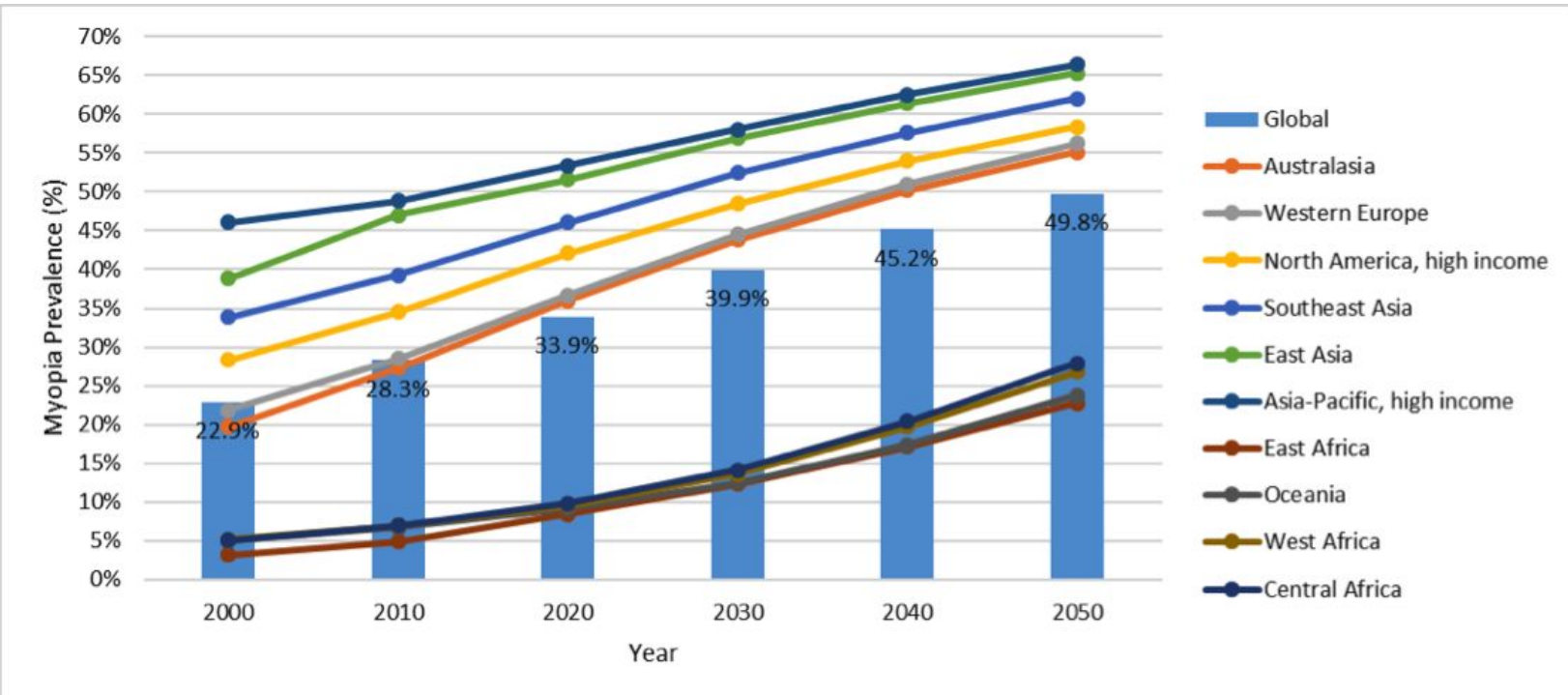


## Abstract

- Changes in the development of eyeballs in the American population shows a direct correlation to the increased use of computers and personal electronics.
- Over the past century, over 11,000 studies on Myopia have been published globally, most from the United States over the past 10 years, to discuss the concerns of the condition Myopia developing into more serious disorders that may result in vision loss or complete blindness.
- The accessibility of computers at home, in the workforce and in schools has changed how we as a society use our eyes on a daily basis.
- Myopia is one of the top five ocular conditions listed as an immediate priority by the World Health Organization, as it is one of the most prevalent eye disorders worldwide and leading causes to blindness.
- Previous studies have shown that individuals who like to read for long periods of time were at higher risk for myopia, but now studies reflect that individuals, especially children, who use electronic screens that exceed 30 minutes a day are high risk candidates as well.
- As the use of computers in education increases, so does the rate of diagnosed Myopia in children. This is strongly reflected by the exponential increase of the disorder after remote learning was required of students during the COVID-19 mandated shut down in 2020.
- The advancement of therapeutic spectacle lenses and contact lenses has become a priority in the field of optometry to slow the progression of Myopia.

