

Summary of National Vision Care Report

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1. Research Background and Motivation

Visual health has become a worldwide public health issue. In 1999, WHO together with 20 international NGOs launched the project *VISION 2020* intended to call for actions to eliminate avoidable blindness by 2020. According to the statistics of WHO, the global economic productivity loss caused by visual impairment (VI) resulted from uncorrected refractive error in 2007 was \$268.8 billion¹. The total cost of VI globally was estimated at \$3 trillion in 2010 and the burden was projected to increase by approximately 20% by 2020². Besides responding positively to the goal of eliminating avoidable blindness initiated by WHO in Vision 2020, many countries, especially the developed countries, have taken proactive actions to promote visual health.

China is experiencing an unparalleled visual health crisis. At present, the prevalence of various visual health problems in China is far above the global average and the East Asian countries. Among those exist the leading cause of teenage-related refraction error, such as myopia and age-related eye diseases/disorders. And it's worthwhile to note that the deterioration is accelerating - visual health problems are permeating in a much younger age than before. On one hand, with the younger tendency of the incidence age, myopia has become a national disease that threatens the health and socioeconomic participation of not only the current but also the future generation. On the other hand,

¹ Smith, T. S. T., et al. "Potential lost productivity resulting from the global burden of uncorrected refractive error." *Bulletin of the World Health Organization* 87.6 (2009): 431-437

² Gordo A, Cutler H, Pezzullo L, et al. An estimation of the worldwide economic and health burden of visual impairment[J]. *Global public health*, 2012, 7(5): 465-481.

more age-related visual function problems, such as cataracts and presbyopia, appear at a much earlier age than ever before, which might lead to huge socioeconomic burden in the context of aging. What's worse, our response towards such problem is insufficient and weak compared to its seriousness. Most of the citizens lack the common sense about visual health, let it alone the access to vision care. We are experiencing an unparalleled visual health crisis, not only for the extent of health problems themselves, but also for how we fail to respond.

It's pressing to integrate the fragmented and blindness-focused public policies towards a systematic policy framework for national vision care. Neither the concept of visual health nor the concept of vision care has been put forward in any of the policies related to eye health since 1949. All the relevant institutions and policies are set to prevent and eliminate blindness. These blindness-focused policies, aiming at “eliminating trachoma” before the 1980s and “sight restoration for cataract” after the 1980s, have achieved a significant reduction of avoidable blindness. In pace with the fast transforming economy and society, however, what people need is no longer the right to see but the right to see well throughout the lifetime. It requires systematic cooperation and coordination between different sectors to promote visual health for all, rather than mere treatment to avoidable blindness. Various sectors such as the education sector and the primary care sector has enhanced eye care for students and those age above 60 respectively. Due to the lack of top design and coordination, these efforts are too fragmented to generate the desired outcome. We need a systematic framework for vision care public policy and to provide vision care at a national level to address the visual health crisis.

This research aims to raise the public awareness for visual health and to promote the design and implementation of relevant public policies. We not only give quantitative evaluation about the visual health status and its socioeconomic burden in China, but also put forward a feasible policy framework based on comparing domestic and oversea policy practice in this field.

2. Framework and Methodology

We used the concept of visual defect (VD) to measure the visual health status, which refers to the uncorrected distance visual acuity (or near visual acuity) below 0.8 due to various reasons and those bring inconvenience or even incapacitation to individuals.

For two considerations, we adopted this concept, which is different from visual impairment (VI) proposed by the WHO but similar to the concept of visual acuity loss (VAL) proposed by the International Council of Ophthalmology (ICO). Firstly, VI is too limited to reflect the issue in China. VI focuses on the most severe cases and only takes those with visual acuity below 0.3 as its objects, while hundreds millions of people have mild visual acuity loss with visual acuity above 0.3 but below 0.8 in China. The prevalence of visual functional problems would be severely underestimated if using the measurement method of VI. Secondly, we used VD to distinguish itself from the VAL although they are same in terms of the measurement methods. In practice, VAL has been mainly used to measure distance visual acuity loss while pays less attention to the near visual acuity loss problem and socioeconomic consequence. In brief, we used VD to measure visual health status to emphasize how both distance visual acuity and near visual acuity loss undermined life quality.

