

## **A Cross-Sectional Study: Does Health Literacy Correlate To The Blood Pressure Of Formal Sector Workers In PT X, Indonesia?**

**Wahiduddin<sup>1\*</sup>, Ridwan Amiruddin<sup>1</sup>, Syamsiar S Russeng<sup>2</sup>, Samsiana<sup>3</sup>, Zhanaz Tasya<sup>3</sup>**

<sup>1</sup>Department of Epidemiology, Universitas Hasanuddin, Makassar, South Sulawesi, Indonesia, 90245

<sup>2</sup>Department of Occupational Health and Safety, Universitas Hasanuddin, Makassar, South Sulawesi, Indonesia, 90245

<sup>3</sup>Faculty of Public Health, Universitas Hasanuddin, Makassar, South Sulawesi, Indonesia, 90245

---

### **ABSTRACT**

Hypertension is a non-communicable disease that causes public health problems, including workers. Exposure to hypertension risk factors can be influenced by the characteristics of the workplace, where workers spend most of their daily time. So it is necessary to prevent the high rate of hypertension in workers. The aim of this study was to determine the correlation between health literacy and blood pressure of formal sector workers in PT X, Indonesia. This study is a quantitative study with a cross-sectional study approach to identify the risk of hypertension in workers, measure the blood pressure of workers for screening for sample determination with Diastolic Blood Pressure (TDD) of 120-139mmHg and Systolic Blood Pressure (TDS) of 80-89mmHG, as well as self-efficacy behaviors and health literacy level. The population in this study was all workers in the PT X. The samples in this study were some of the workers in the PT X who represented the population under the established inclusion criteria. The sampling technique used was stratified random sampling. Data analysis was performed using the Chi-square test. The results show that there is a significant correlation between the variables of age, BMI, Self-Efficacy, and eating patterns ( $\rho < 0.05$ ) with the blood pressure of workers. Also, there is a significant correlation between health literacy and blood pressure ( $\rho < 0.05$ ) and there is a correlation between age and education level ( $\rho < 0.05$ ) with health literacy. Thus, it is concluded in this study that, in general, it can be said that health literacy correlates to the blood pressure of workers in PT X, Indonesia.

**Keywords:** hypertension, health literacy, blood pressure, self-efficacy, worker

## INTRODUCTION

Hypertension is a non-communicable disease that causes public health problems for developed and developing countries. Data from the World Health Organization (WHO) in 2018, shows that non-communicable diseases (NCDs) are the leading cause of death worldwide, causing an estimated 41 million (71%) of the 57 million global deaths—with cardiovascular disease accounting for 17.9 million (44%) to NCD deaths where 9.4 million (52.51%) of them are due to complications of hypertension alone (World Health Organization, 2018). Hypertension is known as a major risk factor for cardiovascular disease, so it is associated with a large global burden of cardiovascular disease (CVD) and premature death (World Health Organization, 2018). The high prevalence of hypertension has an important economic impact. Based on national insurance data, the amount spent on hypertension services is increasing every year, from IDR 2.8 trillion in 2014 to IDR 4.2 billion in 2016.

Hypertension often does not cause symptoms so it is called the silent killer because blood pressure that is continuously high for a long time can cause deadly complications and is usually diagnosed incidentally or after major organ damage occurs. This is supported by a study on the prevalence, awareness, treatment, and control of hypertension in adults in 13 provinces in Indonesia showing the incidence of hypertension among study participants was 30.82% (95% CI = 46.8 - 48.9), which is almost 75 % undiagnosed (Monica & Widyaningsih, 2019)

Hypertension can also occur among workers—in which, exposure to hypertension risk factors can be influenced by the characteristics of the workplace, where workers spend most of their daily time. The workplace is the perfect place for a health promotion initiative—given that a large proportion of the adult population works and spends 8 or more hours a day at work, this is a natural setting to promote healthy habits aimed at reducing the prevalence of non-communicable diseases (Rocha et al., 2014; Vinholes et al., 2017). Even though, the health of workers can also be influenced by other factors outside of work.