## Progression of Myopia



## Timeline of Personal Computers

<p><b>1970s</b> First Personal Computer</p>	<p><b>1980s</b> First Portable Laptop *36.6% of population own a computer</p>	<p><b>1990s</b> First Portable Laptop *25% of populus Myopic</p>
<p><b>2000s</b> First Camera Phone</p>	<p><b>2010s</b> COVID-19 Shut Down *92% of jobs require computer skills for for hire</p>	<p><b>2020s</b> COVID-19 Shut Down *63% of K-12 use online learning as of 2024</p>

## Objective

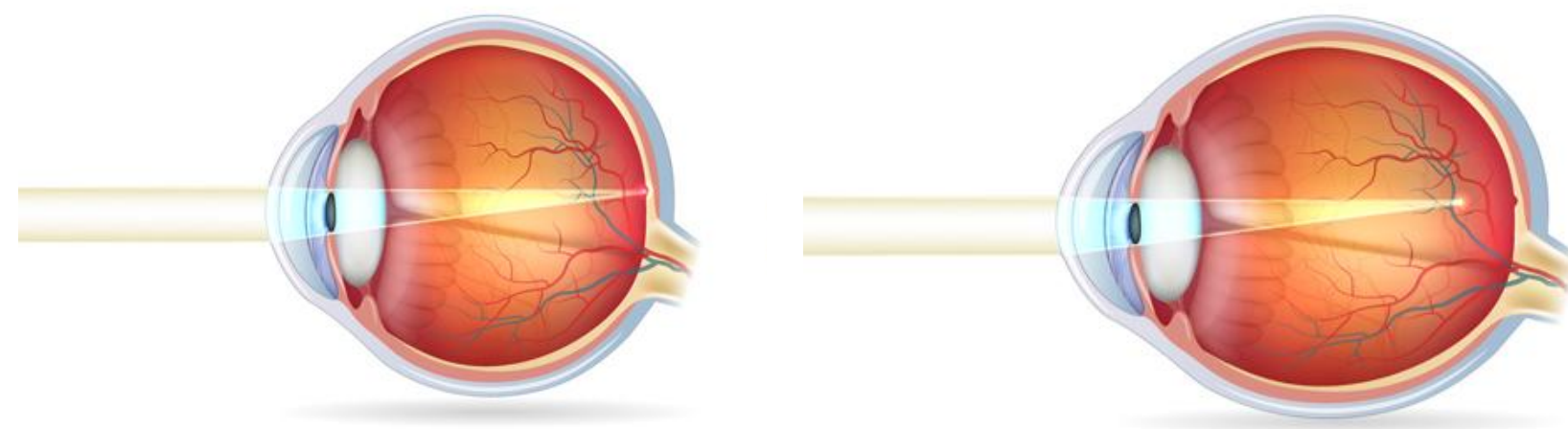
- I started working for Optometrist and Ophthalmologist 6 years ago and in this time have become aware of the increasing rate of diagnosed early onset Myopia in children, especially after the 2020 COVID-19 shut down when screen time use for children greatly increased.
- Through the years I have listened to many sales reps talk about how Myopia is increasing among our population, especially with children, and what methods are being used to slow the progression, but rarely discussed is the cause of the increased diagnosis.
- Increasing trends of diagnosed early onset Myopia and the increased use of personal electronic devices among our youth, directly correlate with screen use and its effect on the development of the eye, especially under age 14.
- I feel it is important to educate the public about the impending risks of early onset Myopia in children and how it will affect their future vision potential.
- Advertisements about Myopia control are becoming more common in public, however, the reasons as to why this intervention is needing to be addressed are not and the promotion of screen use daily increases.

