



# PREDICTION OF AN INCREASE IN EYE PROBLEMS, IN IJEBU-ODE AND IJEBU NORTH LOCAL GOVERNMENT AREA OF OGUN STATE IN THE NEAREST FUTURE AS A RESULT OF SPENDING MUCH TIME ON COMPUTER / SMARTPHONE

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## ABSTRACT

Good eyesight is an important part of wellbeing and a significant factor in retaining independence and quality of life as we get older. The World Health Organisation (WHO) estimates that up to 80 per cent of blindness and serious visual loss around the world is avoidable through prevention or treatment (<https://www.guidedogs.org.au/importance-of-eye-health>). The study is set out to predict an increase in eye related problems in the nearest future in Ijebu-Ode and Ijebu North Local Government of Ogun State, judging from the personal experience of the respondents. To elicit response for the study, the research design adopted was the surveyed method using questionnaire as the instrument for data collection. Five hundred and fifty (550) questionnaires were administered to different categories of people that use computer or handset from the two local government areas, out of which 519 (97.9%) were duly answered and returned to the researcher. Those that participated in the study are people from banking sector, tertiary institutions, health sector, and civil service. The selection cut across different professions. The data obtained were analyzed using Frequency Distribution, Pearson Correlation, Chi-Square and Crosstab.

The result obtained showed in fig. 1 that headache, eyestrains, double vision, redness of eye, blurred eye and irritation of eyes are different problems majority of those who spent much time with Smartphone/Computer mostly have, while watery eyes and dryness of eye are in the minority. Also the results consistently show that in the nearest future there will be an increase in eye related problem in Nigeria.

**Key Words:** Computer, Eyes Problem, Smartphone, Vision, Visual Display, Optometrist, Eyes Strain, Duration

## INTRODUCTION

Computer system has been very useful in almost every field of human endeavour, from offices to different shops and homes. Many people now work with computer for longer hours of time per day. Despite this computer usefulness there are a lot of problems that can be associated with the usage of computer over a long time (Olabiyisi, Akingboye, Abayomi, Izilien and Adeleke, 2013).

Mobile devices such as smartphones or tablet PCs have already become ubiquitous. Recently, it has been increas-

ingly common for people to check e-mail, browse on the Internet, watch movies, and even read books on their portable devices.

Computers have become an indispensable part of modern life. Working for long hours in front of the computer is no longer confined to the office. Computers are now extensively used in schools and at home as well. With increased popularity of notebooks, tablets, smartphones and e-book readers, use of digital devices is no longer only limited to desktops. People use computerized devices for work, web surfing, social networking and playing

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video games. In this techno-age, children as young as two years are given touch screen devices like iPads to play and learn with. Professional video game players in South Korea are known to spend as long as 18 hours per day in front of their screens at a stretch.

These accoutrements of modern living may give rise to a number of visual and ophthalmic problems. The ocular discomfort appears to increase with the amount of computer usage. Up to 90% of computer users may experience visual symptoms like blurred vision, eyestrain, headaches, ocular discomfort, dry eye and diplopia.

The human focusing system responds well to images that have well defined edges with good contrast between the background and the letters. The characters on a computer screen are made of tiny dots called pixels. Pixels are the result of electronic beam striking the phosphor-coated rear surface of the screen. These characters have blurred edges as compared to letters on a printed page with sharply defined edges. This makes it difficult for the eye to maintain focus, thereby leading to eyestrain and fatigue (Chakrabarti 2007; Abelson & Ousler 1999, p.115). Presence of glare and reflections on the screen also worsen the symptoms (Rathore et al 2010).

Computer users who are middle-aged and older may have presbyopia, an eye condition characterised by decreased near and intermediate visual acuities, which are needed for the various working distances of computer users (Izquierdo 2010). Working for prolonged hours of time looking at the computer monitor is a risk factor that may also lead computer users to have dry eye symptoms. Further, patients with pre-existing dry eyes may have exacerbated symptoms when using a computer (Izquierdo 2010).

The specific objectives of this article is to: Determine if the number of respondents having eyes related problem from prolong use of computer/smartphone was significantly different from the number of respondents who does not have eyes related problem from prolong use of computer/smartphone and identify the variation in eyes related problems from prolong use of computer/smartphone as measured by a survey instrument.

The article is arranged as follows: Section 2, contains the prediction of an increase in eye problems in two local governments' areas of Ogun state in the nearest future, as a result of spending much time on computer/smartphone. The research methodology and the hypothesis of the study were carried out in section 3, section 4 deal with the results and suggestions and the concluding remark is in section 5.

