

Original Research Article

Computer related injuries faced by remote software professionals in Enugu, Nigeria

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ABSTRACT

Background: The rise in remote work among software professionals has led to increased concerns about computer-related injuries and associated health risks. This study examined the prevalence of these injuries among remote software professionals in Enugu, Nigeria.

Methods: A descriptive cross-sectional design involving 160 remote software professionals was used. Data were gathered through electronic questionnaires focusing on demographics, ergonomic practices, workstation setups, and injury symptoms. Quantitative analysis using chi square tests explored the associations between injury symptoms and ergonomic factors.

Results: Most participants were aged 26 to 35, with 95% holding tertiary education. Common injuries included neck pain (89.4%), back pain (89.4%), and eye strain (88.1%). Long working hours adversely affected mental health and social life of 59.4% of respondents. Only 29.4% had received training on ergonomics, yet there was a high willingness (86.3%) to participate in such training. Most participants (90.6%) took regular breaks, which is a positive finding. A significant relationship was found between taking regular breaks and reducing injury symptoms ($p=0.018$). Barriers to ergonomic practices included lack of knowledge and resources.

Conclusions: Computer-related injuries are prevalent among remote software professionals in Enugu, exacerbated by inadequate ergonomic setups and prolonged work hours. Despite high awareness of the risks, there is a need for improved ergonomic practices, education, and resource allocation. Both individuals and organizations must collaborate to mitigate these health risks, emphasizing the provision of ergonomic equipment, structured breaks, and access to healthcare resources.

Keywords: Computer related injuries, Ergonomics and mental health, Remote work, Software professionals

INTRODUCTION

Approximately six computers are available per thousand people, totalling 18 million personal computers (PCs) in use, and this number continues to grow consistently.¹

The rapid expansion of digital workspaces, particularly in the tech industry, has reshaped traditional labor practices. Remote work, specifically among software professionals, has seen substantial growth. Nigeria, in line with global trends, has experienced a rise in the number of developers, a consequence of both local startups and international collaborations. While these developments

are positive for the economy, they bring a new set of challenges related to occupational health.

One of the primary concerns associated with prolonged computer use is the increasing incidence of musculoskeletal disorders (MSDs) and other computer-related injuries. MSDs, characterized by neck, shoulder, and back pain, are prevalent among office workers globally. These disorders negatively impact individuals' quality of life, leading to lost workdays and reduced productivity.^{2,3} International guidelines recommend limiting continuous screen time and encouraging frequent breaks, but the evolving nature of work calls for updated recommendations, particularly for remote professionals who may not have access to ergonomically sound workspaces.

A contemporary evidence base is essential for updating guidelines on screen work, given the increasing prevalence of such work in today's occupational environment. For instance, the proportion of the working population exposed to moderate or higher levels of screen work rose from 36% in 2005 to 56% in 2015.⁴ In the Netherlands, current data indicates that workers spend an average of 3.9 hours per day on their work computers, with 38% of workers spending more than 6 hours daily.⁵ While there are several systematic reviews addressing the association between screen work and neck and upper extremity symptoms, additional research is needed to inform guideline revisions effectively.

A survey carried out by the American Optometric Association estimates that at least 10 million cases of computer-related eye strain were reported each year.⁶

In 2021, there was a notable surge in the number of professional developers in Nigeria, marking a six percent increase, with figures reaching 84,000. This growth mirrors a broader trend across the African continent, where the total count of professional developers rose by 3.8 percent to reach 716,000 during the same period, as reported by Google.

These findings are detailed in Google's report titled 'Africa Developer Ecosystem 2021', which sheds light on the evolving landscape of professional developers across the continent. The report highlights that the pool of professional developers now accounts for 0.4 percent of the non-agricultural workforce in Africa, reflecting the growing significance of the tech industry.

The report also indicates positive trends in terms of employment and compensation within the developer community. Notably, there has been an increase in average software developer salaries and more developers securing full-time positions. Additionally, African developers, on average, tend to be younger compared to their counterparts in more mature markets, with a predominant focus on Android and web app development.

Furthermore, Google's report underscores the pivotal role of African startups in driving the demand for local developers. In 2021, these startups collectively raised over \$4 billion, representing a substantial increase compared to the previous year and highlighting the robust growth and investment opportunities within the African tech ecosystem.

The report also highlights a significant trend among sub-Saharan small and medium businesses, revealing that 22 percent of them either initiated or intensified their utilization of the internet. This surge in online activity has subsequently fuelled a heightened demand for web development services, underlining the growing importance of this sector.

