

## Research Article

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## Visual Impairments and Eye Morbidities among School-age Children (5 to 18 Years old) Qualitative Assessment in Dubai, UAE, 2016

Taryam MMO<sup>1</sup>, Al Abadi K<sup>2</sup>, Hussein HY<sup>3</sup>, Al Faisal W<sup>3</sup>, Wasiful Alam M<sup>2</sup>, AlBehandy NS<sup>3</sup>

<sup>1</sup>Primary Health Care Services Sector, Dubai Health Authority, Dubai, UAE.

<sup>2</sup>Public Health and Safety Department, Dubai Health Authority, Dubai, UAE.

<sup>3</sup>Health Affairs Department, Primary Health Care Services Sector, Dubai Health Authority, Dubai, UAE.

**\*Corresponding Author:** Hussein HY, Health Affairs Department, Primary Health Care Services Sector, Dubai Health Authority, Dubai, UAE, E-mail address: hyHussain@dha.gov.ae; wldalfaisal@gmail.com

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### Abstract

**Background:** Refractive errors are common in children and are the commonest cause of visual impairment around the world and the second leading cause of treatable blindness. As children progress in school, they face increasing demands on their visual abilities. Vision problems are common among school-age kids. According to Prevent Blindness America, one in four school-age children have vision problems that, if left untreated, can affect learning ability, personality and adjustment in school. Therefore, it is crucial to protect school aged children 5-18 sight.

**Objective:** To assess the extent of visual impairment and ocular morbidity and to identify influencing factors and key challenges for eye vision among school-aged children 5–18 years in Dubai. It is of particular importance to understand their needs and assess any gaps in eye care or services.

**Methodology:** Data sources are qualitative and quantitative. Qualitative source was from an in–depth interview with school health doctors, focusing on different eye health topics, and on how eye health problems vary within different age groups, nationalities, gender and other confounders. Quantitative data were derived from the official school health annual reports in concerns with student’s eye morbidities.

**Results:** Vision problems are common among school-age kids. School health officials said that in one of population-based cross-sectional survey which was undertaken among 266343 students in Dubai, it was shown that there were 1008 cases of visual disorders in 2015-2016 academic years (3.8 per one thousand), whom they were diagnosed by ophthalmologists and enrolled in management program. Refractive errors are the most common cause of vision problems among school-age children in Dubai private schools. The main types of refractive errors are myopia (near sightedness), hyperopia (far sightedness), presbyopia (loss of near vision with age), and astigmatism. There are many environmental and genetics factors play a role in the development of vision disorders in children such as: family history, and premature birth. A number of neurodevelopment disorders (e.g., cerebral palsy, Down syndrome, autism spectrum disorders, hearing impairment and speech delay) also are associated with higher rates of vision problems. The most significant preventable risk factor for visual disorders in children is maternal smoking. Children of women who smoked cigarettes during pregnancy have higher rates of strabismus, hyperopic, and astigmatism.

**Conclusion:** The study concluded that visual impairments among school age children is not uncommon, most of the time under estimated and has not been screened systematically. Visual assessments at school level is not efficient enough to tackle visual impairment cases at earlier stages. Services wise, visual impairments at school level are underserved as based on absent of comprehensive and structured visual health program. School Eye health program and services with full component (early detection, management, awareness, monitoring) are of priority to be addressed for students in Dubai schools.

**Keywords:** Visual Impairment, School Age, Dubai, Qualitative assessment

**Conflict of interest:** The authors declare that they do not have any conflict of interest.

## Introduction

The estimated number of people visually impaired in the world is 285 million, 39 million blind and 246 million having low vision; [1] It is estimated that about 153 million people around the world are visually impaired because of uncorrected refractive errors. [2] It seems that these errors are the commonest cause of visual impairment and the second leading cause of treatable blindness. [3,4] Globally the principal causes of visual impairment are uncorrected refractive errors and cataracts, 43% and 33 % respectively. Other causes are glaucoma, 2%, age related macular degeneration (AMD), diabetic retinopathy, trachoma and corneal opacities, all about 1%. A large proportion of causes, 18%, are undetermined. [1]

Eye health problems are common among school age children. Demands are increasing as children progress in the school. Poor vision may influence the child's performance in school and has a negative impact on his or her future life in terms of affecting the child's personality and adjustment in school. [5]

