Public Health Approaches for Decrease the Prevalence of Reduced Visual Acuity -Taiwan Experience

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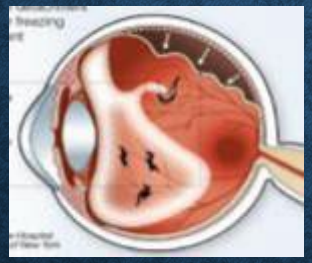
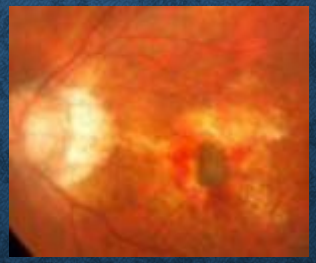
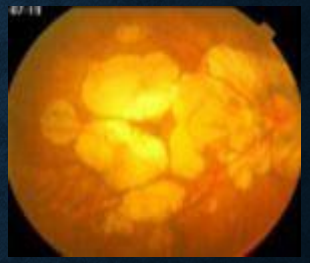
Public Health Approaches for Childhood Myopia

- Awareness & Recognition

WHO (2016) warned: high myopia has the risk of blindness

High myopia (-5D or greater)complications

Cataract	Glaucoma	Retinal Detachment	Myopic CNV	VMT Foveoschisis,fovea detachment macular hole Posterior Staphyloma	Myopic Macular Degeneration
					
5X	8X	40X	121X		No.1

CANDIDATE OF HIGH MYOPIA?
CHILD MYOPIA, SCHOOL MYOPIA

- Once onset, it progress -1D/yr until the end of adolescent
- A chronic, and progressive disease
- Early onset, higher risk of high myopia (-5D within 5 yrs)

Myopic Tsunami

REVIEW ARTICLE

Wu et al. APJO 2016

Epidemiology of Myopia

Pei-Chang Wu, MD, PhD, Hsiu-Mei Huang, Hun-Ju Yu, MD, Po-Chiung Fang, MD, and Chueh-Tan Chen, MS

Abstract: Myopia is not a simple refractory error, but an eyesight-threatening disease. There is a high prevalence of myopia, 80% to 90%, in young adults in East Asia; myopia has become the leading cause of blindness in this area. As the myopic population increases globally, the severity of its impact is predicted. Approximately one-fifth of the myopic highly associated with sight-threatening conditions. The complications of myopia include presenile cataracts, glaucoma, retinal detachment, myopic choroidal neovascularization (CNV), foveoschisis, staphyloma, macular atrophy, and blindness.[11–13] Studies have shown that myopia progresses faster when children present with myopia at a younger age.[14,15] Once myopia occurs

CONCLUSIONS

The tide of myopia is coming along with the consequences it will bring. Not only is the treatment of myopia complicated, but also prevention is more important. Although the mystery of myo-

LACK AWARENESS OF MYOPIA

Table 1 Reports from member states from the Western Pacific Region of the WHO

Country*	Estimated myopia prevalence	National coordinated myopia screening Programme	Barriers to implementation of new programme	Future developments
Australia	3%	None	Lack of awareness School involvement needed—vision screening and more outdoor activities	Promote awareness and public education
Cambodia	2.5% to 13.7%	Vision screening	Lack of awareness Cultural barriers	Public education
Korea	53.7%	Vision screening	Lack of outdoor activities being promoted	Myopia control and recommendations for evidence-based intervention
Laos	14.3%	None	No surveillance programme with lack of data	Implementation of surveillance programme
Malaysia	34.4%	Vision screening	Lack of awareness Limited resources	Integrating primary eye care programme in health services
Mongolia	41.7%	Vision screening	Lack of knowledge and resources	Integrating eye health programme in health services
Vietnam	Unavailable	Vision screening	Lack of awareness Limited resources	Training of eye care professionals in myopia understanding and control

*Countries from member states from the WHO Western Pacific Region participating in the WHO Meeting in 2018. Two countries are discussed in detail as case studies and not included in this table.

Marcus Ang et al. Br J Ophthalmol 2020 Nov;104(11):1482-87.

