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AZƏRBAYCAN ƏHALİSİ ARASINDA MİOPİYANIN YAYILMASI PROBLEMİ – MÜASİR MEYİLLƏR

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XÜLASƏ

Məqalədə Azərbaycanın əhalisi arasında miopiyanın yayılmasının qiymətləndirilməsinə dair retrospektiv təhlil nəticələri təqdim edilir.

Məqsəd – son onillik (2014 - 2023) ərzində Azərbaycanda miopiyanın yayılma səviyyəsini öyrənmək.

Material və metodlar
2014–2023-cü illər üzrə miopiya ilə bağlı məlumatlar Azərbaycan Respublikası Səhiyyə Nazirliyinin elektron məlumat bazasından (statistik forma F12) əldə edilmişdir. Əhali statistikası www.azstat.gov.az elektron resursundan götürülmüşdür. Miopiyanın əhali arasında paylanmasının təsviri xarakteristikası tibbi statistika metodları ilə 100 min nəfərə hesablanmış, yaş və cins göstəriciləri dörd əhali qrupu üçün ("0–13 yaş", "14–17 yaş", "18–29 yaş" və "30 yaşdan yuxarı") müəyyən edilmiş və illik xəstələnmə göstəricilərinin faiz dəyişməsi qiymətləndirilmişdir.

Nəticələr
Son 10 il ərzində miopiyanın Azərbaycanın ümumi əhalisi arasında orta yayılma göstəricisi 100 min nəfərə 527,3±28,7 təşkil etmiş, xəstələnmənin pik səviyyəsi 2022–2023-cü illərdə müşahidə olunmuşdur ($p < 0.05$). Bu artım 2022–2023-cü illərdə insidentlik göstəricisinin artması ilə izah olunur. 2022-ci ildə yeni müəyyən edilmiş miopiya hallarının illik artım tempi əvvəlki illə müqayisədə 40,7% olmuş, baxmayaraq ki, 2015, 2020–2021-ci illərdə bu göstərici mənfi olmuşdur. Bütün müşahidə illərində cinslər arasında statistik əhəmiyyətli fərq aşkarlanmamışdır – kişi və qadın xəstəlik hallarının nisbəti 1:1 olmuşdur. Statistik cəhətdən əhəmiyyətli artım "14–17 yaş" və "30 yaşdan yuxarı" qruplarında qeydə alınmışdır ($p < 0,05$). Bu yaş qruplarında illik artım tempi 2022-ci ildə eyni dərəcədə yüksək olmuş və 2021-ci illə müqayisədə 3–5 dəfə artmışdır.

Yekun
Azərbaycanda miopiyanın yükü ildən-ilə artır və 2023-cü ildə maksimum səviyyəyə çatır ki, bu da miopiyanın mümkün qədər erkən aşkarlanması və monitorinqinin vacibliyini vurğulayır.

Açar sözlər: *miopiya, yayılma (prevalentlik), insidentlik, Azərbaycan*

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PROBLEM OF MYOPIA PREVALENCE AMONG THE POPULATION OF AZERBAIJAN – CONTEMPORARY TRENDS

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SUMMARY

This article presents the results of a retrospective analysis assessing the prevalence of myopia among the population of Azerbaijan.

Purpose – to examine the prevalence of myopia in Azerbaijan over the past decade (2014 - 2023).

Material and methods
Myopia data for 2014–2023 were obtained from the electronic database of the Ministry of Health of the Republic of Azerbaijan (Statistical Form F12). Population statistics were obtained from the e-resource www.azstat.gov.az. A descriptive analysis of the distribution of myopia among the population was conducted using medical statistics per 100,000 people. Age- and gender-specific incidence rates were calculated for four population groups (ages 0–13 years, 14–17 years, 18–29 years, and 30 years and older), and the percentage change in annual incidence rates was estimated.

Results
Average prevalence rate of myopia over the past 10 years among the general population of Azerbaijan was 527.3 ± 28.7 per 100,000 people, with a peak incidence recorded in 2022–2023 ($p < 0.05$). This increase is explained by an increase in the incidence rate in 2022–2023. The annual growth rate of newly diagnosed myopia in 2022 compared to the previous year was 40.7%, despite negative growth rates in 2015 and 2020–2021. No significant gender differences were observed across all observation years; the male-to-female ratio was 1:1. A statistically significant increase in prevalence was observed in the "14–17 years" and "30 years and older" age groups ($p < 0.05$). Moreover, the annual growth rate for these age groups was equally high in 2022 and 3–5 times higher than that recorded in 2021.