Furthermore, the increased demand for remote development work has opened up new avenues of opportunity for African developers. Notably, 38 percent of developers in Africa are now engaged in projects for at least one company located outside of the continent. This expansion of remote work opportunities underscores the global nature of the tech industry and the increasing interconnectedness of developers across different regions.

The data also indicates a noteworthy trend within the sub-Saharan small and medium business sector, with 22 percent reporting either the commencement or escalation of their Internet usage. This uptick in online presence has consequently spurred a heightened demand for web development services, reflecting the evolving needs of businesses in the digital age.

In Nigeria, occupational health in the tech industry remains an under-researched area. The growing number of software professionals working remotely, especially in regions like Enugu, highlights the importance of addressing these health concerns. Remote professionals face unique challenges, including the lack of dedicated office spaces and ergonomic furniture, as well as long work hours, which exacerbate the risk of developing work-related injuries.

This study aimed to investigate the prevalence, contributing factors, and health effects of computer-related injuries among remote software professionals in Enugu, Nigeria. By identifying these issues, we seek to propose best practices for injury prevention and management, providing actionable insights for both individuals and organizations in the tech industry.

METHODS

Study area

The study area is Enugu, Nigeria. Enugu State, situated in the eastern region of Nigeria, lies adjacent to the base of the Udi plateau. It borders Abia State to the south for approximately 25 km, while its eastern boundary meets Ebonyi State. To the northeast, Enugu State shares an 84

km border with Benue State, and to the northwest, it borders Kogi State, spanning a distance of 112 km (70 miles). Anambra State forms the western border of Enugu State, extending for approximately 139 km (86 miles). Enugu State, as of the 2006 census, boasted a population of 3,267,837 individuals, with estimations projecting a figure exceeding 3.8 million by 2012. The state serves as the residence of the Igbo community, predominant in southeastern Nigeria, with a small population of Idoma/Igala people residing in Ette (Igbo-Eze North) within Enugu State, Nigeria. It is actually estimated to have hit 4,690,100 by 2022 according to Enugu State subdivision estimate. The study covers the whole of the city. The study was conducted from March 2023 to June, 2024. The key inclusion criteria for this study were current employment as a remote software professional, resident in Enugu, Nigeria with a minimum of six (6) months experience in software industry, as well as a significant daily computer usage of at least four (4) hours and informed consent to participate. The exclusion criteria for the study is participants who are not currently employed in software related roles, individuals residing outside Enugu, Nigeria, those with less than six (6) months of experience in the software or similar devices for less than four (4) hours daily and participants who declined from providing informed consent to participate in the study

Study procedure and data collection

A snowball sampling method was employed for data collection in this study. Initially, 20 software developers and their instructors, all participating in a boot camp organized by Africa Plan Foundation, in Enugu city were selected as the primary respondents. These individuals served as the initial participants and were asked to refer other remote software developers for the study. Through their referrals, additional participants were recruited, ensuring a broader representation of the remote software development community. This referral-based approach allowed access to a network of professionals with relevant experience in the field.

Each participant was provided with a detailed explanation of the research objectives and assured of the confidentiality of their responses. Data collection was conducted using structured questionnaires, which were electronically administered. The questionnaire was divided into sections; the first section focused on the demographic data of the participants; this included gender, age, educational level, years of experience in software development, current employment status and the working option preferred.

The second section collected information on the working environment and conditions. The third section handled information on computer related injuries. The fourth section dealt with the information on health effects and finally the last section was about the coping strategies and solutions.

Data analysis

Data was analyzed using statistical package for social scientists (SPSS), version 21.0. Quantitative data from the survey responses was analyzed using descriptive statistics, including frequencies, percentages, and Chi-square test.

RESULTS

Quantitative results

Table 1 shows that remote software professionals in Enugu, Nigeria, were predominantly young (58.8% were 26-35 years old, 38.1% were 16-25 years old) and highly educated, with 95% having completed tertiary education. Gender distribution was nearly equal (50.6% male, 48.7% female). Experience levels varied, with 45.6% having 0-1 years and 34.4% having 2-3 years of experience. A significant proportion is self-employed (47.5%), while others work part-time (29.4%) or full-time (23.1%). Most prefer remote work (51.9%), while 28.1% favor a physical office and 20% prefer a hybrid model.

Table 1: Socio-demographic information of respondents (n=160).

