MEETING ON DEVELOPING MYOPIA CONTROL STRATEGIES

13–14 November 2018
Singapore

World Health Organization
Western Pacific Region
Meeting on Developing Myopia Control Strategies
13–14 November 2018
Singapore
MEETING REPORT

MEETING ON DEVELOPING MYOPIA CONTROL STRATEGIES

Convened by:

WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR THE WESTERN PACIFIC

INTERNATIONAL AGENCY FOR THE PREVENTION OF BLINDNESS

BRIEN HOLDEN VISION INSTITUTE

Singapore

13–14 November 2018

Not for sale

Printed and distributed by:

World Health Organization
Regional Office for the Western Pacific
Manila, Philippines

May 2019
NOTE

The views expressed in this report are those of the participants of the Meeting on Developing Myopia Control Strategies and do not necessarily reflect the policies of the conveners.

This report has been prepared by the World Health Organization Regional Office for the Western Pacific for Member States in the Region and for those who participated in the Meeting on Developing Myopia Control Strategies.

Acknowledgements

Thanks go to the authors of this report: Professor Tien Y. Wong, the Chair of the meeting; Professor Serge Resnikoff, Co-Chair; Associate Professors Judith Flanagan and Marcus Ang, Rapporteurs; the scientific secretary; and the participants listed in Annex 1. Thanks are likewise due to WHO, International Agency for the Prevention of Blindness (IAPB), Brien Holden Vision Institute (BHVI), Singapore Eye Research Institute (SERI) and professionals who supported this meeting, and the staff of the IAPB, BHVI, WHO and SERI who organized the meeting.
### CONTENTS

SUMMARY ............................................................................................................................................. 1

1. INTRODUCTION ................................................................................................................................. 3
  1.1 Meeting organization ....................................................................................................................... 3
  1.2 Meeting objectives ......................................................................................................................... 3

2. PROCEEDINGS ................................................................................................................................. 3
  2.1 Opening session: Background ......................................................................................................... 3
  2.2 Plenary session ............................................................................................................................... 4

3. CONCLUSIONS AND RECOMMENDATIONS ..................................................................................... 10
  3.1 Conclusions ................................................................................................................................ 10
  3.2 Recommendations ....................................................................................................................... 11
    3.2.1 Recommendations for Member States .................................................................................... 11
    3.2.2 Recommendations for NGOs .............................................................................................. 12
    3.2.3 Recommendations for WHO ............................................................................................... 12

REFERENCES ........................................................................................................................................... 13

ANNEXES ................................................................................................................................................ 16

Annex 1. Meeting programme
Annex 2. List of participants

### Keywords

Myopia – prevention and control / Eye diseases – prevention and control / Regional health planning
SUMMARY

Uncorrected refractive errors are the main cause of avoidable vision impairment globally. Myopia is a type of refractive error affecting people of all ages, including school-aged children. Although myopia can effectively be corrected with spectacles, services that are affordable and of good quality are commonly not in place. Beyond mild and moderate vision impairment from uncorrected refractive error, myopia may lead to vision impairment and blindness from complications later in life.

The joint WHO/International Agency for the Prevention of Blindness (IAPB) Meeting on Developing Myopia Control Strategies was held in Singapore on 13–14 November 2018. It followed from the joint WHO/Brien Holden Vision Institute Global Scientific Meeting on Myopia in March 2015. While the 2015 meeting was focused on scientific reviews and definition of myopia and its complications, the recent meeting aimed to move from science to practice by addressing prevention, detection and management.

The objectives of the meeting were to support policy development through:

1) updating existing strategies and approaches to reduce the burden of uncorrected myopia;
2) identifying effective activities to address the burden of myopia in countries; and
3) creating partnerships for implementation, in line with *Towards Universal Eye Health: A Regional Action Plan for the Western Pacific (2014–2019)*.

The following eight main themes emerged from the discussions and the issues for future action:

1) Increased community and government understanding of myopia as a major health issue (beyond a cosmetic inconvenience) and awareness of the pathological progression of myopia to high myopia with all its attendant morbidities is needed such that interventions will be effected prophylactically and rapidly in government policy, and school and home practices.

2) Prevalence reports, where they exist, indicate an accelerating rate of myopia progression, which needs to be addressed.

3) Although prevalence data are a good place to start, one-off screening (cross-sectional data) does not provide information about incidence rates of progression, which are vital for any modelling of resources. The best age for screening and best protocols for monitoring progression need to be determined. Fulfilment of spectacle prescription and wearing compliance also need to be determined.

4) Cost of spectacles is a common barrier, even in more affluent countries. Nongovernmental organizations (NGOs) offer limited spectacle schemes, but governments are hesitant to intervene in spectacle provision because spectacles are generally regarded as a cosmetic luxury with attendant industry cost mark-ups as opposed to a medical device. As such, spectacles are often seen as unjustifiable for strapped government coffers. Concerted efforts by countries, NGOs and WHO are needed to advise governments in this area.

5) Government agencies – such as education, health and welfare agencies – are encouraged to work together to develop a multipronged holistic approach to address the myopia epidemic that parallels the rise in other lifestyle-related epidemics such as childhood obesity and anxiety. Interdepartmental cooperation is needed to develop a sustainable education model that incorporates measures to reduce myopia onset and progression, obesity and other linked disorders.
6) From a public health perspective, it is important that parents and teachers be made aware of the consequences of myopia and high myopia. Parents and teachers should be encouraged to consider changing academic cultures that emphasize increased study time and reduced time outdoors. Parents need to be convinced that increased time outdoors can be achieved without a loss of academic excellence, and teachers need to be supported in feeling comfortable allowing children outdoors. Advocacy should be incorporated into the education curriculum.

7) Evidence-based practice needs to inform decision-making in policy and practice in government, school and community.

8) High myopia needs to be recognized as an emerging public health crisis and managed as a high priority with protocols developed around treating high myopia as a single disorder and attendant sequelae treated holistically. With the emerging high myopia epidemic on the horizon, optometrists need to take on a larger role in managing high myopia and early detection of complications due to a shortage of ophthalmologists able or willing to treat this disorder. High myopia can result in severe vision impairment. Actions can be put in place to reduce progression of high myopia. At current rates of myopia progression, some countries are facing the prospect of whole generations with sight-threatening levels of myopia. Management practices and guidelines are needed to reduce this threat.

