



**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
SCHOOL OF PUBLIC HEALTH**

**ASSESSMENT OF COMPUTER VISION SYNDROME AND
ASSOCIATED FACTORS AMONG EMPLOYEES OF ETHIO
TELECOM IN ADDIS ABABA, ETHIOPIA**

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SCHOOL OF PUBLIC HEALTH

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FACTORS AMONG EMPLOYEES OF ETHIO TELECOM IN ADDIS ABABA,
ETHIOPIA**

I undersigned agree to accept all responsibilities for the scientific and ethical conduct of this research project and declare that this thesis is my original work in partial fulfilment of the requirement for the Master of Public Health with specialty in environmental and occupational health

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APPROVAL BY EXAMINATION BOARD

This thesis by Natnael Gizachew is accepted in its present form by the board of examiners as satisfying thesis requirements for the review of degree of masters of public health with specialty in environmental and occupational health

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List of acronyms and abbreviations

Abbreviations Description

AOR	Adjusted odds ratio
CI	Confidence interval
Cm	Centimeter
COR	Crude odds ratio
CVS	Computer vision syndrome
n	Sample size
NORHED	The Norwegian program for capacity development in higher education and research for development.
SPSS	Statistical package for social sciences
VDT	Visual display terminal
VIF	Variance inflation factor

Abstract

Background: Computer Vision Syndrome is a range of eye and vision related problems which may result from extended use of digital devices such as computers. It is a public health problem, affecting more than 70% of all computer users. In developing countries like Ethiopia, there is a scarcity of studies on computer vision syndrome, particularly in the telecom industry for evidence-based practice. Hence, the study aims to identify the determinants and the prevalence of computer vision syndrome among Ethio telecom workers in Addis Ababa, Ethiopia.

Methods: Institution-based cross-sectional study was conducted among Ethio telecom employees in Addis Ababa, Ethiopia from March to June 2023. A total of 497 individuals participated in the study. Data was collected using an interview-administered questionnaire, observational checklist and an illuminance measuring instrument. Data were collected using Kobo toolbox and transferred to Statistical Package for the Social Sciences (SPSS) version 26 for analysis. Multivariable logistic regression was performed to assess the association and control for potential confounders.

Results: the prevalence of computer vision syndrome in the last 12 months among the total study participants of 497 was 68.8% [95% CI (64.5, 72.9)]. In Multivariate logistic regression factors that showed significant association were viewing distance, AOR (2.32(1.24-4.33)) and task illumination AOR: (1.78(1.09-2.91)). And Habit of taking break AOR: (0.439(0.281-0.686)) and adjustment of brightness and contrast AOR: (0.39(0.22-0.68)) were also found significantly associated factors of Computer Vision Syndrome.

Conclusion: More than half of employees of Ethio telecom in Addis Ababa are affected by computer vision syndrome. Viewing distance, task illumination, habits of taking breaks, and adjustment of brightness and contrast were associated significantly. Results suggest a need for remedial actions to improve conditions of work environment.

Key words: Computer vision syndrome, prevalence, environmental factors, computer user workers, task illumination, Addis Ababa, Ethiopia.

1. Introduction

1.1. Background

Technological advances have made a huge impact on almost every aspect of our lives. Particularly, the availability of computers has made our daily tasks simpler (1–3). The use of digital devices has increased substantially in recent years across all age groups. The extensive daily use for both social and professional purposes is now becoming normal (4). Computers are one of the commonest office tools in various institutions such as government offices and their use has become a necessity worldwide (5). Consequently, workers spend more time looking at computers and other digital devices. However, continuous use of computers for extended hours causes a range of impairments such as vision related problems, headaches, and low backache (6).

Computer vision syndrome has been defined in different pieces of literature. The most commonly used definition of Computer Vision syndrome in many works of literature is defined by the American Optometric Association “CVS is a group of eye and vision-related problems resulting from prolonged use of computers, tablets, and cell phones” (2). It is a form of repetitive strain disorder that frequently occurs among people using visual display terminals such as computers, tablets, cell phones for more than 3 hours a day (7). The level of discomfort has been seen to be proportional with the intensity of VDT use (8).

Causes of vision-related problems experienced while the use of computers is multifactorial. Although there is no strong evidence for causation studies have suggested multiple factors that may contribute to the development of this condition such as prolonged exposure to computer screens, environmental factors, and workplace ergonomics (9,10).

Workplace ergonomics, in this context, refers to the setup of furniture and equipment in an office environment for users to work more efficiently and comfortably with less discomfort (11). Computer ergonomics (also called visual ergonomics) usually deals with ways to optimize computer workstations to reduce specific risks of CVS (12). Proper lighting is an important factor for visual efficiency and comfort. Consequently, improper lighting is often considered the biggest environmental factor that contributes

to visual discomfort (11). Hence, an assessment of lighting and other ergonomic conditions is required to get a better understanding of their impact in this context.

1.2. Statement of the problem

Computer Vision Syndrome has become a growing public health concern and contributes significantly to reducing the quality of life and efficiency at the workplace. Computer Vision Syndrome is the 21st-century's most common occupational hazard affecting more than 70% of all computer users and it is estimated that around 60 million people worldwide are affected by the problem with a million new cases occurring each year (13,14). High workload, inadequate accessibility, low utilization of personal protective equipment, and restricted break times when using a computer makes the problem of CVS even worse in low-income countries (15).

In Ethiopia, a meta-analysis conducted very recently among computer users showed that the prevalence of CVS was high and pooled prevalence was 73.21% (15). A recent study conducted among bank employees in Addis Ababa, Ethiopia showed prevalence of CVS was 74.6% (16). Another study in Gondar showed the prevalence of CVS was 78.8% (17). While a study conducted among secretaries working in ministry offices showed the prevalence of CVS was 68.8% (18). This trend shows CVS is prevalent in office settings and researcher expects an even higher rate in the telecom industry.

Computer vision syndrome is considered a serious public health problem resulting in decreased workplace productivity, lower job satisfaction, higher error rates, and impaired visual ability (15,16,19).

Different studies suggest several factors play a role in the development of CVS. Length of computer use, pre-existing eye illness, knowledge about adverse health effects of prolonged computer use, taking regular breaks, brightness adjustment, inappropriate sitting position, and age were significant factors affecting CVS in different pieces of literatures (6–8).

Computer vision syndrome has been studied well in developed countries. However, it is a bit lacking in developing countries such as Ethiopia. To the researcher's knowledge the telecom industry particularly has never been studied. The level of computer uses and technological advancement is high in the telecom industry,

Hence, it requires attention with the needs of extensive studies. Therefore, this study aims to explore the prevalence and possible risk factors of computer vision syndrome among Ethio-telecom workers in Addis Ababa.

1.3. Rational of the study

In Ethiopia, the telecom industry is revolutionizing with technological advancements computers are indispensable tools used by almost all employees without consideration of the health effects embedded in it. There is a chance that workers might be unaware of health problems related to prolonged use of computers. Employers may also neglect the hazards faced by workers in computer offices. Apart from health problems, the impact it has on productivity and quality of life is immense.

Usually, in the telecom industry employees often use laptops to carry out their routine tasks which put more visual demand. In addition, there is often a need to work over time. These conditions make it slightly different from other regular office settings in terms of exposure to conditions aggravating CVS.

In addition, environmental factors such as lighting and other ergonomic factors are less stressed in different studies in Ethiopia. Therefore, this study aims to fill this gap.

1.4. Significance of the study

The main findings of this study will contribute to the currently available literature. In addition, Further recommendations from the study will contribute to the awareness creation of CVS and related factors to the Ethio-telecom company managers and employees. As well other private and governmental offices can benefit from the finding and recommendations from this study and consider potentially making improvements in workstation design and environment for the workers. The findings generated from this study could be helpful for ophthalmic professionals, health, and other stakeholders in this area as an input to enhance knowledge and level of awareness regarding CVS among computer users.

2. Literature Review

2.1. Magnitude of Computer vision syndrome

Regarding the magnitude of CVS, It is estimated that nearly 60 million people are affected worldwide by this problem (13). The vision council reported that 65 % of Americans reported that they experienced CVS of which neck and shoulder pain was the commonly reported symptom accounting for 36% of the population and Eye strain, headache, blurred vision and dry eyes was reported by 35%, 25%, 25% and 24% of the population respectively (20). A cross sectional study in Nepal conducted among VDT users in office settings showed that 84.4% of individuals reported at least one symptom of CVS where the most common symptoms reported were tired eyes (63.3%), dry eyes (57.8%), headaches (56.9%), and pain behind the eyes (45.9%) (21). Whereas, another study conducted in Malaysia among students studying in different universities in Malaysia showed a that the prevalence of CVS (showing at least one symptom of CVS Eye strain (irritation, heaviness), tiredness of eyes, watering of eyes, redness of eyes, blurring of vision, dry eye, discomfort, double vision, headache, backache, neck pain and shoulder pain.) was 89.9% (1).

Another study conducted among engineering students in University of Lahore, Pakistan showed that the prevalence of CVS among students was 72.4 % where the most experienced symptoms were headache, eye strain, neck pain, tiredness and redness of the eyes (22).

A study conducted among academic staff in Ghana showed that CVS was reported among 51.5% of individuals and that the most commonly reported symptoms were burning sensation, foreign body sensation, eye pains, itching, and blurred vision (9).

Whereas, another study conducted among secretaries and data processors in Gondar, Ethiopia showed the prevalence of CVS was 73.9% and frequently reported symptoms were blurred vision (31%) and eye strain (25%) (6).

