

# Changing trend of cataract blindness and visual outcomes after cataract surgery in adults aged 50 years and older: findings from the national eye surveys in Malaysia

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## ABSTRACT

**Background/aims** Population surveys are required to measure the prevalence of cataract blindness in the community. We conducted simultaneous surveys in two regions in Malaysia in 2023 to estimate the prevalence of untreated cataract, measure the visual outcomes after cataract surgery and compare the results with the survey in 2014.

**Methods** The surveys were done in Eastern and Sarawak administrative regions using the rapid assessment of avoidable blindness technique. It involved a multistage cluster sampling method, each cluster comprising 50 residents aged 50 years and older. The prevalence of cataract was determined through a visual acuity (VA) check and eye examination. The VA of those who had undergone cataract surgery was measured, and the findings were compared with the previous survey.

**Results** A total of 9709 subjects, 50 years old and older, were examined (percentages of response were 94.5% and 96.2% for Eastern and Sarawak, respectively). Comparing the current to the previous survey in 2014, the prevalence of cataract at all levels of surgical thresholds (except unilateral VA <6/60 and <6/18 in the Eastern) was reduced. The percentages of cataract surgery visual outcomes with good VA (6/12) were improved, and those with poor VA (<6/60) were reduced in both regions.

**Conclusion** There was a reduction in cataract prevalence and improved visual outcomes in both regions. These favourable results could be attributed to the surgical performance monitoring initiatives and the community cataract programme implemented soon after the survey in 2014.

## INTRODUCTION

Malaysia is one of the 37 member states of the WHO Western Pacific Region.<sup>1</sup> As part of the global and regional eye health agendas, Malaysia has been actively engaged with other countries within the Western Pacific Region in planning, implementing and monitoring community programmes related to the prevention of blindness and low vision (PBL)

### WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Population-based surveys are used to report the prevalence of blindness and its various causes.

### WHAT THIS STUDY ADDS

⇒ This study demonstrates the impact of timely intervention of cataract blindness and quality audits, which will improve the quality of eye care services.

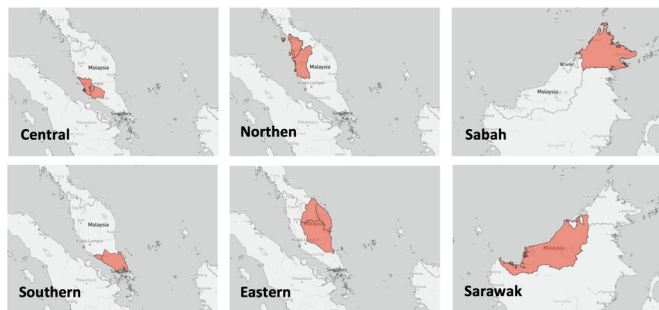
### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ We hope this study will influence national policies in channelling appropriate resources in outreach programmes to reduce the burden of cataract blindness.

initiatives. The activities' coverage expanded and strengthened after the country endorsed and signed the World Health Assembly (WHA) 66.4 resolution in May 2013.<sup>2 3</sup> By signing the resolution, Malaysia is committed to being part of the Global Action Plan, the core activity and aim of which is providing Universal Health Care to the population.<sup>3</sup>

Malaysia is divided into six regions for the PBL administrative purposes: Northern, Eastern, Central, Southern, Sabah and Sarawak (figure 1). Simultaneous surveys were done in 2014 for each region as a baseline, and the results were published. The main finding of the surveys was a higher prevalence of cataract blindness in the peripheral regions, namely Sabah, Sarawak, Northern and Eastern Regions, and a discrepancy between all regions.<sup>4</sup> One of the national action plans planned and implemented was to introduce a community interventional eyecare programme, which could potentially reach the underserved population, especially in remote areas.

