Research Article

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Prevalence and Causes of Blindness in People Age 50 Years and Above, the Intervention Category and Action Required Reducing Blindness in West Java Province Indonesia

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Abstract

Introduction: *Data prevalence and causes of blindness are needed in West Java province since it has highest population of Indonesia then its play important role to reduce blindness for Indonesia. The objective of this study is to assess current situation on blindness in West Java province.*

Methodology: *Population based survey was conducted on February to October 2014. Sample size 3000 peoples age ≥ 50 years was calculated using an automated program within the RAAB software package. Sixty clusters were selected by probability proportionate to size sampling. Households within clusters were selected through compact segment sampling. Participants underwent visual acuity (VA) screening with a tumbling E. Eyes examination and diagnosis done by ophthalmologists. Blindness and Visual Impairment (VI) were verified by WHO definition. A program has been developed in Visual FoxPro version 7.0© for RAAB.*

The results: *2842 were examined (94.7%), 87 persons were absent, 48 refused to participate, and 23 were not able. Prevalence of bilateral blindness with available correction in people aged 50+ was 2.8% (95% CI 2.0-3.5), untreated cataract was the most common cause of bilateral blindness (71.7%), other posterior segment disease (10.9%), all other globe/CNS abnormalities (6.5%), non-trachomatous corneal scarring (4.3%), glaucoma and uncorrected refractive error (2.2%). Of all bilateral blindness 82.6% is considered avoidable. 73.9% is considered treatable (cataract and URE).*

Conclusion: *Cataract was the main cause of blindness, considered treatable; priority should be given for cataract surgery followed by optical services.*

Introduction

Last survey of blindness in Indonesia was conducted on 1993-1996. After 1996 some of blindness survey conducted in limited areas but cannot represent both either Indonesia or West Java province. The width of West Java province was 35377.76 km^2, has a population of 46,497,175 million people (based on population data on 2011), and was the highest population in Indonesia from all over the provinces, which was almost 20% of the entire population of Indonesia [1]. Means that West Java province plays an important role in the eradication of blindness which in addition will affect the residents of West Java alone but also contribute greatly in numbers of blindness in the region of Indonesia. By using a conventional survey method, the magnitude of blindness in West Java will face complex problems in data collection and certainly would require enormous funds given magnitude of the population that will need big sample size and of course overall will be more complicated in conducting the survey. RAAB (Rapid Assessment of Avoidable Blindness) survey is a population-based survey methodology for detecting blindness and visual impairment and eye health services in the age group 50 years and above. RAAB provide special software which ensures the accuracy of the data. RAAB survey can provide a picture of the actual situation in the area of eye health surveys to obtain accurate data to determine the prevalence of blindness and visual impairment, causes blindness and the barriers [2,3]. For planning an eye health program required the data of prevalence and causes of blindness, which unfortunately the data is often not available because there is no survey of the area or the available data is too old so it is not relevant anymore [4,5].

RAAB is needed to be conducted at the level of West Java Province, which is very useful for mapping the problem of blindness and visual impairment so that both government and non-government agencies and professional organizations can design a strategy of prevention of blindness and visual impairment are effective and efficient.

Methods

Study design and participants

A cross-sectional population based survey was conducted from February to October 2014. Sample size was 3000 inhabitants' age ≥ 50 years, calculated using automated program within the RAAB (Rapid Assessment of Avoidable Blindness) software package. Sixty clusters were selected by probability proportionate. Households within clusters were selected through compact segment sampling. Participants underwent visual acuity with tumbling E chart. Eye examination and diagnosis of cause of blindness (verified by WHO definition) were done by an ophthalmologist or senior resident. Data entry and automatic analyzing data using a Visual FoxPro version 7.0© for RAAB.

Subjects were residents of West Java ≥ 50 years old to be elected to the sample through multi-stage cluster random sampling with 95% Confidence Interval, design effect (DE) of 1.5 and no response rate of 10%. The sample size is calculated by entering parameters: the estimated prevalence of blindness 3%, a variation of 26.5% with 95% confidence and 90% compliance, sampling methods, the size and number of clusters (cluster size is taken from 50 people aged over 50 years) to the device RAAB software, obtained a total sample size was 3000 in West Java (60 clusters, each consisting of 50 people).

The sampling frame is based on population census data of 2010, consists of 5879 villages in West Java, using cluster selection module of the software RAAB, 60 villages have been selected (units selected population) from the sampling frame with probability proportion of population size.