2.2. Factors affecting Computer vision syndrome

2.2.1. Socio-Demographic factors and Computer vision syndrome

CVS has varied among sexes according to many studies. Studies have shown a significant association of the female gender and prevalence of CVS (23–25). A study among computer office workers in Sri Lanka revealed that the female gender was

associated with the prevalence of CVS (OR: 1.28, $P < 0.05$) (23). While another study in Malaysia also showed that gender was significantly associated with CVS and logistic regression analysis showed female gender was a significant predictor for CVS with odds of 2.3 (95% CI: 1.45, 3.65) (25).

But, a study conducted among bank workers in Ethiopia showed that male gender was significantly associated with CVS. While males were 1.8 times likely to develop CVS as compared to females (AOR: 1.8; 95% $p < 0.05$) (26).

It is known that the flexibility of the lens decreases gradually with age leading to a condition known as presbyopia. A review previously conducted on CVS has indicated that the incidence of dry eye tends to increase with age (27).

2.2.2. Personal factors

Brightness and contrast of computer screen

The level of computer brightness contributes to the occurrence of CVS. There is an evidence from a study in Jimma, working on a computer without adjusting computer screen brightness was (AOR) 2.8 times more likely to experience CVS when compared to their counterparts respectively (18). Another study in Saudi Arabia also reported a significant association between screen brightness and development of CVS (28).

Use of eye drops

Eye drops help to maintain moisture on the outer surface of the eye. Studies suggest symptoms caused by dry eyes can be relieved by using lubricating eye drops (13).

Use of eye glasses

Some studies suggested that there is a link between eye glass use and CVS. Penn medicine states that almost 71 percent of those who have reported an experience of the symptoms of Computer Vision Syndrome wear eyeglasses (29). A study among instructors in Ethiopia have found that using eyeglasses was significantly associated with CVS while the odds of having CVS among instructors who did not use eyeglasses were 68% less likely than those using eyeglasses (14). However, another study in Nepal found that the use of eye glasses to be protective against developing CVS (30).

Pre-existing eye illness

Individuals with pre-existing eye illness are likely to develop CVS in the workplace. A study in Thailand showed an association between prior history of ocular disease and CVS (31). Another study in Northwest Ethiopia also showed that there was a significant association between CVS and previous history of eye illness (AOR: 3.19, 95% CI (1.49, 6.84)) (32).

Rest breaks

Habit of rest breaks play a role in the occurrence of CVS. In a study in Malaysia, taking rest for at least 10 minutes during continuous one hour of computer work was significantly associated with CVS where respondents who did not take breaks were likely to develop CVS (AOR: 1.78, 95% CI:1.11,2.87) (25). A study among computer users in Northwest Ethiopia also showed that not taking frequent breaks was associated with development of CVS (32).

2.2.3. Environmental and work-related factors

Duration of computer use

The level of discomfort from computer use is often proportional to the duration of use. A study in showed that continuous use of computer for more than 5 hours was a significant predictor for CVS 95% (OR: 1.07-2.16) (33). While another study in Pakistan also showed that longer duration of computer use was significantly associated with symptoms of CVS (34).

Lighting

Lighting is one of the most important environmental factors that can affect vision in computer use. A study in Ghana showed that suboptimal lighting in the workstation was significantly associated with CVS (9). A meta-analysis in Ethiopia reported a significant association with the amount of workplace illumination and CVS where, participants who worked in improper illumination levels were 2.47 times likely to develop CVS [AOR = 2.47, 95% CI (1.47, 4.33)] (17).

Viewing Distance

Viewing distance is a common predictor of CVS in many studies. A study in Nepal showed, inappropriate viewing distance was a predictor for CVS among VDT users with [OR = 2.38; CI (1.17, 5.82) p = 0.017] (35).

Antiglare Filter

Filters are placed in front of screens they help to cut down glare and reflections, which is usually a source of visual related problems. There was an evidence in a study in Indonesia, where respondents who did not use anti-glare filters were more likely to have CVS (P<0.05) (36). Another study in India also showed that CVS was more likely to occur among participants who did not use anti-glare screen (37).

Viewing angle/ level VDT are viewed

The level in which VDT are viewed or gaze angles also matters and studies have indicated an association with CVS. In a study a significant association was found between gaze angle and ocular complaints and it was found that the complaints were less when participants maintained the top of the screen level below the eyes (37).

Conceptual framework of the study

This conceptual framework is developed on the basis of the review of literatures on the topic. It mainly has three components: socio-demographic factors, personal factors, environmental & ergonomic factors. The overall aim of this conceptual framework is to show in brief how different variables interact in affecting the outcome: CVS.

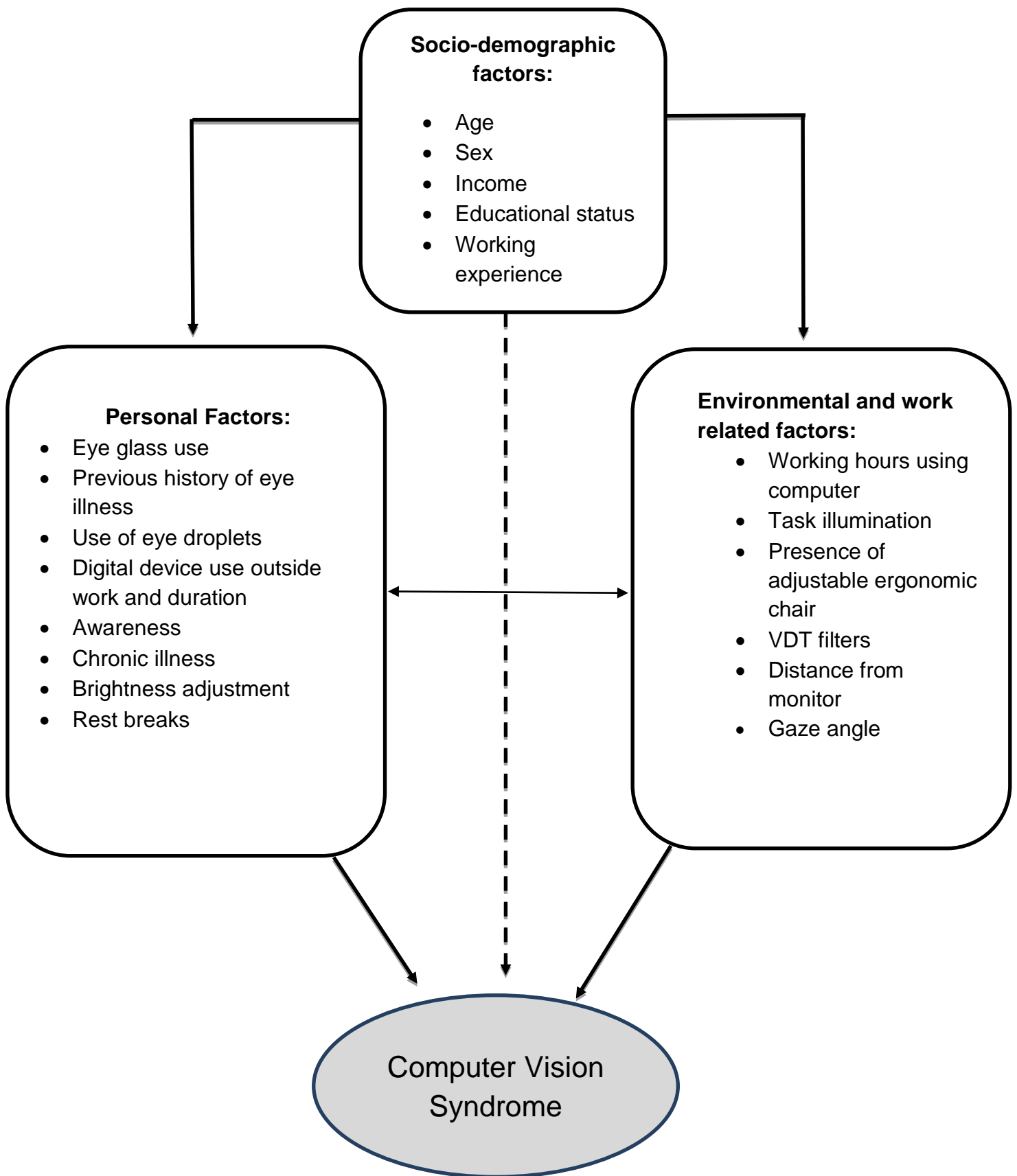


Figure 1. Conceptual framework of the study showing how different variables interact

3. Objectives

3.1. General objective

- The aim of the study is to assess the magnitude of computer vision syndrome and associated factors among Ethio-telecom computer using workers in Addis Ababa, Ethiopia 2023

3.2. Specific objectives

- To determine the prevalence of computer vision syndrome among Ethio-telecom workers who are using computers in Addis Ababa, Ethiopia 2023
- To identify factors associated with computer vision syndrome among Ethio-telecom workers who are using computers in Addis Ababa, Ethiopia 2023

4. Methods

4.1. Study area

The study was conducted in Ethio telecom Zonal office branches in Addis Ababa, Ethiopia. Addis Ababa, the capital and the most important commercial and cultural centre of Ethiopia, is geographically located at the heart of the nation. As of October 2022, Ethio telecom has become the 23rd largest operator in the world from 781 operators and the 2nd largest operator in Africa from 198 operators. As of the time mentioned Ethio telecom has 68.3 million subscribers. Its telecom service coverage and density has also reached 99.1% population, 85.4% Geography and 64.5% tele density respectively. Until recently, Ethio telecom had monopoly over all telecom services in Ethiopia. It has roughly a total of 12,288 employees across the country.

