Heart Disease in Indonesia in 2018: An Ecological Analysis

Ratu Alit Szasha Faulata[1], Agung Dwi Laksono[2], Ratna Dwi Wulandari[3]

[1] Master's Student of Health Policy and Administration, Faculty of Public Health, Airlangga University, Surabaya, Indonesia, [2]Researcher, National Institute of Health Research and Development of the Ministry of Health of the Republic of Indonesia, Jakarta, Indonesia, [3]Lecturer, Faculty of Public Health, Airlangga University, Surabaya, Indonesia

Abstract

Heart failure is a significant cause of morbidity and mortality. The purpose of this study is to analyze the factors related to the prevalence of heart disease in Indonesia, including the percentage of obesity;of dailysmokers;and of people not getting enough physical activity and having a habit of eating fat-and cholesterol-richfoods and fried foods≥ one time/day.The study used secondary data from the 2018 Indonesian Basic Health Survey. Meanwhile, the researchersobtained samplesfrom all provinces. Bivariate data used a scatter plot with SPSS 25 software. The results showed that the higher the percentage of obesity in a region, the higher the prevalence of heart disease in that province; the higher the rate of daily smokers in a region, the higher the prevalence ofheart disease in that province; the higher the percentage of the population with less physical activity in an area, the higher the prevalence of heart disease in that province; and the higher the percentage of peoplein the habit of eating fat- and cholesterol-rich foods and fried foods≥ one time/dayin an area, the higher the prevalence of heart disease in that province. This study concluded that the four independent analyzed variables hadan excellent relationship with the prevalence of heart disease in Indonesia.

Keywords*: heart disease, ecological analysis, obesity, smoking behavior, physical activity, food habit*

Introduction

Heart failure is a significant cause of morbidity and mortality, especially for the elderly. It affects and kills many people[1]. According to the World Health Organization (2020), heart disease causes 16% of total world deaths. Since 2000, the disease caused the largest increase in deaths, increasing from more than 2 million to 8.9 million deaths in 2019[2]. Currently, the incidence of heart and blood vessel disease continues to grow from year to year.In Indonesia, people with heart disease have a prevalence of 1.5%—at least 15 out of 1000 people or about 2,784,064 people. This figure shows that individuals in Indonesia suffer from heart disease and are at risk of lowering their health status[3].

Corresponding Author:
Ratna Dwi Wulandari
Email: ratna-d-w@fkm.unair.ac.id

Heart attacks occur suddenly without the patients realizing it, so they are vulnerable to sudden death if not treated properly. Risk factors for heart disease must be aware of genetic factors (heredity) such as families with premature coronary artery disease, age,and gender—men over 45 years and women over 55 years and over or menopausal women[4].

Some of the causes of heart disease includebeing overweight or obese. In particular, obesity is associated with diabetes mellitus, coronary heart disease, some cancers, and breathing problems while sleeping[5]. Obese people need many blood vessels to supply nutrients to body tissue, especially tofat tissue.Obesity causes the heart to pump blood at a high frequency which can cause the heart to work very hard. In the long run, the heart experiences problems and can trigger heart disease[2,6]. The next cause is the pollution ofsmoking habits. Novice smokers and experienced smokersare prone to heart disease[3].The lack of physical activity can

cause low HDL and high LDL,sometimes followed by an increase in glucose. As a result, the body and heart become unhealthy[4,7]. An unhealthy diet can increase the risk of heart disease[8].

The prevention of heart disease is to minimize destructive lifestyles such as smoking, exercising lazily, eating fewer vegetables and fruit, eating more meat, having prolonged stress, and increasing blood sugar and cholesterol levels. Besides, the most important thing is to carefully monitor heart health and cardiovascular conditions by consulting a cardiologist[8]. Based on this background, this study aims to ecologically analyze the factors associated with the prevalence of heart disease in Indonesia.

Materials and Methods

Study Design

The authors designed the study with an ecological approach. Ecological studies focused on comparisons between groups (not individuals). The analyzed data was aggregate data at a particular group or level,which, in this study, was obtained from the provincial level. Variables in the ecological analysis could be aggregate, environmental, or global measurements [9,10].