Conclusion
Burden of myopia in Azerbaijan is increasing year after year, reaching its peak in 2023, and necessitating the earliest possible detection and monitoring of myopia cases.

Key words: *myopia, prevalence, incidence, Azerbaijan*

According to most population-based studies, pathological myopia is one of the leading causes of irreversible vision loss and blindness worldwide. The global prevalence of myopia continues to rise across many countries. According to the World Health Organization (WHO), more than one billion people worldwide have uncorrected refractive errors, most commonly myopia, and the number of individuals diagnosed with myopia worldwide is steadily increasing each year [1]. The global prevalence of myopia has surged from 22.9% in 2000 to an estimated 34% in 2020 and is expected to reach 50% by 2050 [2, 3]. Myopia-related complications are recognized as the sixth leading cause of blindness globally. Myopia is a major risk factor for a number of other eye pathologies, such as cataracts, glaucoma, maculopathy, and retinal detachment, comparable to the risks associated with hypertension, stroke, and myocardial infarction [4, 5].

Most individuals develop myopia in childhood, and the likelihood of further development of pathologic or high myopia and associated complications is certain. Numerous epidemiological studies have shown that myopia is more common in urban populations, neighborhoods, and primarily among computer users, schoolchildren, university students and etc [6-12].

Continuous monitoring and reporting of myopia prevalence rates are essential to support and evaluate existing myopia control programs in both children and adults [8, 11, 13]. In this context, investigating the epidemiological data on the prevalence of myopia in Azerbaijan is important for providing evidence-based strategies and timely ophthalmologic care. Also, analysis of the prevalence and dynamic of myopia over a ten-year period will make possible to identify age and regional groups at highest risk, evaluate the effectiveness of current eye-health measures by comparing the present data with trends from previous years, and determine the need for adjusting national strategies for the prevention of visual impairment.

Purpose – to investigate the prevalence and temporal trends of myopia in Azerbaijan over a ten-year period (2014–2023).

Material and methods

Data on myopia cases for the period 2014–2023 were obtained from the electronic database of the Ministry of Health of the Republic of Azerbaijan (Statistical Form F12). Population statistics for the study period were retrieved from the official electronic resource of the Statistical Committee of Republic of Azerbaijan (www.azstat.gov.az) [14].

A myopia case, according to international classifications (ICD-11, WHO), is defined as an individual with a spherical equivalent refractive error of -0.50 diopters or less in at least one eye. A descriptive epidemiological analysis was conducted to determine age-standardized indicators [15], prevalence and incidence rates of myopia per 100,000 population using standard medical statistical methods. Along with the estimated annual percentage change, age- and gender-specific prevalence rates were calculated for the population in the age categories “0–13”, “14–17”, “18–29”, and “30+”).

To assess the relationship between gender differences and age-standardized prevalence rates, Pearson correlation and linear regression analyses were applied. Statistical analyses were performed using the Microsoft Excel software. A p-value <0.05 was considered statistically significant.

Results

During the ten-year study period, a total of 524,084 cases of myopia were registered among the population of Azerbaijan, of which 216,522 cases were newly diagnosed myopia. The average overall prevalence rate of myopia in the country was 527.3 ± 28.7 per 100,000 population, while the average incidence rate for newly diagnosed myopia cases was 218.7 ± 12.8 per 100,000 population.

Calculations of both prevalence and incidence revealed a gradual increase in the number of individuals affected by myopia in the population over the study period **(Chart 1).**