Recommendations

Member States are encouraged to consider the following:

1) Recognize myopia as an emerging problem in urban areas.

2) Improve quantity and quality of national surveys/data collection on refractive errors.

3) Train more refractionists, community optometrists and teachers in rural/underserved communities to provide services.

4) Effect policy changes around integration of eye health within school health programmes including training of teachers for vision checks.

5) Carry out studies to support the assertion that increased outdoor activities need not compromise academic performance.

6) Address myopia as a public health issue, with high myopia given even higher priority.

7) Review presenting visual impairment data, and not just corrected vision, to better illustrate the disability-causing problem.

WHO/IAPB is requested to consider the following:

1) Having listed spectacles as a medical device, work with Member States to educate governments and ministries on the medical necessity of spectacles.

2) Provide countries a summary of current evidence in myopia onset, prevalence and progression that can be used to develop national strategies.

3) Help design guidelines and procedures for myopia prevention and treatments that countries can follow.

4) Work with NGOs to educate communities and teachers about the dangers of high myopia.
1. INTRODUCTION

1.1 Meeting organization

The joint WHO/International Agency for the Prevention of Blindness (IAPB) Meeting on Developing Myopia Control Strategies was hosted by the Singapore Eye Research Institute on 13–14 November 2018. It brought together countries from the Western Pacific Region to discuss myopia control strategies, both what is currently rolled out in member countries, and, after listening to experts updating best practice, what new ideas and initiatives might be further effected in each country. During this meeting, global experts delivered the latest findings on myopia control strategies, while member countries reported on their activities in relation to this public health crisis.

1.2 Meeting objectives

The objectives of the meeting were to support policy development through:

1) updating existing strategies and approaches to reduce the burden of uncorrected myopia;

2) identifying effective activities to address the burden of myopia in countries; and


2. PROCEEDINGS

2.1 Opening session: Background

Myopia is the most common ocular condition in the world and is now considered a public health problem. Globally, the reported prevalence of childhood myopia ranges from less than 3% in Ethiopia\(^1\) to around 90% in Hong Kong SAR (China).\(^2\) Despite this wide-ranging prevalence between countries, by 2050, half the world’s population (projected to be 9.8 billion) is expected to be short-sighted, compared to the 1.4 billion people today.\(^3\) Accompanying this increase in myopia levels are increasing costs associated with care and quality of life, along with increased pressure of refractive error services and an increased need for specialist care necessitated by the burgeoning prevalence of high myopia, estimated to reach 20% of myopes (or 911 million people) by 2050.\(^3\)

Outcomes from the 2015 WHO meeting on myopia were summarized to set the scene for discussions. In 2015, the joint WHO/Brien Holden Vision Institute Global Scientific Meeting on Myopia\(^4\) reached consensus on definitions of myopia and high myopia as well as defining pathologic consequences of high myopia. The meeting declared myopia and high myopia as attributable causes of vision impairment, and deemed myopia assessment and management as integral to eye care service. Participants marked areas of the globe lacking in prevalence data as a high priority for future research and agreed on consensus definitions of myopia and high myopia. Further, they agreed that cycloplegia should be employed in epidemiological studies of children (under 18 years), while reporting should include young people up to 25 years. The meeting cautioned against under-correction of myopia to reduce progression in the face of increasing evidence suggesting under-correction actually increases progression. Finally, they itemized behaviours and agents that might decrease progression and detailed pathological consequences of a failure to control progression.

Hence, building upon these previous outcomes, the opening session of the 2018 meeting stated that the scope of this meeting was not scientific (as was the focus of the highly successful 2015 meeting), but rather to bring together key opinion leaders and researchers to guide discussions relating to public
health interventions and to gain an understanding from country representatives about what is happening in each of their countries regarding monitoring of prevalence rates and intervention strategies. By the end of the meeting, country representatives hoped to have broadened their understanding of evidence of myopia as a pressing global health issue and to be empowered to influence policy discussion in their countries.

2.2 Plenary session

1. Programmes that support increased advocacy at all levels; from individual, family, community and government are required to stem the accelerating myopia epidemic.

Country representatives provided an update of: myopia prevalence, policy and procedures in place to address the myopia epidemic, and burdens and challenges faced in their respective countries to tackle myopia. A rapidly emerging common theme is that myopia is an accelerating burden in most countries present, with the exception of Australia. Prevalence rates, where known, were reported as varying from around 14% in rural Lao People’s Democratic Republic to 90% of Chinese college students. Most member countries noted large disparities in prevalence between rural and urban populations. Barriers raised were: differences in access to national screening (for example, Mongolia which lacks this capacity), lack of school screening (Mongolia) or preschool screening (Cambodia), and lack of accurate prevalence data (Mongolia, Cambodia and Viet Nam). Other common issues included: lack of parental and teacher support for children wearing spectacles, resistance by children to wearing spectacles (especially girls in Cambodia), misconceptions around under-correction or lack of correction in limiting progression of myopia, unaffordability of spectacles, resistance to outdoor time, lack of access to atropine, and a lack of cooperation between various ministries (for example, education and health) to work together to tackle myopia. Mongolia reported high rates of astigmatism, which requires more expensive spectacles and trained professionals to service this need. Communities need to better understand the pathology of myopia, especially high myopia. Many parents believe that myopia can be “cured” with spectacles or that once the child is old enough he or she will be “cured” with laser surgery, so there is no imperative to address the issue. In many countries, efforts to increase outdoor time have been hard to implement. Some countries have mandated outdoor time, while other countries recommend two hours outdoors a day but have not legislated this.

Participants agreed to make a concerted effort to educate teachers and parents about the importance of wearing spectacles and the idea that myopia is a pathology. Many representatives expressed the desire to understand genetic versus environmental influences, to become familiar with the tools they need to undertake epidemiological studies in their countries, and to hear stories about successful programmes they can adopt in their own counties. The assembled representatives were united in their strong desire to develop programmes around advocacy.

