Factors Affecting Delay in Presentation and Management of Pediatric Cataract: A Cross-sectional Study at a Tertiary Philippine Hospital

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ABSTRACT

Background. Pediatric cataract is a major cause of childhood visual impairment, and delays in detection, presentation, and surgical management can result in stimulus deprivation amblyopia and poor visual outcomes. In the Philippines, local data on factors contributing to these delays, including sociodemographic, sociocultural, socioeconomic, and pandemic-related barriers, remain limited.

Objective. This study aimed to determine the factors affecting the delay in presentation and management of patients with pediatric cataract in a tertiary Philippine hospital.

Methods. This was a single-center, cross-sectional study that conducted a questionnaire-based interview with guardians of patients who were diagnosed with pediatric cataract from January 2018 until June 2023. The questionnaire covered the basic sociodemographic and socioeconomic information, and asked questions on health-seeking behavior and possible causes of delay before seeking consult and before surgical management.

Results. A total of 93 guardians of patients with pediatric cataract/s were interviewed. There was a delay in presentation for the first consult in 59.1% and in presentation to the Pediatric Ophthalmology and Strabismus (POS) Clinic in 90.3%. Delay in surgical management affected 35.5% of patients. The main reasons for the delay in presentation were unawareness, the COVID-19 pandemic, and financial issues, while the main reasons for delay in surgical management were due to economic issues, the COVID-19 pandemic, and the presence of other ophthalmologic problems that needed to be treated first. The parent being the first person who noticed the problem, having their own means of transport, and a higher loss of income on admission were significant factors contributing to the delay in presentation. A younger age of the mother during the child's birth, the patient being initially seen prior to the COVID-19 pandemic, a lower education level of the father, use of public transport to and from the hospital, and a lower travel cost per visit were factors associated with delay in management. There was a decreasing trend in the delay during and after the COVID-19 pandemic compared to prior to the pandemic.

Conclusion. Unawareness of the problem led the causes of delay in presentation, signifying how high a barrier this was at the household and community level rather than at the provider level. Economic issues contributing

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to the delay represented how citizens in developing countries struggled when it came to preparing for the financial needs for healthcare. The COVID-19 pandemic was shown to be a delaying factor at the individual and community level, but it lessened the delay at the provider level. Health education, cataract screening in the pediatric population, and financial support are recommended to overcome barriers in the prompt management of pediatric cataract.

Keywords: pediatric cataract, pediatric cataract surgery, health-seeking behavior, delay in diagnosis, delay in surgery, delay in management

INTRODUCTION

Pediatric cataract is a major cause of childhood blindness worldwide.[1] In the Philippines, 0.43% of children have visual impairment, with 16.1% caused by cataracts.[2] Cataracts are classified as infantile if present at birth or within the first year, and developmental if they appear later.[3,4] Altogether, cataracts that present prior to 18 years old are called pediatric or juvenile cataracts.[5] These interfere with visual development, causing stimulus deprivation amblyopia, which impacts the child's educational and psychosocial growth.[6,7] Early recognition and removal are crucial for better visual outcomes.[6]

Pediatric cataracts can present as leukocoria, poor visual acuity, strabismus, and nystagmus, typically recognized by parents, caregivers, or healthcare providers. The timing of presentation, surgery, and commencement of visual rehabilitation affects treatment outcomes, with delays leading to stimulus deprivation amblyopia.[1]

Delays in recognition and management of pediatric cataracts are common in low-income countries due to socio-demographic, socio-cultural, and health system factors.[1] Despite the ease of performing the red reflex test, routine pediatric cataract screening is uncommon, leading to late detection.[8] Treatment for pediatric cataract is lens extraction, and the age at surgery is a key factor in visual outcomes.[9] The shorter the delay between cataract recognition and surgery, the better the visual outcome. In developing countries, blindness from childhood cataract is mainly caused by delayed surgery.[10]

The COVID-19 pandemic created additional challenges for managing pediatric cataracts. Nationwide lockdowns restricted children's access to healthcare, delaying treatment for non-COVID-related conditions like cataracts. Health institutions also modified protocols for cataract surgeries, leading to a decrease in procedures and further delays in treatment. Contributing factors included travel restrictions, curfews, and financial disruptions.[11] However, telemedicine emerged as an innovative solution, enabling the diagnosis of pediatric cataract cases, particularly those with leukocoria.

