The Relationship between Occupational Stress and Diet Quality with Productivity Loss in Islamic School Teachers in Medan: A Cross-sectional Study

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Abstract. Occupational stress and poor dietary practices have become a global health concern. Workers with poor dietary practices may be less productive and present at work. This study examined the relationship between occupational stress and diet quality on productivity loss among Islamic school teachers in Medan. This cross-sectional study was conducted on 50 Islamic school teachers in Medan. They were aged 19-64 years old and recruited using purposive sampling. Their occupational stress and diet quality were evaluated using the perceived stress scale (PSS) and the balanced diet index (BDI). Productivity loss was assessed based on the number of primary working days missed (absenteeism) due to poor health during six months. Negative binomial regression was used to examine the association between occupational stress and diet quality with productivity loss. The mean occupational stress, diet quality, and absenteeism were 44.89, 34.87, and 0.86 days, respectively. After controlling sociodemographic characteristics, the regression model indicated that productivity loss was positively associated with occupational stress (p=0.006). Consuming a high-quality diet was negatively associated with productivity loss (p=0.010). It concluded that occupational stress and diet quality were associated with teachers' productivity loss. The study highlights the importance of occupational health promotion policies for teachers.

1 Introduction

Teachers are the most valuable asset in a country because they transfer knowledge and skills to students who will be the next generations in various sectors, such as the economic, environmental, health, and defence sectors [1]. Productivity is the most important organizational factor that teachers should have. It shows how teachers actively plan, execute and monitor each educational activity to achieve school goals [2]. Besides productivity, school attendance is another important variable for teacher participation. The Indonesian

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Ministry of National Education showed that out of 2.6 million teachers, almost 500,000 teachers were absent from schools a day for unacceptable reasons. Similarly, this condition occurs in Malaysia and Thailand. As a result, student learning is less guided and monitored [2]. Absenteeism is caused by multifaceted factors such as lifestyle, demographics, and socioeconomic characteristics.

Teacher well-being is determined by diet quality. Improvements in dietary behavior, such as reducing consumption of fatty foods and increasing fruit and vegetable intake, will significantly impact employee attendance [3]. The recommendations lie based on previous research, which showed a significant association between disease etiologic and chronic eating patterns [4]. Workers with poor dietary practices may be less productive and present at work [5, 6].

Moreover, occupational health quality contributes to how teachers sustain their work. However, they tend to have poor personal and professional lives if they develop occupational stress. In other words, occupational stress may impact their productivity as an educator. The worst impact of occupational stress is teacher turnover. Stress due to heavy workloads and demands may negatively influence their teaching and disrupt their physiological balance [7].

According to Kyriacou [8], teacher stress is a teacher's experience of unpleasant and negative emotions resulting from frustration or depression at work. When teachers are unable to overcome problems with the existing resources, stress might start to develop. Unwanted environmental factors in schools (internal factors) or outside schools (external factors) could also cause stress among teachers.

The teacher has been categorized as an occupation at high risk for stress [9]. An online survey re-submitted by Suparman [10] showed the same results in Indonesia, especially during the pandemic [11]. The symptoms of stress appear in physical complaints, psychological disorders, or teacher behavior [10]. As many as 39.4% of teachers at SMA Santo Yakobus Jakarta experienced severe stress related to work demands [12]. Similar results were found in SMAN 1 Manado, where 38.2% of teachers experienced high stress related to workload, role conflict, and social support [13]. Over 50% of special education teachers in Central Java suffer from poor mental health conditions and cannot deal with their problems effectively [14].

Emotional intelligence and occupational stress could influence teacher performance [15]. Motivation, work stress, and work environment affect teachers' performance at the Yayasan Perguruan Dr Wahidin Sudirohusodo, Medan [16]. Teacher productivity is essential for quality education. It is generally measured by quantity, quality, and work timelines. The success of student learning and institution is 65% determined by teacher productivity [17].

Research that discusses teachers' occupational health and the dietary pattern is limited. Therefore, this study aimed to examine the relationship between occupational stress and diet quality on productivity loss in Islamic school teachers in Medan.

