ARTYKUŁ ORYGINALNY ORIGINAL RESEARCH STUDY

DOI: 10.24292/01.OT.300725

Post-pandemic health debt in cataract treatment and the costs of its mitigation. Population study of Northwestern region in Poland

Arnold Maciejewski[1, 2], Karol Krzystolik[3], Monika Drobek-Słowik[3], Agnieszka Strzelecka[4], Michał Chrobot[2], Kamila Kocańda[4], Monika Raulinajtys-Grzybek[1]

[1] Department of Management Accounting, Warsaw School of Economics
Head: prof. Monika Raulinajtys-Grzybek

[2] Polish Society of Medical Coders, Kielce
Head: Michał Chrobot, PhD

[3] Department of Ophthalmology, Independent Public Health Care Center of the Ministry of the Interior and Administration, Szczecin
Head: Karol Krzystolik, MD, PhD

[4] Collegium Medicum, Institute of Health Sciences, Jan Kochanowski University, Kielce
Head: prof. Edyta Suliga

HIGHLIGHTS

The total cost of eliminating the health debt due to institutional restrictions on surgical qualification criteria and pandemic in the West Pomeranian Voivodeship for all patients with lens opacities was estimated at over PLN 1.5 billion; however, under the current qualification system, this cost drops to PLN 743 million.

ABSTRACT

Regulating access to medical services via institutional means, but also as a result of unforeseeable events, may generate social costs. This may be especially relevant for indications where treatment results in full recovery. One of such indications is cataract, which, if untreated, is the leading cause of blindness. This paper is the first attempt at empirically estimating the existing medical and financial needs associated with cataract treatment among patients aged 41 and older in Poland, taking into consideration the limitations imposed by the system regulators and the impact of the unpredictable event that was the SARS-CoV-2 pandemic. The needs and the costs of fulfilling them were estimated on the basis of three scenarios of treatment eligibility. The first one assumed the system being fully open to every patient diagnosed with crystalline lens opacities. The second one assumed a systemic limitation of the treatment access on the basis of visual acuity as an eligibility criterion. In the third scenario, crystalline lens clouding could only be qualified for surgical treatment if it caused difficulties in performing activities of daily livings.

Key words: cataract, health debt, cataract surgical rate, regulated access to healthcare, prevalence, incidence

DEFINITIONS USED IN THE ARTICLE

1. **Prevalence**: Refers to existing cases; measures the proportion of individuals in a population who have a particular disease or other characteristic at a defined moment, providing an estimate of the likelihood (risk) that a given person is currently ill or will be within a short time frame.
2. **Incidence**: Refers to new cases; measures the number of new cases of a disease (or may be used as an indicator of other events) that arise in a study sample (population) within a defined time period.
   Source: http://www.przeglepidemiol.pzh.gov.pl/media/niezbednik/Miary%20w%20epidemiologii.pdf.
3. **Health Debt**: A limitation in access to appropriate treatment for a specific condition, caused by external or internal factors. The consequences of health debt may include waiting lists for consultations or procedures and an unjustified deterioration in the patient's health.
   Source: own elaboration.
4. **Social Costs**: The costs borne by society as a whole; the sum of private costs and external costs.
   Source: https://encyklopedia.pwn.pl/haslo/koszt-spoleczny;3926347.html.
5. **Cataract Surgical Rate (CSR)**: The number of cataract surgeries performed per million inhabitants per year.
   Source: https://www.iapb.org/learn/vision-atlas/causes-of-vision-loss/cataract/.

INTRODUCTION

Cataracts are among the most frequently diagnosed eye diseases worldwide, and untreated cataracts are a leading cause of blindness [1, 2]. Age is a significant risk factor for cataracts, as confirmed by scientific publications [3, 4]. A study conducted in South Korea on over 20,000 individuals showed that the prevalence of cataracts in the population aged 40 and above was 42.2% [5]. Similarly, a study conducted in India on individuals aged 50 and above indicated a cataract prevalence rate of 62.8% [6]. Data from the National Health Fund in Poland, which show age variations in patients undergoing cataract surgery, also emphasize the need to focus on individuals over the age of 41. In 2019 [7], the percentage of cataract surgeries with simultaneous implantation of an intraocular lens in patients over 41 years of age was 99.5% of all cataract procedures (tab. 1).

In Poland, it is estimated that cataracts affect 2.4% of the general population [8, 9]. However, no epidemiological studies have been conducted so far.

Diagnosing cataracts is straightforward for an ophthalmology specialist, and a single surgical cataract removal procedure has one of the highest success rates among all medical procedures [9]. However, untreated cataracts are still associated with significant social costs, such as the need for care for a dependent patient or the patient's inability to work. These costs may result from limited access to specialist clinics and surgical procedures [10, 11].