2. With increasing myopia prevalence and earlier onset, practitioners need to advocate for improved awareness and strategies to limit this emerging public health crisis.

Recapping the agreed definitions and recommendations for the 2015 meeting, though myopia prevalence varies across ethnicities, the aim of the present meeting was to work out how to curb this epidemic. The global burden of myopia is reaching epidemic proportions with increases in those with myopia from 28% (2 billion people) in 2010 to a projected 50% (5 billion) in 2050. The biggest rise in the burden of myopia will occur in South Asia, the Middle East and Latin America. The myopia epidemic is a quality of life issue as well as political and governmental. Along with an increase in myopia, there will be an increase in high myopia and associated pathologies. Earlier onset of myopia leads to increased myopia and associated pathologies. Increases in high myopia (with attendant pathologies) from 12% of those with myopia to 20% will affect 911 million by 2050. Myopic maculopathy is one of the leading causes of blindness and manifests in high myopia at rates of 68-73% in older myopes and over 8% in younger myopes. This incidence is set to rise if we do not stem the tide of increasing myopia progression. Risk of cataract and open angle glaucoma attributable to myopia will also increase. In addition to an agreed definition of myopia, one of the
important outcomes from the 2015 meeting was the guidelines summary. The definition of myopia as -0.5 D in either eye is a political as well as a health decision, which impacts when interventions are made to stem progression. Representatives had discussed the definition and purpose of defining high myopia, since complications from myopia do not have a specific threshold but increase with increased myopia. Strategies discussed included: multifocal versus executive bifocal spectacles, both shown to have some modulation on myopia progression while soft contact lenses that reduce peripheral defocus and/or induce myopic defocus can slow the progress of myopia; orthokeratology that can slow progression, although overnight wear of contact lenses associated with some risk; and atropine and 7MX that have mixed results with some side-effects. Cycloplegia was advocated for true refractive error measurement, while ocular history was also stated to be important. The meeting did not intend to define high myopia (the group was referred to white papers that address this issue) but to exchange ideas and strategies around advocacy to raise awareness among decision-makers of the increased need for refractive, corrective and specialist services.

3. A concerted and united effort to stem the onset of myopia is cheaper and more effective than addressing manifestations and associated pathologies of myopia and high myopia.

From a public health perspective, there are two main issues surrounding myopia: one is a refractive error problem; the other is the morbidities that accompany refractive error. Presenting visual acuity is complicated as it represents both uncorrected refractive error and measures in place to control myopia progression. A number of regions showed prevalence of refractive error reducing until about 2000, then rising; in the South-East Asia region, it was steady and is now increasing; and other regions appear stable. These fluxes reflect the impact of both changes in prevalence of myopia, and correction rates. Myopia is a risk factor for cataract, glaucoma, and retinal detachment. The higher the myopia, the higher the risk. More importantly, even with moderate myopia, the risk of associated morbidities exists. Hence, there is no obvious threshold as to the level of myopia that increases these risks. We must recognize the complications of myopia in epidemiological surveys. A recent study on productivity loss due to vision impairment from myopic macular degeneration and uncorrected myopia estimated US$ 250 billion in lost productivity, which is probably a vast underestimation since the disability weight given to vision impairment is unrealistically low. This study at least gives an indication of the scale of the problem in direct and indirect costs.

The overarching message of this session was that fixing the problem is much cheaper than dealing with it once it manifests. Myopic macular degeneration is projected to be a main cause of blindness, though reported rates may be lower because epidemiology studies tend to classify myopic macular degeneration as “other” in causes of blindness. In view of the increasing prevalence especially in Asia, myopia progression and onset must be slowed as well as the management of myopic macular degeneration improved. However, in relation to myopia control, universal health coverage does not cover spectacle correction, even in many high-income countries. Annual school screening should be mandatory since myopia progression is continuous, and spectacles are frequently lost or broken. Preschool children should be screened since early diagnosis is key to managing myopia. Country representatives should advocate to stakeholders for policy change since evidence does not necessarily determine policy. Combined advocacy with allied causes such as childhood obesity using existing evidence should be targeted to ministers of education and health.

4. There are various options that should be considered when attempting to manage myopia.

Under-correction with spectacles as a strategy is not useful as we now know under-correction does nothing to control myopia – or actually worsens it. Progressive additions lenses were found to slow myopia, but the effect is small. Presently, executive bifocals provide greatest efficacy. Contact lens designs, including peripheral defocus, simultaneous defocus or extended depth of focus, attempt to decrease the rate of myopia progression by reducing blur at periphery of the retina or putting the image on, or in front of, the retina. Contact lenses are more efficacious than spectacles, offering 30-50% reductions in group average reduction. Children 8 years and above can wear and care for lenses. The more compliant the cohort, the greater the efficacy. Orthokeratology provides similar efficacy to other
control lenses, though there is a marked preference in Asia for orthokeratology, despite a noted drop in efficacy over time. Additionally, there is rebound with some technologies with a higher rate of progression than expected upon cessation of wear. High myopes show a ceiling effect in benefit from such technologies, and wearing contact lenses or orthokeratology lenses can be associated with possible adverse events.

Pharmaceutical interventions require a long and often tortuous path from patenting of intellectual property to preclinical to phase III studies, registration, practitioner education, distribution and marketing, and consumer demand. Atropine enjoys regulatory approval in some member countries, supported by various clinical studies, but studies are ongoing to determine the best concentration to reduce side-effects while maintaining acceptable efficacy. Translating knowledge into practice for such medications requires continued education of practitioners on efficacy and safety, effective marketing, and education of consumers. Other agents such as pirenzepine, dopamine, mRNA agonists and food additives are more experimental and require further validation. Decisions about how much time children spend outdoors, both during the school year and on holidays, are influenced by cultural and political factors. However, there is emerging agreement about the need to increase outdoor time for children to reduce myopia. China for instance, has abolished homework. This is a positive step, but we need immediate action to increase time outdoors in early school years, as well as systematic vision screening in schools for prompt referral for control of myopia progression. In the longer term, the school system needs reforming to reduce the risk of children developing myopia. Ongoing discussion of off-label use of drugs for myopia is necessary as the food and drug administrations do not have a regulated drug for myopia control. Any such discussion must include ethical considerations; for example, can you justify having a child as a control in a drug study showing remarkable success? Regulating off-label treatments and gathering strong evidence from clinical trials are hard.