Sarawak started its basic cataract outreach programme in the 1980s, funded by local



**Figure 1** Six administrative regions in Malaysia. This study surveyed only the Eastern and Sarawak regions. Reprinted from RAAB Repository <https://www.raab.world/map> under a CC BY license, with permission from OpenStreetMap Foundation (OSMF), original copyright year 2024. RAAB, rapid assessment of avoidable blindness.

non-governmental organisations (NGOs). Conventional methods of cataract surgeries (manual extracapsular cataract extraction with intraocular implantation) were done at the provisional hospitals within the state following primary screenings in the population conducted by the NGOs. There were up to 10 provisional hospitals, but each district had basic operating theatre facilities. Although the outings were infrequent (3–4 times per year) and were fund-dependent, the intervals were regular for service marketing and community advocacy purposes. Although no similar outreach activity was running for the Eastern Region, the Public Health Ophthalmologist had been conducting regular training and privileging for the primary eye care providers within the region since the 1990s. This training exposed them to the necessary knowledge and skills in eye care. Both regions were selected because they had the necessary eyecare ownership and network among the hospitals, the health state departments, the NGOs and the community leaders, which would ensure the sustainability of a community programme. Each region had a public health ophthalmologist who could monitor and champion the programme. Guided by the availability of the network, community support and champions to sustain the programme, Sarawak and the Eastern Region were selected as the regions where this programme would be piloted.

This study aimed to determine whether there has been a difference or improvement in the prevalence of cataract and visual outcomes after cataract surgery between the two administrative regions from the previous survey.

## METHODS

These cross-sectional, population-based surveys, which followed the WHO-recommended Rapid Assessment of Avoidable Blindness (RAAB) protocol, were conducted simultaneously from 27 July to 7 October 2023. The surveys also collected data on the prevalence of vision impairment and its causes, cataract surgical coverage and refractive error coverage, the results of which will be discussed in another manuscript.

Each region had six data collector teams comprising three persons: two doctors and one allied health staff member trained in ophthalmology. Each team was responsible for surveying 16–17 randomly selected clusters, examining 50 residents aged 50 years and older. Population sampling was per RAAB methodology, a widely used, population-based survey of the prevalence of vision impairment and its causes. The RAAB survey protocol and methodology have been described elsewhere.<sup>5</sup>

## Sampling frame

Department of Statistics, Malaysia (DOSM) conducts nationwide data collection for the National Population and Housing Census once every 10 years. An enumeration block (EB), the smallest population unit, with 80–120 living quarters each, was outlined based on the latest findings and the population distribution. DOSM also developed the corresponding geographical maps, indicating the exact location and boundaries of each EB. The EBs are gazetted for field work operations, for example, Morbidity, Nutrition, Household Expenditure and Labor Force Survey.<sup>6</sup> The complete list of all EBs from the 2020 national census was used to select clusters for the RAAB. A total of 105 EBs were randomly chosen for Eastern and 98 EBs for Sarawak regardless of strata, using the probability proportionate to size technique. Individual EB codes and the corresponding maps were then used to identify the location of the EBs during fieldwork data collection.

## Training

Training for survey teams was conducted separately in each region before the fieldwork by a certified Western Pacific RAAB trainer to ensure data quality and strict adherence to study protocol. Survey team members were required to attend four training days, including RAAB lectures, interobserver variation assessment and an actual survey in one of the nearby EBs during fieldwork. Each region had one coordinator responsible for the smooth implementation and progress of the survey.

## Survey methods

Each team was assigned to survey 16–17 EBs. Subjects were selected from each block using the Compact Segment Sampling method. The population area was divided into segments of equal population size, enough to provide the required number of eligible people aged 50 years and older. If the subject was unavailable at home, the contact number would be taken from the neighbours, and a revisit would be done before the team left the survey area. If the subject could not be examined after three revisits, this person would be recorded as ‘not available’, and the vision status reported by relatives or neighbours would be taken. Door-to-door interviews were conducted in each randomly selected EB. Subjects were recruited if they were 50 years and older and gave informed consent. A total of 50 subjects were recruited in each