Cataracts are usually first recognized by parents, especially mothers.[1,6,7,10] Detection occurs from zero to five months for infantile cataracts and 54-72 months for developmental cataracts. The most common sign is leukocoria, followed by difficulty seeing, strabismus, and nystagmus.[8] Only 5.1% of children presented within one month of recognition, with unawareness being the main cause of delay.[6] The average delay from recognition to presentation was 18.1 months, and the overall delay to management was 34.3 months.[10] Only 16.7% had surgery within two months of advice by an ophthalmologist, with cost being the major delaying factor.[6] A majority (73.71%) had a delay of over 12 months.[6] Younger age at surgery, better socioeconomic status, and shorter delays between detection, presentation, and management correlated with better visual outcomes.[6]

Health-seeking behavior refers to actions or inactions taken by individuals recognizing a health problem for the goal of finding a remedy.[12] It is influenced by factors like education, marital and economic status, age, sex, healthcare costs, distance and physical access, and service quality.[13] Decision-making involves perceptions of risk of blindness, family dynamics, as well as surgery costs and benefits.[14] Understanding these behaviors helps address gaps in healthcare utilization.

Currently, there is no local data on factors affecting the delay in detection, presentation, and management of pediatric cataracts in the Philippines. This study aims to identify factors that may aid in overcoming the barriers contributing to these delays in a tertiary hospital. Specifically, the study seeks to explore the relationship between sociodemographic, sociocultural, and socioeconomic factors and delays in the diagnosis and management of pediatric cataract. It also aims to determine the time intervals from recognition of pediatric cataracts to presentation and from presentation to surgical management. Additionally, the study will assess the impact of COVID-19 on the delays in diagnosis and treatment of pediatric cataracts.

METHODS

Study Design

This was a single-center, cross-sectional study that conducted a questionnaire-based interview with guardians of pediatric cataract patients from January 2018 to June 2023.

Sampling

Convenience sampling was used, and patients were identified through the Pediatric Ophthalmology and Strabismus Clinic (POS). Guardians of children aged 0-17, diagnosed with pediatric cataract during this period, were included. Excluded were those with traumatic cataracts, non-surgical cataract cases, and missing data.

Data Collection

A standardized questionnaire, adapted from a Brazilian study by Leite et al., was modified for local economic classes and currencies and then validated by two independent Pediatric Ophthalmology experts in the Philippines.[8] Pre-

testing was done with guardians of new pediatric patients of the Department of Ophthalmology and Visual Sciences to ensure clarity and comprehensibility, and the questionnaire was modified as deemed necessary. The questionnaire covered the basic sociodemographic and socioeconomic information, as well as questions related to possible causes of delay before seeking consultation and before surgical management. Since the questionnaire used individual item assessments instead of multi-item scales, calculating Cronbach's alpha was not applicable for measuring its reliability. Informed consent was obtained prior to data collection, and interviews lasted about 20 minutes. A trained research assistant conducted the interviews to avoid researcher bias, ensuring privacy and confidentiality. Data were stored securely by the principal investigator, with raw data to be disposed of five years after publication.

Data Analysis

Microsoft Excel and SPSS were used for statistical analysis. Descriptive statistical analysis was conducted using the mean, median, and range for numerical variables, and count and proportion for categorical variables. The Chi-square test was used to measure the association between categorical variables. A Linear-by-linear Association test was used to determine the direction of association between the different variables and the delay. The Mann-Whitney U and Kruskal-Wallis tests were used to test for the difference between two groups and three or more groups, respectively. A P-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted after the approval of the university's research ethics board and was in full conformance with the principles of the Declaration of Helsinki, Good Clinical Practice guidelines, and the 2017 National Ethical Guidelines of Health and Health-related Research.

RESULTS

A total of 122 patients who were diagnosed with pediatric cataract and met the inclusion criteria from January 2018 to June 2023 were included, of whom guardians of 93 (76.2%) consented to participate in the study. Fifty-three (56.9%) interviews were conducted via phone call, and 40 (43.0%) interviews were conducted face-to-face.

The characteristics of patients included in the study are further shown in Table 1. Based on the study definition, 51.6% of patients presented with infantile cataract and 48.4% of patients presented with developmental cataract. The majority (75.3%) had bilateral cataracts, and the etiology of most (62.4%) was idiopathic. None of the guardians recalled that the patients had been screened for cataract after birth. Eleven (11.9%) had siblings with a history of pediatric cataract. There were 31 (33.3%) patients with other ophthalmologic or systemic diseases. In patients who underwent surgical management (n = 84), 64.3% were operated on both eyes at the same sitting, 27.4% underwent surgery of only one eye, and 8.3% underwent surgery of both eyes but on separate days. Most patients came from Region IV-A and the National Capital Region, while only a small number came from other regions.

