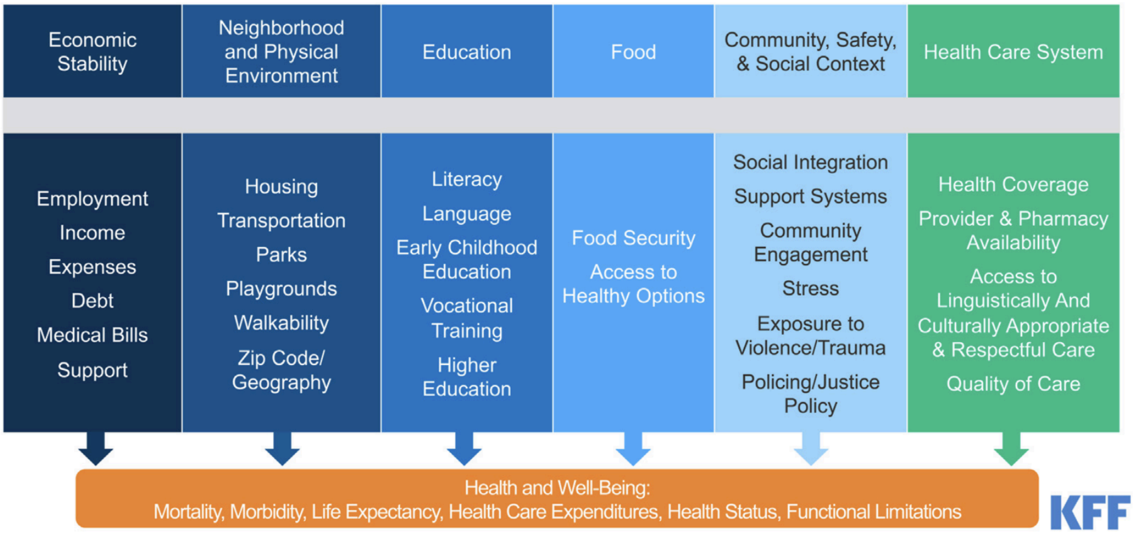
n^{LV}, statement on low vision; n^{B}, statement on blindness; $n^{LV\,B}$ statement on both low vision and blindness.

Fig 07: Results of True or False Questions

Although more than 90% of the 103 participants claimed to know the term “blindness”, the results revealed that most of them had a misinterpretation of what it actually meant. It also showed that a majority of the participants (52%) had never heard of the term “low vision” before (Lupón et al.). This study helps bring light to the clear misrepresentation of the visually impaired community. What would truly help this stand out is conducting the same study across various geo-political locations, to further study the impact of socio-economic factors on the results.

3. Lack accessibility and disparity in existing aid and care

This paper from 2022 examines the disparities present in vision health and access to eye care, with an emphasis on the socio-economic and systemic factors that disproportionately impact the underprivileged population. A health disparity is defined as the outcome of health inequities affecting populations which are medically underserved (Elam et al.).



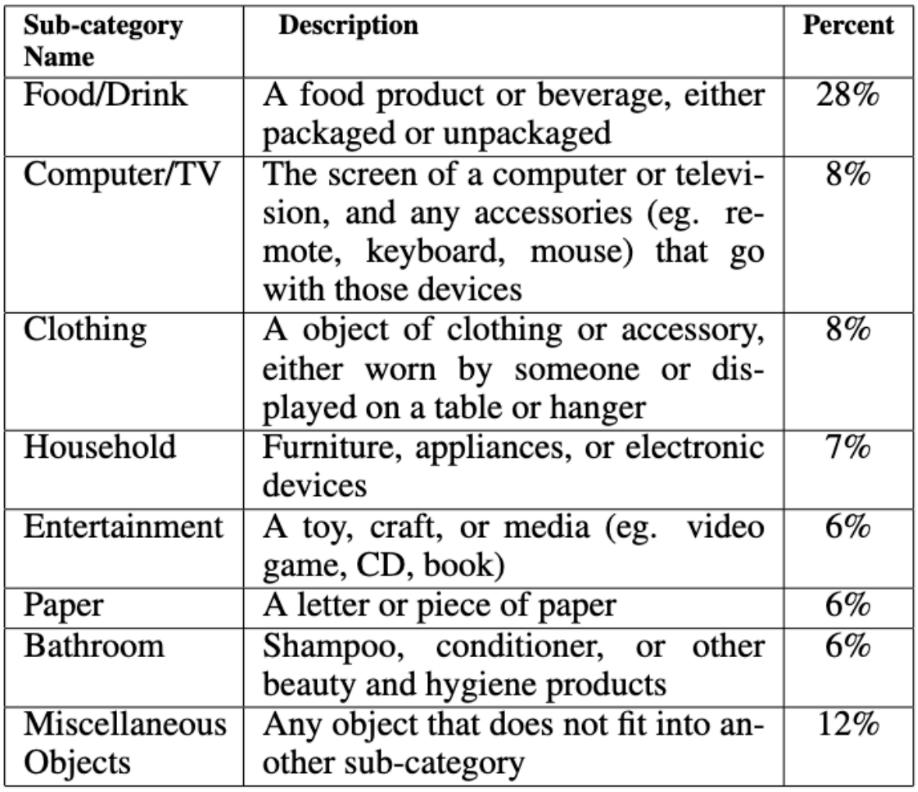
Economic Stability	Neighborhood and Physical Environment	Education	Food	Community, Safety, & Social Context	Health Care System
Employment Income Expenses Debt Medical Bills Support	Housing Transportation Parks Playgrounds Walkability Zip Code/ Geography	Literacy Language Early Childhood Education Vocational Training Higher Education	Food Security Access to Healthy Options	Social Integration Support Systems Community Engagement Stress Exposure to Violence/Trauma Policing/Justice Policy	Health Coverage Provider & Pharmacy Availability Access to Linguistically And Culturally Appropriate & Respectful Care Quality of Care