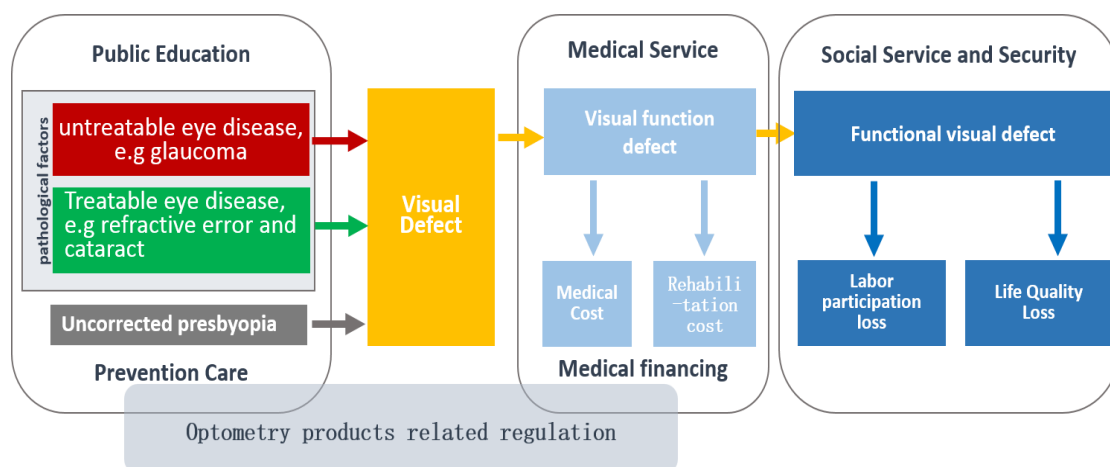


Fig.1 Research Framework of National Visual Health

Following the framework of “causes-consequences” proposed by ICO on aspects of visual health³ (see Fig.1), we analyze: 1) major causes of visual defects; 2) prevalence of visual defects; 3) socioeconomic burden due to visual defects; 4) relevant public policies in each part. We categorized the cause⁴ into three groups and mainly focused on the visual defects caused by cataract and refractive errors, which, according to WHO, can be treated (by surgery or optical correction) to recover visual function.

The loss by VD can range from mere medical cost to as far as life quality loss in accordance with the scale of its damage. For public policy purpose, we divided the loss into medical cost, rehabilitation cost, labor participation loss and life quality loss. An interested and also the core question of public policy making is how to allocate the limited resource between prevention and treatment as well as rehabilitation to reduce the aftermath loss of labor participation and life quality so as to generate the best benefits for the most of the people. Due to data limitation, we could not investigate further on how much loss can be avoided with appropriate policy intervention. But we fully exploited the available and authoritative data source to give a robust estimate of the cost and burden associated with VD in China.

It is challenging to give an accurate estimate for the prevalence and the socioeconomic burden of VD due to the data availability. Firstly, no nationwide census data on visual health was available. Secondly, the available epidemiological statistics usually targeting at a particular area and certain cohort, resulting in low comparability. Last but not least, seldom have the existing visual surveys pay attention to the issue of near visual defect. Given these limitations, **we synthesized existing literatures, survey data and conducts field survey⁵ to perform this research** (See Figure 2).

³ Visual Standards-: Aspects and Ranges of Vision Loss with Emphasis on Population Surveys [M]. International Council of Ophthalmology, 2002.

⁴ As for presbyopia, although being a natural physiological phenomenon rather than an eye disease in the medical sense, it is also to our interest because it would lead to near visual defects

⁵ The field survey involves with interviews, conference with participants from government officers, industry representative and health care providers. The results are not presented in this summary. For details, please go to the appendix for the report of public policy.

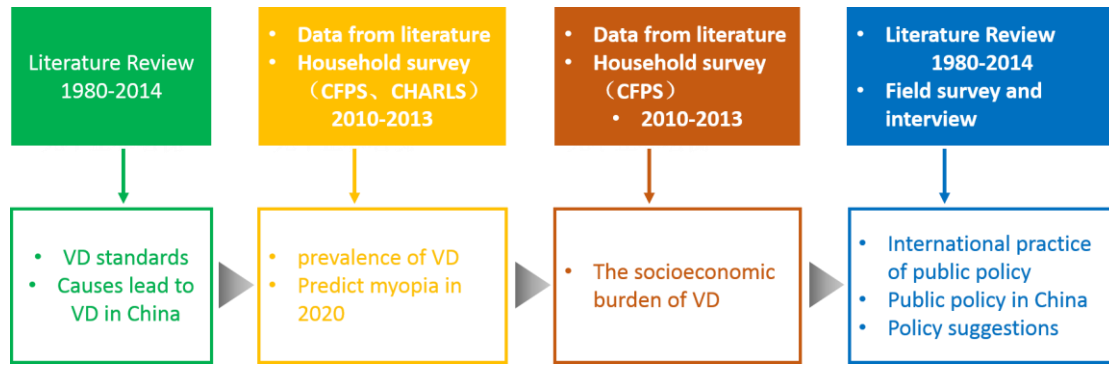


Fig. 2 Research Methodology

The first step was to establish the definition and measurement of VD and discuss the leading causes of VD, which was based on literature review. The second step was to estimate and predict the prevalence of VD based on CFPS (China Family Panel Survey) and CHARLS (China Health and Aging Retirement Longitude Survey) and parameters in literatures. The third step was to estimate the socioeconomic burden caused by visual defect using survey data and literature data. In the final step, we preformed literature review as well as field survey to do public policy analysis. Worth of attention is how we estimate prevalence and cost. For robustness and comparability, we provided an interval rather than a single value, and calculate the contemporary burden rather than the discounted lifetime burden.

Besides filling the gap of evaluating cost for VD, our estimation framework also avoids the problem of deviation and offers a more comprehensive estimation of the overall current situation of visual defects in China, as previous research used to extrapolate the overall situation from a special group.

Our research results can be divided into three parts: description of the current situation of visual defects, quantitative evaluation of socioeconomic burden caused by visual defects and comparative analysis of policies on visual defects in China and abroad.

