

Implication of Excessive Working Hours On The Risk of Worker Morbidity: Microeconomic Analysis Approach

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Abstract

In the increasingly competitive modern era, excessive working hours have become commonplace in various industrial sectors. However, the increase in working hours often has a negative impact on workers' health. This study aims to examine the effect of excessive working hours on workers' morbidity in Bengkulu. Using data from the National Socio-Economic Survey (SUSENAS), this study uses the Instrumental Variable (IV) Probit analysis method to address the potential for endogeneity in the relationship between variables. The results show that excessive working hours have a positive and significant effect on the chance of increasing workers' morbidity by 9.7 percent. In addition, domicile factors, types of business fields and expenditures also contribute to the chance of morbidity status. This study emphasizes that excessive working hours have serious implications for workers' physical and mental health, so it is important to implement policies that support work-life balance and health promotion programs in the workplace.

Keywords: Working Hours, Morbidity, Instrumental Variable, SUSENAS

INTRODUCTION

In the context of future economic development, the transformation of human resources (HR) constitutes a key foundation for creating a workforce that is not only skilled but also healthy and competitive. To date, efforts to transform human resources have often emphasized skill enhancement, technological mastery, and innovation, while paying limited attention to workers' health and well-being. One frequently overlooked challenge is the health risks associated with excessive working hours, which have been proven to

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increase worker morbidity. If such working patterns persist, the productive capacity of the workforce may decline, thereby hindering efforts to enhance national competitiveness. In Indonesia, the phenomenon of excessive working hours is still often perceived as an inseparable part of the work culture, without due consideration of its long-term implications for productivity.

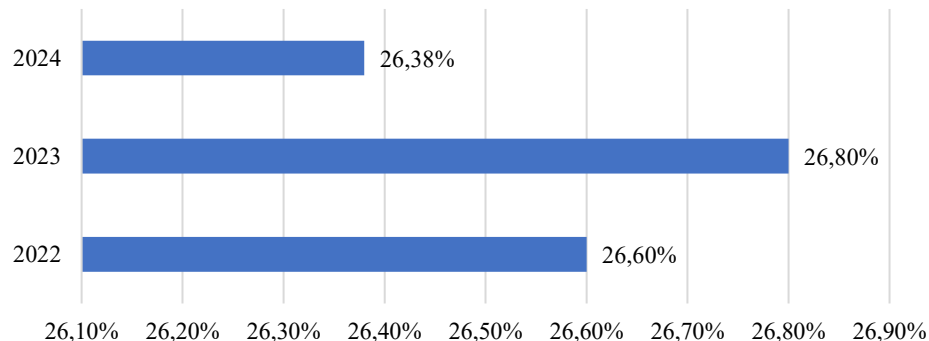


Figure 1. Percentage of the Population Working Above Normal Working Hours in Indonesia, 2022–2023

Source: Sakernas data processed by the author, 2025

In the increasingly competitive modern era, long working hours have become a common phenomenon across various industrial sectors. Excessive working hours are defined as individuals working more than 48 hours per week (BPS, 2024). According to data from the 2024 National Labor Force Survey, as many as 26.38 percent of individuals in Indonesia work more than 48 hours per week. This makes excessive working hours an increasingly urgent issue in the context of both physical and mental health. Extended working duration often brings negative consequences for workers' health. Poor work–life balance can lead to significant health problems, including stress, fatigue, and psychological strain (Che et al., 2023; Lunau, T., Bambra, C., & Eikemo, 2014). Furthermore, workplace management contributes significantly to work–life balance, which in turn affects workers' health outcomes (Pratiwi & Silvianita, 2020). This indicates that effective work–life balance policies can substantially enhance well-being and job satisfaction (Gadzali, 2023).