TABLE 1

Age distribution of cataract surgery procedures in Poland in 2019.

Age	Number of cataract surgeries	
	Number of procedures	Percentage of procedures
Below 1	2	0.001%
1–6	11	0.003%
7–17	65	0.018%
18–40	1 483	0.417%
41–60	25 037	7.044%
61–80	249 872	70.302%
≥81	78 957	22.215%

Data from the Social Insurance Institution in Poland indicate that in 2019, at least one medical certificate due to the insured person's own illness was issued for ICD-10 diagnoses: H25, H26, H28, affecting 21,385 individuals. The total number of sick leave days due to these conditions amounted to 771,528, averaging over 36 days of absence from work per person [12]. Simultaneously, the American Academy of Ophthalmology, in its 2013 report, stated that the cost of cataract treatment in the USA is lower than the combined expenses required to meet the needs of patients with this condition [13, 14]. This could support the regulation of access to ophthalmic services to ensure unrestricted access to both ophthalmology specialists and cataract surgery. Particularly, offering cataract surgery to all individuals diagnosed with cataracts may result in public sector financial savings and an improvement in the quality of life of up to 20.8% for first-eye surgery and 36.2% for surgeries on both eyes [13, 14].

In the Polish healthcare system, criteria introduced in 2018 stipulate that cataract clouding qualifies a patient for surgery only in cases of significant visual impairment, as measured by visual acuity. Currently, "patient cannot be qualified for surgery if their best-corrected distance visual acuity is better than 0.6" [15]. The introduction of these recommendations for qualifying patients for cataract surgery was followed by an unforeseen limitation in access to specialist clinics and hospital treatment, triggered by the onset of the SARS-CoV-2 pandemic at the beginning of 2020 (tab. 2).

Institutional limitations and the SARS-CoV-2 pandemic may have significantly impacted the prevalence of cataracts, thereby contributing to health debt in this area. The authors of this study define health debt as "a restriction in access to appropriate treatment for a specific condition, caused by external and/or internal factors". The consequences of health debt may include increasing waiting times for doctor consultations or procedures, along with an unjustified dete-

TABLE 2

Number of consultations provided to patients diagnosed with cataracts and number of cataract surgeries performed in Poland from 2019 to 2021 [7, 16].

Cataract diagnosis (H25, H26, H28)	2019	2020	2021
Number of primary care physician consultations	194,369	138,238	159,691
Number of ophthalmology specialist outpatient consultations	315,413	240,889	290,826
Number of cataract surgeries	355,427	233,991	270,667

rioration in the patient's health. As a result, health debt can generate additional social costs.

Attempting to assess the scale of health debt in the context of institutionally regulated access to medical services seems essential. This is particularly relevant as physicians conducting the study observe that individuals require different levels of visual acuity to function without lifestyle adjustments. Visual acuity measurement does not fully capture the degree of vision impairment and quality of life deterioration that patients with confirmed lens clouding may experience.

The authors believe that drawing conclusions about the consequences of limitations in access to cataract treatment based solely on the data presented in table 1 is impossible due to the confounding factor of the pandemic [17]. Therefore, they decided to conduct an epidemiological study with the aim of assessing the prevalence of cataracts in the population of the West Pomeranian Voivodeship, along with evaluating:

- access to cataract treatment without institutional restrictions
- access to cataract treatment based on the established visual acuity criterion [14]
- access to cataract treatment based on the patient's difficulties in daily functioning.

An additional analysis was conducted to assess the treatment costs for patients in each of the 3 scenarios above.