Health and Well-Being:
Mortality, Morbidity, Life Expectancy, Health Care Expenditures, Health Status, Functional Limitations

Fig 08: Table showing the social determinants of health and well being

The paper highlights key barriers, including limited access to healthcare facilities, low literacy in health, financial constraints and geographic inequities (Elam et al.). They also bring light to how many from marginalised communities often fall victim to delayed diagnosis and lesser treatment options, which in turn result in worsened symptoms and experiences. The authors cover the barriers which limit access of children to quality eye-care services, which include false-negative eye screening results, lack of symptoms, lack of family history, and/or low socio-economic and health insurance status (Elam et al.). The study explains how even with insurance, children from low income households use cheaper eye care than wealthier families (Elam et al.). This paper greatly sheds light on the issue of economic inequality in the fields of accessibility to quality eye care needs, and can be further improved by showing comparative studies done at locations with different economic status' to help gauge a reference point .

The next study conducted highlights the visual challenges faced by a blind person on a day to day basis. They conduct a large-scale study trying to highlight the accessibility issues present in everyday scenarios (Brady et al.). To do so, 5,329 blind participants had to take photographs of a task they needed help with and ask a question to help and over forty thousand responses were sent in (Brady et al.). Examples include not being able to read instructions from a manual, struggling to count their money, and identifying someone.



Sub-category Name	Description	Percent
Food/Drink	A food product or beverage, either packaged or unpackaged	28%
Computer/TV	The screen of a computer or television, and any accessories (eg. remote, keyboard, mouse) that go with those devices	8%
Clothing	A object of clothing or accessory, either worn by someone or displayed on a table or hanger	8%
Household	Furniture, appliances, or electronic devices	7%
Entertainment	A toy, craft, or media (eg. video game, CD, book)	6%
Paper	A letter or piece of paper	6%
Bathroom	Shampoo, conditioner, or other beauty and hygiene products	6%
Miscellaneous Objects	Any object that does not fit into another sub-category	12%

Fig 09: Categories of the Photographs and Questions Sent

Fig 09 shows a table of categories of the questions asked. It provides great insights on just how much the world depends on sight to function and how inaccessible it can be for people with low vision or blindness (Brady et al.). The results speak for the range of tasks that become challenging when visual cues are incomprehensible, and the authors urge for a solution to help. This paper does a great job at bringing forth the aforementioned issues, but of course it speaks only about a certain working class and above, those with access to phones and technology on a regular basis. I believe it would be interesting to see how much these observations differ when studying people from various economic backgrounds.

The next work from 2025 highlights how socioeconomic and social barriers - low income, limited education, rural residence, stigma, and lack of training -

limit access to assistive technology (Danemayer et al.). Although the paper speaks of mobility assistive technology, the same underlying themes can be applied to those with vision impairment. The paper brilliantly shows how the various barriers can hinder adaptation, education, and independence. It suggests that simply supplying people with devices is insufficient for true change; that interventions must also include awareness, training, and community support to ensure effective use of technology. If a similar study were to be conducted with an emphasis on visual assistive technology, it would confirm and further strengthen the argument for the need of greater access and awareness for all if we wish to see true change in society.