It has been estimated that as much as 80% of the learning a child does occurs through his or her eyes. Reading, writing, chalkboard work, and using computers are among the visual tasks students perform daily. A child's eyes are constantly in use in the classroom and at play. When his or her vision is not functioning properly, education and participation in sports can suffer. [5]

Hence it is recommended by the World Health Organization (WHO) to integrate vision screening and refractive services for school students within screening for other health issues, and to have control of blindness in children as one of the priority areas in "Vision 2020—the right to sight" program. [6-9]

Situation analysis of eye health in Dubai is very important. It is essential to have up to date information on prevalence and on causes of visual impairment. [1] Decision makers will be able to set priorities and plan for the appropriate policies and strategies for the prevention of visual impairment and the improvement of eye health. The aim of this work is to provide an overview of eye health among school aged children for policy makers in Dubai to make informed decisions.

## Objective

To assess the extent of visual impairment and ocular morbidity; and to identify influencing factors and key challenges for eye vision among school-aged children 5–18 years in Dubai. It is of particular importance to understand their needs and assess any gaps in eye care or services.

## Methodology

Data sources are qualitative and quantitative. Qualitative source was from semi structured in-depth interview with school health doctors, focusing on different eye health topics, and on how eye

health problems vary within different age groups, nationalities, gender and other confounders. Quantitative data were derived from the official school health annual reports in concerns with student's eye morbidities.

A qualitative data collection method, in-depth interviews offer the opportunity to capture rich, descriptive data about people's behaviours, attitudes and perceptions, and unfolding complex processes. An in-depth interview is a loosely structured interview. It allows freedom for both the interviewer and the interviewee to explore additional points and change direction, if necessary. [10]

The interview is conducted using a discussion guide, which facilitates the flushing out of the respondent's views through open-ended questioning. We have used this method because the depth discussion might explore topics that were previously unknown thereby identifying new issues or perspectives on the eye health topics among school-aged children in Dubai. For the evaluation of school-aged vision in Dubai, we invited experts in the field of school health.

Guide of the discussion consisted of different topics and open-ended questions with accompanying queries that probe for more detailed and contextual data. The questions were relevant to vision for school-aged children in Dubai, such as:

- What are the main eye conditions among school-aged children? How these vary by age, gender, nationalities?
- What are the main risk factors for eye health problems?
- What are the main health care services? How these services can be developed?
- What is your opinion regarding screening: Childhood visual screening (Pre-school screening, Screening in school-aged children).
- What is your opinion regarding awareness and training: Target, families, schools medical staff, teachers, students etc.
- How can eye health intelligence data improved?

Data of the interviews were audio recorded, transcribed and analysed. With these data, the 5-step method of data analysis developed by McCracken for long interviews was used. [11]

## Results

The results of the in-depth discussions held with school health experts who work routinely with school health services in Dubai highlighted key issues that are relevant for vision care to school-aged children. The results can help decision makers to take further actions and to make appropriate decisions about improving the services in future.

School health care services in Dubai are divided between public and private sectors. The Ministry of Health (MoH) covers the

public schools while Dubai Health Authority (DHA) covers the private schools. There are around 81 public schools and 186 private schools in Dubai. The estimated number of children in public school is around 30,000, and the number of children at private school is approximately 266343 (School Health Annual Report, 2015-2016). The estimated total population in 2016 for Dubai is 2,568,300 (Dubai Statistics Center). Therefore, the school-aged children represent almost 11.5% of the total population. Overall, there are 6 out of 186 (3.2%) DHA-supervised special needs schools to accommodate children with special educational needs (SEN) including children suffering from eye disorder as primary or secondary causes. Children with moderate to severe disability are enrolled in such schools settings.