3. Prevalence, Cause and Trend of Visual Defects in China

We estimate both the prevalence of distance visual defect and near visual defect in China with data synthesized from existing household survey and literature. Then we analyze the cause of visual defects. Then we analyze the cause of visual defects Our research results can be divided into three parts: description of the current situation of visual defects, quantitative evaluation of socioeconomic burden caused by visual defects and comparative analysis of policies on visual defects in China and abroad.

3.1 The Prevalence of VD in China

The current situation is that the population with problems in seeing clearly or well is high far above those who cannot see (see Figure 3). For each two Chinese there would be at least one to find himself/herself have some sort of visual defect.

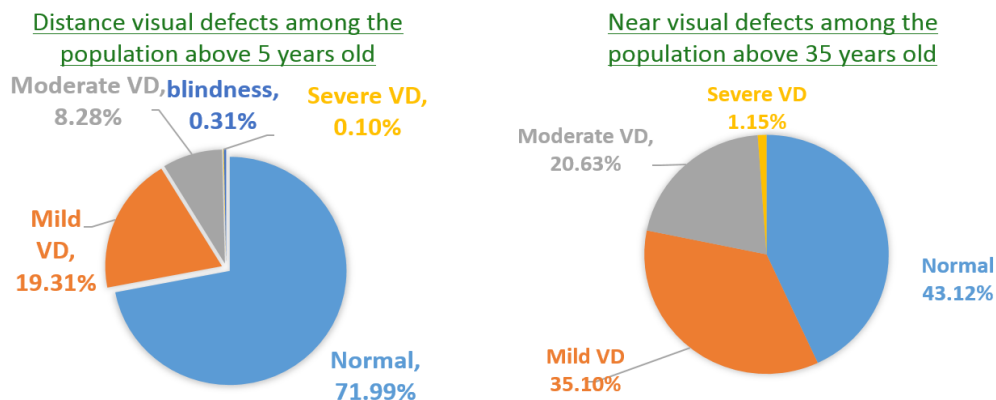


Fig. 3 The Distribution of VD in China

- In terms of distance VD, about 345 ~351 million people above 5 years old have various distant visual defects (Distance VA<0.8), with the prevalence up to 27.80%~28.27%. To be specific, the prevalence of mild distant VD (DVA<0.8, DVA>=0.3), moderate distant visual defects (DVA<0.3, DVA>=0.1), severe distant VD (DVA<0.1, DVA>=0.02), and blindness (DVA<0.02) is 19.31%, 8.28%, 0.1% and 0.31%. Among them, more than 98% fall into the category of mild or moderate VI, while only 2% of the VD is low vision or blindness.
- In terms of near VD, at least 390 million adults over 35 years old are suffering

from various near VD problems. Among those above 35 years old, the prevalence of severe near VD (Near VA $\leq$ 0.1), moderate near VD (NVA $>$ 0.3, VA $\leq$ 0.5) and mild near VD (NVA $>$ 0.3, NVA $\leq$ 0.5)⁶ is 1.15%, 20.63% and 35.10% respectively.

3.2 The Cause and Trend of VD in China⁷

Regarding the severity leading to blindness, cataract is the primary cause for non-mild VD (moderate visual defects, severe visual defects and even blindness) in China. According to the Second China National Sample Survey on Disability (2006), vision disability caused by cataract accounted for 46.93% of the total number of patients who has vision disability, while retina and corneal disease, refractive error and glaucoma accounted for 12.65%, 8.52%, 6.39% and 5.64%, respectively. In 2012, the population diagnosed with cataract in China was 6.26 million, and the aggregate number of Chinese patients who have glaucoma, corneal diseases and other eye disease was approximately 10.35 million.