Significant multilevel public health interventions are urgently needed to improve the diagnosis, treatment, and control of hypertension in Indonesia. Appropriate management of hypertension may require pharmacological and non-pharmacological interventions. Non-pharmacological interventions include lifestyle changes such as increasing physical activity, maintaining a healthy weight, eating a healthy diet, avoiding stress, and minimizing intensive alcohol consumption. The selection of a particular lifestyle intervention should consider the patient's individual values, preferences, socioeconomic status, associated conditions, and comorbidities—to increase adherence to these lifestyle modifications. Blood pressure control may be recommended for lowering blood pressure when combined with co-interventions involving individually tailored support (Tucker et al., 2017).

One of the most important strategies to increase awareness or self-efficacy in adopting healthy lifestyle behaviors is to increase knowledge and promote health literacy among the community through counseling methods (Mokoko, 2018). Health literacy has been defined by Sorensen and others as requiring the knowledge, motivation, and competence to access, understand, assess, and apply information, thereby making judgments and decisions in terms of

health care, disease prevention, and healthy behaviors, to maintain and improve the quality of life throughout life. A number of studies show that lower health literacy level is associated with poorer health outcomes and unhealthy behaviors (Brainard et al., 2016; Du et al., 2018; Lee et al., 2016)

Several studies of health literacy intervention on hypertension have been proven to be effective (Visscher et al., 2018; Walters et al., 2020) however, for handling prehypertension so that it does not continue to hypertension—still needs proof, so to overcome this problem it is necessary to build an electronic health literacy module as an effort to prevent the incidence of hypertension, especially in the formal sector workers. The purpose of this study was to determine the correlation between health literacy and blood pressure of formal sector workers in PT. X.

## MATERIALS AND METHODS

This study is a quantitative study with a cross-sectional study approach to identify the risk of hypertension in workers, measure the blood pressure of workers for screening for sample determination with Diastolic Blood Pressure (TDD) of 120-139mmHg and Systolic Blood Pressure (TDS) of 80-89mmHG, as well as self-efficacy behaviors and health literacy level.

The population in this study was all workers in the PT X. The samples in this study were some workers in PT X who represented the population under the established inclusion criteria. The sampling technique used was stratified random sampling based on existing sample frames. Data analysis was performed using the Chi-square test.

## RESULTS

**Table 1. The Correlation of Respondents Characteristics with Blood Pressure in Workers**

Variable	Blood pressure		p value
	Prehypertension	Normal	
<b>Age</b>			0.012
> 40 Years	23 (95.8%)	1 (4.2%)	
≤ 40 Years	17 (63.0%)	10 (37.0%)	
<b>Education</b>			0.088
Senior High School	24 (88.9%)	3 (11.1%)	
College/ University	16 (66.7%)	8 (33.3%)	
<b>History of Hypertension</b>			0.498
Yes (There is a history of hypertension)	16 (72.7%)	6 (27.3%)	
No (There isn't any history of hypertension)	24 (82.8%)	5 (17.2%)	

<b>Smoking Behavior</b>			
Yes	14 (73.7%)	5 (26.3%)	0.726
No	26 (81.3%)	6 (81.8%)	
<b>BMI</b>			
Obesity	24 (92.3%)	2 (7.7%)	0.034
No Obesity	16 (64.0%)	9 (36.0%)	
<b>Self-Efficacy</b>			
Poor (insufficient)	23 (92.0%)	2 (8.0%)	0.038
Good	17 (65.4%)	9 (34.6%)	
<b>Physical Activity</b>			
Low	23 (85.2%)	4 (14.8%)	0.367
High	17 (70.8%)	7 (29.2%)	
<b>Stress</b>			
Medium-severe	24 (80.0%)	6 (20.0%)	0.744
Mild	16 (76.2%)	5 (23.8%)	
<b>Dietary habit</b>			
High Risk	23 (92.0%)	2 (8.0%)	0.049
Low Risk	17 (65.4%)	9 (34.6%)	

Based on the results of data collection there is a significant correlation between the variables of age, BMI, Self-Efficacy, and eating patterns ( $p < 0.05$ ). Although the variables of education, history of hypertension, smoking, physical activity, and stress have no significant correlation, they have a tendency to experience blood pressure in the prehypertension category.