**Table 1** Examination Status, NES III (2023)

Examination status:	Female		Male		Total	
	n	%	n	%	n	%
Eastern						
Examined*	2829	95.6	2132	93	4961	94.5
Refused	20	0.7	17	0.7	37	0.7
Incapable	83	2.8	105	4.6	188	3.6
Unavailable	26	0.9	38	1.7	64	1.2
Total†	2958	100.0	2292	100.0	5250	100.0
Sarawak						
Examined*	2691	96.4	2057	96	4748	96.2
Refused	28	1.0	8	0.4	36	0.7
Incapable	67	2.4	74	3.5	141	2.9
Unavailable	6	0.2	3	0.1	9	0.2
Total†	2792	100.0	2142	100.0	4934	100.0

\*Total examined (percentage is the response rate).  
 †Total enumerated.  
 NES, National Eye Survey.

EB. All recruited subjects had a brief interview, during which demographic, medical and ocular history data were taken. It was followed by a visual acuity (VA) assessment at a distance of 3 m using a built-in Snellen chart in tablets installed with the RAAB7 application.<sup>7,8</sup> The pinhole vision was checked when required. The distance was measured using a measuring tape. All data entries were recorded in the application with built-in capacity for data quality checks and cloud management. In the previous National Eye Survey II (NES II) in 2014, the measurement for VA was at 6 m using a tumbling E chart and pinhole when necessary. The distance was measured using a premeasured rope, and the measurement of the VA was recorded preliminarily in the manual RAAB form, followed by double data entry into the RAAB6 software. In NES III, there was an added workflow to check VA (uncorrected distant VA (UCVA) followed by corrected VA (CVA) and Pinhole VA (PinVA)). In NES II, either PVA (with available correction) or PinVA (with available correction) was tested.

An eye examination was performed by the doctors in the survey team using a hand-held ophthalmoscope. Should subjects have a vision impairment, the primary cause was identified, and the subjects were referred to the nearest ophthalmic care facility for further management.

### Definition

NES II was conducted in 2014, and the survey under discussion, NES III, was conducted in 2023. Although the later survey only involved two out of six regions, the national PBL committee agreed to maintain the 'National/NES' brand for advocacy purposes.

The prevalence of cataract and visual outcomes were reported using PinVA in the better eye. Vision

impairment categories were defined according to the VA thresholds used in the WHO's International Classification of Diseases-11)<sup>9</sup>:

- ▶ Blindness: VA less than 3/60 in the better eye.
- ▶ Severe VI: VA less than 6/60 to 3/60 in the better eye.
- ▶ Moderate VI: VA less than 6/18 to 6/60 in the better eye.
- ▶ Mild VI: VA less than 6/12 to 6/18 in the better eye

Presenting VA (PVA) was derived from the UCVA and CVA inputs (if only UCVA was available, PVA=UCVA and if UCVA and CVA were available, PVA=CVA, assuming a habitually wearing). PinVA would be tested if VA worse than 6/12.

### Sample size calculation

The latest population data were obtained from the Malaysian National Census 2020.<sup>10,11</sup> A prevalence of blindness of 1.5% in Eastern and 1.6% in Sarawak among subjects aged 50 and older from NES II (2014) was used in the calculation using a 95% CI, precision of 30% and estimated design effect of 1.5. It took into consideration the possibility of 20% non-response.<sup>4,5</sup> The calculation resulted in a sample size of 105 clusters (5239 subjects aged 50 years and older) and 98 clusters (4900 subjects aged 50 years and older) for Eastern and Sarawak, respectively.