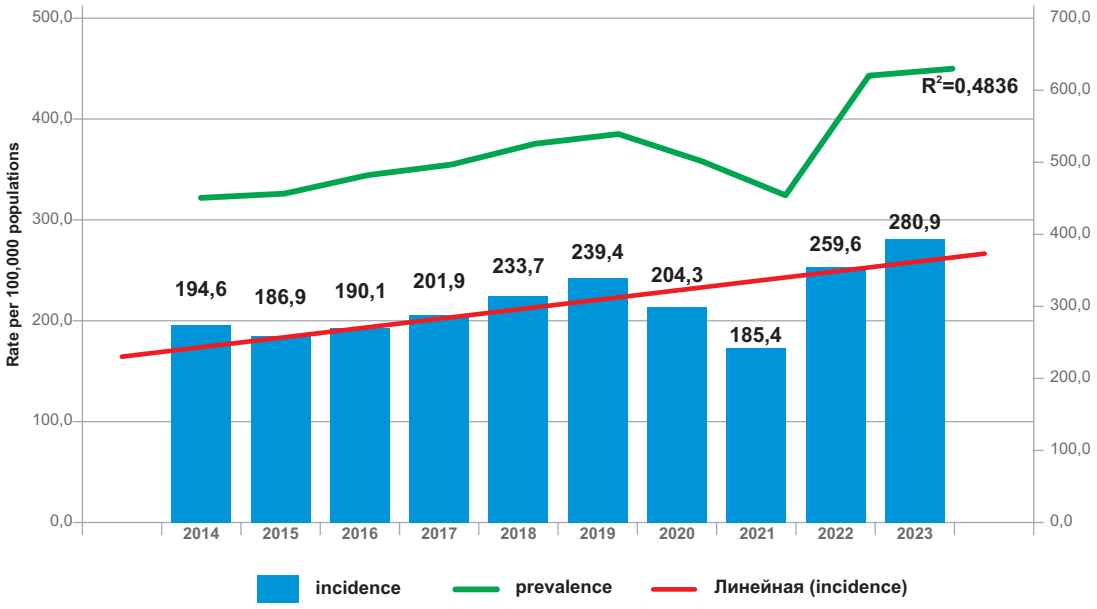

Chart 1. *Trends of myopia prevalence and incidence rates in the population of Azerbaijan (2014-2023).*

The relatively low coefficient of determination (R2 = 0.48) for the linear relationship indicates that approximately 48% of the variability in myopia cases is explained by the observed trend, while the remaining 52% is attributable to other factors or random fluctuations. As illustrated in **Chart 1**, a gradual increase was observed from 2014 to 2019. Starting in 2022, the incidence and prevalence rates increased statistically sharply ($p < 0.05$) compared to 2021, representing a 40.7% growth **(Table 1)**.

As shown in **Table 1**, the annual growth rate of the total number of newly diagnosed myopia cases was negative in 2015 and 2020–2021, reflecting short-term fluctuations in detection rates. The gender distribution demonstrated an equal ratio of men to women (1:1) among both all diagnosed and newly registered myopia cases. The differences in the distribution of myopia cases by sex across the study years were statistically significant for total number of myopia cases ($\chi^2 = 2165$, $p < 0.001$), and newly registered myopia cases ($\chi^2 = 1874$, $p < 0.001$).

An interesting age-related pattern was observed in the distribution of newly diagnosed myopia cases. On average, over the study period, 32.5 ± 1.9% of cases occurred in the 0-13 years age group, 15.1 ± 0.9% in the 14–17 years age group, 16.5 ± 1.1% in the 18–29 years age group, and 35.9 ± 2.4% in the 30 years and older age group. Many authors attribute this distribution to the growth characteristics of the eyeball in children. In contrast, in adults, the ocular development is complete, and myopia is usually stable [7, 10].

As illustrated in **Chart 2**, some wave-like fluctuations were observed in the proportion of newly diagnosed myopia cases across all age categories throughout the study period. Thus, in the 0–13 years age group, the percentage of myopia declined after 2014, before rising to the peak value of 42.5% in 2018. Subsequently, a decline was observed over the years. During the past three years of observation, the proportion of newly diagnosed myopia cases in the 0–13 years age group has accounted for one-third.

Proportion of newly diagnosed myopia cases in the 14–17 years age group demonstrated a relatively low in all observation years, ranging from 12.4% (2021) to 17.5% (2019).

Table 1. *Indicators of the annual growth rate of myopia cases in Azerbaijan for 2014-2023, by gender*

