Vol 9 No 2, Juni 2025
ABDI DOSEN
Jurnal Pengabdian Pada Masyarakat
pISSN: 2614-6509
eISSN: 2620-5156

# THE RELATIONSHIP BETWEEN WORKING HOURS, WORK DURATION, AND LIGHTING INTENSITY ON EYE FATIGUE AMONG TAILORS IN TANJUNG MULIA HILIR SUBDISTRICT, MEDAN CITY

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**Abstract**

Inadequate lighting and long working hours are common occupational health issues faced by tailors in Tanjung Mulia Hilir Village, Medan City. These unfavorable conditions may contribute to eye fatigue, reduced concentration, decreased productivity, and a higher risk of sewing errors. Prolonged work duration without adequate rest also increases the risk of health complaints such as headaches, back pain, and vision problems. This study aimed to examine the relationship between work duration, work experience, and lighting intensity on the incidence of eye fatigue among tailors. The study employed a quantitative analytic method with a cross-sectional design, involving 60 respondents selected through total sampling. Data were collected through questionnaires and direct measurements of lighting levels. The results showed that 19 respondents (31.7%) had adequate lighting, while 41 (68.3%) worked under inadequate lighting conditions. A total of 16 respondents (26.7%) experienced eye fatigue. Bivariate analysis revealed a p-value of 0.00, indicating a significant relationship between work duration and lighting intensity with eye fatigue. It is recommended that workplace lighting conditions and working hours be improved to reduce the risk of visual fatigue.

**Keywords:** Work Duration, Work Experience, Lighting Levels, Eye Fatigue, Tailors

## INTRODUCTION

Working hours have both positive and negative impacts on an individual's performance. On the one hand, longer working durations may contribute to greater experience and skill acquisition over time. On the other hand, excessive working hours without proper rest can lead to a decline in health, increased fatigue, and reduced work efficiency (ILO, 2019). The standard working time generally ranges from 6 to 8 hours per day; exceeding this duration can result in diminished concentration, higher error rates, and an elevated risk of occupational health problems (Halim & Effendy, 2020). For occupations requiring precision and sustained visual focus, such as tailoring, working continuously for more than two hours without adequate rest may contribute to visual strain and eye fatigue (Rathore et al., 2021).


https://pkm.uika-bogor.ac.id/index.php/ABDIDOS/issue/archive
Submitted: May-2025 Received: May-2025 Available online: June-2025

Eye fatigue, also known as asthenopia, is a common complaint among both formal and informal workers, particularly those whose tasks involve prolonged visual attention. Tailors, who are required to maintain detailed focus during sewing, pattern cutting, and stitching processes, are especially vulnerable to this condition. Symptoms of eye fatigue may include blurred vision, headaches, watery eyes, and even temporary visual impairment, all of which can impair work quality and productivity (Zhang et al., 2020).

In addition to working hours, lighting conditions play a critical role in occupational visual health. Adequate lighting ensures not only comfort and safety but also supports visual performance and reduces strain. According to the Indonesian Ministry of Manpower Regulation No. 5 of 2018, the minimum illumination level required for tailoring tasks is 200 lux. Lighting levels below this standard can disrupt the visual performance of workers, slowing down work processes and increasing the likelihood of visual fatigue and errors (Kementerian Ketenagakerjaan RI, 2018).

Previous research has shown a strong association between long work hours, poor lighting, and the incidence of eye fatigue, particularly in professions that rely heavily on visual acuity (Wahyuni & Prasetyo, 2022). In the context of tailors in Tanjung Mulia Hilir Village, these factors are especially relevant given the informal nature of their work environment, which often lacks proper ergonomic and lighting standards. Therefore, it is important to investigate how working hours, work experience, and lighting intensity affect eye fatigue among this population.

## IMPLEMENTATION METHOD

This research employed a quantitative method with a cross-sectional design, where data were collected at a single point in time to examine the relationship between working hours, work experience, and lighting intensity with the occurrence of eye fatigue. The cross-sectional approach was chosen because it allows researchers to assess the prevalence of eye fatigue and its associated factors simultaneously within a specific population. This design is commonly used in occupational health studies to identify patterns and correlations without requiring long-term follow-up.

