

# SMEC eye care system: Profile and its role in eliminating avoidable blindness in Indonesia

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## ABSTRACT


Untreated cataract remains the leading cause of avoidable blindness in Indonesia, as it pointed out 1.9% prevalence of the total population, with incidence of 0.1% and the backlog between 320,000 and 350,000 cases per year. It is reported that 51.6% of people do not know if they suffer from cataracts, 11.6% because they cannot afford it, and 8.1% due to fear of surgery. SMEC eye care system was established with a model similar to Aravind's to increase the number of cataract surgeries with high volume, high quality, affordable, and accessible cataract surgery, combined with well-designed outreach programs to increase demand. The results are that there are 29 branches of eye hospitals and eye clinics from west to east region of Indonesia, with a total of 58,000 cataract surgeries per year. SMEC also collaborates with private and public hospitals to develop their eye clinics to reach out to more people with blindness. Although with a high volume of cataract surgeries, SMEC only contributed cataract surgical rate of 225, as compared to the national target of 2000, which means that only 11% of total untreated cataract were cured by SMEC. At this rate, SMEC, along with the government and ophthalmologists in Indonesia, still has a lot of homework to do to give more hope to people with blindness.

**KEY WORDS:** SMEC Eye Care System; Avoidable Blindness; Cataract Surgical Rate

## INTRODUCTION

Every 5 s one person in the world goes blind. It is estimated by the WHO that over 7 million people become blind every year.<sup>[1]</sup> The vision loss expert group has reported the 2015 magnitude of blindness and visual impairment. According to this report, the world population in the year 2015 counted 7.33 billion people; 36 million people were blind and 216.8 million people had moderate to severe visual impairment. The female sex was affected more often: 56% blind and 55% moderate to severe visual impairment. The largest number of blind and visually impaired people lived in Asia. This report further stated that global blindness has decreased from 0.75%

in 1990 to 0.48% in 2015 and that global moderate to severe visual impairment has decreased from 3.83% to 2.90%. However, the absolute number of blind people has increased from 30.6 million in 1990 to 36.0 million in 2015 (17.9% increase) and the people with moderate to severe visual impairment has increased from 159.9 million in 1990 to 216.6 million in 2015 (35.5% increase). Although the decline in percentage of global blindness and moderate to severe visual impairment could be attributed to socioeconomic development, targeted public health programs, and improved access to eye health services, the increase in the absolute number of blind and visually impaired people is due to population growth and population aging. Based on population-based studies from 1990 to 2012, the vision loss expert group of the global burden of disease study group reported that, compared with the world average, there was a higher prevalence of blindness and visual loss in South Asia (Bangladesh, Bhutan, India, and Nepal included from the WHO Southeast Asia region) and Southeast Asia (Indonesia, Myanmar, Sri Lanka, Thailand, and Timor-Leste from the WHO Southeast Asia region).<sup>[2]</sup>

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Based on surveys during the period of 1993–1996, the prevalence of blindness in Indonesia is 1.5% of the total population, which is 3 million of blind people. The number is the highest in Southeast Asia with the incidence of blindness each year is 0.1% (210,000 people). The backlog is between 320,000 and 350,000 each year and is still increasing. Blindness due to untreated cataract in Indonesia is pointed at 0.78% of the population, and in the national survey, 2014 was reported that cataract prevalence is 1.8%. It affects the quality of life and socioeconomic status of patients and the economy of a nation at microlevel. The preventable blindness affects the economic contribution of citizens in the age group of 50–65 years and the output of the working class due to the economic and social dependence of those senior people within their family. Due to the tropical climate in Indonesia, its population tends to bear cataract 15 years earlier than people in a subtropical climate.<sup>[1]</sup>