**Table 2. Correlation of Health Literacy with Blood Pressure**

Variable	Blood pressure		$\rho$ Value
	Prehypertension	Normal	
<b>Health Literacy</b>			0.026
Poor (insufficient)	21 (95.5%)	1 (4.5%)	
Good	19 (65.5%)	10 (34.5%)	
Total	40 (78.4%)	11 (21.6%)	

Based on Table 2, it is shown that respondents who have poor (insufficient) health literacy and have prehypertension blood pressure are 21 (95.5%) and respondents who have good health literacy but have prehypertension blood pressure are 19 (65.5%). Based on the results of data collection there is a significant correlation between health literacy and blood pressure ( $p < 0.05$ ).

**Table 3. Factors related to Health Literacy**

Variable	Health Literacy	$\rho$ Value
----------	-----------------	--------------

	<b>Poor (Insufficient)</b>	<b>Good</b>	
<b>Age</b>			
> 40 Years	15 (62.5%)	9 (37.5%)	0.019
≤ 40 Years	7 (25.9%)	20 (74.1%)	
<b>Information Access</b>			
Poor (Insufficient)	11 (68.8%)	5 (31.3%)	0.028
Enough	11 (31.4%)	24 (68.6%)	
<b>Level of education</b>			
Senior High School	14 (60.9%)	9 (39.1%)	0.042
College/ University	8 (28.6%)	20 (71.4%)	
<b>Total</b>	22 (43.1%)	29 (56.9%)	

Based on the results of data collection there is a significant correlation between age, access to information, and level of education with health literacy ( $\rho < 0.05$ ).

## DISCUSSIONS

The results of this study indicate that age has a significant correlation with blood pressure (prehypertension), namely age > 40 years—this usually occurs at an older age. Between the ages of 30 and 65, systolic pressure increases by an average of 20 mmHg and continues to increase after age 70. The increased risk associated with age is largely explained by isolated systolic hypertension and is associated with increased peripheral vascular resistance in the arteries (Adrian & Tommy, 2019). This is in line with a study conducted by Triyastuti which results show that there is a correlation between age and incidence of prehypertension ( $p = 0.015$ ;  $p = 0.05$ ) (Tryastuti, 2019). In adulthood, it is known that late adult individuals have a 2.84 times higher chance of experiencing prehypertension compared to early adulthood (OR = 2.84; 95% CI 1.2-5.1) (Aristoteles, 2018).

In this study, it is categorized as obese if the Body Mass Index (BMI) is 25 and not obese if the BMI value is < 25. Based on the results of the study, there is a significant correlation between (BMI) and blood pressure (pre-hypertension). This happens because body weight that exceeds the normal limit causes the accumulation of excessive body fat tissue, thereby increasing the heart's effort to pump blood pressure strongly which causes an increase in blood pressure that exceeds normal, also fat that accumulates can increase the incidence of atherosclerosis and shrink blood vessels so that it can lead to prehypertension (Tryastuti, 2019). It is following a study conducted by Jiang Song et al in China, where obesity is a risk factor for prehypertension (OR: 1.51, 95%CI: 1.15–1.97) (Song et al., 2018) and study by Rachmawati et al, where overweight subjects—when compared to normal weight subjects, have a 15% greater risk of suffering from prehypertension (relative risk = 1.15; 95% CI: 1.06 - 1.24), while obese subjects have a 25% higher risk of suffering from prehypertension (RR = 1.11; 95% CI: 1.16 – 1.34) (Rachmawati & Permanasari, 2011).

The results show that there is a very significant correlation between self-efficacy and blood pressure (prehypertension). Workers with less self-efficacy tend to have higher blood pressure

(>120/80mmHg). A study conducted at General Hospital (RSU) of Makassar also shows that patients with less self-efficacy tend to have high systolic and diastolic blood pressure (>140/90 mmHg)(Ode et al., 2021). Good self-efficacy is statistically significant with an increase in the prevalence of medication adherence (PR = 1.23, 95% CI: 1.08 – 1.32), eating a low-salt diet (PR = 1.64, 95% CI: 1.07- 2.20), physical activity engagement (PR = 1.27, 95% CI: 1.08-1.39), non-smoking (PR = 1.10, 95% CI: 1.01-1.15), and practicing weight management techniques (PR = 1.63, 95% CI: 1.30 – 1.87)(Knutson, 2012).