### Statistical analysis

Data were entered into the cloud-based RAAB7 software using tablets. It reported the prevalence of cataract and visual outcomes in percentages and 95% CI values by adjusting for age and sex. Other categorical data were reported in frequency and percentage. Digital reports were generated automatically in real time and accessible

**Table 2** Adjusted prevalence of cataract at surgical thresholds <3/60, <6/60, <6/18 and <6/12 comparing NES II (2014) and NES III (2023)

	NES II (2014)			NES III (2023)		
	Female	Male	Total	Female	Male	Total
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
<b>Eastern</b>						
Bilateral						
PinVA<3/60	0.8 (0.3 to 1.3)	0.1 (0.0 to 0.3)	0.4 (0.1 to 0.7)	0.5 (0.2 to 0.8)	0.3 (0.1 to 0.6)	0.3 (0.2 to 0.5)
PinVA<6/60	1.3 (0.7 to 2.0)	0.5 (0.0 to 1.2)	0.9 (0.5 to 1.4)	0.7 (0.3 to 1.0)	0.6 (0.3 to 0.9)	0.5 (0.3 to 0.8)
PinVA<6/18	4.3 (3.1 to 5.5)	2.5 (1.4 to 3.7)	3.4 (2.6 to 4.3)	3.1 (2.4 to 3.9)	2.3 (1.6 to 2.9)	2.4 (1.9 to 3.0)
PinVA<6/12	10.1 (8.2 to 12.0)	7.3 (5.3 to 9.2)	8.7 (7.3 to 10.1)	5.2 (4.2 to 6.2)	4.3 (3.3 to 5.2)	4.3 (3.6 to 5.1)
Unilateral						
PinVA<3/60	2.8 (1.7 to 3.8)	2.2 (1.2 to 3.1)	2.5 (1.7 to 3.3)	2.2 (1.6 to 2.8)	2.4 (1.6 to 3.1)	2.3 (1.8 to 2.8)
PinVA<6/60	3.3 (2.1 to 4.5)	2.3 (1.3 to 3.4)	2.8 (2.0 to 3.7)	3.2 (2.5 to 4.0)	3.0 (2.1 to 3.8)	3.1 (2.5 to 3.6)
PinVA<6/18	6.4 (4.7 to 8.0)	4.8 (3.2 to 6.3)	5.6 (4.4 to 6.8)	6.2 (5.1 to 7.2)	5.7 (4.5 to 6.8)	5.8 (5.0 to 6.7)
PinVA<6/12	10.5 (8.4 to 12.5)	8.8 (6.3 to 11.4)	9.7 (8.0 to 11.3)	8.3 (7.2 to 9.4)	7.9 (6.4 to 9.4)	8.0 (7.1 to 9.0)
<b>Sarawak</b>						
Bilateral						
PinVA<3/60	1.1 (0.5 to 1.8)	0.2 (0.0 to 0.4)	0.6 (0.2 to 1.0)	0.4 (0.2 to 0.7)	0.1 (0.0 to 0.3)	0.3 (0.1 to 0.4)
PinVA<6/60	1.3 (0.7 to 2.0)	0.5 (0.1 to 0.9)	0.9 (0.5 to 1.3)	0.6 (0.3 to 1.0)	0.4 (0.1 to 0.6)	0.5 (0.3 to 0.7)
PinVA<6/18	6.7 (5.0 to 8.4)	5.2 (3.6 to 6.8)	5.9 (4.5 to 7.3)	3.1 (2.3 to 3.8)	2.5 (1.8 to 3.2)	2.6 (2.0 to 3.2)
PinVA<6/12	16.1 (12.6 to 19.6)	11.5 (8.5 to 14.5)	13.7 (10.8 to 16.7)	7.4 (6.1 to 8.6)	5.7 (4.6 to 6.9)	6.2 (5.2 to 7.3)
Unilateral						
PinVA<3/60	3.2 (2.2 to 4.2)	3.1 (2.0 to 4.2)	3.1 (2.4 to 3.8)	2.2 (1.5 to 2.8)	1.9 (1.2 to 2.6)	2.0 (1.5 to 2.6)
PinVA<6/60	4.2 (2.8 to 5.6)	3.6 (2.3 to 4.9)	3.9 (2.9 to 4.9)	2.9 (2.2 to 3.6)	2.8 (1.9 to 3.6)	2.9 (2.3 to 3.5)
PinVA<6/18	8.4 (6.7 to 10.2)	7.3 (5.7 to 8.8)	7.8 (6.7 to 9.0)	5.8 (4.7 to 7.0)	5.3 (4.0 to 6.5)	5.6 (4.6 to 6.5)
PinVA<6/12	10.9 (9.0 to 12.8)	11.3 (8.9 to 13.7)	11.1 (9.5 to 12.7)	10.1 (8.8 to 11.4)	8.8 (7.3 to 10.2)	9.4 (8.4 to 10.5)