## THE PREDICTION OF AN INCREASE IN EYE PROBLEMS, IN IJEBU-ODE AND IJEBU NORTH LOCAL GOVERNMENT AREA OF OGUN STATE.

Facts and figures of problems resulted from long usage of computer or handset in Nigeria have not been documented. About sixty million people suffer from CVS (Computer Vision Syndrome) globally and a million new cases occur every year (Sen & Richardson 2007, p.45). In other parts of the world, the 2001 United States Census report states that more than 143 million Americans spend time on a computer every day, and that 54 million of them are children. According to the National Centre for Education Statistics, 95% of schools and 62% of all classrooms in the USA have had computers since 1999 (Izquierdo 2010).

According to Dr. David Allamby, a leading laser eye surgeon: there has been a 35% increase in the number of people with advancing myopia since the launch of smartphones in 1997. He also warned that the problem could increase by 50 per cent in the next ten years.

"The information age has taken a toll on our eyesight" says Jeffrey Anshel, an optometrist in Carlsbad, California, and president of Corporate Vision Consulting, which advises employers on vision issues. According to the American Optometric Association (AOA), 90% of employees who use computers at least three hours a day experience vision problems.

More than 70% of computer users in the United States are having eye problem one way or the other (Torrey 2003). Recent studies also show that 70% of computer users worldwide report having vision problems (Divjak & Bischof 2009). Some studies suggest that one out of six patients requiring eye examination have a computer-related eye problem (Sheedy 1992; Sheedy & Shaw-McMinn 2003).

Computer work is particularly stressful for contact lens wearers. Long non-blinking phases may cause the surfaces of most lenses to dry out which can lead to discomfort and reduction in visual clarity (Anshel 2006).

According to Dr. Blakeney, an optometric adviser to the college of optometrists, USA, computers will not permanently damage the eyes, however, they can cause strain or exacerbate existing eye conditions.

The level of visual discomfort that occurs with computer users appears to increase with the amount of computer use. Based on current evidence, it is unlikely that use of computers causes permanent damage to the eyes. However, some users of computer may experience continued reduced visual abilities such as blurred distance vision even after work (Chiemekwe et al 2007).

Reading from digital displays – especially from computer screens - creates severe usability problems that the readers must cope with (Bus & Neuman, 2009; Quinn & Stark-Adam, 2007; Van Den Broek, Kendeou, & White, 2009). Among these problems are the large reading-distance from the display, the long lines, the problem in shifting the eye-gaze from line to line (Evans, Charland, & Saint-Aubin, 2009) and the blurring of text on computer monitors.

In Nigeria low back pain, neck pain, headache, shoulder pain and eyestrain, are the most prevalent Occupational Overuse Syndrome (OOS) symptoms/pains (Allen E. Akhowa, 2007). He recommended that there is need for computer workplaces to improve on their designs towards finding a lasting solution to the hazardous problem.

CVS is marked by eyestrain, tired and burning eyes, headaches, blurred vision, neck and back

pain and muscle spasms. Computer work has not yet proven to cause permanent damage to eyes, but temporary discomfort that may occur can reduce productivity. It can cause lost work time and reduce job satisfaction. The performance on a specific task can be significantly decreased due to CVS, as much as 40 percent. This includes a reduction in work accuracy and a decrease in task volume.

Employees using Visual Display Unit (VDU) for a larger part of their working days frequently report their eyesight is quite badly affected at work and for some time afterwards. Daum (2002) strongly suggests that improving the visual status of workers using computers results in greater productivity in the workplace, as well as improved visual comfort. The visual symptoms can largely be resolved with proper management of the environment and by providing proper visual care for the employees (Sheddy 1992). The symptoms of CVS-headaches and eyestrain- can force employees to shut down. Even the symptoms are negligible; they can affect performance and productivity in a big way. Companies can choose to understand and address the hazards of computer use. The gain can be extremely significant, both for employer and the employees (Torrey 2004).

## RESEARCH METHODOLOGY AND HYPOTHESIS TEST

Social survey design was used for this research in order to obtain relevant information from respondents on the incidents of eye problems among computer users in Ijebu North Local Government of Ogun State in Nigeria. Questionnaire was the instrument used for data collection in this study. The questionnaire was designed and self-administered to different categories of computer/smartphone users in various works of life in Nigeria, ranging

from banking sector, civil service, educational sector, health sector to private sector. The distribution was ensured to cut across different field of professionalism.