## What is Myopia?

- The eyeball should be a sphere or a globe shape for optimal focus on the back of the retina, but when the eye grows to be too long and is shaped like an oval, the focal point of the eye changes to be in front of the retina instead of directly on it, this is what we call Myopia
- With a prescription of -3.00 diopters or greater, the structural integrity of the eye begins to weaken but at -6.00 diopters, this is considered to be at high risk for visual impacting deterioration of the eye that can lead to blindness.

## What Causes Myopia?

- **Genetics** - 50% chance of inheritance if both parents have Myopia, 30% chance if only one parent has Myopia and 25% chance if neither parent has Myopia.
- **Modern Lifestyles** - Not enough time outside, prolonged reading or digital device use, and poor lighting levels can all affect the development of the eye and result in early onset Myopia, especially in children whose eyes don't fully develop until age 20.

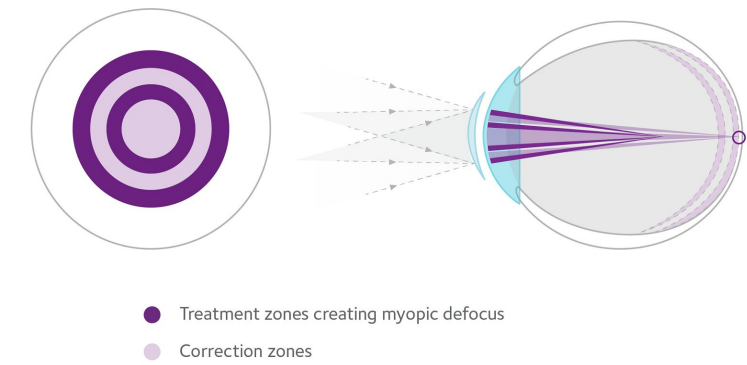


## Methods of Slowing Myopia Progression

These methods all create suppressed regions of vision reflected on the retina that requires the eye to accommodate in other ways that are less destructive than the elongation of the globe, thus slowing the progression of Myopia. There are only a couple FDA approved methods, the rest are still considered experimental but have shown to be effective in other countries.

### MySight Contact Lens (FDA approved)

Slowed the axial elongation by 52% over a 3 year study.



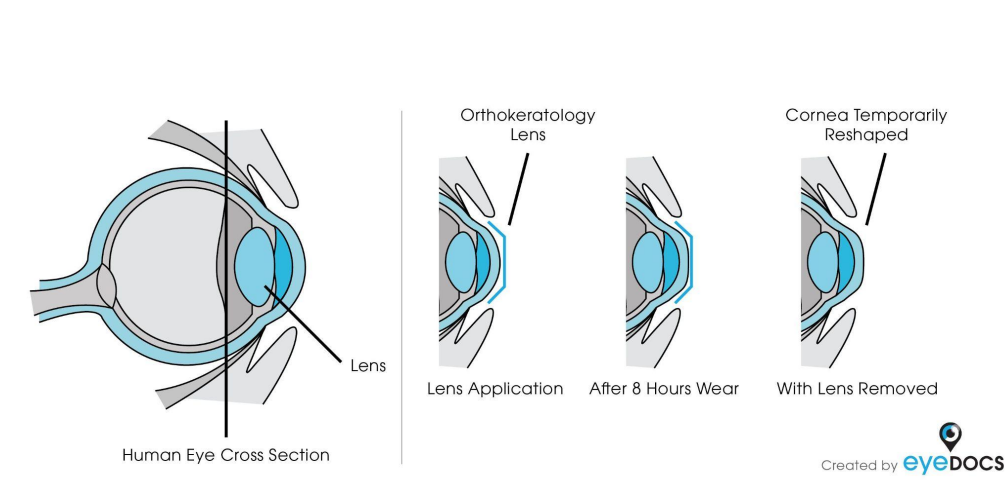
### Atropine Drop Therapy (Not FDA approved)

