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Knowledge of Computer Vision Syndrome among computer users in the workplace in Abuja, Nigeria

by

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submitted in accordance with the requirements for

the degree of

Master of Public Health

at the

University of South Africa

Supervisor: Prof Yohana Mashalla

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Dedication

This research work is dedicated to God Almighty who is success personified, in whom are hid all the treasures of wisdom and knowledge, for guiding me and preserving my life throughout the period of my study.

Student number: 44923902

DECLARATION

I declare that **Knowledge of Computer Vision Syndrome among computer users in the workplace in Abuja, Nigeria** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

13 June, 2012

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AKINBINU TOPE RAYMOND DATE

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KNOWLEDGE OF COMPUTER VISION SYNDROME AMONG COMPUTER USERS IN THE WORKPLACE IN ABUJA, NIGERIA.

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ABSTRACT

Quantitative, descriptive, cross-sectional study was conducted to determine the level of knowledge and extent of Computer Vision Syndrome (CVS) among computer users in the Securities and Exchange Commission (SEC), Abuja, Nigeria. Structured questionnaires were administered to 100 computer users aged between 18 and 40 years. The study findings revealed that 40 respondents (40%) were aware of CVS and 27 (27%) of them had knowledge of the disorder. 74 (74%) of the respondents experienced at least one symptom of CVS. Headache and eyestrain were the most common symptom of CVS among the population. The study also revealed that the internet (accounting for 50%) was the major source of information about CVS awareness. The study concluded that 27% knowledge level is too low and much emphasis is needed to educate the people at risk of CVS.

Key terms:

Computer Vision Syndrome; knowledge; awareness; workplace; computer users; glare; headache; eyestrain; presbyopia; ergonomics.

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CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

When the first IBM personal computer was manufactured in 1981, the company did not envisage the possible potential health hazards the users may consequently experience (Mvungi, Mcharo, Mmbuji, Mgonja & Kitua 2009, p.69). Today, a condition known as Computer Vision Syndrome (CVS) is common to millions of computer users around the world. A syndrome is defined as a group of signs and/ or symptoms which occur together to produce a pattern typical of a particular disease (*Pocket Medical Dictionary* 1987, p.256). CVS is characterised by a complex group of eye and vision-related problems that result from prolonged computer use (Bali, Navin & Thakur 2007, p.290). Nearly 60 million people suffer from CVS globally and a million new cases occur each year (Sen & Richardson 2007, p.45). Symptoms of CVS occur in approximately 75-90% of computer users (Anshel 2007, p.37). Studies conducted in Nigeria have shown that CVS may result in lowered productivity, increased error rate, reduced job satisfaction, impaired visual abilities and blurred distant vision (Chiemeke, Akhahowa & Ajayi 2007, p.1).

Mvungi et al (2009, p.73) also reported that most problems associated with the use of the computer can be largely attributed to improper use of computers and most importantly, insufficient knowledge about safe computer usage techniques and practices. Most CVS-related problems can be avoided by appropriate preventive measures, but the majority of computer users are not aware of CVS-related symptoms while some choose to ignore them (Divjak & Bischof 2009, p.350).

1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM

1.2.1 The source of the research problem

The research problem is derived from clinical practice. The case history records from a private eye clinic in Abuja, Nigeria show that one of the most common complaints by patients is eyestrain during computer use. The records also show that a large proportion (about 90%) of people with these complaints work with computer for prolonged hours (at least 4 hours daily) and were diagnosed to suffer from Computer Vision Syndrome. The research questions therefore include:

(i) How much do the computer users know about this disorder?
(ii) What is the extent of CVS among computer users in the selected workplace?
(iii) Will a good knowledge of CVS and its preventive measures reduce the number of patients seeking relief from computer-related stress?

Extensive literature search did not reveal any study that assessed the knowledge of computer users about CVS in Abuja, Nigeria, hence the rationale for this study. To successfully address this public health issue, there is a need to assess the knowledge of the people at risk, so that adequate measures can be developed.

1.2.2 Background to the research problem

There is sufficient evidence in the literature that a large number of computer users suffer from CVS (Ihemedu & Omolase 2010, p.49; Sen & Richardson 2007; Torrey 2003). In the USA more than 143 million Americans work on a computer each day with an estimated 90% suffering from computer eyestrain. Additionally, almost 90% of children in the USA work on a computer at home or in school every day (LFV [n.d.]; VCA 2007). Computer use in Nigeria has attained a significant patronage especially with the upsurge of information and communication technology systems as most organisations barely manage their businesses without it. However, poor publicity and

utilisation of preventive measures have hampered the effectiveness of computers due to the overwhelming symptoms experienced by some users (Ihemedu & Omolase 2010, p.51). Awareness of visual problems from computer use has also been minimally stressed in most industrially developing countries like Nigeria (Chiemeke et al 2007).

CVS is caused by the eye and brain reacting differently to characters on the screen than they do printed characters. Characters on a computer screen lack the contrast or well defined edges that printed characters have. Because the colour intensity of digital characters diminishes around the edges, it is difficult for eyes to remain focused. Having to continuously refocusing on digital text fatigues the eyes and can lead to burning or tired eyes. CVS is marked by symptoms such as eyestrain, burning sensation, blurred vision, gritty sensation, headache and neck pain. Some computer users may experience continued reduced visual abilities such as blurred distant vision even after work (Chiemeke et al 2007). These symptoms may be aggravated by poor lighting, glare, improper work station set up and uncorrected refractive errors (Ihemedu & Omolase 2010, p.49; Torrey 2003). Though symptoms such as burning sensation and gritty sensation have been reported by people exposed to dusty environments, it is however not clear whether these symptoms occur to a greater extent in computer users than workers in other highly visually demanding occupations (Chiemeke et al 2007).

A study conducted by Chiemeke et al (2007) in Benin, Nigeria tested the respondents' knowledge on computer ergonomics and preventive measures of CVS. Results from the study showed that only a small percentage (32%) of the respondents was aware of preventive measures for visual symptoms, while a minority (1%) had former ergonomics guidelines/ policies at their workplace. Similar studies in south-west Nigeria (Ihemedu & Omolase 2010) show that a large number of respondents were aware of various types of computer shields but only a few utilised the shields. Studies from other parts of Africa show that most problems associated with computer use are caused by insufficient knowledge about safe computer usage (Mvungi et al 2009, p.73).

CVS remains an underestimated and poorly understood issue at the workplace (Izquierdo, Garcia, Buxo & Izquierdo 2004, p.103). About 70% of computer workers worldwide report having vision problems and there is an alarming increases in the number of people affected (Blehm, Vishnu, Khattak, Mitra & Yee 2005). Not much is known about CVS among children in Africa who are also increasingly becoming regular computer users. Some researchers (Divjak & Bischof 2009, p.350; Mvungi et al 2009, p.69) explain that CVS can be avoided by suitable preventive actions but majority of the sufferers are ignorant of this. In this light, some eye care professionals have referred to CVS as the number one occupational epidemic of the 21st century (Graney [n.d.]; Torrey 2003).

1.3 RESEARCH PROBLEM

Mounting evidence shows that CVS can significantly harm workplace productivity, as it places an unusual strain on the human physical well-being thereby reducing the quality of life (Torrey 2003). Studies by Izquierdo et al (2004), Chiemeke et al (2007), Divjak & Bischof (2009) have shown a direct correlation between proper vision correction and the time required for a computer worker to complete a task; and that productivity is reduced even more among computer users who were unaware that they had vision problems. CVS is therefore a significant public health problem as it affects computer users from all walks of life (Torrey 2003).

Current management of CVS in Nigeria makes little emphasis on educating computer users. It is therefore imperative to assess the knowledge about CVS and level of awareness of its preventive measures among computer users in order to develop strategic interventions to reduce the effects of CVS among computer users and identify areas in which educators will concentrate their efforts.

1.4 AIM OF THE STUDY

1.4.1 Research purpose

The main purpose of the study is to assess the knowledge of computer users about CVS in a workplace in Abuja, Nigeria. The goal is to attempt to reduce the occurrence of CVS among computer users in Nigeria.

1.4.2 Research objectives

(i) To explore the level of knowledge and awareness about CVS among computer users.
(ii) To determine the extent of CVS by assessing the visual symptoms among the study population.

1.5 SIGNIFICANCE OF THE STUDY

The study will contribute as evidence-based information to the little literature available on CVS in Nigeria. Information about CVS knowledge will help employers and other stakeholders to develop strategies that will be used to reduce the effects of CVS in the selected population. The strategies, if eventually applied would help reduce the loss of productivity in the workplace and the associated visual discomfort.

Training institutions and health educators will find the information useful for developing and revising training curricula that will enhance knowledge and level of awareness of CVS among computer users. This will contribute to the reduction in the occurrence and effects of CVS in Nigeria.

1.6 DEFINITIONS OF TERMS

1.6.1 Knowledge

Conceptual definition: The fact or condition of knowing something with familiarity gained through experience or association (Merriam-Webster 2011).
Operational definition: Knowledge in the study will be defined as having some understanding of CVS.

1.6.2 Awareness

Conceptual definition: Knowing that something exists (*Oxford advanced learner's dictionary* 2006, p.88).
Operational definition: Awareness in this study will be defined as having heard of CVS.

1.6.3 Computer Vision Syndrome

Conceptual definition: A complex group of eye and vision-related problems that result from prolonged computer use (Bali et al 2007, p.290).
Operational definition: Eyestrain, blurred vision and headache that occur as a result of computer use (Chiemeke et al 2007).

1.6.4 Workplace

Conceptual definition: Office, factory or place where people work (*Oxford advanced learner's dictionary* 2006, p.1698).
Operational definition: In this study, workplace refers to the Securities and Exchange Commission (SEC) headquarters in Abuja, Nigeria.

1.7 RESEARCH DESIGN AND METHOD

Quantitative research is a formal, objective and systematic process in which numerical data is used to obtain information about the world, usually under conditions of considerable control (Burns & Grove 2005, pp.17-18). A quantitative, descriptive cross-sectional study was conducted to assess the level of knowledge about CVS and its preventive measures among the staff members of the SEC, Abuja.

The study population included both male and female adults (18-40 years) working at the SEC office. Simple random sampling was used to select the sample for the study. The data was collected with a semi-structured questionnaire, with the help of two research assistants. Data was analysed with the help of a statistician using descriptive and inferential statistics. Descriptive statistics was used to organise, describe and synthesise the data generated in order to facilitate insight about knowledge on CVS. Inferential statistics was used to test the relationship between knowledge of CVS and demographic factors such as age, gender and level of education. Univariate chi square tests were used for data analysis. A two-tailed ‘p’ value of less than 0.05 was considered statistically significant. Details of the research design and methodology are discussed in chapter 3.

1.8 LIMITATIONS OF THE STUDY

Depth or accuracy of the knowledge of CVS may not be ascertained due to the instrument used (structured questionnaire). Therefore, respondents who indicate familiarity with CVS may only have a shallow knowledge of the disorder.
Generalisability of the findings may be limited, since only one institution will be included in the study.

1.9 STRUCTURE OF THE DISSERTATION

This dissertation consists of five chapters as outlined in Table 1.1.

Table 1.1 Structure of the dissertation

Chapter	Title	Content description
1	Orientation to the study	Overview of the research problem, purpose, significance of the study, definitions of terms, research design, methods and structure of the dissertation.
2	Literature review	An in depth review of the literature related to the topic under investigation to give the researcher an overview on what is published or discussed in the empirical literature about the phenomenon
3	Research design and method	The overall plan and research procedures such as population and sampling technique, choice of sample size, data collection and data analysis method, ensuring validity and reliability and ethical considerations for addressing the research questions and objectives
4	Data presentation, analysis and interpretations	Presentation, analysis and interpretation of the research findings
5	Conclusions and recommendations	Discussions, conclusions and recommendations based on the research findings

1.10 CONCLUSION

In this chapter, a brief outline of the steps that were taken to conduct this study is presented. An introduction to the background to the research problem in relation to the knowledge and prevalence of CVS has been described. The research purpose and objectives, definition of the key terms and the significance of the study have been discussed.