Recent studies demonstrate a significant correlation between excessive working hours and various health complaints, including morbidity rates. Study of (Brough et al., 2014) found that work–time balance can extend beyond individual health to positive organizational outcomes; conversely, excessive working hours can lead to diminished

well-being and productivity. This indicates that organizations must address work–time balance to enhance employee satisfaction and overall performance (Odle-Dusseau et al., 2012). Long working hours, particularly exceeding 45 hours per week, are strongly associated with increased symptoms of depression and anxiety, especially during the COVID-19 pandemic (Che et al., 2023). In addition, prolonged working hours contribute to higher risks of serious physical health conditions. Study from (Magee et al., 2011) reported that individuals working longer hours tend to experience health problems such as obesity and cardiovascular diseases, often linked to limited time for exercise and maintaining a healthy diet. Similarly, (Kivimäki et al., 2015), revealed that working more than 55 hours per week increases the risk of stroke by 33% and coronary heart disease by 13% compared to those working the standard 35–40 hours per week. The stress induced by excessive working hours can further exacerbate pre-existing health conditions, such as hypertension and diabetes, thereby elevating individual morbidity levels (Ricketts et al., 2019; Setyopranoto et al., 2019). These findings underscore the potential cardiovascular health hazards associated with prolonged working hours.

In addition to its impact on physical health, long working hours also have serious implications for mental health. Studies have shown that individuals working more than 55 hours per week face a higher risk of experiencing symptoms of depression and anxiety (Gu et al., 2019; Virtanen et al., 2018). These findings highlight the importance of maintaining work–life balance to safeguard workers' mental health. Another aspect of concern is the effect of working hours on sleep quality. In their systematic review. Study from (Bannai & Tamakoshi, 2014)) revealed that prolonged working hours are consistently associated with sleep disturbances, including insomnia and poor sleep quality. Such disruptions in sleep patterns can trigger various other health problems, including reduced cognitive functioning and an increased risk of occupational accidents (Gu et al., 2019; Rigas et al., 2024).

Workers with longer working hours also tend to experience lower back pain and other musculoskeletal disorders, which may result from prolonged exposure to static postures or repetitive movements (Wong, K., Chan, A. H., & Ngan, 2019). A study in Ethiopia demonstrated that heavy workloads and reduced attention to detail in high-pressure situations adversely affect individual health and safety (Endalamaw *et al*, 2020; Park et al., 2023). Excessive working hours may also elevate the risk of burnout and work-related stress. These conditions not only affect individual health but also reduce workplace productivity (Afonso *et al*, 2017; Ganster *et al*, 2018). Overall, excessive working hours exert significant impacts on both mental and physical health.



Bengkulu Province, as one of the provinces in Sumatra with relatively high levels of poverty and unemployment, is particularly vulnerable to excessive working hours. In addition, the province's economy is predominantly driven by the primary sector, with a large proportion of workers engaged in informal employment and industries that are highly susceptible to excessive working hours due to economic pressures. Against this background, excessive working hours exert significant impacts on various aspects of workers' health. The topic of work–time balance and its implications for morbidity has thus become increasingly relevant in today's fast-paced work environment. Therefore, the objective of this study is to analyze the effect of excessive working hours on workers' morbidity in Indonesia by employing both individual- and household-level analyses using data from the National Socioeconomic Survey (SUSENAS).

METHODOLOGY

This study employs a quantitative descriptive approach. This approach systematically and objectively describes specific phenomena or issues using numerical data. It is frequently applied to analyze relationships and causal effects between variables and to depict the characteristics of a population based on figures obtained through surveys or other secondary data sources (Gujarati, 2013). The data source for this research is secondary data from Statistics Indonesia (BPS) in the form of microdata, namely the 2023 National Socioeconomic Survey (SUSENAS). SUSENAS is microdata at the individual and household levels that provides information on demographic, social, and economic characteristics, community welfare, poverty, consumption, education, and other socio-economic aspects (Nopiah & Pangaribowo, 2023). Furthermore, the type of data used is cross-sectional, meaning that the study draws samples at a single point in time across different individuals, thereby offering a snapshot of conditions during that specific period.

The variables in this study consist of two types: dependent and independent variables. The dependent variable is morbidity status, while the independent variable is working hours status. In addition, control variables are included to account for other factors that may influence the dependent variable, thereby preserving the validity of results, improving estimation accuracy, and reducing bias. The control variables used include demographic characteristics (age, marital status, gender, household size, and domicile), years of education, economic status, and employment sector. The unit of analysis is individuals aged 15 to 64 years (the productive age group) who are employed, working more than 48 hours per week, and residing in Bengkulu Province as the study sample.