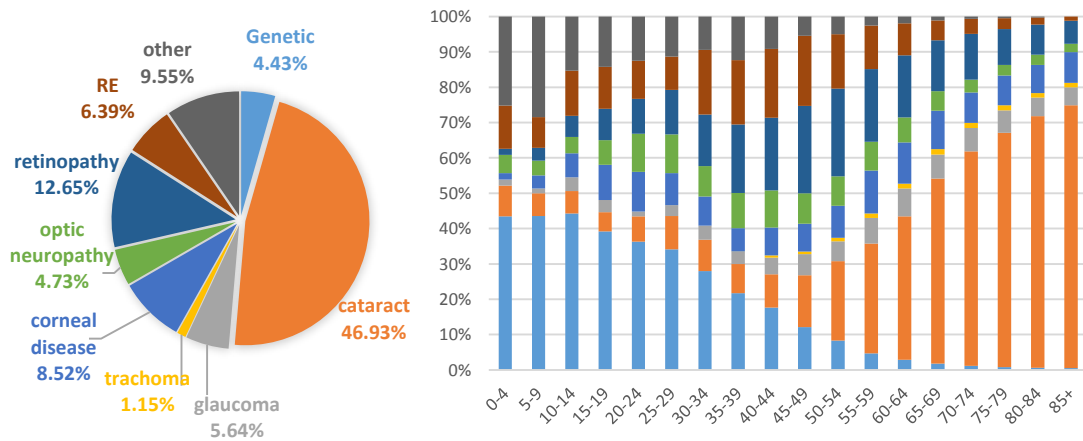


Fig. 4 The Spectrum of Eye Diseases that Lead to Non-mild VD in China

⁶ Because of data limitation, the only data that can be used is the study on near visual defect among the people over 35 years in Shunyi District in Beijing conducted by PhD Li Jie from Peking Union Medical College. Based on Li Jie's study, we use our country's population structure to calculate the visual defects condition among the adults over 35 years old. There are two points that should be noted, one is the representativeness of the sample. Economic development in Shunyi District ranks above the national average level and might result in overestimation. But due the measurement difference, there also exists the possibility of underestimation. Li Jie used the standard of WHO, which takes near VA $\leq$ 0.5 as near visual defects, but we take VA $\leq$ 0.8 in this study. Overall, the data calculated here is a rough estimation and it is close to the real situation in terms of magnitude.

⁷ It needs to point out that except for refractive error and presbyopia, most eye diseases would damage both the distance visual acuity and near visual acuity at the same time. For instance, myopia, as a main type of refractive error, would lead to distance visual defect but can be corrected with appropriate spectacle.

The profile of blindness-leading disease varies with age. In adolescence, genetic factors and amblyopia are the main leading cause for non-mild VD. But the proportion of those two causes decrease with age, and the proportion caused by cataract increase rapidly after age 45. For those above 65, cataract is the leading cause to severe visual defect.

Nevertheless, it is far from enough to pay attention merely to blindness or low vision eye disease. Refractive error (mainly myopia) and presbyopia are currently the two most prevailing factors that threatens the visual health of Chinese population in terms of the scale of prevalence. But refractive error and physiological presbyopia have not received the deserved attention from both the public and the government.

- In 2012, among those above 5 years old, the total population with refractive error (excluding presbyopia patients) is 480 ~ 531 million, of which 90% is myopia. The total population with myopia amounts to 437~487 million. Among them, 29~30.4 million belongs to hyper-myopia.
- In 2012, among those above 40 years old, the total population with uncorrected presbyopia⁸ approximates 371 million, accounted for 27.83% of the country's total population.

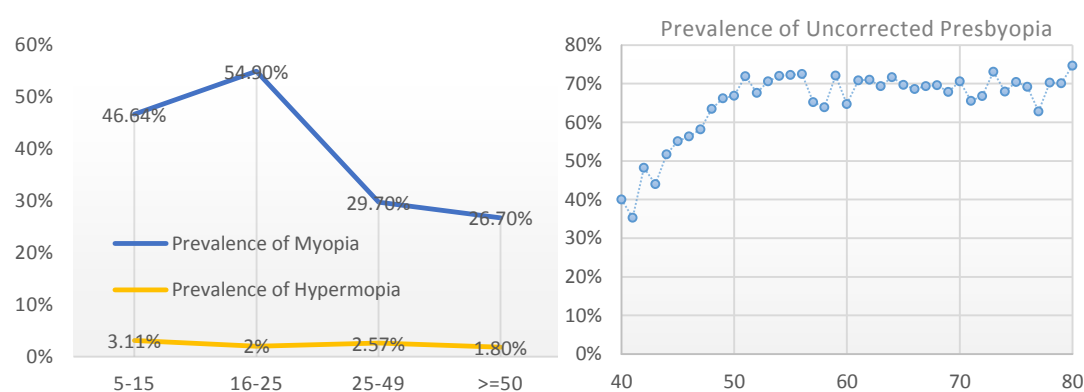


Fig. 5 Prevalence of myopia and presbyopia in China

The fast rising prevalence of myopia among teenagers worth our attention. The

⁸ While presbyopia and refractive error can happen concurrently, it mainly happens among middle aged and elderly people. Subject to the limitation of data, we only calculated for the respective number of patients having presbyopia and refractive error. According to our conservative estimation, the aggregate number of presbyopia and refractive error patients will be 610 million to 650 million.

prevalence of myopia increase rapidly with schooling grade and the average rate has reached 46.64% for those age 6-15. The prevailing of myopia is closely related to the socioeconomic environment change, which could be partly supported by the evidence that more developed area has higher prevalence for the same cohort.

The ever increasing intensity of near work and the decreasing intensity of outdoor activities might have been the key factors leading to the high prevailing of myopia. For instance, compared to Taiwan, Hong Kong and Singapore, the prevalence of myopia in the city of Guangzhou is much lower until mid-1970s, staying at 20~30%. But due to the rapidly aggravating academic pressure and the popularizing of electronic device with LCD screens, the prevalence of myopia in Guangzhou increase rapidly to rank itself at the same level as the three mentioned above. The prevalence among those born in the 1980s has surpassed 80%.

We also estimates the prevalence rate of refractive error in China in 2020 under the current policy scenario:

- The prevalence of myopia among those above 5 years old is projected to be increased to 50.86%~51.36% by 2020, and the population with myopia would be 704~711 million, which will be twice as much as the United States' total population. Meanwhile, the population with hyper-myopia patients will reach 40~51.55 million.