The chapter concludes with a brief introduction of the research design and methods used in the study, the limitations and structure of the dissertation.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Stommel & Wills (2004, p.339) define a literature review as a written summary and evaluation of the information gleaned from literature searches. It is an organised written presentation of what has been published on a topic by scholars. The purpose of the review is to convey to the reader what is currently known regarding the topic of interest (Burns & Grove 2005, p.93). Mouton (2001, p.87) states that a review of existing literature is important to:

- ensure that previous studies are not duplicated
- discover the most recent and authoritative theory on the subject
- find out the most widely accepted empirical findings in the field of study
- identify available instrumentation that has proven validity and reliability

The literature review in this study was conducted on the epidemiology, clinical features, diagnosis, treatment and knowledge of Computer Vision Syndrome.

2.2 THE COMPUTER

This section describes the different classes of computers, how they operate and the relationship between computer usage and CVS. Understanding of what a computer is and how it operates is important for understanding how CVS comes about.

A computer is an electronic device used in various organisations for storing, processing and managing information in accordance with a set of information (Ihemedu & Omolase 2010, p.49). *Oxford advanced learner's dictionary* (2006, p.298) defines a computer as

a machine that can store, organise, find information, do calculations and control other machines.

2.2.1 Classes of computers

Microcomputers

Microcomputers (also known as personal computers) are the most common type of computers used by people today. Mostly used in the workplace, at school or homes. A microcomputer is a small computer that contains a microprocessor designed for one person to use at work or at home (*Oxford advanced learner's dictionary* 2006, p.927). They include desktop computers, incar computers (built into a car for entertainment and navigation), game consoles (computer games), mobile devices (laptops, notebooks and palmtop computers), tablet computers, smartphones, smartbooks, programmable calculators and personal digital assistants (Personal computer 2006).

Minicomputers

A minicomputer is a class of multi-user computers that lies in the middle range of the computing spectrum, that is in between the smallest multi-user systems and the largest single-user systems (*Oxford advanced learner's dictionary* 2006, p.935).

Mainframe Computers

A mainframe computer is a large powerful machine, usually at the centre of a network and shared by many users (*Oxford advanced learner's dictionary* 2006, p.890). They are capable of handling and processing very large amounts of data quickly. They are used in large institutions such as governments, banks and large corporations. It is measured in million instructions per second (MIPS) and responds up to hundreds of million users at one time.

Supercomputer

A supercomputer is a powerful machine with a large amount of memory and a very fast central processing unit (*Oxford advanced learner's dictionary* 2006, p.1484). In terms of computational capability, memory size and speed, supercomputers are the most powerful. They perform tasks involving intense numerical calculations such as weather forecasting, fluid dynamics, nuclear simulations and complex scientific computations. Their processing speeds are measured in floating point operations per second (FLOPS).

2.2.2 Basic Computer Components

2.2.2.1 The Central Processing Unit

The Central Processing Unit (CPU) is the part of a computer that controls all the other parts of the system (*Oxford advanced learner's dictionary* 2006, p.227). The CPU is the brain of a computer that is used to process everything from basic to complex functions.

2.2.2.2 The Visual Display Unit

The Visual Display Unit (VDU), otherwise called the monitor, is the part of a computer (appears like a television) that displays information the computer is processing (*Oxford advanced learner's dictionary* 2006, p.949). Characters on the liquid crystal display (LCD) monitors have sharper edges than those on the visual display terminal (VDT) monitors and are more comfortable to view (Chakrabarti 2007).

2.2.2.3 The Keyboard

The keyboard is a set of keys that allows a computer user to enter text commands into the computer system (*Oxford advanced learner's dictionary* 2006, p.811).

2.2.2.4 The Mouse

The mouse is a small device moved by hand across a surface to control the movement of the cursor on a computer screen (*Oxford advanced learner's dictionary* 2006, p.959).

2.3 THE HUMAN EYE

The human eye is a peripheral organ of vision in which an optical image of the external world is produced and transformed into nerve impulses. It is a spheroidal body approximately 24mm in diameter. It consists of the cornea (the transparent anterior portion of the eye), the conjunctiva (a thin, transparent membrane lining the posterior surface of the eyelids and the eyeball), the sclera (an external coat of fibrous tissue), the iris (a middle vascular coat), the choroid (a highly vascular structure that lies between the retina and the sclera), the retina (the thin transparent membrane and the light receptive, innermost nervous structure of the eye).

Within the eye are the aqueous humour (located between the cornea and the crystalline lens), the vitreous humour (located between the crystalline lens and the retina) and the crystalline lens (a biconvex structure, located between the iris and the vitreous body and suspended by the zonular fibres). The movement of the human eye is directed by six extraocular muscles (Millodot 1997, p.85).

The lacrimal apparatus is the system involved in the production and conduction of tears. It consists of the lacrimal gland, lacrimal sac, the eyelid margins and the two puncta. Each punctum is a small round or oval aperture situated on a slight elevation at the inner end of the upper and lower lid margin (Millodot 1997, p.134). The puncta lead to the naso-lacrimal ductules which form the excretory elements of the system, depositing these secretions into the nose. The tear fluid is secreted over the surface of the eye by the action of blinking (Vaughan, Asbury & Riordan-Eva 1999, p. 84).

2.4 COMPUTER VISION SYNDROME

Computer Vision Syndrome (CVS) is the complex of eye and vision problems related to near work, which are experienced during or related to computer use (Anshel 2006). Izquierdo (2010) defines CVS as visual and ophthalmic symptoms that occur among computer users. Chakrabarti (2007) defines CVS as the excessive viewing of visual display terminal (VDT) screens without proper attention to practical visual hygiene.

CVS is characterised by visual symptoms which result from interaction with a computer display or its environment. In most cases symptoms occur because the visual demands of the task exceed the visual abilities of the individual to comfortably perform the task (Anshel 2006).

2.4.1 Epidemiology of Computer Vision Syndrome

Facts and figures of CVS in Nigeria have not been documented. About sixty million people suffer from CVS 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). More than 70% of computer users in the United States are affected by CVS (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). According to Thompson (1998), the prevalence of ocular symptoms in a computer user, as part of CVS ranges from 25-93%.

Anshel (2006) reports that 75 to 90% of those who work on computers experience at least some of the symptoms of CVS. Nearly 80% of those who work on a computer for

more than two hours a day suffer from the symptoms of CVS, while less than one in four regular computer users suffer from carpal tunnel syndrome, three times as many experience CVS. Anshel (2006) further reports that in the United States, 54 million children (90% of school-age children) use a computer at home or at school. Besides, the rise in environmental myopia in children, too many hours spent on the computer by children places them at increased risk for repetitive stress, injuries and obesity. Children's visual systems are immature, therefore long periods in front of monitors may retard their visual-spatial awareness.

2.4.2 Co morbidities

Hales, Sauter, Peterson, Fine, Putz-Anderson & Schleifer (1994) report that approximately 22% of computer users have musculoskeletal problems, such as neck problems, back problems, shoulder problems and/ or carpal tunnel syndrome. In a similar study carried out in Nigeria, Adedoyin, Idowu, Adagunodo, Owoyomi & Idowu (2005) reported that low back pain and neck pain were the commonest pain complaints with prevalence of 74% and 73% respectively. 67% of their respondents complained of wrist pain, 65% finger pain, 63% shoulder pain and 61% complained of general body pain. The knee and foot pain were the least reported complaints with 26% and 25% respectively. Diseases that widen the interpalpebral fissures or lead to lid retraction, such as thyroid disease may lead to increased tear evaporation, thereby worsening dry eye symptoms (Izquierdo 2010).

2.4.3 Causes/ Aetiology

CVS is caused by decreased blinking reflex while working long hours focusing on computer screens. Normal blink rate is about 16-18 times per minute. Studies show that blink rate decreases to as low as 6-8 blinks per minute (about 1/3rd the normal rate) which leads to dry eyes (Anshel 2006; Rathore et al 2010). Also the near focusing effort required for such long hours puts strain on the ciliary muscle of the eye. This introduces

symptoms of asthenopia leading to a feeling of tiredness in the eyes after long hours of work (Rathore et al 2010).

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).

2.4.3.1 Environmental causes

Large angle of gaze, short viewing distance, low humidity and excess room illumination may exacerbate symptoms of CVS. Computer users open their interpalpebral fissures to look at their monitors, as opposed to others who look downwards at their reading materials. Therefore computer users may have more eye surface exposure to environmental factors, which may lead to increased tear evaporation (Izquierdo 2010). Symptoms associated with CVS are diminished when computer users gaze downwards at angles of 14 degrees or more (Izquierdo et al 2004). An upward gaze exposes 40% more of the cornea, which dries out the tear film and compounds the effects of the already dry environment in most offices (Anshel 2006). Results from Chiemeke, Akhahowa & Ajayi (2007) also shows that visual complaints were more pronounced with people employing a viewing distance of less than 10 inches from the computer.

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). Many patients with CVS also complain of light sensitivity which is worsened by high wattage fluorescent or flickering lights at the workplace (Izquierdo 2010).

2.4.3.2 Personal causes

Uncorrected refractive errors may contribute to CVS due to fatigue with visual tasks. 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).

2.4.4 Age and Gender

Previous studies (Craig & Tomlinson 1998; Maissa & Guillon 2010) have shown that female patients as compared to male patients tend to have a reduction in the tear film's aqueous layer with increasing age, thus may be more susceptible to CVS as they grow older (Izquierdo 2010). Dry eye is more prevalent in older patients and more marked in women than men. The increase in dry eye with aging is traditionally thought to be associated with a decrease in tear production enhanced by hormonal changes. Clinical evidence of an abnormal lipid production system in older patients, particularly women is established. Maissa & Guillon (2010) in their study concluded that the rate of evaporation of tears in older women was 34-80% higher than that of older men, and 36-69% higher than younger women.

2.4.5 Clinical Presentation of Computer Vision Syndrome

Symptoms

The most common symptoms reported in a national survey by optometrists were eyestrain, headaches, blurred vision, neck or shoulder pains (Chiemeke et al 2007). Rathore, Bagdi & Rathore (2011) also stated eyestrain, headaches, blurred vision, dry eyes, neck and shoulder pains as some of the symptoms of CVS. Patients with CVS

may also complain of eye burning sensation, redness, stinging sensation, tearing and photophobia (Izquierdo 2010). 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 (Chiemeke et al 2007).

In terms of severity, studies by Chiemeke et al (2007) show that out of 103 returned questionnaires, 42.7% experienced eyestrain, 45.7% blurred distance vision, and 28.2% experienced headache. In a cross sectional study of 136 computer users, Sen & Richardson (2007, p.48) report that 55% had burning sensation, 61% reported some headache, about less than half (46%) complained of eye redness. The majority (87%) complained of some problems of eye fatigue. After analysis, it was found that eye fatigue was the symptom with the highest score (4.5), followed by burning sensation (3.3), headache (3.3), focusing problem (2.7), redness (2.7) and double vision (2.1). Similarly, in a study of CVS in Indian Ophthalmologists, Bali, Navin & Thakur (2007) reported the major symptoms as eyestrain (97.8%), headache (82.1%), tiredness/ burning sensation (79.1%), watering (66.4%), redness (61.2%), shoulder pain (44.0%) and neck pain (35.8%).

2.4.6 Diagnosis of Computer Vision Syndrome

CVS is a diagnosis of exclusion, hence an acceptable diagnostic and grading system needs to be established and the tendency to label any vague collection of symptoms as CVS needs to be discouraged (Bali et al 2007; Chakrabarti 2007). Since the symptoms of CVS can occur in people who do not use computers, the diagnosis of CVS is made in conjunction with the symptoms the computer-using patient reports (Anshel 2006).

