



WEST AFRICAN JOURNAL OF NURSING

ISSN 1117-9689

Published by West African College of Nursing
An Agency of West African Health Organisation

Vol. 26

No. 1

May 2015



2015: MAGIC YEAR' FOR ACHIEVING THE MDGS

Website: www.wacn-online.com

E-mail: westafricanjournalnursing@yahoo.com
westafricancollegenursing@gmail.com





2015: MAGIC YEAR FOR ACHIEVING THE MDGs

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EFFECT OF AGE AND JOB DESIGNATION ON VISUAL DYSFUNCTION AMONG COMPUTER USERS AT THE NATIONAL OPEN UNIVERSITY OF NIGERIA.

Simeon Kayode **Olubiyi**, RN, BSc(N), MSc., Ph.D, PGDE, FWACN, FCP

Lecturer, Department of Nursing Science, Faculty of Clinical Sciences, College of Health Sciences, University of Ilorin, Ilorin. **Email address:** olubiyisimeon@yahoo.co.uk, olubiyi.sk@unilorin.edu.ng.

Phone Numbers: +2348033617649.

Joel Adeleke **Afolayan**, RN, BSc(N), MSc., Ph.D, FWACN.

Senior Lecturer, Department of Nursing Science, Faculty of Clinical Sciences, College of Health Sciences, University of Ilorin, Ilorin.

Email address: joel.afolayan@gmail.com, afolayan.ja@unilorin.edu.ng.

Phone number: +2348052625510, 08037116208

Bidemi **Okesina**, BSc., MSc.

Assistant Lecturer, Department of Optometry, Faculty of Life Sciences, University of Ilorin, Ilorin. **Email address:** okesina_bidemi@yahoo.co.uk

Phone Number: 07086854723, 08065482455.

Abstract

Competitiveness in today's world requires the use of computers for problem solving. This often demands prolonged working hours with its attendant health hazards. The study was carried out to determine the frequency of existence of visual dysfunction arising from prolonged usage of computer among staff of NOUN. Specifically, this study looked into persistent computer visual dysfunctions among NOUN staff and also examined whether these visual problems were linked with age and job designation of staff.

The study was a cross-sectional survey adopting multi-stage random sampling method in the 17 NOUN Study Centres. The sample size for the study was 297; this was determined by the minimum sample size calculation from a total population of 902 staff of NOUN as at the time of the survey. A self-administered and structured questionnaire was used to gather information for the study. Snellen's test was used to determine visual acuities of the respondents. Frequency, percentage and chi-square ($p < 0.05$)

were used to interpret, illustrate and establish strength of associations among the variables.

The findings of the study revealed that majority of visual dysfunctions observed were among the 31 – 42 years age group who were mostly chronic computer users. Also, academic staff category whose roles are largely computer intensive were observed to have less desirable visual acuities compared to their counterparts.

This study concludes that prolonged computer usage may trigger hypermetropia, allergic conjunctivitis; itching eyes and photophobia, as these were prominent among computer users at the NOUN. It was, however, suggested that sensitization programmes on safe and effective computer use among staff most especially academics should be encouraged by institutional authorities.

Keywords: Age, Job designation, Visual dysfunctions, Computer users.

Introduction

The advent of modern computers in the twentieth century has influenced the growing need to find a system that would facilitate rapid data collection and that would organize them in such a way that retrieval of data is not compromised. Every electronic device including computer produces a form of Electromagnetic Field (EMF). This is a non-ionizing radiation which releases energy from electronic device that is not enough to ionize the atoms, hence instead of removing electrons it only excites the electrons. This energy brings negative effects to human health.

Computer, like most electrical appliances, emit both ionizing and non-ionizing radiation. By using computer or even sitting in computerized workplaces certain number of hours, an individual especially employees is directly exposed to the harmful effects of EMF which may cause rapid or slow several health hazards including the eye.