Sociodemographic characteristics of the households of patients are shown in Table 2. The majority of patients (80.6%) had parents who were living together. Most mothers (59.1%) and fathers (59.1%) finished secondary education;

Table 1. Characteristics of Patients Diagnosed with Visually Significant Pediatric Cataract from January 2018 to June 2023

	Frequency	Percentage (%)
Year patient was first seen		
2018-2019	31	33.3
2020-2021	17	18.3
2022-2023	45	48.4
Sex		
Male	37	39.8
Female	56	60.2
Screening done for pediatric cataract after birth		
Yes	0	0.0
No	56	60.2
Unsure	37	39.8
Number of siblings		
None	27	29.0
1 to 2	43	46.3
3 or more	23	24.8
Sibling with a history of pediatric cataract		
None	82	88.2
Yes	11	11.9
Laterality of cataract		
Unilateral	23	24.7
Bilateral	70	75.3
Cataract type		
Infantile	48	51.6
Developmental	45	48.4
Etiology		
Idiopathic	58	62.4
Congenital Rubella	13	14.0
Presumed familial	11	11.8
Uveitic	4	4.3
Syndrome	3	3.2
Persistent hyperplastic Vitreous	3	3.2
Metabolic	1	1.1
Presence of other ophthalmologic or systemic abnormalities		
None	62	66.7
Yes	31	33.3
Laterality of surgery among patients who underwent surgery (n = 84)		
Bilateral	54	64.3
Unilateral	23	27.4
One eye at a time	7	8.3

Table 2. Sociodemographic Characteristics of the Households of Patients

	Percentage (%)
Distance of household from hospital (in kilometers)	
<50	62.4
51-100	22.6
101-150	3.2
151-200	2.2
>200	9.7
Status of parents	
Together	80.6
Separated	19.4
Educational attainment of mother	
Primary	17.2
Secondary	60.2
Tertiary	22.6
Educational attainment of father	
Primary	23.7
Secondary	57.0
Tertiary	19.4
Employment status of mother	
Employed	36.6
Unemployed	63.4
Employment status of father	
Employed	88.2
Unemployed	11.8
Transportation owned by the household	
None	54.8
Yes	45.2
Housing status	
Owned	36.6
Rented	31.2
Shared with others	32.3
Income class	
Poor	45.2
Low Income	39.8
Lower Middle income	14.0
Middle Income	1.1

Table 3. Characteristics in the Recognition and Presentation of Pediatric Cataracts

	Frequency	Percentage (%)
Person who first noticed that there was an eye problem		
Mother	59	63.4
Father	13	14.0
Other relative	12	12.9
Teacher	3	3.2
Pediatrician	2	2.2
Ophthalmologist	1	1.1
Nurse	1	1.1
Neighbor	1	1.1
Patient	1	1.1
First sign or symptom noticed		
White pupil	63	67.7
Visual difficulty	15	16.1
Eye deviation	10	10.8
Squint	4	4.3
Glare	1	1.1
Who the patient was brought to for first consult		
Ophthalmologist	66	71.0
Pediatrician	21	22.6
Physician other than an ophthalmologist or pediatrician	3	3.3
Optometrist	3	3.3
Modality of first consult		
Face-to-face	88	94.6
Telemedicine	5	5.4
Clinic who first saw the patient at the tertiary Philippine hospital		
General ophthalmology clinic	49	52.7
Ophthalmology Telemedicine	27	29.0
POS clinic	6	6.5
Pediatrics clinic	11	11.9

however, only 36.6% of mothers and 88.2% of fathers were employed. The majority of the patients' households belonged to the poor income classification. Most households (54.8%) did not own any mode of transportation, and most rented (31.2%) or shared their home with others (32.3%).

Table 3 shows the characteristics describing the recognition and presentation of patients with pediatric cataract. A parent (mother, 63.4%; father, 14.0%) was usually the first person to recognize that the patient had an eye problem, and the first sign or symptom detected in 67.7% of patients was a white pupil. Most patients were first brought to an ophthalmologist for consult, and 94.6% of patients were initially seen via face-to-face consult. Patients were usually brought to one or more doctors prior to seeking consult at the tertiary government hospital. At the tertiary government hospital, the majority were initially seen at the Department of Ophthalmology and Visual Sciences, either at the General Ophthalmology Clinic, via telemedicine, or at the Pediatric Ophthalmology and Strabismus Clinic, and the rest of the patients were seen at the Pediatrics Clinic.

In patients with infantile cataracts, the median age at recognition was 2.1 months (range 0 to 11.5 months), and in 33.3%, the condition was recognized during the neonatal period (0 to 28th day of life). Median age at first consult was 6 months (range 0.1 to 133.7 months), and median age at presentation at the clinic was 13.6 months (range 2.1 to 134.7 months). Only 31.3% of patients were brought to a doctor for consultation within one month from recognition of the first symptom. Median age at surgery was 14 months (range 2.6 to 127.4 months), and 58.3% underwent surgery within 2 months of presentation at the Pediatric Ophthalmology Clinic.