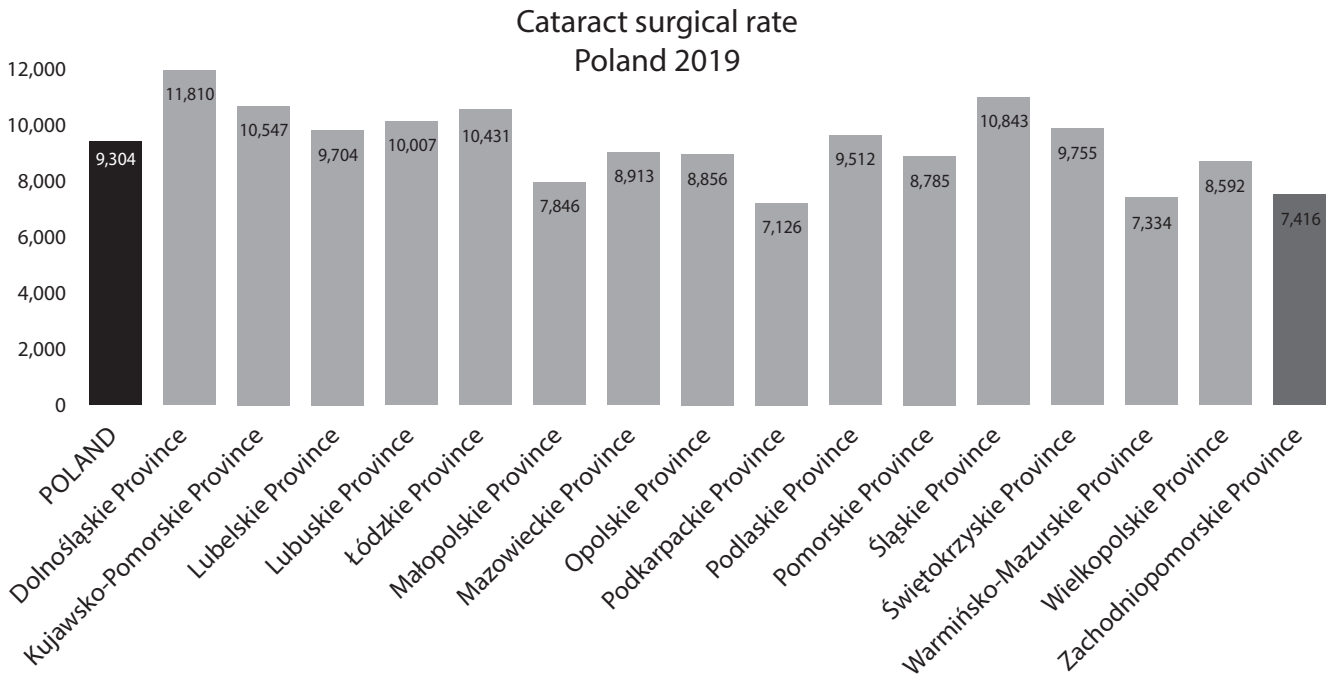
To the authors' knowledge, the analysis of this study's results represents the first attempt to assess the impact of institutional limitations on access to cataract treatment and contributes to research on the social and economic consequences of shaping access to medical services.

MATERIALS AND METHODS

Due to one of the lowest CSR (number of cataract removal surgeries per 1 million people in the population) rates in Poland in 2019 [18], the study focused on the population of the West Pomeranian Voivodeship (fig. 1).

FIGURE 1

CSR Rate (number of cataract removal surgeries per 1 million people in the population). Own calculations based on data from the National Health Fund and the Central Statistical Office.



The study covered 310 people aged 41 or more (average age 68.2 years), including 206 women (66.5%) and 104 men (33.5%), who were asked to provide consent for participation. In order to cover as diverse a population as possible, the study was conducted in 5 different parts of the voivodeship, between July 2021 and June 2022.

TABLE 3

Own calculations based on sample size calculator at https://www.naukowiec.org/dobor.html.

Age group	Population	Sample size	Confidence level	Fraction size	Maximum error
≥41	877,000	310	95%	0.6	5%

Recruitment of subjects was performed via advertisements in local media. The advertisements contained details of where and when the study was to be conducted. The press announcement also specified that eligible for participation were subjects aged 41 or more who had not had an eye appointment for at least 3 previous years (verified by the subject's own declaration). Candidates were registered by phone and were given the time of admission.

During the study, in order to assess functional capacity, the subjects performed a self-assessment of their present condition in terms of visual modality by answering the question: "Do you find that your sight, at present, in some way causes you difficulty in your everyday life?". The responses were marked on a 5-level Likert scale, where:

0 – cannot decide
1 – no, no difficulty
2 – yes, some difficulty
3 – yes, great difficulty
4 – yes, very great difficulty.

In the next stage, ophthalmologists performed an evaluation of patients' best corrected visual acuity with a Snellen chart. The patients' pupils were dilated, and the lens of each eye was examined in a slit lamp [19]. The same ophthalmology team worked at each of the 5 locations.

Data analysis diagrama

On the basis of the epidemiological study results, we defined 3 patient sets (fig. 2) for the purpose of this research.

Set 1 included all subjects with any lens opacity, regardless of its degree.

Set 2 included all subjects from set 1 whose best corrected distance visual acuity was equal to or worse than 0.6.

Set 3 included all subjects from set 1 who indicated in the self-assessment test that they experienced difficulty in everyday life (i.e. chose answers 2, 3 or 4 in the questionnaire).

RESULTS

Presence of lens opacities

Presence of lens opacities in the population aged 41 and older: total

Of the 310 patients included in the study, 199 (64.19%) had lens opacities and 111 (35.81%) did not. Prevalence by eye (left, right) was similar: cloudy lens was diagnosed in 192 (61.94%) right eyes and 191 (61.61%) left eyes (tab. 4).