NES, National Eye Survey; PinVA, pinhole visual acuity; VI, vision impairment.

to the authorised investigators through the web-based portal.

### Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of our research.

### RESULTS

A total of 10184 subjects, 50 years old and older, were enumerated: Eastern, n=5250, Sarawak, n=4934). A total of 9709 were examined: Eastern, n=4961 (94.5% response), Sarawak, n=4748 (96.2% response). These subjects represented 0.5% of all people aged 50 and older in both regions. Of the 475 non-respondents, 73 (0.7%) refused to participate, 329 (3.3%) were incapable of being examined due to communication problems such as deafness or dementia, and 73 (0.8%) were not available. More female subjects were examined, n=5520 (56.8%) (table 1).

There was a significantly higher prevalence of bilateral cataract, corrected VA <3/60 among women than men in Eastern and Sarawak during NES II: Eastern women

0.8%, 95% CI (0.3 to 1.3) versus men 0.1%, 95% CI (0.0 to 0.3) and Sarawak women 1.1%, 95% CI (0.5 to 1.8) versus men 0.2%, 95% CI (0.0 to 0.4). The prevalence of bilateral and unilateral cataract at all levels of surgical thresholds (except for unilateral <6/60 and <6/18 in the Eastern region) was reduced during NES III. There was no significant difference in the prevalence between genders in NES III (table 2).

There was an improvement in the percentage of cataract visual outcomes with corrected good VA (<6/12) comparing NES II with NES III: Eastern from 70.6% to 87.5% and Sarawak from 73.0% to 89.8%. In general, the percentage was higher in Sarawak. There was a reduction in the percentage of poor postoperative visual outcomes (<6/60) comparing NES II with NES III: Eastern from 10.5% to 3.1% and Sarawak from 9.5% to 3.7% (table 3). In the Eastern region, for VA of 6/12, the total percentage difference between PVA and PinVA was 10.1% during NES II and 9.0% during NES III. In Sarawak, the total percentage difference was 11.0% during NES II and 10.4% during NES III. The results also revealed improvement in the percentage difference of other levels of VA



**Table 3** Postoperative visual outcome (corrected visual acuity), count by eyes comparing NES II (2014) and NES III (2023)