Year	Total number of myopia cases					Number of newly registered myopia cases					
	Total	Women		Men		Total	Annual growth rate	Women		Men	
	(abs.)	(abs.)	%	(abs.)	%			(abs.)	%	(abs.)	%
2014	43727	20829	47.6	22898	52.4	18323		9284	50.7	9039	49.3
2015	44814	21732	48.5	23082	51.5	17818	-2.9	8895	49.9	8923	50.1
2016	47739	22975	48.1	24764	51.9	18342	2.9	9201	50.2	9141	49.8
2017	49663	24140	48.6	25523	51.4	19701	7.4	10249	52.0	9452	48.0
2018	52923	25245	47.7	27678	52.3	23033	16.9	9711	42.2	13322	57.8
2019	54690	26586	48.6	28104	51.4	23795	3.3	12059	50.7	11736	49.3
2020	51462	25276	49.1	26186	50.9	20475	-14.0	10672	52.1	9803	47.9
2021	47210	22998	48.7	24212	51.3	18717	-8.6	9789	52.3	8928	47.7
2022	63744	32961	51.7	30783	48.3	26327	40.7	13588	51.6	12739	48.4
2023	68112	34211	50.2	33901	49.8	29991	13.9	15174	50.6	14817	49.4
TOTAL	***524084***	***1466***		***267131***		***216522***		***108622***		***107900***	

As **Chart 2** shows, the proportion of newly diagnosed myopia cases in the 18–29 age group increased steadily year by year. While it was only 11.6% in 2014, by 2023 it had reached 17.7% of all cases registered.

A similar upward trend was observed among individuals aged 30 years and older **(Chart 2)**. In 2014, this age group accounted for one-third of all newly diagnosed myopia cases; but by 2021-2023, the proportion of myopia cases had increased by approximately 10%, reaching nearly 40%.

By place of residence, the results of this study revealed a predominant prevalence of newly diagnosed myopia cases among the urban population of Baku City and the five cities of republican subordination (Sumgayit, Mingachevir, Ganja, Naftalan, and Shirvan)

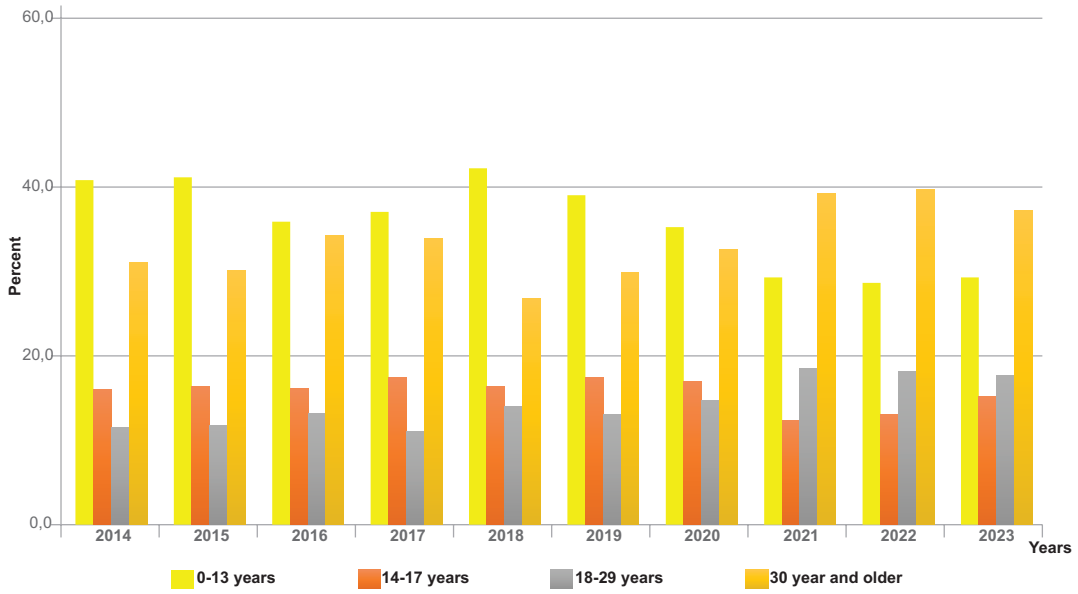

Chart 2. *Age distribution of newly diagnosed myopia cases in the population of Azerbaijan over 2014-2023 (in %).*

according for an average of 69.9 ± 3.7% of cases per year.

The present research revealed ambiguity in the distribution of newly diagnosed myopia cases among rural residents, particularly when stratified by age category **(Chart 3)**.

As illustrated in Chart 4, while the 0–13, 14–17, and 18–29 years age groups demonstrated relatively stable overall incidence rates of myopia, a statistically significant year-by-year increase was observed in the 30 years and older age category. A particularly pronounced increase in the incidence of newly diagnosed myopia among this age group was observed in 2020–2023 ($\chi 2 = 4.71$, $p < 0.05$).