Computerized jobs are more sedentary as it requires more cognitive processing and mental attention. Besides, to put computers into operation for many tasks in tandem means that operator would necessarily sit before visual display terminal of computers. The computer screen demands that the user work within a very restricted posture range. The use of computer device has increased throughout the developed countries ranging from five minutes a day to eight hours a day depending on the type of job a person does. The extent to which an individual experiences related-computer usage symptoms is largely dependent upon visual demands of the task being performed. Since most activities of today's world are hinged on the usage of computer, it is expedient to consider the effect of age and job designation on visual dysfunction arising from computer usage.

Theoretical framework

The theoretical framework on the effect of age and job designation on visual dysfunction arising from prolonged computer usage is based on the Godfrey Hochbaum's Health Behaviour concept of inferential learning for behaviour modification.¹

The underlying concept of the HBM is that health behaviour is determined by personal beliefs or perceptions about a disease and the strategies available to decrease the occurrence. The HBM theory illustrates the importance of individual beliefs about health, prevention of diseases and it's strongly oriented towards the individual perceptions of the world, and the relative costs and benefits of actions to modify health behaviour².

Research Objectives:

1. To evaluate the influence of age on persistence of computer visual dysfunctions
2. To determine the frequency of existence of visual dysfunction arising from prolonged usage of computer among staff of NOUN.
3. To describe the correlation between job designation of staff of NOUN and appearance of computer visual dysfunctions.

Research Questions

Specifically, this study was concerned with finding answers to the following questions.

1. What are the common visual dysfunctions associated with prolonged computer use among NOUN staff?

1. Is there any significant relationship between age and visual dysfunction among NOUN staff?
2. Does job description (job categories) contribute to observed visual dysfunction among NOUN staff?

Significance of the Study

The study was designed with the hope that it will encourage the University management to include eye assessment in the employment procedure of her staff that use computer for their day-to-day work.

Literature review

Eyestrain and asthenopia are growing obstacles facing the computer generation of today and tomorrow³. Eye strain also known as asthenopia is defined as blurred or double vision, burning, irritation, headaches, gritty eye sensation, eye fatigue, neck and shoulder pain, colour perception change, decreased visual efficiency, more frequent errors and reduced efficiency. Eye fatigue is often caused by the eye muscles becoming tired much like other muscles in our body. Eyestrain is developed from looking at a visual display terminal (VDT) for a long time that the eyes are not accustomed to doing⁴.

One of the most common causes of eye fatigue observed to be common to millions of computer users around the world is staring for long periods at digital devices such as computer screens, smart phones and video games^{5,6}. This type of eye fatigue is sometimes known as computer vision syndrome (CVS). Working with the computer is visually demanding because it requires excessive ocular motility, continuous eye focusing and alignment demands. Problems occur when these demands exceed

the visual ability of an individual. Studies conducted in Egypt 2000 and reported in Australia found that eye discomfort was associated with computer use, mainly eye strain, deterioration of vision, aching or burning eyes and blurred vision⁷.

The human eye consists of three sets of muscle cells. These muscle cells work harder when we work at the computer because the eye is required to see close objects. Extra-ocular muscle cells work to make the eyes go into the sphincter muscles and work so that pupils shrink, while the ciliary muscle contracts in order to make the eye lens produce images or pictures in a clearly visible. The use of computers is associated with a decreased frequency of blinking and an increase rate of tear evaporation contributes to dry eyes⁸.

Cataract results from a clouding opacification of the normally slightly yellowish lens of the eye. While the most common cataracts are age-related, there are other types of cataracts, including secondary cataracts (resulting from other diseases, such as glaucoma or diabetes); traumatic cataracts (which may develop as a result of injury to the eye); or radiation cataracts (which develop as a result of exposure to radiation) (AAO)⁹.

Methodology

The research was a cross sectional survey of National Open University of Nigeria (NOUN) Staff

Study Population

The study population comprised of all staff of the National Open University of Nigeria (NOUN) made of the academics, administration, secretaries/other computer operators, information technologists and

accounts staff at the Headquarters in Lagos, Abuja Planning Office, Kaduna Campus and at the 44 study centres who used computer for their day to day official activities.