5. Translation of science to practice requires cooperation between clinical and basic research, and open dialogue between researchers, clinicians, community and government.

Case study 1

Presently, the large body of information around myopia in the public domain offers limited guidance for practitioners. The International Myopia Institute was established to draw together experts from around the world to collect and review evidence, and to deliver understanding of best practice in an attempt to make science relevant to action. The late Professor Brien Holden drew together a global virtual network with support from Brien Holden Vision Institute, CooperVision, Essilor and the Vision Impact Institute to collect and structure evidence as a series of white papers to provide guidance for research and for educators and policy-makers. The seven white papers (a collaboration of 86 experts) cover definitions, interventions, clinical trials and instrumentation, industry guidelines and ethical issues, clinical management guidelines, experimental models, and genetics. They are freely accessible to eye care practitioners and public health workers, and will be translated into the world’s major languages.

An interesting development in clinical management guidelines for myopia is the idea of targeting the pre-myope through educating parents in lay terms about causes and risks to get children into care as soon as possible to reduce myopia progression. Developing tools to predict rates of progression and personalized management programmes will be key in limiting progression on a global scale.

Case study 2

Before we can educate parents and teachers to be proactive in the care of children’s eyes, we need to train confident practitioners who are armed with evidence and skills in myopia management. To that end, the Myopia Education Programme run by the Brien Holden Vision Institute has produced a series of courses that targets etiology, risk assessment and management strategies, understanding of complex cases, and the business of myopia that will encourage practitioners to develop ongoing care of myopic patients. All modules are online and interactive with certification upon completion. With two thirds of
canvassed practitioners indicating an increase in myopia cases within practice over 12 months, there is much interest in the courses and reports of almost universal changes in myopia management upon completion of the courses.

There is debate within the academic community as to whether we are doing enough in attempting to prevent myopia onset as opposed to managing it once it has developed. There is consensus that preventive myopia education should be linked holistically with other public health issues such as obesity and dental care. To be effective, such programmes require cooperation of national health bodies and education bodies. In Singapore, the early childhood agency under the Ministry of Education has mandated, through licensing, that preschool children receive one hour of outdoor time daily, in an attempt to address a range of potential health issues. This model is however harder to institute in some countries in the Western Pacific Region with less cooperation between government ministries and a lack of eye care professionals.

**Case study 3**

With mixed levels of resources and education within the Western Pacific Region, cooperation is key to balancing the regional needs and resources to advance to anti-myopia agenda most effectively. In this respect, the Shanghai experience is an excellent model and inspiration for other countries. The framework of blindness prevention in Shanghai involves the Shanghai Eye Disease Prevention and Treatment Centre as the central network with NGOs, international cooperation and industrial resources, and the Disabled Persons' Federation, as well as a network comprising more than 50 hospitals. Over 50% of students in Grade 5 have myopia, more than 20% of 16-year-olds and above have high myopia, and myopic macular degeneration is the leading cause of blindness in adults in Jing-An district, Shanghai. With myopia a pressing health concern in China, the President announced in August 2018 that Chinese children needed a brighter future, which has led to a nationwide impetus to address this issue. A plan to screen 1 million children relies loosely on the LV Prasad model of eye care. Details of the study will be provided in a forthcoming publication although the main outcomes were from the technical and physical challenges of screening 1 million children. Apps were developed to help educate parents; novel light meters were developed to monitor outdoor time; and expert panels comprising government, teachers, parents and the community were assembled for quality control. Blood samples were collected from these children as well as demographic data and other clinical data. Such a body of data could be very useful for translational studies into, for example, obesity, and other emerging public health concerns, highlighting again how myopia development is not happening in isolation but is part of a swathe of health issues affecting younger generations which must be stemmed to reduce further associated pathologies as children age.

**Case study 4**

Outdoor activity during class recess reduces myopia onset and progression in school children, as shown by the measurable impact in Taiwan, China. As early as 1980 school nurses in Taiwan, China, were trained to perform unaided visual acuity screening every semester with referral for students ≤ 20/25; in 1986, the Department of Health supported development of medical centres aimed to prevent myopia and to treat those who are myopic. The epidemiology of refraction status of Taiwanese children has been documented every five years since. Between 1999 and 2004, there were efforts to reduce myopia onset and progression through improved room lighting and table height, distance gaze and other ocular exercises, and near work breaks (30 minutes near work, 10 minutes break). However, these interventions were not successful. More encouraging results were observed with an education policy intervention that mandated increased outdoor time (80 minutes per day) showing a significant decrease in onset of myopia of 8% versus 17% with no intervention and a significant decrease in myopic shift from 0.25D versus 0.38D with no intervention. This protective effect was most evident in children who were not yet myopic. A study conducted in 2013 showed that outdoor activity even in shade (as opposed to direct sunlight) can retard myopia progression by 30% and reduce onset of new cases by 1%, corresponding to 30,000 children, with the attendant reduction in progression to high myopia. These data have encouraged cooperation between
departments of health and education and will lead to significant curriculum changes that encourage outdoor activities. These findings reiterate the idea that myopia must be tackled holistically as part of general health and well-being of children and communities.

**Case study 5**

A holistic approach is needed to tackle myopia along with other chronic childhood health issues. Within a single generation, myopia prevalence rates in Singapore have risen from 30% to 80%. The myopia epidemic in Asia has been branded a “tsunami”. Without drastic intervention, entire countries will be myopic as their populations age. By 2050, 80% of Singaporeans 80 years old or above will be myopic. There is evidence that for every hour spent outside, the incidence of myopia is reduced. Primary prevention of myopia will be achieved by changing modifiable environmental factors such as increasing time spent outside. However, overcoming cultural biases that push children into more close work and less time outside is a huge hurdle. Secondary prevention – to limit progression – relies on encouraging very young children to spend more time outdoors since the mean age of onset is 8.5 years and 10% of children in Singapore develop myopia by age 6. The Singapore Health Promotion Board is encouraging families to spend time together outdoors, participating in activities such as hiking that achieve a number of public health goals at once. Light monitors that also work as fitness trackers can be used in such a holistic approach both to track data and to provide incentives to wearers through feedback. Use of diaries, questionnaires and light levels indicate Singaporean children spend a huge amount of time in very low light levels. It is important to understand whether intense periods of outdoor time (for instance summer camp) will provide the same level of protection as consistent small periods of outdoor time such as daily exercise routines. Recommendations for outdoor time to prevent myopia include 2–3 hours outside every day, which can include increased physical activity to reduce risks of chronic diseases such as diabetes, hypertension, heart disease and cancer in later life. An outdoor lifestyle offers better emotional health, lower levels of depression, anxiety and stress through an increased appreciation of nature. We need a holistic approach (even encompassing diet and sleep) to address a cohort of public health crises in child health.