In patients with developmental cataracts, the median age at recognition was 4 years (range 1 to 16.4 years). Median age at first consult was 5 years (range 1 to 16.7 years), and median age at presentation at the clinic was 5.8 years (range

Table 4. Time from Recognition to Presentation and Presentation to Management Based on Cataract Type

	Time from recognition to presentation (first consult), in months			Time from recognition to presentation (POS clinic), in months			Time from presentation (POS clinic) to surgical management, in months			Total time from recognition to surgical management, in months		
	Median	Range	*p*-value	Median	Range	*p*-value	Median	Range	*p*-value	Median	Range	*p*-value
Infantile	3.0	0 to 128.7	0.258	9.1	0.7 to 130.1	0.062	1.1	0 to 35.4	0.33	11.0	1.2 to 127.4	0.654
Developmental	1.8	0 to 56.7		12.3	0.3 to 96.7		1.4	0.2 to 34		26.2	1.6 to 107.1	
Infantile + Developmental N = 93	2.0	0 to 128.7	-	12.2	0.3 to 130.1	-	1.2	0 to 35.4	-	13.8	1.2 to 127.4	-

Table 5. Causes of Delay in Presentation and Management of Pediatric Cataract

Causes	Delay in presentation (first consult), n = 55 (59.1%)		Delay in presentation (POS Clinic), n = 84 (90.3%)		Delay in management, n = 33 (39.3%)	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Conflict with child's school schedule	1	1.8	1	1.2	0	0.0
Cost of treatment/ Economic issues	10	18.2	16	19.0	11	33.3
COVID-19 pandemic related	8	14.5	16	19.0	7	21.2
Did not know there was a problem	17	30.9	-	-	-	-
Difficult to make an appointment	4	7.3	12	14.3	-	-
Difficulty in scheduling of the surgery	-	-	-	-	3	9.0
Ophthalmologist not available in my town	3	5.5	0	0.0	-	-
Far distance from hospital	1	1.8	15	17.9	1	3.0
I did not know who to seek/where to go	3	5.5	4	4.8	-	-
No one available to accompany child	1	1.8	0	0.0	0	0.0
Opted to observe	4	7.3	4	4.8	0	0.0
The child had other more serious problems to be treated	3	5.5	4	4.8	3	9.0
Fear of treatment	0	0.0	1	1.2	1	3.0
Have to take care of another family member	0	0.0	1	1.2	0	0.0
Sought consult with an optometrist/another ophthalmologist	-	-	9	10.7	-	-
Other ophthalmologic problems had to be treated first	0	0.0	0	0.0	7	21.2

1 to 16.7 years). Only 37.7% of patients were brought to a doctor for consultation within one month from recognition of the first sign or symptom. Median age at surgery was 6.2 years (range 1 to 14.6 years), and 71.1% underwent surgery within 2 months of presentation at the clinic.

The time intervals from recognition to presentation and from presentation to surgical management according to cataract type are shown in Table 4. Overall, the median time intervals were 2 months from recognition to first consult, 12.2 months to clinic presentation, 1.2 months from clinic presentation to surgical management, and 13.8 months from recognition to surgical management.

Of the 93 patients, 55 (59.1%) had delayed presentation to the first doctor, while the remaining 38 (40.9%) were brought to a doctor within one month of recognition of the first symptom. In addition, 84 patients (90.3%) had delayed presentation to the clinic, defined as being seen more than one month after recognition of the first symptom. The most common reason for delay in presentation to the first doctor was due to the guardian not knowing that there was a problem (30.9%), while the most common reasons for delay in presentation at the clinic were the COVID-19 pandemic (19.0%) and economic issues (19.0%). These causes of delay are summarized in Table 5.

The time from presentation at the clinic to surgical management ranged from 0 to 35.4 months (median 1.2 months). Among the 84 patients who underwent surgical management, 33 (39.3%) had delayed surgical management defined as more than two months from presentation to the clinic. The total time from recognition to surgical management had a median of 13.8 months, with a range of 1.2 to 127.4 months. The most common reason for this delay was economic issues, followed by the COVID-19 pandemic and the presence of other ophthalmologic problems that needed to be treated first. Other causes of delay in management are summarized in Table 5.

Table 6. Time from Recognition to Presentation and Presentation to Management in Relation to the Pandemic

	Time from recognition to presentation (first consult)			Time from recognition to presentation (POS clinic)			Time from presentation (POS clinic) to surgical management			Total time from recognition to surgical management		
	Median	Range	*p*-value	Median	Range	*p*-value	Median	Range	*p*-value	Median	Range	*p*-value
Pre-COVID pandemic, n= 17	3	0 to 56	0.092	7.1	1.3 to 130.1	0.233	3.6	0.1 to 35.4	0.564	11.0	4.3 to 119.2	0.333
COVID pandemic, n = 31	1	0 to 23.8		7.8	0.4 to 96.3		1.1	0.2 to 26.2		13.9	1.6 to 107.1	
Post-COVID pandemic ('New Normal'), n = 45	4	0 to 128.7		17.5	0.3 to 130.1		0.9	0 to 8.3		18.4	1.2 to 127.4	

In our study, no significant difference was found in the time from recognition to presentation for the first consult and at the clinic, from presentation to surgical management, and the total delay with regard to being first seen prior to the COVID-19 pandemic, during the COVID-19 pandemic, and during the new normal (Table 6).