Sample and Sampling Technique

A total of 297 respondents were included in the study using a multi-stage sampling technique. Seventeen (17) study centres were selected out of the thirty four (34) study centres in the six geopolitical zones with computer setting required for the study. It was adopted in the following order:

First Stage: The first stage involved a purposive sampling of 34 out of the existing 38 NOUN Study Centres. The study centres were chosen because they

have high concentration of staff that use computer frequently.

Second Stage: The second stage was the simple random selection of 297 respondents from the 17 Study Centres to complete the questionnaire.

Research instrument

The research instrument used for the study was a self administered questionnaire designed to capture both qualitative and quantitative data using the Likert scale to elicit their responses.

Visual acuity of the subjects

The visual acuity of the 297 respondents was assessed and interpreted accordingly using the format in Table 1. Deficit findings on each eye were recorded.

Table 1: Visual acuity codes and interpretation from Snellens Chart.

Visual acuity code	Interpretation
6/4 6/5	Very desirable
6/6	Desirable
6/9 6/12 6/18 6/24 6/36 6/60	Not so desirable

Source: Field Survey Template, 2014.

Data Analysis

The inferential statistics of Pearson chi-square test was employed at 0.05 level of significance using Statistical Package for Social Sciences (SPSS) 16.0 version. The data collected was analyzed using both descriptive and inferential statistics

comprising of Chi-square, T-test and Analysis of Variance (ANOVA). The descriptive statistics of frequency counts, percentage, mean score, graphs, charts, standard deviation were used to show the distribution of the socio-demographic characteristics of workers at NOUN.