In 2013, the prevalence of blindness in Indonesia in the population above 50 years of age was 3% [Figure 1], based on a Rapid Assessment of Avoidable Blindness (RAAB) survey. The highest prevalence was in East Java (4.4%) followed by West Nusa Tenggara (4%) and South Sumatera (3.6%), in which cataract contributes as the main cause as high as 70–80%. In 2014–2016, a RAAB survey performed in 15 provinces, which represented 75% of the nation's total population, indicated the severity of avoidable blindness and visual impairment prevalence in Indonesia. It revealed a national figure of 3–1.9% due to untreated cataract [Figure 2]. This figure still ranks the highest in the Southeast Asia Region.<sup>[3]</sup>

Unoperated cataract was the most common cause of visual impairment (moderate: 51.2% and severe: 73.7%) and blindness (71.7%). Accessibility to the current eye care services was the principal barrier to take and the expenses of availing services were the principal concern in the periphery.<sup>[2]</sup>

There are still many cataract patients who do not know they are suffering from cataract. This can be concluded from these most obvious reasons. Based on the results of the national basic health research in 2013, one reason is that 51.6% of the cataract patients do not realize they are actually suffering from cataract. Another reason is because 11.6% of the patients cannot afford the costs for an eventual eye surgery. One more reason is that 8.1% is very afraid of having an eye surgery,<sup>[4]</sup> although much of potential blindness can be corrected through this type of surgery. Furthermore, lack of access to a nearby eye clinic, availability of medical equipment, and illiteracy are making the incidence of blindness rise each year, despite the current existing medical resources and the skilled ophthalmologists are available in Indonesia.

Based on the prevailed data, in 2006, the SMEC eye care system was established as an effort to help government to overcome the number of people having cataract in Indonesia.

Hence, many people with vision problems still have no access to hospitals. SMEC has to increase the awareness of the cause of blindness and emphasize to the population the need and the importance for starting with an early treatment. SMEC had to make more efforts to create a demand for those eye treatments, especially because most of the blindness is unnecessary and curable. This article will elaborate the profile of the SMEC eye care system and its role in eliminating avoidable blindness in Indonesia.

## PROFILE OF SMEC EYE CARE SYSTEM<sup>[5]</sup>

SMEC eye care system (SMEC) was first established in Medan, North Sumatera, in October 2006. An ophthalmologist named Imsyah Satari was the only founder and he started an eye clinic named Sumatera Eye Center. The number of ophthalmologists recruited was only six at the time.

It was the data which stated that the prevalence of blindness accounted for was 1.5%, of which 0.78%<sup>[1]</sup> was untreated cataract that took SMECs concern to focus as much as possible on cataract surgeries. The vision is simple: To become the leading, modern, most advanced, and professional eye health service center in Indonesia and to be able to compete with similar institutions abroad. Creating a modern concept of “high-tech, low-cost” SMEC embarked a “Cost leadership strategy,” where costs are affordable for all levels of society but still prioritize professional services that are using sophisticated and modern equipment. It was to help people overcome the stigma attached to blindness that made SMEC adopt the Aravind Eye Hospital's system for eye surgery. Seeing Aravind thriving as a business model in health care, reaching out to the masses, and aiming at being inclusive and affordable yet still highly profitable, SMEC decided to follow the same model to eliminate avoidable blindness in Indonesia. Moreover, it worked. One thing led to another and having grown from strength to strength, in 12 years, SMEC has built 29 branches of eye clinics and hospitals [Figure 3].

Cataract surgery is already performed with phacoemulsification (phaco) and intraocular lens (IOL) implantation. The sophisticated medical equipment had been put in the clinics to provide better assessment before surgery with slit-lamp biomicroscopy, auto refracto-keratometry, non-contact tonometer, biometry, B-scan ultrasonography, optical coherence tomography, and fundus photography. A routine eye checkup at SMEC entails registration, basic vision testing, measurement of ocular pressure, a preliminary doctor's examination, pupil dilation, and a final examination.

In January 2014, Sumatera Eye Center changed its name to be SMEC Eye Hospital. It had 60 beds available and had recruited 28 ophthalmologists in five branches. These were eye hospitals and vision centers, with six subspecialties, such as cataract and refractive surgery, pediatric ophthalmology and strabismus,

glaucoma, vitreoretinal surgery, oculoplastic surgery, and community eye health. As of January 2019, there were 115 ophthalmologists working in SMEC throughout Indonesia.