Data Source

The study used secondary data from the 2018 Indonesian Basic Health Survey. The report was officially issued by the Ministry of Health of the Republic of Indonesia. The unit of analysis in this study wasa province. The authors analyzed all provinces(34 regions) in Indonesia as the sample.

Data Analysis

The dependent variable in this study was the prevalence of heart disease in Indonesia. Heart disease was recorded based on the health history of all ages in allprovinces in Indonesia. In addition to the dependent variable, there werefour independent variables analyzed in this study—the percentage of obesity, the percentage of daily smokers, the percentage of the population with less physical activity, and the percentage of the populationhaving a habit of consuming fat- and cholesterol-rich foods and fried foods≥ one time/day[3].

Bivariate data used a scatter.The study used a linear suitability line as the basis for determining the trend of the relationship between heart disease prevalence and the independent variables. The study carried out the analysis with SPSS 25 software.

Results and Discussion

Table 1 presents the prevalence of heart disease and other variables analyzed in this study. The given information shows that the lowest prevalence of heart disease is 0.70%, while the highest prevalence is 2.20%. Meanwhile, the range of prevalence or percentage of other variables also looks relatively high. For example, the percentage of the population who habitually consumefat- and cholesterol-rich foods and fried foods≥ one time/dayranges from 10.30% to 58.1%.

Table 1. Descriptive Statistics of Prevalence of Heart Disease and Related Variables by Province in Indonesia, 2018

Descriptive Statistics	Prevalence of heart disease	Percentage of obesity	Percentage of daily smokers	Percentage of the population with less physical activity	Percentage of population who have a habit of consuming fat- and cholesterol-rich foods and fried foods ≥ one time/day
N	34	34	34	34	34
Mean	1.4382	21.7029	23.4941	34.8794	33.3265
Median	1.4500	21.0500	23.3500	33.9500	33.2000
Mode	1.30a	18.70a	22.10a	33.70	10.30a
Std. Deviation	0.34990	4.28008	2.60139	5.79199	11.15579
Range	1.50	19.90	9.30	22.60	48.10
Minimum	0.70	10.30	18.80	25.20	10.30
Maximum	2.20	30.20	28.10	47.80	58.40

Source: The 2018 Indonesian Basic Health Survey

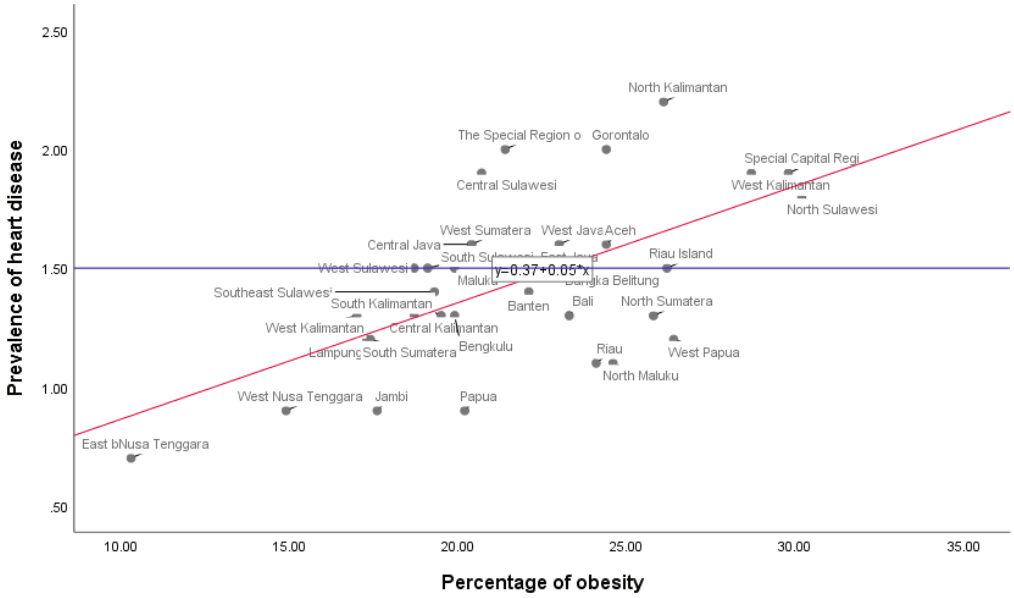

Figure 1. Scatter Plot of Percentage of Obesity and Prevalence of Heart Disease by Province in Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

Figure 1 shows the distribution of heart disease prevalence and obesity percentage according to provinces in Indonesia. The figure shows that the two variables show a positive relationship. The result means that the higher the percentage of obesity in a province, the higher the prevalence of heart disease.

