Life in Lockdown: Impact of COVID-19 lockdown measures on the lives of visually impaired school-age children and their families in India

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Short title: Impact of COVID-19 on children and families

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Abstract

Purpose: The COVID-19 outbreak has adversely impacted all societal domains, including education. Home confinement, school closures, and distance learning impacted children, teachers, and parents' lives worldwide. In this study, we aimed to examine the impact of COVID-19 lockdown on the lives, including education, of school-age children with vision impairment (VI) and their parents in India.

Methods: Primary and secondary school children with VI were recruited from the Institute for Vision Rehabilitation, L V Prasad Eye Institute, Hyderabad, India. A qualitative research methodology, utilising a self-constructed questionnaire with open and closed questions and stem and leaf design was employed to explore the experiences of school closure and its impact on education, and attending online classes during the COVID-19 lockdown. Textual data from responses to the questions were analysed using content analysis to identify themes pertinent to the cohort studied.

Results: Forty-eight child-parent dyads were included. Median age of children was 10 years (range, 7-19 years) and 60% were male. Inherited retinal disorders were the major cause of VI (40%). Best-spectacle corrected visual acuity (better eye) ranged from 6/12 (0.3 logMAR) to 6/750 (2.09 logMAR). Six major themes were identified: (1) accessibility of technology (online learning and technology); (2) parental beliefs/concerns (harmful effects of technology, prioritization of normally sighted children, online classes considered a distraction); (3) support (peers, parents, teachers, private tuition); (4) socialization and physical activity, (5) socioeconomic status, and (6) near vision.

Conclusions: Our study provides an understanding of the adverse impact of the lockdown on the lives of children with VI and their parents, especially related to education in India. The study identified critical factors that affect online learning and the participation of children with VI in these sessions. Policy makers and educators should implement effective measures for supporting online classes.

Key Points

- COVID-19 has resulted in major challenges for the education of visually impaired children in India.
- Access to technology (e.g. internet enabled smart phones) is a major constraint for online education for visually impaired children. Parents are also concerned about technology overuse and reduced social interaction.
- Policy makers and educational establishments must ensure that visually impaired children can access online education. Both students and teachers should receive appropriate technology training to create an equitable learning environment.

Introduction

The outbreak of COVID-19 has affected the lives of people worldwide, highlighting inequities in society particularly in healthcare access[1] and education[2]. In March 2020, governments worldwide announced national lockdowns in an effort to contain the virus. In India, the first phase of nationwide lockdown commenced on 24th March, 2020 resulting in the introduction of several restrictions including shutting down public transportation and educational institutions (e.g. schools). Despite several countries allowing teachers and students to return to face-to-face classes and other hybrid modalities, at the time of writing this paper in the summer of 2021, many educational institutions in India either remain closed or are continuing with online education. UNESCO estimates that approximately 1.37 billion students in 138 countries worldwide have been affected by the closure of the education sector during COVID-19.[3]

For school-age children, lockdowns meant home confinement, school closures and suspension of in-person teaching, which adversely affected educational systems and health.[4] The loss of free school meals as a result of school closure meant that many children across the world lost their only nutritious meal of the day. Many also lost access to a support network and to primary healthcare including immunisation programmes.[2] Schools also faced difficulties and had to transition quickly to online learning which placed a heavy burden on teachers, children, and their parents.[5, 6] While this rapid shift to online learning posed challenges across the world, these were felt more deeply in low and middle-income countries [7]and particularly for children with disabilities.[8]

Access to online education should meet two requirements: use of technology and good internet connectivity. While a good proportion of children in high-income countries have access to some form of technology and the internet, the situation is very different in low and middle-income countries (e.g. India), as many live in areas without the internet, have no access to computers, and others attend poorly equipped government-run schools.[9] Recent government data in India (2019) estimates that approximately 24% of Indian households have access to internet and the situation is far worse in rural areas with only 4% of households having access.[4]For children with VI, however, access problems are not limited to the availability of computers and the internet.[7] There are likely to be additional challenges: many children are unable to access specialist software or aids at home in order to participate in online learning.[8] Parents may have struggled to assist with online learning due to their own work and home commitments, lack of technology skills to appropriately use resources, or a lack of specific

expectations for online learning. Online classes require ongoing parental support, particularly for younger children, and this type of support is likely to have been a greater challenge for illiterate parents who are more likely to have jobs that required them to work outside the home. [10]