The analytical method employed is the instrumental variable (IV) approach. This method addresses endogeneity issues in regression analysis, where the independent variable is correlated with the error term. IV estimation applies an instrumental variable (Z) that is correlated with the endogenous variable (X) but does not directly affect the dependent variable (Y) (Wooldridge, 2016). The analytical model can be expressed as follows:

$$Y = \beta_0 + \beta_1 X + \beta_2 W + u \quad (1)$$

Where Y denotes the dependent variable, W represents the control variable, and X is the independent variable. However, in this case, X is endogenous and therefore requires an instrumental variable Z. Accordingly, the instrumental equation (first-stage regression) is:

$$X = \gamma_0 + \gamma_1 Z + \gamma_2 W + u \quad (2)$$

Where Z is the instrumental variable that is correlated with X but uncorrelated with the error term ε , while u represents the error term in the first-stage regression. In this study, the selected instrumental variable (Z) is the number of household members. This choice is based on the rationale that the number of children (Z) may compel an individual to work longer hours (thus affecting working hours), but it does not directly influence workers' health. Therefore, the number of household members is appropriate as an instrumental variable (IV) in this analytical model to address the endogeneity problem. The research model equations are specified as follows:

$$\text{Morbidity} = \beta_0 + \beta_1 \text{Work_hours} + \sum \beta_n \text{Control_var} + \varepsilon \quad (3)$$

Equation IV (*first stage regression*):

$$\text{Work_hours} = \gamma_0 + \gamma_1 \text{Tot_child} + \sum \gamma_n \text{Control_var} + u \quad (4)$$

$$\text{Morbidity} = \beta_0 + \beta_1 \text{Work_hours} + \sum \beta_n \text{Control_var} + \varepsilon \quad (5)$$

Table 1. Operational Variable Definition

No.	Variables	Operational Definition	Unit
Dependent Variable			
1	Morbidity status	In the past month, has (Name) had any health complaints (fever, cough, runny nose, diarrhea, dizziness, chronic illness, etc.)?	Categorical 1 = Yes 0 = No



		Book K – R1102	
Independent Variable			
2	Work hours	During the past week, how many hours did you work in your primary job? Working hours for individuals working >48 hours per week Book K – R708	Ratio
Instrumental Variable (IV)			
3	Total member of household	Number of household members in one house Book K – R301	Ratio
Control Variable			
4	Age	How old is (the respondent)?	Ratio
5	Marital status	What is the respondent's marital status? Book K – R404	Categorical 1 = Married 0 = Not / never married
6	Domicile	Classification of respondents' residence	Categorical 1 = Urban 0 = Rural
7	Gender	Is the respondent male or female? Book K – R405	Categorical 1 = Man 0 = Woman
8	Years of education	What is the highest level of education the respondent is currently/has ever attended? And what is the highest level/grade the respondent is currently/has ever attended? Books K – R612 and R613	Ratio
9	Expenditure per capita	Food and non-food expenditure per capita (respondents) KR Book – CAPITA	Ratio



10	Types of employment fields	During the past week, what was the respondent's primary field of work or occupation? Book K – R706	Categorical 1 = Primary Sector 0 = Secondary sector and others
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Source: data modified by the author, 2025

RESULT AND DISCUSSION

Result

This chapter presents the research findings, which are divided into two parts: descriptive statistics and the results of the logistic regression.

Table 2. Data Statistic Description

Variables	Observation	Mean	Std. Deviation	Min	Max
Morbidity status	2138	0.270	0.444	0	1
Work hours >48 hours per weeks	2138	59.266	10.225	49	97
Domicile (1 = urban)	2138	0.384	0.486	0	1
Marital status (1 = Married)	2138	0.206	0.404	0	1
Gender (1 = Man)	2138	0.688	0.463	0	1
Age	2138	40.446	11.541	16	64
Type of employment sector (1=primary sector)	2138	0.426	0.495	0	1
Years of education	2138	9.613	3.950	0	18
Expenditure per household (log)	2138	14.011	0.566	12.638	16.936

Source: data processed by authors, 2025



Table 2 shows that the morbidity status of employed individuals in Bengkulu Province reaches 27.03 percent, or 578 individuals, with an average of 59.26 working hours per week. These individuals predominantly reside in rural areas, are male, aged between 40 and 41 years, and are married. Furthermore, the average duration of education completed is 9 years and 6 months, which corresponds to the level of junior secondary school (SMP) up to the first grade of senior secondary school (SMA). However, there are individuals who attained education up to the master's level (S2) while still working beyond normal working hours. In terms of industry classification, 42.60 percent, or 912 individuals, who work more than 48 hours per week are employed in the primary sector, while 57.34 percent are engaged in the secondary and other sectors.