Associations between clinical, sociodemographic, and socioeconomic variables and delay in presentation and management are summarized in Table 7. There were no differences in the time from recognition to presentation, time from presentation to surgical management, and total delay, based on laterality (p = 0.351, 0.211, 0.525, 0.109, respectively) and type of cataract (p = 0.258, 0.062, 0.33, 0.654, respectively). Although there were no significant differences between males and females in the time from recognition to presentation and the time from presentation to surgical management (p = 0.826, 0.698, 0.052, respectively), there was a significant difference in total delay (p = 0.008), with males having a longer interval from recognition to surgical management. Delay in presentation for the first consult was significantly associated with whether a parent was the first person to note the problem (p = 0.018) and whether the household owned a means of transport (p = 0.029). Delay in presentation to the clinic was linked to a higher loss of income during admission (p =0.037). Additionally, delay in surgical management was associated with younger maternal age (p = 0.044), being first seen at the clinic between years 2018 and 2019 (p = 0.006), lower educational attainment of the father (p = 0.015), and use of public rather than private transportation (p = 0.021). A lower total travel cost per visit, defined as less than PhP 250, was associated with both delay in surgical management and total delay from recognition to surgical management (p = 0.013 and p = 0.040, respectively).

Economic factors were also identified during the interviews as contributors to delays in presentation and management. Most patients did not incur charges for their hospital stay and intraocular lenses, which is consistent with the study setting in a government-subsidized hospital. However, travel and food expenses still accounted for a considerable portion of the out-of-pocket expenses per visit. In addition, income lost during consultations and hospital admission added to the overall economic burden.

Table 7. Correlation of Sociodemographic, Sociocultural, and Socioeconomical Factors to the Delay in Presentation and Management of Pediatric Cataract

Variables	Delay in presentation (first consult)	Delay in presentation (POS clinic)	Delay in surgical management	Delay from recognition to surgical management
	p-value			
Sex	0.708 (OR 0.85, 95% CI 0.37–1.97)	0.314 (OR 0.49, 95% CI 0.12–1.97)	0.370 (OR 1.48, 95% CI 0.63–3.49)	0.236 (OR 3.53, 95% CI 0.40–31.51)
Mother's age at child's birth	0.608	0.954	0.044 (-1.787 linear-by linear association)	0.748
Gestational age	0.603	0.387	0.185	0.525
# of siblings	0.848	0.771	0.859	0.676
# of siblings with cataract	0.334 (OR 1.99, 95% CI 0.49–8.03)	0.945 (OR 1.08, 95% CI 0.12–9.58)	0.927 (OR 0.94, 95% CI 0.25–3.47)	0.359 (OR 0.93, 95% CI 0.87–0.99)
Laterality of cataract	0.818	0.981	0.206	0.604
Type of cataract	0.358 (OR 0.68, 95% CI 0.29–1.55)	0.755 (OR 1.25, 95% CI 0.31–4.98)	0.772 (OR 1.13, 95% CI 0.49–2.63)	0.979 (OR 0.98, 95% CI 0.19–5.11)
Laterality of surgery	0.482	0.277	0.201	0.300

Table 7. Correlation of Sociodemographic, Sociocultural, and Socioeconomical Factors to the Delay in Presentation and Management of Pediatric Cataract *(continued)*