Figure 2 shows the distribution of heart disease prevalence and the percentage of daily smokers by provinces in Indonesia. The scatter plot shows that the two variables show a positive relationship. The results mean that the higher the percentage of daily smokers in a province, the higher the heart disease prevalence.

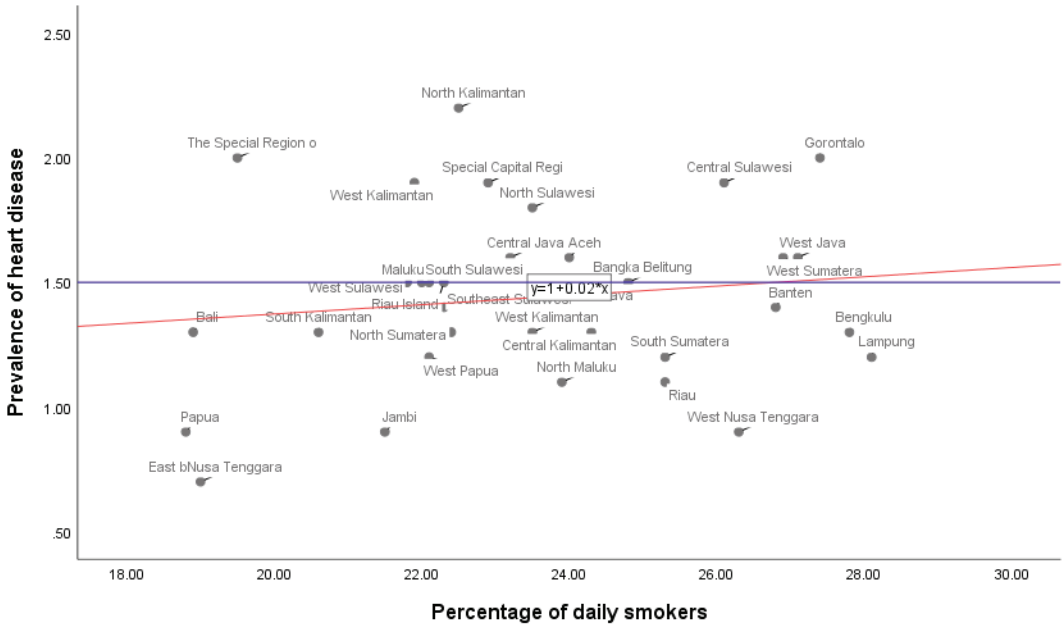

Figure 2. Scatter Plot of Percentage of Daily Smokers and Prevalence of Heart Disease by Provincein Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

Figure 3 shows the distribution of heart disease prevalence and the percentage of inadequate physical activity by provinces in Indonesia. The result indicates that the two variables show a positive relationship. The analysis result means that the higher the percentage of the population with less physical activity in a province, the higher the prevalence of heart disease.