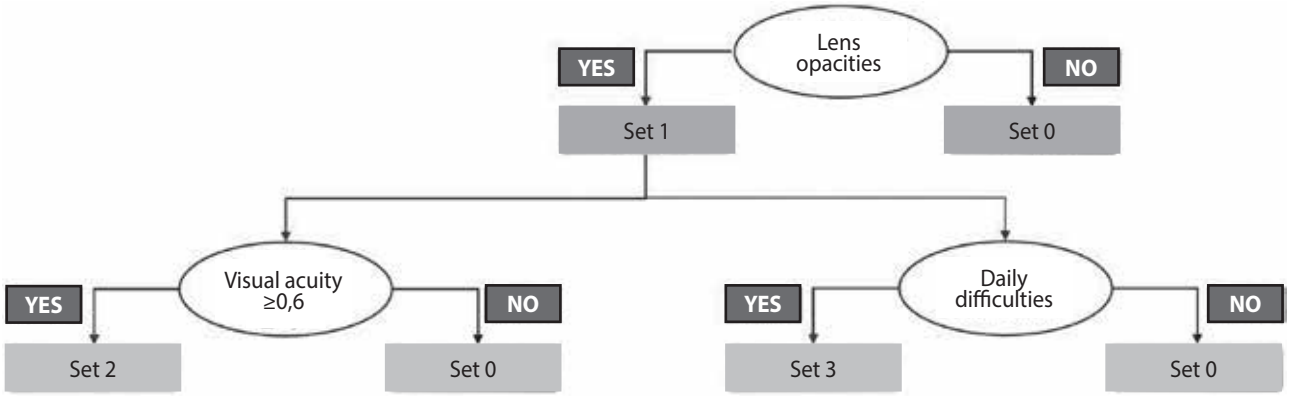
TABLE 4

Lens opacities in the study population by eye (left/right).

Incident	Lens opacities: right eye		Lens opacities: left eye	
	n	%	n	%
Yes	192	61.94	191	61.61
No	118	38.06	119	38.39
TOTAL	310	100.00	310	100.00

FIGURE 2

Data analysis flowchart.



Presence of lens opacities and best corrected distance visual acuity of ≤0.6.

Visual acuity as a categorical variable and presence of cataract

Subjects with lens opacities in the right eye had a significantly higher (p <0.001) rate of best corrected distance visual acuity equal to or worse than 0.6 (93; 48.44%) than subjects without lens opacities (16; 13.56%) (tab. 5). Subjects with lens opacities in the left eye had a significantly higher (p <0.001) rate of best corrected distance visual acuity equal to or worse than 0.6 (91; 47.64%) than subjects without lens opacities (20; 16.95%) (tab. 5).

TABLE 5

Visual acuity as a categorical variable and presence of cataract – right and left eye.

Visual acuity	Total (n = 310)	Lens opacities: right eye		p-value*
		NO (n = 118)	YES (n = 192)	
0 (0.7–1)	201 (64.84)	102 (86.44)	99 (51.56)	<0.001**
1 (0–0.6)	109 (35.16)	16 (13.56)	93 (48.44)	
Visual acuity	**Total (n = 310)**	**Lens opacities: left eye**		**p-value***
		NO (n = 119)	YES (n = 191)	
0 (0.7–1)	198 (63.87)	98 (82.35)	100 (52.36)	<0.001**
1 (0–0.6)	112 (36.13)	21 (17.64)	91 (47.64)	

*χ^2Test; **p <α, α = 0.05.*

Descriptive statistics for the visual acuity variable

On the basis of raw data regarding best corrected distance visual acuity equal to or worse than 0.6, statistical significance (p <0.001) was observed in the distribution of this study parameter: in the left and right eye the median visual acuity in cataract patients equaled 0.70 and in non-cataract eyes median = 1 (tab. 6).

TABLE 6

Descriptive statistics for the visual acuity variable.

Presence of opacities	n	M	SD	Min	Max	Q1	Me	Q2	p-value*
Right eye									
YES	192	0.65	0.31	0.00	1.00	0.40	0.70	1.00	<0.001**
NO	118	0.89	0.21	0.06	1.00	0.90	1.00	1.00	
TOTAL	310	0.74	0.30	0.00	1.00	0.50	0.90	1.00	-
Left eye									
YES	191	0.64	0.32	0.00	1.00	0.40	0.70	1.00	<0.001**
NO	119	0.87	0.24	0.00	1.00	0.80	1.00	1.00	
TOTAL	310	0.73	0.31	0.00	1.00	0.50	0.90	1.00	-

** Mann–Whitney U test; **p <α, α = 0.05.*
n – number; M – mean; Me – median; Q1 – first quartile; Q2 – second quartile; SD – standard deviation.