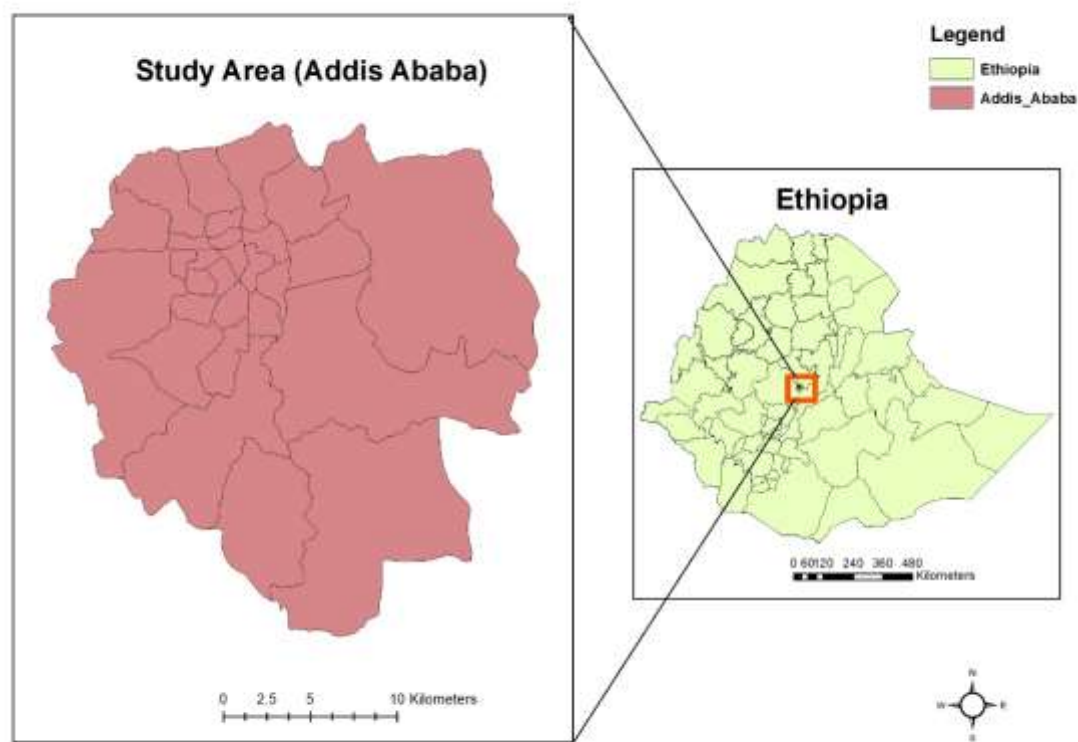


Figure 2: Study area map (Addis Ababa Ethiopia)

4.2. Study design and period

An institution based cross-sectional study was conducted from April to June, 2023 to assess the prevalence and associated factors of CVS among computer user employees of Ethio telecom.

4.3. Source population

All Ethio telecom employees who use computers in Addis Ababa were considered as the source population.

4.4. Study population

Selected employees who use computers in the 6 Zonal district offices of Ethio telecom across Addis Ababa were the study population.

4.5. Inclusion and exclusion criteria

4.5.1. Inclusion Criteria

All workers who are using computers for at least 2 hours per day during the last 12 months were considered eligible for inclusion in the study (25,38).

4.5.2. Exclusion Criteria

Individuals with a history of ocular diseases due to other medical problems excluded from the study(39).

4.6. Sample size determination

1. Sample size for first objective (magnitude of CVS)

The sample size for the prevalence of CVS among Ethio-telecom employees is determined using single population proportion formula with assumptions of the level of significance (α)=5%, marginal error d =4%, and prevalence of 74.6 % (26) from recent study on CVS among Employees of Commercial Bank of Ethiopia in Addis Ababa, Ethiopia.

$$n = \frac{(Z_{\alpha/2})^2 p(1 - p)}{d^2}$$

After adding a 10% non-response rate will yield a sample size of **506**.

2. Sample size for second objective (factors associated)

A study conducted in Gondar showed that the prevalence of CVS among individuals who worked on computer for more than 7 hours per day and less were 82.79% and 69.63% respectively (6). And, another study showed presence of window curtains as a significant factor affecting CVS where prevalence in situations where window curtains are present and not present were 65.13 and 81.9 respectively and for another variable, use of electronics outside of work for unexposed and exposed were 60% and 76% respectively (26).

Based on this finding sample size calculation computed on EPI INFO, using double population proportion formula,

$$n = \frac{(z_{\alpha/2} + z_{\beta})^2 \cdot (P_1(1-P_1) + P_2(1-P_2))}{(P_1 - P_2)^2}$$

Assuming, 85% power, 5% significance level,

P1 : 82. 79% (proportion of CVS among individuals who worked on computer >7 hours per day) and P2: 69.63% (proportion of CVS among individuals who worked on computer < 7 hours per day) adding 10 percent non-response rate yields a final sample size of 449.

P1: 81.9%, P2: 65.13% for variable: presence of window where final sample size is 297 considering 10% non-response rate. And, P1= 76% and P2= 60% for variable: use of electronic device outside of work where final sample size is 360.8 (adjusted for 10% non-response).

Finally, comparing the two methods, the one that gives the maximum sample size was selected which is 506.

4.7. Sampling Technique

There are 6 Zonal offices of Ethio telecom in Addis Ababa, namely: Central Addis Ababa Zone (CAAZ), East Addis Ababa Zone (EAAZ), North Addis Ababa Zone (NAAZ), South Addis Ababa Zone (SAAZ), South West Addis Ababa Zone (SWAAZ), West Addis Ababa Zone (WAAZ), with 2623 workers in total. A proportionate sample

size was allocated to each zone and participants were selected randomly from each zonal office.

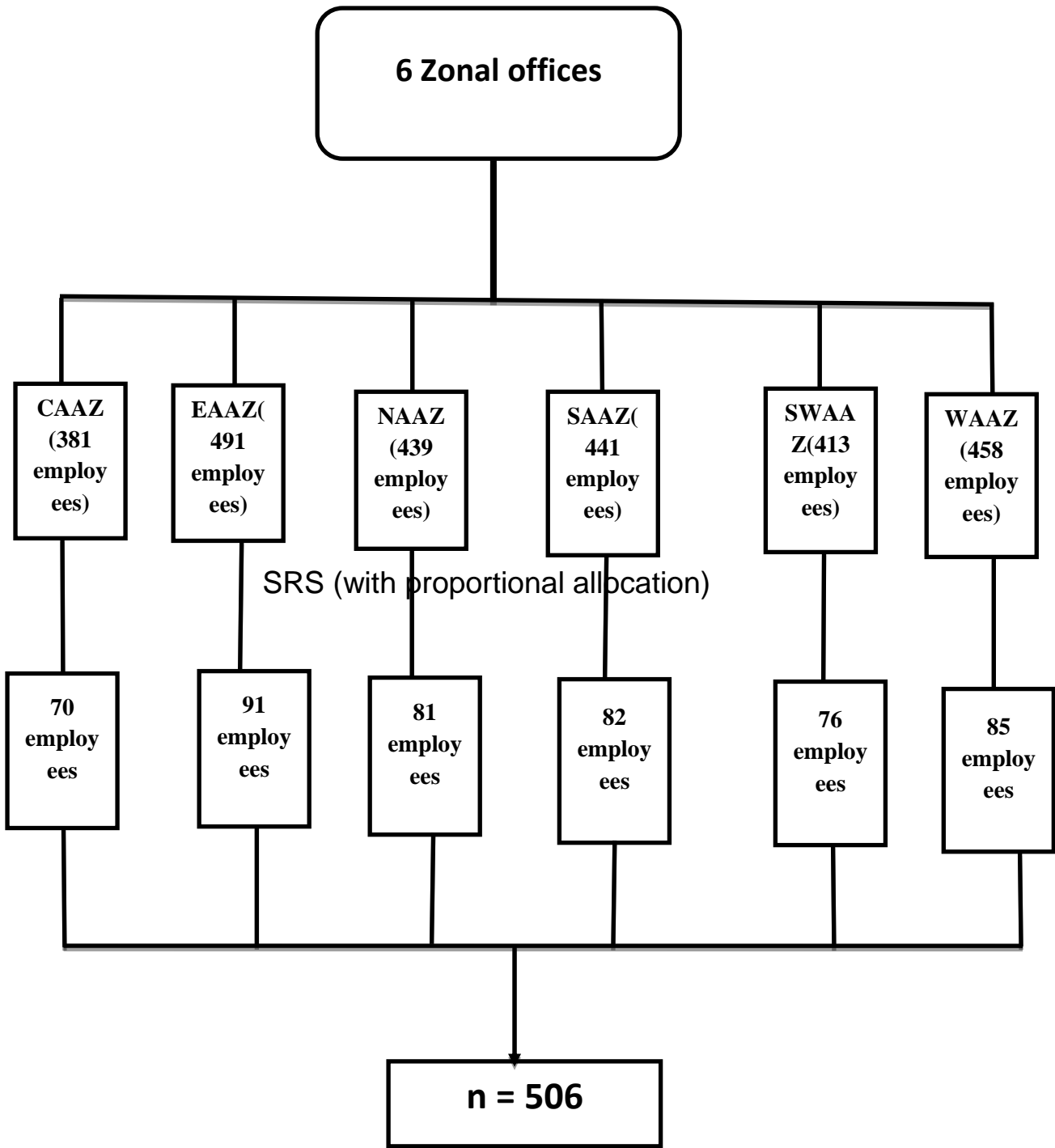


Figure 3: Schematic presentation of the sampling procedure for the study.