Although some evidence exists, for example, on children's learning habits during COVID-19, [11]these studies do not adequately explore individual experiences of how the COVID-19 pandemic impacted learning particularly in a country such as India. Data collection methods such as in-depth qualitative exploration[12] that allow for open-ended responses are important to capture an experiential account derived from the voices of school-age children with VI and their parents. The aims of our study were to: (a) explore how children with VI and their families have been impacted by COVID-19 and are managing their daily lives, especially with regard to schooling and educational needs; (b) explore the impact of COVID-19 on domains such as physical activity, play, and socialization; and (c) understand the barriers and challenges recognised by them due to change in the education system from the COVID-19 pandemic.

Methods

The study was approved by the Ethics committee for Human Research, L V Prasad Eye Institute, Hyderabad, India (reference number: LEC-BHR-P-12-20-553) and was conducted in accordance with the tenets of the Declaration of Helsinki.

Participants

Primary and secondary school-age children with VI who attended the Institute for Vision Rehabilitation, L V Prasad Eye Institute, Hyderabad, India between December 2020 and March 2021 were invited to participate in the study. Included participants were required to speak fluent conversational English or one of the two local languages, Telugu and Hindi. Patients with hearing and intellectual disabilities were excluded. Recruitment was purposive to capture variability in the child's age, level of VI, type of school enrolled in (government-run or fee-paying), rural or urban residence, and socioeconomic status of the parents, and continued until thematic saturation was achieved, as indicated by data coding with no further emergence of new themes and redundancy of information. Forty-eight child-parent dyads were approached and all agreed to participate, resulting in 48interviews. Children contributed to the interviews but the parent answered a majority of the questions. For all interviews only one parent, either the mother, father or local guardian participated along with the child.

All eligible participants were provided with written information about the study and participation was voluntary. Eligible child-parent dyads provided informed written consent/assent. They completed a demographic form with details that included: age and sex of child and parent, highest education level of parents, occupation of parents, monthly family income (in Indian Rupees), number of children in the family and number with disability (including VI), type of school attended (government-run/fee-paying/special), grade, number of mobile phones including smart phones in the household, if the school was providing online classes (yes/no), type of digital device used to access online classes (smartphone, tablet computer, iPad, Laptop, PC), if the child was attending online classes (yes/no), if attended and discontinued including reasons for doing so, if the child was using other methods of attending online classes (through Television – TSAT), and if the child was attending private tuition (yes/no). Clinical data was collected from the medical record at the clinic following completion of each interview. This included cause of VI and best-spectacle corrected visual acuity (BSCVA) in each eye for distance and near.

Data Collection

One to one semi structured interviews were conducted either in person in a private room during the clinic visit (n=43) or using the telephone (n=5) with consenting child-parent dyads who met the inclusion criteria. Interviews were conducted by two bi-lingual team members (one is a senior researcher [VKG] and the other [KPK] received initial training and ongoing training from VKG). A phenomenological qualitative approach – the inductive content analysis (described later) was adopted for the study. A semi-structured guide was developed for the study to explore the experiences of school closure and its impact on education, and attending online classes during the COVID-19 lockdown among school-age children with VI (Appendix). The guide consisted of a stem and leaf design: stem questions ensured that observations and experiences for each domain (such as availability of technology at home and functional limitations due to VI, socialization issues) were queried across children and their parents, and 'leaf' questions allowed new lines of questioning related to the stem question responses. The guide consisted of open and closed questions such as, 'Is your school providing online classes? If yes, are you attending them? If attending, what is the duration and what sort of difficulties do you experience in accessing the content because of your eye condition? What type of device do you use to access these online classes? Are you satisfied and happy with

online classes? Do you miss your school environment?' was used to facilitate the interviews and discussions. Except for two interviews conducted in English, the remaining were conducted in two local languages (Hindi and Telugu). Given the bi-lingual experience of both researchers, we translated the spoken sentences into English during the data collection stage with back-translation during the same phase and read the transcription aloud to the parent/child for them to verify the content, and modify/add anything, in case something was misinterpreted/inadvertently missed out. Given the cultural context (whereby participants are reluctant to share their experiences in a recorded session) and age group (children) included in our study, we made running notes (in English) of the experiences shared by the child and the parent in response to the open and closed questions in our interview guide. We continued the interviews until thematic saturation (point where no new information was gained from subsequent interviews) was achieved. [13]