PRESENCE OF LENS OPACITIES AND DIFFICULTIES IN EVERYDAY LIFE ESTABLISHED BY SELF-ASSESSMENT

Lens opacities is a factor that contributes to functional difficulties in the daily life of patients. The subjective assessment performed by patients revealed that subjects with opacities in either the right or left eye most often reported some difficulty (157, 50.65%) and great difficulty (80; 25.81%). The difficulty in everyday life did not depend on whether opacities was present in the right or in left eye (p >α). The reason might be that patients without cataract in the right eye do have it in the left one and vice versa (tab. 7).

TABLE 7

Difficulty in daily living vs. presence of clouding in the right and left eye.

Daily difficulties	TOTAL (n = 310)	Lens opacities: right eye		p-value*	Lens opacities: left eye		p-value*
		NO	YES		NO	YES	
		(n = 118)	(n = 192)		(n = 119)	(n = 191)	
0	13 (4.19)	5 (4.24)	8 (4.17)	0.068	4 (3.36)	9 (4.71)	0.170
1	36 (11.61)	19 (16.10)	17 (8.85)		19 (15.97)	17 (8.90)	
2	157 (50.65)	65 (55.08)	92 (47.92)		64 (53.98)	93 (48.69)	
3	80 (25.81)	22 (18.64)	58 (30.21)		25 (21.01)	55 (28.80)	
4	24 (7.74)	7 (5.93)	17 (8.85)		7 (5.88)	17 (8.90)	

χ^2Test; p >α, α = 0.05.

Economic analysis

The cost analysis of eliminating health debt in relation to cataract surgeries in the population of the Zachodniopomorskie Province was based on the data collected in this study, with the three sets of potential treatment candidates (tab. 8).

TABLE 8

Number of eyes potentially eligible for cataract surgery.

Eyes total		Eyes with lens opacities					
		Total		Visual acuity ≤0.6		Daily difficulties	
count	%	count	%	count	%	count	%
620	100	383		184	29.7	332	53.6

Our results may be used to establish the total level of expenditure on the surgical treatment of cataract. Research shows that incidence rates are correlated with age and higher in the older age groups. The age structure of the study sample was different than in the general population of the region (tab. 9), with overrepresentation of subjects aged 61–80 and ≥81, and underrepresentation of subjects aged 41–60.

TABLE 9

Age distribution in the study population vs. the general population of the region.

Study age group (years)	Region population [20]		Study population	
	count	%	count	%
41–60	436,925	49.8	44	14.2
61–80	379,518	43.3	234	75.5
≥81	60,557	6.9	32	10.3
TOTAL	877,000	100	310	100

In order to extrapolate the study results on the number of opacities lens eyes, the results were compared with the population values in three age groups. The age group division was based on the data grouping used by the public payer (NFZ) in its databases.

The estimation of total need for surgical treatment of cataract was conducted for the 3 sets defined in the Methods section. The results of the empirical study for these sets, by age groups, are presented in table 10.

TABLE 10

Number of eyes eligible for surgical treatment by age group and by access limiting criteria.

Age group	Eyes with lens opacities					
	Total		Visual acuity ≤0,6		Difficulty	
	count	% sample	count	%	count	%
41–60	33	37.50	15	17.05	31	35.23
61–80	307	65.60	134	28.63	266	56.84
≥81	43	67.19	35	54.69	35	54.69
TOTAL	383	61.77	184	29.68	332	53.55

The cost of the standard cataract surgery in Poland is determined by three elements subject to separate funding from the public payer:

Qualification visit: 56.80 PLN
Cataract surgery: 2,720.72 PLN
Follow-up visit: 660.30 PLN

Data as of 1st July 2023. The provided values refer to the hospitalization mode, funded under group B19G (over 95% of all procedures). The total cost of surgical treatment of cataract was assumed to be 3,437.82 PLN, only taking into account the direct costs incurred by the public payer. Budget Impact Analysis (BIA) was performed in accordance with the ISPOR-SMDM guidelines. We ignored the indirect costs associated with the patients (and in some cases also their families) being excluded from professional activity, although it should be noted that these costs do exist, as cataract is one of the major reasons for sick leaves. Also ignored were expenses associated with post-surgery complications and secondary cataract, as well as medication expenses (both reimbursable and out of pocket) incurred directly by the patient, since there is no detailed information on the level of these expenses.

The total number of eyes with lens opacities was equivalent to 61.77% of the sample – 37.50%, 65.60% and 67.19%, respectively, in the defined age groups. These rates were extrapolated to the general population of the region. Assuming equivalent prevalence rates of lens opacities in the population of the region, over 450,000 people aged ≥41 may be expected to require surgical treatment of cataract (tab. 11). Total treatment expenses for the payer would then amount to 1,559,013,554 PLN. It must be noted that these are not annual expenses, but total expenses for the treatment of the above patient group, measured in terms of current payer costs.