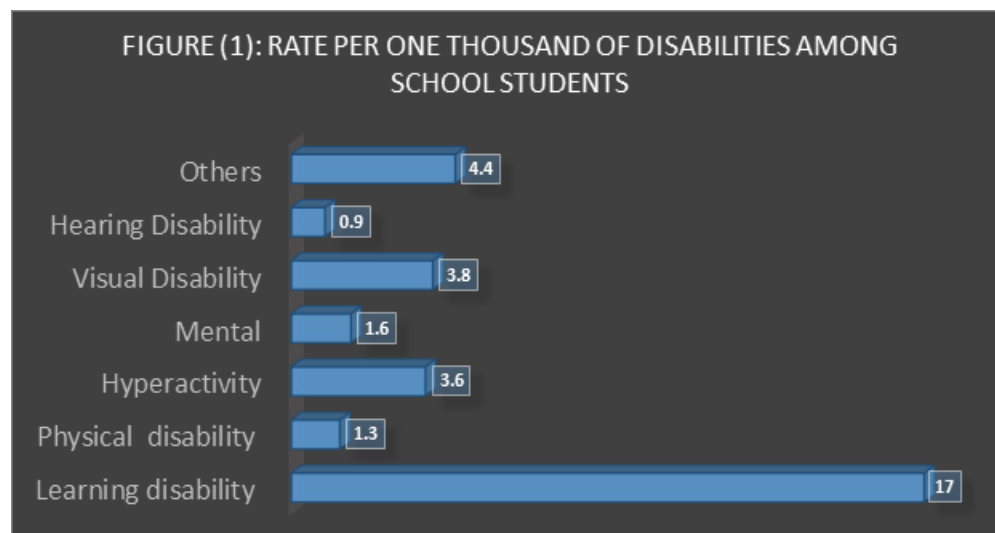
The Primary Health Care Services Sector (PHCSS) of Dubai Health Authority has a Schools and Educational Institutions Health Unit (SEIHU) that provide school health services to private schools in Dubai. The school health services aim to assist school-aged children to grow and develop into healthy adults by encouraging healthy lifestyles, conducting health assessments, administering immunisations and by providing support and advice at school, and annual updates and supervision. The team has the knowledge and skills of child health development to ensure that assessment, promotion and monitoring of children's health development is in line with local and federal guidelines.

The school health team play also important role in developing guidelines, policies, training, and auditing to protect and improve child health. It has a duty to safeguard and promote the health

of children at private schools. Each school has a medical team managed directly by the school while DHA supervise their work.

The medical team at each school consists of a nurse and a doctor. There are regulations that schools have to abide by a minimum number of healthcare professionals on site. In Dubai, that means one full-time nurse for schools with up to 500 children, two full-time nurses for schools with 500-2000 children, and one additional full-time nurse for every additional 1,000 children for schools with more than 2,000 pupils. Regarding physicians, the schools should have one part time physician for schools with up to 750 children, one full-time physician for schools with 750-2000 children, and two full time physicians for schools with more than 2,000 pupils. (WEYAK initiative, Health Regulation Department, DHA). In addition to that, in each school there is a "coordinator school health program". One of the competences of such program is to have a counsellor position. People who fulfil such positions should have the knowledge and skills necessary to integrate schools health, mental health, and safety programs and carry a psychology degree to provide psychological and social support and enable them to tackle any issues such as bulling of students complaining from eyesight difficulties.

School health official said that in one of population-based cross-sectional which study was undertaken among 266343 students in Dubai, it was shown that there were about 1008 case of visual disorders in 2015-2016 academic years (3.8 per one thousand) as shown in figure (1) and Table (1), whom they were diagnosed by ophthalmologists only.



**Table (1):** Visual impairment among private school students of Dubai according to nationality and gender

Nationality	Gender	Total students	Visual Impairment	Rate per one thousand
UAE	M	15699	129	8.2
	F	14330	91	6.4
Expatriates	M	121247	503	4.2
	F	115067	285	2.5
<b>Total</b>		<b>266343</b>	<b>1008</b>	<b>3.8</b>

Vision problems are common among school-age kids. Refractive errors are the most common cause of vision problems among school-age children in Dubai private schools. Refractive error means that the shape of your eye does not bend light correctly, resulting in a blurred image.

Another screening program showed that about 38.9% of the total screened students visually assessed were having error of refraction, and about 42% of students with error of refractions are wearing glasses, while about 16.4% of total students examined were being wearing glasses as reflected by table (2).

**Table (2):** Distribution of visually assessed students according to presence of error of refractions and wearing glasses

	No.	%	No.	%
<b>Total examined</b>	<b>316</b>	<b>100.0</b>		
<b>Error of refraction</b>	<b>123</b>	<b>38.9</b>	<b>123</b>	<b>100.0</b>
<b>Wearing glasses</b>	<b>52</b>	<b>16.5</b>	<b>52</b>	<b>42.3</b>

The main types of refractive errors are myopia (near sightedness), hyperopia (far sightedness), presbyopia (loss of near vision with age), and astigmatism. Another condition is amblyopia (Sometimes called “lazy eyes”). Vision loss occurs because nerve pathways between the brain and the eye are not properly stimulated.