The data obtained from the questionnaires administered were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 17.0 for windows. The analysis was done in three facets: descriptive analysis through the frequencies procedure which produced

frequency tables that displayed both the numbers and percentages of cases for each observed value of variables.

Hypothesis were tested using Pearson Correlation to establish whether or not there is relationship between incidence of eye problems and duration of computer/smartphone usage (years of computer usage and hours of computer usage at a stretch).

## RESEARCH HYPOTHESIS

### Hypothesis 1

H0: There is no significant relationship between the duration of computer usage and the incidence of eye related problem.

HA: There is significant relationship between the duration of computer usage and the incidence of eye related problem.

Criteria for Rejection and Acceptance of Hypothesis  $\alpha = 0.01$

If  $p \leq 0.01$  the null hypothesis is rejected

If  $p > 0.01$  null hypothesis is accepted

Where  $\alpha$  is the level of significant and p-value is the probability that the observed correlation coefficient  $r$  was seen by chance.

## RESULTS AND DISCUSSION

This section discusses the results from the data analysed.

**Table 1: Distribution of Respondents by Age**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	16-25yrs	125	24.1	26.5	26.5
	26-25yrs	96	18.5	20.4	46.9
	36-45yrs	68	13.1	14.4	61.4
	46-55yrs	81	15.6	17.2	78.6
	56-65yrs	101	19.5	21.4	100.0
	Total	471	90.8	100.0	
Missing	System	48	9.2		
Total		519	100.0		

## AGE OF RESPONDENTS

Table 1: presents the distribution of the study respondents by their age. It shows that the majority (74.5%) were aged between 26 and 25 years.

**Table 2: Distribution of Respondents by Gender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	243	46.8	51.6	51.6
	Female	228	43.9	48.4	100.0
	Total	471	90.8	100.0	
Missing	System	48	9.2		
Total		519	100.0		

## GENDER OF RESPONDENTS

Table 2 above: presents the gender distribution of the respondents. 46.8% of the respondents were males while 43.9% were females.

**Table 3: Hours of Computer /Smartphone Usage**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2 hours	84	16.2	16.2	16.2
	3-5 hours	241	46.5	46.5	62.7
	6-8 hours	158	30.4	30.4	93.1
	> 8 hours	36	6.9	6.9	100.0
	Total	519	100.0	100.0	

**Table 4: Years of Computer /Smartphone Usage**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2 years	46	9.0	9.0	9.0
	3- 5 years	146	28.1	28.1	37.1
	6-8 years	93	17.9	17.9	55.0
	9-10 years	114	22.0	22.0	77.0
	> 10 years	119	23.0	23.0	100.0
	Total	519	100.0	100.0	

## DISTRIBUTION OF HOURS AND YEARS OF COMPUTER /SMARTPHONE USAGE

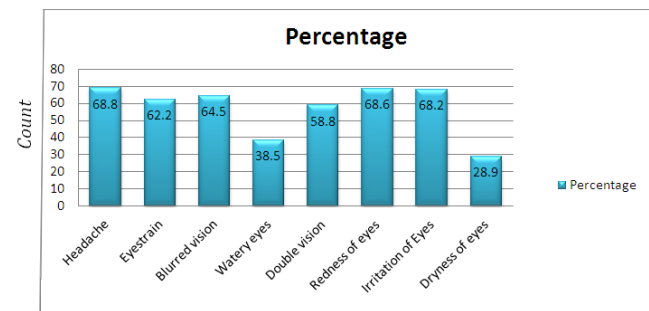
Table 3 and 4: presents the distributions of hours and years of computer usage. It shows that respondents who used computer /smartphone for 3-5 hours and 3-5 years have the highest percentage of 46.5% and 28.1%

respectively. The table also revealed that majority of respondents 83.8% used computer/smartphone more than 3 hours in a day and that 90% of the respondents have been using computer/smartphone for more than 3 years.