TABLE 11

Costs of cataract treatment in patients with lens opacities.

Age group	Eyes with lens opacities					
	Total					
	Count	% sample	Region population	Statistical number of patients	Expenditure (PLN)	Total cost (PLN)
41–60	33	37.50	436,925	163,846	3,437,82	563,273,055.72
61–80	307	65.60	379,518	248,957	3,437,82	855,869,353.74
≥81	43	67.19	60,557	40,686	3,437,82	139,871,144.52
TOTAL	383		877,000	453,489		1,559,013,553.98

The percentage of eyes with lens opacities and best corrected distance visual acuity equal to or worse than 0.6 was 29.68% of the sample, and the rates for the individual sets were lower than in the first set for each age group (17.05%, 28.63% and 54,69%, respectively). It should be noted that the difference versus the total number of subjects with lens opacities is the smallest in the ≥81 age group, meaning that in this group, the most patients had both opacities and visual acuity of 0.6 at best.

Assuming equivalent prevalence rates of lens opacities and poor visual acuity in the population of the region, approx. 216,000 people aged ≥41 may be expected to require surgical treatment of cataract (tab. 12). Total expenses for the payer in this scenario would amount to 743,452,640 PLN, i.e. almost 48% of the figure from the previous scenario.

The last patient set included subjects who declared having difficulty in daily life. The total percentage of eyes in this group was 53.55% of the sample: 35.23%, 56.84%, and 54.69% in the 41–60, 61–80 and ≥81 age groups, respectively. In the first age group, the results are most consistent with the numbers of patients suffering from lens opacities – a significant majority of subjects aged 41–60 report difficulty in

TABLE 12

Costs of treatment in patients with lens opacities and visual acuity ≤ 0.6.

Age group	Eyes with lens opacities					
	Visus ≤0.6					
	Count	% sample	Region population	Statistical number of patients	Expenditure (PLN)	Total cost (PLN)
41–60	15	17.05	436,925	74,475	3,437.82	256,031,644.50
61–80	134	28.63	379,518	108,665	3,437.82	373,570,710.30
≥81	35	54.69	60,557	33,117	3,437.82	113,850,284.94
TOTAL	184		877,000	216,257		743,452,639.74

daily living caused by vision problems. Assuming equivalent prevalence rates of lens opacities and difficulty in the population of the region, over 400,000 people aged ≥41 may be expected to require surgical treatment of cataract (tab. 13). Total expenses for the payer in this scenario would amount to 1,384,551,064.62 PLN.

TABLE 13

Costs of treatment in patients with lens opacities and difficulties in daily life due to vision problems.

Age group	Eyes with lens opacities					
	Daily difficulties					
	Count	% sample	Region population	Number of patients	Expenditure (PLN)	Total cost (PLN)
41–60	31	35.23	436,925	153,916	3,437.82	529,135,503.12
61–80	266	56.84	379,518	215,708	3,437.82	741,565,276.56
≥81	35	54.69	60,557	33,117	3,437.82	113,850,284.94
TOTAL	332		877,000	402,741		1,388,551,064.62

TABLE 14

Summary of treatment cost differences between different patient sets.

Item	Lens opacities		
	All	Visual acuity ≤0.6	Daily difficulties
Total costs (PLN)	1,559,013,553.98	743,452,639.74	1,388,551,064.62
Percentage of maximum costs	100%	48%	89%

DISCUSSION

Healthcare system decision-makers have tools (legal, financial, and medical solutions) that enable them to regulate the supply of medical services provided with public funding. These tools include price control, preferred quality standards for medical products, and, relevant to this study, medical restrictions that serve as a basis for qualifying patients for a particular publicly funded medical procedure. Although the approach of imposing limitations on access to medical services by healthcare system decision-makers conflicts with the principle upheld by the World Health Organization –namely, that the effectiveness of a healthcare system is measured by its ability to ensure health for every citizen – it could be argued that such an approach may be justified in poorer countries. However, it is difficult to understand the introduction of restrictions for a procedure whose effectiveness has been confirmed, and where lack of treatment, as demonstrated in this article, leads to social costs that far exceed the treatment costs for all patients for whom lens clouding impedes daily functioning.

Adopting a model in which all individuals diagnosed with lens clouding have the option to undergo intraocular lens implantation surgery assumes that these individuals feel the need for surgery. However, as observed by ophthalmology specialists, each person requires a different level of visual acuity to function safely and effectively in society. Thus, despite the undeniable benefits of reducing social costs, we should not require that every individual with diagnosed lens clouding be automatically qualified for cataract surgery.