III. Case Studies:

This section analyses three of the current forms of existing visual aid tools. The first product being an expensive and highly technological product type. The second is a more commonly accessible but still technology dependent solution. The final aid tool is a primitive, physical, non-technological product. This analysis will point out the positive impacts each of the three have, the gaps and areas yet to grow, and the social, psychological and economical implications of using them.

1. Smart vision glasses

There is a growing trend of the public wearing smart glasses. There are many available in the market today, the most popular being the Meta Raybans. Released in 2025, the Meta glasses can be classified as “one of a kind”, being incredibly innovative, compact and efficient, taking the next big step into the future of technology. However, it is aimed toward sighted individuals. There are smart glasses in the market that are aimed towards the visually impaired, but these have their own shortcomings. Two popular examples are Acesight Electronic Glasses (available in the USA and Canada) and SHG Technology's Aura Vision glasses (available in India). They are the leading companies in their markets in the United States and India respectively.

Fig 10 : Acesight Electronic Vision Glasses

Acesight is an electronic wearable assistance device for the visually impaired ("Acesight - Low Vision Electronic Glasses"). It is one of the most technologically advanced aid tools for vision loss currently in the market allowing those with almost any severity level of vision loss to use it (except total or near total vision loss). It is a headset-like product which gives real time image magnification and screening to users. However, the feedback on this product is not all positive. In a study, only 36% of patients found Acesight to be helpful. Nearly half the patients described the product to be "not helpful" (Xu et al.) The product is also bulky and does not have a long battery life (approximately 4 hours of use per charge). To be able to try Acesight can be another challenge in itself as the product is very hard to acquire for many. First, it is very expensive (~ US$3,000), which already stops many potential users from even considering using the product. Second, it is available exclusively in the USA and Canada, making an already hard to get product even more of a challenge. This product still needs immense development to be “usable” daily.

Fig 11: SHG Technologies’ Aura Vison

Developed by SHG Technologies in India, Aura Vision is the country’s first Augmented Reality assistive device for low vision (*SHG Technologies - Aura Vision Glasses*). Similar to the Ace Sight, the product is a wearable which magnifies and colour corrects if necessary an image live, helping the individual with tasks such as reading and navigating (*SHG Technologies - Aura Vision Glasses*). The product is a great pioneer to improving accessibility in the world’s most populated country. They even provide the service where the product is fine tuned to the user. However, the product still has ways to go. The glasses are too bulky and can often leave a person feeling dizzy from the magnification. However, the price point is better, as the company wants to make it as accessible as possible. They also aim to make a more compact and efficient version of the product soon.

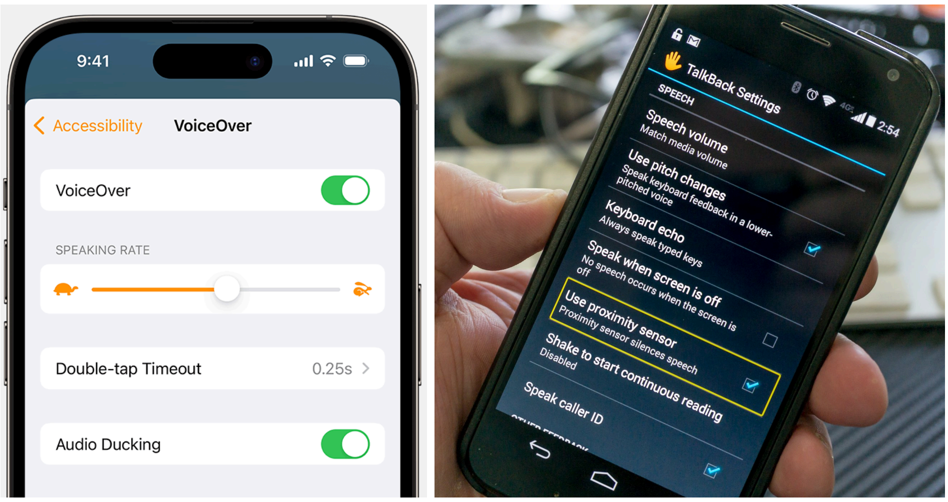
Although one of the firsts to push for accessibility advancements for the visually impaired, the both focus on low vision as a whole, not narrowing down on the many factors required to truly make this successful. Treating vision loss as a whole, both products simply display magnified and sometimes colour-modified visuals captured from the camera. As of now, both products also do not account for numerous factors such as use for longer periods of time, weight, look, and feel. Many sources state how the form of the products are unappealing, reducing their interest in it before even testing it.

