

ความพึงพอใจของการมองเห็นและปัจจัยที่เกี่ยวข้อง

Impact on Self-reported Visual Perception Satisfaction and Related Factors

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บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อหาความสัมพันธ์ของความพึงพอใจของการมองเห็นของประชากรไทย กับ ปัจจัยที่เกี่ยวข้อง ได้แก่ระดับสายตา อายุ เพศ และอาชีพ วิธีการ โดยนำข้อมูลความพึงพอใจของการมองเห็นที่สอบถาม จากกลุ่มตัวอย่างอายุ 20 ปีและมากกว่า จำนวน 14,658 คนซึ่งมารับการตรวจตาในโครงการสำรวจภาวะสายตาพิการ ในประเทศไทย ปีพ.ศ. 2549-2550 ผลการศึกษา พบว่ากลุ่มตัวอย่างมีระดับสายตาของตาข้างที่เห็นดีกว่าอยู่ในเกณฑ์ $\geq 20/70$ เป็น 88.3%, $\geq 10/200$ เป็น 3.9%, และน้อยกว่า 10/200 เป็น 7.8% กลุ่มตัวอย่างจำนวน 3.6 % พบว่าไม่มีปัญหา และมีความพึงพอใจของการมองเห็น 51.1 % มีปัญหาเล็กน้อย 33.5 % มีปัญหามากกลาง และมีเพียง 11.8 % เท่านั้นที่มีปัญหามาก เมื่อวิเคราะห์ความพึงพอใจของการมองเห็นและระดับสายตาในตาข้างที่ดี พบว่ามีความสัมพันธ์กัน คือ ความพอใจมากขึ้นเมื่อสายตาดีขึ้น และเมื่อวิเคราะห์ความพึงพอใจของการเห็น กับอายุก็พบว่าความพึงพอใจของการมองเห็นจะลดลงเมื่ออายุเพิ่มขึ้น และมีความสัมพันธ์กับกลุ่มอาชีพพบว่ากลุ่มนักเรียนและข้าราชการ/พนักงาน รัฐบาลหาก็มีความพึงพอใจที่มีในการมองเห็นของตนเองมากที่สุด เพศชายและหญิงมีความพึงพอใจของการมองเห็น ไม่แตกต่างกัน สรุปว่าปัจจัยที่มีความสัมพันธ์กับความพึงพอใจของการมองเห็นของประชากรได้แก่ ระดับสายตาของตาข้างที่เห็นดีกว่า อายุ และอาชีพ

คำสำคัญ: ความพึงพอใจของการมองเห็น การสำรวจภาวะสายตาพิการ ประเทศไทย

Abstract

The objective of the study is to estimate the association and magnitude of self-reported visual perception satisfaction to the age group, gender, occupation and presenting visual acuity of adult Thai population. Data from the cross-sectional population-based study in a national survey of visual impairment in Thailand, conducted 2006-2007 were used. Of the 14,658 adult samples, the results showed that the prevalence of good distance presenting visual acuity (VA) of the better eye was 88.3% and a of 20/70 and higher, 3.9% had VA lower than 20/70-10/200 and 7.8% had a VA lower than 10/200. Self-reported visual perception satisfaction that 3.6 % reported no visual problem, 51.1 % had minimal problem, 33.5% had moderate and only 11.8 % had severe problem. There had been

significant association of self-report visual perception satisfaction and presenting visual acuity of the better eye. There was a similar pattern with aging but had declined. Maximum visual satisfaction showed in the age range 20-39 years and then it started to decline. There was also significant association of self-reported visual perception satisfaction and occupation. Student and the civil / state enterprise employee had statistically significant visual perception. Gender played no significant role. In conclusion, the factors that related to self – reported visual perception satisfaction were age, occupation and presenting visual acuity of the better eye.