All SMEC systems are oriented toward enabling the doctors to be at their productive best. Rather than to depend on externally trained staff, SMEC took an innovative and self-reliant approach to recruitment and training, not just of nurses but of doctors too. More than 90% of SMEC ophthalmologists are the results of its own training programs. SMEC supports new recruited ophthalmologists through their 3 months of phaco training by master skilled phaco surgeons and well-trained paramedical staff. SMEC sees training as a form of sharing and caring. It does not happen in a day. The buildings, the money, and even the technology can be acquired rather quickly. However, the professional values, they have to be cooked. Senior nurses are the chief decision-makers for 70% of all the activity that takes place in SMECs operating rooms and patient wards. This includes the daily staff allocation, equipment, and sterilization planning, as well as caseload distribution among the doctors. SMEC relies heavily on its nurses' sharp-eyed judgment and familiarity with protocol. These nurses play an integral

role in the training of cataract surgery. Senior nursing staff members assign patients to an individual doctor, based on case complexity and the doctor's skill level.

SMEC performs 95% of cataract surgeries with insertion of IOLs. The surgery that SMEC is performing is phaco, an elegant technique with excellent visual outcomes. This minimally invasive, high-tech approach delivers ultrasound through a microscopic surgical handpiece, controlled by the surgeon through sophisticated software to emulsify the large, hard cataract core. It enables the entire cataract to be suctioned out through tiny incision <3 mm long. Phaco is a convenient, same-day procedure with rapid recovery rates. It is the gold standard for cataract treatment in SMEC. This model provides hope that we can solve the huge problem of cataract in Indonesia.

**MANAGEMENT OF CATARACT SURGERY BY SMEC EYE CARE SYSTEM<sup>[5]</sup>**

The barriers we face today are challenging. Accessibility was the principal barrier to uptake of the current eye care