History

The patient history should be obtained, including age, chief complaint and onset of symptoms (Izquierdo 2010). A questionnaire should be given to collect information about the history of computer use, their work habits, window proximity, ceiling and desk illumination, type and position of their computer equipment (Anshel 2007).

Previous eyeglasses and eye drops should be evaluated. Review of systems may include issues such as xerostomia, thyroid disease, menopause, arthritis, carpal tunnel syndrome, Parkinson's disease and systemic medication use that may exacerbate dry eye symptoms (examples are anticholinergics, antihistamines, antidepressants and diuretics) (Izquierdo 2010).

Physical Examination

Patients with CVS should undergo a comprehensive ophthalmic evaluation that includes the following:

- Best corrected visual acuity for near, intermediate and distance vision.
- A Schirmer test to evaluate for dry eye.
- A slit lamp examination to evaluate tear meniscus and corneal staining.
- Manifest refraction at near, intermediate and distance for refractive errors.
- Measurement of intraocular pressure.
- A fundus examination to evaluate the optic nerve, vessels, macula and peripheral retina (Izquierdo 2010, Rathore et al 2010).

2.4.7 Management/ Treatment of Computer Vision Syndrome

- CVS can be alleviated by obtaining regular professional eye care (Anshel 2006; Rathore et al 2010).

- Education of patients about good preventive vision care habits and proper computer use (Anshel 2007).
- Making changes in workplace ergonomics.
- Dry eye is a major symptom that is targeted in the therapy of CVS. Use of over-the-counter artificial tear solutions can reduce the effects of dry eyes in CVS (Bali et al 2007; Rathore et al 2010).
- Prescription of special lens designs, powers, tints or lens coatings which may help maximise visual abilities and comfort (Rathore et al 2010).

2.5 KNOWLEDGE OF COMPUTER VISION SYNDROME

Extensive literature search did not reveal any study in Nigeria that assessed the knowledge of CVS amongst computer users. Most of the studies conducted are on CVS symptoms, prevention and associated factors. A closely related study in India (Bali et al 2007) did not just assess the knowledge of computer users about CVS, but the knowledge, attitude and practices in Ophthalmologists. All 134 respondents claimed that they knew about CVS as a definite clinical entity. It was concluded that Ophthalmologists were aware of CVS, but there was confusion regarding the diagnosis and treatment. The computer-using Ophthalmologists were better informed than those who were not using computers.

In a related study, on the awareness of rural secondary school students in Australia, Sawyer & Penman (2011), involved students in discussions on disorders associated with computer use, warning signs, applying the principles of ergonomics, software and practical session. This was followed by the distribution of a Questionnaire to test the students' knowledge based on the discussions just concluded. The study concluded that the educational session assisted in increasing the students' knowledge of ergonomics and computer use.

2.6 CONCLUSION

The chapter started with a brief introduction of literature review, a written summary of information gathered from previous related studies. The chapter describes the different classes of computers and the basic computer components. A brief introduction was also made on the anatomy and basic physiology of the human eye which is the focus of discussion in Computer Vision Syndrome. The epidemiology, clinical features and other factors that affect CVS were also discussed.

Since CVS is a new research area that evolved as a result of invention of the computer, literature search did not reveal any study that assesses the knowledge of CVS among computer users which further justifies the significance of the study.

CHAPTER 3

RESEARCH DESIGN AND METHOD

3.1 INTRODUCTION

Chapter three describes the research design and methodology used to assess the level of knowledge about Computer Vision Syndrome (CVS) among the staff of the Securities and Exchange Commission (SEC) in Abuja, Nigeria. Research design and methodology focus on the process, tools and procedures utilised during the research process (Mouton 2001, p.55).

3.2 RESEARCH DESIGN

Research design is an overall blueprint for implementing a particular study including specifications for enhancing the internal and external validity of the study (Burns & Grove 2005, p.211). It guides the researcher in the planning and implementing the study in a way that is most likely to achieve the intended goal, objectives and answers to the research questions (Burns & Grove 2005, p.211).

3.2.1 Research paradigm

Quantitative research is a formal, objective, systematic process to describe and test relationships and to examine cause-and-effect interactions between variables (Burns & Grove 2005, p.747).

Quantitative research was considered an appropriate approach and used in this study because the study aims to measure knowledge and test relationships among variables. The variables were operationalised (made measurable) to generate statistical (verifiable) evidence. The study complied with the characteristics of quantitative research in the following ways:

- It focused on a limited number of pre-specified variables (Knowledge, CVS).
- A structured data collection instrument was used.
- The objectivity was enhanced by using structured data collection instrument that consisted of pre-specified items and by conducting statistical analysis.
- Control was imposed by piloting and the data collection instrument was tested for validity.
- Data analysis was done numerically using statistical procedures (descriptive statistics).

A **Descriptive cross sectional** design using quantitative approach was used in this study. A descriptive research provides an accurate account of the characteristics of a particular individual, event or group in real-life situations for the purpose of discovering new meaning, describing what exists, determining the frequency with which something occurs and categorising information (Burns & Grove 2005, p.734). The typical descriptive design is important for acquiring knowledge in an area in which little research has been conducted (Burns & Grove 2005, p.233). Some descriptive studies use questionnaires to describe an identified area of concern. As an example Annells & Koch (2002) distributed questionnaire to 90 people to determine the extent of problems they experienced with constipation and strategies they used in seeking a solution.

A **Cross sectional** survey provides a snapshot of a defined population at one point in time (Geddes [n.d.]). The risk factors and outcome are measured simultaneously. Sen & Richardson (2007, p.46) in a study of computer-related upper limb discomfort and CVS, used a cross sectional study design. With the distribution of 150 questionnaires, each subject was surveyed using questions on four main areas: computer usage, awareness of ergonomic modifications, symptoms of CVS and degree of occupational overuse syndrome. The results were then analysed using descriptive non-parametric statistics. In another cross sectional design, Ihemedu & Omolase (2010, p.49) collected data through a combination of e-mail based on-line questionnaire using the survey monkey website and self-administered semi-structured hard copy questionnaire.

In descriptive cross-sectional studies, variables of interest in a sample of subjects are assayed once and the relationship between them determined (Hopkins 2000). The main characteristics of a descriptive cross sectional design include:

- Data is collected only once
- Ability to measure prevalence
- Multiple outcomes can be studied
- Hypothesis for future research can be generated
- It is quick to conduct and can study a large number of subjects and variables at little cost or effort (PHAST 2010).

In this study, data was collected from a sample of respondents (staff) of the SEC office, Abuja to acquire knowledge on CVS and the extent of CVS in the selected population group because such information had not been adequately researched.

3.3 RESEARCH METHOD

Research method refers to the systematic procedure for carrying out research. It is the logical process which is followed during the application of scientific methods and techniques when a particular phenomenon is being investigated (Polit & Beck 2008, p.765). Under research methods, emphasis is always given to make sure that the following are clearly described: The study setting, population, the sampling and sampling technique, the approach to data collection, data analysis, validity and reliability as well as ethical considerations.

3.3.1 Research study setting

Study setting is defined by Polit & Beck (2008, p.766) as the physical location and conditions in which data collection takes place in a study. The study setting is the SEC Towers, located in central area, in the federal capital city of Nigeria. The SEC is a government agency mandated to regulate and develop the Nigerian capital market in

order to achieve its wider objectives of investor protection and capital market development towards enhanced socio-economic development. Administratively, the commission is divided into departments headed by departmental directors and divisions under divisional heads.

3.3.2 Population

A population is a group of people who share common traits or attributes of interest to the researcher, from whom a sample will be drawn and to whom the findings will be generalised (Burns & Grove 2001, p.83). Burns & Grove (2005, p.746) define a population as all elements such as individuals, objects, events or substances that meet the sample criteria for inclusion in a study. A population is the entire aggregate of cases in which a researcher is interested and the elements which show the sample criteria for inclusion in the study. It is sometimes referred to as a target population. A portion of a target population to which the researcher has reasonable access to is referred to as an accessible population (Burns & Grove 2005, pp.549, 727). In this study, the population consisted of staff of the SEC in Abuja.

3.3.3 Sampling method

The source of data for the study was the staff of Securities and Exchange Commission (SEC) in Abuja, Nigeria. The SEC has about 400 workers of which about 75% of this population uses the computer on daily basis. The official working hours is from 8a.m. to 4.30 p.m., Mondays to Fridays.

A sampling method is the process of selecting a group of people, events, behaviour or their elements that are representative of the population being studied. In probability (random) sampling techniques which include simple random sampling, stratified random sampling, cluster sampling and systematic sampling, each member in the population should have a greater than zero opportunity to be selected for the sample. In non-probability sampling, such as convenience sampling, quota sampling, purposive

sampling and network sampling, not every element of the population has an opportunity for selection in the sample (Burns & Grove 2005).

Ihemedu & Omolase (2010, p.50) employed a simple random sampling method to select 124 subjects within a community with estimated computer user population of about 700 people. Kyari et al (2009) used a multistage, stratified, cluster random sampling with probability proportional to size to identify a cross sectional, nationally representative sample. The population included in the sampling frame in each state was based on the actual population of the state (more populous states had more clusters). In each cluster location, the centre of the cluster was located and a random start was made by spinning a bottle. Fifty adults aged 40 years and above were selected through this process.

Bali et al (2007) also used a simple random sampling technique to distribute questionnaires to Ophthalmologists at the annual conference of the all India Ophthalmological society. They used a 34-point questionnaire which was answered at the venue. Roughly 15% of the attending Ophthalmologists (n=300) were randomly given the questionnaire on the spot.

In this study, a probability (random) sampling was used and it was possible because the target population was clearly defined. A sample obtained using a probability sampling method is more likely to be representative of the population than a non-probability sample. All the subsets of the population which may differ from one another but contribute to the parameters of the population have a chance to be represented in the sample. There is less opportunity for systematic bias as it leaves the selection to chance thereby increasing the study validity (Burns & Grove 2005, pp.346, 347). The sampling procedure in this study was carried out as follows:

- The target and accessible population was identified.
- A sampling frame was compiled using the SEC database of staff.
- A simple random sampling was used to obtain the sample.

Simple random sampling is the most basic of the probability sampling methods. Using a simple random sampling, the names were selected at random from the sampling frame. Numbers were assigned to each name in the sampling frame. These numbers were then selected randomly to obtain the sample.

Advantages of simple random sampling

The advantages of simple random sampling technique include that it is:

- Easy to assemble the sample.
- Considered a fair way of selecting a sample from a given population since every member is given equal opportunities of being selected.
- Very representative of the population.
- Reasonable to make generalisations from the results (of a Simple Random Sampling) back to the population (Castillo 2009).

Disadvantages of simple random sampling

The disadvantages of simple random sampling technique include that it:

- Has a likelihood of high subject mortality which reduces the possibility that the final sample is representative of the target population (Burns & Grove 2005, p.348).
- Needs a complete list of all the members of the population (Castillo 2009).

3.3.4 Eligibility criteria and sample size estimation

The target population is the entire set of individuals who meet the sampling criteria and to which the study findings will be generalised. An accessible population is the portion of the target population to which the researcher has reasonable access. The sampling frame is a list of every member of the population with membership defined by the eligibility criteria. The eligibility criteria include a list of characteristics essential for membership or eligibility in the target population (Burns & Grove 2005, pp.342, 753).

Several studies can be used to explicate the above terms. Mwingira & Dowse (2006) in a study on the comprehension and acceptability of a patient information leaflet for anti-retroviral therapy in South Africa clearly specified the eligibility criteria as people who are Xhosa-speaking and are also able to read. This defined the target population. The accessible population comprised Xhosa people living in Grahamstown where the survey was conducted. In another study, Chiemeke et al (2007) described their target population as subjects between age 10 and 35 years in the University of Benin campus, who used computers during their working hours for a period of time. Exclusion criteria for the study were subjects with magnitude of hyperopia from +1 Dioptres. Accessible population includes those who meet the criteria above.