The study was conducted in Tanjung Mulia Hilir Subdistrict, located in the Medan Deli District of Medan City, Indonesia. This area was selected due to the high number of informal tailors working in home-based or small-scale environments, which often lack standardized workplace conditions. The target population consisted of all tailors who actively work in the Tanjung Mulia Hilir area. A total of 60 tailors participated in this study. The sampling technique used was total sampling, meaning that the entire population that met the inclusion criteria was selected as respondents. This approach ensured that the data represented the entire group of tailors in the area.

Data collection involved the use of structured questionnaires and direct measurements. Information on working hours, work experience, and eye fatigue was gathered using a self-administered questionnaire, which had been previously tested for clarity and relevance. Meanwhile, the measurement of lighting intensity in the workplace was conducted using a digital lux meter to objectively determine whether the lighting met the recommended standard.

The researchers conducted direct observations and measurements in each respondent's workspace during regular working hours to ensure data accuracy and consistency.

In this study, several operational definitions were applied to classify the variables. Working hours were defined as the total number of hours worked per day by the respondents. This variable was categorized into two groups: less than or equal to 8 hours (coded as 0), and more than 8 hours (coded as 1), based on general labor standards. Work experience referred to the total number of years the respondent had worked as a tailor, categorized as 5 years or less (coded as 0) and more than 5 years (coded as 1). Lighting intensity was measured in lux units. According to the Ministry of Manpower Regulation No. 5 of 2018, the minimum standard lighting level for tailoring tasks is 200 lux. Therefore, lighting levels below 200 lux were considered inadequate (coded as 0), while lighting levels of 200 lux or more were considered adequate (coded as 1). Eye fatigue was assessed through a set of structured questions that explored symptoms such as eye strain, blurred vision, headaches, and visual discomfort. Respondents were categorized into two groups: experiencing eye fatigue (coded as 0) and not experiencing eye fatigue (coded as 1).

The data analysis process was conducted in three main stages. First, univariate analysis was carried out to describe the characteristics of each variable, including frequency and percentage distributions. Second, bivariate analysis was performed using the Chi-Square test to examine the relationships between independent variables (working hours, work experience, and lighting intensity) and the dependent variable (eye fatigue). Finally, a multivariate analysis was conducted to control for confounding variables and to determine the dominant factors influencing eye fatigue. All statistical analyses were performed using appropriate software tools, and the level of significance was set at $p < 0.05$.

## RESULTS AND DISCUSSION

Table 1 presents the characteristics of the respondents. Out of 60 participants, 19 were male (31.7%) and 41 were female (68.3%). Regarding work experience, 18 respondents (30%) had ≤5 years of experience, while 42 respondents (70%) had >5 years of experience. Based on daily working hours, 26 respondents (43.3%) worked ≤8 hours per day, while 34 respondents (56.7%) worked more than 8 hours. In terms of lighting intensity, 19 respondents (31.7%) were found to work under adequate lighting conditions (≥200 lux), while 41 respondents (68.3%) were exposed to inadequate lighting. As for eye fatigue, 44 respondents (73.3%) reported no symptoms of eye fatigue, while 16 respondents (26.7%) experienced eye fatigue.

Table 2 shows the relationship between working hours and eye fatigue among the respondents. Of the 26 respondents who worked ≤8 hours per day, the majority (25 respondents or 96.2%) did not experience eye fatigue, and only 1 respondent (3.8%) reported fatigue. In contrast, among the 34 respondents who worked >8 hours per day, 19 (55.9%) did not experience fatigue, while 15 (44.1%) reported experiencing eye fatigue. The Chi-Square test revealed a statistically significant relationship between working hours and eye fatigue (p-value = 0.000). These findings suggest that working more than the standard 8 hours per day substantially increases the risk of visual fatigue among tailors.

Table 3 presents the association between work experience and eye fatigue. Among the 18

respondents with ≤5 years of experience, 13 respondents (72.2%) did not experience eye fatigue, and 5 respondents (27.8%) did. For the 42 respondents with more than 5 years of experience, 31 respondents (73.8%) reported no fatigue, while 11 respondents (26.2%) did. The results of the Chi-Square test indicate that there is no significant relationship between work experience and eye fatigue (p-value = 1.000). This implies that the length of time a tailor has been in the profession does not appear to be a determining factor in the occurrence of visual fatigue.