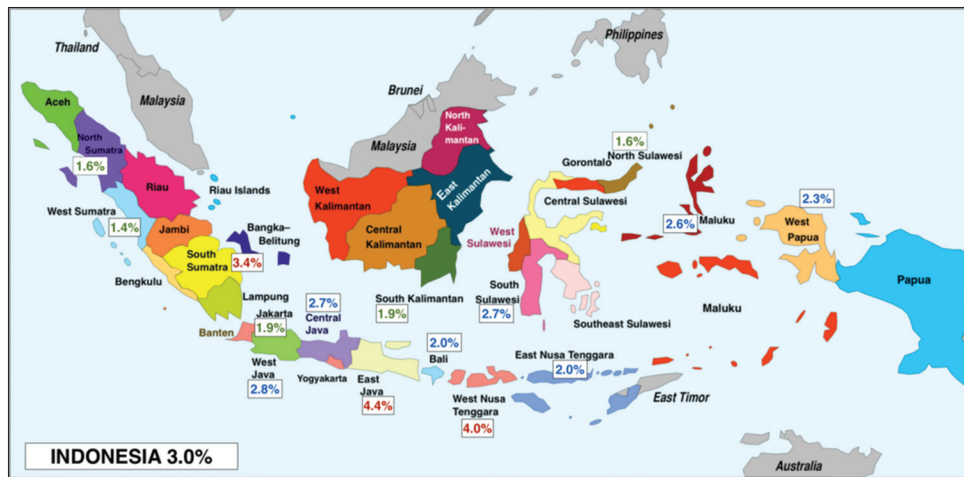


Figure 1: The prevalence of blindness in Indonesia<sup>[3]</sup>

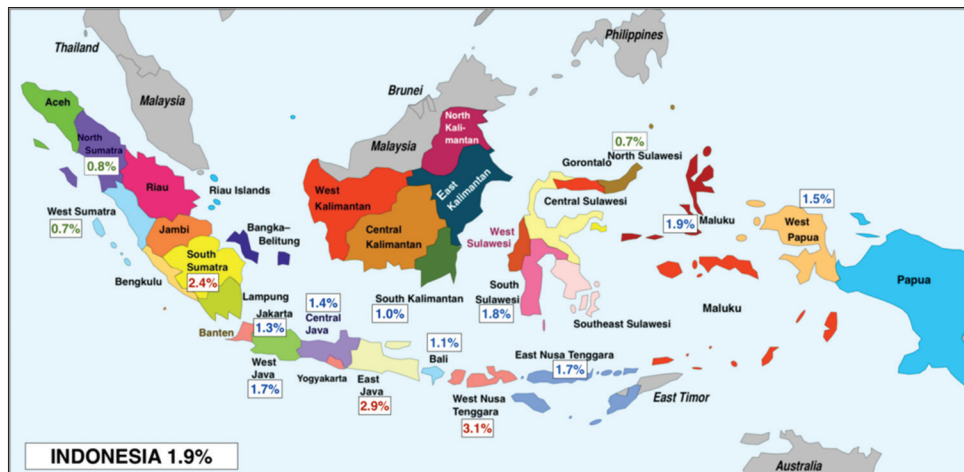


Figure 2: The prevalence of blindness due to untreated cataract in Indonesia<sup>[3]</sup>

services and the lack of human resources and the urban-centric distribution of eye care personnel. Social awareness of the benefits of cataract surgery is still low among people living in a low economic area. Fear, superstition, and cultural indifference can all be very real barriers to accessing medical care. SMEC wanted to overcome these barriers. These are the reason why SMEC initiated to open as many as eye clinics and hospitals from west to east Indonesia to reach people who are in need for cataract surgery.

From patient identification to post-operative care, SMEC embarked a system similar to Aravind's. SMEC recruits general practitioners to educate patients in public health centers and train cadres to collect elderly people, in particular, those aged 50 years and over and check their eyes

when they start to have a blurry vision. After screening and education, SMEC provides transportation to eye hospitals or eye centers to have their eyes further checked and evaluated by local ophthalmologists. If surgery is recommended, detailed counseling takes place to ensure that the patient fully understands the process. Typically, an ophthalmologist would perform the bulk of these duties. However, at SMEC, the entire stream of patient-centric activities, from entry to discharge, is broken up into sets of discrete tasks. SMECs army of paraprofessionals performs most of these tasks, except for the preliminary examination and the final diagnosis, which are done by doctors. This group includes nurses, counselors, refractionists, and pharmacists; each specialized in a clearly defined set of recurring duties. Everything is geared to allow doctors to focus almost exclusively on diagnosing patients and