	NES II (2014)			% Gap	NES III (2023)			% Gap
	Female	Male	Total		Female	Male	Total	
	n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	
<b>Eastern</b>								
PVA								
Good (6/12)	91 (65.0)	47 (53.4)	138 (60.5)		197 (79.4)	154 (77.4)	351 (78.5)	
Borderline (<6/12 to 6/60)	38 (27.1)	24 (27.3)	62 (27.2)		41 (16.5)	35 (17.6)	76 (17.0)	
Poor (<6/60)	11 (7.9)	17 (19.3)	28 (12.3)		10 (4.0)	10 (5.0)	20 (4.5)	
Total	140 (100.0)	88 (100.0)	228 (100.0)		248 (99.9)	199 (100.0)	447 (100.0)	
PinVA								
Good (6/12)	103 (73.6)	58 (65.9)	161 (70.6)	10.1	217 (87.5)	174 (87.4)	391 (87.5)	9.0
Borderline (<6/12 to 6/60)	28 (20.0)	15 (17.0)	43 (18.9)	8.3	24 (9.7)	18 (9.0)	42 (9.4)	7.6
Poor (<6/60)	9 (6.4)	15 (17.0)	24 (10.5)	1.8	7 (2.8)	7 (3.5)	14 (3.1)	1.4
Total	140 (100.0)	88 (99.9)	228 (100.0)		248 (100.0)	199 (99.9)	447 (100.0)	
<b>Sarawak</b>								
PVA								
Good (6/12)	96 (67.6)	67 (55.4)	163 (62.0)		252 (77.5)	198 (81.8)	450 (79.4)	
Borderline (<6/12 to 6/60)	35 (24.6)	34 (28.1)	69 (26.2)		58 (17.8)	33 (13.6)	91 (16.0)	
Poor (<6/60)	11 (7.7)	20 (16.5)	31 (11.8)		15 (4.6)	11 (4.5)	26 (4.6)	
Total	142 (99.9)	121 (100.0)	263 (100.0)		325 (99.9)	242 (99.9)	567 (100.0)	
PinVA								
Good (6/12)	111 (78.2)	81 (66.9)	192 (73.0)	11.0	290 (89.2)	219 (90.5)	509 (89.8)	10.4
Borderline (<6/12 to 6/60)	22 (15.5)	24 (19.8)	46 (17.5)	8.7	23 (7.1)	14 (5.8)	37 (6.5)	9.5
Poor (<6/60)	9 (6.3)	16 (13.2)	25 (9.5)	2.3	12 (3.7)	9 (3.7)	21 (3.7)	0.9
Total	142 (100.0)	121 (99.9)	263 (100.0)		325 (100.0)	242 (100.0)	567 (100.0)	

Gap, difference between total PVA and PinVA; NES, National Eye Survey; PinVA, pinhole visual acuity; PVA, presenting VA.

except for 'borderline (<6/12 to 6/60)' in Sarawak (8.7% during NES II and 9.5% during NES III).

## DISCUSSION

The availability of RAAB7 software facilitated data entry and cleaning during NES III. The web platform with live survey data visibility enabled real-time monitoring for quality assurance throughout the survey. The trainer and investigators could identify and respond to any issues and questions from the data collectors on the ground in real time. Compared to NES II (2014), digitalisation of data entry, cleaning, analysis and delivery of reports during NES III (2023) assured data quality. It saved time and, therefore, costs needed to support the survey teams on the ground as the duration of data collection was shortened.

There was a significantly lower prevalence of bilateral cataract, corrected VA <3/60 among women than men in Eastern and Sarawak in NES III. However, the gender difference was insignificant, suggesting that the gender issue in cataract surgical services in both regions could have been addressed. Within Sarawak and the Eastern region, the accepted culture was 'women to stay at home' or 'women should give more priority

to men'. These perceptions resulted in women's hesitancy to travel far from home to seek treatment for their eye problems. Reaching out to women was one of the strategies embedded into the service concept of Klinik Katarak-Kementerian Kesihatan Malaysia (Cataract Clinic Ministry of Health Malaysia, *KK-KKM*). It aimed to help women come forward to receive cataract treatment. Unpublished service data showed a generally higher percentage of women presenting for cataract surgery at the outreach programme locations within both regions by year, except during the COVID-19 pandemic, where the percentages were lower. The reason was probably the same: men were given more priority in seeking treatment during the pandemic. We are unable to address this pattern in this paper as more research is needed to identify the possible factors.

The prevalence of bilateral and unilateral cataract at all levels of surgical thresholds (except for <6/60 and <6/18 in the Eastern region) was also reduced during NES III. It is possible that within 9 years, more individuals with cataract, especially women, could have better awareness to come forward and seek treatment. The difference in the total percentage of PVA as a measure of visual outcome (presenting VA or unaided VA) and PinVA (corrected



**Figure 2** A mobile unit of Klinik Katarak Kementerian Kesihatan Malaysia (KK-KKM) (the ministry's outreach arm) reached a provisional hospital in Sarawak, Borneo (Courtesy of Dr. Mohamad Aziz Salowi, Ministry of Health Malaysia).