**Research question 1:** Which of these problems do you experience while using smartphone/computer?

**Table 5: Eye Problems**

Problems	Experienced	%	Not experienced	%
Headache	357	68.8	162	31.2
Eyestrains	323	62.2	154	29.7
Double vision	305	58.8	170	32.8
Redness of eye	356	68.6	163	31.4
Watery eyes	200	38.5	319	61.5
Dryness of the eyes	150	28.9	369	71.1
Blurred vision	335	64.5	184	35.5
Irritation	354	68.2	164	31.6



**Figure 1:** The effects of spending much time on computer / smartphone

Table 5 and the chart above: Shows that majority of the respondents' experienced one problem or the other in their eyes as a result of long use of computer / smartphone. From the table and chart, 68.8% of the respondents experienced headache, 62.2% experienced eyestrains, 58.8% experienced double vision, 68.6% experienced redness of eye, 38.5% experienced watery eyes, 28.9% experienced dryness of eyes, 64.5% experienced blurred vision and 68.2% experienced irritation. It follows therefore that headache, eyestrains, irritation, redness of eye, blurred vision and double vision are the problems majority of those who spent much time on smartphone/computer have.

**Hypothesis 1:** There is no significant difference between those experiencing eye problems as a result of prolong use of smartphone/computer and those who do not experience any problem.

**Table 6: Difference between those who experienced problem as a result of using computer for a long time and those who do not.**

Symptoms	Experi- enced?		X2	Sig
	Yes	No		
Headache Not experienced	67	95	84.9	0.00
Count Expected	111.1	50.9		
Experienced Count	256	53	133.5	0.00
Expected	211.9	97.1		
Eyestrain Not experienced	51	103	84.9	0.00
Count Expected	105.6	48.4		
Experienced Count	272	45	65.5	0.00
Expected	217.4	99.6		
Double vision Not experi- enced Count	72	98	25.5	0.00
Expected	116.6	53.4		
Experienced Count	251	50	0.24	0.36
Expected	206.4	94.6		
Redness Not experienced	73	90	0.24	0.36
Count Expected	111.8	51.2		
Experienced Count	250	58	0.24	0.36
Expected	211.2	96.8		
Watery eye Not experienced	195	124	0.24	0.36
Count Expected	218.8	100.2		
Experienced Count	128	24	0.24	0.36
Expected	104	47.8		
Dryness Not experienced	251	118	0.24	0.36
Count Expected	253	115.9		
Experienced Count	72	30	0.24	0.36
Expected	69.9	32.1		

Table 6 above, reveals that there is significant difference between those experiencing eye problems and those who do not. In all the identified problems, it was only in dryness of the eyes that there is no significant difference between those experiencing eye problems and those who do not. The chi-square value has  $p > 0.05$ .

**Hypothesis 2:** There is no significant relationship between the duration of computer usage and the incidence of eye related problem.

**Table 7: Relationship between the duration of computer usage and the incidence of eye related problem.**

Descriptive Statistics			
	Mean	Std. Deviation	N
Duration of using computer	7.50	4.005	519
Eye problem	2.13	3.048	519
Correlations			
		Duration of using computer	Eye problem
Duration of using computer	Pearson Correlation	1	.348**
	Sig. (2-tailed)		.000
	N	519	519
Eye problem	Pearson Correlation	.348**	1
	Sig. (2-tailed)	.000	
	N	519	519

\*\*Correlation is significant at the 0.01 level (2-tailed).

Table 7 above reveals that, there is a strong relationship between duration of computer usage and incidence of eye related problems. The result showed a significant correlation at 0.01 levels ( $p=0.00$ ,  $p<0.01$ ,  $n=519$ ,  $r=.348$ ) between duration of computer usage and occurrence of eye related problems. The null hypothesis is rejected and alternate hypothesis accepted (see table 7)

## CONCLUSION

The results of this article indicate that there is a link between the duration of computer usage and incidence of eye related problem. It also indicates that the longer hours spent of computer /smartphone, the higher the proximity of having headache, eye strain, double vision, redness of eyes, eyes irritation, dryness of eyes and watery eyes.

## RECOMMENDATION

Enlightenment programs should be created in developing countries to educate people on measures to prevent eyes related problems from the use of computer. Media houses should also be involved in creating awareness on prevention of eye related problems among computer / smartphone users.



## Measures to prevent eyes related problem should includes:

- Proper lighting or window treatments to reduce glare and minimize variations in light levels in computer room.
- Reducing visual stress from computer usage through rest or alternate task breaks throughout the workday or frequently looking into the distance to reduce focusing fatigue
- Adjustments to the work equipment, such as the location of the screen (s), keyboard, mouse, paperwork and chair;
- Adjustments to computer software, such as ensuring that the font, font size and screen display settings and its resolution in term of brightness to meet the visual needs of the user;
- Specific lenses to meet the unique demands of computer work, such as lenses that are focused for the distance of the computer screen, lens designs that incorporate near and intermediate focusing distances, and lens tints or coatings that may help to maximise vision and comfort;
- A programme of optometric vision therapy for computer/smartphone users

Additional research regarding the influence of radiation from computer /smartphone should be investigated to determine its effects on the computer users.