4. Social and economic burdens brought by national visual defects

To conclude, visual defects has become a significant public concern in China. On one hand, there are approximately 500 million people suffering from various kinds of refractive error problems. The population with hyper-myopia alone has approximated 30 million, far more than the population with low vision and blindness. On the other hand, approximately 371 million among those above 40 years old suffer from uncorrected presbyopia. As even the conservative estimate of the population with refractive error or uncorrected presbyopia has reached the scale of 600 million, the core

issue regarding national visual health has become how to preserve the right to see well in lifetime rather than merely the right to see.

Especially, myopia has become our “national disease”. Myopia is irreversible and progressive. The consequence of forward trend and thus prolonged course of myopia among teenagers is far more than solely wearing glasses. Within the current generation, the distribution of myopia would move towards more hyper-myopia, which would lead to higher risk of fundus lesions, permanent visual impairment and eventually irreversible blindness. Looking ahead, myopia would be an unwanted heritage for generations, as consistent conclusions have already been reached by researchers that myopia is heritable and family clustering and genetic factors play a little more important role in getting myopia than environmental factors. Besides impairing individual health and socioeconomic participation, as more and more young adults fail to meet the requisite visual standards for certain occupations such as national defense, astronomy and precise Machinery manufacturing, myopia are also beginning to undermining our national human resource safety.

In order to make a quantitative assessment on the social and economic burden brought by visual defects, we classifies such social and economic costs into four categories: medical cost (including the cost of lens), rehabilitation cost, labor participation loss and life quality loss. Among them, labor participation loss is measured by the labor income deduction for those with VD, and life quality loss is measured by DALY (Disability Adjusted Life Year).

In principle, the estimation strategy is to identify key cost parameters and then calculate the weighted sum for the overall population. We use different sources of data to approximate the true parameters for costs. Then we construct the weight using our estimates of prevalence combining the labor participation rate from outsource. The estimated cost for each category and hence the overall burden are obtained through weighted summation.

We calculate the cost for the year of 2012. The estimated total economic burden due to VD amounted to 682~691 billion RMB, which accounted for 1.306%~1.322% of China's GDP. Measured by monetized DALY, the life quality loss by visual defects is about RMB 952 billion, 1.83% of China's GDP in 2012.

Among the four types of cost/burden, the highest is the loss of labor participation of RMB 591 billion, which is 87% of the total costs, and 1.14% of the GDP of China. At the individual level, average annual labor income loss for those with mild or moderate VD ($VA > 0.1$, $VA \leq 0.8$) at the working age is RMB 2517, lower than those without visual defects, equivalent to 1/10 of urban residents' disposable income or 1/3 of rural residents' income. Next follows the medical cost of 90.14 ~98.67 billion RMB, including the treatment of eye diseases, myopia and presbyopia lens fitting, which account for 13.2% of the overall cost.

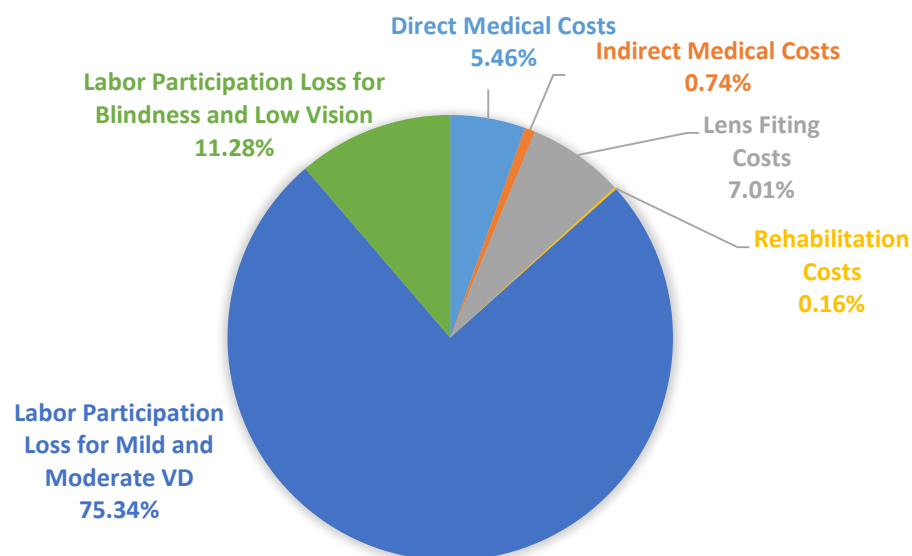


Fig.6 Cost structure for the socioeconomic burden of VD in China

With appropriate correction treatment, however, at least 40% ~77% of the labor participation loss is avoidable. At the individual level per year, this is equivalent to an increment of RMB 955~3721 of annual labor income for those suffered from uncorrected visual defects. At the national level, this reduction of loss amounts to at least 105.7~412 billion RMB, approximating 0.20%~0.80% of the GD.

The results we give here are rather conservative regarding the overall socioeconomic

burden. The estimates would be several hundreds of billions higher if taking into consideration of the multiplied adverse effect of visual defects into economic activities for a lifetime span.