Keywords: self-reported visual perception satisfaction, national survey of visual impairment, Thailand

1. Introduction

Almost all of the previous studies about visual acuity and visual impairment (Laitinen et al., 2005; Globe et al., 2004; Dandona et al., 1999; Taylor et al., 1997) had the same results as visual impairment increased with the population's age. These reports grouped the population using the presenting visual acuity measured by health personnel. In daily life, some people with poor visual acuity can maintain their independent living. There were few reports about satisfaction of visual perception in the population group of poor visual acuity which can be explained by daily visual perception, were different from formal visual acuity measurement which uses high-contrast letters on a brightly illuminated background. How to evaluate the visual function, the most common test used is the 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ 25) (Globe et al., 2004; Torres et al., 2005; Broman et al., 2005). In Thailand, visual function evaluation for cataract (Sornpaisarn et al., 2002) and refractive surgery (Kosirukvongs et al., 2004) were designed with minimal acceptance. It was accepted that visual

impairment is a risk factor for morbidity especially, in the elderly and is often screened by health workers rather than self-reported (Friedman et al., 1999). For health administrators and policy makers, knowing a population's visual perception will help them to provide better healthcare according to their needs, age, gender and occupation.

To determine visual impairments, criteria from World Health Organization (WHO) (ICD10, 1999) was used for Blind (BI) and Low Vision (LV).

Blind is a person who has the best corrected visual acuity less than 3/60 or 20/400 and / or visual field of less than 10 degree.

Low Vision is a person who has the best corrected visual acuity better than 3/60 or 20/400 and less than 6/18 or 20/70.

Visual perception was subjectively classified as criteria from Burden of Disease study in Thailand in 1999 (Thai BOD, 2002) as no problem, minimal problem, moderate problem, severe problem as Table 1.

Table 1 Visual loss as definition of Burden of Diseases (BOD) in Thailand in 1999

Visual loss in BOD	Visual acuity
No visual loss	20/20 - 20/40
Minimal visual loss	<20/40 – 20/63
Moderate visual loss	20/80 – 20/160
Severe visual loss	less than 20/200
Uncertain visual loss	Central stable and maintain

2. Objectives

To estimate the association and magnitude of self-reported visual perception satisfaction to the related factors as age group, gender, occupation and visual acuity of Thai adult population over 20 years old.

3. Materials and methods

Using data from cross sectional population based survey on visual impairments (blindness, low vision) in Thailand in the year 2006-2007 (Jenchitr et al., 2007) with:

1) Inclusion criteria, the data set for this study was 21,711 samples from the villages selected by systematic random sampling from 21 provinces in every part of Thailand and Bangkok. The samples were interviewed and had complete eye examination including visual acuity with and without eye glasses, auto-refraction, intraocular pressure measurement, anterior and posterior segment examination. Fundus pictures were also taken. The samples with eye diseases or suspected of eye diseases were referred to provincial or regional hospital for definite diagnosis and proper treatment. 18,474 samples who were 20 years old and older were requested to answer the question of satisfaction in their visual perception.

2) Exclusion criteria is the samples with incomplete data.

4. Results and Discussion

Out of 14,658 samples with completed data (Table 2), it was found that the prevalence of good distance presenting visual acuity of the better eye (VA 20/70 and better) was 88.32%, VA worse than 20/70 - 10/200 was 3.92% and worse than 10/200 was 7.76% (Table 3). Self-report visual perception satisfaction displayed that 3.6 % of samples had no visual problem, 51.1% had minimal problem, 33.5% had moderate and only 11.8 % had severe problem (Table 4). Self-reported visual perception satisfaction and good presenting visual acuity of the better eye were correlated (Table 5). From Table 6, the student and house-worker had the least percentage of good self-reported visual perception satisfaction (only 47.5% and 49.4%, respectively) followed by priest 54.2% , agriculture worker 54.3%, fisherman - 57.7%, employee - 59.3%, factory worker - 63.5% and civil / state enterprise employee had the most satisfaction self-reported visual perception satisfaction of 63.5% and 65.3%. For every ten years increase in the age group, there was chance getting worsen visual acuity (Table 7). Gender did not have significant different in self-reported visual perception satisfaction (Table 8).

Using multiple logistic regression to analyze self report visual perception satisfaction and factors of presenting visual acuity of the better eye , age group , gender and occupation, the results were shown in Table 9 that good presenting visual acuity of better eye had significant association with self reported visual perception (Linear by –Linear association, $p < 0.000$), with a magnitude of 0.230, $p < 0.001$ (Chi-Square, ordinal by ordinal Kendall's tau-b) Stratified analysis

by Multiple logistic regression yielded advancing adjusted odd ratio (AOR) with increasing good presenting visual acuity of the better eye from 1.26 (95% CI 1.01,1.57), 2.04 (95% CI 1.76, 2.37) and 3.18 (95% CI 2.76, 3.68), respectively and all at $p < 0.000$.