0.01% Atropine Slowed the axial elongation by 12% over a 2 year period of time



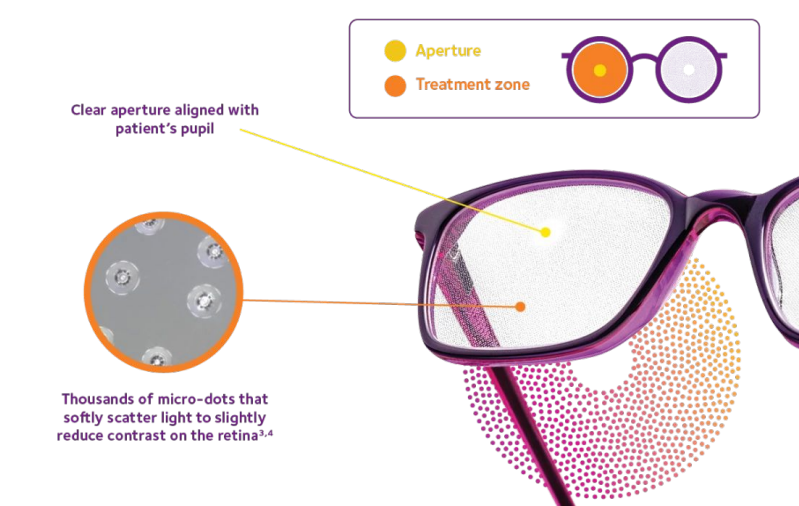
### Ortho-K Nightly Contact Lens (FDA approved)

Slowed the axial elongation up to 2 years; however, myopia control success declined over follow-up, with rates of 64%, 53%, 50% and 47% recorded for



### MySight Spectacle Lens (\*Not FDA approved)

Slowed the axial elongation by 59% over a two year trial period in Singapore



### Stellest Lenses by Essilor (\*Not FDA approved)

Slowed the axial elongation by 67% over a 2 year trial period in China \*research trial consisted of only 50 applicants



## Complications of Myopia

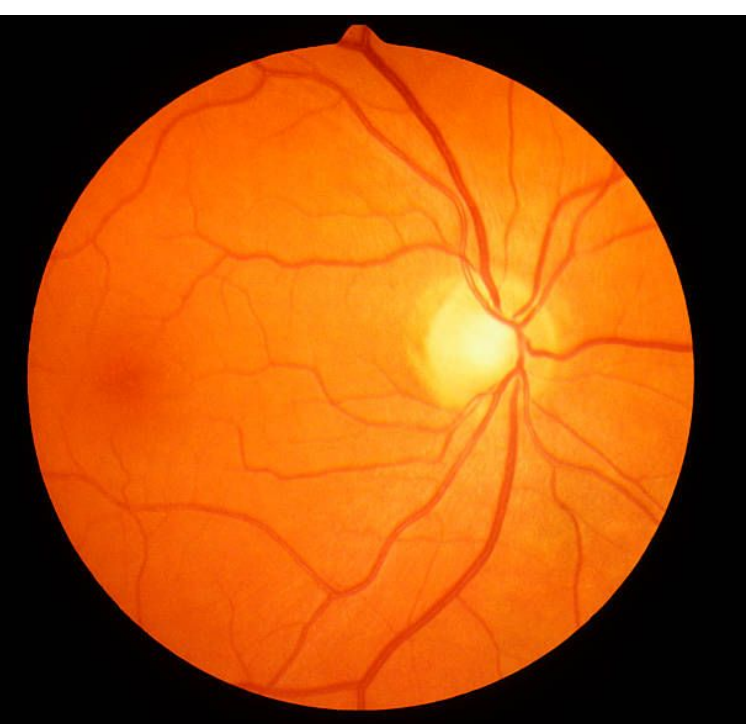
- **Blurred Distance Vision** - Objects and signs further than 10 feet become blurred and will not come into focus without a prescription for glasses or contact lenses.
- **Myopic Macular Degeneration** - When the eyeball stretches, the sclera and retina become thin, resulting in a retinal tear and bleeding beneath the retina.
- **Retinal Detachment** - When the retina, or internal layer of the eye, separates from the visceral layer of the eye that provides the retina with nutrients. Once loss of nutrients to the retina occurs, the photoreceptors that interpret light as vision start to die.
- **Chorioretinal Degeneration** - The choroid, a layer of the eye that contains blood vessels, becomes thinner with age due to myopia, and then continues to thin with age. In some areas, the choroid may become so thin that it disappears entirely, causing patches of tissue loss.
- **Glaucoma** - Elevated fluid pressures inside the eye due to insufficient drainage sites results in the degeneration of the optic disc where the optic nerve attaches from the brain to the eye. Severe cases can lead to Peripapillary Atrophy (see below for explanation of disorder).
- **Peripapillary Atrophy** - Estimated to be present in about 20% of cases, the retina and retinal pigment epithelium (RPE) thin in the area around