In each unit there is a population of more than 50 people aged 50 years, so we need further sampling on each unit of the population. Used way of sampling "compact sampling" to select households which are to be taken as a sample. With an estimated population aged 50 years and older by 15%, then the needed 50/15% = 333 (rounded to 350) where there will be a number of 50 persons aged 50 years and older. This means the unit of the population that has elected to be divided into segments where each segment amounted to approximately 350 people. This segment gets an eye examination, the selection of one segment in many segments of the population units by simple random sampling done by unplugging the segment number created in the roll of paper. If the segment has a population of less than 350 people, the eye examination unit can be forwarded to neighboring populations, it is necessary for a map of population units (villages).

Subjects/samples are eligible are those aged 50 years or over, have lived at home is at least 6 months, guests or visitors in the household were excluded. Any person aged over 50 years who are in the household and eligible to be recorded in the RAAB form, and always asked for the possibility of some people over the age of 50 years in the house because of the possibility aged over 50 years but when the visit was are outside. In this case the fixed RAAB form must be filled and eye examination should be done with the wait or make an appointment to come back again. If the house is locked, then the communication with the neighbors whether the house there is the population aged 50 years and above, if there is then it should be made an agreement to go back again, but if it turns out homeowners the possibility of leaving home for long distances and leave their homes over 1 night, the visit continued to the other houses. Visits to households stopped when the numbers of samples have to meet 50 people.

Training of survey team and eye examination

The survey team coached by 5 teams, each team consisting of an ophthalmologist, two senior residents, a nurse and a clerk. In additional an administrative officer was trained for entering data.

Coach was Dr. Hans Limburg PhD, namely RAAB creator itself. The training lasted for 4 days in PMN Cicendo Eye Hospital Bandung on 8 January to 11 January 2014. To determine interobserver variation, examined 52 participants/patients from the outpatient clinic PMN Cicendo Eye Hospital by each team. The results are compared to the team that became the Gold standard. All teams got acceptable interobserver variation for all categories which were above 0.6.

Eye examinations of samples were conducted in their houses during the day, follow the protocols and standardized survey forms that exist in the program RAAB 6. Examined visual acuity using E cards tumbling for size 6/60, 6/18 and 6/12. Visual acuity examination was carried out at a distance of 6 meters. Samples were examined using its glasses (available correction). With a pinhole inspection was also conducted. Visual acuity <3/60 with available correction is referred to as blind. Severe visual impairment (Severe visual impairment, SVI) when visual acuity ≥ 3/60 to 6/60, and Impaired vision (moderate visual impairment, MVI) when visual acuity ≥ 6/60 to 6/18, and mild vision disorders (early visual impairment, MVI) when visual acuity 6/18 -6/12.

After examination of visual acuity, participants were examined by an ophthalmologist or senior resident. Anterior segment examination using a flashlight, if so required, the examination carried out by using a portable slit lamp. The lens is checked with a flashlight and with direct ophthalmoskop without dilates the pupil. Lens examined turbidity, classified: normal, real turbidity, afakia, and planting lens implantation. The lens does not look too noted. The lens is not visible when there are opacities or corneal scarring. When the visual acuity <6/18 did not advance to the pinhole, must be examined posterior segment, whether the cause of vision disorders.

Statistical Analysis and ethical approval

This survey uses statistical analysis program RAAB 6. This program is used for data entry and automatic standardized data analysis. In addition to blindness figures are also calculated the coverage number of cataract operations, operation quality, patient barriers to obtain services operations, as well as the prevalence of which has been extrapolated value of the age and sex distribution of the population.

Ethical clearance for this survey was obtained from the University of Padjadjaran Bandung. The survey also uses the participants signed an informed consent after the explained about the survey. Survey permit has been obtained from the Health Department of West Java Province, Department of Health district / municipality, local Kesbangpol (Office of National and Political Unity), notification and coordination has been made with the health center and the village office/local municipality. All participants who require treatment are referred to the nearest eye care facilities.

Results

The survey included 3000 people aged 50 years and older, of whom 2842 were actually examined. The average was 94.75. 87 person (2.9%) were absent, 48 (1.6%) refused to participate in the study, and 23 (0.8%) were not able to the test (Table 1).

Age and sex adjusted blindness and visual impairment

Table 2 shows the adjusted prevalence and the estimated number of cases of bilateral blindness, SVI, MVI, EVI and low vision. An estimated 180,663 persons aged 50+ are bilateral blind, 77,538 persons aged 50+ are severely visually impaired and another 471, 355 persons have MVI. Among them are 87,105 people (11.9%) aged 50+ with functional low vision, requiring low vision services.