Table 4 analyzes the relationship between lighting intensity and eye fatigue. Of the 19 respondents working under adequate lighting conditions (≥200 lux), 10 respondents (52.6%) did not report eye fatigue, while 9 respondents (47.4%) did. In contrast, among the 41 respondents exposed to lighting levels below 200 lux, 34 respondents (82.9%) did not experience fatigue, while 7 respondents (17.1%) did. The Chi-Square test yielded a p-value of 0.014, indicating a statistically significant relationship between lighting intensity and eye fatigue. Surprisingly, although more respondents under inadequate lighting reported no fatigue, the statistical results suggest that poor lighting remains a significant risk factor contributing to visual discomfort.

Table 5 displays the results of the multivariate analysis, identifying the dominant factors associated with eye fatigue among tailors. The analysis revealed that working hours was the most influential factor, with a p-value of 0.003, an odds ratio (OR) of 46.961, and a 95% confidence interval (CI) ranging from 3.729 to 591.335. This indicates that tailors working more than 8 hours per day are 46 times more likely to experience eye fatigue than those working 8 hours or less. The second dominant factor was lighting intensity, with a p-value of 0.018, an OR of 6.139, and a 95% CI of 1.362 to 27.677. These results confirm that insufficient lighting increases the likelihood of eye fatigue by approximately six times compared to adequate lighting. Meanwhile, work experience did not show a significant influence in the multivariate model.

**Table 1 Result of unvariate analysis**

| Respondents' Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 19 | 31.7 |
| Female | 41 | 68.3 |
| Work Duration | | |
| ≤ 5 years | 18 | 30.0 |
| > 5 years | 42 | 70.0 |
| Working Hours per Day | | |
| ≤ 8 hours | 26 | 43.3 |
| > 8 hours | 34 | 56.7 |
| Lighting Intensity | | |
| Meets the Standard | 19 | 31.7 |
| Does Not Meet the Standard | 41 | 68.3 |
| Eye Fatigue | | |
| Not Fatigued | 44 | 73.3 |
| Fatigued | 16 | 26.7 |

**Table 2 Results of Bivariate Analysis**

| Working Hours | Eye Fatigue – Not Fatigued | Eye Fatigue – Fatigued | Total | p-value |
|---|---|---|---|---|
| | n (%) | n (%) | n (%) | |
| ≤ 8 Hours | 25 (96.2%) | 1 (3.8%) | 26 (100%) | |
| > 8 Hours | 19 (55.9%) | 15 (44.1%) | 3 | |

**Table 3 Results of Bivariate Analysis**

| t | Eye Fatigue | | | | Total | p-value |
|---|---|---|---|---|---|---|
| | Not Fatigued | | Fatigued | | | |
| | N | % | N | % | N | |
| Work Duration | | | | | | |
| ≤ 5 Years | 13 | 72.2% | 5 | 27.8% | 18 | |
| > 5 Years | 31 | 73.8% | 11 | 26.2% | 42 | |

**Table 3 Result of Bivariate Analysis**

| Variable | Eye Fatigue | | Total | p-value |
|---|---|---|---|---|
| | No Fatigue | Fatigue | | |
| | N | % | N | |
| Lighting Level | | | | |
| Meets the Standard | 10 | 52.6% | 9 | |
| Below the Standard | 34 | 82.9% | 7 | |

**Table 5 Result of Multivariate Analysis**

| Variable | p-value | OR (Odds Ratio) | 95% CI (Confidence Interval) |
|---|---|---|---|
| Work Duration | 0.099 | 0.202 | (0.030 – 1.354) |
| Length of Service | 0.003 | 46.961 | (3.729 – 591.335) |
| Lighting Intensity | 0.018 | 6.139 | (1.362 – 27.677) |

This study examines the relationship between work duration, length of service, and lighting intensity with eye fatigue among tailors in Tanjung Mulia Hilir, Medan City. The findings reveal a significant relationship between the number of working hours and the occurrence of eye fatigue. Based on the bivariate analysis, the variable of daily work duration showed a statistically significant association with eye fatigue (p-value = 0.000). This result is consistent with the study conducted by Wirgunatha (2019), which found that tailors working more than 10 hours per day experienced higher levels of eye fatigue. Similarly, research by Wendy Alfonso (2022) also supports this finding, showing that workers who worked more than 8 hours per day had higher complaints of eye strain.