Data analysis

Content analysis

We utilized the qualitative (inductive) content analysis to assess the qualitative data regarding the experiences of the child-parent dyads of school closure and its impact on education, and attending online classes during the COVID-19 lockdown.[14]Being an exploratory study, no analytical categories were established *a priori*. All interviews were coded and then aggregated into themes and subthemes. We developed coding categories (described later) directly and inductively from the raw data.[15] This process included open coding and creating categories.[16]Open coding refers to the analytical process of examining, comparing, and categorizing qualitative data to develop thematic concepts.[17]To ensure the quality of the analysis, credibility, dependability, confirmability, and transferability criteria were considered.[14, 18] Before thematic coding began, all team members familiarized themselves with responses to the questions by reading and re-reading anonymised responses in Excel. For purposes of credibility and dependability, the first author (VKG) obtained codes inductively by analyzing each of the participants' responses using Excel. The words and phrases used by participants to describe their experiences were used to code the data. Codes describing similar concepts were aggregated to form emergent themes and sub-themes using an Excel matrix that was later reviewed independently by each of the co-authors. At the end of the review process, discussions were held between the team members to reach a consensus and ensure validity.

During this step, we used a holistic approach to go beyond descriptions of individual cases towards developing themes (by keeping the research aim in mind) which offered possible explanations for what was happening within the data. For higher dependability, the research procedures are explained, including the inclusion and exclusion criteria and contents of the data collection. For confirmability, the final categories and emergent themes were confirmed by the team members. The generalizability of the results due to its sample may be affected, so the transferability may be limited. Thereafter, regular team meetings facilitated our critical exploration of participant responses, discussion of deviant cases and agreement on recurring themes of experiences with school closure and the shift to online instruction.

Results

Participant Characteristics

Forty-eight child-parent dyads took part. All children who participated had a VI. After 43 in-depth interviews conducted face-to-face and 5 using the telephone, data saturation was observed. Table 1 shows the demographic, socioeconomic, and VI characteristics of the participants. The median age of the children was 10 years (7-19 years) and there were 29 males (60%). The majority of the participants (n=19, 40%) had retinal disorders (inherited retinal degenerations) as the cause of VI. The BSCVA in the better eye ranged from 6/12 (0.3 logMAR) to 6/750 (2.09logMAR).

Interviews lasted an average of 35 minutes (range, 15-45 minutes) and the duration varied depending on the length of the responses.

Themes

Six major themes describing the impact of COVID-19 on the lives of school-age children with VI and their parents (specifically related to education) emerged out of the qualitative analysis of the participant narratives. These themes included (1) accessibility of technology, (2) parental beliefs/concerns, (3) support, (4) socialization and physical activity, (5) socioeconomic status, and (6) near vision. The remaining portion of this section expands on the themes. Table 2 provides a list of quotes from representative participants.

Theme 1: Accessibility of technology

Sub-theme 1: Online learning and technology

In India, school education is provided by government-run schools (free) or privately-run schools (fee-paying). The majority of children (n=41, 85%) attended a private school and were in mainstream schools (n=45, 94%). Only 3 children attended a special school for the VI. The majority of schools (n=34, 71%) provided online instruction; these were either synchronous (n=31, 92%) or asynchronous sessions (n=3, 8%), and most sessions were provided through platforms such as google classroom or Skype. Learning materials were also sent through WhatsApp. One-half of the children (n=17, 50%) in schools with scope for online instruction were regularly accessing classes and one-quarter (n=9, 26%) had either discontinued or were accessing classes occasionally (n=8, 24%). As can be seen from Table 1, a smartphone was the most common device (n=16, 64%) used to access online instruction.

Overall, 40 child-parent dyads (83%) reported having access to a smartphone with 4G internet and the remaining (n=8, 17%) had access only to an ordinary phone (without internet access or to wireless internet).Although the majority had access to a smartphone, there was mostly only one phone (n=19, 48%) in the household. This made accessing online classes very difficult for some children especially if the owner of the phone (mostly the father) had to be away for work.