For occupation, self-reported visual perception satisfaction was significantly good with the civil / state enterprise employee occupation and worst in the group of student when controlled factors presenting visual acuity of the better eye, gender, age. These difference were significant (Chi-Square, Ordinal by Ordinal, $p < 0.000$) and magnitude of association was 0.55 ($p < 0.000$, Ordinal by Ordinal-Kendall, tau-b). Final analysis by multiple logistic regression only the civil / state enterprise and student had statistically significant AOR of 1.33 (95% CI 1.11, 1.58) $p = 0.002$ and 0.83 (95% CI 0.69, 0.98) $p = 0.032$, respectively.

For increasing age, self-reported visual perception satisfaction was worse with increasing age and was significant (Linear by-Linear association, $p < 0.000$). The magnitude of association (Ordinal by Ordinal-Kendall's tau-b) was 0.209 at $p < 0.001$. It was cleared that age group played significant role effecting self-reported visual perception satisfaction. As comparing to age group of 20–29, it was found that people in the age group of 30–39 had the best self report visual perception satisfaction but not really significant with an AOR 1.09 (95%CI 0.84, 1.41), $p = 0.53$. The more increasing age group, the more complained of visual un-satisfaction. The satisfaction decrease down was straightly since age group of 40-49, 50-59, 60-69, 70-79, 80-89 with AOR 0.51 (95% CI 0.41, 0.65) $p < 0.000$,

0.42 (95% CI 0.33, 0.53) $p < 0.000$, 0.38 (95% CI 0.30, 0.48) $p < 0.000$, 0.33 (95% CI 0.26, 0.42), $p < 0.000$, 0.25 (95% CI 0.18, 0.35) $p < 0.000$, respectively. Exception was in the age group of 90 and over which due to in adequate sample size.

Men had slightly higher self-reported visual perception satisfaction than women but after controlled factors of presenting visual acuity of the better eye, occupation and age, it was not significant with an AOR 1.06 (95% CI 0.10, 1.16) $p = 0.58$.

From Table 10, if considering self-reported visual perception satisfaction into two categories, Thai samples had 54.71% visual perception satisfaction and 45.29% visual perception un-satisfaction.

5. Discussion

Since the aging population is increasing, the basis and subsequent programs for maintaining daily life activities and quality of life have to be ascertained for each population group with declining vision. Exploring their satisfaction in visual perception will be amendable to health sector to provide assistance correspondent and relevant to their needs. Age was the prominent factor to decreased visual perception due to the onset of presbyopia, cataract and age-related macular degeneration (Branch et al., 1989). Other variables such as visual acuity at near, visual field (Nelson et al., 1999) and eye diseases were known factors causing poor visual perception. Additionally, education and contrast sensitivity (West et al., 2002) were also contributing factors for visual perception. Self-reported visual impairment among middle-aged individuals came from fair self-rated health and low

availability of informal social support or unmet needs for basic eye care (Horowitz et al., 2005). Some activities, like motor cycling and automobile driving are infrequent in rural women or the group of house worker which mostly are women, so they do not look for any instruments or treatment to improve their vision. The prevalence of self-reported visual perception satisfaction in this group was low and associated with poor distant and near VA. The other explanation for not looking for visual aids were mostly due to their work only required nearsightedness. An African study stated that impairment of nearsighted vision was found to create higher burden of functional disability than that of farsighted vision (Bekibele et al., 2008). The last explanation for the lowest visual acuity in the house worker group might be due to their being recognized as the lowest socioeconomic group and eye glasses were unaffordable. In an aside opinion, their poor functional performance (Bekibele et al., 2008), may be due to poor visual acuity and they could not work out of their houses to earn income.

From this study, the most satisfaction in visual perception was in the group of Civil / State enterprise employee which may be due to their higher education, easy accessibility to healthcare and eye glasses. The priest group had high satisfaction in their visual perception which may be due to their following the teaching of middle way of life by The Lord Buddha and are not used to complaining or are not dissatisfied with their daily living.