Kyari, Gudlavalleti, Sivsubramaniam, Gilbert, Abdull, Entekume, Foster & the Nigeria National Blindness and Visual impairment study group (2009) described their target population as all adults 40 years and above residing in each cluster for the preceding three months. Sampling frame was extrapolated from the 1991 census using annual growth rates, and the proportion of the population aged 40 years and above was estimated to be 17.6% (23.6 million) in 2005. The accessible population included those people who conformed to the eligibility criteria and were available for the study. In this study, the inclusion criteria were:

- Members of staff (male and female) between 18 to 40 years of age. About 70% (280) of the working population is within this age range.
- Members of staff (male and female) whose duties involve the use of a computer.

The exclusion criterion was:

- Members of staff older than 40 years of age. They are excluded because presbyopia, an ageing eye condition that affects near and intermediate vision usually starts at age 40.

The inclusion criteria define the target population. The sampling frame included a list of all members of the population as defined by the sampling criteria. The accessible population included all individuals who conform to the inclusion criteria and were

available for the study. The sample size of a study is dependent on the accuracy required and the possible variation of the population characteristics being investigated. The sample size should be large enough to:

- Allow for appropriate analysis
- Provide the required level of accuracy in estimates of proportions
- Allow validity of significant tests.

Samples should not be too large in which case, it will not conserve resources, which are usually limited (Araoye 2003, pp. 115, 116). The formula for the sample size determination by Araoye (2003, p.118) when the population is larger than 10,000 is:

$$n = \frac{z^2 (1-p)\, p}{d^2}$$

Where:

z = the standard normal deviate set at 1.96, which corresponds with the 95% confidence interval.

p = the proportion in the target population estimated to have knowledge about CVS. This was estimated to be 8.7% based on a similar study carried out on eye disorders in India (Sathyamangalam et al 2009, p.335) i.e. p = 0.09.

$1 – p = 1 – 0.09 = 0.91$

d = degree of accuracy desired usually set at 0.05

Therefore, $n = \frac{(1.96)^2 (0.09) (0.91)}{(0.05)^2}$

$n = 125.$

When the population is less than 10,000, sample size will be calculated using:

$$nf = \frac{n}{1+n/N}$$ (Araoye 2003, p.119)

Where nf = desired sample size when population is less than 10,000.

n = desired sample size when population is more than 10,000.

N= estimate of the population size (in this study= 400).

Using the formula above, nf = 125/ 1+ 0.3125

nf = 95.2.

For easier computation of percentages in this study, a sample size of one hundred (100) was used.

3.3.5 Data collection

Data collection is the process of identifying respondents and the precise, systematic gathering of information relevant to the research purpose, the specific objectives or research question of a study (Burns & Grove 2007, p.536). Data was collected using a structured questionnaire (see annexure G) with multiple-choice questions to assess their knowledge about CVS.

3.3.5.1 Data collection instrument

A multiple-choice questionnaire with some closed-ended questions was developed specifically for this study (see annexure G). The questionnaire was used to collect data related to knowledge.

A questionnaire is a printed self-report form designed to elicit information that can be obtained through written responses of the subject (Burns & Grove 2005, p.398). Questionnaires are documents containing questions and other types of items designed to solicit information appropriate to analysis. Questionnaires are used primarily in survey research. The majority of studies in medical literature use self-administered questionnaires. In the use of questionnaires, no hard and fast rules dictate the way it should be formatted. Researchers may either use existing instruments or develop a new one (Dawson & Trapp 2004, pp.282-287). In this study, existing instrument was adapted into a new questionnaire with 29 multiple-choice questions based on the research questions, research objectives and literature review.

Questionnaire design

A new questionnaire was formulated in the English language only using question items from previous studies (Onunkwor 2011). In order to minimise ambiguity and difficulty in comprehension, simple multiple-choice questions were used in the questionnaire to explore CVS knowledge and symptoms among the respondents. The answer categories were mutually exclusive, and special instructions were provided on how to choose correct options necessary for ease of understanding. In view of the fact that most of the respondents were literate, the instrument was developed as a self-administered questionnaire or assessment tool.

Content of the questionnaire

The questionnaire has three major sections namely; section A: Personal data, Section B: Employment, Section C: Knowledge about CVS.

3.3.5.2 Pilot study

A pilot study is a smaller version of a proposed study conducted in order to develop or refine the methodology (Dawson & Trapp 2004, p.289). The research instrument was pre-tested on a small number of five respondents from the Central Bank of Nigeria (CBN), central area, Abuja who were comparable to the sample of correspondents but were not part of the main study. This ensured that errors of whatever nature could be rectified immediately at little cost. After the necessary modifications had been made following the pilot study, the instrument was administered to the full sample. Actual data were collected during the pilot study and analysed carefully to ascertain whether or not they answered the multiple questions as expected. The result of the pilot study was used to refine the research instrument before using it in the actual study.

3.3.5.3 Data collection process

Two research assistants were carefully selected and properly trained for the data collection. The research assistants were members of the National Youth Service Corps (NYSC) serving at the SEC. The research assistants were trained in the handling of the questionnaires (filling them in, answering the multiple choice questions, distribution and collection). Ethical issues such as informed consent, confidentiality, anonymity and respect were emphasised.

The informed written consent (see annexure F) was obtained from the respondents before completing the questionnaire. A clear explanation about the study, its goal procedures and benefit was given. The completed instruments were checked at the end of each day for omissions, incomplete answers and unclear statements. Data was collected for a period of three weeks. The questionnaires were collected immediately after completion. Out of 120 questionnaires distributed, 106 were returned (a return rate of 88.3%).

3.4 VALIDITY AND RELIABILITY

Validity and reliability are critical aspects in research since they affect all processes leading to the credibility of research findings. They are important criteria to evaluate a research instrument in terms of its adequacy and quality.

3.4.1 Validity

The validity of the data collection instrument refers to the extent that it measures what it is intended for. In other words, a valid instrument actually measures the concept it is supposed to measure accurately (Dawson & Trapp 2004, p.288). The validity of a data collection instrument is enhanced by improving its content validity, construct validity and criterion-related validity amongst others. It is a determination of the extent to which the

instrument actually reflects the abstract construct being examined (Burns & Grove 2005, p.376).

In this study, the validity of the questionnaire was assured by using questions from various instruments that had been used in other similar studies to formulate the multiple choice questions. The instruments were also subjected to evaluation and approval by the study supervisor and UNISA Ethics Committee. The service of a statistician was used to check if the structure of the instrument and the formulated items were in line with the objectives of the study.

Face validity refers to the degree to which a questionnaire or test appears to be measuring what it is supposed to measure (Dawson & Trapp 2004, p.289). Face validity means that an instrument empirically appears to measure what it is supposed to measure at face value (Polit & Beck 2008, p.458). In this study, face validity was ensured by careful selection of items to be included in the questionnaire. These items reflected the concept of knowledge about CVS.

Content validity is defined as the degree to which the items in an instrument adequately represent the universe of content for the concept investigated. Content validity deals with the question of how representative or adequate the compiled multiple choice questions are for the construct being measured (Dawson & Trapp 2004, p.289). This was ensured by the assistance of the study supervisor and the statistician. They read the content of the questionnaire and made their comments. Their suggestions were implemented where appropriate to make the content as valid as possible.

External validity is defined by Polit & Beck (2008, p.753) as the degree to which study results can be generalised to settings or samples other than the one studied. This has implications for selection of respondents, which should be representative of the study population.

In this study, one hundred and twenty (120) questionnaires were distributed and one hundred and six (106) were returned. The sample had characteristics that represent the population being investigated. The sample size was also reasonable to enhance generalisability of the results to other similar contexts.

3.4.2 Reliability

The reliability of a measurement tool denotes the consistency of measures obtained in the use of a particular instrument and is an indication of the extent of random error in the measurement instrument method (Burns & Grove 2005, p.374). It is the relative absence of unsystematic, random measurement error (Stommel & Wills 2004, p.209). According to Burns & Grove (2005, p.374), a reliability coefficient of 0.80 is considered to be lowest acceptable value for a well developed psycho-social instrument, and 0.70 is sufficient for a newly developed psycho-social instrument.

The test-retest method, interrater reliability, Cronbach's alpha coefficient and other methods can be used to assess the reliability of a tool (Burns & Grove 2005, pp.374-376). A pilot study, using respondents with similar characteristics to the study sample, was conducted to determine clarity of the items, questions and consistency of responses.

3.5 DATA ANALYSIS

Data analysis refers to techniques used to reduce, organise and give meaning to data (Burns & Grove 2005, p.43). In quantitative studies, data analysis relies heavily on statistical analysis tools. Regardless of the types of data collected and the orientation of the researchers, data analysis always involves 2 steps: a summary of the results and an interpretation (Stommel & Wills 2004, p.27).

Data preparation involves checking or logging the data into the computer. Data is also checked for accuracy and transformed. A database structure that integrates the various

measures is developed and documented. With the help of a statistician, the Epi-Info computer program (version 7, 2011) was used for data entry and analysis. A mark sheet was used to assess the responses and to obtain scores of each respondent. Descriptive statistics, percentages, frequency tables and figures were used in the data analysis and interpretation. Chi-square analysis, were used to test for relationships between knowledge of CVS and demographic factors. A two-tailed p-value of less than 0.05 was considered statistically significant.

3.6 ETHICAL CONSIDERATIONS

Research ethics involves protecting the rights of the participants and the institutions in which the research is done, as well as maintaining scientific integrity (Burns & Grove 2005, pp.181, 207). The study does not have either physical or psychological risks. The discomfort may just be mere inconvenience in terms of time. Research ethics in the study was adequately covered as follows:

- **Protecting the rights of the respondents**.

o Informed consent was obtained from the respondents.

o Right to self determination (based on ethical principle of respect for persons) (Burns & Grove 2005, p.181): All respondents were treated as autonomous agents by informing them about the proposed study and allowing them to voluntarily choose to participate or not. They had the right to withdraw from the study. Coercion, covert data collection was avoided.

o Right to privacy: The opinions and other private information of respondents were protected.

o Right to autonomy and confidentiality: respondents' anonymity was ensured and the researchers' management of private information shared by the respondents was kept confidential.

o Right to fair treatment (based on ethical principle of justice): Selection and treatment of respondents was fair and devoid of bias. Gender selection was fair.

Employing random sampling techniques provided equal opportunity for male and female respondents.

o Right to protection from discomfort and harm (based on the ethical principle of beneficence): It holds that one should do good, and above all do no harm. (Burns & Grove 2005, p.190). Respondents were protected from any form of harm/ discomfort which may be physiological, emotional, social or economic in nature. Benefit-risk ratio was maintained maximising the benefits and minimising the risks. Benefits of the study include; improved awareness of CVS and preventive measures, potential reduction in the resultant loss of productivity and poor vision. The risk of the study was temporary and minimal and may just be mere inconvenience.

- **Protecting the rights of the institution.**

o Approval of the ethical standards committee of University of South Africa (UNISA) was sought before conducting the study, and a certificate of approval issued (see Annexure A).

o Written permission to conduct the study was obtained from the management of the SEC before commencing study, and an approval letter was issued (see Annexure C).

- **Scientific integrity.**

o Scientific integrity was secured through honest conduct, reporting and publication of the study. Data was not fabricated and the research materials/ processes were not falsified. Appropriate credit was given to the use of other person's ideas, processes, results and words (plagiarism was avoided).

3.7 CONCLUSION

This chapter described the research design and methodology which included discussions on population, sampling and sampling technique, data collection, validity and reliability of the instrument, data analysis and ethical considerations. Chapter 4 discusses the data analysis and interpretation of the research findings.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

The study was carried out to assess the level of knowledge and extent of CVS among the staff of the SEC in Abuja, Nigeria.

