The World Health Organization has revealed in 2002 that more than 161 million people worldwide were visually impaired, of whom 37 million were blind. The prevalence of visual impairment is not evenly distributed across different geographical regions. Asia, being the world’s largest continent, has an estimated 21.5 million blind people and another 67.4 million with low vision. Over 82% of these people are aged 50 years and above. The epidemiology of eye diseases and the major causes of low vision and blindness have generally been well-documented in Western societies such as the US and Australia. However, reports from large, population-based studies of eye conditions in Asian countries have only begun to emerge in the last few years.

In general, these Asian studies have indicated certain racial/ethnic variation in both the prevalence and risk factors for eye diseases among Asians. They have provided insights into the etiology of diseases in comparison with studies in the Western countries. For example, the higher frequency of myopia among Chinese people is well documented. The importance of angle closure glaucoma as a cause of blindness in Chinese people is now supported by more reliable population-based information. Another study showed that age-related macular degeneration (AMD) is less common in Japanese people than in Caucasian populations. These and many other interesting epidemiological data suggest that the approach to treatment and prevention of eye diseases may need to be tailored to suit the Asian community in order. This is needed for the treatment to be truly effective in eradicating blindness and visual impairment here. Population-based studies currently conducted by Asian researchers will soon have results to further demonstrate the genotypic variations of eye diseases.

Fig 1. SiMES Study Areas By Singapore Postal Code Sector.

Fig 2. A Digital Image Of A Healthy Retina.
In Singapore, our group has undertaken a major eye study of the Malay population called the Singapore Malay Eye Study (SiMES). People of Malay origin make up nearly 200 million worldwide, with the majority living in Malaysia, Indonesia, Brunei, Singapore and other South East Asian countries. Despite this large number, there is relatively little information on the prevalence and etiology of eye diseases for this ethnic group. Singapore, as a multicultural society, allows the opportunity to investigate racial/ethnic differences in a single environment. As we have previously conducted a similar study of eye diseases among Singaporean Chinese adults in the Tanjong Pagar Survey of 1996-97, we will soon be able to make comparative analysis between the Chinese and Malays.

SiMES is a survey of Singaporean Malay adults aged 40-79 years living in designated study areas South and West of Singapore. About 6,000 participants are randomly selected from a list provided by the Ministry of Health in Singapore. These selected people are sent an invitation letter to explain the aims of our study and to describe the tests that we provide, which are all free of charge. SiMES follows a strict and comprehensive protocol that mirrors two world-famous eye studies, the Beaver Dam Eye Study of the US and the Blue Mountains Eye Study of Australia. With a pre-selected sampling strategy that does not rely on open public response, we are able to document the prevalence of eye diseases that is truly reflective of the Malay community across different socio-economic background, gender, age group and existing health state. While such study method abides epidemiological standards, it increases the difficulty of participant recruitment as the response rate is dependent on our efforts to persuade invitees to join the study.

The efforts of the study continue with the participants’ arrival at our research clinic at the Singapore Eye Research Institute, which is located within the Singapore National Eye Center. On the day of their appointment, participants are registered and provided with a written and oral explanation of the study by our dedicated research staff, fluently bilingual in Malay and English. Upon completion of the informed consent process, the participants are provided with an assessment of their visual acuity, blood pressure, eye pressure, field of vision and refraction. Their eyes are examined by an ophthalmologist for signs of cataract, glaucoma, corneal and retinal diseases. The doctor will also provide the participant with consultation and referral, if a condition is found and needs to be followed up by an eye care provider. However, no medication is provided during the participants’ examination at SiMES. Apart from these assessments, the participants are also asked about their medical history and lifestyle factors by trained interviewers.

Further to these traditional examination methods, SiMES incorporates state-of-the-art imaging technique that uses photography and laser tomography to capture digital images of the participants’ retina, lens and optic disc. These images are sent for analysis, or grading, to identify any signs of microscopic and microvascular pathologies, which will complement the clinical assessment of the eye conditions. Thus, the ophthalmic images of SiMES form an invaluable databank of information that may be revisited by researchers in future when new technologies for disease analysis emerge. We believe that digital ophthalmic imaging is a powerful and versatile tool as it is non-invasive, relatively easy to use, and provides visual information of the highest resolution.
To complete the picture of modern medical research, every participant of SiMES is invited to donate samples of their blood and urine for biochemical analyses, such as for levels of cholesterol, glucose, creatinine and microalbumin. These biochemistry tests are also offered free of charge to the participants. In addition, samples of their DNA and plasma are extracted from blood and are kept at -80°C Celsius conditions for long-term storage, thus creating a genetic databank for future association studies. These studies will assess the correlation between genetic variants and disease trait differences on a population scale. SiMES will be the first study in the world to document the prevalence of eye conditions such as refractive error, cataract, glaucoma, age-related maculopathy and diabetic retinopathy in adult Malay people. By matching these phenotypic data with biometric data from their DNA samples, we will be able to study the gene variants that predispose this population to certain diseases. Such genetic association studies will ultimately make treatment and disease management more customized and comprehensive.

Today, SiMES is still ongoing but the results of our analysis thus far have already shown that our research methodology is effective. SiMES promises to provide epidemiological information that will advance our understanding of ophthalmic disease etiology, and its variations between and within different racial/ethnic groups. The protocols developed and the lessons learned from SiMES will allow researchers to conduct of similar and better eye studies on other ethnic communities, thus giving us important insights into eye diseases with an Asian perspective. Armed with information, medical sciences will then be able to move forward to eliminate visual impairment and blindness, and ultimately restore sight to millions of people in Asia.

*SiMES is funded by the Singapore National Medical Research Council and the Biomedical Research Council, and is approved by the Institutional Review Board of the Singapore Eye Research Institute. SiMES is conducted in accordance with the World Medical Association’s Declaration of Helsinki. For more information, visit www.simes.com.sg.*

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