Findings

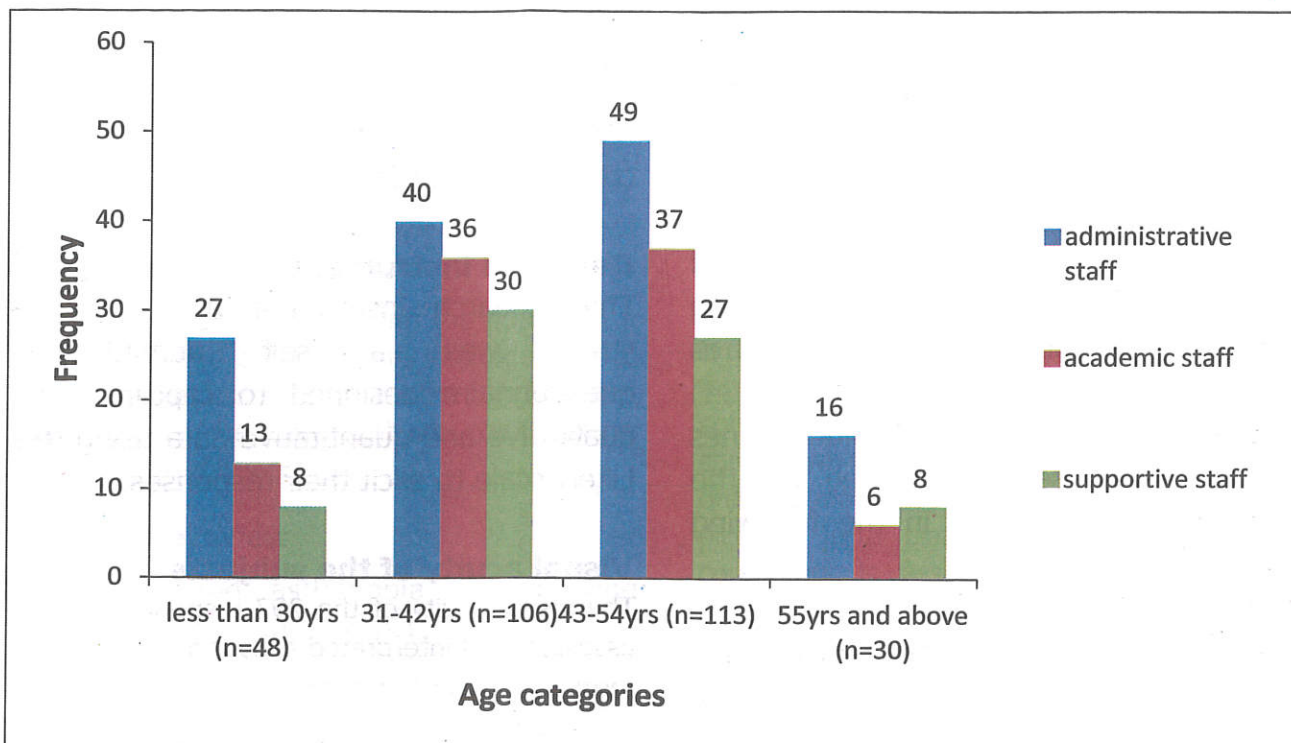


Fig. 1: Age distribution of the Staff categories at the National Open University of Nigeria (NOUN)

This bar chart presents the age distribution of the three categories of staff who participated in the study. The 43-54 year age group had the highest percentage (38%) among the respondents in each category of staff. This was

followed by the 31-42 year olds with 36% representation, less than 30 years has 16% and the least group in the study was the 55 years and above age group with about 10% representation.

Love never dies a natural death. It dies because we don't know how to replenish its source. It dies of blindness and errors and betrayals. It dies of illness and wounds; it dies of weariness, of withering, of tarnishings.

Anais Nin

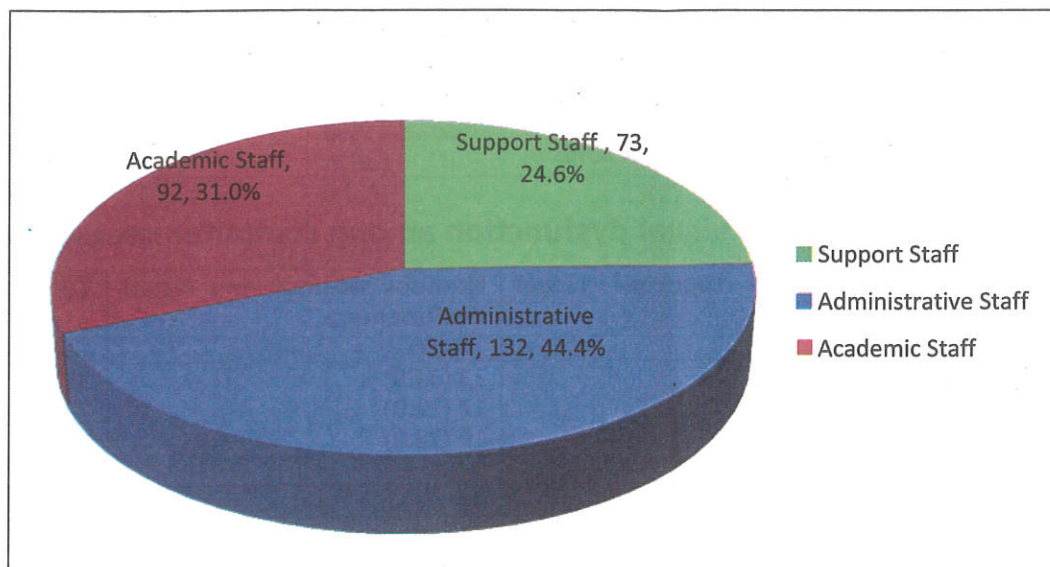


Fig. 2: Distribution of job designation of Staff at NOUN.

Figure 2 showed the frequency and percentage distribution of job designation of Staff at the National Open University of Nigeria (NOUN) who participated in the study. One hundred and thirty-two

(44.4%) members of the staff are in the administration; 92(31%) are in the academics while the remaining 73(24.6%) are support staff of the university.