4.8. Study Variables

4.8.1. Dependent Variables

Computer Vision Syndrome (CVS)

4.8.2. Independent variables

Socio demographic: Age, sex, monthly income, educational status, working experience in years

Personal factors: working hours using computers, eye glass use, previous history of eye illness, presences of chronic illnesses, use of eye droplets, use of digital device outside of work (such as laptops, tablets and smartphones), duration of digital device use outside of work, adjustment of computer brightness and contrast

Environmental and ergonomic related characteristics: Task illumination measured in LUX, light sources, position of monitors against windows, presence of curtains, presence of adjustable ergonomic chair, viewing distance, taking rest breaks, VDT filters, gaze angles

4.9. Data collection tools and procedures

2 data collectors, who are health students, and 1 supervisor were involved during the period of data collection. During the collection process participants were asked the questions in the questionnaire and data collectors recorded their response in their phones on kobo tool box and after they completed the questionnaires, they record their observation on the observation section of the questionnaire. Then they kindly ask participants to sit in their natural way of sitting in front of their monitors and they measure and record the distance from their face to the top of the monitors in cm. Then they measure the task lighting conditions on 4 spots, two on top of the monitor and two on the keyboard each measurement were recorded and an average value was obtained.

Data collection was collected in such manner and it was completed over a period of 5 weeks April through may.

Structured questionnaire: A structured questionnaire adopted from review similar literature was used to collect data. Questionnaire was prepared in English and translated to Amharic and will be retranslated to English by experts to check for consistency. A brief explanation was given to participants about the purpose of the

study and administered face to face (interview) to the selected participants. The questionnaire contains sections to collect background variables, symptoms of CVS and personal characteristics questions regarding CVS.

Observational Checklist: An observational checklist developed from a review of literature was used to assess environmental and ergonomic related conditions such as:

- light sources: artificial, natural, both
- position of monitors against windows: perpendicular, at the back, or in the line of sight to the user
- presence of curtains, or blinds
- presence of ergonomic adjustable chair: Armrest, back support, height adjustment
- presence of laptop holders
- The level at which the monitor is viewed, i.e. upward gaze, downward gaze

Measuring viewing distance: measuring tape was used to measure the viewing distance between the top of the monitor and the level of the face.

Measuring task illumination levels: Task illumination levels was measured objectively using instrument lux meter. On the task area(computer workstation) a total of 4 measurements was taken: 2 on the top of the monitor screen 10 cm apart and on the keyboard position 2 measurements were also be taken 20 cm apart (17,40). The measurements were averaged and a single average illumination level of task area was obtained.

4.10. Data quality assurance

Questionnaire was prepared in English and translated into Amharic after discussion with language experts and retranslated back to English to check for consistency. Three health science graduate data collectors were recruited. Training was given to data collectors and supervisor for 3 days on objectives of the study, procedures & techniques of collecting the data and familiarization with the study instrument. Participants were informed how to answer the questions in detail. Questioners were checked for completeness and illogical answers. Study questionnaire was pretested on 5% of the sample size of the study population to check for reliability and

practicability whether the tool allows for legible collection of the data, whether the content is clearly understood and necessary modifications were made afterwards.

4.11. Operation definitions

Computer Vision Syndrome(CVS): Presence of at least one symptom, either intermittently or continuously for at least one week, during the last 12 months in the eyes was considered as presence of CVS(26). Symptoms considered are blurred vision, eye strain, eye fatigue, redness of eyes, watery eyes, eye dryness, double vision, eye irritation, burning sensation, and headache.

Distance from monitor: The distance from the face to the monitor measured in centimetres. The distance from the face to the monitor measured in centimetres. ≥ 50 cm Proper viewing distance, < 50 cm improper viewing distance (41).

Task illumination: average amount of light falling on the task surface measured at the height of the task, 1000-200 lux at the task area is deemed as appropriate lighting level. Average measurement below 200 lux will be considered as an inappropriate lighting (42,43).

Adjustment of computer brightness: adjusting the brightness of the computer so it is balanced with surrounding light.

Rest breaks: taking breaks for at least 15 minutes after two or less hours of continuous work on computer(44).

Gaze angle: the level at which the computer screen is viewed: upward gaze if the screen is above horizontal viewing level, downward gaze if top of the screen below the horizontal viewing level (44).

4.12. Data management and analysis

Data collected on kobo toolbox was exported to SPSS version 26 and data cleaning was done to avoid missing values, outliers and other inconsistencies. For data cleaning, frequency, sorts and list were used. SPSS version 26 was used to analyse data.

Descriptive statistics: frequency and proportion were used to analyse symptoms, and prevalence of CVS. Results was presented with narration, tabulation, and graphical presentation.

Normality and outliers were checked. Multicollinearity of variables was checked using the variance inflation factor (VIF) and corrected when variables showed $VIF > 5$.

Binary logistic regression analysis was performed for factors affecting CVS. Those explanatory variables having P value less than 0.2 in bivariate analysis were candidates for multivariate analysis. Variables with $P < 0.05$ and 95% confidence level in the multivariate analysis were considered statistically significant. Adjusted Odds Ratio (AOR) with 95% confidence interval was used to report the strength of association.

4.13. Ethical Considerations

Ethical clearance was obtained from research ethics committee of Addis Ababa University. Official letters of cooperation from AAU were written to Ethio-Telecom. All ethical principles were considered during conducting the study. Written informed consent were obtained from each study participants. And they were also be verbally briefed about the aim and nature of the study before proceeding to data collection. Anonymity of participants were kept by deidentification of the information obtained from individuals.

5. Results

5.1. Socio demographic characteristics of study participants

A total of 497 employees of Ethio telecom were participated in the study over a period of 5 weeks from April to May 2023, with a response rate of 98.2%. From the study participants, just over half 270(54.3%) were males. The (median interquartile range) age of the participants was 32(29-38). Regarding the duration of computer use per day, the majority, 381(76.7%) of the participants use computers for more than 6 hours per day. From the participants, over 283(56.9%) had over 6 and more years of experience working with computers in their workplace.

Table 1: Socio demographic characteristics of computer user Ethio telecom workers, 2023

Variable	Category	Frequency	Percent
Sex	Male	270	54.3 %
	Female	227	45.7 %
Age	20-29 years	132	26.6 %
	30-39 years	251	50.5 %
	≥40 years	114	22.9 %
Work experience	<6 years	214	43.1 %
	≥6 years	283	56.9 %

5.2. Personal characteristics of study participants

Of the study participants, 143(28.8%) reported that they use eyeglasses. While, 48(9.7%) of the respondents reported that they were previously diagnosed with eye illness.

In this study, it was found that only 32(6.4%) of the study participants use lubricant eye drops while working on computers.

From the total study participants, only about a third, 136(27.6 %) of them reported that they have previously heard about Computer Vision Syndrome. While only 29(5.8 %) of the participants reported that they are aware of the 20-20-20 rule.

Table 2: Distribution of study participants according to personal characteristics

Variable	Category	Frequency	Percent
Eye glass use	Yes	143	28.8 %
	No	354	71.2 %
Previous history of eye illness	Yes	48	9.7 %
	No	449	90.3 %
Lubricant eye drops use	Yes	32	6.4 %
	No	465	93.6 %
Awareness of the 20-20-20 rule	Yes	29	5.8 %
	No	468	94.2 %

5.3. Environmental and work-related characteristics

Out of the 497-study participants, the majority 381 (23.3 %) worked on computers for 6 hours or more during their normal task day.

The majority of participants in this study, 439 (88.3%) had an ergonomic adjustable and comfortable sitting chair in their work place.

Out of the 497-study participant, only 170 (34.2%) of the participants reported that they had a habit of taking breaks during their normal working hours. None of the participants in this study used an anti-glare screen filter for their computers.

In this study, it was found that the viewing distance from their eyes to the top of the screen was below 50 cm in 128(25.8%) of the participants.

Majority of the participants 360(72.4%) reported that they adjust their computers brightness and contrast to match the surrounding light levels. Most of the participants, 370(74.4%) used laptops for their routine tasks at work. Local lighting was present in the majority 312(62.8%) of the participants task area. From the total study participants, 229(46.1%),145(29.2%), 121(24.3%) sat aside, at the back, and Infront of the windows respectively.