Figure 3: The map of SMEC from west to east region of Indonesia<sup>[5]</sup>

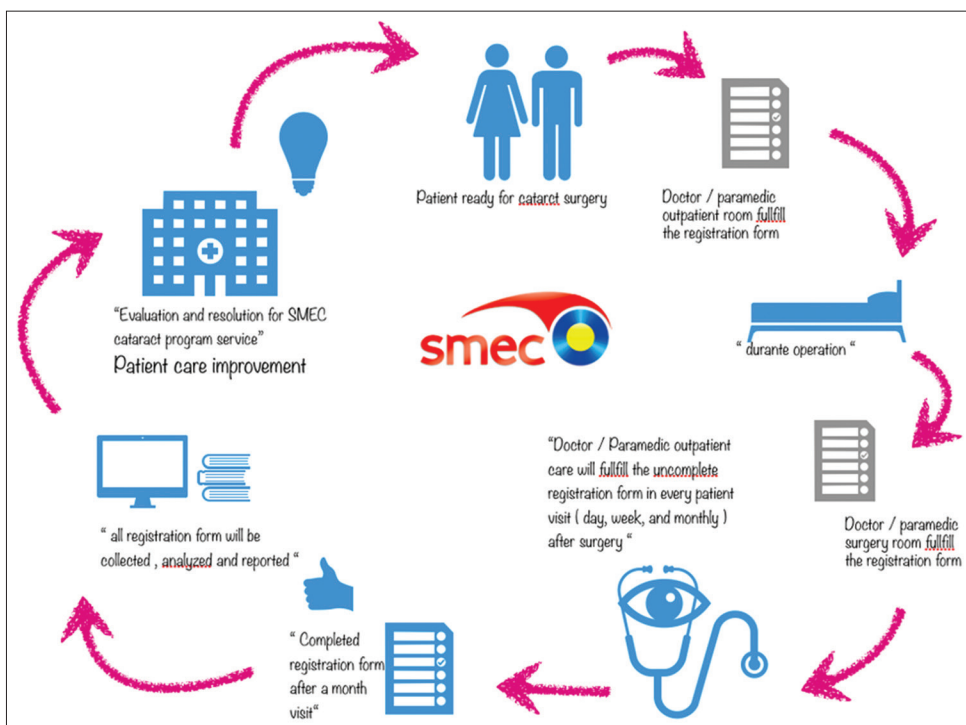
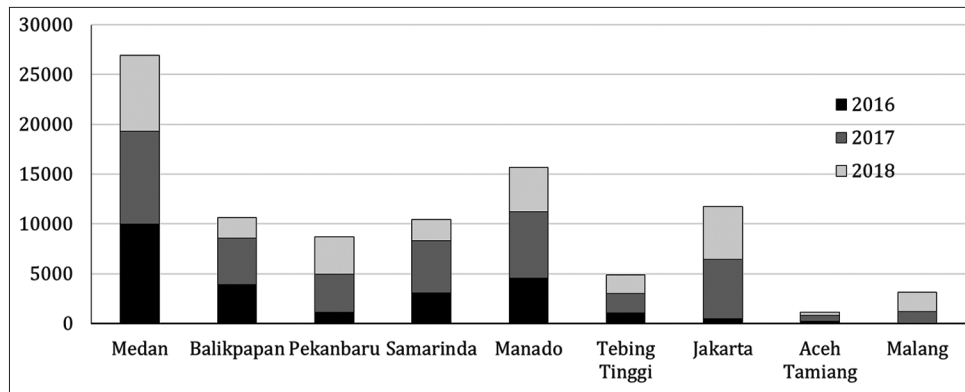


Figure 4: SMECs workflow in outpatient departments and surgical wards<sup>[5]</sup>



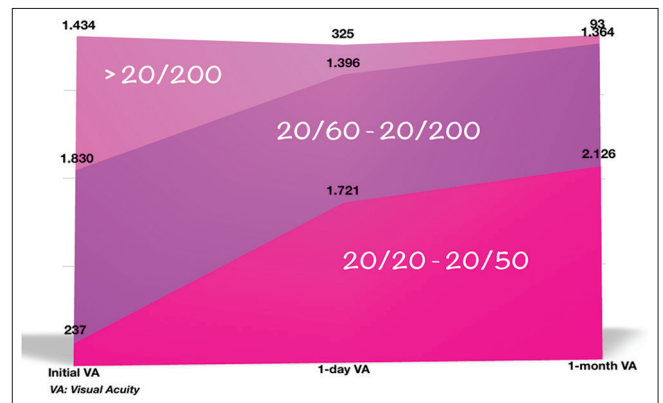
**Figure 5:** Number of cataract surgeries performed by SMEC by 2016–2018<sup>[5]</sup>

performing operations. SMEC seeks to maximize the doctors’ contribution by helping them to devote their time mainly to medical advising. Tests that can be done by paramedical staff are done by paramedical staff only. SMEC counselors are highly trained to help the patients to make informed decisions so that doctors are not required to spend their time on such matters. A similar role designation is seen in SMECs operating rooms and post-operative wards. The result is a system that powerfully maximizes the time and skill of SMEC surgeons. Patients would have complete examinations pre-operative and phacoemulsification performed by trained and skilled surgeons. Eye drops and glasses and post-operative care education will be given before discharge. Patients are usually seen 1 day, 1 week, and 1 month after surgery and still transportation is provided to patients to and fro to their public health centers. Through day care services, nearby patients can get their surgery done and discharged on the same day itself. The workflow in the outpatient departments of the different units of SMEC is shown in Figure 4.