Self-reported visual perception satisfaction or functional visual acuity in adults caused many difficulties, not only physical but also mental and

emotional (Gilman et al., 1986; Ray et al., 2008; Rizzo et al., 2009; Berger et al., 2008). They needed familial and community support. As the incidence of people living with poor vision is increasing to epidemic proportions due to aging, understanding the relationship between vision and participation in meaningful activities has important implications (Branch et al., 1989). Both self-reported and performance-based measures seem to complement each other in providing useful information about physical limitations (Kempen et al., 1996).

6. Conclusion

6.1 For visual acuity, self-report visual perception satisfaction associated significantly with good presenting visual acuity of the better eye when control factor of gender, age, occupation. Considering with the worst presenting visual acuity of better eye (worse than 10/200) showed the worst self-reported visual perception satisfaction, and the better VA (worse than 20/70 – 10/200, worse than 20/40 – 20/70 and 20/20 – 20/40) correlated with the better self-reported visual perception satisfaction.

6.2 For occupation, self-reported visual perception satisfaction was significantly better with the Civil / State enterprise employee and worst in the group of student when controlled factors presenting visual acuity of the better eye, gender, and age.

6.3 Age group played significant role effecting self-reported visual perception satisfaction. The more increasing age group, the more complained of visual

un-satisfaction was. The satisfaction decrease down was straightly since age group of 40-49, 50-59, 60-69, 70-79, 80-89 years old. Exception was in the age group of 90 and over which due to inadequate sample size.

6.4 Gender had no association with self-reported visual perception satisfaction when controlled factors of presenting visual acuity of the better eye, occupation and age.

Table 2 Number of survey population samples and samples with complete data in various age groups

Age range (years)	Survey population samples			Population samples with complete data		
	Male	Female	Total	Male	Female	Total
20-29	241	544	785	135	276	411
30-39	624	1,582	2,206	360	936	1,296
40-49	1,582	3,089	4,671	1,224	2,504	3,728
50-59	1,691	3,193	4,884	1,389	2,731	4,120
60-69	1,285	2,217	3,502	1,085	1,915	3,000
70-79	820	1,224	2,044	713	1,072	1,785
80-89	152	199	351	125	182	307
90-98	6	8	14	4	7	11
Total	6,401	12,056	18,457	5,035	9,623	14,658

Table 3 Visual acuity of better eye, age group and gender

Age group (years)	Presenting visual acuity of better eye								Total	
	20/20-20/40		20/50-20/70		< 20/70 -10/200		<10/200		Number	Percent
	M	F	M	F	M	F	M	F		
20-29	115	37	10	9	2	11	8	276	411	2.80
30-39	314	816	30	76	4	10	12	34	1,296	8.84
40-49	1,104	2,207	88	230	6	30	26	37	3,728	25.43
50-59	1,057	1,976	252	607	21	50	59	98	4,120	28.11
60-69	566	846	346	726	59	116	114	227	3,000	20.47
70-79	186	234	286	455	88	117	153	266	1,785	12.18
80-89	17	31	44	68	28	33	36	50	307	2.09
90 and over	0	1	0	2	1	0	3	4	11	0.08
Total	9,689 (66.1%)		3,257 (22.22%)		574 (3.92%)		1,138 (7.76%)		14,658	100.00

Table 4 Self-reported visual perception satisfaction in various occupations

Occupations	Satisfied				Not satisfied				Total	
	No problem		Minimal problems		Moderate problems		Severe problems			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
House worker	10	71	252	1,566	210	1,157	109	466	581	3,260
Agriculture worker	90	83	895	1,373	648	919	207	281	1,840	2,656
Factory worker	3	2	15	34	7	16	2	6	27	58
Employee	102	108	715	1,010	413	596	134	184	1,364	1,898
Civil / State enterprise employee	14	17	212	237	107	98	29	21	362	373
Fisherman	0	3	201	397	108	223	36	74	345	697
Student	5	7	107	192	74	162	44	64	230	425
Priest	4	-	80	-	50	-	21	-	155	-
No work (Unemployed)	4	8	73	130	40	84	16	32	133	254
Total	232	299	2,550	4,939	1,657	3,255	598	1,128	5,037	9,621
Grand total	531		7,489		4,912		1,726		14,658	
Percent	3.62%		51.10%		33.50%		11.80%		100%	

Table 5 Self-reported visual perception satisfaction and presenting visual acuity of better eye (VA)