Tailors in this study reported that prolonged periods of focusing on intricate sewing tasks contributed to visual strain. Long working hours, especially without adequate rest, can significantly affect ocular health. Normally, a working duration of 6–8 hours is considered optimal. Extending work hours beyond this limit often results in reduced efficiency, increased

fatigue, and potential health risks, including eye strain and other musculoskeletal complaints. Some participants stated that working for more than 3 continuous hours caused their eyes to feel tense and sleepy, particularly when there were large order volumes requiring overtime. However, older workers reported difficulty maintaining long working hours due to physical limitations, emphasizing the need for appropriate workload management.

Work duration was found to be a key contributor to eye fatigue in this population. Sewing tasks demand high levels of visual concentration, often involving detailed objects viewed at close range. These conditions may cause excessive stress on the visual system, leading to symptoms of eye fatigue among tailors.

Regarding the length of service, the results indicated no statistically significant association with eye fatigue (p-value = 1.000). Although tailors with more than five years of experience showed slightly higher rates of eye fatigue, the association was not significant. This is in line with the study by Sri Mindayani et al. (2021), which also found no significant relationship between years of service and eye fatigue. Similar findings were reported by Maulina et al. (2019), who concluded that work duration and daily working hours had a stronger impact on visual strain than the overall length of employment.

It is possible that experienced workers develop coping mechanisms and greater tolerance for job-related fatigue over time. Additionally, prolonged exposure to similar work environments may lead to adaptation. However, despite these adaptations, the cumulative effect of years spent in close-range visual tasks may still pose a risk to ocular health. Mardikaningsih et al. (2022) suggested that while longer job tenure may lead to increased productivity and expertise, it may also raise the risk of health problems due to repetitive and continuous exposure to occupational hazards.

Finally, the findings revealed a significant association between lighting intensity and eye fatigue (p-value = 0.014). Measurements taken using a lux meter showed that the majority of workspaces did not meet recommended lighting standards. Specifically, 68.3% of participants were working in environments with substandard lighting. Although some workers expressed a preference for dim lighting due to discomfort from glare, the lack of adequate illumination contributes to visual strain and increases the likelihood of eye fatigue.

These findings align with previous studies. Jeanet (2021) found a significant relationship between lighting levels and visual fatigue among tailors in Kupang City (p-value = 0.004), while Suhermawan (2021) reported a similar association in tailors from Tamalanrea, Makassar. Both studies emphasize the importance of proper lighting in reducing occupational eye strain.

Observations during this study revealed that most tailoring workspaces in Tanjung Mulia Hilir were small and poorly lit, conditions which exacerbate visual fatigue. Improving lighting conditions in the workplace—such as adjusting the orientation of workstations to maximize natural light, replacing dim bulbs, adding task lighting, and using light-colored wall paint to enhance light reflection—can significantly help reduce eye strain.

Overall, the study highlights the importance of managing work duration and optimizing environmental factors such as lighting to reduce the incidence of eye fatigue among tailors. Tailors should be encouraged to take regular visual breaks and ensure that their work environments meet minimum ergonomic and lighting standards.

## CONCLUSION

This study concludes that there is a significant relationship between working duration and lighting levels with eye fatigue among tailors in Tanjung Mulia Hilir Subdistrict, Medan City. Tailors who work more than 8 hours per day and are exposed to lighting levels below 200 lux are more likely to experience symptoms of eye fatigue. These symptoms may include dry eyes, redness, headaches, blurred vision, and difficulty focusing. The findings highlight the need for occupational health interventions, including proper work-rest cycles and adequate workplace lighting, to minimize the risk of visual fatigue among tailors. Implementing these measures could help improve workers' overall health, productivity, and quality of life.

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