Fig 12: Envision Glasses

The envision glasses are a great example of good design and form. They are aimed towards the visually impaired and have a great functionality, becoming incredibly popular in the low vision community. However, the product only uses auditory feedback and no visual display. This is a great example of truly inclusive products, but it has limited use as compared to a product with visual feedback as well.

2. Screenreaders

As of 2026, a huge majority of the world's population uses a smartphone, or electronic devices to be online, around 5 billion ("Digital Around the World — DataReportal – Global Digital Insights"). With this, accessibility features are a must. With many such as the Zoom ins and colour customisations. Text to speech screen readers is an accessibility tool designed for people with low vision or visual impairments. Essentially, the software reads out the text sent on screen, even describing things like emoticons. The two most popular text to speech softwares are VoiceOver and Talkback.


VoiceOver ●
SPEAKING RATE
Double-tap Timeout 0.25s
Audio Ducking ●

TalkBack Settings
SPEECH
Speech volume
Match media volume
Use pitch changes ☑
Speak keyboard feedback in a lower-pitched voice
Keyboard echo
Always speak typed keys
Speak when screen is off ☐
No speech occurs when the screen is off
Use proximity sensor ☑
Proximity sensor silences speech
Shake to start continuous reading
Disabled
Speak caller ID ☑

Fig 13 and 14: VoiceOver and TalkBack customisations

As shown in Fig 13 and 14, VoiceOver is the iOS text to speech software and TalkBack is Android's text to speech. They aid in enhancing users' digital independence, enabling communication and information access to perform daily tasks. Over the years, they improved in its efficiency also allowing the user to customise it such as by selecting the voice of who is speaking back to them, their accent and its speed. It has been a landmark development, allowing millions of low vision and blind individuals to continue working in many fields, creating a huge step in the growth towards a more accessible world. However, it is heavily dependent on the user’s digital literacy. For example, older people who do not have much comfort using smartphones will have an incredibly challenging time using it. They also must learn new gestures for navigation which differ from conventional touch interfaces (Leporini et al.). Let us take an example of a person using an iPhone with the standard interface vs with VoiceOver on. While reading an article on an iPhone, if the user swipes “upwards” with one finger and taps on a link, it commonly scrolls the page up onto the next section and opens the selected link. However, with VoiceOver on, it simply moves the screen reader selection to the next paragraph. To scroll , they must use a three finger swipe, and to open a link, they must first tap to select it and then double-tap to open it . It also has certain limitations in a few applications, documents or websites where it cannot accurately help read what’s displayed, making it heavily dependent on the website or application’s accessibility features. The software can also not read images yet, making it effectively unusable in situations like reading e-newspaper, which often upload as jpegs, or reading pdf documents. The software definitely has a lot of scope to grow and can continue to change the lives of many more.

1. White cane

The white cane is the most common, widely available and widely used mobility aid for individuals with visual impairments. They provide tactile feedback to the user's surroundings helping them navigate independently.

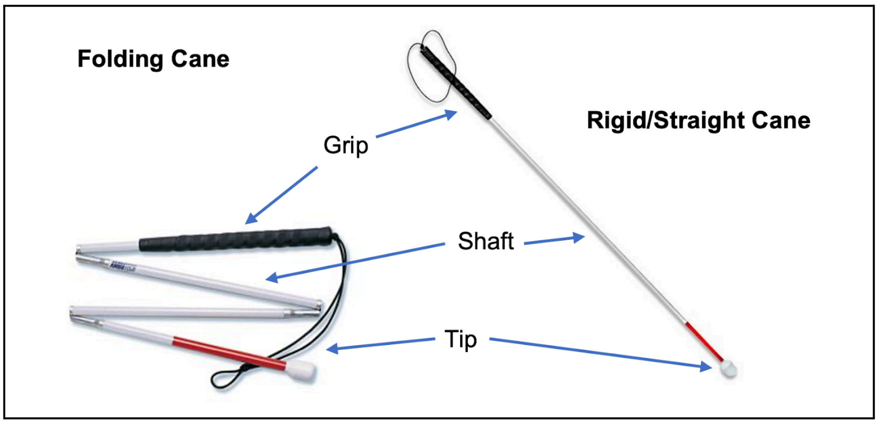


Fig 15: Common white cane

As shown in Fig 15, a traditional white cane has no electrical components, being a purely physical product. A commonly used version in modern times is a collapsible one, allowing the user to conveniently store the tool when not in use and easily open it when required. It has four main components: the handle with a grip, the shaft body and the tip, and a band to wear around the wrist to secure it. The use of the product is primitive. The user holds the cane by the handle in their dominant hand and places the tip on the ground a few steps ahead of them. They then move their wrist in a sweeping motion from left to right, a few inches past their shoulders. This ensures obstacles that would soon meet their path can be discerned before collision. A brilliant intervention credited to the artist James Bigg in 1921, the white cane is a staple in the blind community to this day (Strong).