The screening conducted in Dubai private schools revealed that the common error of refractions identified among the sample were (myopia (9.8%), hypermetropia (4.8%), astigmatism (43.9%) as shown in table (3).

**Table (3)** Distribution of the types of error of refraction among visually screened students

Type of refractive error	No.	%
Myopia	11	8.9
Hypermetropia	6	4.9
Astigmatism	54	43.9
Others	52	42.3
<b>Total</b>	<b>123</b>	<b>100.0</b>

Vision problems in children tend to emerge between 18 months and 4 years old and frequently seen at grades 1, 2, 3, or 4. It is often detected through school doctor, paediatrician, the school nurse, or an eye specialist. In addition to that, the teacher might identify vision problems among school-age children as they are having a hard time seeing the blackboard (near sighted) or they are having a hard time reading up close (far sighted).

There are many environmental and genetics factors play a role in the development of vision disorders in children such as:

- Family history of refractive error is a risk factor for children to develop vision disorder.
- Premature birth might cause retinopathy of prematurity (ROP). It usually affects both eyes and is the main reason children have vision loss
- A number of neurodevelopment disorders (e.g., cerebral palsy, Down syndrome, autism spectrum disorders, hearing impairment and speech delay) also are associated with higher rates of vision problems.
- The most significant preventable risk factor for visual disorders in children is maternal smoking. Children of women who smoked cigarettes during pregnancy have higher rates of strabismus, hyperopic, and astigmatism.

Therefore, family history of eye problems together with eye exams for children is extremely important to identify vision problems as early as possible.

School-aged children 5-18 years of age, at private schools in Dubai receive four comprehensive medical check-up during different stages while they are attending schools. The medical assessment covers general health, medical examinations including eye and hearing examination. It is done at grades 1, 5, 9, and 12, and it includes a number of tests and procedures to evaluate the eyes. Students with visual issues may be referred to a secondary care professional or through communication with his family members to resolve the issue.

However, these periodic medical examination results may not be of high quality because it is not monitored closely or evaluated by a third party or an ophthalmologists; therefore leaving a question mark on its data provided. It is necessary to offer vision-screening programs as early as possible i.e. pre-school vision screening or even earlier than this. It is an efficient and cost-effective method to identify children with vision problems as early as possible. Children have different eye health needs than adults; some eye problems can become irreversible once a child is older. [12] The results of the eye screening proposed program could be better if it is being delivered by independent party such as Al Jaber optical, Noor Dubai or others.

The eye health awareness is important to promote eye health for school-aged children. The eye care awareness/programs target school children, teachers, and families. Awareness programs focus on the need of each of the three-targeted groups. For example, the awareness campaigns for families should highlight the benefits

of early detection and treatment. In addition, families' awareness about the risk factors for avoidable blindness and vision loss is also important. It should target families who have history of vision impairment. Eye health education is among the most important components of the coordinated school health program in Dubai. However, there are substantial differences between schools in delivering eye health education. Hence, school nurses and teachers require further and continuous training how to detect vision problems in students.

Children with glasses or vision impairment are at increased risk of bullying in school. There are sporadic cases in Dubai but are managed well. The school teachers/nurses are trained enough to control this.

The schools collect visual information on each child. However, these records are stored as paper records. One of the major tasks that schools should accomplish is the converting of all the information in paper medical records to electronic medical records. This will help in conducting research and better understanding of overall eye health problems or any other medical issues. In addition to that it is also required to conduct periodically surveys to assess visual impairment in children attending schools in align with other health topics which will help to understand other vision issues not possibly measured through health registries i.e. measure care satisfactions, etiological factors, etc.