4.2 DATA ANALYSIS

Data was collected from 100 (54 male and 46 female respondents) who were members of staff of the SEC, Abuja over a three-week period from December 2011 to January 2012. Data was collected using a questionnaire which contained 22 items and was analysed using Epi-info version 7 (2011) software.

4.3 GENERAL INFORMATION

The general information collected about the respondents include the date of birth, gender and education.

4.3.1 Distribution of respondents by department

Respondents from 25 departments completed the questionnaire. Two of the respondents did not indicate their departments. All respondents indicated they used computer at work. The information is presented in Table 4.1.

Table 4.1 Distribution of respondents from the SEC, Abuja by department

Departments	Frequency	Departments	Frequency
Information Technology	16	Enforcement & Compliance	1
Administration	11	Network & communication	5
Human Resources	7	Internal Audit	1
Financial Standard & Corporate Governance	8	Internal Control	1
Legal	7	International Relations	2
Research & Planning	12	Library Information	1
Corporate affairs	3	Monitoring & Investigation	2
Director General's Office	2	Mergers & Takeover	1
Finance & Accounting	6	Registry	1
Media	2	Registration & Recognition Investment Exchange	1
Zonal Office Coordinator	2	Secretary to Executive Commissioner	2
Applications	1	Securities Investment Services	1
Collective Investment Services	2		

4.3.2 Respondents' age distribution

The age distribution of the respondents is presented in Table 4.2. The majority of them (84%) were between the ages of 25 and 39 with a mean age of 31 years.

Table 4.2 Age distribution of respondents from the SEC, Abuja, Nigeria.

Age group	Frequency	Percent (%)	Cum. Percent (%)
18-20 years	1	1	1
21-24 years	15	15	16
25-29 years	26	26	42
30-34 years	25	25	67
35-39 years	33	33	100
Total	**100**	**100**	

4.3.3 Respondents' level of education

The level of education of respondents in this study is presented in Figure 4.1. Out of 100 respondents 5% (n=5) indicated they had a secondary school education, 69% (n=69) had basic university degree, 20% (n=20) had master degree and 6% (n=6) had PhD.

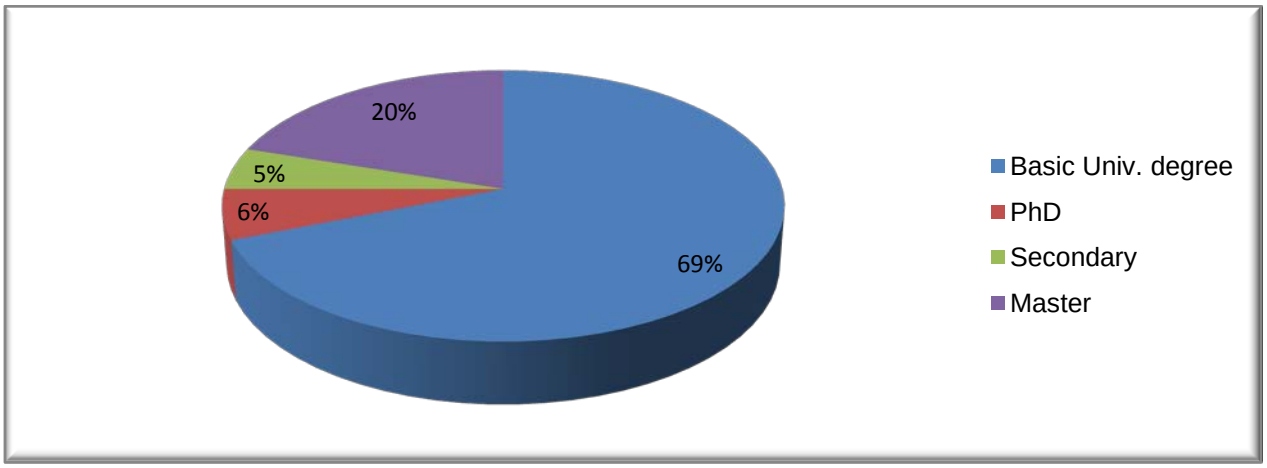

Figure 4.1 Pie chart showing respondents' level of education

4.4 AVERAGE HOURS SPENT ON COMPUTER DAILY

One respondent did not answer this question. Table 4.3 shows that the majority (45%) spend 6-8 hours on the computer daily, followed by those who spend 3-5 hours (33%), then >8 hours (17%) and 1-2 hours (4%). No respondent indicated less than 1 hour.

Table 4.3 Average hours spent on computer daily by respondents

Ave. Hours	Frequency	Percent (%)
1-2 hours	4	4
3-5 hours	33	33
6-8 hours	45	45
>8 hours	17	17
Total	**99**	**99**

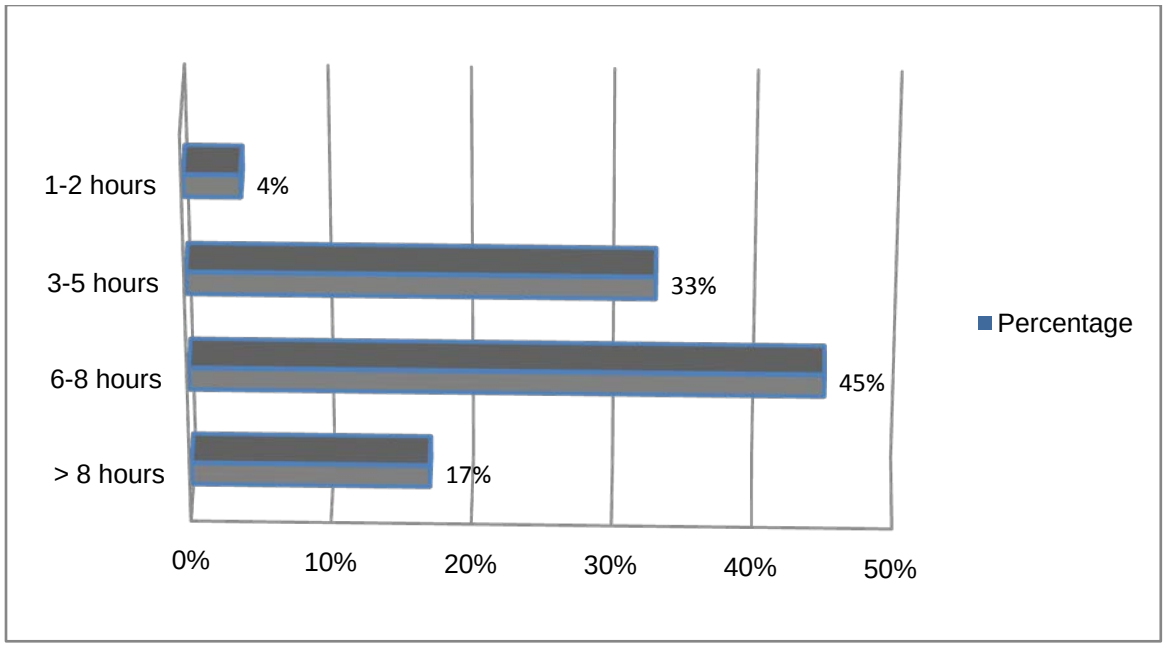

Figure 4.2 Bar chart showing the average hours spent on computer daily by respondents

4.5 DURATION OF COMPUTER USE

Two respondents did not answer this question. Only 6% of the respondents have been using the computer for less than 1 year, 15% of the respondents had been using the computer for between 1-2 years, 28% have used the computer for a duration of 3-5 years, 29% have been using the computer for between 6-8 years and 20% have used the computer for more than 8 years. Table 4.4 and figure 4.3 represent the duration, frequency and the percentages.

Table 4.4 Duration of computer use by the respondents

Duration	Frequency	Percent (%)
<1 year	6	6
1-2 years	15	15
3-5 years	28	28
6-8 years	29	29
>8 years	20	20
Total	**98**	**98**

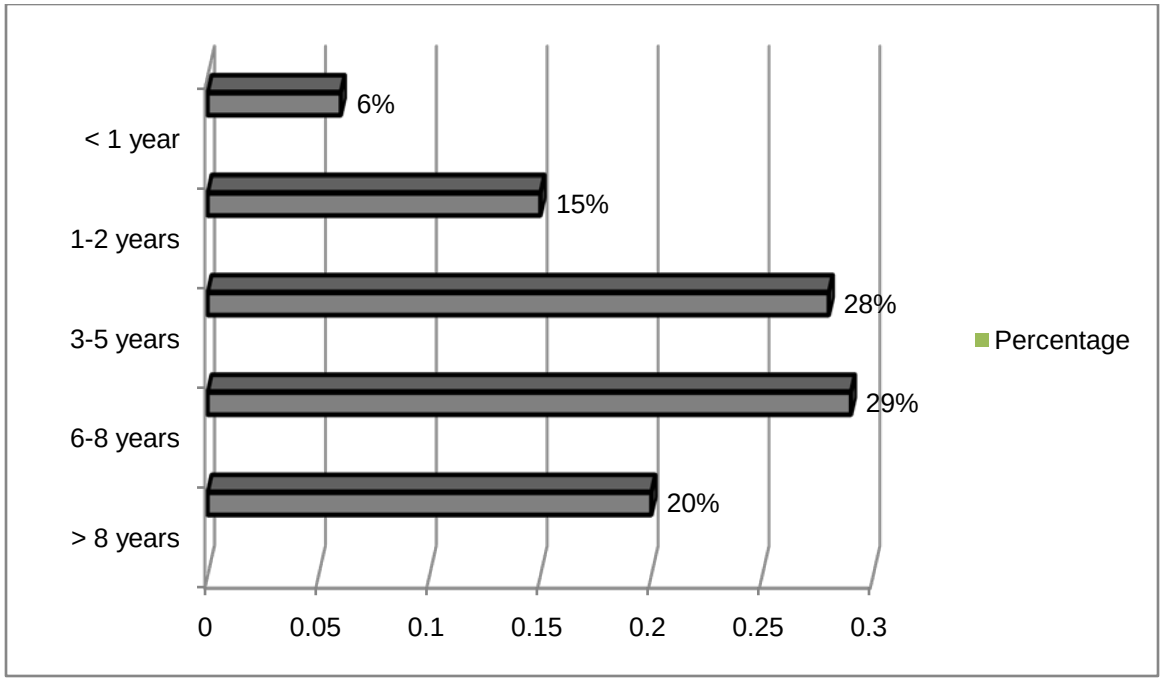

Figure 4.3 Bar chart showing the duration of computer use by respondents

4.6 AWARENESS OF COMPUTER VISION SYNDROME

In this study the term 'awareness' was used to mean having heard of CVS. Table 4.5 shows the respondents' response to the question 'are you aware of a condition called Computer Vision Syndrome?' One respondent did not answer the question. Of the respondents who answered the question, 40 admitted to be aware of the syndrome and over 50% were not aware of the syndrome.

Table 4.5 Awareness of CVS by respondents

Aware of CVS	Frequency	Percent (%)
Yes	40	40.40
No	59	59.60
Total	**99**	**100**

4.7 KNOWLEDGE OF COMPUTER VISION SYNDROME

Knowledge of CVS in this study is defined as acknowledging having some understanding of CVS by selecting the options presented in Table 4.6. Out of the 40 respondents that indicated 'yes' to the awareness of CVS, 2 respondents (5%) indicated option (i), 1 respondent (2.5%) indicated option (ii), 27 respondents (67.5%) indicated the correct option (iii), and 10 respondents (25%) indicated option (iv).