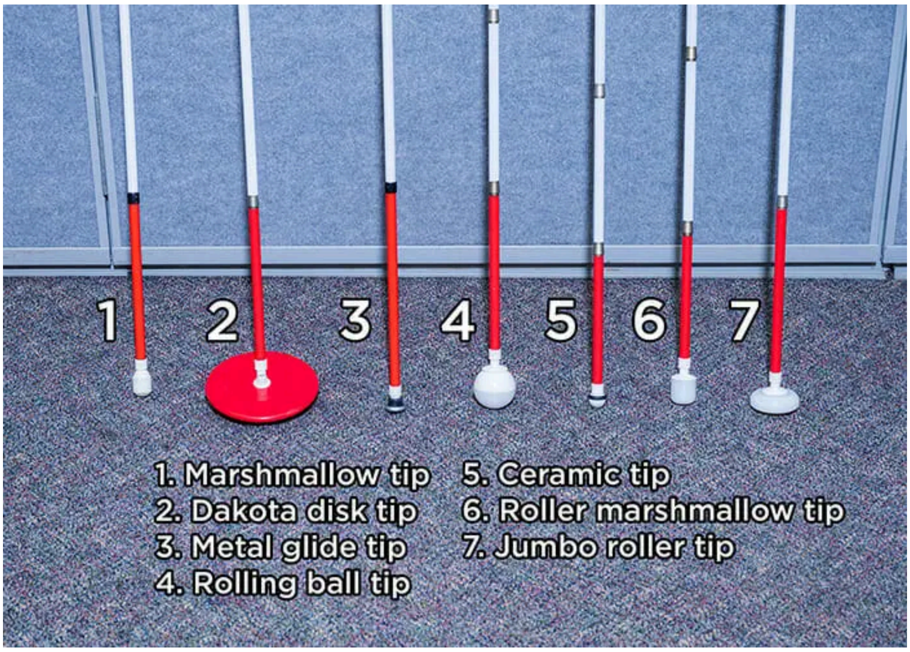


Fig 16: White cane tip types

Its affordability, portability and convenience make it appealing and very accessible. Over the years, various modifications for the comfort and needs of the user (example: Fig 16) have also been introduced, increasing its popularity. However, it has many limitations. First, it can only detect disruptions below waist level, which leave obstacles such as tree branches or low hanging signs undetectable (Guirguis and The Ritt Lab at Boston University). They also might be risky to use on uneven or open-ish surfaces such as a muddy path or a drain cover as it might get stuck.

Fig 17: Stanford University’s Self-Navigating Smart Cane

There have also been advancements in the functionality of the cane, with many technology integrated white canes being produced. An example shown in Fig 17, the purpose being to help the user navigate to destinations even more independently (*Stanford Researchers Build $400 Self-Navigating Smart Cane | Stanford HAI*). However, if the blind person still has partial sight, a majority report preferring to not use a cane at all. Many reject the use of the cane due to the stigma and judgement of others which inevitably come with it (Kahaki et al.). Even after a century of use, the white cane carries a negative connotation with it. It makes them feel like an “outcast”, judged and vulnerable (Kahaki et al.). There is also still a lack of much public knowledge about the cane beyond it indicating the person is blind. Many in the public try to help out a person when they see them use a cane without knowing the proper etiquette of how to hold them and guide them. A lot of people also offer a lot of pity and patronise them subconsciously, which the user in most cases does not appreciate. As also understood from the literature reviews earlier, many do not even understand how being blind oftentimes does not imply the person cannot see at all. There is still a long way to go for this product and society's understanding of it.

4. Conclusion of case studies

After observing three case studies of the current interventions, it can be concluded that there is still a lot of scope to improve on. Be it the efficiency of the product, the user's comfort and ease of mind or the societal awareness. With the wave of technological advancements in various fields, there must be a way to emphasise both form and function to provide a more comfortable life to the visually impaired community. The accessibility to tools which help make up as much as possible for the loss of one of our primary senses is essential to create a more diverse and accessible world.

IV. Primary research

a) Interviews

I conducted four interviews. Two are with those who are visually impaired, with the aim of understanding their life after the loss of their sight and their experiences ranging from relations, to careers and aid tools. The other two interviews were conducted with sighted individuals who closely work with the blind. I use their insights to understand how we as sighted individuals can do our part in making the world a more inclusive one.