**Case study 6**

School-based screening of 1.5 million children per year in Shanxi, China, offers learnings about coordination, real-time data entry, and participation by teachers and the community. A 5-year screening programme, from June 2013 to May 2018, screened 1.5 million students annually and referred 200 000. A centralized management system was used with real-time data entry during screening at over 2000 screening sites. This system tracked the students who had undergone screening as well as those referred. As the teachers were trained to assist in the screening, medical professionals were not required. The system also allowed for real-time communication with parents if visual acuity was < 6/12 or in cases with rapid myopia progression. To engage parents, a text message is sent to parents with a copy of the report as well as location of the nearest eye clinic for referral. Optical shops under this programme also provided low-cost glasses, with discounts within three months of referral. Tests were developed to measure visual acuity online. This programme is an example of a successful coordinated effort to screen vast numbers of children and to engage children, parents and teachers in active participation and responsibility for children’s eye health. Even with this concerted effort, however, less than 50% of parents followed up referral for spectacles, giving an indication of efforts required to improve parental education about reducing myopia progression.

6. Accessibility and awareness: Reaching children is more critical than ever as it is estimated that by 2050, 10% of the world will be highly myopic, with nearly 1 billion people at risk of developing blinding conditions.

To reduce the increasing burden of myopia development and progression, providing early interventions for good vision and lifestyle is critical. Our Children’s Vision (OCV) is a five-year campaign acting as a catalyst to drive change for children in both the developed and developing world.
to have universal access to eye care. OCV works to ensure that effective, sustainable eye health initiatives for children are integrated into national and global health and education policies and programmes through advocacy aimed at governments and key influencers by emphasizing that eye care for children is critical to education and health outcomes – the key drivers of economic development for a nation. OCV creates partnerships with key opinion leaders, develops coalitions and networks to provide innovative systemic changes, drives awareness, utilizes local knowledge, and funds spectacles and assistive devices. By 2020, the campaign will have reached 50 million children through 79 partners in 60 countries (almost 30 million screened thus far with 2 million pairs of spectacle dispensed), integrated eye health into new and existing child health and education systems, and increased awareness and understanding of the impact of vision impairment on a child’s health and development. OCV is not a programme funding mechanism but rather seeks to expand existing programmes. Key achievements include an advocacy framework developed for engaging with UNICEF at a global level, supporting campaign partners, donating more than 300,000 spectacle frames to 20 partners, and publishing system reviews.

The International Agency for the Prevention of Blindness gender working group examined the barriers to access for women and girls. IAPB reported that women and girls experience two thirds of the world’s blindness and that women are 40% less likely to utilize eye care services than men. Girls with visual impairment are also less likely to attend schools than boys and, in some parts of the world, it is almost impossible for girls who are blind or significantly visually impaired to access education. Educated mothers are more likely to educate their children, contribute to family/community, immunize their children, understand the cause of disease and know when to seek medical help. They are also likely to prevent malnutrition in their children. Increasing education in girls can boost their participation in the workforce, improve health and safeguard the education of their children. Women’s and girl’s equity in eye care is fundamental to women’s and girl’s equality in life.

In addition to gender equity, other segments of society with restricted access such as the disabled, ethnic minorities, undocumented workers, dwellers of remote towns and villages, and children in areas of conflict can all be difficult to reach.

7. Next steps: A united voice in mechanisms to address myopia in the countries of the Western Pacific

Representatives presented the best next steps in dealing with increasing myopia in their respective countries. Many common themes emerged as to the strategies and barriers to implementation.

Country representatives agreed in general that prevalence needs to be better measured, especially in rural areas. In measuring prevalence, it was suggested that school-based testing is powerful but requires education of teachers in learning to screen. In addition, while this testing and determination of prevalence highlights the scope of the problem for policy-makers, it is useless without the associated education of children, parents and teachers. The detrimental consequences of uncorrected refractive error and pathological risks associated with high myopia compete with the interests of both the state (in higher-priority public health issues) and parents (in pursuit of academic advancement to the detriment of eye sight) for attention.

Increased outdoor time was almost universally stated as a top priority (with the exception of children in Australia who enjoy longer play times and higher intensity light levels outside and those in the Philippines who walk to school about 30–60 minutes each way). Constraints to implementation of increased outdoor time were consistent between many countries: bad air quality, perception that increased outdoor time necessarily equates to decreased opportunities to study, and teachers’ concerns about monitoring children outside – all leading to severely restricted opportunities for outside play.
This negative cycle of health implications for children led to the suggestion that myopia should not and cannot be tackled in isolation and that enlisting the cooperation between government departments of education and health will help in developing holistic education models that can tackle various health issues, including obesity, anxiety and depression that accompany the pressures to succeed academically.

The affordability of spectacles was raised as a huge barrier, even in Australia. Governments are often unwilling to support subsidized spectacle schemes because of the high mark-up by industry that spectacles are seen as a luxury and not medical devices. WHO recently listed spectacles as medical devices, which will help in educating governments to sponsor affordable access to spectacles.

Finally, participants universally agreed that no effective strategies or guidelines are in place to modulate the future high myopia epidemic. China is already facing an epidemic of high myopia with most other countries to follow. New procedures are required to deal with associated pathologies in a holistic manner as presently the various pathologies are treated by different specialists leading to fragmented and expensive care.