Results of the ranking of cities and regions of Azerbaijan by the incidence of newly diagnosed myopia cases in 2023 are presented in **Table 2.**

Discussion

The present study revealed that the prevalence and incidence of myopia in Azerbaijan showed a marked decline in 2020–2021. According to international literature, this decline worldwide is explained by a decrease in patient visits during the COVID-19 pandemic [16]. It can be assumed that the isolation measures during the pandemic, prolonged indoor confinement, increased screen time, television viewing, and using mobile applications, and reduced outdoor activities during lockdowns could have triggered this increase in new cases of myopia. These findings are of practical significance for public health planning, as they emphasize the need to implement targeted preventive strategies.

No statistically significant gender differences in distribution of myopia in Azerbaijan were found ($p < 0.001$). The analysis revealed that the distribution of myopia cases differs significantly among age groups ($\chi 2 = 135.4$, $p < 0.0010$). This indicates the important role of factor influencing the prevalence of myopia in population. The most vulnerable age groups were those aged 0–13 years and 30 years and older. As evidenced by the results, the identified fluctuations in the age composition of population of the country by years determine the risk of developing myopia.

As many authors point out, this risk may vary depending on the place of residence

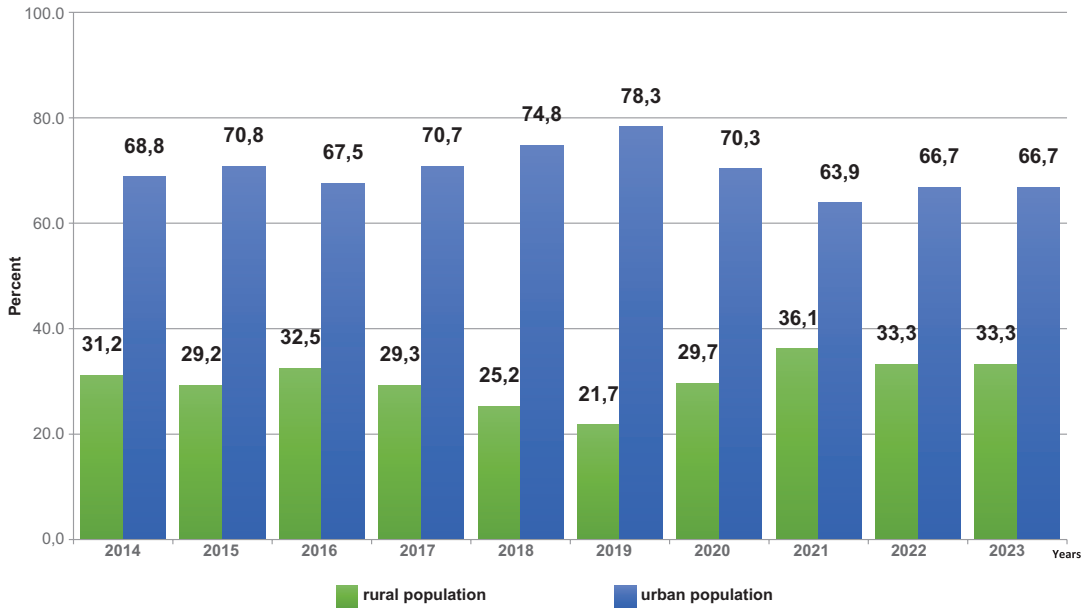

Chart 3. *Percentage distribution of newly diagnosed myopia cases by urban and rural residence, 2014-2023.*