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Outcomes and eye care knowledge in rhegmatogenous retinal detachment patients with a history of laser refractive surgery for myopia

Chieh Lan[1], Yi-Hao Chen[2], Yung-Jen Chen[2], Jong-Jer Lee[2], Hsi-Kung Kuo[2] and Pei-Chang Wu[2]*

Effective Interventions for Child Myopia

- **Awareness**
  1. Recognize the child myopia is a disease
  2. Educate parents, teachers, skate holders and the public
  3. Keep in alert
  4. Prevention is essential
- Recognition

TIME OUTDOORS IS STRONG PROTECTIVE FACTOR

Factor	Evidence/Causal Relationship	Confounding Issues
Major factors		
Education	Strong and causal	Time outdoors
Time outdoors	Strong and causal	Role of light (intensity, duration
Screen time	Equivocal	Nearwork

Morgan IG, Wu PC, Ostrin LA, Tideman JWL, Yam JC, Lan W, Baraas RC, He X, Sankaridurg P, Saw SM, French AN, Rose KA, Guggenheim JA. IMI Risk Factors for Myopia. Invest Ophthalmol Vis Sci. 2021 Apr 28;62(5):3

Increase time outdoors for myopia prevention

Concern about UV harm?

SUNGLASS OR HAT

- indoors (< 1000 lux)
- hat (4112–8156 lux), Sunglasses (1792-6800 lux)
- light levels were still 11 to 43 times higher than indoors
- Protective sunglasses, hat or under tree shade are still maintaining high illuminance levels to prevent myopia

. Protective eye measures (hat and sunglasses).

Lanca et al. Transl Vis Sci Technol 2019

MODERATE SUNLIGHT EFFECTIVE

- Prevention and Outdoor Light Intensity in a School-Based Cluster Randomized Trial. (ROCT711)

  Wu PC et al. Ophthalmology. 2018 125(8):1239-1250.

  - spent 11 hours or more outdoors a week
  - 54% lower risk of rapid myopia progression
  - 30% (0.23D/0.79D) efficacy of myopia control in myopic children
  - achieved even with moderate light intensities such as in hallways or under a tree (around 2000~7500 lux)

Enough time outdoors with moderate light intensity could achieve myopia prevention and partial control

HIGHER LEVEL OF EVIDENCE META-ANALYSIS: OUTDOOR AND MYOPIA

Dose-Response Relationship of Outdoor Exposure and Myopia Indicators: A Systematic Review and Meta-Analysis of Various Research Methods.

Ho CL, Wu WF, Liou YM. Int J Environ Res Public Health. 2019 Jul 21;16(14):2595.

- Daily outdoor light exposure of more than 120 min was the most effective intervention
- Weekly intervention time exhibited a dose-response relationship

Effective Interventions for Child Myopia

- Awareness, recognition
- Promoting

  -Rewarding, reminding

REWARDING

- incentive-based outdoor physical activity program
  - the Family incentive trial (FIT) in Singapore
  - a 9-month cluster randomised controlled trial.
  - 285 children aged 6-12 years of age
  - targeted education on myopia and good eye care habits, structured weekend outdoor activities and incentives for children to increase their daily steps via pedometer
  - a significant increase in mean outdoor time per week in the intervention arm (14.75 h/week) compared to the control arm (12.40 h/week) at 6 months
  - outdoor time was not statistically significant at the end of the trial (15.95 h/w) in the control group (14.34 h/w)