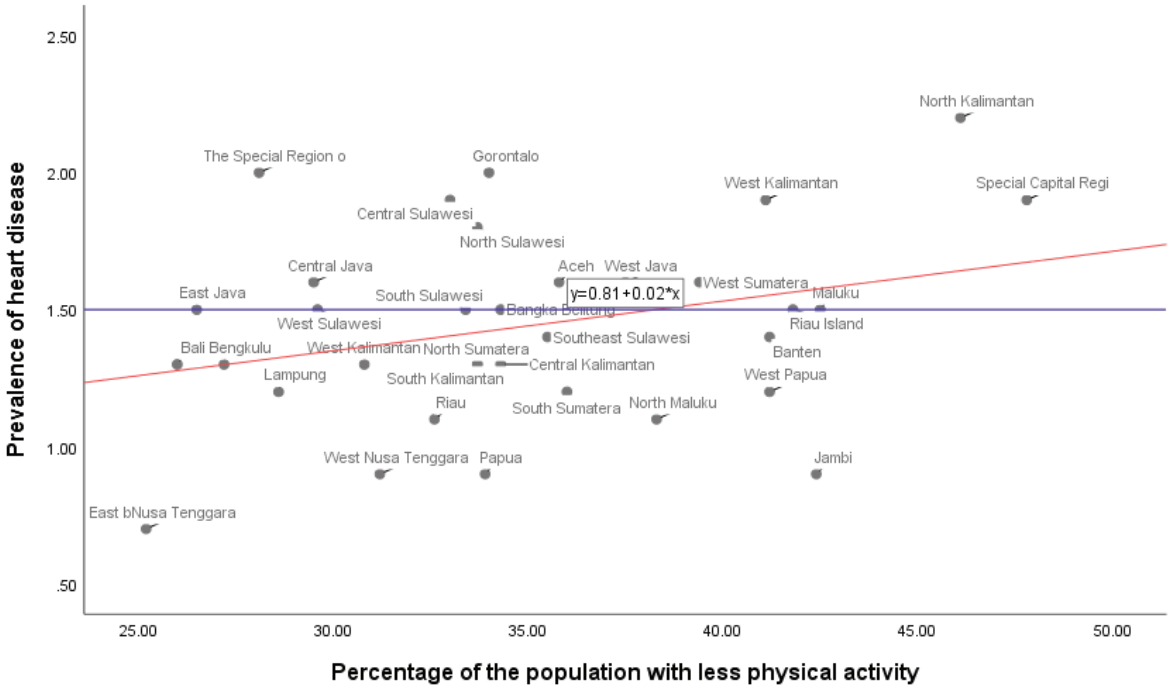

Figure 3. Scatter Plot of Percentage of the population with less physical activity and Prevalence of Heart Disease by Province in Indonesia, 2018
Source: The 2018 Indonesia Basic Health Survey

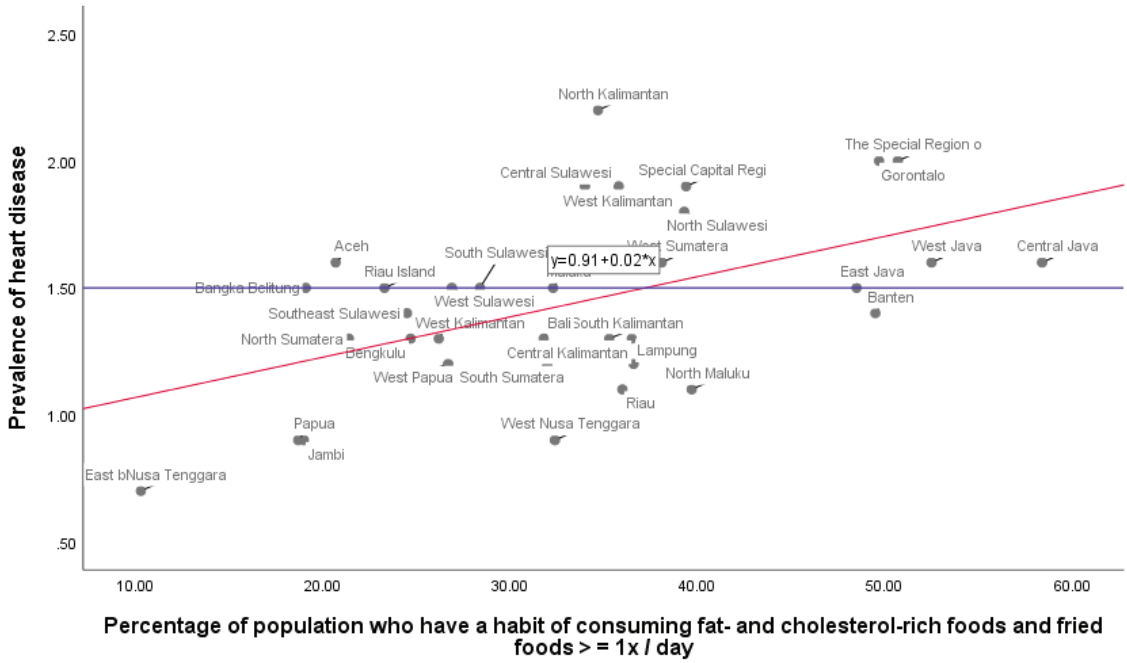

Figure 4. Scatter Plot of Percentage of population who have a habit of consuming fat- and cholesterol-rich foods and fried foods ≥ one time/day and Prevalence of Heart Disease by the province in Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

Figure 4 shows the distribution of the prevalence of heart disease and the percentage of the population who habitually consume fat- and cholesterol-rich foods and fried foods ≥ one time/day by provinces in Indonesia. Figure 4 shows that the two variables show a positive relationship. The result means that the higher the percentage of fat- and cholesterol-rich foods and fried foods ≥ one time/day in a province, the higher the prevalence of heart disease.