Some children reported only attending a few online classes each day as they shared a device with another sibling. Very few children had access to other devices such as tablet computers (n=2) and laptops/PC (n=5). While a majority of parents reported that they had to make arrangements for digital devices by themselves, there was one case whereby the school had worked with parents and a local company to source inexpensive tablet computers for parents to purchase.

In some cases, such as in the state of Telangana (where our centre is located), children enrolled in government-run schools had access to classes relayed through television channels such as TSAT/Doordarshan. Most families had access to a television (TV) and if needed, children were able to access classes on TV. However, only three children used this facility. There was one child-parent dyad who reported that they did not have access to a TV and the parent was concerned about social distancing if the child was sent for private coaching outside the home and felt it appropriate to abandon home schooling altogether.

Theme 2: Parental beliefs and concerns

Sub-theme 1: Harmful effects of technology

Of the 31 children with provision of synchronous online classes, 9 parents (26%) expressed concerns about using technology for extended periods of time as they felt that this could potentially damage their child's eyesight (due to a short viewing distance) even further and they discouraged their children from attending online classes. Instead, they made alternate arrangements such as hiring a personal tutor or sending their child to a private coaching centre.

Sub-theme 2: Prioritisation of support to sighted children

Some parents (n=8, 17%) reported that they prioritised the learning needs of the sighted child over the child with VI. Reasons cited included that the child with VI was struggling to manage and it was best to prioritise the sighted child. In other cases, parents felt that the child with VI was academically weaker and given the lack of a smart device they preferred to prioritise the child who appeared to be intellectually more capable.

Sub-theme 3: Online classes considered a distraction

Of the 31 children with provision of synchronous online classes, 12 parents (39%) felt that online classes were a distraction and preferred not to let their children attend these classes as a result. A few children (n=4, 13%) reported that they preferred online classes, but this was not a view shared by their parents.

Theme 3: Availability of support

Sub-theme 1: Peer support

Given the VI, almost all children (n=47, 98%) reported that they relied on their peers for support at school. While this support took on many different forms, it also included the child with VI receiving help from their normally sighted peers in the classroom to help with learning. For example, if a child with VI was unable to copy from the board or needed help understanding things, he/she could ask his/her normally sighted peers for further clarification. This type of help was unavailable at home. Although parents acknowledged that they endeavoured to support their child's learning in the best way that they could and in some instances an older

sibling might provide help, most children with VI reported that they missed the peer support that was available in a school environment.

Sub-theme 2: Teacher support

A little over one-half of the children (n=25, 52%) reported that they missed the one-to-one and more general support that they received from their teachers at school and as a consequence of this, parents felt that the child's education was suffering. There was only one child where additional one-to-one support was provided by the teacher as a result of their VI. Specifically, the child was given special permission to ask questions during online lessons; this privilege was not available for other normally sighted peers.

Sub-theme 3: Parental support

Parents reported struggling to support their child's education at home. While most of the time it was because both parents worked and found it difficult to find time to support the child (n=21, 44%), in some cases the parent was illiterate (n=7, 15%) and could not help the child. In one case, the child had to discontinue online classes as they were unable to keep up and the parents were unable to help due to work commitments.

Sub-theme 4: Private tuition

A number of parents arranged private tutors (n=10, 21%) as they felt that this was a better alternate to online learning. Given that some of the parents were unable to support their children's education, they sent them to private tuitions. More importantly, most parents (n=23, 48%) believed this to be a cheaper alternative compared to paying school fees. In one case the parent hired a private tutor to attend online lessons with the child with VI. The tutor listened to the online lessons with the child and provided support both during and after the lessons.

Theme 4: Socialization and Physical Activity

The COVID-19 pandemic affected the social experiences of more than one-half of the study population (56%). Children with VI identified the following unique pandemic-related challenges: feelings of sadness and loneliness from missing their school community (n=10, 21%), unavailability of group play and study (n=8, 17%), unavailability of support from peers for online classroom work (n=47 98%), and lack of face-to-face interaction with school mates/friends in order to share daily life experiences (n=10, 21%). Parents (n=12, 25%) expressed concerns about reduced physical activity in their child due to being indoors. Some

parents reported that their children had become 'lazy' during the pandemic spending a lot of time playing video games. Parents also reported that they were worried that their children were missing out educationally and would have a lot of catching up to do when schools resumed face to face learning.