Causes of bilateral blindness

Table 3 shows the causes of VI in people aged 50+ with bilateral blindness, SVI, MVI and EVI. In people aged 50+, untreated cataract is the most common cause of bilateral blindness (PVA<3/60 in the better eye) with 71.7%, followed by other posterior segment disease (10.9%), all other globe/CNS abnormalities (6.5%), non-trachomatous corneal scarring (4.3%), glaucoma and uncorrected refractive error (2.2%). Also for SVI and MVI cataract is by far the main cause. Uncorrected refractive errors (URE) are causing 10.5% of SVI, 36.8% of MVI and 68.0% of EVI. There are only a few cases of SVI and MVI due to pterygium, (Figure 1). Of all bilateral blindness 82.6% is considered avoidable: 73.9% is considered treatable (cataract and URE); 6.5% avoidable by primary eye care and 2.2% avoidable by specialized ophthalmic care. Posterior segment disease accounts for 13.0% of all bilateral blindness.

	Total eligible		Examined		Not available		Refused		Not capable	
	n	%	n	%	n	%	n	%	n	%
Males	1,142	100.0%	1,065	93.3%	48	4.2%	22	1.9%	7	0.6%
Females	1,858	100.0%	1,777	95.6%	39	2.1%	26	1.4%	16	0.9%
Total	3,000	100.0%	2,842	94.7%	87	2.9%	48	1.6%	23	0.8%

Table 1: Eligible persons, coverage, absentees and refusals.

	Males		Females		Total	
Bilateral VA	n	% (95%CI	n	% (95%CI)	n	% (95%CI)
Blindness (PVA<3/60)	69,058	2.1 (1.1 – 3.1)	111,605	3.4 (2.4 – 4.4)	180,663	2.8 (2.0 – 3.5)
SVI (PVA<6/60 – 3/60)	27,649	0.9 (0.2 – 1.5)	49,889	1.5 (0.9 – 2.2)	77,538	1.2 (0.7 – 1.7)
MVI (PVA<6/18 – 6/60)	214,133	6.6 (4.3 – 8.8)	257,222	7.9 (6.1 – 9.7)	471,355	7.2 (5.7 – 8.8)
EVI (PVA<6/12 – 6/18)	222,996	6.9 (5.2 – 8.5)	258,452	7.9 (6.4 – 9.4)	481,446	7.4 (6.3 – 8.5)
Functional Low Vision	52,493	1.6 (0.6 – 2.6)	34,612	1.1 (0.6 – 1.5)	87,105	1.3 (0.8 – 1.9)

Table 2: Age and sex adjusted prevalence of blindness, SVI and MVI in adults aged 50+.

	Blindness		SVI		MVI		EVI	
	n	%	n	%	n	%	n	%
Refractive error	2	2.2%	4	10.5%	89	36.8%	157	68.0%
Aphakia uncorrected	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Cataract untreated	66	71.7%	28	73.7%	124	51.2%	51	22.1%
Cataract surgical complications	0	0.0%	0	0.0%	3	1.2%	1	0.4%
Trachomatous corneal opacity	1	1.1%	1	2.6%	0	0.0%	0	0.0%
Non Trachomatous corneal opacity	4	4.3%	0	0.0%	1	0.4%	0	0.0%
Phthisis	1	1.1%	0	0.0%	0	0.0%	0	0.0%
Pterygium	0	0.0%	2	5.3%	3	1.2%	3	1.3%
Glaucoma	2	2.2%	0	0.0%	3	1.2%	0	0.0%
Diabetic retinopathy	0	0.0%	1	2.6%	3	1.2%	0	0.0%
ARMD	0	0.0%	0	0.0%	2	0.8%	3	1.3%
Other posterior segment disease	10	10.9%	0	0.0%	9	3.7%	11	4.8%
All other globe/CNS abnormalities	6	6.5%	2	5.3%	5	2.1%	5	2.2%
Total	92	100.0%	38	100.0%	242	100.0%	231	100.0%

Blindness, SVIad MVI in persons by intervention category								
A. Treatable (1,2,3)	68	73.9%	32	84.2%	213	88.0%	208	90.0%
B. Preventable (PHC/PEC services) (5,6,7,8)	6	6.5%	3	7.9%	4	1.7%	3	1.3%
C. Preventable (Ophthalmic services) (4,9,10)	2	2.2%	1	2.6%	9	3.7%	1	0.4%
D. Avoidable (A+B+C)	76	82.6%	36	94.7%	226	93.4%	212	91.8%
E. Posterior segment causes (8,9,10,11,12)	12	13.0%	3	7.9%	20	8.3%	17	7.4%

Table 3: Main causes of blindness, SVI and MVI in people aged 50+ in West Java.