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## REFERENCES

1. Abelson, MB & Ousler III, GW (1999), *How to fight Computer Vision Syndrome*, Review of Ophthalmology, pp. 114-116, July 1999, viewed 3 February 2012 from [http://www.dryeyesummit.org/sites/default/files/ROOjul1999\\_Howtofight\\_Computer\\_Vision\\_Syndrome.pdf](http://www.dryeyesummit.org/sites/default/files/ROOjul1999_Howtofight_Computer_Vision_Syndrome.pdf).
2. Anshel, JR (2006), *CVS: Constructing a new approach to visual ergonomics*, Optometric management, September 2006, viewed 15 January 2012 from <http://www.optometricmanagement.com>.
3. Bus, A. G. & Neuman, S. B. (editors) (2009). *Multimedia literacy development*. Routledge, New York.
4. Chakrabarti, M (2007), *What is Computer Vision Syndrome?* Kerala journal of Ophthalmology, Vol. XIX, No. 3, viewed 27 December 2011 from [http://www.ksos.in/journal\\_Article\\_9\\_110.pdf](http://www.ksos.in/journal_Article_9_110.pdf).
5. Chiemeke, SC, Akhahowa, AE & Ajayi, OB (2007), 'Evaluation of vision-related problems amongst computer users: a case study of University of Benin, Nigeria', *Proceedings of the world congress on Engineering*, 2007, Vol. 1, WCE (2007), July 2-4, London, U.K.
6. Daum KM, Clore KA, Simms SS, Vesely JW, Wilczek DD, Spittle BM, Good GW (2002). Productivity associated with visual status of computer users. *Optometry*, 75(1): 1-15.
7. Divjak, M & Bischof, H (2009), 'Eye blink-based fatigue detection for prevention of computer vision syndrome', *MVA 2009, IAPR conference on machine vision applications*, May 20-22 2009, Yokohama, Japan.
8. Evans, M. A., Charland, A. R. & Saint-Aubin, J. (2009). A new look at an old format: Eye-tracking studies of shared book reading and implications for eBook and eBook research. In Bus, G. And Neuman, S. (eds.) *Multimedia and Literacy Development*. Routledge: New York. pp. 89-111 <http://www.guidedogs.org.au/importance-of-eye-health>
9. Izquierdo, NJ (2010), *Computer Vision Syndrome*, viewed 21 December 2011 from <http://www.emedicine.medscape.com/article/1229>.
10. Izquierdo, JC, Garcia, M, Buxo, C & Izquierdo, N (2004), 'Factors leading to the computer vision syndrome: an issue at the contemporary workplace', *Bol. Assoc. Med.*, P.R, Vol.96, no.2, pp.103-110.
11. Torrey J (2004). Computer eyeglasses for employees - good business. <http://www.allaboutvision.com/cvs/sidworker-productivity.htm> (As retrieved on March 23, 2006).
12. Sheddy J E (1992). Vision Problems at Video Display Terminals: A survey of Optometrists. *J Am Optom Assoc*, 63: 687-692.
13. Sheedy, JE & Shaw-McMinn, PG (2003), *Diagnosing and treating computer-related vision problems*, Butterworth Book publishers, Boston.
14. Rathore, KS, Bagdi, P & Rathore, S (2010), *Computer Vision Syndrome: An update*, viewed 17 November 2011 from <http://www.articlesbase.com>.
15. Sen, A & Richardson, S (2007), 'A study of computer-related upper limb discomfort and computer vision syndrome', *J. Human Ergol.*, 36, pp. 45-50.
16. Olabiyisi Olatunde, Akingboye Yusuff, Abayomi -Alli Adebayo, Izilien Fred and Adeleke
17. Iyiola (2013). "An Investigation of the Incidences of Repetitive Strain Injury among computer Users in Nigeria", *International Journal of Computer Science Issues*, Vol. 10, Issue 4, p254.
18. Quinn, S. & Stark-Adam, P (2007). What are the differences in reading news in print and online? *The Poynteronline*, April, 2007.
19. Van Den Broek, P, Kendeou, P & White, M. J. (2009). Cognitive processes during reading: Implications for the use of multimedia to foster reading comprehension. In Bus, G. and Neuman, S. *Multimedia and Literacy Development*. Routledge: New York. pp 57-74.