At the opposite end of the spectrum is a qualification model for surgery based on a minimum visual acuity criterion. Our analysis indicates that while the public payer's costs for this model account for only 48% of the costs associated with providing cataract surgery to all patients, this approach may lead to an increase in sick leave days for individuals affected by lens clouding and their caregivers. In cases where daily functioning is significantly impaired, patients may also bear private costs for procedures performed outside the public system. Implementing such a model in the public healthcare system results in a growing number of patients requiring specialist medical care, which not only extends waiting times for consultations in public specialist clinics but also drives up costs for ophthalmology consultations.

The third model we analyzed involves performing surgical cataract removal for individuals whose lens clouding significantly impacts their daily lives. Considering the importance of good vision, this model appears to be the most rational option for implementation in the public healthcare system. Each person affected by lens clouding can independently assess the extent to which it disrupts their daily functioning. For example, a professional driver or someone whose job requires precise vision is likely to seek cataract treatment sooner, as visual acuity is crucial not only for their personal

life but also for their professional responsibilities. Conversely, elderly individuals, particularly those receiving family support, might defer surgery, especially if the clouding is mild and affects only one eye. A qualification model based on a self-assessment of daily difficulties may best serve both patients and their families, while also reducing public healthcare expenditures for cataract surgery and decreasing patient demand for specialist clinic visits.

When addressing health debt and the costs required to eliminate it, we must emphasize that in analyzing the economic aspects of our results and the potential public budget burden associated with lifting restrictions on specialist access, we did not consider the indirect costs associated with delaying cataract surgery. Therefore, to determine the actual budgetary impact (including the public payer's budget, social insurance budget, and GDP losses), it would first be necessary to estimate, for example, following the calculations of the American Academy of Ophthalmology, the indirect costs related to caring for visually impaired individuals due to cataracts, sick leave costs, the extended time required for advanced cataract surgery, and GDP losses. However, it can already be assumed that accounting for such costs would only strengthen the rationale for removing restrictions on access to treatment.

CONCLUSIONS

Based on the number of surgeries performed in various regions of Poland, we can infer that there is a disparity in the number of cataract removal procedures with simultaneous artificial lens implantation per capita in each region. Considering that age-related cataracts affect individuals regardless of their place of residence, it is essential to emphasize that there should be equal access to treatment across all areas of Poland to meet the same societal needs for healthcare availability.

This study found that lens clouding occurs in 64.19% of the population over 41 years of age, which, compared to reports estimating that 2.4% of the entire Polish population suffers from cataracts, suggests that previous data may not accurately reflect the actual need for treatment. However, according to the authors, the primary reason for the high percentage of individuals with diagnosed lens clouding could be the limitations in access to general practitioners and specialist clinics during the SARS-CoV-2 pandemic, resulting in fewer diagnoses and, consequently, fewer surgical qualifications. Institutional restrictions on cataract surgery qualifications also play a significant role, with public health regulators and the Polish Ophthalmological Society requiring specialists to qualify only those with visual acuity ≤0.6 for surgery, thus enabling full visual acuity restoration for only 48% of cataract patients.

As the results of this study indicate, visual acuity as a criterion for treatment qualification does not meet the needs of individuals for whom vision dysfunction poses a problem in daily activities. The findings show that 89% of people with lens clouding report difficulties in daily functioning due to vision quality. Changing cataract treatment qualification criteria to prioritize patients' functional difficulties over visual acuity would increase current expenditures by 86%. However, the American Academy of Ophthalmology has stated that the cost of cataract treatment is lower than the total expenses required to support patients' needs. Funding cataract treatment based on patients' actual needs could reduce costs related to sick leave and caregiving for individuals with vision impairment caused by lens clouding.

CORRESPONDENCE
Arnold Maciejewski, MSc
Department of Management Accounting,
Warsaw School of Economics
Al. Niepodległości 162, 02-591 Warszawa
e-mail: amaciej3@sgh.waw.pl

ORCID
Arnold Maciejewski – ID – http://orcid.org/0000-0001-5301-0075
Karol Krzystolik – ID – http://orcid.org/0000-0002-7695-0788
Monika Drobek-Słowik – ID – http://orcid.org/0009-0008-2199-7221
Agnieszka Strzelecka – ID – http://orcid.org/0000-0002-4182-2268
Michał Chrobot – ID – http://orcid.org/0000-0003-3242-4679
Kamila Kocańda – ID – http://orcid.org/0000-0002-0598-2002
Monika Raulinajtys-Grzybek – ID – http://orcid.org/0000-0002-2451-8061