Self-efficacy will affect one's way of thinking (cognitive), feeling (affective), motivation, and appearance shown by that person. One's motivation to show certain behavior depends on her/his ability to evaluate her/his self-efficacy(Manuntung, 2018). Self-efficacy that is owned can be used to predict healthy behavior, if one think s/he will definitely succeed in carrying out the recommended hypertension management behavior, the success of lifestyle changes is predicted to be successful(Yanti et al., 2020).

The results of this study indicate that there is a significant correlation between diet and prehypertension ( $p < 0.05$ ). This happens even though the company prepares catering, but workers in their spare time often consume foods that are high in fat such as fried foods. Consumption of foods high in saturated fat can cause blood pressure to increase. Excessive consumption of fat can increase the risk of hypertension because it will increase cholesterol levels in the blood. Excess cholesterol levels will attach to the walls of blood vessels. The presence of blockages in blood vessels can increase the volume of blood that passes through the blood vessels, so eventually it will increase blood pressure. Sources of fat consumed come from fried foods such as tempe mendoan, fried tofu, flour fried chicken, Cireng, and packaged food (snacks, chiki). The majority of subjects have irregular eating habits and skipping breakfast or dinner(Candra, 2017).

Also, the results of this study indicate that the respondents' health literacy level is in the good category 56.9% — there is a significant correlation between the variables of age and education ( $< 0.05$ ) with health literacy. According to UNESCO in 2015, health literacy includes the ability to read and write, identify, understand, interpret, create, communicate and calculate, use printed and written materials, as well as solve problems in an increasingly technological and information-rich environment(Nations, 2016).

One definition of health literacy puts health individually or collectively into a context to understand the factors that cause disease and how to overcome them. If one has an adequate level of health literacy, s/he will have the ability to be responsible for her/his personal health, her/his family and the surrounding community(Sørensen et al., 2012). The level of health literacy is strongly influenced by several determinants. Based on the integration model, the determinants that have an impact on health literacy are social and environmental determinants (e.g., demographic situation, culture, language, political power, social system); personal determinants (e.g., age, gender, race, socioeconomic status, education, occupation, income, literacy); and situational determinants (e.g., family support and peer influence, use of social media, and physical environment)(Sørensen et al., 2012).

The interaction process of health literacy with personal determinants, situational

determinants, social and environmental determinants will affect the knowledge, motivation and skills that enable a person—if s/he is in a condition at risk of experiencing a disease—to improve health efforts whether it is in the community, at work, or in a education system(Sørensen et al., 2012). Access to health information affects one's ability to obtain health information and education from health care providers(Medyati Novita et al., 2019). The easier the health information that will be accessed, the better the level of one's health literacy(Prambudia et al., 2021).

The results show that most of the workers are in the sufficient category of access to health information (68.8%), but if it is associated with health literacy on the prevention of hypertension, 68.8% have poor health literacy. This study is supported by Liobikiene et al (2018), that access to sufficient information is not always directly proportional to the knowledge of the health problems experienced by individuals(Liobikiene & Bernatoniene, 2018).

The results of the study based on age show that as many as 62.5% of respondents aged > 40 years had poor health literacy. This is in line with study conducted by Berens that the age group > 40 years shows a limited perception of health literacy. In all age groups, a limited perception of health literacy is associated with limited functional health literacy, low social status, and high frequency of doctor visits(Berens et al., 2016).

The results of the study based on the level of education show that as many as 60.9% of respondents with the latest education level of senior high school have poor health literacy. The results of this study are in line with those of Heide et al where the results show that compared to respondents who had completed higher education, respondents who had only completed senior secondary education show lower health literacy skills ( $B = 17.6$ ,  $SE = 1.20$ ,  $p < .001$ )(Van Der Heide et al., 2013).

Regarding blood pressure, the results of this study prove a significant correlation between health literacy and blood pressure. There is a tendency to increase blood pressure in workers with poor health literacy compared to workers with good health literacy. The literature study conducted by Du et al (2018) also shows that one with poor health literacy tends to have poor knowledge about hypertension(Du et al., 2018).

## **CONCLUSIONS**

This study concluded that the variables of age, BMI, self-efficacy, diet, and health literacy are associated with prehypertension blood pressure. Besides, there is a correlation between the variables of age, education, and access to information with health literacy. It is recommended that — workers regulate their diet to avoid the risk of obesity and hypertension and are expected to improve health literacy skills by accessing health information related to hypertension prevention.

