ISSN-0973-9122 (Print) • ISSN-0973-9130 (Electronic)

Volume 15 / Number 4 / October-December 2021

Indian Journal of Forensic Medicine & Toxicology

Website: www.ijfmt.com

Official Organ of Indian Association of Medico-Legal Experts (Regd.)

Indian Journal of Forensic Medicine & Toxicology

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Print-ISSN:0973-9122 Electronic - ISSn: 0973-9130

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Editor

Dr. R.K. Sharma
Institute of Medico-legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall, Sector- 32, Noida - 201 301 (Uttar Pradesh)

Printed, published and owned by

Dr. R.K. Sharma
Institute of Medico-legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall, Sector- 32, Noida - 201 301 (Uttar Pradesh)

Published at

Institute of Medico-legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall, Sector- 32, Noida - 201 301 (Uttar Pradesh)

"Indian Journal of Forensic Medicine & Toxicology" is peer reviewed quarterly journal. It deals with Forensic Medicine, Forensic Science, Toxicology, DNA fingerprinting, sexual medicine and environment medicine. It has been assigned International standard serial No. p-0973-9122 and e- 0973-9130. The Journal has been assigned RNI No. DELENG/2008/21789. The journal is indexed with Index Copernicus (Poland) and is covered by EMBASE (Excerpta Medica Database). The journal is also abstracted in Chemical Abstracts (CAS) database (USA. The journal is also covered by EBSCO (USA) database. The Journal is now part of UGC, DST and CSIR Consortia. It is now offical publication of Indian Association of Medico-Legal Experts (Regd.).

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Health Risk Behavior Related to Stroke in Indonesia

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Abstract

Stroke is a condition with clinical signs that develop rapidly in focal and global neurologic deficits, which can be severe and lasts ≥24 hours and cause death, without other apparent causes besides vascular. The study aims to analyzeecologically the health risk behavior related to the prevalence of stroke in Indonesia. The research conducted an analysis using secondary data from the 2018 Indonesia Basic Health Survey. The study takes all provinces as samples. Apart from the prevalence of stroke, four other variables analyzed as independent variables were the prevalence of obesity, the percentage of the population with less physical activity, the percentage of the people with fatty/cholesterol/ fried food consumption habits ≥1 per day, and the percentage of daily smokers. Data were analyzed using a scatter plot.The study results found that the higher the prevalence of obesity in a province, the higher the prevalence of stroke. The higher the percentage of the population with less physical activity in an area, the higher the stroke prevalence. The higher the rate of peoplewith fatty/cholesterol/ fried food consumption habits ≥1 per day, the higher the prevalence of stroke in that province. The higher the percentage of daily smokers in a region, the higher the prevalence of stroke. The study concluded that the four health risk behavior analyzed ecologically were positively related to most stroke in Indonesia.

Keywords: *stroke, ecological analysis,physical activity, healthy behavior*

Background

Stroke is a non-communicable disease. Globally, stroke is the second leading cause of death globally after heart disease and the third leading cause of disability. World Stroke Organization data shows 13.7 million new stroke cases each year, and around 5.5 million die from stroke[1]. According to data from the South East Asian Medical Information Center (SEAMIC), Indonesia is a country in Southeast Asia with the largest stroke mortality rate[2].

According to the World Health Organization(WHO), stroke is a condition that has clinical symptoms that develop rapidly in the form of focal and global neurological deficits.It can be severe and last ≥24 hours and can cause death, with no other apparent cause other than vascular. A stroke occurs when the brain's blood vessels become blocked or burst, which will result in part of the brain not getting the blood supply that carries the necessary oxygen, resulting in cell/tissue death[1].

The WHO states that Indonesia is ranked 97thglobally for the highest number of stroke sufferers, with the death rate reaching 138,268 people or 9.7% of the total deaths in 2011[3]. According to the 2018 Indonesia Basic Health Survey results, the prevalence of stroke based on doctor's diagnosis in the population aged ≥15 years increased compared to 2013, namely from 7‰ to 10.9 ‰ or an estimated 2,120,362 people. The highest prevalence was in East Kalimantan province, namely 14.7 ‰ and DI Yogyakarta 14.6 ‰. The lowest prevalence was in Papua (4.1‰) and North Maluku provinces (4.6‰)[4].