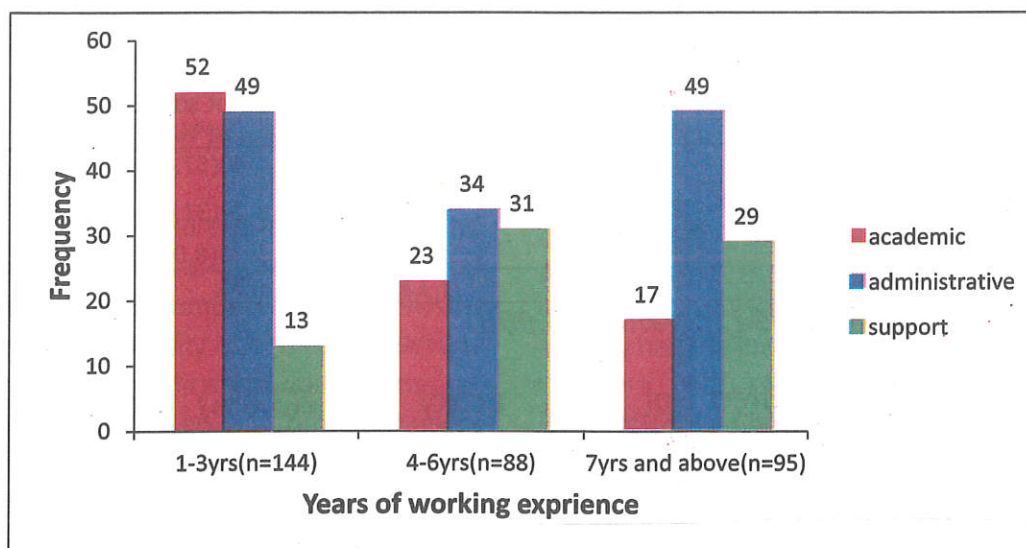


Fig. 3: Working experience of Staff of NOUN

Figure 3 describes the working experience (in years) of the three categories of staff of the National Open University of Nigeria

(NOUN) who participated in the study. One hundred and fourteen members of the staff (38.%) of the National Open

University of Nigeria (NOUN) have only 1 – 3 years working experience with the institution. A total of 88 (30%) members of Staff have been working with NOUN

for 4 – 6 years. Ninety-five members of staff (32%) had seven years of experience with NOUN.

Table 2: The Effect of age on visual dysfunction among computer users at NOUN

Age Intervals	Number with reported visual dysfunctions n (%)	Number without any visual dysfunction n (%)	Total
≤ 30yrs	25 (66.0)	13 (34.0)	38
31-42yrs	61 (78.0)	17 (22.0)	78
43-54yrs	50 (72.0)	19 (28.0)	69
≥ 55yrs	3 (100.0)	0 (0.0)	3
Total	139	44	188

**Fisher's exact $X^2 = 3.182$; p value = 0.364*

Table 2 above showed the effect of age on visual dysfunction among computer users at NOUN. Twenty-five (66.0%) of the respondents who are less than 30 years had visual dysfunctions, 61(78.0%) of the 31 – 42 years interval had visual dysfunctions while only

3(100.0%) were reported among respondents who were 55 years and above. The outcome showed that there is no significant association between the age and visual dysfunctions reported from the respondents ($p > 0.05$)

Table 4: The Effect of job designation on visual acuities of right eye of Staff categories of computer users

Job designation	Computer Users (N=188)			Total
	Very desirable n(%)	Desirable n(%)	Not so desirable n(%)	
Academic staff	1(1.0)	36(42.0)	48(57.0)	85
Administrative staff	2(3.0)	42(66.0)	20(31.0)	64
Supportive staff	4(10.0)	32(82.0)	3(8.0)	39
Total	7	110	71	188

**Fisher's exact $X^2 = 32.892$; p value = 0.008*

Table 4 showed the Effect of job designation on visual acuities of right eye of Staff categories of Computer Users. Forty-eight (57.0%) of the Academic staff category had not so desirable acuity, 36(42%) had desirable visual acuity and 1(1.0%) had very desirable visual acuity. Out of the 64 Administrative staff, 42(66%) had desirable visual acuity, 20(31.0%) had not so desirable visual

acuity and 2(3.0%) had very desirable visual acuity. In the Support Staff category, 32(82.0%) had desirable visual acuity, 4(10.0%) had very desirable visual acuity and 3(8%) had not so desirable visual acuity. A significant association was recorded ($p < 0.05$). This implies that job designation is associated with the right eye visual acuity presented.