Presenting visual acuity of better eye (VA)	Self-reported visual perception				Total
	No problem	Minimal problems	Moderate problems	Severe problems	
20/20- 20/40	457 (4.7%)	5,559 (57.4%)	2,961 (30.6%)	712 (7.3%)	9,689 (66.10%)
Worse than 20/40-20/70	62 (1.9%)	1,430 (43.9%)	1,258 (38.6%)	507 (15.6%)	3,257 (22.22%)
Worse than 20/70-10/200	2 (.3%)	186 (32.4%)	224 (39.0%)	162 (28.2%)	574 (3.92%)
Worse than 10/200	10 (.9%)	314 (27.6%)	469 (41.2%)	345 (30.3%)	1,138 (7.76%)
Total	531 (3.6%)	7,489 (51.1%)	4,912 (33.5%)	1,726 (11.8%)	14,658 (100%)

Table 6 Self-reported visual perception satisfaction different among various occupations

Occupations	Satisfied	Percent	Not satisfied	Percent	Total	
	(Number)		(Number)		Number	Percent
House worker	1,899	12.95	1,942	13.25	3,841	26.20
Agriculture worker	2,441	16.65	2,055	14.02	4,496	30.67
Factory worker	54	0.37	31	0.21	85	0.58
Employee	1,935	13.20	1,327	9.05	3,262	22.25
Civil / State enterprise employee	480	3.27	255	1.74	735	5.01
Fisherman	601	4.10	441	3.01	1,042	7.11
Student	311	2.12	344	2.35	655	4.47
Priest	84	0.57	71	0.48	155	1.05
No work (Unemployed)	215	1.47	172	1.17	387	2.64
Total	8,020	54.72	6,638	45.28	14,658	100.00

Table 7 Self-reported visual perception satisfaction and age groups

Age group (years)	Self-reported visual perception				Total
	No problem	Minimal problems	Moderate problems	Severe problems	
20-29	51 (0.35%)	253 (1.73%)	76 (0.52%)	31 (0.22%)	411 (2.80%)
30-39	143 (0.98%)	848 (5.78%)	263 (1.79%)	42 (0.29%)	1,296 (8.84%)
40-49	150 (1.02%)	2,145 (14.63%)	1,166 (7.95%)	267 (1.82%)	3,728 (25.43%)
50-59	98 (0.67%)	2,135 (14.57%)	1,436 (9.80%)	451 (3.08%)	4,120 (28.11%)
60-69	59 (0.40%)	1,352 (9.22%)	1,131 (7.72%)	458 (3.12%)	3,000 (20.47%)
70-79	26 (0.18%)	664 (4.53%)	717 (4.89%)	378 (2.58%)	1,785 (12.18%)
80-89	4 (0.02%)	89 (0.61%)	118 (0.81%)	96 (0.65%)	307 (2.09%)
90 and over	-	3 (0.02%)	5 (0.03%)	3 (0.02%)	11 (0.08%)
Total	531 (3.62%)	7,489 (51.09%)	4,912 (33.51%)	1,726 (11.78%)	14,658 (100.00%)

Table 8 Self-reported visual perception satisfaction and gender

Sex	No problem in seeing	Minimal problems	Moderate problems	Severe problems	Total
		in seeing	in seeing	in seeing	
Female	299 (2.04%)	4,940 (33.70%)	3,256 (22.21%)	1,128 (7.70%)	9,623 (65.65%)
Male	232 (1.58%)	2,549 (17.39%)	1,656 (11.30%)	598 (4.08%)	5,035 (34.35%)
Total	531 (3.62%)	7,489 (51.09%)	4,912 (33.51%)	1,726 (11.78%)	14,658 (100.00%)

Table 9 The association of self-reported visual perception satisfaction and VA, occupation, age group and gender in population with 95% CI