## Myopia Vision Examples of Blurred Vision



## Complications of High Myopia

### Healthy Retina



### Retinal Detachment



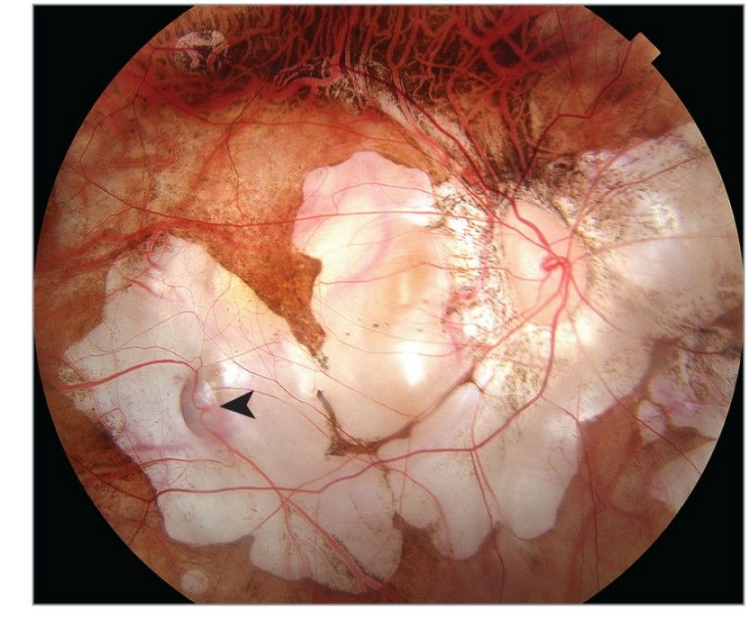
### Glaucoma



### Mypopic Macular Degeneration



### Chorioretinal Degeneration



### Peripapillary Atrophy



## Conclusion

- As more children are diagnosed with Myopia each year, the likelihood of developing High Myopia increases as they become adults.
- It is projected from annual increasing rates of Myopia diagnosis, that by 2050, 50% of the American Population will have Myopia with 10% at risk for High Myopia.
- It is important that we as a society understand the effects of long term screen use and how it affects the development of our eyes and how it seriously affects the overall long term health of the eye.
- Myopia is not irreversible and is one of the leading causes of blindness globally. If we as a society do not intervene with treatment methods and attempt to reduce dependency on personal computers.
- It is not yet proven that looking at screens for long periods of time causes Myopia in children, however, when looking at the increased use of personal electronic devices and the increase diagnosis of Myopia, it is difficult to dispute the possible direct correlation.
- American Academy of Pediatrics (AAP) recommends a family media use plan with appropriate screen time for children.
- Under 2 years old: Zero screen time unless it is a brief video chat with a loved one
- 2-5 years old: No more than one hour per day co-viewing with a parent or sibling
- 5-17 years old: Generally no more than two hours per day, except for homework
- Pediatricians recommend the 1/2/10 rule: mobile phone at one foot, desktop devices and laptops at two feet, and roughly 10 feet for TV screens