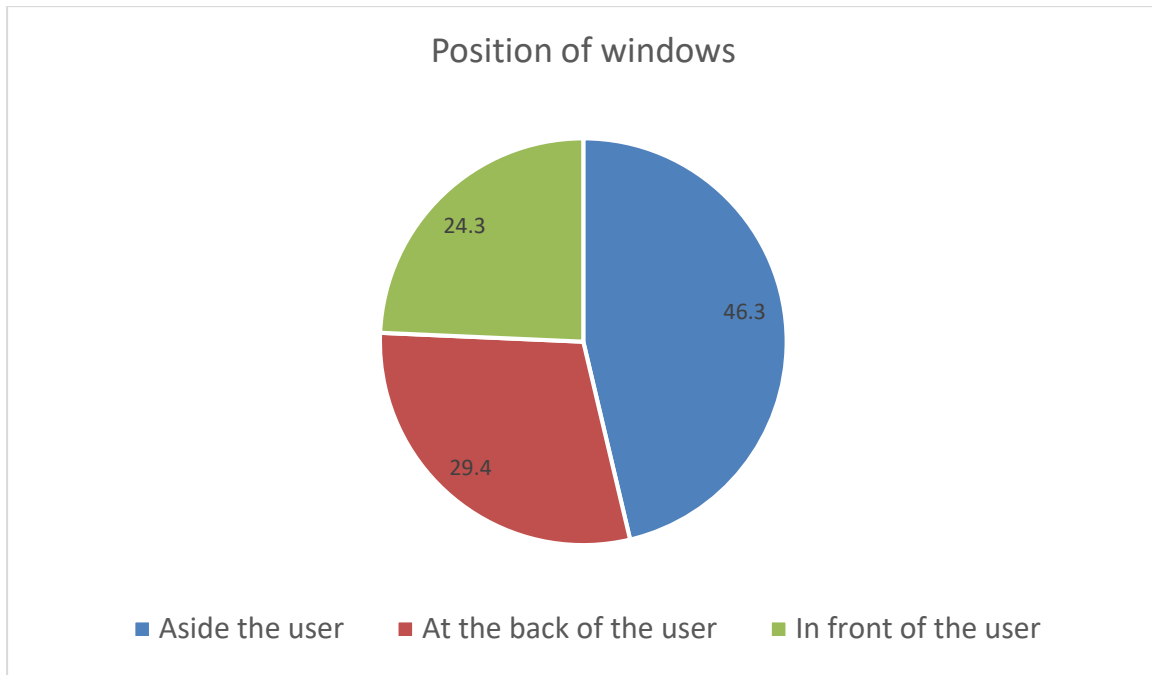


Figure 4: Distribution of study participants sitting position in relation to position of windows

5.3.1. Lighting assessment

Just over half of the study participants, 276(55.5%) were working under lighting of ≥ 200 LUX. 221 (44.5%) of the participants worked under lighting of ≤ 200 LUX.

5.4. Prevalence of CVS

The prevalence of CVS among Ethio telecom zonal office workers during the last 12 months was 68.8% [95% CI (64.5, 72.9)]. Where the commonest reported symptoms were eye irritation (51.7%), burning sensation (51.5%) and blurred vision (49.1%). Double vision (8.7%) and eye dryness (11.5%) were reported the least. There is no significant difference in the prevalence of CVS between males 184(54%) and females 154(46%) with p value > 0.05 .

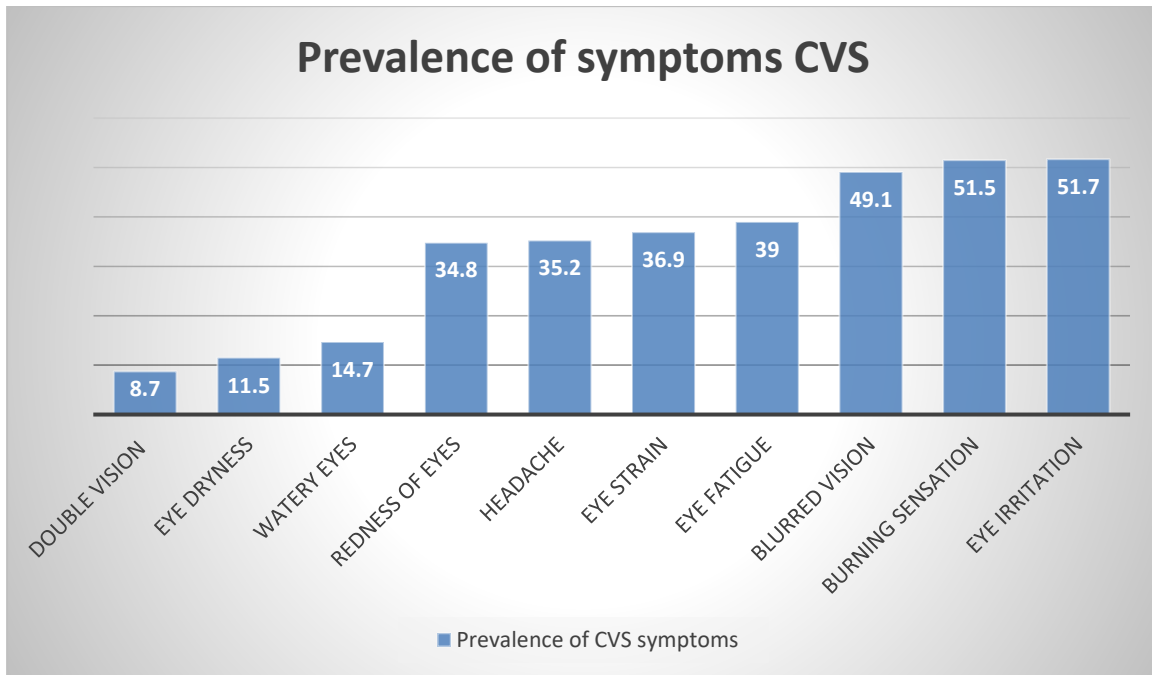


Figure 5: Prevalence of symptoms among computer user Ethio telecom workers in Addis Ababa, 2023

5.5. Factors associated with CVS

5.5.1. Binary logistic regression

A binary logistic regression was performed and a total of 13 variables: age, sex, years of work on computer, working hours on computer, habits of taking breaks, eye glass use, pre-existing eye illness, use of digital devices outside work, adjustment of brightness and contrast, presence of blinds and curtains, presence of ergonomic adjustable chair, viewing distance, task illumination. Among these 11 of the variables were found to be associated with the dependent dichotomous variable presence of CVS at $p < 0.2$. Variable which did not show association were sex and use of digital device outside of work. Those variables were included in to multivariate logistic regression.

Table 3: Bivariate analysis for computer vision syndrome among computer user Ethio telecom workers in Addis Ababa (for Sociodemographic factors)

Variables	Categories	Computer vision syndrome		COR(95% CI)
		No	Yes	
Sex	Male	86	184	1
	Female	69	158	1.070(0.731-1.567)
Age	20-29	59	73	1
	30-39	83	163	2.009 *(1.296-3.116)
	>40	131	252	3.031 *(1.721-5.338)
Years of work On computer	<6 years	78	123	1
	≥ 6 years	77	207	1.594 *(1.087-2.336)

*variables significant in the first model, 1- reference, COR- Crude odds ratio, CI- confidence interval.

Table 4: Bivariate analysis for computer vision syndrome among computer user Ethio telecom workers in Addis Ababa (for personal factors)

Variables	Categories	Computer vision Syndrome		COR(95% CI)
		Yes	No	
	No	230	124	1
Eye glass use	Yes	112	31	1.948 *(1.237-3.066)
Pre-existing eye illness	No	302	147	1
	Yes	40	8	2.434 *(1.111-5.332)
Duration of smartphone use	< 2	32	48	1
	≥ 2	295	99	4.470 *(2.706-7.383)
Adjustment of brightness and contrast	No	118	19	1
	Yes	224	136	0.265 *(0.156-0.450)
Habit of taking breaks	No	255	72	1
	Yes	87	83	0.296 *(0.199-0.441)

*variables significant in the first model, 1- reference, COR- Crude odds ratio, CI- confidence interval.

Table 5: Bivariate analysis for computer vision syndrome among computer user Ethio telecom workers in Addis Ababa (for environmental and work-related factors)

Variables	Categories	Computer vision syndrome		COR(95% CI)
		Yes	No	
Position of Windows	Aside of the user	126	104	1
	Infront and at the back of the user	216	51	3.496 *(2.342-5.219)
Ergonomic adjustable chair	No	118	19	1
	Yes	224	136	0.479 *(0.241-0.952)
Viewing distance	>50cm	230	139	1
	≤50cm	112	16	4.23 *(2.405-7.440)
Task illumination	Proper	160	116	1
	Improper	182	39	1.383 *(2.222-5.151)

*variables significant at the first model, 1- reference, COR- Crude odds ratio, CI- confidence interval.

5.5.2. Multivariate logistic regression

In the multivariate logistic regression factors such as habit of taking breaks, adjustment of brightness and contrast, viewing distance and task illumination showed a significant association at below 0.05 p-value.

In this study, individuals with a habit of taking breaks were 56 %(AOR: 0.44, 95% CI (0.28-0.69)) less likely to develop CVS as compared to those individuals who did not have a habit of taking breaks. In a similar fashion, individuals from this study who

adjust their brightness and contrast of their computer screen were 61 %(AOR: 0.39, 95% CI (0.22-0.68)) less likely to develop CVS when compared to those individuals who do not adjust the brightness and contrast of their computer screens.

While distance between participants and their computer screen (viewing distance) was significantly associated with CVS. Employees who viewed their computer screens at below 50 cm were 2.3 times likely to develop CVS as compared to those employees who viewed their computer screens from a distance more than 50 cm, (AOR 2.32, 95% CI (1.24-4.33)).

Workers working under improper task illumination (<200 LUX) were 1.8 times likely to develop CVS when compared to individuals working under proper illumination conditions (≥ 200 LUX), (AOR: 1.78 95% CI(1.09-2.91)).