Factors	Number	Percent	Statistic/P value	Magnitude of Association, p-value / or Crude odd ratio with 95% CI	Stratified analysis by Multiple Logistic Regression AOR & 95% CI, p-value
VA*	14,658	100.0	Pearson Chi- square (Linear		
<10/200	1,138	7.8	by linear association)/	0.230, p<0.000	1.26 (95% CI 1.01, 1.57), p<0.000
<20/70-10/200	574	3.9	p<0.000	(Kendal's tau-b, Ordinal	
<20/40-20/70	3,257	22.4		by Ordinal)	2.04 (95% CI 1.76, 2.37), p<0.000
20/20-20/40	9,689	66.1			3.18 (95% CI 2.76, 3.68), p<0.000
Occupation	14,658	100.0	Pearson Chi- square (Linear by		
House worker	3,841	26.20	linear association)/	0.55, p<0.000	1
Agriculture	4,496	30.67	p<0.000	(Kendal's tau-b, Ordinal	0.10 (95% CI 0.91, 1.09), p=0.918
worker				by Ordinal)	
Factory	85	0.58			0.96 (95% CI 0.60, 1.52), p=0.855
worker					
Employee	3,262	22.25			0.99 (95% CI 0.90, 1.11), p=0.918
Civil/State	735	5.01			1.33 (95% CI 1.11, 1.56), p=0.002
enterprise					
Fishermen	1,042	7.11			1.08 (95% CI 0.62, 1.24), p=0.278
Students	655	4.47			0.83 (95% CI 0.69, 0.98), p=0.032
Priests	155	1.05			0.08 (95% CI 0.62, 1.24), p=0.460
Unemployed	387	2.64			1.06 (95% CI 0.85, 1.32), p=0.584
Age group	14,658	100.0	Pearson Chi- square (Linear		
20-29 years	411	2.80	by linear association)/	0.209, p<0.001 (Kendal's	1
30-39 years	1,296	8.84	p<0.000	tau-b, Ordinal by Ordinal)	1.09 (95% CI 0.84, 1.41), p=0.528
40-49 years	3,728	25.43			0.51 (95% CI 0.41, 0.65), p<0.000
50-59 years	4,120	28.11			0.42 (95% CI 0.33, 0.53), p<0.000
60-69 years	3,000	20.47			0.38 (95% CI 0.30, 0.48), p<0.000
70-79 years	1,785	12.18			0.33 (95% CI 0.26, 0.42), p<0.000
80-89 years	307	2.09			0.25 (95% CI 0.18, 0.35), p<0.000
≥90 years	11	0.08			0.27 (95% CI 0.67, 1.67), p=0.063
Sex	14,658	100.0	Pearson Chi- square/ p=0.1, not		
Male	5,035	34.35	significant		1
Female	9,623	65.65			1.08 (95%CI 0.01, 1.16), p=0.058
					Not significant

*VA=Presenting visual acuity of better eye

Table 10 Considering self-reported visual perception satisfaction of samples over 20 years old into two categories

Self-reported visual perception satisfaction	Visual perception un-satisfaction	Visual perception satisfaction	Total
No problem in seeing	0	531	531
Minimal problems in seeing	0	7,489	7,489
Moderate problems in seeing	4,912	0	4,912
Severe problems in seeing	1,726	0	1,726
Total	6,638 (45.29%)	8,020 (54.71%)	14,658

7. References

- Bekibele, C.O., Gureje, O. (2008). Self-reported visual impairment and impact on vision-related activities in an elderly Nigerian population: report from the Ibadan study of ageing. *Ophthalmic Epidemiol.* 15(4): 250-6.
- Berger, S., Porell, F. (2008). The association between low vision and function. *J Aging Health.* 20(5): 504-25.
- Branch, L.G., Horowitz, A., Carr, C., (1989). The implications for everyday life of incident self-reported visual decline among people over 65 living in the community. *The Gerontologist.* 29: 359-65.
- Broman, A.T., Munoz, B., Rodriguez, J., Sanchez, R., Quigley, H.A., Klein, R., et al. (2005). The impact of visual impairment and eye disease on Vision-Related Quality of Life in a Mexican-American Population: Projector VER. *Research on Aging.* 27: 307-26.
- Dandona, L., Dandona, R., Naduvilath, T.J., McCarty, C.A., Srinivas, M., Mandal, P., Nanda, A., Rao GN. (1999). Burden of moderate visual impairment in an urban population in Southern India. *Ophthalmology.* 106(3): 497-504.
- Friedman, S.M., Munoz, B., Rubin, G.S., West, S.K., Bandeen-Roche, K., Fried, L.P. (1999). Characteristics of discrepancies between self-reported visual function and measured reading speed. Salisbury Eye Evaluation Project Team. *Investigative Ophthalmology & Visual Science.* 40: 858-864.
- Gilman, S., Arthur, E., Simmel, G., Arnold, W., Simon, D., Ellen, P. (1986). Visual handicap in the aged: Self-reported visual disability and the quality of life of residents of public housing for the elderly. *J of Visual Impairment & Blindness.* 80: 588-90.
- Globe, D.R., Wu, J., Azen, S.P., Varma, R. (2004). Los Angeles Latino Eye Study Group. The impact of visual impairment on self-reported visual functioning in Latinos: The Los Angeles Latino Eye Study. *Ophthalmology.* 111(6): 1141-9.
- Horowitz, A., Brennan, M., Reinhardt, J.P. (2005). Prevalence and risk factors for self-reported visual impairment among middle-aged and older adults. *Research on Aging.* 27: 307-26.
- International statistic classification of diseases, injuries and causes of death. (1999). 10th revision (ICD 10): H54 (9) WHO Geneva.