Variables	Frequency	Percentage
Gender		
Male	82	51.3
Female	78	48.7
Age (years)		
16-25	61	38.1
26-35	94	58.8
36-45	5	3.1
46 years and above	0	0.0
Level of education completed		
None	1	0.6
Primary education	0	0.0
Junior secondary education	1	0.6
Senior secondary education	6	3.8
Tertiary education	152	95.0
Years of experience in software development		
0-1	73	45.6
2-3	55	34.4
4-5	12	7.5
5 years and above	20	12.5
Current working option		
Self-employed software professional	76	47.5
Part-time remote software professional	47	29.4
Full-time remote software professional	37	23.1
Working option preference		
Remote	83	51.9
Physical office	45	28.1
Hybrid	32	20.0

Table 2: Prevalence of computer-related injuries among remote software professionals in Enugu State.

Variables	Frequency (n=160)	Percentage
Respondents that are aware that injuries can arise from daily protracted exposure to the computer		
Yes	148	92.5
No	12	7.5
Respondents that have experienced neck pain while working or after work		
Yes	143	89.4
No	17	10.6
Respondents that have experienced shoulder pain while working or after work		
Yes	131	81.9
No	29	18.1
Respondents that have experienced back pain while working or after work		
Yes	143	89.4
No	17	10.6
Respondents that have experienced eye strain while working or after work		
Yes	141	88.1
No	19	11.9
Respondents that have experienced mental stress while working or after work		
Yes	92	57.5
Maybe	47	29.4
No	21	13.1
Respondents that have experienced any stress on any part of their body after being in a particular posture for long, while working remotely on the computer		
Yes	154	96.3
No	6	3.7
How frequent respondents experience symptoms of injuries after work		
Sometimes	75	46.9
Rarely	65	40.6
Often	19	11.9
Always	1	0.6
Respondents that have sought medical attention for any computer-related injuries		
No	117	73.1
Yes	43	26.9

The data in Table 2 reveals that a high percentage of remote software professionals in Enugu State are aware that injuries can arise from prolonged computer use (92.5%). Neck pain (89.4%), shoulder pain (81.9%), and back pain (89.4%) are among the most common injuries experienced. Eye strain is also prevalent, reported by 88.1% of respondents. Mental stress is frequently experienced (57.5%), with 29.4% of the respondents not sure if they experience mental stress or not, along with stress on various body parts due to prolonged postures (96.3%). Symptoms of injuries are experienced sometimes (46.9%) or rarely (40.6%) after work. Despite

this, a significant number (73.1%) have not sought medical attention for their computer-related injuries.

Table 3: Coping strategies and solution.

Variables	Frequency (n=160)	Percentage
Respondents who understand the concept of work-life balance		
Yes	134	83.8
No	26	16.2
Respondents who work with a blue light blocking glass or a photochromic lens		
No	88	55
Yes	72	45
Respondent's methods of alleviating stress and physical discomfort associated with computer use (asked to select all that applies to them)		
Stretching breaks	94	58.8
Regular exercise	73	45.6
Ergonomic adjustments to workstation	51	31.9
Meditation or mindfulness techniques	31	19.4
None	11	6.9
Respondents that believe the methods above can help keep them healthy in the long run		
Yes	137	85.6
Maybe	20	12.5
No	3	1.9
Respondents who struggle with having the discipline to consistently take up one of the methods above as a daily activity		
Yes	99	61.9
No	61	38.1
Respondents that have received any training or education on ergonomic or injury prevention related to computer usage		
No	113	70.6
Yes	47	29.4
Respondents who would be willing to be part of such training		
Yes	138	86.3
No	22	13.7

Figure 1 shows that a majority (59.4%) of remote software professionals believe that long working hours on the computer have negatively affected their mental health or social life. Conversely, 40.6% of respondents do not feel that long working hours have negatively affected their mental health or social life.

The data from Table 3 reveals that a substantial majority (83.8%) of respondents understand the concept of work-life balance, indicating awareness of its importance. However, only 45% of respondents use blue light blocking glasses or photochromic lenses to protect their

eyes. Regarding stress and physical discomfort alleviation methods, 45.6% engage in regular exercise, 58.8% take stretching breaks, 19.4% practice meditation or mindfulness, and 31.9% make ergonomic adjustments to their workstation, while 6.9% do not use any methods. An overwhelming 85.6% believe these methods can contribute to long-term health, although 61.9% struggle with the discipline to consistently implement them. Training on ergonomics or injury prevention has been received by 29.4% of respondents, but a significant majority (86.3%) expressed willingness to participate in such training.