Table 6: Multivariate analysis for computer vision syndrome among computer user Ethio telecom workers in Addis Ababa

Variables	Categories	Computer vision syndrome		COR (95% CI)	AOR (95% CI)
		Yes	No		
Age	20-29	73	59	1	1
	30-39	163	83	2.009 (1.296-3.116)	1.617(0.965-2.708)
	>40	252	131	3.031 (1.721-5.338)	2.016 (0.994-4.092)
Years of work	<6 years	123	78	1	1
	≥ 6 years	207	77	1.594 (1.087-2.336)	0.941 (0.579-1.530)
On computer Working hours per day	<6 hours	230	124	1	1
	>6 hours	112	31	1.594 (1.087-2.336)	1.565 (0.714-1.902)
Habit of taking breaks	No	255	72	1	1
	Yes	87	83	0.29(0.199-0.441)	0.439***(0.281-0.686)
Eye glass	No	230	124	1	1

use	Yes	112	31	1.948 (1.237-3.066)	1.566 (0.922-2.658)
Pre-existing eye illness	No	302	147	1	1
	Yes	40	8	2.434(1.111-5.332)	1.637(0.663-4.037)
Adjustment of brightness and contrast	No	118	19	1	1
	Yes	224	136	0.265(0.156-0.450)	0.389**(0.221-0.684)
Blinds and Curtains	No	103	28	1	1
	Yes	239	127	0.512(0.320-0.818)	0.727(0.420-1.258)
Ergonomic adjustable chair	No	144	11	1	1
	Yes	295	47	0.479 (0.241-0.952)	0.763 (0.349-1.670)
Viewing distance	≥50 cm	230	139	1	1
	<50 cm	112	16	4.23(2.405-7.440)	2.315**(1.238-4.330)
Task illumination	proper	160	116	1	1
	Improper	182	39	1.383(2.222-5.151)	1.782*(1.090-2.914)

*P<=0.05, ** P<=0.01 and *** P<=0.001, 1- reference, COR- Crude odds ratio, AOR- Adjusted odds ratio, CI-confidence interval.

6. Discussion

In this study it was found that the prevalence of CVS among employees of Ethio telecom zonal workers was 68.8% [95% CI (64.5, 72.9)], and factors showing significant association were CVS were habit of taking breaks, adjustment of brightness and contrast, viewing distance and task illumination.

The prevalence of CVS in this study was closely in line with studies: 67.4% in Sri Lanka among computer office workers (23), 72% in Pakistan among computer engineering students (22), 70.4 among university instructors in Ethiopia (14), 69.5% among computer users in Ethiopia (32). The closeness of the estimates may be attributed to similar definition of CVS symptoms.

However, elsewhere a higher prevalence has been reported: 89.9% in Malaysia (1), 94.5 % in Jordan (45), 81.0% in Thailand (31). The possible reason for the higher prevalence reported could be that study participants are students the amount of time spent on computers could increase significantly and the habit of taking breaks could be limited as they are more focused on their studies and exams or that they may not have a fixed reading and studying places as they may use any places to study they may study in their dormitories where lighting conditions may not be as appropriate.

Then again, the different tools used to assess CVS and definition of CVS might be the reason for the difference in estimates. For example, the study in Jordan used a 16-symptom questionnaire for determining the presence of CVS. In contrast to this, this study used a 10 symptoms questionnaire.

In this study, eye irritation and burning sensation were the most prevalent symptoms reported this is in line with study among bank workers in Ethiopia (26), this similarity might be attributed possibly to the similarity in exposure status employees having similar workstations.

Blurred vision was another prevalent symptom in this study reported by 49.1 % similarly it was reported by 45.7% of individuals in university in Jordan (45). This is probably due to blurred vision being associated with several other conditions in individuals such as sight problems, astigmatism, and other underlying medical conditions (46).

Several studies suggest that the proportion of females who develop CVS when compared to males is slightly higher (23,31). On the contrary, some studies have shown the proportion of males who develop CVS is higher than females (26,47). However, we were not able to find a significant difference between male and females in this study.

In multivariable regression habits of taking rest breaks was a significant predictor of Computer Vision Syndrome among participants where those who had a habit of taking rest breaks were 56.1% less likely to develop CVS as compared to their counterparts. This is also supported with other studies showing similar pattern of decreased risk when taking rest breaks (8,17,18,25,26). This is perhaps due to increased blinking rates while taking breaks as reduced blinking rates is considered often to lead to dry and irritated eyes (48). In many instances it is suggested to take micro breaks during tasks that require sitting in the same posture(41). And the importance of the 20-20-20 rule could never be stressed enough. The American Optometric Society (AOA) suggests adhering to the 20-20-20 rule, which states that you should spend at least 20 seconds every 20 minutes gazing at something that is 20 feet away. This enables your eyes to unwind and lubricate more due to greater blinking. Taking frequent pauses can help you focus better (2).

In this study it is seen that participants adjusting brightness and contrast were 61.1% less likely to develop CVS compared to those who do not adjust their brightness. This finding is supported with other similar studies (39,49). It is suggested to keep screen brightness to match the ambient light. Some modern devices often adjust brightness automatically to match the ambient light using sensors but it is not possible to always rely on this as most devices in office setting may not have this feature. And as for contrast it is often recommended to increase contrast to make the texts that are read stand out against the background and hence reduce eyestrain.

In this study we found a significant between viewing distance and the development of CVS where participants who watched their computers from a distance less than 50 cm were 2.3 times likely to develop CVS than those who viewed them from a distance more than 50 cm. There are studies in agreement with this finding (50,51) as well another study revealed that CVS. The possible reason for this again has to do with the reduced blinking rate when sitting too close to monitors. Between 20 and 40

inches is the optimal distance from your eyes to the screen. The ideal distance for this is roughly an arm's length. Based on the size and resolution of the screen, you can also determine the appropriate distance. You can sit back in the proper posture without slouching too far back or forward if you have the proper distance between your monitor and your eyes (52).

It was also reported in this study, when compared to people who worked under sufficient illumination circumstances (≥ 200), workers who were working under inadequate task illumination (< 200 LUX) had a 1.8 times higher risk of developing CVS. There are studies that support this finding (2,9,17). Although there is no clear cut value for level of illumination, it is recommended to keep office workplaces well illuminated and not below 200 LUX (42). It is described in many instances working under poor lighting conditions can possibly cause eye strain and dry eyes. Perhaps this possibly due to the extra load put on the eyes to focus more during poor lighting conditions and as any other muscles of the body the muscle of the eyes get overworked and tired.

7. Strength and Limitation of the study

The major strength of this study was the use of objective measurements using instruments to measure task area illumination and viewing distance from the eyes to the monitor.

Limitations of this study are; possible information bias introduced such as recall bias where participants might not readily remember symptoms for the major outcome and other variables of the study and Hawthorne effect could also come into play where participants are aware that they are being observed and act in unusual manner. However, steps were taken to minimize this such as explanation of the questions in simple language and allocating sufficient time for response as well health information were shared to participants after data collection was completed. Nonetheless, sufficient training was provided to data collectors on the proper use of instruments and data collection.

8. Conclusion

This study reported the prevalence of CVS among employees of Ethio telecom zonal office workers in Addis Ababa was 68.8% [95% CI (64.5, 72.9)].

Habits of taking rest breaks, adjustment of computer brightness and contrast, viewing distance and task illumination levels were significantly associated to CVS.

9. Recommendations

Ethio Telecom:

- Ethio telecom has to provide training to individuals regarding health and safety and office ergonomics.
- Lay out of office equipment's should be placed as such an optimum use of natural light is made.
- Installation of uniform lighting artificial lighting should be considered and local lighting should also be considered in areal with heavy work load.
- The organization should encourage workers to take regular short breaks between continuous 2-hour tasks for not less than 15.

Ethio Telecom employees:

- Workers need to follow the 20-20-20 rule: in every 20 minutes of screen time, they should look away at something at least 20 feet (6-meters) away for at least 20 seconds
- They ought to sit at the recommended viewing distance from computer screens which is greater than 50 cm.

Ministry of Labour and Skills (MoLS)

- Shall set guidelines for office lighting levels and include task lighting conditions as a standard during routine inspections.

For researchers:

Study should be done in better designs and even larger sample sizes to better understand the predicting factors CVS. Symptoms should be assessed objectively using clinical examinations.

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Assurance of the principal investigator

I, the undersigned student, agree to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Research Publications Office in effect at the time of grant is forwarded as the result of this application.

Name of the student: Natnael Gizachew

Date _____ Signature _____

Approval of the primary Advisor

Name of the primary advisor: Dr. Teferi Abegaz

Date. _____ Signature _____

11. Annex

11.1. ANNEX II. INFORMATION SHEET

Hello, my name is _____. I came from Addis Ababa University, College of Health Science, and School of Public Health to collect data regarding computer vision syndrome which is conducted among Ethio telecom workers in Addis Ababa. The study has ethical approval from Addis Ababa University School of Public Health and Ethio telecom. I kindly request for your willingness to fill out the questionnaires.

The study title: assessment of computer vision syndrome and associated factors among employees of Ethio-telecom in Addis Ababa, Ethiopia.

Aim of the study: to assess the prevalence and associated factors of computer vision syndrome among Ethio-telecom workers in Addis Ababa, Ethiopia.

Benefits of the study: Evidences generated from this research will help to identify factors contributing to computer vision syndrome reduce computer-related visual problems.

Risks of the study: There are no any risk or inconvenience that you will face by participating in this research except dedication of time for responding the questionnaires and illumination measurement.

Confidentiality: All Personal identifiers & personal information will not be taken. All your responses and results obtained will be kept confidentially by using a coding system whereby no one has access to your responses. Information will not be accessed to others except the researcher.

Voluntary participation: Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

Persons to contact: Please if you have any question regarding the study you may contact:

Natnael Gizachew (the principal investigator): **Tel +251-922856890** or,

Dr. Teferi Abegaz **+251911361607**, Addis Ababa University, College of Health Sciences, School of Public Health.