(i) **Mr. Srinivas Nidugondi** - Leber Hereditary Optic Neuropathy (LHON)

Fig 18: Interview with Mr. Srinivas

Interview purpose: Mr. Srinivas, my father, is the inspiration for this paper. As someone who grew up in poverty, he is a sedulous man working his way to a better life for his wife and kids. However, when he was only 34, he began to lose his central vision, first in one eye, and in the other shortly after. He recalls his struggles and how he overcame them; the painstakingly long journey to get diagnosed accurately, the social and psychological impact of his diagnosis, how he learnt to adapt to his new life and his experiences with assistive products (Appendix 1).

(i) **Mrs. Pooja** - Stargardt's disease

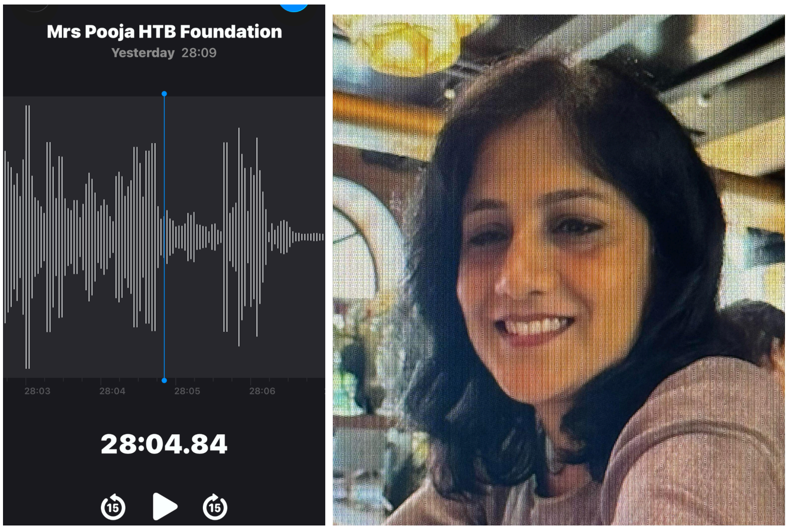
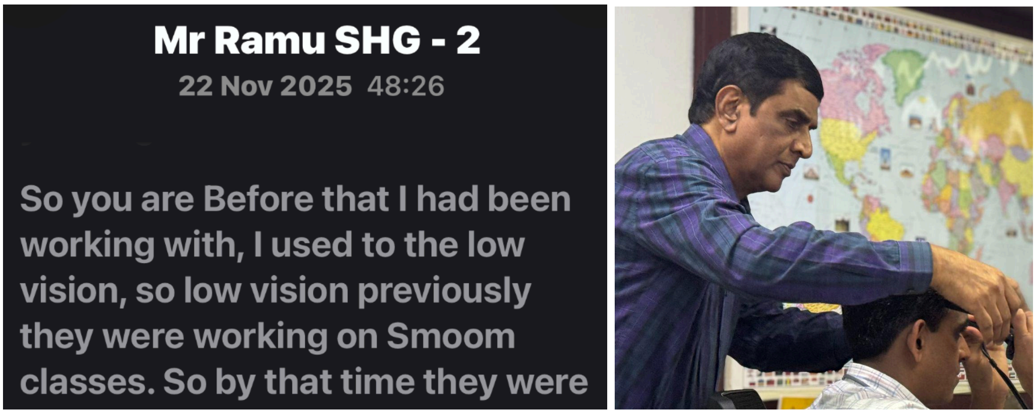


Fig 19 and 20: Interview with Ms. Pooja

Interview objective: Mrs. Pooja is a pioneering advocate for growing accessibility and awareness for the blind. She explains how her journey with vision loss was an especially long one, losing more and more slowly over the years until it stopped at 80% loss. After learning to adapt herself, she has now devoted her time to help improve the lives of others. She shares her work at the Help the Blind Foundation in India, which provides education and life skill lessons to underprivileged blind children in India (Appendix 2).

(iii) **Mr. Ramu** - Sighted individual

Relation to the blind: CEO OF SHG Technologies


Mr Ramu SHG - 2

22 Nov 2025 48:26

So you are Before that I had been working with, I used to the low vision, so low vision previously they were working on Smoom classes. So by that time they were

Fig 21 and 22: Interview with Mr. Ramu

Interview objective: Mr. Seetharam Muthungi, or Mr. Ramu, founded SHG Technologies in 2020. The company's mission is to develop accessible aid tools for the blind with a focus on the Indian market. They observed how inaccessible most popular vision aid tools are, be it their availability of price point, and hence developed India's first smart vision glasses: AURA Vision. Mr. Ramu kindly allowed me to visit his office, understand the company's motives, the products, the processes that go into development and even had Mr. Srinivas test it out to help understand how the product functions (Appendix 3).