2 Methods

This cross-sectional study was conducted on Islamic school teachers in Medan in July-August 2022. The teachers were aged 19-64 years old from the Islamic High Schools of Al Ulum Terpadu, Al Amjad, and Al Washliyah. The three Islamic schools were selected because they are well known in Medan city, so they would at least represent the conditions of other teachers at the Islamic high school in Medan city. The participants were recruited using purposive sampling. Statcalc, as part of the EpiInfo-software v7.2.5.0. provided by The Centres for Disease Control and Prevention (CDC), was used to calculate the minimum sample size for this study with a 95% confidence level and 80% power. After the calculation, it obtained 39 teacher participants. This study included 50 teachers in the final sample.

Productivity loss was the dependent variable assessed based on the number of primary working days missed (absenteeism) due to poor health during six months. It was included in the questionnaire with a six-month recall period. The Human Resource Department of each school validated teacher absenteeism each semester.

Moreover, the independent variables were sociodemographic characteristics, occupational stress, and diet quality. Sociodemographic characteristics for controlling potential confounders included sex, age groups (18-29, 30-44, or 45-64 years), ethnicity from Sumatera (Batak, Nias, Mandailing, Karo, Minang, or Aceh) and others (Java, Sunda, Bugis), marital status (unmarried or married), educational level (senior high school or tertiary), income (below or above regional minimum wage for Medan City) and working period (less than 5, 5-9, 10-19, or more than 20 years). Occupational stress was evaluated using the perceived stress scale (PSS) with 14 items, consisting of seven positive items and seven negative items rated on a 5-point Likert scale. An overall score was obtained by summing all 14 items, of which higher scores indicate higher levels of perceived stress [18]. Additionally, dietary intake was assessed using a 24-hour food recall. The balanced diet index (BDI) score for an adult was constructed from the 24-hour food recall. A high BDI score indicates high diet quality [19, 20]. All data were collected by enumerators using an online questionnaire on KoBotoolbox.

This study was approved by the Health Research Ethics Committee of Universitas Sari Mutiara Indonesia (Reference number: 1370/F/KEP/USM/VII/2022) as compatible with the Declaration of Helsinki. All participants provided informed consent forms prior to their participation. The study was reported according to the guidelines of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) [21].

Data were exported from KoBotoolbox questionnaire forms to Microsoft Excell office 2019. They were analyzed descriptively with a mean (M) and standard deviation (SD) calculated for continuous data, while categorical data was calculated in frequency and percentage. A negative binomial regression model was used to examine the association between occupational stress and diet quality with productivity loss. This model was considered the most appropriate due to the over-dispersion of the count variables to calculate incidence rate ratios (IRR). All sociodemographic data were included in the analysis.

3 Results and Discussion

A total of 50 participants in the final sample consisted of 27 men (54%) and 23 women (46%). The sociodemographic characteristics of the subjects are summarised in Table 1. The mean values of absenteeism across different groups are also included in Table 1. The participants were mostly aged 18-29 years (48%), married (58%), and of Sumatra ethnicity (52%). Almost all had tertiary education (94%). Around half of the participants had income below the regional minimum wage for Medan City (56%). Over 50% of the participants had more than five years of work.

The mean value of absenteeism was 0.86±1.77 days. We employed a negative binomial regression model to investigate the relationship between occupational stress and diet quality with productivity loss. The model showed that the value of Pearson Chi-Square in the Goodness of Fit table was more than 0.05, and the value of the Likelihood Ratio Chi-Square was less than 0.05 ($p = 0.000$). Statistical significance was observed at the 5% significance level. The analysis results are provided in Table 2.

Table 1. Sociodemographic characteristics of teachers.