The results of this study indicated that this study is in line with several previous research. The studies showed that obesity or overweight, smoking every day, lack of physical activity,cholesterol-and fat-rich foods, and fried foods increase the risk of heart[11–18].Research by Rinkuniene et al. (2009) informed that conventional factors—smoking, diabetes, hyperlipidemia, and hypertension—increase chronic heart disease risk by 80% to 90%[19].

All the factors mentioned above result from a poor diet and lifestyle,resulting in the impairment of heart function. If one of the characteristics is in a person, he is at risk of developing heart disease.

It is evident from the research results using secondary data from the 2018 Indonesian Basic Health Survey that in Indonesia, the lowest prevalence of heart disease is 0.70%, while the highest prevalence is 2.20%. The percentage of the population with a habit of consuming fat- and cholesterol-rich foods and fried foods ≥ one time/day, a bad eating habit rangesfrom 10.30% to 58.1%. This figure shows that individuals in Indonesia suffer from heart disease and are at risk of lowering their health status.

A heart attack, also known as myocardial infarction, is characterized by a build-up of plaque on the arteries' walls. The situation is causing the artery walls to thicken and lose their flexibility, so that blood flow is obstructed. If allowed, this results in the death of heart tissue. One of the diseases that can arise from a heart attack is a shock. Shock occurs due to a lack of blood flow to body tissues, so the supply of oxygen, gas, and nutrients is reduced. The results in obstruction of the transport of metabolic products, which threatens the survival of body tissues[8].

The research with this ecological analysis has limitations. Research carried out using an ecological analysis method has disadvantages in its use as a policy basis because aggregated data at the regional level are used. More research is needed at the personal level to obtain more accurate information on intervention policy decisions[20,21]. Still, this study's informationis useful for the government in providing policy direction to reduce heart disease prevalence in Indonesia[22]. The government must encourage people to have a healthy lifestyle, do adequate physical activity, not smoke, andreduce cholesterol- and fat-rich food and fried foods to the safe limit recommended by health workers.

Heart attacks are prone to causing sudden death if not treated properly. The prevention of heart disease can be done in a preventive and curative manner. Preventive changes can be made by changing from a bad diet and lifestyle to a healthy diet and lifestyle, such as avoiding cholesterol-containing foods, quitting smoking, exercising diligently, consulting withcardiologists, and following developments related to heart disease. Curativeapproaches , one of which is by taking care after the occurrence of heart disease in accordance with heart disease management as regulated in Health services,are directed at the treatment after the event of heart disease[8].

The lifestyle changes, the treatment of heart disease, including the need for cardiologists, the need for health facilities, and the information systems regarding the development of heart disease in the community, require all parties' participation. The prevention and control of heart disease in the community urgently needs support and cooperation among stakeholders, including government, academia, society, and others,to improve Indonesia's health status.

Conclusion

Based on the research results, the authors concluded that the four independent variables analyzed ecologically have a positive relationship with the prevalence of heart disease in Indonesia. The independent variables are the percentage of obesity, the percentage of smokers every day, the percentage of the population with less physical activity, and the percentage of the people who habitually consumefat- and cholesterol-rich foods and fried foods

≥ one time/day.

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Ethical Clearance: The study was conducted by utilizing secondary data from publishedreports. For this reason, the study's unrequired ethical clearance in the implementation of this study.