- Jenchitr, W., Hanutsaha, P., Iamsirithaworn, S., Parnrat, U., Choosri, P., Yenjittr, C. (2007). Thailand national survey of visual impairment in 2006-7. *Thai J PBl Ophthalmol.* 21(1): 10-85.
- Kempen, G.M., Van Heuvelen, M.G., Van Den Brink, R.S., Kooijman, A.C., Klein, M., Houx, P.J. et al. (1996). Factors affecting contrasting results between self-reported and performance based levels of physical limitations. *Age and Ageing.* 25: 458-464.
- Kosrirukvongs, P., Leurmarnkul, W., Srivanaboon, S., Prabhasawat, P., Booranapong, W., Chuleewattanapong, C. (2004). Questionnaire for quality of life before and after Laser in Situ Keratomileusis. *Thai J Ophthalmol.* 18: 11-25.
- Laitinen, A., Koskinen, S., Härkänen, T., Reunanen, A., Laatikainen, L., Aromaa, A. (2005). A nationwide population-based survey on visual acuity, near vision, and self-reported visual function in the adult population in Finland. *Ophthalmology.* 112(12): 2227-37.
- Nelson, P., Aspinall, P., O'Brien, C. (1999). Patients' perception of visual impairment in glaucoma: a pilot study. *Br J Ophthalmol.* 83: 546-552.
- Ray, C.T., Wolf, S.L. (2008). Review of intrinsic factors related to fall risk in individuals with visual impairments. *J Rehabil Res Dev.* 45(8): 1117-24.
- Rizzo, M., Sparks, J., McEvoy, S., Viamonte, S., Kellison, I., Vecera, S.P., Change blindness, aging, and cognition. *J Clin Exp Neuropsychol.* 2009 ;31(2): 245-56.
- Sornpaisarn, C., Jenchitr, W., Yenjittr, C., Tangcharoenstian, V. (2002). How to measure quality of life of cataract patients in rural area. *Thai J PBl Hlth Ophthalmol.* 16: 69-94.
- Taylor, H.R., Livingston, P.M., Stanislavsky, Y.L., McCarty, C.A. (1997). Visual impairment in Australia: distance visual acuity, near vision, and visual field findings of the Melbourne Visual Impairment Project. *Am J Ophthalmol.* 123(3):328-37.
- The Thai working group on burden of disease (BOD) and injury. (2002). Ministry of Public Health. Burden of diseases and injuries in Thailand. Priority setting for Policy. Kanitha Boonthamcharoen, Yot Teerawatananon, Theo Vos, Stephen Begs. Printing House of the Wars Veterans Organization of Thailand. ISBN 974 9580 26 5.
- Torres, M., Wu, J., Klein, R., Azen, S.P. (2005) Los Angeles Latino Eye Study Group. Self-reported comorbidities and visual function in a population-based study: the Los Angeles Latino Eye Study. *Arch Ophthalmol.* 123(6):815-21.
- Varma, R., Ying-Lai, M., Klein, R., Azen, S.P. (2004). Los Angeles Latino Eye Study Group. Prevalence and risk indicators of visual impairment and blindness in Latinos: the Los Angeles Latino Eye Study. *Ophthalmology.* 111(6):1132-40.
- West, S.K., Rubin, G.S., Broman, A.T., Muñoz B., Bandeen-Roche, K., Turano, K. (2002). The SEE Project. How does visual impairment affect performance on tasks of everyday life? *Arch Ophthalmol.* 120:774-780.