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In terms of financing, *BPJS Kesehatan* noted that the cost of health services for stroke has increased from 2016 to 2018. If in 2016 it reached 1.43 trillion IDR, the figure would raise the following year to 2.18 trillion IDR and get 2.56 trillion IDR in 2018[1]. The best prevention of stroke is to know the risk factors for stroke[5,6]. It can control the risk factors more quickly,and it shows to be effective at reducing mortality from stroke even in some low-income people[7]. For this reason, it is necessary to have an adequate understanding of what factors are related to stroke in Indonesia.Based on this background, this study aims to analyze ecologically health risk behaviorrelated to the prevalence of stroke in Indonesia.

Materials and Methods

Study Design

The author designed the study using an ecological analysis approach. Ecological studies focus on comparisons between groups, not individuals. The data analyzed is aggregate data at a particular group or level, which in this study is the provincial level. Variables in ecological analysis can be in the form of aggregate measurement, environmental measurement, or global measurement[8,9]

Data Source

The study conducted the analysis using secondary data from the 2018 Indonesia Basic Health Survey report. The 2018 Indonesia Basic Health Survey reports is an official publication from the Ministry of Health of the Republic of Indonesia. The unit of analysis in this study is the province. The study analyzed all regions in Indonesia as a sample (34 provinces).

Data Analysis

The dependent variable in this study was the prevalence of stroke. Stroke was recorded based on the doctor's diagnosis history. There were four independent variables analyzed in this study: prevalence of obesity, percentage of the population with less physical activity, percentage of the population with fatty/cholesterol/fried food consumption habits ≥1 per day, and percentage of daily smokers.

Data were analyzed bivariate using a scatter plot. The study used the linear fit line to determine the tendency of the relationship between the prevalence of stroke and the independent variable. The entire analysis process utilizes SPSS 26 software.

Results and Discussion

Table 1 shows the descriptive statistics of the prevalence of stroke and other variables analyzed in this study. The information presented informs that the lowest prevalence is 4.1%, while the highest prevalence is 14.7%. The range of prevalence of stroke among provincesin Indonesia is quite wide. Meanwhile, the prevalence range or the percentage of other variables also appears to be relatively high. For example, in the variable percentage of the population with fatty/ cholesterol/fried food consumption habits 1 per day, the range is between 10.3%-58.4%.

Table 1. Descriptive statistics of Prevalence of Stroke and Related variables by Province in Indonesia, 2018

Descriptive Statistics	Prevalence of Stroke	Prevalence of Obesity	Percentage of Population with Less Physical Activity	Percentage of Population with Fatty/Cholesterol/ Fried Food Consumption Habits ≥1 per day	Percentage of Daily Smokers
N	34	34	34	34	34
Mean	10.082	21.703	34.879	33.326	23.494
Median	10.500	21.050	33.950	33.200	23.350

Cont... **Table 1. Descriptive statistics of Prevalence of Stroke and Related variables by Province in Indonesia, 2018**

Mode	8.3	18.7a	33.7	10.3a	22.1a
Std. Deviation	2.7091	4.2801	5.7920	11.1558	2.6014
Variance	7.339	18.319	33.547	124.452	6.767
Range	10.6	19.9	22.6	48.1	9.3
Minimum	4.1	10.3	25.2	10.3	18.8
Maximum	14.7	30.2	47.8	58.4	28.1

Source: The 2018 Indonesia Basic Health Survey

Figure 1 shows a map of the prevalence of stroke by the province in Indonesia. Based on this spatial information, the figure indicates that most stroke tends to be lower in Eastern Indonesia. The result shows Papua, North Maluku, and East Nusa Tenggara have a lower stroke prevalence.