(iii) **Mr. Natraj** - Sighted individual

Relation to the blind: Trustee at Help The Blind Foundation

Nataraj Uncle Zed

Outgoing Call 06/02/26 · 5:31PM
47 minutes

Fig 23 and 24: Interview with Mr. Natraj

Interview objective: Mr. Natraj Sankaran has his roots in Management and Fashion, with experiences like being the managing director of Ralph Lauren's first RL Sourcing office in Bangalore, India. For the last 8 years, he has worked as a trustee for the Help the Blind Foundation. He explains to me his role of testing out new aid products, critiquing their design and function to provide feedback to the company. He then helps source the products to distribute to the children at the school to test out its effectiveness in hopes to improve his students' quality of life. He also provides insights into what the pros and cons of the popular aid tools in the market currently are, and what needs to change (Appendix 4).

b) Interview findings

From the interviews, I gathered the following key understandings:

1. The stigma faced by people due to lack of public knowledge
2. The gaps in existing interventions and care

The interviews with the two visually impaired participants gave a deep dive into the untold stories in the world of blindness. Though the two had completely different conditions and symptoms, they shared a few key experiences which are noted to be common experiences faced by almost everyone in the community. The problem of stigma. The two shared how their world changed when they were diagnosed. Mr. Srinivas' condition was more sudden, taking only 1 year to lose his central vision in both eyes. However, Mrs. Pooja's condition worsened very slowly over almost 30 years until she lost 80% of her vision. However, while both of them learned to adapt and live a fulfilling life, they were also subjected to harsh realities. Mr. Srinivas speaks how he had to adjust so many aspects of his life, even just basic body language, to avoid being subjected to judgement. He explains:

> My eyes look normal, and I don’t typically announce my impairment… I’ve realized, it can lead people to think I’m arrogant or a weirdo when I don’t respond to their greetings or look “through” them. So, to appear like a “nice person,” I used to look down or to the side when people walked by my office cabin. My wife even chastised me for looking straight at people, fearing women thought I was ogling them – if only I could actually see them! (Nidugondi)

He even recalls a time when he was out shopping with his family and was using his phone by keeping it very close to his eye to see the screen better. That’s when a clerk at the store stood in front of him and confronted him, fearing he was trying to take pictures of a child (his own son). (Appendix 1 - pg 4)

Mrs. Pooja detailed her struggles of her condition worsening so slowly, starting from whens he was only a schoolgirl stating:

> I used to read a lot earlier, but then slowly I was not able to read storybooks (Appendix 2 - pg 9)

She further emphasised on how difficult it was for her to perform basic tasks like even writing her own exams without a scribe as until 1995, low vision or partial vision loss did not count as a disability as it was not total blindness. (Appendix 2 - pg 9) She also shared similar struggles to Mr. Srinivas, where people would assume she was quote:

> …very snooty because I would not smile, but the fact was I couldn't recognise people (Appendix 2, pg 10).

The two have tried a multitude of solutions, from aid tools to possible cures/ therapies, most of which have failed them. Mr. Srinivas claims:

> They don’t meet my intuitive needs and don’t work for my condition. (Appendix 1 - pg 6).

Mrs. Pooja adds on by stating:

> Yes, It just didn't work for me (Appendix 3 - pg 17).

The two however have a common position for the Meta Raybans to have been the most helpful so far, as it helps them be more independent in some tasks such as navigation or reading. However, the product is not designed for visually impaired people, limiting its usage. Mr. Srinivas also uses iOS’s screen reader (VoiceOver) on a daily basis to help him work and use his phone. He remarks about the effectiveness describing:

> It’s great, honestly the reason I can still work in my field. It of course has limitations (Appendix 1 - pg 5)

Both interviewees expressed the need for a compact visual aid tool which truly goes in depth about vision loss rather than just magnifying an image. The two love to travel and state how if a product is designed with modifications for their needs, be it navigation, facial recognition, or smart magnification that activates only when they need, it would truly help out many like them.

The interviews with the two sighted participants provides a better understanding of the behind the scenes of aid tool developments and their usability. Mr. Ramu, the CEO of SHG technologies which introduced India’s first Augmented-Reality Smart glasses states during his interview:

> I have a lot of different feedback on that design… factors that are not very much in favour of scaling up (Appendix 3 - pg 24).