5. Comparative Analysis of Vision Care Policies in China and Abroad

5.1 Current visual health policies in China

We analyzed the relevant public policies in China from the perspective of public education, preventive healthcare, medical services, medical insurance system and supervision of the optical products. The key features with visual health related public polities in China can be summarized as follow (see Fig.7):

With the rapid transformation of China's economy, the spectrum of diseases causing visual defects has undergone great change. Functional visual disorders such as refractive errors and presbyopia have become the major threats to national visual health. Nevertheless, the public policies are too fragmented and blindness-centered to effectively respond to the changing trend.

(1) The “fragmented” decision-making and implementation system. There is a severe lack of coordination and cooperation between administration governance and profession guidance in making and implementing visual health related public policies. The Ministry of Health, who is responsible for the top design for vision care with its professionalism, has devoted itself to the prevention and treatment of blindness while left the vision care for students to the education sector, the supervision of Optometry products to the ministry of commerce, the certification and regulation of optometrist to the labor and security departments. The consequence is the severe mismatch between the vision care demand and the policy response.

(2) The “blind” public education. Rather than promoting the common sense of visual health care, the current public education are aimed at raising the awareness of treating avoidable blindness for those with severe visual defects. For contents, it is focused on

blindness-leading disease like the cataract and diabetic retinopathy while overlooking functional visual problems such as refractive error, presbyopia and occupational vision care. For accessibility, it is quite limited and passive as only when people visit professional optometry institutions might they have access to relevant information. The consequence of blindness-orientation and low public participation is the prevailing misperceptions about visual health problems

(3) The “empty” preventive care. As the main implementer of preventive care, neither the primary care institutions nor the schools effectively fulfilled the function of preventing eye disease. Regarding the primary care, although the screening of retinopathy for the elders to prevent blindness have been integrated into the basic public health service programs, the aftermath intervention and care is far from enough regarding the huge demand to promote visual health. Regarding the in-campus effort, due to the lack of professional guidance, the traditional eye exercise has been disregarded by more and more schools to spare the time for study. Although there is annual eye examination, it only measures the basic item of uncorrected distance VA for students, failing to provide accurate evidence support for preventing visual problems.

(4) The “blank” medical care support. Regarding the supply, the distribution of the optometric medical recourses, from institutions to workforce, is largely focused on blindness prevention and treatment. The access to even the basic eye examination is quite rare for those with non-blindness visual defects. Regarding the insurance, the overall coverage and intensity is still quite weak for those with severe visual defects. Affordability is still a key factor in deferring early treatment for preventable visual defects.

(5) The shortage of Ophthalmology and Optometry professionals. In 2010 the average number of Optometrist per capita in China is only slightly above that in African countries. Every year only about 3000 students are enrolled and after 3-year or 4-year