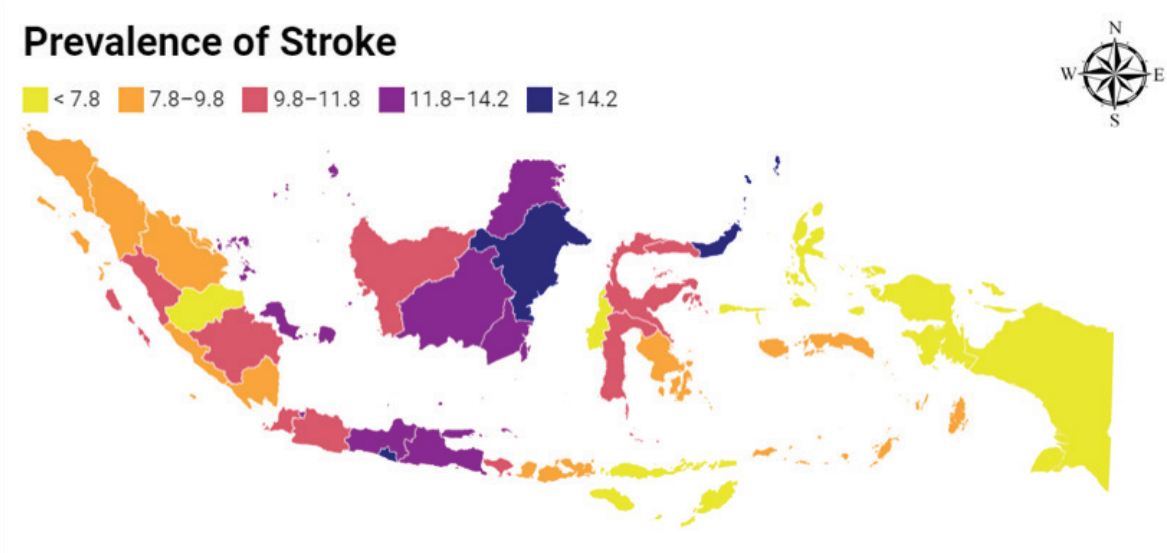

Figure 1. Map of the Prevalence of Stroke by Province in Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

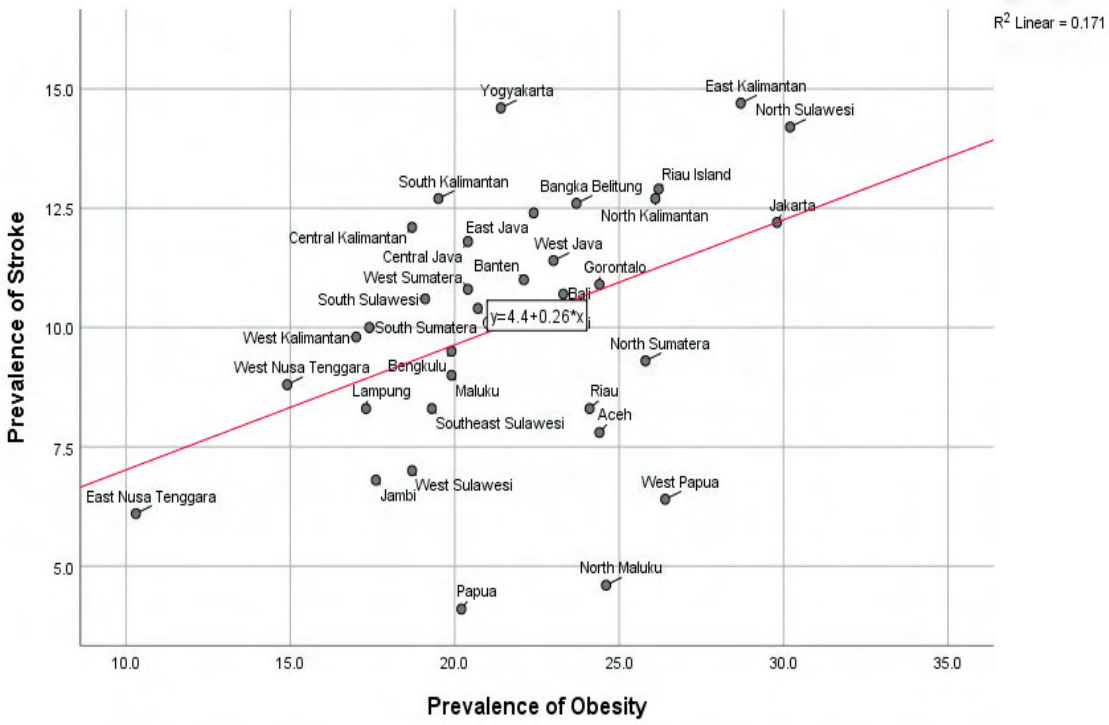

Figure 2. Scatter Plot of Prevalence of Obesity and Prevalence of Stroke by Province in Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

Figure 2 is a scatter plot of the prevalence of obesity and the prevalence of stroke by Indonesia's province. The study result indicates that the relationship between the two variables shows a positive trend. The work means that the higher the prevalence of obesity in a province, the higher the prevalence of stroke.