ANNEX III. CONSENT FORM

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Contact:

Natnael Gizachew (the principal investigator): **Tel +251-922856890**,

Dr. Teferi Abegaz **+251911361607**, Addis Ababa University, College of Health Sciences, School of Public Health

11.2. ANNEX IV. ENGLISH VERSION QUESTIONNAIRE

Date:

Participant ID:

District ID:

Questionnaire Concerns Your Ergonomics Practice and Possible Computer Vision Syndromes Symptoms You May Be Experiencing among workers of Ethio telecom in Addis Ababa, Ethiopia. 2023

Part I: Questions regarding sociodemographic variables

SR no	Questions	Response	
1.1	Sex?	0. Female 1. Male	
1.2	Marital Status?	1. Single 3. Divorced 5. Widowed 2. Married 4. Separated	
1.2	Educational Status ?	1. Completed secondary education 2. College graduate (certificate) 3. First degree 4. Second degree	
1.3	Department?	_____	
1.4	How many years did you work in this particular job?	_____ Years	
1.5	How much is your monthly salary?	_____ ETB	
1.6	Age?	_____ Years	

Part II: Questions regarding symptoms of Computer vision syndrome

2.1 Did you experience any of these symptoms after the use of electronic devices in the past 12 months for at least 1 week either continuously or intermittently ?
(choose 'no symptoms' if not present)

(mark 'X' on the boxes)

Sr. no.	Symptoms	No symptoms	Symptoms present
2.1.	Blurred vision	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.2.	Eye strain	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.3.	Eye fatigue	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.4.	Redness of eyes	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.5.	Watery eyes	<input type="checkbox"/> 0	<input type="checkbox"/> 1

2.6.	Eye dryness	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.7.	Double vision	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.8.	Eye irritation	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.9.	Burning sensation	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.10.	Headache	<input type="checkbox"/> 0	<input type="checkbox"/> 1

Part III: Questions regarding personal factors

The following section will include questions about your work conditions, and personal conditions in relation with your computer use.

SR no	Questions	Response	
3.1.	On average, while on your job, how many hours a day do you work on computers?	_____ hours.	
3.2.	How many days per week do you use computer devices?	_____ days	
3.3.	Have you heard about computer vision syndrome?	0. No 1. Yes	
3.4.	Do you currently use eyeglasses?	0. No (Skip to Q. 3.6) 1. Yes	
3.5.	If your answer to question number 3.4 is 'yes', Were your glasses prescribed by a physician?	0. No 1. Yes	
3.6.	Were you previously diagnosed with eye illness?	0. No (Skip to Q. 3.9) 1. Yes	
3.7.	If your answer to question number 3.6. is yes please indicate the type of eye illness	_____	
3.9.	were you diagnosed with any kind of chronic illness?	0. No (Skip to Q. 3.11) 1. Yes	
3.10.	If your answer to question '3.9' is yes please list your illnesses?	_____	
3.11.	Do you use lubricant eye drops while working on the computer?	0. No 1. Yes	
3.12.	How frequently do you use lubricant eye drops while working on the computer?	1.Always 3. Sometimes 2. Often 4. Rarely	
3.13.	Do you use smartphones or other digital devices such as tablets, laptops outside of work?	0. No 1. Yes	
3.14.	If your answer to question number 3.13. is 'yes' How long on average do you spend on these devices?	_____ hours.	

Part IV: Environmental and ergonomic practice related questions

The following questions consists of information about your workstation environment and your routine ergonomic related practices while at work in your office in Ethio telecom, Addis Ababa.

Sr. no	Questions	Response	
4.1	Which device do you use for your regular office work?	1. Desktops 2. Laptops 3. Both	
4.2	Do you take breaks during the use of electronic devices?	0. No (Skip to Q. 4.5) 1. Yes	
4.3	If your answer to question number 4.2 is 'yes' How often do you take breaks during the use of an electronic device?	1. Every 30 min or less 2. Every 1 hour 3. Every 2 hours 4. More	
4.4	If your answer to question '4.2.' is 'yes' How long do your rest breaks typically last?	_____ Minutes	
4.5	Do you use an anti-glare / screen filter / blue light filter for your computer screen?	0. No 1. Yes	
4.6	Do you adjust your computer brightness and contrast often to match the surrounding light level?	0. No 1. Yes	

11.3. ANNEX V. OBSERVATIONAL CHECKLIST AND PARAMETER MEASUREMENT

Sr. no	Observations	Options(Variables)	Remark
1.1	Light source present	1. Artificial 2. Natural 3. Both	

1.2	position of windows against user	<ul style="list-style-type: none"> 1. Perpendicular to the user 2. In front of the user 3. At the back of the user 	
1.3	direction of artificial lighting against user	<ul style="list-style-type: none"> 1. Perpendicular to the user 2. In front of the user 3. At the back of the user 4. Aside of the user 	
1.4	Are blinds and curtains for windows present_____	<ul style="list-style-type: none"> 0. No 1. Yes 	
1.5	Is brightness and contrast are properly adjusted_____	<ul style="list-style-type: none"> 0. No 1. Yes 	
1.6	Matte(non-shiny) finishes on furniture on the task area_____	<ul style="list-style-type: none"> 0. No 1. Yes 	
1.7	Is an ergonomic adjustable chair present?_____	<ul style="list-style-type: none"> 0. No 1. Yes 	
1.8	Direction of gaze	<ul style="list-style-type: none"> 1. Upward gaze 2. Downward gaze 3. At level with the screen 	
1.9	Are laptop holders present?_____	<ul style="list-style-type: none"> 0. No 1. Yes 	
1.10	Is an adjustable keyboard present ?	<ul style="list-style-type: none"> 0. No 1. Yes 	

2. PARAMETER MEASUREMENT TASK LIGHTING LEVELS AND VIEWING DISTANCE

2.1. The viewing distance from the horizontal to the top of the screen_____ in Centimetres (Cm)

2.2. 9. Light intensity in LUX between participant and computer(Task position)

Id no	Measurement 1 (Top right)	Measurement 2 (Top left)	Measurement 3 (bottom right)	Measurement 4 (bottom left)	Average measurement

11.4. ANNEX VI. INFORMATION SHEET (AMHARIC VERSION)

የስምምነት ማሳወቂያ ቅጽ

ጤና ይስጥልኝ ስሜ _____ ነው። በአዲስ አበባ በኢትዮጵያ ስራተኞች መካከል የሚደረገውን የኮምፒዩተር ቪዥን ሲንድሮምን በተመለከተ መረጃ ለመሰብሰብ ከአዲስ አበባ ዩኒቨርሲቲ፣ ጤና ሳይንስ ኮሌጅ እና የህብረተሰብ ጤና ትምህርት ቤት መጥቻለሁ። ጥናቱ ከአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና እና ኢትዮጵያ የስነ-ምግባር ማረጋገጫ አግኝቷል። ፍቃደኛ መሆንዎን በአክብሮት እጠይቃለሁ እና መጠይቆችን ይሙሉ።

የጥናት ርዕስ፡ የኮምፒዩተር ቪዥን ሲንድሮም ግምገማ እና ተያያዥ ምክንያቶች በአዲስ አበባ፣ ኢትዮጵያ ውስጥ በኢትዮጵያ ጤና ስራተኞች መካከል።

የጥናቱ ዓላማ፡ በአዲስ አበባ፣ ኢትዮጵያ ውስጥ በኢትዮጵያ ስራተኞች መካከል የኮምፒዩተር ቪዥን ሲንድሮም ስርጭትን እና ተያያዥ ምክንያቶችን ለመገምገም።

የጥናቱ ጥቅሞች፡- ከዚህ ጥናት የተገኙ መረጃዎች ለኮምፒዩተር ቪዥን ሲንድሮም (Computer Vision Syndrome) አስተዋጽኦ የሚደርጉ ምክንያቶችን ለመለየት ይረዳሉ ከኮምፒዩተር ጋር የተያያዙ የእይታ ችግሮችን ይቀንሳሉ

የጥናቱ ስጋቶች፡ በዚህ ጥናት ውስጥ በመሳተፍ የሚያጋጥሙ ምንም አይነት ስጋት ወይም ችግር የለም መጠይቆችን እና የብርሃን ልኬትን ለመመለስ ጊዜ ከመሰጠት በስተቀር።

ሚስጥራዊነት፡ ሁሉም የግል መለያዎች እና የግል መረጃዎች አይወሰዱም። ሁሉም ያገኙቸው ምላሾች እና ውጤቶች ማንም ሰው የእርስዎን ምላሾች ማግኘት በማይችልበት ኮድ ስርዓት በመጠቀም በሚሰጥ ይቀመጣሉ። መረጃ ከተመራማሪው በስተቀር ለሌሎች አይደርስም።

ሊያገኙባቸው የሚገቡ ሰዎች፡ እባኩትን ጥናቱ በተመለከተ ጥያቄ ካላችሁ ናትናኤል ግዛቸውን (ዋና መርማሪውን) በስልክ +251-922856890 ወይም ዶ/ር ተፈሪ አበጋዝ አዲስ አበባ ዩኒቨርሲቲ የጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ትምህርት ቤት ማግኘት ይችላሉ።

በፈቃደኝነት ተሳትፎ፡ በዚህ ጥናት ውስጥ ያለዎት ተሳትፎ በፈቃደኝነት ነው። በዚህ ጥናት ውስጥ ለመሳተፍ ወይም ላለመሳተፍ መወሰን የእርስዎ ውሳኔ ነው። በዚህ ጥናት ለመሳተፍ ከወሰኑ፣ የስምምነት ፎርም እንዲፈረሙ ይጠየቃሉ። የስምምነት ቅጹን ከፈረሙ በኋላ በማንኛውም ጊዜ እና ምክንያት ሳይገልጹ አሁንም ነጻ ነዎት። ከዚህ ጥናት መውጣት ከተመራማሪው ጋር ያለዎትን ግንኙነት አይጎዳውም። መረጃ መሰብሰብ ከመጠናቀቁ በፊት ከጥናቱ ከወጡ፣ የእርስዎ ውሂብ ወደ እርስዎ ይመለሳል ወይም ይጠፋል።