VA) could represent an improvement in the biometric measurement and improvement in the surgery technique and other equipment used to support the programme.

In general, the prevalence of vision impairment during NES II and III was lower compared with other countries, especially in the Southeast Asia region.<sup>12–16</sup> Acknowledging the country's position regarding the prevalence and cataract surgical outcomes compared with neighbouring countries is essential. However, achieving a reduction or improvement following an intervention is more important or meaningful.

The leading national initiative that could have contributed to the reduction in cataract prevalence and improved visual outcomes after cataract surgery in both regions is the *KK-KKM*, an outreach arm of the ministry to reach the population (figure 2). It was launched in 2014 in Sarawak and the Eastern region of Malaysia as part of the country's progress commitments with the WHA 66.4 resolution and as one of the national action plans following the findings of the NES II (2014). The modified buses transport surgical and medical equipment along the selected service routes according to the location of provincial Hospitals, which are used as the primary service sites. Once arrived at the site, the equipment is offloaded and used in the clinic (for screening) or operating room (for cataract surgery). The service concept is based on operating near patients' homes. However, unlike other cataract mobile units in other countries, surgery is not done on the bus.<sup>17–19</sup> Instead, surgeries are done in sterile operating theatre facilities/rooms available at the provincial hospitals, hence minimising risks of infection. More than 90.0% of surgeries used phacoemulsification technique (by portable phacoemulsification machine), and qualified optometrists perform all biometry measurements for the intraocular lens.<sup>20–22</sup> The surgeries are monitored by quality indicators such as

the incidence of posterior capsular rupture, poor visual outcomes and endophthalmitis.<sup>23–26</sup>

The *KK-KKM* project in both regions emphasises scheduled trips for screening and surgery and revisiting after 1 month by optometrists to assess patients' visual outcomes. The timetable for the mobile unit is distributed to all the provincial hospitals at the beginning of each calendar year. The fixed schedule allows people in remote areas to plan their finances and trips to come forward and seek eye treatment. Operating in proper operating rooms using standard cataract extraction techniques, quality measurement of biometry and fixing the timetable for the service maximise access and ensure quality surgery for the people.

Like in all other hospital facilities in the Malaysian Ministry of Health, data from cataract surgeries performed at the *KK-KKM* locations are entered into the National Eye Database, a web-based password-protected surveillance system collecting data on eye diseases and the clinical performance of ophthalmology services in Malaysia. It consists of online systematic data entry according to predefined sets of preoperative, operative and outcome forms. Details on the Malaysian Cataract Surgery Registry and Cumulative Summation Techniques in cataract surgical performance monitoring have been published elsewhere.<sup>27 28</sup>

The concept of 'Bringing High Impact Quality Eyecare Closer to Home', community engagement/advocacy, quality surgery and performance monitoring in outreach cataract surgery could have explained the reduction in the prevalence of cataract and improvement in the visual outcomes within both regions after 9 years of service. The objective, concept and work process were endorsed by WHO when it was selected as a Case Study for the Western Pacific WHO Innovation Challenge in 2021/2022.<sup>29</sup>

### Limitations

The on-the-field work for data collection coincided with the pre-election time for the state legislative assemblies. Although the highest level of permission to visit the houses, examine, and interview the subjects was applied and given by the local authorities, there was resistance from the subjects/community to the examination/interview, alleging that the study had political intentions.

### CONCLUSION

There was a reduction in cataract prevalence and improved visual outcomes in both regions. These favourable results could be attributed to the quality measures, surgical performance monitoring initiatives and the community cataract programme implemented soon after the survey in 2014.

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selection, analysed data and wrote the manuscript. NM, WRWN and SNS conducted data extraction, data interpretation and proofreading of the paper. All authors read, revised and approved the final manuscript. MAS is the guarantor of this work.

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