Theme 5: Socioeconomic status

Children from lower socioeconomic backgrounds appear to have been disproportionately affected by the pandemic. About one-third of the parents (n=15, 31%) reported their total monthly income to be INR 10,000 (approximately £100) or less; this would be considered to be below the average salary in India. The learning levels of children from these groups suffered for several reasons. Although many children from this group had access to a smartphone (n=11, 73%); only one smartphone was available for use by the entire family in little over one-half of them (n=6, 54%). The remaining children had to depend on TV, radio or textbooks to keep up with learning. Consequently, many children (n=9, 60%) in this group discontinued online learning.

Theme 6: Near vision

Although all children had distance VI, near visual acuity (NVA) was N10 or better in approximately one-half of the study population (n=23, 48%), albeit at reduced working distances (closer than 25cms). Of these, 10 (43%) children attended online classes through smartphones, tablet computer, laptop and TV. Thirteen parents (57%) expressed concerns regarding further deterioration of vision due to viewing electronic gadgets at short distances and did not encourage their child to attend online instruction; of these 4 children were not attending synchronous online instruction.

Discussion

In this exploratory qualitative research study, we examined the impact of COVID-19 restrictions on educational and life experiences of school-age children with VI and their parents in India. To the best of our knowledge, this is the first study to qualitatively explore the experiences of children with VI and their parents due to the pandemic. The impact was variable across socioeconomic groups, and concerns regarding the lack of resources including access to

technology were greater among families on low incomes. According to the United Nations Development program report, the number of people living in poverty in India has increased by over 25% as a result of the pandemic widening the gap between the rich and the poor.[19] Approximately one-third of the families (n=15) in the current study belonged to a low income group, traditionally these groups of individuals have had poor access to smart devices such as phones [13] and this is likely to have become worse as a result of the pandemic.

The most prominent theme identified by the study participants was access to technology. Access to online learning varies depending on available resources and proficiency with technology. Lack of technological skills and experience with online learning have been cited as barriers to online education.[20, 21] Furthermore, start-up costs for online learning are expensive including purchasing necessary technology such as computers, and these barriers could also affect the adoption of online learning by schools and parents.[22]In developed countries, technology is ubiquitous and embedded in nearly all aspects of life[23]and computer and smartphone use are as widely spread among individuals with VI as among sighted people. By comparison, in resource-limited settings such as India, only 14.9% in rural households and 42% in urban households have internet access (National Sample Survey, 2017-2018). Even so, there is an uneven access to technology among different subsets of populations, households, and spaces because network access is not the same everywhere and network speed can be a limitation. In the present study, only a small minority of participants had access to laptops/computers and most did not have access to wireless connections. Most commonly participants had access to a smartphone with 4G connection although often this was shared with others in the household.

A little less than one-third (n=14, 29%) of the schools did not provide online classes which meant that these children were left without any educational support. Given that at the time of writing this report many schools in India still continue to be closed this is a very worrying statistic not just for visually impaired children but for all children going to these schools. One of the major challenges for the Indian education system is the inequality of educational resources including access to technology not just for children with VI but for all children. The provision of educational resources is skewed in favour of schools classed as premier schools (high-end fee-paying) usually located in urban areas. Although some children in our study may have had the resources to access online education, they still did not access them for other environmental reasons, such as parents being illiterate, parents working and not having the time

to assist with online learning and lack of technological skills. Furthermore, teachers ought to have the required advanced technological skills, which is not mandatory in a conventional classroom teaching. Given these constraints, there are major challenges to providing online education, especially in the rural regions.[24]While students from high income families are able to make the transition to remote learning relatively easily, students from poorer families are likely to face challenges due to inefficiency and a lack of adaptation, either because of the inaccessibility of the technology or lower educational qualifications of their parents to guide them through tech-savvy applications. In our study, only one-third (n=16, 33%) of parents (at least one parent/family) had educational levels of university degree or higher.