Table 5: The Effect of job designation on visual acuities of Left eye of Staff categories of computer users

Job designation	Computer Users			Total
	Very desirable n(%)	Desirable n(%)	Not so desirable n(%)	
Academic staff	0(0.0)	23(27.0)	62(73.0)	85
Administrative staff	2(3.0)	53(83.0)	9(14.0)	64
Supportive staff	3(8.0)	36(92.0)	0(0.0)	39
Total	5	112	71	188

**Fisher's exact $X^2 = 26.417$; p value = <0.0001*

Table 5 showed the Effect of job designation on visual acuities of Left eye of Staff categories of computer users. Sixty-two (73.0%) of the Academic staff category had not so desirable acuity and 23(27.0%) had desirable visual acuity. Fifty-three (83.0%) Administrative staff had desirable visual acuity, 9(14.0%) had not so desirable visual acuity and 2(3.0%) had very desirable visual acuity. Out of the Support Staff category, 36(92.0%) had desirable visual acuity and 3(10.0%) had very desirable visual acuity.

A significant association was recorded ($p < 0.05$). This implies that job designation is associated with the left eye visual acuity presented.

Discussion

This study has examined the effect of age and job designation on visual dysfunctions among the Staff categories of computer users at NOUN. A decrease in visual acuity of computer users of NOUN correlates significantly with a loss of accommodation expected as computer users advance in age. It has been reported that the near point recedes throughout life; it starts slowly at first and then rapidly as an individual advances in age from approximately 90cm at age 10 to about 83cm at age 60¹⁰. This recession has been attributed primarily to increasing

hardness of the lens consequently leading to loss of accommodation precipitated by steady decrease in the degree to which the curvature of the lens has been increased.

The findings of the Left eye mirror those of the Right eye. The anomalous observation of a relatively higher visual acuity in the Right eye of computer users in the 43 – 54 age intervals is a rare occurrence among populations with a frequency of 0.1%. The accommodative power of the lens is also affected by the pattern of computer usage. The percentage of people with normal visual acuity decreases with more frequent usage of computer while the percentage of people with less desirable visual acuity increases with more frequent use of computer.

The visual acuities observed reflect the intensity of computer usage by the Staff categories. Academic Staff that has the highest percentage (88%) of computer intensive roles for each activity has the lowest percentage (42%) of this category with normal visual acuity. The Administrative category which has 17% of its activities as computer intensive exhibited normal visual acuity in 66% of its Staff, while the Support Staff category with 33% of its activities being computer intensive has the largest percentage of Staff (82%) with normal visual acuity.

Staffing system at NOUN exists in three categories namely: Academic, administrative and Support, with each Staff category having roles that match the operation of distant learning.

This large percentage of normal visual acuity observed among the Support Staff is apparently a reflection of the pattern of computer usage by the Support Staff; this category of Staff experiences a number of recovery times from computer desk in the course of daily activity in spite of the fact that they are also prolonged daily computer users as opposed to the Academic Staff that sit by the computer uninterruptedly with no recovery time as nature of the tasks dictated. As has been the case in all the visual acuity studies, similar results on the effect of job designation on visual acuities observed for the Right eye also existed for the Left eye.

The majority of visual dysfunctions were found among the 31 – 42 years age interval of computer users. It should be noted that the majority of the Academic category of Staff of NOUN is found within this age interval whose roles are largely computer intensive thereby further associating the visual dysfunctions with computer usage.

Conclusion

This study has attempted to investigate the effect of age and job designation on visual dysfunction among staff of the National Open University of Nigeria. Staff between 31-42 year age group had the highest frequency of visual dysfunction and prolonged computer usage creates visual dysfunction such as hypermetropia, allergic conjunctivitis, itching eyes and photophobia were more among computer users at the NOUN.

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*The most important practical lesson
than can be given to nurses is
to teach them what to observe"*

Florence Nightingale