	Men (54%) n (%)	**Women (46%) n (%)**	**Total n (%)**	**Mean number of days absent**
Age group (years)				
18-29	18 (66.7)	6 (26.1)	24 (48)	0.83
30-44	8 (29.6)	12 (52.2)	20 (40)	0.85
45-64	1 (3.7)	5 (21.7)	6 (12)	1.00
Ethnicity				
Sumatera (Batak, Nias etc)	14 (51.9)	12 (52.2)	26 (52)	0.69
Others (Java, Sunda etc)	13 (48.1)	11 (47.8)	24 (48)	1.04
Marital status				
Not married	14 (51.9)	7 (30.4)	21 (42)	1.62
Married	13 (48.1)	16 (69.6)	29 (58)	0.31
Educational level				
Senior high school	3 (11.1)	0 (0)	3 (6)	0.00
Tertiary	24 (88.9)	23 (100)	47 (94)	0.91
Income				
<Regional Minimum Wage	17 (63)	11 (47.8)	28 (56)	0.89
≥Regional Minimum Wage	10 (37)	12 (52.2)	22 (44)	0.82
Length of employment (years)				
<5	14 (51.9)	6 (26.1)	20 (40)	0.70
5-9	7 (25.9)	2 (8.7)	9 (18)	1.22
10-19	4 (14.8)	11 (47.8)	15 (30)	0.80
≥20	2 (7.4)	4 (17.4)	6 (12)	1.00

The negative binomial regression showed a statistically significant relationship for both variables ($p<0.05$). After controlling for all sociodemographic variables, the model indicated a positive relationship between productivity loss and occupational stress. If the occupational stress score increased by one point, the rate of productivity loss would be expected to increase by a factor of 1.14 while holding other variables constant. Otherwise, a negative relationship between productivity loss and diet quality would be observed. If the diet quality score increased by one point, the rate of productivity loss would be expected to decrease by a factor of 0.85 while holding other variables constant. No significant associations were found between age, ethnicity, educational level, income, and length of employment with productivity loss.

Table 2. The effect of occupational stress and diet quality on teachers' productivity loss.

	Mean±SD	**B**	**p-values**	**IRR (95% CI)**
Occupational stress	44.89±10.49	0.135	0.006	1.14 (1.04 to 1.26)
Diet quality	34.87±11.26	-0.165	0.010	0.85 (0.75 to 0.96)

IRR (Incidence Rate Ratio); CI (Confidence Interval)

Previous research identified occupational stress as a significant predictor of productivity loss [22-25]. Stress affects mood, eating behavior, and metabolism [26]. It can cause a person not to think appropriately and effectively, resulting in decreased performance and work

productivity. Moreover, stress increases the risk of stress-related illness. It might contribute to cardiovascular risk and morbidity. The excessive activation of the sympathetic nervous system and subsequent high levels of catecholamines could initiate the process [27, 28]. When these illnesses occur, employees are absent from work or are not fully functioning in the workplace due to unhealthy conditions. These conditions can be defined as losses in productivity [23]. Aligned with the current findings, occupational stress significantly increased the risk of productivity loss among Islamic school teachers in Medan. Previous studies have also contributed to different assessment methods to measure occupational stress and productivity loss.

Poor diet quality of workers could lead to increased absenteeism and decreased productivity [5, 6]. An unhealthy diet is a leading risk factor for non-communicable diseases (NDCs) and death [29]. NCDs were associated with productivity loss. The mean value of absenteeism for those with three or more NCDs was more significant than those without NCDs. Compared with those without NCD, being diagnosed with three or more NCDs was expected to have a higher incidence rate of absenteeism [30]. This study showed that consuming a high-quality diet based on Indonesian Balanced Nutrition Guidelines could significantly reduce productivity loss in Islamic school teachers in Medan. To limited literature on this topic, this study only found two studies that found poor diet quality of teachers in Wangi-Wangi Selatan Sub-district, Wakatobi [31] and Dramaga Sub-district, Bogor [32].

Despite the significant findings, this current study had certain limitations. First, as it used a cross-sectional design, its findings should be interpreted cautiously to avoid the potential for reverse causality. Second, using a negative binomial model was still challenging with small sample size. However, this study and previous publications add to knowledge on related topics.

4 Conclusion

The mean value of absenteeism was 0.86 days. After controlling sociodemographic characteristics, the regression model indicated that productivity loss was positively associated with occupational stress. Consuming a high-quality diet was negatively associated with productivity loss. It concluded that occupational stress and diet quality were associated with teachers' productivity loss. The study highlights the importance of occupational health promotion policies and suggests schools design recommendations on how to prevent occupational stress and improve the diet quality of teachers.

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Conflict of Interest Disclosure
The authors declare no conflicts of interest.

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