Incidence tends to be lower in rural areas, but care is concomitantly lower as well, which is a potential disaster when children begin to adopt more aspirational Western habits. There are too few optometrists or ophthalmologists in rural areas due to lack of training.

Evidence-based action plans need to be made in conjunction with all stakeholders. We need a holistic approach to childhood health both physical and mental. If we can shift behaviours and expectations, we can tackle all of these health issues together.

Myopia is seen as a pressing public health concern that will require concerted cooperation between and within levels of society and government to increase public awareness and understanding of the ramifications of the global myopia epidemic.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

This report summarizes the 10 main themes that emerged from discussions and the issues for future action:

1. It is recommended that myopia be viewed as a public health emergency. Increased community and government understanding of myopia as a major health issue (beyond a cosmetic inconvenience), and awareness of the pathological progression of myopia to high myopia with all its attendant morbidities is needed such that interventions will be effected prophylactically and rapidly in government policy, and school and home practices.

2. Prevalence reports, where they exist, indicate an accelerating rate of myopia progression which needs to be addressed. Some countries lack good prevalence data indicating a need for increased training of health workers, teachers and nurses in regional areas to address this issue.

3. Although prevalence data are a good place to start, one-off screening does not provide information about rates of progression, which are vital for modelling of resources. The best age for screening and best protocols for monitoring progression need to be determined, as do fulfilment of spectacle prescriptions and wearing compliance.
4. Cost of spectacles is a barrier, including in more affluent countries. NGOs offer limited spectacle schemes, but governments are hesitant to intervene in spectacle provision because spectacles are generally regarded as a cosmetic luxury – with related industry cost mark-ups – as opposed to a medical device. As such, spectacles are often seen as unjustifiable for strapped government coffers. Concerted efforts by countries, NGOs and WHO are needed to inform governments in this area.

5. Government agencies such as education, health and welfare are encouraged to work together to develop a multipronged holistic approach to address the myopia epidemic that parallels the rise in other lifestyle-related epidemics such as childhood obesity and anxiety. Interdepartmental cooperation is needed to develop a sustainable education model that incorporates measures to reduce myopia onset and progression, obesity and other linked disorders.

6. From a public health perspective, it is important that parents and teachers be made aware of the consequences of myopia and high myopia. Parents and teachers are to be encouraged to consider changing academic cultures that emphasize increased study time and reduced time outdoors. Parents need to be convinced that increased outdoor time can be achieved without a loss of academic excellence, and teachers need to be supported in feeling comfortable to allow children outdoors. It is desirable for advocacy to be incorporated into the education curriculum.

7. Evidence-based practice needs to inform decision-making in policy and practice in the government, school and community.

8. High myopia needs to be recognized as an emerging public health crisis and managed as a high priority with protocols developed around treating high myopia as a single disorder and attendant sequelae treated holistically. With the emerging high myopia epidemic on the horizon, optometrists need to take on a larger role in treating high myopia due to a shortage of ophthalmologists able or willing to treat this disorder. Actions can be put in place to reduce progression to high myopia. At current rates of myopia progression, some member countries are facing whole generations with sight-threatening levels of myopia. We need management practices and guidelines to reduce this threat.

9. The take-home message was an agreed desire for a simplified list of current evidence and up-to-date recommendations for member countries that can be delivered to ministries to develop national strategies. These strategies must be developed relative to the degree of myopia. Advocacy is key in informing the government and community. These activities can be followed up at further global meetings to clarify gaps identified during this meeting and those that arise during implementation of the recommendations.

### 3.2 Recommendations

#### 3.2.1 Recommendations for Member States

Member States are encouraged to consider the following:

1) Recognize myopia as an emerging problem in urban areas.

2) Improve quantity and quality of national surveys/data collection on refractive errors.

3) Train more refractionists, community optometrists, and teachers in rural/underserved communities to provide services.

4) Refine curricula in school health programmes to include extended outdoor time.
5) Effect policy changes around integration of eye health within school health programmes, including training of teachers for vision checks.

6) Carry out studies to support the assertion that increased outdoor activities will not compromise academic performance.

7) Address myopia as public health issue, with high myopia given even higher priority.

8) Push for development of treatments approved by international experts.

9) Review presenting visual impairment data, and not just corrected vision, to better illustrate this disability-causing problem.

3.2.2 Recommendations for NGOs

NGOs are encouraged to:

1) Support countries to develop and implement sustainable eye care models.

2) Take a proactive approach in educating about the health implications of high myopia.

3) Support countries that have vast regions and limited resources to access rural children.

4) Provide advocacy in a manner sympathetic to the language around myopia within-country to maximize communication and education.

5) Convene meetings to assist in advocacy.

6) Continue reporting on world vision.

3.2.3 Recommendations for WHO

WHO is requested to:

1) Have listed spectacles as a medical device, work with Member States to inform governments and ministries in the medical necessity of spectacles.

2) Provide Member States a summary of current evidence in myopia onset, prevalence and progression that can be used to develop national strategies.

3) Support the development of guidelines and procedures for myopia prevention and treatments that Member States can follow.

4) Work with NGOs to educate communities and teachers about the dangers of high myopia.
REFERENCES


35. Yam JC, Jiang Y, Tang SM, et al. Low-concentration atropine for myopia progression (LAMP) study: A randomized, double-blinded, placebo-controlled trial of 0.05%, 0.025%, and 0.01% atropine eye drops in myopia control. *Ophthalmology* 2018