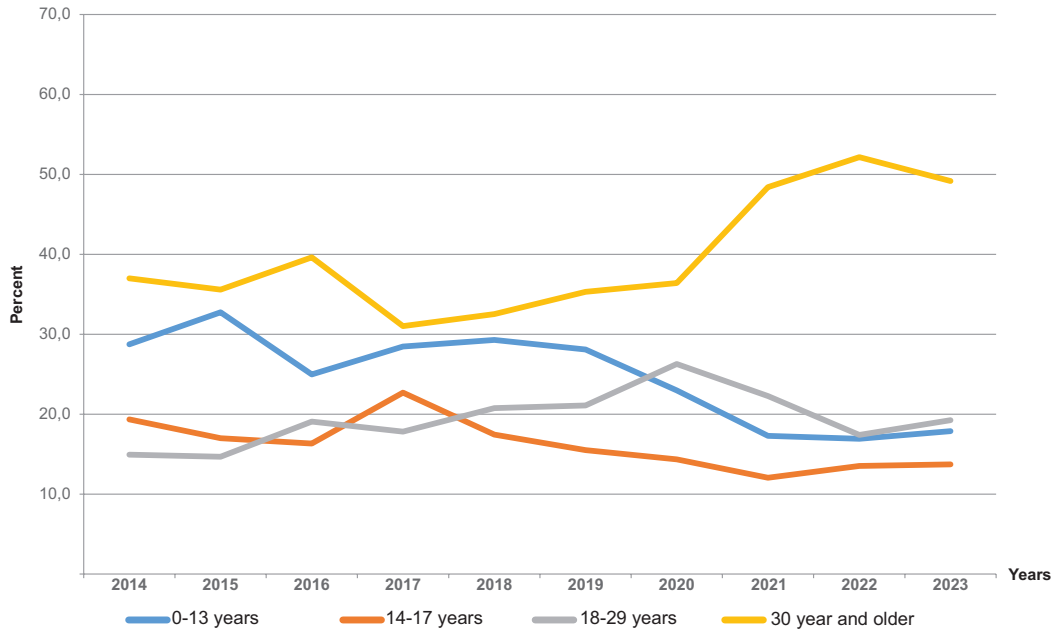

Chart 4. *Share distribution of newly diagnosed myopia cases among the rural population by age categories (in %).*

[7, 8]. In our research, it was found that the registration of new myopia cases was higher in rural areas.

So, despite this fact, the proportion of the rural population with myopia is also steadily increasing year by year, reaching 33.3% in 2022–2023.

The high incidence rate of myopia in Baku, Sumgayit, Ganja, Nakhchivan AR and several districts **(Table 2)** may be associated with high urbanization, intensive use of digital devices, and better access to eye care. In contrast, low rates in other regions (Khizi, Lankaran, Gusar, etc.) may reflect a predominantly rural lifestyle, more time spent outdoors and limited access to eye examinations.

According to scientific information, similar trends in the spread of myopia are characteristic of urban agglomerations [8, 12].

This can be explained by both the possible lack of timely optical correction in younger

Table 2. *Ranking of Azerbaijani regions by the incidence rate of newly diagnosed myopia cases, 2023*

Regions with highest incidence rates		*Regions with lowest incidence rates*	
r1=13859	Baku City	r1=2	Khizi District
r2=2739	Sumgayit City	r2=3	Lankaran District
r3=1989	Sheki District	r3=5	Gusar District
r4=1209	Nakhchivan AR	r4=11	Kurdamir District
r5=1174	Aghdam District	r5=13	Gakh District
r6=998	Shamkir District	r6=16	Hajigabul District
r7=949	Absheron District	r7=17	Lachin District
r8=773	Ganja City	r8=18	Dashkasan District
r9=769	Barda District	r9=24	Aghjabadi District
r10=707	Beylagan District	r10=27	Aghstafa District

Note: *Data are presented according to the patients' place of registration.*

population with myopia and the increasing digitalization of rural life [5, 13].

Thus, our findings confirm an overall upward trend in newly diagnosed myopia during the study period and in the future. We also identified age-related and gender differences in the myopia spreading. To develop an effective national strategy to improve ophthalmological care aimed at preventing myopia and its consequences, it is necessary to conduct additional research on the differentiation of myopia by its degree of development, as well as to clarify specific risk factors for its occurrence, to strengthen screening for the early detection of myopia in kindergartens, schools, and higher education institutions and to provide optical correction.

In the broader context, these measures align with global initiatives recommended by the WHO to mitigate the projected increase in myopia and its associated complications, such a retinal detachment, glaucoma, and myopic maculopathy.

Conclusion

Over the past decade, the prevalence and incidence of myopia in Azerbaijan have remained consistently high, with a statistically significant upward trend ($p < 0.01$) indicating a clear tendency to increase in the coming years.

No significant gender-related differences were identified in either overall or newly diagnosed myopia rates ($p > 0.05$).

The highest proportions of myopia were observed in the 0–13 years and the 30 years and older age groups, which together account for the majority of cases, with the age-related distribution showing highly significant differences between groups ($\chi 2 = 135.4$, $p < 0.001$).

Throughout the study period, the proportion of newly diagnosed myopia cases has shown a steady increase among both urban and rural populations, with significant differences in incidence between these groups ($\chi 2 = 245.7$, $p < 0.001$) and the most pronounced rise recorded in the 30 years and older age group.