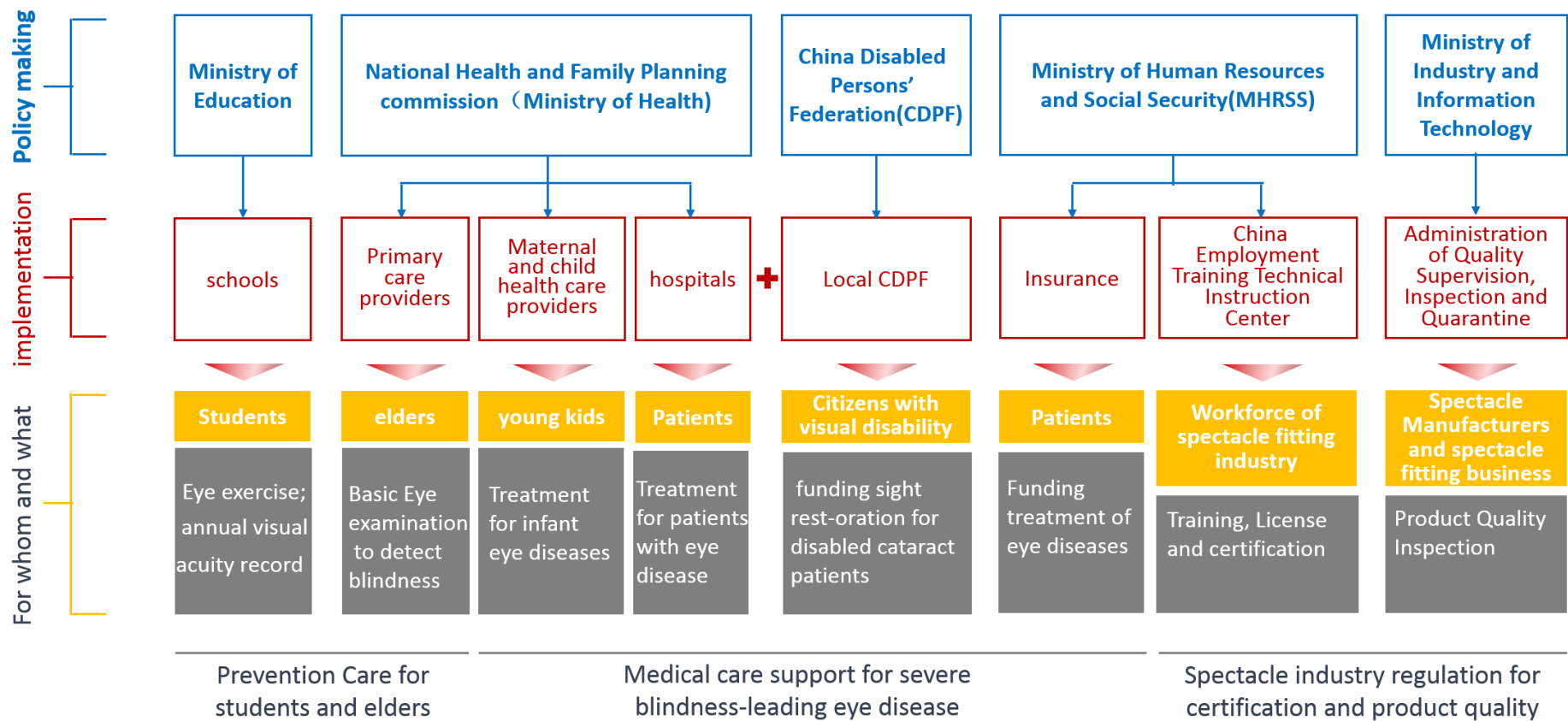


Fig. 7 Current Public policies for vision care in China: who, how, whom and what

study at college less than half of them would choose to work in this field. The leading cause to this shortage is that occupation of optometrist has not received its credible certification, as optometry and glasses fitting are categorized as ordinary service vocation which are no different from driver or salesman in China.

(6) The commoditized regulation on the optometric industry. The practice of regulating lens and lens fitting as general commodity and service has significantly hindered the development of this industry. Except for contact lens, lens products are supervised under standards drafted by optics engineer and implemented by merchandized commodity quality supervision departments. Besides, due to loose supervision in quality, the market is occupied by lens that is qualified commodity but unqualified medical device. As for lens fitting, unlicensed practice prevails so much that lens fitting service is free of charge, customers only need to pay the price of lens. The consequence of commoditized regulation is that unqualified producers crowd out the qualified ones, which further undermine the consumer health and welfare.

5.2 International experience and practice in promoting visual health

Through decades of practice, many countries have accumulated rich experience in vision care. In the *Global Action Plan 2014-2019: Towards Universal Eye Health* in 2013, WHO called on all countries, especially the developing countries, to work on vision care by enhancing multi-sector cooperation and evidence-based decision making. In the field of preventive care, medical care and workforce, China can make use of many formulated systematic experiences.

First of all, establishing and tracking visual health records over a life span is the precondition for evidence-based policy and proactive actions such as early detection and early treatment. Second, integration of medical and social policy prevention is more effective than medical-centered prevention. For instance, Singapore adopted an integrated strategy to conduct prevention care for visual health since 2001. Besides releasing the user guide of electronic products, increasing the time for outdoor activity,

Singapore also build myopia records for teenagers. These records have not only provide evidence for evaluating policy intervention but also made it possible to refine intervention. The visual health of teenagers in Singapore has greatly improved through its national program. Third, integrating visual health care into health care system is the cornerstone of effective coordination between public education, prevention and treatment. Fourth, strict and professional regulation on both the workforce and the optics products relevant to vision care is indispensable. China can learn from the 30 system (Ophthalmologists, Optometrists and Opticians) in the UK or the 20 (Ophthalmologists and Optometrists) in the France to develop its own model of vision care workforce.

6. Frame National Vision Care

China needs an integrated vision care plan to address its visual health crisis. The conservative estimates for the burden of visual defects in a single year reaches 556.855 ~565.842 billion RMB, accounting for 1.072%~1.090% of GDP. At least 1/2 of Chinese live with various sorts of visual defects. Nevertheless, our public polies are mis-oriented and too fragmented to provide sufficient and qualified vision care. With no effective countermeasure, the projection that by 2020 more than 700 million Chinese will live with myopia is a rather modest estimate. It's pressing to adjust our blindness-oriented vision care towards national vision care to promote visual health for all.

We suggest that the national vision care plan should consist of four dimensions, namely, the dimension of the implementing, supporting, planning and decision-making.

6.1. Feasible Implementation to make Vision Care Accessible

(1) Incorporate visual health related public education into existing health education and public health service. The awareness of visual health should be publicized through various forms and means, which can be guided by the professional optometry agency, supervised by the institutes of health education, and implemented

by the grass-root medical organizations and schools. The education on visual health care should focus not only on the kids, but also the professionals and the elderly, which could foster more public awareness of the visual health. Special attention should be paid to the public participation, as the experience of historic public health movements in China and the myopia prevention in Singapore has exemplified its significance.

(2) Add the primary visual healthcare service into the basic public health services, and establish the lifetime visual health records for everyone. Although already included in the basic public health services in China, the primary eye care service is only confined to the basic examination of visual acuity and the screening for diabetes-related retinopathy and other eye diseases for the elderly, far behind the actual prevention and healthcare demands. We suggest expanding the existing primary eye care service to delivering primary visual healthcare service, which shall accommodate more functional visual problems detection and treatment. In the process of providing the primary visual healthcare service, the top priority should be establishing visual health files especially the refractive development records for teenagers, which is crucial for research and policy to prevent myopia.