11.5. ANNEX VII. CONSENT FORM (AMHARIC VERSION)

የስምምነት መዋዋያ ቅጽ

አንብቤ የቀረበውን መረጃ ተረድቻለሁ እና ጥያቄዎችን ለመጠየቅ እድሉን አግኝቻለሁ። የእኔ ተሳትፎ በፈቃደኝነት እንደሆነ እና በማንኛውም ጊዜ ያለምክንያት እና ያለምንም ወጪ ለመልቀቅ ነፃ መሆኔን ተረድቻለሁ። የዚህ የስምምነት ቅጽ ቅጂ እንደሚሰጠኝ ተረድቻለሁ። በዚህ ጥናት ለመሳተፍ በፈቃዴ ተስማምቻለሁ።

የተሳታፊ ፊርማ _____ ቀን _____

የመርማሪው ፊርማ _____ ቀን _____

የባለ ጥናቱ አድራሻ:

ናትናኤል ግዛቸው (ዋና ተሳታፊ): ስልክ +251-922856890፤

ዶ/ር ተፈሪ አበጋዝ +251911361607፤ አዲስ አበባ ዩኒቨርሲቲ፤ ጤና ሳይንስ ኮሌጅ፤ የህብረተሰብ ጤና ትምህርት ቤት

11.6. ANNEX VIII. AMHARIC VERSION QUESTIONNAIRE

ቀን:

የተሳታፊ መለያ ቁጥር :

ዞን መለያ ቁጥር:

ክፍል 1 ማህበራዊ ጉዳዮችን በተመለከተ

ይህ መጠይቅ የርስዎን የኤርትራ ልምዶች እና ሊሆኑ የሚችሉ የኮምፒዩተር ቪዥን ሲንድረም ምልክቶች በአዲስ አበባ፣ ኢትዮጵያ ውስጥ በኢትዮጵያ ሰራተኞች መካከል 2023

ቁጥር	ጥያቄዎች	ምላሽ	
1.1	ጾታ?	0. ሴት 1. ወንድ	
1.2	የጋብቻ ሁኔታ?	1. ያላገባ 3. የተፋታ 5. ሌላ 2. ያገባ 4. ተለያይቷል	
1.2	የትምህርት ሁኔታ?	1. ሁለተኛ ደረጃ ትምህርት ያጠናቀቀ 2. የኮሌጅ ምሩቅ (ሰርትፍኬት) 3. የመጀመሪያ ዲግሪ 4. ሁለተኛ ዲግሪ	
1.3	ሥራ ክፍል?	_____	
1.4	በዚህ ሥራ ውስጥ ስንት ዓመት ሰርተዋል?	_____ አመት	
1.5	የወር ደሞዝዎ ስንት ነው?	_____ ብር	
1.6	ዕድሜ?	_____ አመት	

ክፍል II: የኮምፒዩተር ቪዥን ሲንድረም ምልክቶችን በተመለከተ ጥያቄዎች

2. ባለፉት 12 ወራት ውስጥ ኤሌክትሮኒክስ መሳሪያዎችን ከተጠቀሙ በኋላ ከነዚህ ምልክቶች አንዱን ቢያንስ ለ 1 ሳምንት በተከታታይ ወይም ያለማቋረጥ አጋጥሟል?

ተራ ቁጥር	ምልክቶች	ምንም ምልክቶች የሉም	ምልክቶች አሉ
2.1.	የደበዘዘ እይታ	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.2.	የዓይን መወጠር	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.3.	የዓይን ድካም	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.4.	የዓይን መቅለት	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.5.	የእምባ መፍሰስ	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.6.	የአይን ድረቀት(ፈሳሽ ወይም እምባ እጥረት አይን ውስጥ)	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.7.	ድርብ እይታ(አንድ ነገር ሁለት ሆኖ መታየት)	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.8.	የዓይን መቆጥቆጥ	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.9.	የማቃጠል ስሜት	<input type="checkbox"/> 0	<input type="checkbox"/> 1
2.10.	ራስ ምታት	<input type="checkbox"/> 0	<input type="checkbox"/> 1

ክፍል III: ግላዊ ሁኔታዎችን የሚመለከቱ ጥያቄዎች

የሚከተለው ክፍል ስለ የሰራ ሁኔታዎ እና ከኮምፒዩተርዎ አጠቃቀም ጋር በተያያዘ የግል ሁኔታዎችን የሚመለከቱ ጥያቄዎችን ያካትታል።

ተራ ቁጥር	ጥያቄዎች	ምላሽ	
3.1.	በአማካኝ፣ በስራ ላይ፣ በቀን ስንት ሰዓት በኮምፒዩተር ትሰራለህ?	_____ ሰዓታት	
3.2.	የኮምፒዩተር መሳሪያዎችን በሳምንት ስንት ቀናት ይጠቀማሉ?	_____ ቀናት	
3.3.	ስለ ኮምፒዩተር ቪሻን ሲንድሮም ሰምተህ ታውቃለህ?	0. አይ 1. አዎ	
3.4.	በአሁኑ ጊዜ የዓይን መነፅር ትጠቀማለህ?	0. አይ (ወደ ቁ. 3.6 ይዘለሉ) 1. አዎ	
3.5.	ለጥያቄ ቁጥር 3.4 የሰጡት መልስ 'አዎ' ከሆነ፣ መነፅርዎ በሀኪም የታዘዘ ነው?	0. አይ 1. አዎ	
3.6.	ከዚህ ቀደም የዓይን ሕመም አልብዎት?	0. አይ (ወደ ቁ. 3.9 ይዘለሉ) 1. አዎ	
3.7.	ለጥያቄ ቁጥር 3.6 መልስዎ ከሆነ አዎ ነው እባክዎን የዓይን ሕመምን አይነት ያመልክቱ	_____	
3.9.	እንድ ስኳር ደም ግፊት ያሉ እና ተመሳሳይ በሽታ አለብዎ?	0. አይ (ወደ ቁ. 3.11 ይዘለሉ) 1. አዎ	
3.10.	ለጥያቄ ቁጥር 3.9 መልስዎ አዎ ከሆነ እባክዎን የበሽታዎን አይነት ይዘርዝሩ?	_____	
3.11.	በኮምፒዩተር ላይ በሚሰሩበት ጊዜ የሚቀባ የዓይን ጠብታዎችን ይጠቀማሉ?	0. አይ 1. አዎ	
3.12.	በኮምፒዩተር ላይ በሚሰሩበት ጊዜ ምን ያህል ጊዜ የሚቀባ የዓይን ጠብታዎችን ይጠቀማሉ?	1. ሁልጊዜ 3. አንዳንድ ጊዜ	

		2. ብዙ ጊዜ 4. አልፎ አልፎ	
3.13.	ስማርትፎኖች ወይም ሌሎች ዲጂታል መሳሪያዎችን ለምሳሌ ታብሌቶች፣ ላፕቶፖች ከስራ ውጪ ይጠቀማሉ?	0. አይ 1. አዎ	
3.14.	ለጥያቄ ቁጥር 3.13 መልስዎ ከሆነ 'አዎ' ነው በአማካይ በእነዚህ መሳሪያዎች ላይ ምን ያህል ጊዜ ያሳልፋሉ?	_____ ሰአታት	

ክፍል IV: የአካባቢ ሁኔታ እና የኢርጎኖሚክ ልምምድ ተዛማጅ ጥያቄዎች

የሚከተሉት ጥያቄዎች በኢትዮ ቴሌኮም፣ አዲስ አበባ በሚገኘው ቢሮዎ ውስጥ በሥራ ላይ እያሉ ስለ እርስዎ የሥራ ጣቢያ አካባቢ እና ስለ መደበኛ ergonomic ተዛማጅ ልምዶች መረጃን ያካትታል።

ተራ ቁጥር	ጥያቄዎች	ምላሽ	
4.1	ለመደበኛ የቢሮ ስራዎ የትኛውን መሳሪያ ይጠቀማሉ?	1. ዴስክቶፖች 2. ላፕቶፖች 3. ሁለቱም	
4.2	የኤሌክትሮኒክስ መሳሪያዎችን በሚጠቀሙበት ጊዜ እረፍት ያደርጋሉ?	0. አይ (ወደ ቁ. 4.5 ይዘለሉ) 1. አዎ	
4.3	ለጥያቄ ቁጥር 4.2 የሰጡት መልስ 'አዎ' ከሆነ የኤሌክትሮኒክስ መሳሪያ በሚጠቀሙበት ጊዜ ምን ያህል ጊዜ እረፍት ያደርጋሉ?	1. በየ 30 ደቂቃው ወይም ከዚያ በታች 2. በየ 1 ሰዓቱ 3. በየ 2 ሰዓቱ 4. ተጨማሪ	
4.4	ለጥያቄ '4.2' የሰጡት መልስ 'አዎ' ከሆነ የእረፍት ጊዜዎ በተለምዶ ለምን ያህል ጊዜ ይቆያል?	_____ ደቂቃዎች	
4.5	የስክሪን ፊልተር ትጠቀማለህ? (የስክሪን ፊልተር ስክሪን ላይ የሚለጠፍ አንጻባራቂ ብርሃን ለመቀነስ የሚረዳ መሳሪያ ነው)	0. አይ 1. አዎ	
4.6	የኮምፒዩተርዎን ብራይትነስ እና ኮንትራስት በዙሪያው ካለው የብርሃን ደረጃ ጋር ለማመጣጠን የማስተካከል ልምድ አለዎ?	0. አይ 1. አዎ	