Table 4.6 Respondents' knowledge of CVS

Options	Frequency	Percent (out of 40)	Overall percent (%)
(i)Tiredness during computer use	2	5	2
(ii)Wearing glasses while using the computer	1	2.5	1
(iii)Combination of headache, eyestrain and blur vision that occur as a result of prolonged computer use	27	67.5	27
(iv)I only heard of it, I don't know what it means	10	25	10

4.7.1 Age and knowledge of Computer Vision Syndrome

The relationship between age and knowledge of CVS among the respondents is presented in Table 4.7. The age group with the highest CVS knowledge was 35-39 years. The knowledge of CVS appears to increase with increasing age (r= 0.97).

Table 4.7 The relationship between age and CVS knowledge of respondents.

		CVS Knowledge				
		Yes	**%**	**No**	**%**	**Total**
Age Group	18-20 yrs	1	100	0	0	1
	21-24 yrs	3	20	12	80	15
	25-29 yrs	4	15.38	22	84.62	26
	30-34 yrs	8	33.33	16	66.66	24
	35-39 yrs	11	33.33	22	66.66	33
	Total	**27**		**72**		**99**

4.7.2 Gender and knowledge of Computer Vision Syndrome

The relationship between gender and knowledge of CVS is shown in Table 4.8. There was no statistically significant difference found between the two proportions (X^2= 1.23, df =1, p=0.237).

Table 4.8 The relationship between gender and knowledge of CVS among respondents of the SEC, Abuja, Nigeria.

		CVS Knowledge		
		Yes	**No**	**Total**
Gender	**Male**	12	41	53
	%	22.64	77.36	100
	Female	15	31	46
	%	32.61	67.39	100
	Total	**27**	**72**	**99**
	%	27	72	99

4.7.3 Education and knowledge of Computer Vision Syndrome

Table 4.9 presents the relationship between CVS knowledge and the education levels of the respondents. Respondents with master degree had the highest level of CVS knowledge (45%), followed by respondents with PhD (33.33%), and respondents with basic university degree (22.05%). Respondents with secondary education were excluded from the analysis, due to the small sample size. When respondents with basic university degrees were pooled with those with PhD and then compared with master degree holders, there was no statistical significant difference in CVS knowledge of the two groups (X^2= 3.85, df= 1, p= 0.049).

Table 4.9 The relationship between CVS knowledge and education level of respondents

		CVS Knowledge				
		Yes	**%**	**No**	**%**	**Total**
Education	Secondary	1	20	4	80	5
	Basic university degree	15	22.06	53	77.94	68
	Master	9	45	11	55	20
	PhD	2	33.33	4	66.66	6
	Total	**27**		**72**		**99**

4.7.4 Previous eye examination and knowledge of Computer Vision Syndrome

Thirty five (35) respondents indicated 'Yes' to consultation with a doctor for eye examination and 27 respondents indicated 'Yes' to CVS knowledge. As observed in Table 4.5, one respondent did not answer the question on awareness of CVS, making it a total of 99 respondents that answered the question on awareness/ knowledge of CVS. Respondents who indicated 'Yes' to consultation with a doctor for eye examination were found to be more likely to have CVS knowledge than those who had never consulted a doctor (X^2=12.38, df=1, p=0.00043). The details are presented in Table 4.10.

Table 4.10 History of eye examination and CVS knowledge in respondents

		CVS Knowledge		
		Yes	**No**	**Total**
Eye Exam.	**Yes**	17	18	35
	%	48.57	51.43	100
	No	10	54	64
	%	15.63	84.37	100
	Total	**27**	**72**	**99**
	%	27	72	99

4.8 SYMPTOMS OF COMPUTER VISION SYNDROME

4.8.1 Frequency of Computer Vision Syndrome symptoms

The frequencies of CVS symptoms experienced by the respondents are presented in figure 4.4. 74 respondents (74%) indicated 'Yes' to at least one symptom experienced during computer use. 25 respondents (25%) indicated 'No' to the symptoms and one respondent (1%) did not indicate either 'Yes' or 'No'. The symptoms most experienced by respondents when using the computer are Headache (30.94%) and Eyestrain (30.94%). Double vision was experienced by 12.95%, Watery eyes were reported by 10.79%, Blur vision and Redness were experienced by 10.07% and 4.31% respectively.

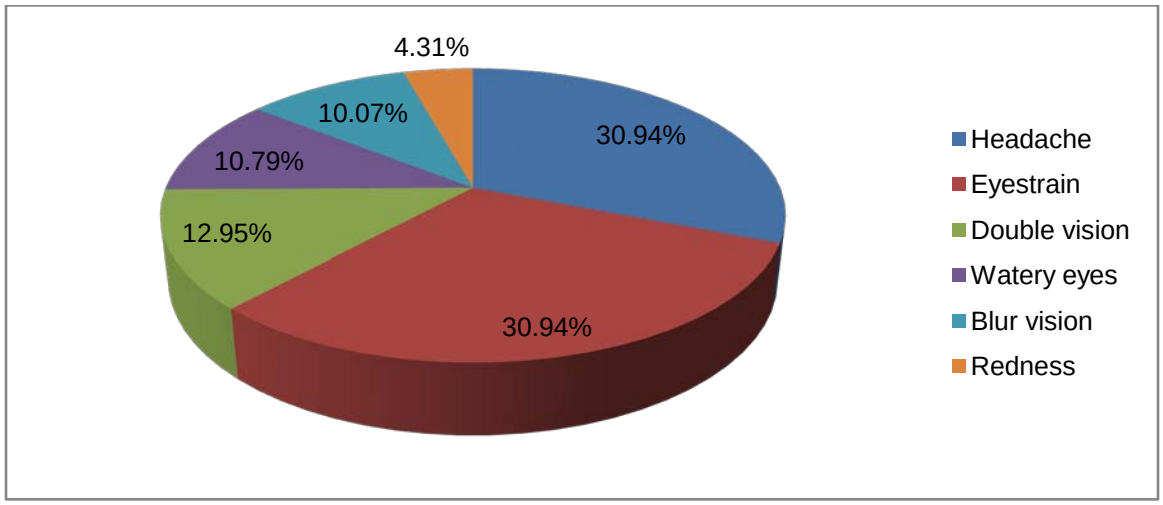

Figure 4.4 Pie chart showing the frequency of CVS symptoms by respondents

4.8.2 Comparison of symptoms in the current study with previous studies

The current study records lower percentages of symptoms than reported in previous studies. The common feature in all the studies is that headache and eyestrain are the most frequent symptoms of CVS. The details are presented in Table 4.11.

Table 4.11 Comparison of current study with previous studies

Symptoms	% of respondents in different studies					
	Akinbinu (Current study)	Chiemeke et al 2007			Bali et al 2007	Sen & Richardson 2007
		Severe	Moderate	Mild		
Eyestrain	30.9	20.4	22.3	53.4	97.8	-
Blur vision	10.1	7.8	37.9	37.9	-	-
Headache	30.9	3.9	24.3	53.4	82.1	61
Watery eyes	10.8	1.0	11.7	35.9	66.4	-
Redness	4.3	3.9	25.2	36.9	61.2	46
Double vision	12.9	1.0	28.2	43.7	-	<46

4.8.3 Average number of hours spent on computer and Computer Vision Syndrome symptoms

One respondent did not indicate the average number of hours spent on computer daily, but indicated watery eyes as a symptom experienced during computer use. The frequency of CVS symptoms and the average number of hours spent on the computer daily by the respondents is presented in Table 4.12.

Table 4.12 CVS symptoms and the average number of hours spent on computer by respondents

Hours	Headache	Eyestrain	Double vision	Redness	Watery eyes	Blur vision
1-2 hrs	-	1	-	-	-	-
3-5 hrs	8	15	3	2	2	3
6-8 hrs	24	16	12	3	7	6
>8 hrs	11	11	3	1	5	5

CVS symptoms were reported most by respondents that spend 6-8 hours on computer daily (49.3%). This is followed by respondents that spend more than 8 hours on the computer daily (26.1%), then those that spend 3-5 hours (23.9%) and 1-2 hours (0.7%).

4.8.4 Years of computer use and Computer Vision Syndrome symptoms

Two respondents did not indicate their duration of computer use, but indicated they had symptoms while using the computer (double vision and watery eyes). Table 4.13 presents the relationship between the duration of computer use in years and CVS symptoms.

Table 4.13 Relationship between the duration of computer use in years and CVS symptoms

Years	Headache	Eyestrain	Double vision	Redness	Watery eyes	Blur vision
<1 year	1	1	-	-	-	-
1-2 years	4	3	2	-	1	-
3-5 years	11	16	2	1	5	2
6-8 years	15	12	7	3	4	3
>8 years	12	11	6	2	4	9

Respondents that have been using computer for less than one year experience the least symptoms (1.5%), followed by 1-2 years (7.3%) and 3-5 years (27%). Respondents that have been using the computer for 6-8 years (32.1%) and for more than 8 years (32.1%) experience the highest symptoms.

4.8.5 Respondents history of eye problem and Computer Vision Syndrome symptoms

Table 4.14 represents the respondents' responses to the question 'Do you have any eye problems'? Of the 99 respondents (99%) that answered the question, 30 indicated 'Yes' and 69 respondents indicated 'No' as answers.

Table 4.14 History of eye problems and CVS symptoms

		CVS symptoms		
		Yes	**No**	**Total**
Eye problem	**Yes**	29	1	30
	%	96.67	3.33	
	No	45	24	69
	%	65.22	34.78	
	Total	**74**	**25**	**99**
	%	74	25	99

Respondents who indicated they have eye problems were found to experience more CVS symptoms than respondents who indicated they do not have eye problems (X^2=10.956, df= 1, p= 0.00093).

Some findings of note on the individual questions in Section C of the questionnaire are highlighted below.

Question 16: How did you know about CVS?

There were 40 responses to the question. The options, frequency and percentages are presented in Table 4.15 and figure 4.5. The majority (50%, n=20) indicated the internet, by a Doctor (20%, n=8), Friend /Relative /Colleague (17.5%, n=7), Radio /TV /Newspaper /Magazine (10%, n=4), Others: Teacher (2.5%, n=1) as source of information.

Table 4.15 How respondents knew about CVS

Options	Frequency	Percent (%)
(a)Friend/ Relative/ Colleague	7	17.5
(b)Radio/ TV/ Newspaper/ Magazine	4	10
(c)Internet	20	50
(d)Doctor	8	20
(e)Others	1	2.5

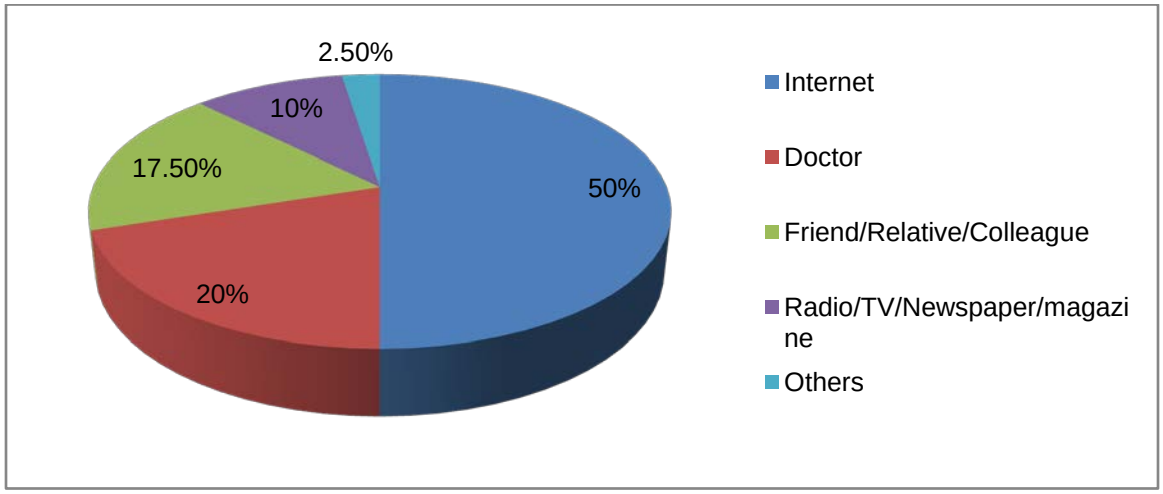

Figure 4.5 Pie chart showing how respondents knew about CVS

Question 18: What do you do to get relief from computer-related symptoms?