**THE ROLE OF SMEC EYE CARE SYSTEM IN INDONESIA**

SMEC built a system based on problems and experience. The approach to expansion was without haste or complacency. As SMEC made more money, it built more branches. Recently, SMEC has opened four eye hospitals and 25 eye clinics throughout Indonesia, and some new branches are under constructions. Moreover, SMEC is collaborating with private and public hospitals to develop their eye clinics to reach out more people with blindness. Starting from medical equipment, human resources, eye care system, and financial needs, SMEC provides them all to each hospital who is willing to collaborate. Moreover, as SMEC does the work, the number of cataract surgeries increases significantly.

The number of cataract surgeries per year starting from 2006 to 2018 varies and increasing as the social awareness of cataract surgery among people also increases [Figure 5]. Starting from 2015, SMEC has been joining national health insurance which covers cataract surgery cost for society and



**Figure 6:** Comparison between pre-operative sight recording and 1 day and 1 month post-operative sight recording, January–August 2017<sup>[5]</sup>

for the past 3 years, it was recorded that SMEC had performed 130,828 cataract surgeries which means the number of cataract surgeries per year point out roughly 43,609 eyes. Table 1 describes the number of patient statistics in several branches of SMEC eye care system from January 2016 to December 2018. As the number of cataract surgery increases, so as the number of visual improvement is shown in Table 2 and Figure 6. The visual improvement can be seen at pre-operative sight recordings compared to post-operative sight recordings. The number of patients with visual acuity over 20/50 decreased 1 month after surgery. This could tell us that despite gathering more and more patients with cataracts in the clinics and hospitals, SMEC also improves their sight after surgery along with their quality of life. The rest of patients with moderate to severe visual impairment after surgery are due to diabetic retinopathy, glaucomas, retinitis pigmentosa, or corneal scars.<sup>[5]</sup>

However, have we reached the target of eliminating the avoidable blindness by year 2020? The answer is no. By 2016, the number of Indonesian ophthalmologists is 2877.<sup>[6]</sup> However, there is maldistribution, whereas the eye doctors centralized mostly in big cities compared to those in urban area or in the periphery. We have a lot of very capable and intelligent people, all very well trained in theoretical knowledge. However, knowledge by itself is not going to

**Table 1:** Patient statistics for several branches of SMEC eye care system, 2016–2018<sup>[5]</sup>

Time	Medan	Balikpapan	Pekanbaru	Samarinda	Manado	Tebing Tinggi	Jakarta	Aceh Tamiang	Malang
<b>2016</b>									
January	764	233	54	102					
February	825	237	48	147	3				
March	931	252	41	185	109	57			
April	1022	208	64	183	366	115			
May	924	270	51	212	388	112			
June	694	210	39	150	482	100			
July	665	275	29	208	414	89			
August	848	351	82	301	541	134			
September	795	307	82	311	496	107			
October	957	488	163	422	685	127		52	
November	869	586	218	441	649	144	163	95	
December	726	484	272	412	409	123	327	120	
<b>2017</b>									
January	834	614	360	445	581	122	430	88	9
February	776	468	347	473	594	128	304	53	4
March	862	421	366	526	636	163	515	45	5
April	720	361	309	424	533	170	434	50	3
May	832	398	285	544	587	160	506	54	8
June	499	240	182	223	513	108	230	14	47
July	885	465	395	661	739	158	689	40	80
August	794	443	305	452	667	212	575	47	166
September	758	328	306	320	459	122	504	41	190
October	912	477	450	434	582	197	705	65	338
November	771	294	309	393	517	207	640	50	251
December	671	159	227	334	266	156	448	18	134
<b>2018</b>									
January	722	199	314	243	451	167	465	67	207
February	651	190	393	138	383	198	383	37	151
March	726	205	396	213	379	186	464	38	198
April	781	204	370	198	473	185	482	38	229
May	672	180	254	181	375	175	327	58	159
June	367	112	163	151	362	107	45	32	77
July	878	206	373	221	452	168	518	56	183
August	593	151	263	175	364	177	497		159
September	583	140	313	143	343	139	542		123
October	575	191	379	134	353	131	509		145
November	584	136	259	178	327	135	530		130
December	479	131	246	192	200	135	521		142