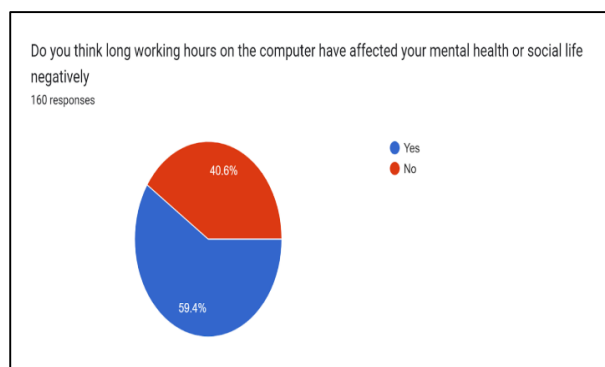


Figure 1: Impact of long working hours on mental health and social life of remote software professionals.

Table 4: Showing the association between the frequency of experiencing symptoms of injuries after work and taking regular breaks during work among remote software professionals in Enugu, Nigeria.

Experience of work-related injuries	Regular breaks during work		* χ^2 (p)
	Yes	No	
Always	1	0	$\chi^2=10.121$ df=3 P=0.018
Often	16	3	
Rarely	64	1	
Sometimes	64	11	
Total	145	15	160

There was a significant association between the frequency of experiencing symptoms of injuries after work and taking regular breaks ($p=0.018$). This suggests that taking regular breaks is associated with a reduction in the frequency of injury symptoms among these professionals.

DISCUSSION

The age distribution aligns with previous findings by Adebayo and Akingboye, indicating the tech industry's appeal to a younger workforce.⁷ Additionally, the high educational attainment mirrors global trends in the tech sector.⁸

Notably, this study found a more balanced gender distribution compared to earlier research by Smith and Anderson, suggesting improving gender diversity in the

profession.⁹ The variability in experience levels, with many professionals having 0-3 years of experience, points to the field's expanding opportunities and the growing preference for freelance work, as supported by Kässä and Lehdonvirta.¹⁰

The prevalence of computer-related injuries such as neck, shoulder, and back pain is consistent with global data, particularly the findings on musculoskeletal issues from poor ergonomics and prolonged sitting.¹¹ Eye strain was also common, reaffirming Anshel's conclusions about screen-related visual discomfort.¹²

Mental stress was reported by more than half of the respondents, echoing Wang et al observations on the psychological toll of remote work.¹³ Poor posture and long working hours, significant contributors to discomfort, align with findings by Van den Heuvel et al.¹⁴ Despite high injury awareness, many professionals have not sought medical attention, reflecting similar trends in Smith et al research.¹⁵

Encouragingly, most participants take regular breaks and use ergonomic tools, which are effective preventive measures. However, poor posture while working, such as leaning forward, remains a challenge, consistent with Gerr et al findings.^{11,14}

The study also revealed significant gaps in adopting preventive measures, like using blue light glasses, despite awareness of their benefits. Although most respondents engage in preventive behaviors, many struggles with the discipline to consistently apply them, a barrier often highlighted in health behavior research.¹⁶ The willingness of the majority to undergo ergonomic training indicates a potential for improving workplace health through education, in line with the work of Gerr et al.¹¹

Barriers to implementing health practices, including lack of knowledge and regulation in the remote work sector, highlight structural challenges. This finding emphasizes the need for increased awareness and support from individuals and organizations, aligning with the Health Belief Model and emphasizing shared responsibility for worker well-being.¹⁷

The significant association found in this study supports the hypothesis that regular breaks can help reduce the frequency of computer-related injuries among remote software professionals. This finding is consistent with prior research indicating the benefits of regular breaks in preventing musculoskeletal discomfort and reducing mental stress among individuals engaged in prolonged computer use.¹⁵

This study has certain limitations that should be acknowledged. Although the sample size provides useful initial insights, it may not fully represent all remote software developers in Nigeria or other regions.

CONCLUSION

This study contributes to the understanding of health risks associated with remote work among software professionals in Enugu. The findings highlight a significant awareness of computer-related injuries and the importance of ergonomic practices but reveal gaps in consistent preventive measures. The balanced gender representation and the rise of new entrants into the tech field are notable trends.

This research advances knowledge by identifying barriers to effective injury prevention and emphasizing the need for education, organizational support, and regulation in remote work settings. It underscores the critical role of shared responsibility between workers, employers, and potentially regulatory bodies in promoting a healthier work environment for remote professionals.

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