Interestingly, children who had access to a smartphone did not report much difficulty using the phone to access online learning. This was surprising given that most phone screens are relatively small and increasing the font size is likely to have reduced the field on vision. That said it may have been that there was more emphasis on listening to what was being said then actually reading what was appearing on the screen. A few children (n=2) reported to only listening to classes as they were unable to see the screen of the mobile phone. Children with VI were more likely to continue with online classes if they had reasonably good NVA (better than N10) at a reasonable working distance. If children had poorer NVA, they were more likely to report discontinuing online classes as they were unable to keep up. One child-parent dyad reported that the child (studying in special school) did all schoolwork in Braille. The school sent work on WhatsApp once a week which the parent transcribed to Braille. The child completed work in Braille which the parent then transcribed back to WhatsApp and returned to the school. This was a lot of effort for the parent but they felt it was necessary and did not want the child to miss out on learning and feedback from their teachers. Online classes were more likely to be held for secondary school children and not for primary school children under the age of 7 years. This was true for all children regardless of their visual status. Parents were largely satisfied with these arrangements and many parents of young children believed that it was inappropriate for these children to be schooled online given the fear of eyestrain from the use of digital devices.

In the current study several parents (n=17, 35%) who worked in the informal sector lost (for example, daily wage labourers who worked at construction sites) their jobs which meant that some children were deprived of basic nutrition. This coupled with the loss of free school meals is likely to have adversely affected the physical and mental health of children. The World Food

Programme estimates that 370 million children are currently not receiving free school meals during the pandemic, thereby, increasing hunger, impacting cognition and indirectly effecting rural food chains.[25]

Many parents expressed concerns about adverse effects from extended use of smart devices as they felt this could further damage their child's eyesight, increase distraction, and cause an internet addiction. Consequently, some children were not allowed to use digital devices and attend online classes. Health problems have been reported with the use of smart technology devices including headaches,[26] visual problems such as eye strain[27]and dry eye,[28, 29] neck/shoulder and lower-back pain[30] and obesity[31]. Excessive screen time has been also linked to behavioural problems among children such as hyperactivity, inattention, conduct and emotional problems.[32, 33]Other detrimental impacts of technology overuse (>4hours per day[34]) include disruption of the child's social relationship with family and peers, reduced focus on school tasks, and interference with activities of daily living.[33, 35]Furthermore, it has been reported that children tend to become sedentary with use of smart technology and don't practice gross motor skills, have less face-to-face communication, and thus lag in the socio-emotional and communication domain.[36]

Socialization was an important theme identified by participants. Several parents expressed concerns about reduced socialization skills of their children due to school closure. A majority of children reported that they missed the face-to-face interaction with their teachers, peers and group activities. A small number of children felt that online classes were monotonous and lacked the ambience of face-to-face interactions. Children with VI are likely to require additional support from their teachers and peers for activities such as board work and reading. Such support was lost during online classes and children were hesitant to keep on continuing with online learning as a result. Given this, parents preferred to send children to private tuition in their local area close to home. They also reported that private tuition was a cheaper option to paying school fees.

There were also concerns about lack of physical activity both due to lockdown and screen time. Being physically active during childhood is important for health, including the maintenance of a healthy body weight.[37] However, there are conflicting reports in the literature regarding the impact of overuse of smart devices on physical activity. While some studies have found that screen time is associated with a reduction, other studies have suggested that reducing screen

time does not necessarily translate to an increase in time spent on physical acitvity.[38] There appears to be an inverse relationship between the use of smart devices and physical activity, explained by the fact that inactive children tend to spend more time on smart devices.[38, 39]

Although this study only concentrated on children with VI, all of the families interviewed also had children with normal vision and many of the barriers that were identified for visually impaired children are also likely to have applied to their normally-sighted siblings. A recent Lancet report has highlighted the adverse impact that the pandemic has had on children worldwide.[2] School closures have not only meant a loss of education but have also had a negative impact on children's health and health systems. This has included a detrimental effect on mental health and well-being, social skills, loss of nutritious school meals and curtailment of vaccination programmes. These concerns largely echo findings from the present study. The report has also highlighted the disproportionate effect of the pandemic on poorer families and emphasised that the digital divide has increased, again agreeing with our results. In addition to the challenges that all children have faced regardless of ability, there are some challenges which are specific to children with VI. These include access to peer support to assist with learning, parents tending to prioritise the sighted child if there was only one smart device and parents tending to prevent children from online learning as they felt that close working distances could further damage the child's eyesight. Additionally, a small number of children with VI struggled to use a smart phone due to lack of accessibility features and a small screen. This latter finding although applying to a very small number in our study is likely to be much bigger in a larger sample. A report by the professional association for vision impairment education workforce (VIEW) to the select parliament committee in the United Kingdom, for example, highlighted how children with VI had been disadvantaged by online learning because of accessibility issues. [40]