## **ACKNOWLEDGEMENTS**

We gratefully thank to all of the respondents for their contribution in this study. Also, thank to Universitas Hasanuddin for the grant funds to did the research.

## **REFERENCES**

- Adrian, S. J., & Tommy. (2019). Hipertensi Esensial : Diagnosis dan Tatalaksana Terbaru pada Dewasa. *Cermin Dunia Kedokteran*, 46(3), 172–178.
- Aristoteles. (2018). Korelasi umur dan jenis kelamin dengan penyakit hipertensi di emergency center unit Rumah Sakit Islam Siti Khadijah Palembang 2017. *Indonesia Jurnal Perawat*, 3(1), 9–16.
- Berens, E. M., Vogt, D., Messer, M., Hurrelmann, K., & Schaeffer, D. (2016). Health literacy among different age groups in Germany: results of a cross-sectional survey. *BMC Public Health*, 16(1), 1–8. <https://doi.org/10.1186/s12889-016-3810-6>
- Brainard, J., Loke, Y., Salter, C., Koós, T., Csizmadia, P., Makai, A., Gács, B., & Szepes, M. (2016). Healthy ageing in Europe: prioritizing interventions to improve health literacy. *BMC Research Notes*, 9(270). <https://doi.org/https://doi.org/10.1186/s13104-016-2056-9>
- Candra, A. (2017). Hubungan Asupan Zat Gizi dan Indeks Antropometri dengan Tekanan Darah Remaja. *JNH (Journal of Nutrition and Health)*, 5(2), 85–101. <https://doi.org/10.14710/jnh.5.2.2017.85->
- Du, S., Zhou, Y., Fu, C., Wang, Y., Du, X., & Xie, R. (2018). Health literacy and health outcomes in hypertension: An integrative review. *International Journal of Nursing Sciences*, 5(3), 301–309. <https://doi.org/10.1016/j.ijnss.2018.06.001>
- Knutson, J. S. (2012). The Association Between Self-Efficacy and Hypertension Self Care Activity Among African American Adults. *J Community Health*, 37(1), 15–24. <https://doi.org/10.1007/s10900-011-9410-6>.The
- Lee, Y.-J., Shin, S.-J., Wang, R.-H., Lin, K.-D., Lee, Y., & Wang, Y.-H. (2016). Pathways of empowerment perceptions, health literacy, self-efficacy, and self-care behaviors to glycemic control in patients with type 2 diabetes mellitus. *Patient Education and Counseling*, 99(2), 287–294. <https://doi.org/10.1016/j.pec.2015.08.021>
- Liobikienė, G., & Bernatoniėnė, J. (2018). The determinants of access to information on the Internet and knowledge of health related topics in European countries. *Health Policy*, 122(12), 1348–1355. <https://doi.org/10.1016/j.healthpol.2018.09.019>
- Manuntung, A.-. (2018). Hubungan Keyakinan Diri Dan Aktivitas Perawatan Mandiri Pasien Hipertensi Di Wilayah Kerja Puskesmas Pahandut Kota Palangka Raya. *Jurnal Ilmu Kesehatan*, 7(1), 199. <https://doi.org/10.32831/jik.v7i1.181>
- Medyati Novita et al. (2019). Health Literacy as a Risk Predictor of Cardiovascular Diseases among Informal Sector Worker in Makassar City. *Indian Journal of Public Health*, 2(1), 1–8.
- Mokoko, P. (2018). Educational Module on Health Literacy for Hypertension in the Inmate Population [Walden University]. <https://scholarworks.waldenu.edu/dissertations/4974/>
- Monica, W., & Widyaningsih, V. (2019). Prevalence, Awareness, Treatment, and Control of Hypertension in Indonesian Young Adults. *International Conference on Public Health*.



<https://doi.org/https://doi.org/10.26911/theicph.2019.01.20>

Nations, U. (2016). Promoting Health and Literacy for Women ' s Empowerment.