These findings statistically supported findings highlight the urgent need to strengthen screening programmes, increase public awareness, and access to optical correction to prevent further growth of myopia and its complications, particularly in younger and older age groups.

ƏDƏBİYYAT

REFERENCE

1. WHO Global Initiative for the elimination of avoidable blindness // https://www.iapb.org/learn/resources/vision-2020-global-initiative-1999/
2. Holden, B.A. Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050 / B.A.Holden, T.R.Fricke, D.A.Wilson [et al.] // Ophthalmology, – 2016. 123(5), – p. 1036-1042. https://doi.org/10.1016/j.ophtha.2016.01.006
3. Агаева, Р.Б. Медико-социальные аспекты заболеваемости органа зрения в Азербайджане / Монография, Баку, – 2015. – с. 176.
4. Du, Y. Complications of high myopia: An update from clinical manifestations to underlying mechanisms / Y.Du, J.M.W.He, J.Q.L.Lu [et al.] // Advances in Ophthalmology Practice and Research, – 2024. 4(3), – p. 156-163. https://doi.org/10.1016/j.aopr.2024.06.003
5. Миришова, М.Ф. Эффективность фоторефракционной кератоэктомии на фоне проведенного кросслинкинга роговицы в лечении миопии и астигматизма при субклиническом кератоконуса // Azərbaycan Oftalmologiya Jurnalı, – 2019. 3(31), – c. 65-69.
6. Əliyeva, G.V. Miopiya ilə uşaq və yeniyetmələrdə ortokeratoloji linzaların tətbiqi, onların rolu, işləmə prinsipi, mexanizmi və üçillik müşahidənin nəticələri // Azərbaycan Oftalmologiya Jurnalı, – 2024. 2(49), – s. 9-14.
7. Foo, L.L. Factors influencing myopia stabilization in young myopic adult Singaporeans / L.L.Foo, C.S.Tan, B.Noel [et al.] // British Journal of Ophthalmology, – 2024. May; 21. 108(6), – p. 884-888. https://doi.org/10.1136/bjo-2023-323680
8. Pan, W. The Current and Future Landscape of the Childhood Myopia Epidemic in China. A Review / W.Pan, W.Lan // Ophthalmol. Ther., – 2024. 13, – p. 883-894. https://doi.org/10.1007/s40123-024-00887-1
9. Lee, Y.Y. What factors are associated with myopia in young Adults? A survey study in Taiwan military conscripts / Y.Y.Lee, C.T.Lo, S.J.Sheu [et al.] // Invest Ophthalmol. Vis. Sci., – 2013. 54, – p. 1026-1033. https://doi.org/10.1167/iovs.12-10480
10. Saw, S.M. School grades and myopia / S.M.Saw, A.Cheng, A.Fong [et al.] // Ophthalmic. Physiol. Opt., – 2007. 27, – p. 126-129. https://doi.org/10.1111/j.1475-1313.2006.00455.x
11. Morgan, I.G. IMI Risk Factors for Myopia / I.G.Morgan, P.C.Wu, L.A.Ostrin [et al.] // Invest Ophthalmol. Vis. Sci., – 2021. Apr; 28. 62(5), – p. 3. https://doi.org/10.1167/iovs.62.5.3
12. Lanca, C. Myopia and Schooling Study Group. Role of tutorial classes and full day schooling on self-reported age of myopia onset: findings in a sample of Argentinian adults / C.Lanca, A.Szeps, R.Iribarren // J. AAPOS, – 2022. 26(6), – p. 1-6. https://doi.org/10.1016/j.jaapos.2022.08.525
13. Əliyeva, S.Ş. Orta və yüksək dərəcəli miopiyanın lazer korreksiyasından sonra görmə itiliyinin və buynuz qişanın topometrik göstəricilərinin tətqiqi //Azərbaycan Oftalmologiya Jurnalı, – 2025. 4(51), – s.27-34. https://doi.org/10.71110/ajo791020241604512734
14. www.azstat.gov.az
15. Всемирная организация здравоохранения. Нарушения зрения и слепота // Информационный бюллетень, №282, – 2014.
16. Трубилин, В.Н. Влияние пандемии COVID-19 на офтальмологическую практику. Исторические аспекты и клинические примеры / В.Н.Трубилин, Е.Г.Полунина, В.В.Куренков [и др.] // Офтальмология, – 2021. 18(2), – p. 181-187. https://doi.org/10.18008/1816-5095-2021-2-181-187