Table 4.16 presents the responses to the question. Ten (10) respondents indicated multiple answers to the question.

Table 4.16 What respondents do to get relief from computer-related symptoms

Options	Frequency	Percent (%)
(a) Take a break	52	61.18
(b) Blink more frequently	10	11.76
(c) Close eyes	9	10.59
(d) Nothing	9	10.59
(e) Others	5	5.88

Question 19: In your opinion, do you think the symptoms you are experiencing are related to the use of a computer?

Out of 74 respondents that indicated they have symptoms when using the computer, 65 respondents (87.84%) believe their symptoms are computer-related while 9 respondents (12.16%) indicated 'No' to the question.

Question 20: If 'Yes' to question (19), why do you think so?

Five (5) respondents indicated multiple answers to the question. One respondent indicated three options, four others indicated two options each. The information is presented in Table 4.17.

Table 4.17 Reasons for computer-related symptoms selected by respondents

Options	Frequency	Percent (%)
(a) Prolonged glaring at the computer screen	41	57.74
(b) Too bright computer screen	16	22.54
(c) External light reflection on the computer screen	9	12.68
(d) My poor eyesight	5	7.04

Question 21: If 'No' to any of question (19), what do you think is the cause of your symptoms? List three important reasons.

Three respondents gave 3 reasons each, others gave 1 reason each. Two of the respondents that indicated NO to question (19) did not attempt the question. The reasons are presented in Table 4.18.

Table 4.18 Reasons given for (non-computer related symptoms) by respondents

Reasons	No. of respondents
Stress	4
Poor eyesight	2
Too bright screen/ light	2
Prolonged glaring at the screen	1
Long work duration	1
Use of too much mental strength	1
Personal fatigue	1
Poor ventilation	1

Question 22: What do you consider to be important preventive measures of CVS?

Twenty three (23) respondents indicated multiple answers to this question. The details are presented in Table 4.19.

Table 4.19 Preventive measures of CVS selected by respondents

Options	Frequency	Percent (%)
(a) Taking regular breaks	40	32
(b) Blinking frequently	7	5.6
(c) Checking eyes regularly	39	31.2
(d) Using glare screen on the computer	39	31.2

4.9 CONCLUSION

This chapter discussed the data analysis and interpretation using frequency, percentages (tables and figures), descriptive and inferential statistics. One hundred respondents participated in the study (54 males, 46 females). The mean age of the respondents was 31 years. The study generally reveals low levels of CVS knowledge (27%). CVS knowledge appears to increase with increasing age (r=0.97). However, there was no statistically significant difference in CVS knowledge between males and females.

Comparison between respondents with basic university degrees and those with at least a master degree did not show statistical significant difference in CVS knowledge. Headache and eyestrain are the most common CVS symptoms experienced by respondents. CVS symptoms were reported most in respondents that spend 6-8 hours on the computer daily and those that have been using the computer for more than 6 years.

CHAPTER 5

FINDINGS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

CVS is a condition that affects millions of people globally (Sen & Richardson 2007, p.45). With advances in technology and dependency on information technology, the computer has become a common tool in schools, colleges, universities and workplaces. As such, CVS is becoming a public health concern. Unfortunately, CVS has not been studied extensively in Nigeria and other developing countries. This study was carried out to explore the level of knowledge about CVS among employees of the SEC in Abuja, Nigeria.

This chapter discusses the findings and limitations of the study and makes recommendations for practice, education and research.

5.2 SUMMARY AND INTERPRETATION OF THE RESEARCH FINDINGS

A structured questionnaire was used in this study to collect data. Fifty four males (n=54) and forty six (n=46) females were recruited in this study. The respondents were mostly young working class with age ranging between 21 and 39 years. All respondents that participated in this study were literates with the majority (69%) having basic university degrees, 5% had secondary education, 20% had master degree and 6% had PhD. The majority of the respondents (73%) had little or no knowledge of CVS. Of the forty respondents who indicated being aware of CVS, only 27 have the knowledge of CVS. This means only 27% of the 100 respondents involved in the study had knowledge of CVS.

Seventy four percent (74%) of the respondents experienced at least one symptom of CVS. 25% did not experience any symptom of CVS. The CVS symptoms most

experienced by respondents are headache (30.94%) and eyestrain (30.94%). Others are double vision (12.95%), watery eyes (10.79%), blur vision (10.07%) and redness (4.31%).

Sufficient knowledge about CVS and its preventive measures would help reduce the incidence in a population. Extensive literature search did not reveal any publication on knowledge of CVS, thus making comparison with other results difficult. Studies conducted by Chiemeke et al (2007) reported that only 32% of respondents were aware of preventive measures for computer-related visual symptoms. Considering the fact that all respondents in this study are computer users and a majority are well educated, a CVS knowledge level of 27% would be considered inadequate. From the multiple choice questions, 60% of respondents indicated they are not aware of CVS, 2% of the respondents believe CVS is tiredness during computer use, 1% believe it means wearing glasses while using the computer, 10% indicated they had heard of CVS but do not know the meaning.

In this study, the knowledge of CVS increases with increasing age, with a strong positive correlation of 0.97. CVS knowledge was independent of gender as there was no significant difference in CVS knowledge between males and females. The analysis of the relationship between CVS and level of education was in this study restricted to respondents with basic university degrees and master/ PhD. The study revealed no statistical significant difference in CVS knowledge of the educational levels. However, respondents with master and PhD degrees had higher level of CVS knowledge (45% and 33% respectively) than the other groups. Respondents with master/ PhD degrees may be more research-oriented, thereby making them more knowledgeable about CVS.

The study also revealed that respondents who had visited an eye clinic for consultation with a doctor had more CVS knowledge than those who had not. This is an expected finding because respondents who had previous eye examination may have more potential for exposure to information about eye disorders from a doctor which might

have prompted them to conduct personal search for information on CVS (Onunkwor 2011).

The findings from this study indicated that eyestrain (30.9%) and headache (30.9%) are the most common CVS symptoms experienced by respondents. This agrees with Bali et al (2007) who reported eyestrain (97.8%) and headache (82.1%) as chief presenting symptoms of CVS. Similarly, the findings in this study concur with the findings by Chiemeke et al (2007) who reported eyestrain (96.1%) as being the most common visual symptom experienced by computer users. They also reported blurred distance vision (83.6%), headache (81.6%), double vision (72.9%), redness of eyes (66%) and watery eyes (48.6%) as other common visual symptoms associated with computer use.

In terms of severity of symptoms, the current study records lower percentages than studies by Chiemeke et al (2007) and Bali et al (2007). The possible explanations include that because the respondents in this study are civil servants and due to the recent economic crises plaguing the country which has resulted in loss of jobs in the Nigerian civil service respondents may not have wanted to disclose their true visual status. Some respondents (though assured of anonymity and confidentiality by the researcher) may have the wrong perception that the results of this study would not work in their favour. Some methodological differences and settings between the studies may also have contributed to the differences in the values on the severity of symptoms.

Respondents that spend 6-8 hours average daily on the computer experience the highest CVS symptoms (49.3%), followed by respondents that spend more than 8 hours daily (26.1%) and respondents that spend 3-5 hours daily (23.9%). Respondents that spend 1-2 hours daily experience the least symptoms of CVS (0.7%). There is a likelihood of respondents that spend more than 8 hours daily on the computer taking more frequent breaks than those that spend 6-8 hours daily. This may partly explain why those that spend 6-8 hours daily experience more symptom than those that spend more than 8 hours on the computer daily. This finding is similar to Ihemedu & Omolase (2010, p.51) who reported that more symptoms were noticed amongst the computer users in the university and hospital compared to the bankers. They reasoned that it may

be due to fear of subjects not exposing their possible ocular deficiencies or an adaptation of the subjects to the frequent computer use.
However, these findings do not correlate with the findings by Chiemeke et al (2007) who reported that visual symptoms associated with computer use were more experienced by respondents that spend more than 8 hours daily with computer. They further reported that visual symptoms begin to occur after 1 hour of computer work and increases with an increase in the number of hours spent on computer uninterrupted. Future studies need to be conducted in this area to corroborate these findings.

This study further revealed that the longer the duration in years of computer use, the more severe the CVS symptoms. Respondents that have been using computer for less than 1 year experienced the least symptoms (1.5%), 1-2 years (7.3%), 3-5 years (27%), while respondents that have been using computer for 6-8 years (32.1%) and more than 8 years (32.1%) experience the highest symptoms of CVS. Experimental and epidemiological lines of evidence have indicated that near work performed in the long term can alter the tonic accommodative status of the eyes which can influence the development of refractive errors (Borish 1998, p.40). This may be the reason why respondents who have been using computer for more than 6 years experienced more symptoms than others.

5.3 CONCLUSION

CVS has been classified as the number one occupational hazard of the 21st century (Torrey 2003). This statement cannot be overemphasised when one considers the upsurge in information technology, the proliferation of computer systems, and the overwhelming visual symptoms experienced by computer users as observed in this study. More so since the year 2000, 75% of daily activities of all jobs involve the use of the computer (Ihemedu & Omolase 2010, p.49). CVS significantly harms workplace productivity and reduces the quality of life by placing unusual strain on the human physical well-being.

The current study has explored the level of knowledge of CVS and the common visual symptoms experienced by computer users in the SEC workplace in Abuja, Nigeria. As reported in other similar studies, headache and eyestrain are the most frequent symptoms reported by respondents in this study. Duration in years of computer use and number of hours spent on computer are factors that influence the occurrence and severity of CVS symptoms. CVS knowledge level of 27% in this study was considered inadequate. Despite the shortcomings of this research, the results would serve as a knowledge base on which to build strategies for improving CVS knowledge. The results would be useful for policy makers, programme planners and eye care practitioners.

5.4 RECOMMENDATIONS

The findings of this study provide useful information on the knowledge level of CVS and visual symptoms experienced by computer users. It is important to note that a survey of this nature can be very educative by prompting respondents to obtain more information about the survey topic (Onunkwor 2011).

- The current management of CVS in Nigeria and the recommendations made by other studies conducted in this area lay little or no emphasis on education of computer users. Given the low level of knowledge of CVS (27%) by the respondents in this study and the overwhelming symptoms experienced by 74% of the respondents, adequate education about CVS and its prevention amongst the people at risk is highly recommended.

o This study reveals the internet as a major source of information for CVS by respondents. However, internet may not be easily accessible to most population groups in Nigeria. Therefore, Health Educators are encouraged to focus on dissemination of information through other means which are easily accessible to a wider population. This should involve seminar presentations at public offices and communication through the print and other electronic media.

o Special attention should be given to the young population. This includes children and students in schools, colleges and universities. As reported by Ihemedu & Omolase

(2010, pp. 49, 50) children can experience many of the same symptoms related to computer use as adults and some unique aspects of how children use computers may even make them more susceptible than adults to the development of CVS. Training institutions are encouraged to develop learning materials and mainstream the training on CVS in their curricula.

- Eye care practitioners should endeavour to probe patients that attend the clinic about the history of computer use and spend time to discuss with their patients about CVS during consultations. Anshel (2006) suggests the issuing of questionnaires to acquire more information from patients about computer use. Izquierdo (2010) further suggests ergonomic visits to the patients office and emphasises that environmental factors such as computer set up, sitting, wrist position, monitor type, desktop colour, window proximity, ceiling and desk illumination sources should be evaluated.