# MEETING PROGRAMME

**TUESDAY, 13 November 2018**

<table>
<thead>
<tr>
<th>TIME</th>
<th>TOPIC</th>
<th>LEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Welcome</td>
<td>Professor Tien Y. Wong</td>
</tr>
<tr>
<td>09:05</td>
<td>Introductions</td>
<td>Dr Andreas Mueller</td>
</tr>
</tbody>
</table>
| 09:15 | Western Pacific meeting - Setting the scene | IAPB – Ms Amanda Davis  
 WHO – Dr Andreas Mueller |
| 09:25 | Objectives and scope of the meeting | Ms Amanda Davis |
| 09:35 | Meeting processes  
 ▪ Election of office bearers (Chair, Co-Chairs and Rapporteurs)  
 ▪ Administrative arrangements  
 ▪ Adoption of the agenda | Dr Andreas Mueller |
| 09:45 | Fast five - country updates | Dr Andreas Mueller |
| 11:00 | Morning tea | |
| 11:30 | Myopia - This meeting in context  
 ▪ What is myopia? How many people does it impact?  
 ▪ Why is it a problem?  
 ▪ Recapping the 2015 Joint Meeting: Agreed Definitions  
 ▪ Recommendations from 2015 meeting | Professor P. Sankaridurg |
| 12:00 | The Impact of myopia on society:  
 ▪ Burden and cost | Professor Serge Resnikoff |
| 12:45 | Lunch | |
| 13:45 | Panel discussion – Considerations in managing myopia  
 ▪ Optical  
 ▪ Pharmaceutical  
 ▪ Environmental  
 ▪ Surgical/Management of complications of high myopia  
 ▪ Regulatory considerations | Ms Amanda Davis  
 Professor P. Sankaridurg  
 Professor Audrey Chia  
 Professor Ian Morgan  
 Dr Tae Yakoi  
 Professor Donald Tan |
| 15:00 | Case studies: Translating science to practice  
 ▪ The International Myopia Institute  
 ▪ Myopia control in clinical practice  
 ▪ Practitioner education - online, certificate programmes | Professor Serge Resnikoff  
 Professor Serge Resnikoff  
 Professor P. Sankaridurg  
 Ms Judith Stern |
| 16:00 | Close | Professor Tien Y. Wong |
| 16:30 | Singapore presentation & reception | |

**Venue:** The Academia, SGH Campus, Level 1, Seminar Room 3 (L1 S3)
<table>
<thead>
<tr>
<th>TIME</th>
<th>TOPIC</th>
<th>LEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:30</td>
<td>Fighting myopia - The Singapore experience</td>
<td>Lecture by Professor Wong Tien Yin</td>
</tr>
<tr>
<td>17:00</td>
<td>Fireside chat</td>
<td>Moderator: Marcus Ang</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Panel: Professor Donald Tan, Associate Professor Audrey Chia, Dr Veronica Tay (policy), Professor Saw Seang Mei (epidemiology), Associate Professor Gemmy Cheung (retina)</td>
</tr>
<tr>
<td>18:00</td>
<td>Reception (Level 3, Atrium)</td>
<td></td>
</tr>
</tbody>
</table>