He reveals how his team understands the various issues with the form of the product and are trying to develop more products without compromising on the technical functions.

Mr Natrajan, a trustee for the Help the Blind Foundation provides his insights with the various aid products as well. Through the interview, it was gathered that most of the existing aid products were the product form and weight, the camera quality and the processing speed. The few that did do well with the above mentioned were said to be incredibly expensive, as he mentions:

> …in (the) U.S. it was around $3,000. So even for them, it’s not affordable. Even for us, it is unimaginably expensive. No one can buy it (Appendix 4 - pg 36).

The two participants have worked together, with Mr. Natraj testing out SHG’s products, bulk ordering them to test with the students and providing critique and feedback for MR. Ramu to improve on. Although advancements have been made,there is still a long way to go. However, these two are examples of those who are constantly working to create a more inclusive society for the visually impaired.

V. Interview analysis and interpretation

a) Common struggles and stigma faced by Visually Impaired individuals

The first insight the interviews provide us with is the day to day struggles of low vision and blind persons. Observed from the time of diagnosis till their present day, there are many instances of prejudice faced by the affected. The interview claims strongly support the points made earlier in the paper. The interviewees provide details of their experiences, their takeaways and what can be done to better improve daily tasks. They also shared their experiences with diagnosis, though different followed a similar theme : not fully understanding their condition at first. Mr. Srinivas shared how it took him a year full of visits to multiple hospitals and specialists to receive his diagnosis (Appendix 1)

Across all interviews, one theme remained common, the stigmatisation of the blind. The blind participants stated how they had to relearn functions and even at times change their body language (Appendix 1, pg _) to simply fit in. Ms. Pooja also provides a perspective into the HTB Foundation school, how they not only teach the kids academics, but also life skills required to adjust as a blind person. As many come from underprivileged backgrounds and not much prior knowledge about their own conditions, she states:

> The end goal is to get them employed (Appendix 2, pg 19).

b) Issues with current aid:

The blind interviewees share a common dislike for using aid tools as the functions of them do not justify the form, as they worry it makes them stand out too much in the public, fearing judgement. This was further backed up by the sighted interviews. Mr. Ramu refers to feedback he has received such as :

> … “Do you expect me to walk into a boardroom with these kinds of glasses?.” And there is another gentleman who says, “How can I walk with my wife wearing these kinds of glasses in the street?” (Appendix 3, pg 25).

Even Mr. Natraj points to the same issues, solidifying the claims made in the paper’s case studies (Appendix 4). There have been incredible scientific advancements in recent times, so it is only a matter of time before someone works towards truly understanding the balance of form and function in visual aid tools. There is also a socio-economic factor in the aid tools, as some of the best ones cost a sum that many cannot afford regardless of their geographical demographic (Appendix 4). This emphasises on the points made earlier about low access to quality technology and care.

VI. Conclusion

This paper explores visual impairment and low vision beyond the purely clinical perspective, by examining the other facets of impact a diagnosis has. From psychological challenges, to barriers in accessibility and disparities in technologies, it sheds light on the untold realities and experiences of affected individuals.

The dissertation covered all three of the research questions stated. The psychological and social impacts of vision loss and the lack of awareness were covered through meticulously analysing academic literature on the topic, and the disparity and gaps in existing interventions were explored primarily through case studies. The interview findings not only gave solid support to the claims made, but also provided a more emotional and human aspect to the paper.

The aim was to shed light on the consistently large gap in the accessibility of the world in the visual fields. Although being around for centuries, the common public still fails to understand the realities of a “blind” person, which in turn leads to judgement and stigma. Socioeconomic and psychological situations, digital literacy and institutional infrastructures continue to be primarily shaped for the sighted. While the medical field has made momentous advancements increasing the quality of human life by tenfold, findings prove that the hardships faced by the visually impaired do not simply arise from the condition itself and is a much more complex system of their environment within which they are forced to function.

The world must grow to be a more accepting place, through advancements in technological aid, widespread availability of the aid by not being a profit driven motive, and through educating everyone on the various factors of blindness; from busting myths to teaching etiquette. Accessibility goes beyond just product solutions and needs the people’s co-operation and support to truly be effective. Only once society accepts and addresses the issues at hand can we hope to start truly working towards an inclusive future, where everyone feels like they belong.

Word count : 6,231

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Fig 18: *Appendix 1.*

Fig 19: *Appendix 2*

Fig 20: *Appendix 2*

Fig 21: *Appendix 3.*

Fig 22: *Appendix 5*

Fig 23: *"Appendix 4*

Fig 24: *"Appendix 4*

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