The major strength of this study is the use of qualitative methods for an in-depth exploration of the impact of the COVID lockdown on the lives of children with VI and their families including education. Semi-structured interviews allowed for tailored discussions and a deeper understanding of the impact of COVID-19. Data saturation was achieved so we are confident the themes captured the perspectives of this group. However, the study is limited to those child-parent dyads who were provided low vision care at a single tertiary centre located in Hyderabad, South India. It is possible that the study might have selected children who had the resources and were willing to travel during the pandemic, reducing the representativeness of

our population. We included the views of children and their parents only and did not include the perspectives of the teachers. It is likely that teachers may have different challenges in conducting online classes and these may be increased in case of children with VI.

In conclusion, our results suggest that access to technology for online education by children with VI during the COVID-19 pandemic in resource-limited countries such as India is fraught with lots of challenges. Consequently, children with VI and their parents perceived that online learning is not effective. Limited access to smart technology, parental concerns regarding the adverse impacts of smart devices on the children's eye sight, lack of social interactions and physical activity, lack of availability of support from teachers and peers during online sessions were cited as some of the barriers towards ineffectiveness of the e-learning. Understanding and improving these barriers faced by children with VI and their parents may help increase the reach of online learning to a wider population in the country.

Table 1. Sociodemographic and clinical characteristics of the sample (n=48)

Characteristic	N (%)
Child	
Age (years)	
6-10	24 (50)
11-15	17 (35)
16-19	7 (15)
Gender	
Male	29 (60)
Female	19 (40)
Level of vision impairment[ψ]	
Mild	8 (17)
Moderate	22 (46)
Severe	15 (31)
Profound[ξ]	3 (6)
Near visual acuity (binocular)	
N_{10} or better	23 (48)
N_{12}-N_{20}	13 (27)
N_{25}-N_{50}	8 (17)
N_{63} or worse	4 (8)
Cause of vision impairment	
Retinal disorders[§]	19 (40)
Uveal coloboma	6 (13)
Oculocutaneous albinism	5 (10)
Primary congenital glaucoma	4 (8)
High myopia with amblyopia	4 (8)
Optic atrophy	3 (6)
Retinopathy of prematurity	2 (4)
Microphthalmos	1 (2)
Others	4 (8)
Nystagmus	15 (31)
Type of school	
Government	7 (15)
Fee-paying (Private)	41 (85)
Mode of education[∞]	
Print (mainstream school)	45 (94)
Braille (Special school for the VI)	3 (6)
Provision of online classes by school	
Yes	34 (71)
No	14 (29)
Attending online classes	
Yes	16 (47)
No	9 (26)
Discontinued	9 (26)
Device used to access online classes	
Smartphone	16 (64)
Laptop/desktop	4 (16)
Television	3 (12)
Tablet PC	2 (8)
Parent	
Highest educational level	
Father	
Primary school/illiterate	6 (13)

Secondary school	27 (60)
University degree and beyond	12 (27)
Mother	
Primary school/illiterate	9 (19)
Secondary school	30 (62)
University degree and beyond	9 (19)
Occupational status	
Mother	
Self-employed	4 (8)
Office work	9 (19)
Professional	1 (2)
Driver/Mechanic	0 (0)
Daily wage labour	10 (21)
Homemaker	24 (50)
Father[ŧ]	
Self-employed	12 (27)
Office work	13 (29)
Professional	5 (11)
Driver/Mechanic	8 (18)
Daily wage labour	7 (16)
Home maker	0 (0)

Totals in some columns may not add up to 100 due to rounding

VI – Visually impaired

[ψ] using logarithm of minimum angle of resolution (logMAR) in the better eye; mild (≤0.5), moderate (0.6-1.0), severe (1.1 -1.5), profound (≥1.6)

[ξ] - 3 patients had light perception and 1 had no light perception in the fellow eye

[ŧ] deceased - 3

[§] - Includes cone dystrophy, rod monochromatism, retinitis pigmentosa, leber's congenital amaurosis, stargardt's disease, cone-rod dystrophy, familial exudative vitreoretinopathy

[∞] Represents total number of students (n=48)

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