Other recommendations especially for companies and institutions with large number of computer users should include:

- Establishment of ergonomic guidelines to reduce visual complaints from computer usage (Chiemeke et al 2007). As practised in the United Kingdom, the Nigerian government should also establish a legislation to protect computer operators from ocular hazards inherent in computer use by setting out legal requirements of employees for their computer operators. The requirements should include that:

o All computers fit a minimum specification for health use.
o Work stations should be assessed for risk. All windows must be covered with blinds and monitors should not be exposed to direct light source to reduce glare on the screen.
o Institutions should purchase ergonomic (adjustable) chairs for computer users in order to ensure that shoulders are not raised high and feet are firmly rested on the floor (Mvungi et al 2009).
o Computer rooms should be well lit to avoid eyestrain (Chiemeke et al 2007).

- All computer users should take regular breaks from computer work and be subjected to regular eye tests and special glasses provided if required.
- Training on computer safety should be provided and relevant information relating to health and safety should be given to all computer users.

- Finally, further research of this nature about CVS should be conducted in computer-using institutions in other parts of Nigeria.

5.5 LIMITATIONS OF THE STUDY

The study was conducted in the SEC, located in the central area district of the federal capital territory, Abuja, Nigeria. All respondents in this study are members of staff of the SEC, age from 18 to 39 years. The findings from this study may not be generalised to other populations, because only one institution was used and respondents above the age of 40 years were excluded from the study. Computer users in other institutions and those above 40 years of age may exhibit a different pattern of results.

Depth or accuracy of CVS knowledge may have not been ascertained due to the use of a structured questionnaire, because respondents who indicate familiarity with CVS may only have a shallow knowledge of the disorder.

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Annexure A: Approval from the university

UNISA university of south africa

UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
(HSHDC)
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE

Date of meeting: 13 October 2011 Project No: 4492-390-2

Project Title: Knowledge of computer vision syndrome among computer users in the workplace in Abuja, Nigeria.

Researcher: Dr TR Akinbinu

Degree: Masters in Public Health Code: DIS4986

Supervisor: Prof YJS Mashalla
Qualification: D Litt et Phil
Joint Supervisor: -

DECISION OF COMMITTEE

Approved [√] **Conditionally Approved** [ ]

Prof E Potgieter
CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE

Prof MC Bezuidenhout
ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

Annexure B: Letter of permission to the SEC, Abuja, Nigeria

Rayfields EYE CARE LTD. RC: 733774.
Suite B2, 1st floor, Danziyal Plaza, Central Business District, Abuja.
P.O. Box 13401, Wuse Zone 3, Abuja.
Tel: 08033968475, 08098110976.

5th December, 2011.

THE HUMAN RESOURCE MANAGER,
SECURITIES AND EXCHANGE COMMISSION,
ABUJA.

Dear Sir,

Permission to carry out research study

I am writing to apply for permission to carry out a study on Computer Vision Syndrome (CVS). I am an Optometrist with *Rayfields* Eye Care Ltd. Abuja and a research student of public health from the University of South Africa. My research title is *'Knowledge of Computer Vision Syndrome among computer users in the workplace in Abuja, Nigeria'*. Your institution was chosen for this study because of the large number of computer users in your workforce.

Questionnaires will be distributed to participants between the ages of 18 to 40 years. Benefits of the study include; improved awareness of Computer Vision Syndrome and its preventive measures, potential reduction in the loss of productivity and vision problems associated with computer use, identification of weak areas for health educators to improve on.

On completion of the research, a bound copy of the final research papers will be donated to your library. The information from the study will be useful for developing and revising training curricula that will enhance level of awareness of CVS and improve productivity in the workplace. I would be very grateful if this application is approved.

Sincerely yours

Dr. Tope Akinbinu

Annexure C: Letter of approval from the SEC, Abuja, Nigeria

Securities & Exchange Commission

SEC TOWER, Plot 272 Samuel Adesujo Ademulegun Street, Central Business District, P.M.B 315, Garki - Abuja, Nigeria.
Tel: 09-6330000 - 6330399
e-mail: sec@sec.gov.ng. web: www.sec.gov.ng

Dr. Tope Akinbinu December 19, 2011

Attention: University of South Africa, College of Human Sciences.

Dear Sir,

RE: PERMISSION TO CARRY OUT RESEARCH STUDY

We wish to acknowledge the receipt of your letter of 5th December, 2011 on the above subject.

We are pleased to inform you that the Management of the Securities and Exchange Commission has agreed to your request to carry out research study in the Commission.

Thank you.

Yours faithfully

H.Dauda
HOD, (Human Resource Department)
For: Director General

Lagos Zonal Office: No. 3 Idejo Street, Victoria Island P.M.B. 12638, Marina - Lagos.
Port-Harcourt Zonal Office: New First Bank Building 22/24 Aba PH Expressway, Port Harcourt. Tel: 084-575939-40
Kano Zonal Office: African Alliance House, 4th Floor, F1 Sani Abacha Way/Aiport Road, Kano. Tel: 064-314105,312606

Annexure D: Letter from statistician

RC 731452

el Stinik HealthINFOSystems Ltd

Knowledge Management . Health IT . Consumer Health Informatics

DR. JUSTIN IKOR EKPA

e-mail: ikorekpa@gmail.com

Phone: 07025652852

8th JUNE, 2012.

ATTENTION:

UNIVERSITY OF SOUTH AFRICA,

DEPARTMENT OF HEALTH STUDIES.

RE: STATISTICAL ANALYSIS OF MPH DISSERTATION

Dr. Tope Raymond Akinbinu has been my client since he started MPH programme in 2009. He consulted me for the analysis of his dissertation titled "Knowledge of Computer Vision Syndrome among computer users in the workplace in Abuja, Nigeria".

I assisted in the design of the questionnaire and the result of the study was analysed in April 2012 with the Epi-info (version 7; 2011) statistical software.

Sincerely yours,

Dr. Justin Ekpa

Suite 13, Tolse Plaza, Lawan Gwadabe crescent,
Behind Apo Legislative Qtrs. PMB 706 Garki, Abuja
Tel: 07025652852 email: info@.e-shis.com

www.e-shis.com

Annexure E: Letter from professional editor

FORM SERVICES LTD.
(BUSINESS CENTRE)

S. FF 32, Plot 2161
Funmilayo Ransomkuti Road,
Abuja Shopping Complex,
Area 3, Garki - Abuja

09 - 2347868
Tel - 09- 2348996
08033233965

E-mail: bleso_akor@yahoo.com
Phone: 08050835700

9th June, 2012

University of South Africa,
Department of Health Studies.

Dear Sir/ Ma,

RE: AKINBINU, TOPE RAYMOND

I was consulted by the above-named student of your university for professional editing of his MPH dissertation.

I have gone through the document and made the necessary corrections (tenses, grammar, spellings and organisation) as stipulated in your tutorial letter MNUALL/ 301/ 2011. He would be anticipating your approval.

Yours faithfully,

Blessing Akor

Annexure F: Consent form

Please read this form carefully and ask any question you may have before agreeing to take part in the study.

Research title

Knowledge of Computer Vision Syndrome among computer users in the workplace in Abuja, Nigeria.

What the study is about

The purpose of the study is to assess the level of knowledge of computer users about computer vision syndrome and its preventive measures in a workplace in Abuja, Nigeria.

What you will be asked to do

If you agree to be in this study, a questionnaire will be given to you. The questionnaire consists of 22 questions which will take about 20 minutes to complete. You are requested to respond to each question to the best of your knowledge.

Risks and benefits of the study

***Risks*:** The researcher does not anticipate any risks to you participating in this study other than those encountered in day-to-day life. This may just be mere inconvenience.
***Benefits*:** The study will help improve the awareness of computer vision syndrome and its preventive measures and the potential reduction in the loss of productivity and vision problems associated with computer use. It will also help health educators identify areas to concentrate their efforts.

Your answers will be confidential

The records of this study will be kept private. In any sort of report made public, information that will make it possible to identify you will not be included. The research records will be kept in a locked file, only the researchers will have access to the records.

Taking part is voluntary

Taking part in this study is completely voluntary. You may also skip any questions that you do not want to answer and you are free to withdraw from the study at any time, without giving any reason.

If you have questions

The researcher conducting this study is **Dr. Tope Akinbinu**. You are free to ask any questions now. If you have questions later, you may contact:

Dr. Tope Akinbinu
Tel: 08033968475
E-mail: topeakinbinu@yahoo.com.
You will be given a copy of this form to keep for your records.

Statement of consent

I have read the above information, and have received answers to any question I asked. I consent to take part in the study.

Your signature……...Date……..

Your name……

Annexure G: Questionnaire

A: BIO DATA

1. DATE OF BIRTH:……

2. GENDER: (a) Male (b) Female.

3. EDUCATION

(a) Primary [ ]

(b) Secondary [ ]

(c) Tertiary [BSc, BA etc] [ ]

(d) Masters [ ]

(e) PhD. [ ]

(f) Others (specify)……

B: Employment

4. State which department you are working……

5. How many years have you worked in this department?.....Months/years

6. Do you use a computer for your work? [Yes] [No]. If Yes:

7. On average how many hours do you work on the computer in a day?.....

8. How long (in years or months) have you been using the computer?.....

C: Knowledge about CVS

9. Do you have any eye problems? [Yes] [No]

10. Have you ever consulted a doctor or eye specialist for an eye problem?

[Yes] [No].

11. Do you experience any of the following eye problems when you are not at work? (headache, eyestrain, double vision, redness, watery eyes, dryness of eyes, blur vision).

[Yes] [No].

If Yes to the above question (11):

12. Which of the following list of eye problems do you experience? ***(Tick whichever is appropriate)***

(i) Pain [ ]
(ii) Irritation [ ]
(iii) Blurred vision [ ]
(iv) Headache [ ]
(v) Neck pain [ ]
(vi) Eyestrains [ ]
(vii) Dryness of the eyes [ ]
(viii) Double vision [ ]

If YES to any of the above symptoms

13. What do you do to get relief? ***(Circle whichever applicable)***

(i) Take a break but remain seated
(ii) Take a break and move around
(iii) Close my eyes
(iv) Blink more frequently
(v) Others (specify)…….

14. Are you aware of a condition called Computer Vision Syndrome? [Yes] [No]

If Yes to the above question:

15. What do you understand by Computer Vision Syndrome? ***(Circle whichever applicable)***

(i) Tiredness during computer use.
(ii) Wearing glasses while using the computer.
(iii) Combination of headache, eyestrain and blur vision that occur as a result of prolonged computer use.

(iv) I only heard of it, I don't know what it means.

16. How did you know about Computer Vision Syndrome? *(Circle whichever applicable)*

(a) Friend/Relative/Colleague

(b) Radio/TV/Newspaper/Magazine

(c) Internet

(d) Doctor

(e) Others (specify):……

17. Do you experience any of these problems while using the computer? (Write Yes or No in the boxes)

(a) Headache [ ]

(b) Eyestrains [ ]

(c) Double vision [ ]

(d) Redness [ ]

(e) Watery eyes [ ]

(f) Dryness of the eyes [ ]

(g) Blur vision [ ]

If YES to any of question (17) above:

18. What do you do to get relief? *(Circle whichever applicable)*

(a) Take a break

(b) Close eyes

(c) Blink more frequently

(d) Nothing

(e) Others (specify)……

19. In your opinion, do you think the symptoms you are experiencing are related to use of a computer? [Yes] [No]

20. If Yes to question (19), why do you think so?

(a) Prolonged glaring at the computer screen

(b) Too bright computer screen

(c) External light reflection on the computer screen

(d) My poor eyesight

(e) Others (specify)…….

21. If NO to any of question (19), what do you think is the cause of your symptoms? (List three important reasons)

(a)……

(b)……

(c)……

22. What would you consider to be important prevention measures of CVS?

(a) Taking regular breaks

(b) Blinking frequently

(c) Checking eyes regularly

(d) Using glare screen on the computer.