Variables	Delay in presentation (first consult)	Delay in presentation (POS clinic)	Delay in surgical management	Delay from recognition to surgical management
	p-value			
Etiology of cataract	0.806	0.701	0.588	0.776
Presence of other disabilities	0.974 (OR 1.02, 95% CI 0.43–2.42)	0.510 (OR 0.64, 95% CI 0.16–2.51)	0.670 (OR 1.21, 95% CI 0.50–2.92)	0.068 (OR 0.90, 95% CI 0.83–0.98)
Distance from hospital	0.143	0.170	0.174	0.640
Year seen as a new patient	0.960	0.574	0.006 (-2.675 linear-by-linear association)	0.249
Parent was the first to note the problem	0.018 (OR 0.17, 95% CI 0.03–0.86; -2.358 linear-by-linear association)	0.184 (OR 0.32, 95% CI 0.06–1.83)	0.782 (OR 0.81, 95% CI 0.19–3.48)	0.554 (OR 0.51, 95% CI 0.05–4.89)
Initial health care provider consulted for the eye problem	0.653	0.636	0.584	0.242
Modality of first ever consult	0.335 (OR 2.90, 95% CI 0.31–27.04)	0.428 (OR 0.40, 95% CI 0.04–4.02)	0.294 (OR 2.63, 95% CI 0.42–16.55)	0.209 (OR 0.24, 95% CI 0.02–2.58)
Number of doctors consulted prior to hospital presentation	-	0.679 (OR 1.43, 95% CI 0.27–7.61)	0.584 (OR 0.74, 95% CI 0.25–0.22)	0.972 (OR 0.96, 95% CI 0.10–8.82)
Modality of first consult	0.313 (OR 1.60, 95% CI 0.65–3.95)	0.157 (OR 4.22, 95% CI 0.50–35.39)	0.560 (OR 0.76, 95% CI 0.31–1.89)	0.404 (OR 2.50, 95% CI 0.28–22.40)
Parents' marital status	0.052 (OR 2.80, 95% CI 0.97–8.05)	0.515 (OR 0.49, 95% CI 0.06–4.21)	0.904 (OR 0.94, 95% CI 0.33–2.69)	0.219 (OR 1.09, 95% CI 1.02–1.16)
Mother's educational attainment	0.660	0.149	0.251	0.622
Father's educational attainment	0.799	0.086	0.015 (-2.415 linear-by-linear association)	0.475
Mother unemployed	0.177 (OR 0.55, 95% CI 0.23–1.30)	0.835 (OR 1.17, 95% CI 0.27–5.01)	0.333 (OR 1.54, 95% CI 0.65–3.66)	0.301 (OR 3.06, 95% CI 0.34–27.31)
Father unemployed	0.331 (OR 1.88, 95% CI 0.53–6.66)	0.315 (OR 2.38, 95% CI 0.43–13.26)	0.573 (OR 0.69, 95% CI 0.20–2.46)	0.359 (OR 1.08, 95% CI 1.02–1.15)
Transport owned by household	0.029 (OR 2.60, 95% CI 1.09–6.18; 2.176 linear-by-linear association)	0.149 (OR 3.18, 95% CI 0.362–16.22)	0.104 (OR 0.48, 95% CI 0.21–1.16)	0.808 (OR 0.81, 95% CI 0.16–4.25)
Housing tenure status	0.217	0.287	0.991	0.667
Usual method of transport	0.587 (OR 0.67, 95% CI 0.16–2.85)	0.128 (OR 0.27, 95% CI 0.05–1.59)	0.021 (OR 0.59, 95% CI 0.49–0.70; -2.286 linear-by-linear association)	0.443 (OR 0.93, 95% CI 0.88–0.99)
Income class	0.456 (OR 0.65, 95% CI 0.21–2.02)	0.109 (OR 0.30, 95% CI 0.07–1.38)	0.874 (OR 0.91, 95% CI 0.28–2.97)	0.910 (OR 0.88, 95% CI 0.10–8.14)
Total travel cost per visit	0.882	0.089	0.013 (-2.451 linear-by-linear association)	0.040 (-2.041 linear-by-linear association)
Food expenses per visit	0.833	0.420	0.912	0.433
Total cost per visit	0.777	0.288	0.194	0.571
Lost income per consult	0.322	0.137	0.596	0.088
Lost income during admission	0.641	0.037 (1.944 linear-by-linear association)	0.958	0.095
Total lost income	0.701	0.060	0.543	0.132
Total of other costs	0.486	0.877	0.480	0.341
Grand total of expenses	0.678	0.296	0.747	0.948
Total loss	0.771	0.572	0.681	0.456

DISCUSSION

Cataract Recognition

Our study found a median age of recognition of 2.1 months for infantile cataract and 48.1 months for developmental cataract, consistent with Leite et al. in Brazil but older than Olunsaya et al.'s findings in Southwest Nigeria, where recognition usually occurred at birth.[1,8] Delays may be due to the lack of neonatal cataract screening in the Philippines, as none of our patients were screened at birth, highlighting the need for further research on this aspect.

Leukocoria was the first sign in 67.7% of cases, similar to studies in India, Brazil, and Egypt (71.1%, 62.9%, and 63%, respectively), with other symptoms including visual difficulty (16.1%) and eye deviation (10.8%).[8,15,16]

Most cataracts were first recognized by mothers (63.4%), consistent with studies from Tanzania, Southwest Nigeria, India, and Egypt, likely due to cultural norms.[8,10,15,16] In our study, 63.4% of mothers were unemployed, and 82% of fathers were employed. Healthcare workers (4.3%) and teachers (3.2%) also recognized symptoms, emphasizing the importance of visual screening programs and the red reflex test.