Ngo et al. Ophthalmic Physiol Opt 2014

REMINDING

Li et al. JAMA Pediatr 2022

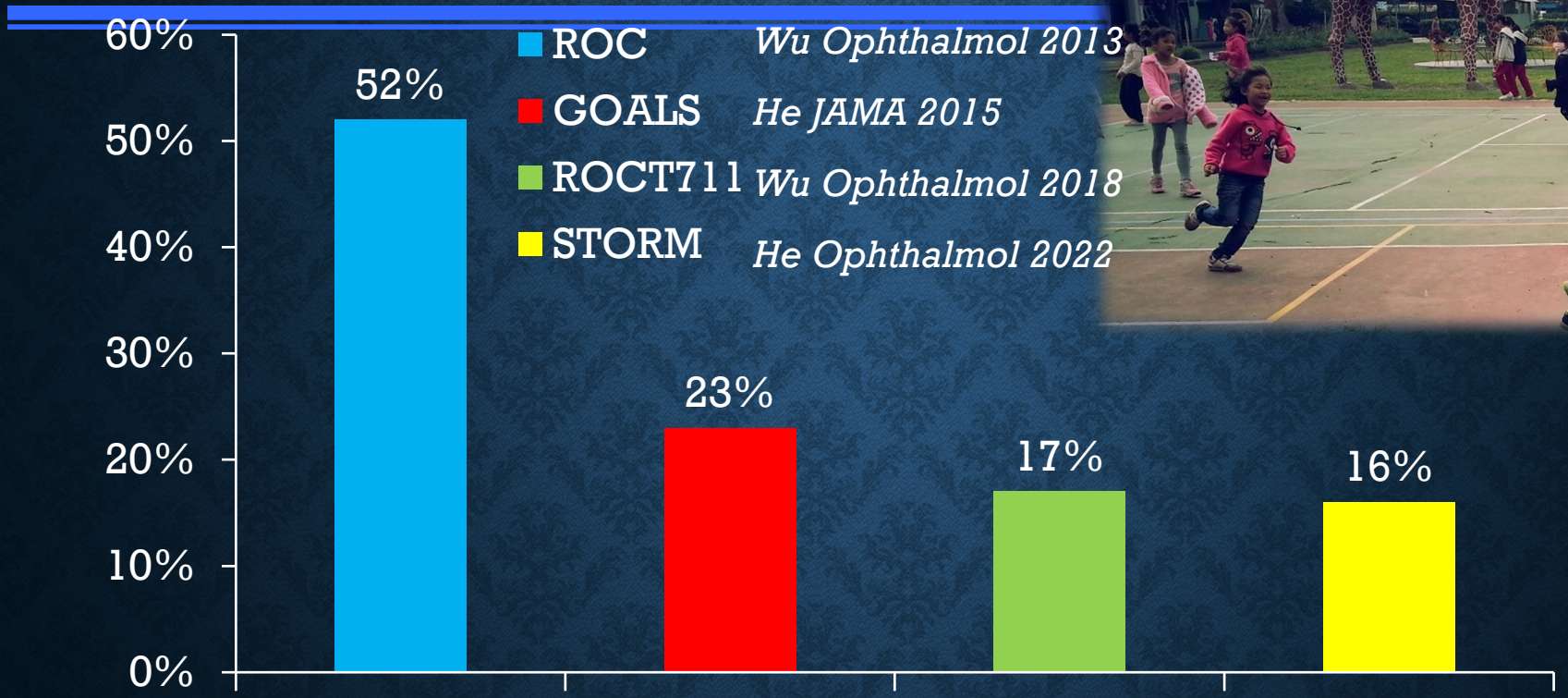
- Effect of Text Messaging Parents of School-Aged Children on Outdoor Time to Control Myopia: A Randomized Clinical Trial
  - 268 grade 2 schoolchildren were selected and randomly assigned to SMS and control groups.
  - Parents of children in the SMS group were sent text messages twice daily for 1 year to take their children outdoors.
  - SMS intervention group demonstrated greater light exposure and higher time outdoors during weekends
  - significantly decrease myopia progression and AXL elongation
  - Myopia prevalence: 46.6% vs 65.4% at year 3

WHO Health Promoting School in Taiwan

Public Health Approaches for Childhood Myopia (APP)

- Awareness, recognition
- Promoting
  - -Rewarding, reminding
  - -Health promoting school
- Policy intervention

MYOPIA INCIDENCE REDUCTION RATE



ROC	GOALS	ROCT711	STORM
Grade 1-7	Grade 1	Grade 1	Grade 1
School policy	School policy	encourage	School policy
intermittent	continued	intermittent	continued
80 min/day	40 min/day	40 min/day	80 min/day
1 yr	3 yrs	1 yr	2 yr

Curriculum of primary schools in Taiwan
-outdoor activities separate to recess(10, 20, 10, 10, 10, 20 mins)– total 80 mins per day

臺北縣鷺歌鎮永吉國小 九十九 學年度班級日課表　五 年 三 班　吳 威 敏 老師

時段	節次	時間	一	二	三	四	五
上午		07：50～08：30	教師晨會	兒童朝會	社團活動	全校英語	導師時間
	1節	08：40～09：20	國語	國語	國語	國語	國語
	2節	09：30～10：10	數學	數學	國語	美勞 陳宜珍老師	體育 李顯鎮主任
		10：10～10：30	課間活動				
	3節	10：30～11：10	資訊 鄭惠坤老師	綜合	數學	美勞 陳宜珍老師	數學
	4節	11：20～12：00	健康 李顯鎮主任	英語 潘思吟老師	彈性(閱讀)	數學	英語 潘思吟老師
下午		12：00～12：40	午餐時間				
		12：40～13：10	午間靜息				
	5節	13：20～14：00	國語	自然 伍秀鶴老師	自然 伍秀鶴老師	國語	綜合
	6節	14：10～14：50	音樂 林宜汝老師	自然 伍秀鶴老師	閩南文化 潘思吟老師	社會	綜合
		14：50～15：10	整潔活動				
	7節	15：10～15：50	體育 李顯鎮主任	社會	閩南文化 潘思吟老師	社會	閩南語 吳長能老師

VISION SCREEN AND REFERRAL

- Unaided visual acuity
  - Widely used to approximately detect the myopia in schoolchildren *Tong L et al. OVS 2002*
  - For myopia detection
    - Highest sensitivity and specifity97.8% and 97.1%)

    -Australian children *Leone* JF et al. Arch Oph 2010
    - Correlation index 0.992
      - Chinese children *Zhao J, et al. AJO 2000*