save the world. What we need is dedication and devotion to the practice. Despite all efforts to eliminate avoidable blindness, SMEC only eliminated 11% of total untreated cataract in Indonesia, as recorded in 2017.<sup>[5]</sup>

If we refer to the cataract surgical rate (CSR) indicators, say Indonesia is targeting CSR of 2000, then the number of cataract surgeries needed for the Indonesian population

(estimated at 250 million) is 500,000 surgeries per year. According to Indonesian Ophthalmologists Association, the estimated ability of cataract surgery by ophthalmologists in Indonesia is around 150,000–180,000/year.<sup>[7]</sup> This rough calculation shows that to achieve the CSR 2000 figures alone, Indonesia has a backlog of cataract surgeries of 320,000–350,000/year. This number will increase according to the increase in population and increasing life expectancy

**Table 2:** Summary of the improvement in sight after surgery, January–August 2017<sup>[5]</sup>

Visual acuity	Pre-operative sight recording	Post-operative sight recording	
		1 day	1 month
20/20–20/50	237	1721	2126
20/60–20/200	1830	1396	1364
>20/200	1434	325	93

considering that most cataract patients occur at the age over 50 years.<sup>[7]</sup> It is reported in 2014 that Indonesia achieved the number of CSR was 1411,<sup>[8]</sup> almost reached the expectation of national target of 2000.

According to SMEC group data report, SMEC performs only on average 50,000 cataract surgeries a year, which means that the CSR is only 225/year.<sup>[5]</sup> At this rate, we cannot catch up. The incidence of cataract blindness, however, was fairly uniformly distributed across the various socioeconomic group. Although Indonesia’s 2877 ophthalmologists performed nearly 150,000–180,000 cataract surgeries a year, the medical infrastructure to clear the backlog of cataract cases was inadequate in making maximal use of existing resources. We have to do something to clear the backlog of 5 million blind eyes in Indonesia. We could dramatically increase CSR by embracing efficient, high volume, high quality, affordable, and accessible cataract surgery, combined with well-designed outreach programs to increase demand.

**HOPE TO INDONESIA**

Today, information technology and computers have reached the villages. Farmers and fishermen in villages now have access to all kinds of information such as health, market prices, education, and developments in agriculture. If we can use the information technology properly, there is no reason why people should be blind at all. Blindness can be a fatal disease. Once blindness sets in, life expectancy can reduce to just a few years and destroys an individual’s sense of dignity and independence. We cannot prevent blindness. We need to have good institutions, financially viable organizations with good human resources that can provide eye care to all economic classes in a community. SMEC still has a lot of homework to do to eliminate avoidable blindness and contribute the number of cataract surgeries to help government reaching national CSR of 2000. It takes enlightened commitment; well-trained and organized cataract surgical teams (including ophthalmologists, nurses, technicians, and other support staff); a systematic approach to reaching those in need; suitable training in both cataract surgery and management of the cataract surgical process;

adequate facilities, equipment and supplies; and government support and investment. We need to work together, all stakeholders and ophthalmologists, hand in hand to reach the people affected with blindness to give them hope.

**CONCLUSION**

Cataract is the leading cause of blindness in Indonesia and accounted for 1.9% of the total population, making it the highest in Southeast Asia. SMEC was established and spread out from west to east of Indonesia with one purpose: To eliminate avoidable blindness by raising social awareness of cataract among people and improving sight and quality of life through cataract surgery.

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