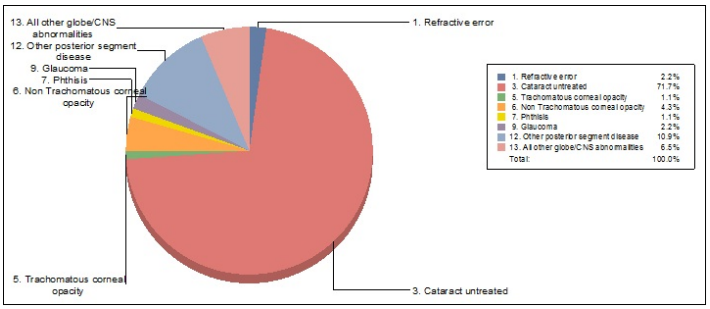

Figure 1: Main cause of blindness in persons.

Figure 2 shows that 80.4% of blindness can be treated or prevented by cataract surgery, Primary Health Care (PHC) and Primary Eye Care (PEC) activities. Another 2.2% of blindness can be prevented with adequate ophthalmic services.

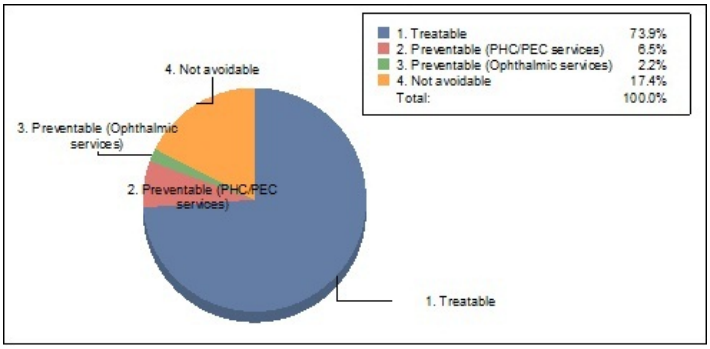

Figure 2: Main category of blindness in persons.

The main intervention strategies to reduce avoidable blindness in West Java are shown in figure 3. Priority should be given to cataract.

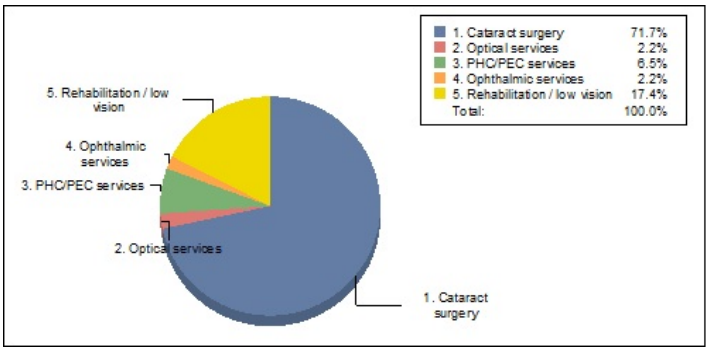

Figure 3: Action required to reduce blindness.

Surgery followed by the development of optical services and PHC and PEC services, as these are the most cost-effective interventions. These two interventions will address 80% of the causes of blindness and have most impact.

Conclusion

The adjusted prevalence of blindness among people aged 50+ in West Java is 2.8%, an estimated 180,663 people. Untreated cataract is by far the major cause of avoidable blindness and low vision; an estimated 85,055 people are bilaterally blind due to cataract, 102,997 cannot see 6/60 and 268,642 cannot see 6/18 in the better eye due to cataract. An estimated 387,785 eyes are blind due to cataract, 454,502 eyes have a BCVA <6/60 due to cataract and are in need of cataract surgery, and nearly 889,000 eyes have a BCVA<6/18 due to cataract; 3.96 million people aged 50+ have uncorrected refractive errors. There is an urgent need to increase cataract surgery by intensifying the case finding and by operating cataract patients at an earlier stage. Priority should be given to cataract surgery, followed by the development of optical services and primary health care/primary eye care services, as these are the most cost-effective intervention. The two interventions will address 80% of the causes of blindness and have most impact.

References

1. The Central Bureau of Statistics of West Java. The population of West Java, by age group and gender in 2011.
2. Kuper H, Polack S, Limburg H (2006) Rapid assessment of avoidable blindness. Community Eye Health 19: 68-69.
3. Limburg H, Meestering W, Kuper H, Polack S (2013) rapid assessment of avoidable blindness-RAAB version 6 for Windows. London.
4. World Health Organization. Blindness: Vision 2020- The global initiative for the elimination of avoidable blindness.
5. World Health Organization (2010) Action plan for the prevention of avoidable blindness and visual impairment 2009-2013. Geneva.