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References

1. Khudhur Y, Mohammed Y. Impact of health education program on health status of heart failure patients: A quasi-experimental study. Indian J Forensic Med Toxicol. 2020;14(1):933–7.
2. World Health Organization. The Top 10 Causes of Death [Internet]. www.who.int. 2020 [cited 2020 Feb 10]. Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
3. National Institute of Health Research and Development of The Indonesia Ministry of Health. The 2018 Indonesia Basic Health Survey (Riskesdas): National Report. Jakarta; 2019.
4. Chung K. Edward. 100 Questions & Answers About Heart Attack an Related Cardiac Problems. Sudbury; 2004.
5. Kopelman PG. Obesity as a medical problem. Nature. 2000;404(6778):635–43.
6. Agbota G, Fievet N, Heude B, Accrombessi M, Ahouayito U, Yovo E, et al. Poor maternal anthropometric status before conception is associated with a deleterious infant growth during the first year of life: a longitudinal preconceptional cohort. Pediatr Obes. 2020;15(1):Article number e12573.
7. Bueno DR, Marucci M de FN, Gobbo LA, Almeida-Roediger M de, Duarte YA de O, Lebrão ML. Expenditures of medicine use in hypertensive/diabetic elderly and physical activity and engagement in walking: cross secctional analysis of SABE Survey. BMC Geriatr. 2017;17(70).
8. Ridwan muhamad. Jantung. Yogyakarta; 2017.
9. Laksono AD, Kusrini I. Ecological Analysis of Stunted Toddler in Indonesia. Indian J Forensic Med Toxicol. 2020;14(3):1685–91.
10. Utami SM, Handayani F, Hidayah M, Wulandari RD, Laksono AD. Ecological Analysis of Preeclampsia/Eclampsia Case in Sidoarjo Regency, Indonesia, 2015-2019. Indian J Forensic Med Toxicol. 2020;14(4):3474–9.
11. Petersen CB, Grønbæk M, Helge JW, Thygesen LC, Schnohr P, Tolstrup JS. Changes in physical activity in leisure time and the risk of myocardial infarction, ischemic heart disease, and all-cause mortality. Eur J Epidemiol. 2012;27(2):91–9.
12. Ghadage PP, Devi TP. Effect of nordic and normal walking on coronary risk factors among middle aged obese population: Comparative study. Indian J Forensic Med Toxicol. 2020;14(3):534–8.
13. Karyatin K. Faktor-Faktor Yang Berhubungan Dengan Kejadian Penyakit Jantung Koroner. J Ilm Kesehat. 2019;11(1):37–43.
14. Shields M, Wilkins K. Article Smoking , smoking cessation and heart disease risk : A 16-year follow-up study by Margot Shields and Kathryn Wilkins. 2014;(August).
15. Gillies D. The Russo-Williamson thesis and the question of whether smoking causes heart disease. Causality Sci. 2011;(April).
16. Pradono J, Werdhasari A. Faktor Determinan Penyakit Jantung Koroner pada Kelompok Umur 25-65 tahun di Kota Bogor, Data Kohor 2011-2012. Bul Penelit Kesehat. 2018;46(1):23–34.
17. Tsani fitri rusdiyana. HUBUNGAN ANTARA FAKTOR LINGKUNGAN DAN PERILAKU DENGAN KEJADIAN PENYAKIT JANTUNG KORONER (Studi Kasus di Rumah Sakit X Kota Semarang). Unnes J Public Heal. 2013;2(3):1–9.
18. Farahdika A, Azam M. FAKTOR RISIKO YANG BERHUBUNGAN DENGAN PENYAKIT JANTUNG KORONER PADA USIA DEWASA MADYA (41-60 TAHUN) (Studi Kasus di RS Umum Daerah Kota Semarang). Unnes J Public Heal. 2015;4(2):117–23.
19. Rinkuniene E, Petrulioniene Ž, Laucevičius A, Ringailaite E, Laučyte A. Prevalence of conventional risk factors in patients with coronary

heart disease. Medicina (B Aires). 2009;45(2):140–6.

20. Morgenstern H. Ecologic Studies in Epidemiology: Concepts, Principles, and Methods. Annu Rev Public Health. 1995;16:61–81.
21. Laksono AD, Sandra C. Ecological Analysis of Healthcare Childbirth in Indonesia (Analisis Ekologi Persalinan di Fasilitas Pelayanan Kesehatan di Indonesia). Bull Heal Syst Res. 2020;23(1):1–9.
22. Megatsari H, Laksono AD. Hypertension in Indonesia in 2018 : An Ecological Analysis. 2020;(December).