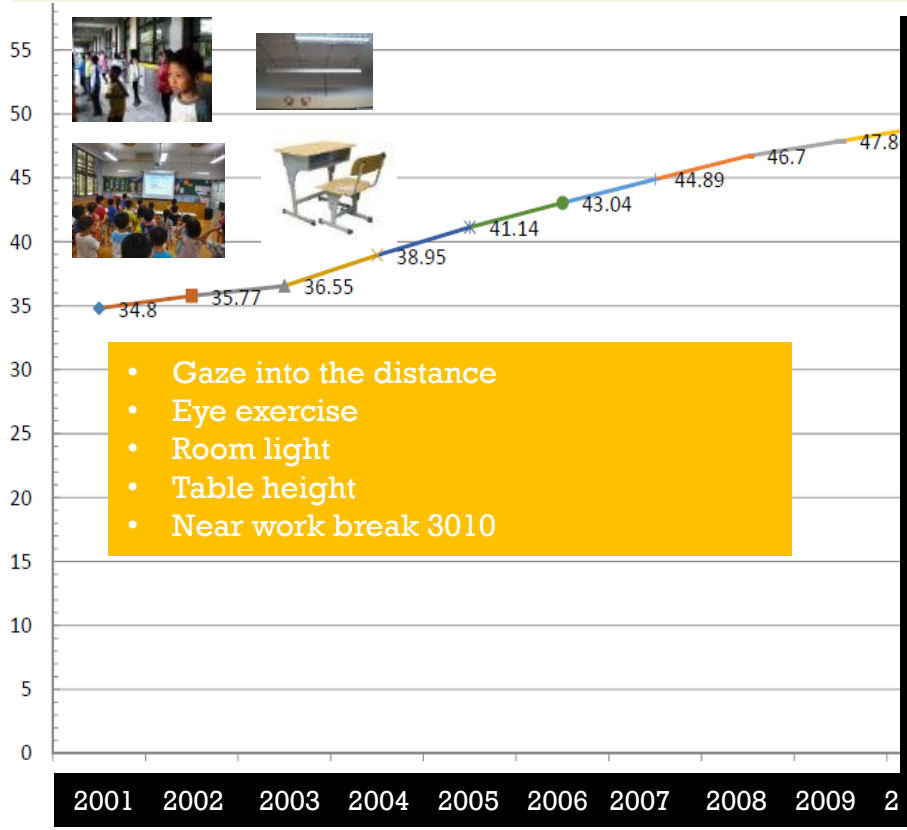
- In Taiwan from 1980
  - School nurse perform unaided VA screen every semester
  - Vision impairment: ≤20/25 →referral to Ophthalmologist

THE HISTORY OF VISION CARE IN TAIWAN

- 1980 The Executive Yuen instructed relative departments to initiate 「enhance important measures of student vision care」, student vision screen as the routine in each semester
- 1986 The Department of Health (DOH) support centers of child vision care in 5 medical centers, began myopia prevention and treatment. Every 5 year 「Epidemiology study of refraction status of 6~18 y/o students in Taiwan」
- 1995 DOH promote random dot stereopsis (300 s) test and vision screen for amblyopia and strabismus in 5 y/o preschool children
- 1999 Ministry of Education (MOE)「enhance schoolchildren vision care – 5 year program」
- 2010 MOE 「schoolchildren vision care–3 year program 」
- 2014~ MOE「**schoolchildren vision care program** 」**TSVCP**

Wu et al. Ophthalmology 2020

Prevalence of reduced visual acuity (20/25) of primary school children in Taiwan

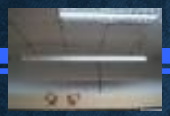


- Gaze into the distance
- Eye exercise
- Room light
- Table height
- Near work break 3010

Vision care advisory council in MOE: Outdoor activity reduces the prevalence of myopia in children

data

2001~2019 Prevalence of Reduced Visual Acuity (20/25) in Schoolchildren in Taiwan


55.0
50.0
45.0
40.0
35.0
30.0

34.8 35.8 36.6 39.0 41.1 43.0 44.9 46.7 47.9 49.1 50.0

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019

- Gaze into the distance
- Eye exercise
- Room light
- Table height
- Near work break 3010

- Recognition of myopia as disease
- Outdoor TT120
- Near work break 3010
- Room light
- Table height

Effective Public Health Approaches for Child Myopia (APP)

Awareness

1. child myopia is a disease
2. enough time outdoors 80-120 min/day
   - beneficial for myopia prevention and control
   - moderate sunlight

Promotion

- rewarding, reminding,
- incorporation with health promotion school

Policy intervention

THANK YOU FOR YOUR ATTENTION