Delay in Presentation of Pediatric Cataract

Patients with infantile cataracts presented at a median age of 13.7 months, and those with developmental cataracts at 69.3 months. Mwende et al. reported earlier presentations in Tanzania, with median ages of 9 months for infantile and 24 months for developmental cataracts.[10]

In our study, delayed presentation was observed in 59.1% of patients, while the remaining 40.9% were brought for their first consult within one month of symptom recognition. This delay was higher compared to Leite et al.'s Brazil study, where 81.4% of patients consulted a doctor within a month.[8] The main causes of delay in our study were unawareness (30.9%), treatment cost (18.2%), and COVID-19-related issues (14.5%), with unawareness also being the leading cause in Sen et al.'s study (26.8%).[6] Figure 1 illustrates the pathways of delay in pediatric cataract care, from recognition to presentation and surgical management, highlighting the barriers encountered at different stages of care.

Delays were associated with parents being the first to notice symptoms, likely due to lack of awareness, misinterpretation, or fear. In Filipino households, where parents are primary caregivers, they often notice symptoms before healthcare professionals. Delays were also associated with households having their own transportation, possibly due to transportation issues, such as the inability to safely transport the child or accommodate companions using their own transportation, leading to utilization of public transportation and incurring additional expenses. Financial constraints, including income loss during hospitalization and insufficient savings, further delayed treatment.

Delay in Surgical Management of Pediatric Cataract

Ideally, surgery should be done at 6 weeks of age for unilateral cataracts and 10 weeks of age for bilateral cataracts. However, our study found the mean surgery age for infantile cataracts was 28.3 months, earlier than Sheeladevi et al.'s study in India (32.4 to 81.4 months) and similar to Lin et al.'s study in China (27.6 months).[7,17] For developmental cataracts, the mean age at surgery was 85 months, similar to Sheeladevi et al.'s findings (84.5 to 120.1 months).[7] A study by Villanueva and Santiago found no impact on visual outcomes with delays in surgery for unilateral and bilateral congenital cataracts, but early surgery for bilateral developmental cataracts in children aged 3-5 and older than 7 showed better outcomes.[18]

In our study, the median time from presentation to surgery was 1.2 months, with 64.5% of surgeries done within 2 months, much earlier than in Kazakhstan (15 months).[9] In Brazil and India, only 44.3% and 16.7% had surgery within 2 months of diagnosis, respectively.[6,8] Delays

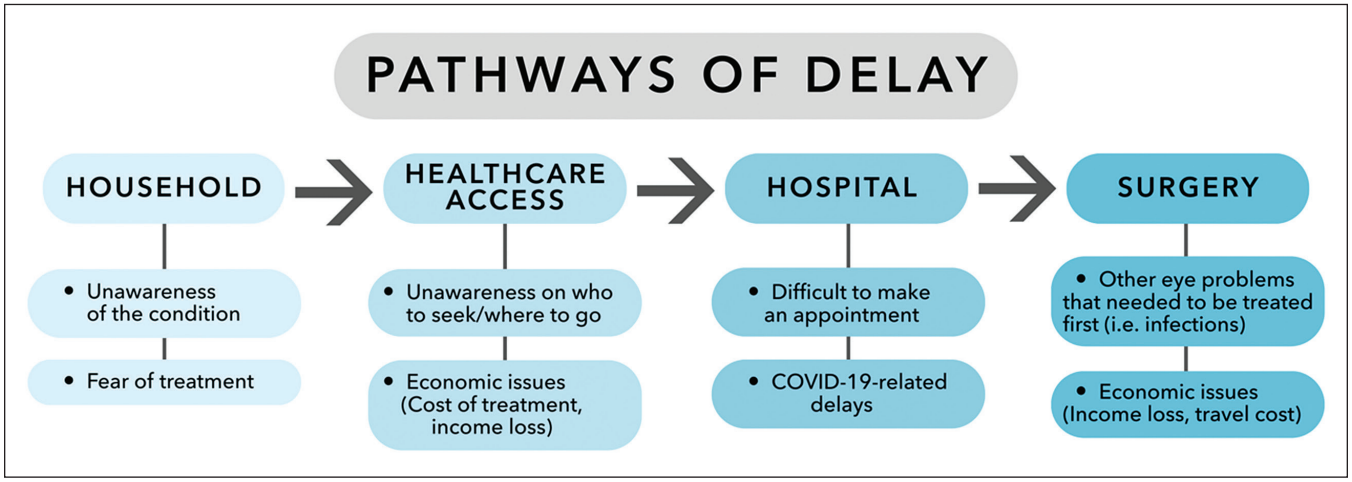

Figure 1. Pathways of delay in the recognition, presentation, and management of pediatric cataract.

in our study were mainly due to COVID-19-related issues, economic factors, and other ophthalmologic conditions requiring treatment first. In other studies, delays were due to long waiting times for anesthesia, systemic illnesses, second opinions, and surgery costs.[15]

Factors associated with delays in our study included younger maternal age (16-25 years), being a new patient before the COVID-19 pandemic, lower paternal education, use of public transport, and lower travel costs (under PhP 250). Younger mothers may have less awareness and more stress in being a young parent, while lower paternal education and income can limit decision-making. Delays in management for new patients first seen before the pandemic were likely due to surgery backlogs, while during the pandemic (2020-2021), surgeries were prioritized as pediatric cataracts were deemed urgent cases. Public transport and financial constraints also contributed, with lower travel costs possibly linked to longer, more challenging public transport routes. Misallocation of resources and inadequate financial preparation may have also contributed to the delay.