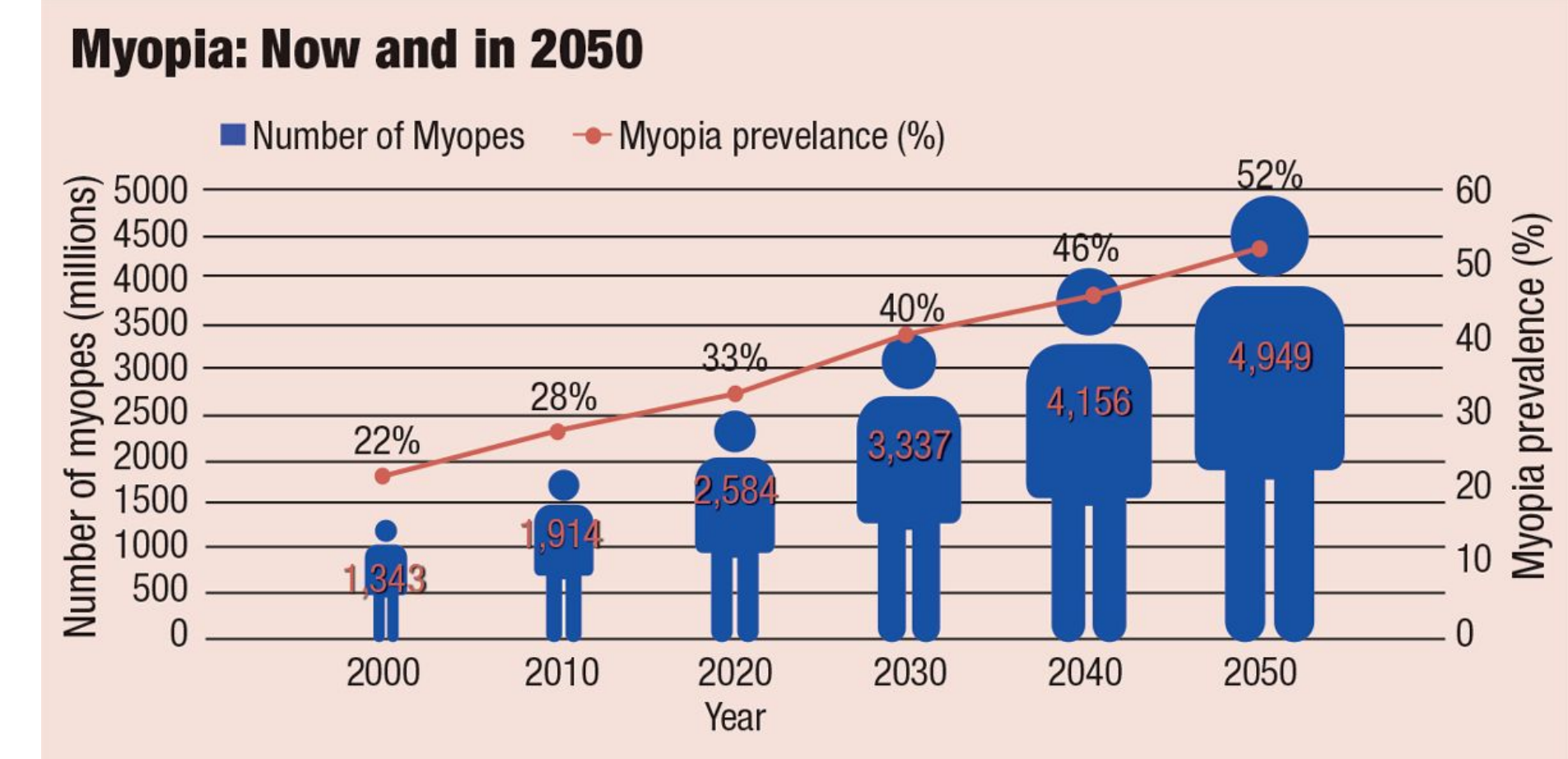


\*\*Not including 1-4 hours of screen time use for education purposes

- 8-10yo average of 6 hours per day in front of a screen

- 15-18yo average of 7.5 hours per day in front of a screen

## Global Projected Rates of Myopia



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