Ode, W., Asnaniar, S., Tuanany, R., & Munir, N. W. (2021). Self-Efficacy in Patients with Hypertension. *Jurnal Aisyah : Jurnal Ilmu Kesehatan*, 6, 109–113. <https://doi.org/10.30604/jika.v6iS1.770>

Prambudia, R. D., Widyawati, I. Y., & Has, E. M. M. (2021). Factors Related to the Level of Health Literacy in Patients with Hypertension: Literature Review. *Critical Medical and Surgical Nursing Journal*, 10(1), 26. <https://doi.org/10.20473/cmsnj.v10i1.24575>

Rachmawati, R., & Permanasari, Y. (2011). Higher body mass index may increase prehypertension risk. *Health Science Indonesia*, 21–27.

Rocha, J. do C., Teixeira, M. T. B., Silva, G. A. e, Duque, K. de C. D., & Machado, M. L. S. M. (2014). Prevalence of prehypertension and associated factors in women. *Investigación y Educación En Enfermería*, 32(3), 471–479.

Song, J., Chen, X., Zhao, Y., Mi, J., Wu, X., & Gao, H. (2018). Risk factors for prehypertension and their interactive effect: A cross- sectional survey in China 11 *Medical and Health Sciences 1117 Public Health and Health Services. BMC Cardiovascular Disorders*, 18(1), 1–10. <https://doi.org/10.1186/s12872-018-0917-y>

Sørensen, K., Van Den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12(1), 80. <https://doi.org/10.1186/1471-2458-12-80>

Tryastuti, D. (2019). Determinan Pre-Hipertensi Di Kelurahan Curug Kecamatan Cimanggis Kota Depok. *The Indonesian Journal of Health Science*, 11(1), 71. <https://doi.org/10.32528/ijhs.v11i1.2240>

Tucker, K. L., Sheppard, J. P., Stevens, R., Bosworth, H. B., Bove, A., Bray, E. P., Earle, K., George, J., Godwin, M., Green, B. B., Hebert, P., Hobbs, F. D. R., Kantola, I., Kerry, S. M., Leiva, A., Magid, D. J., Mant, J., Margolis, K. L., McKinstry, B., ... McManus, R. J. (2017). Self-monitoring of blood pressure in hypertension: A systematic review and individual patient data meta-analysis. *PLoS Medicine*, 14(9), 1–29. <https://doi.org/10.1371/journal.pmed.1002389>

Van Der Heide, I., Wang, J., Droomers, M., Spreeuwenberg, P., Rademakers, J., & Uiters, E. (2013). The relationship between health, education, and health literacy: Results from the dutch adult literacy and life skills survey. *Journal of Health Communication*, 18(SUPPL. 1), 172–184. <https://doi.org/10.1080/10810730.2013.825668>

Vinholes, D. B., Bassanesi, S. L., Junior, H. de C., Machado, C. A., Melo, I. M., Fuchs, F. D., & Fuchs, S. C. (2017). Association of workplace and population characteristics with prevalence of hypertension among Brazilian industry workers: a multilevel analysis. *BMJ Open*, 7(8).

<https://doi.org/10.1136/bmjopen-2016-015755>

- Visscher, B. B., Steunenbergh, B., Heijmans, M., Hofstede, J. M., Devillé, W., Heide, I. van der, & Rademakers, J. (2018). Evidence on the effectiveness of health literacy interventions in the EU: a systematic review. *BMC Public Health*, 18(1), 1414. <https://doi.org/10.1186/s12889-018-6331-7>
- Walters, R., Leslie, S. J., Polson, R., Cusack, T., & Gorely, T. (2020). Establishing the efficacy of interventions to improve health literacy and health behaviours: a systematic review. *BMC Public Health*, 20(1040). <https://doi.org/10.1186/s12889-020-08991-0>
- World Health Organization. (2018). *Global Status Report on Noncommunicable Diseases 2018*.
- Yanti, D. E., Perdana, A. A., Oktarina, N., Kesehatan, F., Universitas, M., Mena, P. H., & Selatan, L. (2020). Health Belief Model : Selfcare Penderita Hipertensi di Wilayah Kerja UPT Puskesmas Kalirejo Kabupaten Pesawaran Health Belief Model : Selfcare for Hypertension Patients in the Kalirejo Primary Healthcare , Pesawaran Regency dimana tekanan darah sistolik >. *Jurnal Dunia Kesmas*, 9(2), 192–205.