**WEDNESDAY, 14 November 2018**

<table>
<thead>
<tr>
<th>TIME</th>
<th>TOPIC</th>
<th>LEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Review day one</td>
<td>Dr Marcus Ang</td>
</tr>
<tr>
<td>09:10</td>
<td>Agenda day two</td>
<td>Ms Amanda Davis</td>
</tr>
<tr>
<td>09:15</td>
<td><strong>Case studies: Translating science to practice</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engaging the community:</td>
<td>Professor Serge Resnikoff</td>
</tr>
<tr>
<td></td>
<td>o The Shanghai experience</td>
<td>Professor Zhu Jiangufeng</td>
</tr>
<tr>
<td></td>
<td>o Implementing myopia control into health and education policy: The measurable impact in Chinese Taipei</td>
<td>Professor Pei Chang Wu</td>
</tr>
<tr>
<td></td>
<td>Wearables: Singapore</td>
<td>Professor Seang Mei Saw</td>
</tr>
<tr>
<td></td>
<td>School-based activities</td>
<td>Professor Minguang He</td>
</tr>
<tr>
<td>10:15</td>
<td>Morning Tea</td>
<td></td>
</tr>
<tr>
<td>10:45</td>
<td><strong>Accessibility</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Our children’s vision:</td>
<td>Mr Drew Keys</td>
</tr>
<tr>
<td></td>
<td>Integrating eye health into school health</td>
<td>Mr Hasan Minto</td>
</tr>
<tr>
<td></td>
<td>IAPB Gender Working Group:</td>
<td>Ms Jennifer Gersbeck</td>
</tr>
<tr>
<td></td>
<td>Barriers to access for women and girls</td>
<td>Ms Joanna Conlon</td>
</tr>
<tr>
<td></td>
<td>World Report of Vision</td>
<td></td>
</tr>
<tr>
<td>11:45</td>
<td><strong>Breakout session</strong></td>
<td>Professor Serge Resnikoff</td>
</tr>
<tr>
<td></td>
<td>What do we need to do?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What resources do we require?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What are the HR considerations?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What are the regulatory considerations?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What is the policy change and implementation required?</td>
<td></td>
</tr>
<tr>
<td>13:00</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>14:00</td>
<td><strong>Reporting back – Different approaches by country</strong></td>
<td>Professor Serge Resnikoff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr Andreas Mueller</td>
</tr>
<tr>
<td>15:30</td>
<td><strong>Next steps</strong></td>
<td>Dr Andreas Mueller</td>
</tr>
<tr>
<td>16:00</td>
<td><strong>Closing remarks</strong></td>
<td>Professor P. Sankaridurg (BHVI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ms Amanda Davis (IAPB)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr Andreas Mueller (WHO)</td>
</tr>
</tbody>
</table>
# LIST OF PARTICIPANTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms Amanda Davis</td>
<td><a href="mailto:davisamanda2017@gmail.com">davisamanda2017@gmail.com</a></td>
</tr>
<tr>
<td>Mr Drew Keys</td>
<td><a href="mailto:dkeys@iapb.org">dkeys@iapb.org</a></td>
</tr>
<tr>
<td>Dr Andreas Mueller</td>
<td><a href="mailto:muellera@who.int">muellera@who.int</a></td>
</tr>
<tr>
<td>Professor Tien Y. Wong</td>
<td><a href="mailto:wong.tien.yin@singhealth.com.sg">wong.tien.yin@singhealth.com.sg</a></td>
</tr>
<tr>
<td>Dr Marcus Ang</td>
<td><a href="mailto:Marcus.Ang@Singhealth.com.sg">Marcus.Ang@Singhealth.com.sg</a></td>
</tr>
<tr>
<td>Professor Audrey Chia</td>
<td><a href="mailto:audrey.chia.w.1@singhealth.com.sg">audrey.chia.w.1@singhealth.com.sg</a></td>
</tr>
<tr>
<td>Professor Seang Mei Saw</td>
<td><a href="mailto:seang_mei_saw@nuhs.edu.sg">seang_mei_saw@nuhs.edu.sg</a></td>
</tr>
<tr>
<td>Professor Serge Resnikoff</td>
<td><a href="mailto:serge.resnikoff@gmail.com">serge.resnikoff@gmail.com</a></td>
</tr>
<tr>
<td>Professor Padmaja Sankaridurg</td>
<td><a href="mailto:p.sankaridurg@brienholdenvision.org">p.sankaridurg@brienholdenvision.org</a></td>
</tr>
<tr>
<td>Associate Professor Judith Flanagan</td>
<td><a href="mailto:j.flanagan@brienholdenvision.org">j.flanagan@brienholdenvision.org</a></td>
</tr>
<tr>
<td>Ms Judith Stern</td>
<td><a href="mailto:j.stern@brienholdenvision.org">j.stern@brienholdenvision.org</a></td>
</tr>
<tr>
<td>Mr Hasan Minto</td>
<td><a href="mailto:h.minto@brienholdenvision.org">h.minto@brienholdenvision.org</a></td>
</tr>
<tr>
<td>Professor Kyoko Ohno Matsui</td>
<td><a href="mailto:k.ohno.oph@tmd.ac.jp">k.ohno.oph@tmd.ac.jp</a></td>
</tr>
<tr>
<td>Dr Tae Yokoi</td>
<td><a href="mailto:yokoitae@icloud.com">yokoitae@icloud.com</a></td>
</tr>
<tr>
<td>Professor Ian Morgan</td>
<td><a href="mailto:ian.morgan@anu.edu.au">ian.morgan@anu.edu.au</a></td>
</tr>
<tr>
<td>Ms Jennifer Gersbeck</td>
<td><a href="mailto:jgersbeck@hollows.org">jgersbeck@hollows.org</a></td>
</tr>
<tr>
<td>Professor PC Wu (Pei-Chang)</td>
<td><a href="mailto:wpc@cgmh.org.tw">wpc@cgmh.org.tw</a> <a href="mailto:wpc@cgmh.org.tw">wpc@cgmh.org.tw</a></td>
</tr>
<tr>
<td>Professor Minguang He</td>
<td><a href="mailto:liying.li@unimelb.edu.au">liying.li@unimelb.edu.au</a>; '<a href="mailto:Mingguang.he@unimelb.edu.au">Mingguang.he@unimelb.edu.au</a>'</td>
</tr>
<tr>
<td>Professor Zhu Jiangfeng</td>
<td>Zhu Jianfeng <a href="mailto:jzhu1974@hotmail.com">jzhu1974@hotmail.com</a></td>
</tr>
<tr>
<td>Professor Jialiag Zhao</td>
<td><a href="mailto:13501132676@163.com">13501132676@163.com</a></td>
</tr>
<tr>
<td>Ms Leilei Zhan</td>
<td><a href="mailto:po_niha@163.com">po_niha@163.com</a></td>
</tr>
<tr>
<td>Dr Do Seihha</td>
<td><a href="mailto:doseihha@gmail.com">doseihha@gmail.com</a></td>
</tr>
<tr>
<td>Dr Kampsoua Southisombath</td>
<td><a href="mailto:southi1961@gmail.com">southi1961@gmail.com</a></td>
</tr>
<tr>
<td>Dr Bouathep Phoumindr</td>
<td><a href="mailto:bouathep@hotmail.com">bouathep@hotmail.com</a></td>
</tr>
<tr>
<td>Dr Noorhaire Sumarlie Nordin</td>
<td><a href="mailto:drnoorhaire@moh.gov.my">drnoorhaire@moh.gov.my</a></td>
</tr>
<tr>
<td>Ms Duratul Ain Binti Hussin</td>
<td><a href="mailto:duratulain.hussin@gmail.com">duratulain.hussin@gmail.com</a></td>
</tr>
<tr>
<td>Ms Rosmawati Uthman</td>
<td><a href="mailto:rosmawatiuthman@gmail.com">rosmawatiuthman@gmail.com</a></td>
</tr>
<tr>
<td>Ms Oyungerel Nanzad</td>
<td><a href="mailto:oyungerel@moh.gov.mn">oyungerel@moh.gov.mn</a></td>
</tr>
<tr>
<td>Dr Chimee Chuluunghkuu</td>
<td><a href="mailto:chimgee.chuluun@gmail.com">chimgee.chuluun@gmail.com</a></td>
</tr>
<tr>
<td>Dr Leo Cubilan</td>
<td><a href="mailto:leo.cubillan@up.edu.ph">leo.cubillan@up.edu.ph</a></td>
</tr>
<tr>
<td>Dr Mildred Pre</td>
<td><a href="mailto:premildred@gmail.com">premildred@gmail.com</a></td>
</tr>
<tr>
<td>Mr (Holden) Yoon Seung Kim</td>
<td><a href="mailto:holden.kim@labsd.net">holden.kim@labsd.net</a></td>
</tr>
<tr>
<td>Dr Nguyen Thi Thu Hien</td>
<td><a href="mailto:thuhienvnio@gmail.com">thuhienvnio@gmail.com</a></td>
</tr>
<tr>
<td>Ms Amanda (Yiwen) Huang</td>
<td><a href="mailto:yhuang@hollows.org">yhuang@hollows.org</a></td>
</tr>
<tr>
<td>Mr Peter Hendicott</td>
<td><a href="mailto:p.hendicott@qut.edu.au">p.hendicott@qut.edu.au</a></td>
</tr>
<tr>
<td>Dr Priya Morjaria</td>
<td><a href="mailto:priya.morjaria@lshtm.ac.uk">priya.morjaria@lshtm.ac.uk</a></td>
</tr>
<tr>
<td>Ms Joanna Conlon</td>
<td><a href="mailto:jconlon@iapb.org">jconlon@iapb.org</a></td>
</tr>
<tr>
<td>Ms Janine Lancaster</td>
<td><a href="mailto:janine.lancaster@myt.uk.com">janine.lancaster@myt.uk.com</a></td>
</tr>
</tbody>
</table>