Table 3. Intrumental Variable Result – Probit

Probit model with endogenous regressors		Total observation	= 2138	
Log likelihood = -9130.1832		Prob >chi2	= 0.0000	
Dependent variable: Morbidity status (1 = Yes, have morbidity)				
Variables	Coefficient	Std. Err	z	p> z
Work hours >48 hours per weeks	0.097	0.007	13.39	0.000***
Age	0.007	0.005	1.49	0.136
Gender (1 = Man)	0.067	0.061	1.11	0.269
Marital status (1 = Married)	-0.028	0.063	-0.45	0.653
Domicile (1 = urban)	0.104	0.053	1.96	0.050**
Years of education	0.003	0.007	0.48	0.631
Expenditure per household (log)	-0.176	0.047	-3.73	0.000***
Type of employment fields (1=Primary sector)	0.400	0.090	4.44	0.000***
Constanta	-4.056	0.596	-6.81	0.000***

Description: Instrumental variable: Number of Household. Significance levels are $p > 0.01$ (1%)***; 0.05 (5%)**; 0.1 (10%)*. Robustness has been tested.

Source: data processed by the author, 2025



Table 3 presents the results of the probit logistic regression using instrumental variables to address the endogeneity problem in linear regression. The findings indicate that excessive working hours are positively associated with the likelihood of individuals experiencing morbidity. Other variables that exhibit a positive relationship include age, gender, place of residence (domicile), years of education, and type of employment sector. Conversely, variables negatively associated with morbidity are marital status and per capita expenditure.

Subsequently, Table 4 presents the endogeneity test, which is employed to verify whether variable X is indeed endogenous, thereby justifying the use of an instrumental variable model. The results indicate that the Durbin statistic is 7.459, with a residual p-value of 0.0063, which is less than 0.05. Thus, it can be concluded that morbidity is endogenous, and the use of instrumental variables (IV) is required for further analysis.

Tabel 4. Endogeneity test

Tests of endogeneity		
H0 : Variables are exogenous		
Durbin (score) chi2 (1)	= 7.459	(p = 0.0063)
Wu-hausman F(1.2128)	= 7.450	(p = 0.0064)

Source: data processed by the author, 2025

After conducting the instrumental variable probit regression and confirming that morbidity is endogenous, the marginal effects probit test is employed to examine the extent to which excessive working hours affect the probability of individuals experiencing morbidity. The results of the margins analysis indicate the change in morbidity probability for each additional hour of work. As shown in Table 5, the findings reveal that working hours have a positive and significant effect on morbidity. Specifically, each additional working hour increases the probability of morbidity by 9.7 percent.

Other variables that exhibit significant effects include domicile, household expenditure, and type of employment sector. Regarding domicile, individuals working more than 48 hours per week and residing in urban areas face a 10.4 percent higher risk of morbidity compared to those living in rural areas. Moreover, employment in the primary sector increases the probability of morbidity risk by 40 percent compared to individuals employed in the secondary and other sectors. Conversely, each additional unit of per capita expenditure reduces the probability of morbidity by 17.6 percent. In contrast,



demographic variables such as age, gender, marital status, and years of education are found to have no significant effect.