## Discussion

The study revealed significant eye impairment among students in Dubai schools. When derived from school student files, it was found that they are much less than percentages found in other studies like the one conducted in India in 2011 and showed high eye morbidities. [13]

Other studies conducted in many other countries reported high prevalence of eye morbidities among primary schools students compared to our current study. Examples are the study of primary school children between 6 and 14 years of age in the rural Tibetan area of Maqin County, China, reports that 18.36% had ocular morbidity. Refractive errors were found in 11.07%, strabismus in 2.49%, corneal leukoma in 1.20%, amblyopia in 1.02%, and vernal conjunctivitis in 0.65%. Monocular blindness was seen in 1.48%. [14]

Among the school children aged 5 to 10 years in Kolkata a study showed that 25.11% had refractive errors, myopia being the commonest (14.02%); astigmatism affected 3.93%. The prevalence of refractive errors increased with age with no difference of refractive errors between boys and girls. [15]

A study of school children 7 to 15 years of age showed that the prevalence of uncorrected (unaided), presenting, and best-corrected visual impairment (visual acuity < or =20/40 in the better eye) was 17.1%, 10.1%, and 1.4%, respectively. In eyes with reduced vision, refractive error was the cause in 87.0%, amblyopia in 2.0%, other causes in 0.6%, and unexplained causes in 10.4%. Myopia was present in 9.8% of children seven years of age, increasing to 34.4% in 15-year-olds; and hyperopia in 10.0% and 32.5%, respectively".

Myopia was associated with older age, female gender. [16]

A study from the Darjeeling district of West Bengal noted a prevalence of abnormal Visual Acuity (VA) (< 20/30 in any eye) of 3.65% and it was highest in the seven to eight years age group in both the sexes contributing to 75% of the total students having abnormal VA. Prevalence of Vitamin A deficiency was 8.16%. Prevalence of Bitot's spot was 3.63%; females outnumbered the males. [17]

School children 5-15 years of age, screened for eye morbidity, revealed that trachoma (18%) was the most common ocular morbidity followed by vitamin A deficiency (10.6%), refractive error (7.4%) and apparent / latent squint (7.4%). [18]

In an Iranian study it was shown that the prevalence of myopia, hyperopia and astigmatism was 29.3% [95% confidence interval (CI), 25-33.6%], 21.7% (95%CI, 17.8-25.5%), and 20.7% (95%CI, 16.9-24.6%), respectively. The prevalence of myopia increased significantly with age [odds ratio (OR)=1.30, P=0.003] and was higher among boys (OR=3.10, P<0.001). The prevalence of hyperopia was significantly higher in girls (OR=0.49, P=0.003). The prevalence of astigmatism was 25.9% in boys and 15.8% in girls (OR=2.13, P=0.002). The overall prevalence of high myopia and high hyperopia were 0.5% and 1.2%, respectively. The prevalence of with-the-rule, against-the-rule, and oblique astigmatism was 14.5%, 4.8% and 1.4%, respectively. Overall, 4.6% (95%CI, 2.6-6.6%) of subjects were anisometropic. [19]

This in-depth interview with experts working with school-aged children revealed four top priorities for improving eye care for school-aged children. The first of these priorities is the importance of gathering routine information for eye care, which includes establishing health registries at schools. The current paper based healthcare records are not reliable source of data to detect the main vision problems or identify the group of children at higher risk than others and does not support research easily.

Dubai Health Authority has successfully invested in a new system named Panorama, which has two components, computer system as a public health management solution, and smart phone application. Panorama system supports service providers and public health decision makers with good solutions for public health management. The tool will support health professionals with information regarding eye health or other health issues.

On the other hand, the schools should implement a new healthcare records management strategy shifting from paper records to electronic records in align with the new DHA medical electronic records system (EMR). Recently, Noor Dubai agreed to lead on the eye awareness programs for the schools, this is an excellent achievement for the schools as Noor Dubai has lot of experience in eye care and awareness programs. We need to ensure that these programs target families, students, teachers and nurses.

It is important to have a national or local eye screening service for all children between the ages of 4-5 years. Detection of eye problems in the very young and pre-school child requires expert clinical examination. Therefore, this should be an Ophthalmologist

led service. Finally, it is relevant to assess whether it is feasible to develop a local high quality services in Dubai for children with eye impairment or other special needs in the community. This will strengthen the capacity of the childcare in addition to the care they received at schools of special needs.

## Conclusion

The study concluded that visual impairments among school age children is not uncommon, most of the time under estimated and has not been screened systematically. Visual assessments at school level is not efficient enough to tackle visual impairment cases at earlier stages. Services wise, visual impairments at school level are underserved as based on absent of comprehensive and structured visual health program. School Eye health program and services with full component (early detection, management, awareness, monitoring) are of priority to be addressed for students in Dubai schools.

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