(3) Launch specific vision care projects for children in poor areas. The survey data shows that in the rural areas of Shanxi, Gansu, 5/6 children with myopia are not wearing glasses for various reasons, among these reasons is affordability. Correcting myopia in time can help children not only to improve their academic performance, but also improve visual health significantly, which has a close relationship with their education, employment and happiness. Therefore, it is recommended that China may refer to the Nutrition Improvement Plan for Rural Compulsory Education Students, Prevention of Blindness Project for Millions of Poor Cataract Patients and other major public health projects to launch the eyesight health projects for children in poor areas. In addition, the major public health projects may be used to provide prevention, healthcare, fitting, disease treatment and other services for the school-age children in poor areas, which can effectively promote the visual health.

(4) Encourage the pilot of purchasing visual health services with medical security funds. The expenses on vision correction such as fitting has been granted in some countries. It is recommended to experiment purchasing visual health services by medical security funds to such as vision examination, fitting and correction in the regions where the fund balance is relatively high. It may be realized in the form of proportional reimbursement or vouchers for designated groups such as teenagers.

6.2. Professional Workforce and Industry Regulation

(1) Establish a feasible “3O” model for China. In training and education, the enrollment and course should be planned on population vision care needs. In entry and certification, it is crucial to set the three O apart and impose on different standards. Given the situation in China, it is suggested to transform the thousands of salesman in the lens fitting industry into Opticians after systematic occupational training so as to relieve the shortage of qualified opticians in a short time.

(2) Transform the current “free optometry” towards a paid model through insurance payment scheme and differentiated tax policy. Firstly, China can learn from France to set its insurance payment scheme for optometry service and eyeglass fitting, which would not only relieve the economic burden for the public, but would also help change the public perception of optometry from merely service to health care. Secondly, optometry and dispensing should be identified as service while spectacle sales should be identified as commodity sales, and differentiated tax policy on optometry and dispensing is recommended so as to realize the value of professional optometry service.

(3) Cooperate with non-government organizations to train optometrist and dispensing optician. The shortage of qualified professional workforce can be solved through training the existing employees within this industry to become optometrist and dispensing optician. Given the rapid development of various optic center affiliated to medical schools or public hospitals, it is highly feasible for government to cooperate

with these non-government organizations regarding on-the-job training.

(4) Establish professional regulation of optometric industry. It is recommended to distinguish the optometric products from the general light industrial products by establishing professional standards of lens and frames and the optometry supervision, guided by the health sector and implemented by the CFDA to avoid the overlap or gap of regulation and to strengthen its professionalism.

6.3. Prevention-focused Resource Allocation

(1) Expand the public policy to cover for all people in all aspects. With respect to the beneficiary, the public visual health policy should not only continue to strengthen the care for children and the elderly, but also extend to provide vision care for those at their working age. With respect to function, the public policy shall consist of public education, preventive care, medical care, rehabilitation, workforce training and regulation, and optometric industry regulation, so as to fundamentally reduce the social environment risks that lead to visual defects.

(2) Invest more into public education and prevention care to strengthen the prevention for visual defects. The public education on visual health shall be expanded to the full population to make the common sense of vision care accessible everywhere for everyone with an emphasis on the influence of unhealthy life style. With respect to the strengthening of prevention care, the primary eye care services programs shall be extended as soon as possible, from the basic examination of visual acuity, screening of infectious eye diseases to more comprehensive services including the examination of fundus, near vision and refractive examination.

(3) Encourage early detection and treatment by addressing the affordability problem through public health insurance. In recent years, “Prevention of Blindness Project for Millions of Poor Cataract Patients”, “Vision First-China in Action” and other major public health projects have made great achievements in reducing the blindness brought by cataracts. Nevertheless, such programs are quite narrow in terms of its scope

and are not sustainable as they are convenient for the goal of short-term poverty-relief. The medical insurance shall expand its coverage for avoidable visual defects and encourage the early detection and early treatment. Regarding the payment scheme, China can learn from the experience of UK and France to develop its own approach of funding visual health care through public health insurance.

6.4. Accountable Decision Making Administrations

(1) A centralized and professional governance administration is the cornerstone to decide whom the policy is intended for, what it is about and how to implement.

The proposed administration should be a cooperation between different departments regarding the complexity of visual health, but it is recommended to be dominated by the department of health. By establishing such a decision-making mechanism would coordinative and professional policies regarding public education, preventive care and medical care be feasible and effective.

Besides, the decision making process can be evidence-based through promoting more cooperation between relevant government agencies and research institutions. Empirical research based on ongoing and dynamic records of citizens' visual health is necessary to decide when to intervene and how to intervene as well as on who.

(2) Get the administration system work, by listing visual health improvement as indispensable part of performance evaluation with public agenda for relevant agencies. From the historic experience of eliminating trachoma, the promotion of vision care in schools and the prevention of cataracts, it is quite efficient to mobilize the enthusiasm of local agencies with performance evaluation and public agenda.