References

1. The World health report: 1998: Life in the 21st Century: a vision for all: report of the Director-General. World Health Organization. 1998; A51/3. https://apps.who.int/gb/archive/pdf_files/WHA51/ea3.pdf.
2. GBD 2019 Blindness and Vision Impairment Collaborators; Vision Loss Expert Group of the Global Burden of Disease Study. Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. Lancet Global Health. 2021; 9(2): e144-60. https://doi.org/10.1016/S2214-109X(20)30489-7.
3. Robman L, Taylor H. External factors in the development of cataract. Eye. 2005; 19 (10): 1074-82. http://dx.doi.org/10.1038/sj.eye.6701964.
4. Song P, Wang H, Theodoratou E et al. The national and subnational prevalence of cataract and cataract blindness in China: a systematic review and meta-analysis. J Glob Health. 2018; 8(1): 010804. https://doi.org/10.7189/jogh.08-010804.
5. Sang JP, Ju HL, Se WK et al. Cataract and cataract surgery: Nationwide Prevalence and Clinical Determinants. J Korean Med Sci. 2016; 31(6): 963-71. http://dx.doi.org/10.3346/jkms.2016.31.6.963.
6. Aarthi R, Roy G, Kar SS et al. Prevalence of cataract among adults above 50 years in a rural community of Villupuram, Tamil Nadu. Int J Adv Med Health Res. 2015; 2(1): 50-54. http://dx.doi.org/10.4103/2349-4220.159170.
7. Data from the National Health Fund (February 2023 r.). https://statystyki.nfz.gov.pl.
8. Partyka O, Wysocki MJ. Epidemiologia chorób narządu wzroku oraz infrastruktura okulistyki w Polsce. Przegląd Epidemiologiczny. 2015; 68: 905-8.
9. Seredyk-Butruk M, Błoch W, Stępniewski P. Zaćma – problem starzejącego się społeczeństwa, cz. IV. Historia i współczesne metody operacji zaćmy. Optyka. 2019; 6: 58-61.
10. Grzybowski A, Maciejewski A. Koszt społeczny odroczonej operacji zaćmy z wszczepieniem soczewki wewnątrzgałkowej. OpthaTherapy. 2016; 3(1): 53-8.
11. Raulinajtys-Grzybek M, Wachowicz R, Maciejewski A. Skuteczna i ekonomiczna organizacja opieki zdrowotnej nad pacjentami z zaćmą. OpthaTherapy. 2018; 5(2): 119-27. https://doi.org/10.24292/01.OT.290618.10.
12. Information from the Health Insurance Fund received electronically in response to an inquiry from the President of the Polish Society of Medical Coders 9.03.2023.
13. Brown GC, Brown MM, Menezes A et al. Cataract Surgery Cost Utility Revisited in 2012. A new Economic Paradigm. Ophthalmology. 2013; 120(12) 2367. http://dx.doi.org/10.1016/j.ophtha.2013.04.030.
14. Cataract surgery saves $123.4 billion in cost, delivers 4,567% return to society. American Academy of Ophthalmology. ScienceDaily. 2013; 15 November. https://www.sciencedaily.com/releases/2013/11/131115104553.htm.
15. Grabska-Liberek I, Lubiński W, Rejdak R et al. Standard kwalifikacji do zabiegu usunięcia zaćmy. https://scop.org.pl/wp-content/uploads/2018/07/Standard_kwalifikacja.pdf.
16. Data from the Ministry of Health (Poland) (February 2023). https://basiw.mz.gov.pl/mapy-informacje/mapa-2022-2026/analizy/.
17. Eshghi SRT, Cheema M, Damji KF. Effect of the COVID-19 pancemic on elective cataract surgery wait times. Can J Ophthalmol. 2024; 59(1): P3-6. https://doi.org/10.1016/j.jcjo.2022.09.001.
18. Limburg H, Ramke J. Cataract indicators: their development and use over the last 30 years. Community Eye Health. 2017; 30(100): 82-4.
19. Acosta R, Hoffmeister L, Roman R et al. Systematic review of population-based studies of the prevalence of cataracts. Archivos de la Sociedad Espanola de Oftalmología. 2006; 81(9): 509-16.
20. Statistics Poland. https://bdl.stat.gov.pl/bdl/start. December 2022.

Authors' contributions:
Arnold Maciejewski – 25%
Karol Krzystolik – 20%
Monika Drobek-Słowik – 20%
Agnieszka Strzelecka - 15%
Michał Chrobot – 5%
Kamila Kocańda – 5%
Monika Raulinajtys-Grzybek – 10%.

Conflict of interest:
None.

Financial support:
None.

Ethics:
The content presented in the article complies with the principles of the Helsinki Declaration, EU directives and harmonized requirements for biomedical journals.