Table 5. Marginal Effect – IV Probit

Average marginal effects	Total observation	= 2138		
Model VCE: OIM				
Dependent variable: Morbidity status (1 = Yes, have morbidity)				
Variables	dy/dx	Delta-method Std. Err	z	p> z
Work hours >48 hours per weeks	0.097	0.007	13.39	0.000***
Age	0.007	0.005	1.49	0.136
Gender (1 = Man)	0.067	0.061	1.11	0.269
Marital status (1 = married)	-0.028	0.063	-0.45	0.653
Domicile (1 = urban)	0.104	0.053	1.96	0.050**
Years of education	0.003	0.007	0.48	0.631
Expenditure per household (log)	-0.176	0.047	-3.73	0.000***
Type of employment fields (1=Primary sector)	0.400	0.090	4.44	0.000***

Description: Instrumental variable: Number of Household. Significance levels are $p > 0.01$ (1%)***; 0.05 (5%)**; 0.1 (10%)*. Robustness has been tested.

Source: data processed by the author, 2025

DISCUSSION

Excessive working hours have been shown to have a significant impact on health, contributing to an increased risk of morbidity. This finding is consistent with previous studies indicating that long working hours elevate the risk of heart disease and depression (Virtanen et al., 2018), as well as anxiety and sleep disorders (Müller et al., 2018). Sleep



deprivation, which frequently results from extended working hours, also contributes to higher body mass index (BMI) and obesity risk (Magee et al., 2011; McHugh et al., 2020). Other studies have demonstrated that high job stress and nonstandard working hours can lead to acute reactions such as fatigue and mental health problems (Sari, D., 2021). One possible mechanism explaining the association between long working hours and health outcomes is through lifestyle effects. Extended working hours may reduce physical activity and disrupt glucose metabolism, thereby contributing to the risk of type 2 diabetes (Gilbert-Quimet, M., 2018; Kivimäki et al., 2015).

In terms of domicile, urban residence is associated with higher morbidity due to health-related conditions in these areas. Urban environments, particularly slum areas, are often linked to poor health outcomes as a result of multiple risk factors, including inadequate sanitation, pollution, and limited access to healthcare services (Corburn, J. and Hildebrand, 2015; N'gattia, K. A., Kouassi, D. P., Coulibaly, D., Chérif, D., & Tiembré, 2020; Otsuka, H., Fukao, A., Funakami, Y., Duncan, K. E., & Fujiwara, n.d.). Moreover, individuals living in urban areas experience higher levels of anxiety, depression, and psychosis compared to those in rural areas, particularly when combined with excessive working hours (Jaya & Wulandari, 2018; Keller1 et al., 2022). Air pollution is another key factor contributing to morbidity in urban settings (T. S. Brisimi, T. Xu, T. Wang, W. Dai, 2018).

Employment in the primary sector, such as agriculture, fisheries, and forestry, may also contribute to increased morbidity among workers, especially those working more than 48 hours per week. Workers in this sector are frequently exposed to high-risk working conditions that affect both physical and mental health. In addition, informal workers in the primary sector are more vulnerable to health risks due to the absence of social security and labor protection (Sultan, 2023). This lack of protection may prevent them from receiving necessary medical care when health problems arise, thereby increasing morbidity risk.

However, the adverse effects of long working hours on morbidity can be mitigated by higher per capita expenditure. This finding is consistent with (Yulyanah, 2023) who showed that increased per capita expenditure improves public health, particularly among workers exposed to health risks from extended working hours. Workers with higher per capita expenditure are more likely to afford healthcare services, making them better able to access necessary treatment when health problems occur. Individuals living in better economic conditions also tend to enjoy better health status, as they can access nutritious food, adequate housing, and appropriate healthcare services (Sari, 2018



CONCLUSION

The findings of this study demonstrate that excessive working hours have a significant effect in increasing the probability of morbidity risk in Bengkulu. This indicates that individuals who work longer hours are more likely to experience health problems compared to those with normal working hours. In addition, other variables that contribute to higher morbidity risk include urban domicile and employment in the primary sector, whereas per capita expenditure helps mitigate morbidity risk. These results underscore that excessive working hours not only affect the physical and mental health of workers but also have the potential to reduce labor productivity and competitiveness in the long run. Therefore, the transformation of human resources (HR) to support the future economy must incorporate health protection policies for workers through the promotion of work-life balance, reasonable working hours, and the implementation of workplace health programs. Accordingly, the development of high-quality human resources should not only be determined by skills and competencies, but also by health and well-being conditions that enable workers to contribute optimally to sustainable economic development.

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