There was no significant difference in waiting time between unilateral (1.2 months) and bilateral cataracts (1 month), though unilateral cataracts had a longer median waiting time. In Gaafar's study in Egypt, unilateral cataracts had shorter waiting times.[16] Unilateral cataracts should be treated earlier due to their higher risk of causing amblyopia compared to bilateral cataracts.

Distance from the hospital was not significantly associated with delay in our study, likely due to accessible transportation. In Kazakhstan, patients from rural areas had later surgeries.[9] In our study, 62.4% of patients lived within 50 km, suggesting better access to specialists.

COVID-19 Pandemic and Delay in Presentation and Management

The COVID-19 pandemic contributed to delays in first consults (14.5%), clinic consults (19%), and management (21.2%) due to disrupted hospital services, reduced manpower, and new protocols. However, patients seen during the pandemic experienced less delay, as pediatric cataracts were prioritized as urgent cases, ensuring that patients were prioritized for clinic appointments and elective surgery despite limited operating room availability. Pre-pandemic patients faced delays of over three months from consult to surgery.

Socioeconomic Factors Associated with Delay in Presentation and Management

Economic issues caused delays in 18.1% of first consults, 19.0% of clinic visits, and 33.3% of surgeries. Lost income during hospitalization and travel costs contributed to delays, reflecting financial concerns before committing to surgery. Studies in India and Nepal also identified similar financial barriers.[6,19] Congdon et al. found that free accommodation or financial support helped with early hospital presentation.[20] Our study population, mostly from low-income families, showed no direct link between income class and delays. However, income classes were underrepresented, as the population came from a government-subsidized public hospital. Most families (65.5%) rent or share housing, reflecting socioeconomic challenges that lead to financial instability, causing them to prioritize immediate needs over healthcare and delay seeking treatment for pediatric cataracts.

Total Delay in Presentation and Management of Pediatric Cataract

The mean delay in our study was 27.7 months, with 93.5% being delayed by over three months. Delays were mainly due to unawareness at the household and community levels, similar to Mwende et al.'s study in Tanzania.[10] In our study, higher travel costs per visit were associated with reduced delays, suggesting that households prioritizing surgery to avoid additional costs for follow-up consults had shorter waiting times.

The total delay for unilateral cataracts was longer (17 months) than for bilateral cataracts (13.8 months), aligning with Sen et al.'s findings in rural India.[6] Children with unilateral cataracts may function normally despite worsening vision in one eye, while those with bilateral cataracts show symptoms of poor vision earlier due to both eyes being affected.

Our study highlights the need to address barriers to timely pediatric cataract care at the individual, household, and community levels. Implementing screening protocols like the red reflex test and providing health and financial support for travel costs can reduce delays and prevent childhood blindness.

The main limitation of this study was its retrospective nature, which may have introduced recall bias. The relationship between cataract morphology and recognition timing was not investigated. As a government hospital-based study, it excluded patients seen by private ophthalmologists, who may have had different timelines from recognition to management. Since convenience sampling was done, it may have limited the study's external validity since the sample may not be representative of the broader population of patients with pediatric cataract. Additionally, the study did not explore the relationship between delays and the outcomes of surgery. Due to the cross-sectional design of the study, causality cannot be established.

CONCLUSION

This is, to our knowledge, the first study in the Philippines that characterized and analyzed the factors affecting the delay in presentation and management of pediatric cataract. Early presentation after recognition of the cataract is important for timely management, yet this is where most of the delay occurred. Unawareness of the problem led the causes of delay in presentation, signifying

how high a barrier this was at the household and community level rather than at the provider level. Interestingly, the study found that lower travel costs were associated with delays in management, possibly due to reliance on public transportation, which takes longer and involves more logistical challenges. The COVID-19 pandemic was shown to be a factor in the delay in presentation to management at the individual and community level, but it lessened the delay at the provider level. In Filipino households, the parent, often the primary caregiver, is usually the first to notice symptoms, even before seeking medical consultation, which plays a crucial role in early detection and timely intervention. Strengthened community education, cataract screening in the pediatric population, and financial support are recommended to overcome barriers in the prompt management of pediatric cataracts. Additionally, incorporating red reflex screening into newborn and school-based programs could improve early detection and timely intervention of pediatric cataracts.

Statement of Authorship

Both authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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