The analysis results shown in Figure 2 are in line with previous research, which found that 56.5% of respondents who had a stroke had risk factors for obesity[10]. In another meta-analysis study, the result found that being overweight and obese in young adulthood was associated with increased stroke risk. The risk effect will gradually increase as you gain weight[11,12]. Being overweight and obese is associated with an increased risk of high blood pressure, diabetes, heart disease, and stroke[13–15].

Figure 3 shows the Scatter plot of the population's percentage with less physical activity and stroke prevalence by the province in Indonesia. The results of the scatter plot indicate that two variables tend to have a positive relationship. The condition means that the higher the population with less physical activity in a province, the higher the stroke prevalence.

Lack of physical activity causes blood circulation to become less smooth. Blood functions to carry oxygen and nutrients to body cells. Besides, lack of activity can lead to obesity, which is a risk factor for stroke. Exercise and activity can reduce the risk of stroke[16,17]. Increased activity can reduce 80% of non-communicable diseases such as stroke, which is the largest contributor to death globally[18].

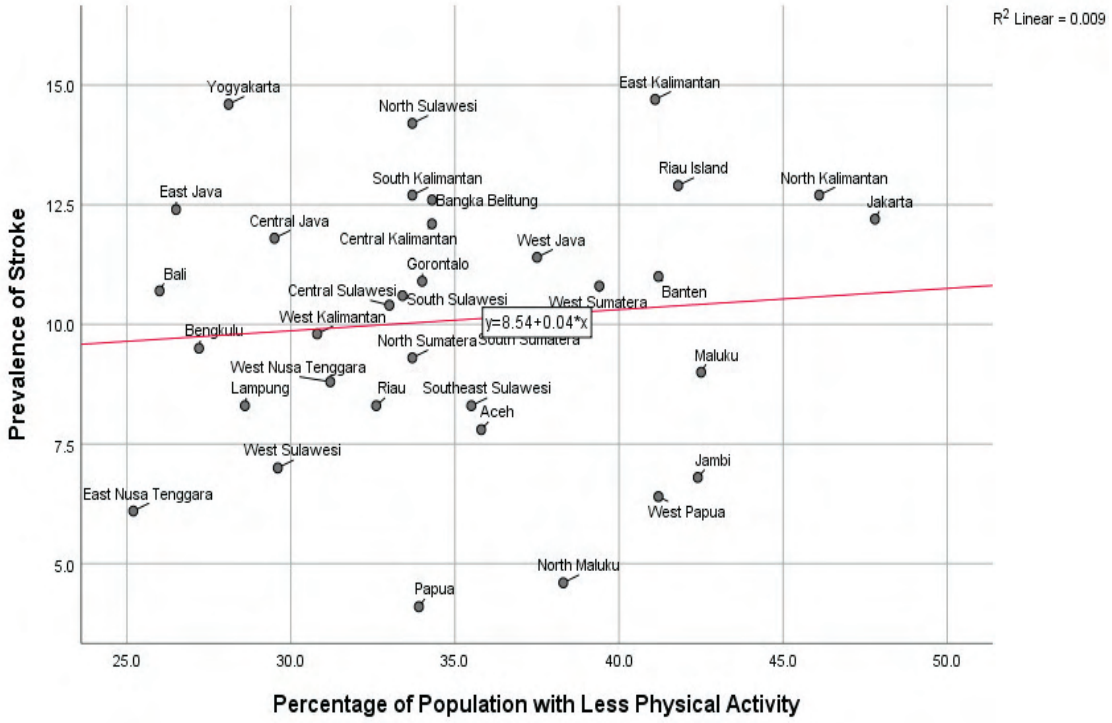

Figure3. Scatter Plot of Percentage of Population with Less Physical Activity and Prevalence of Stroke by Province in Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

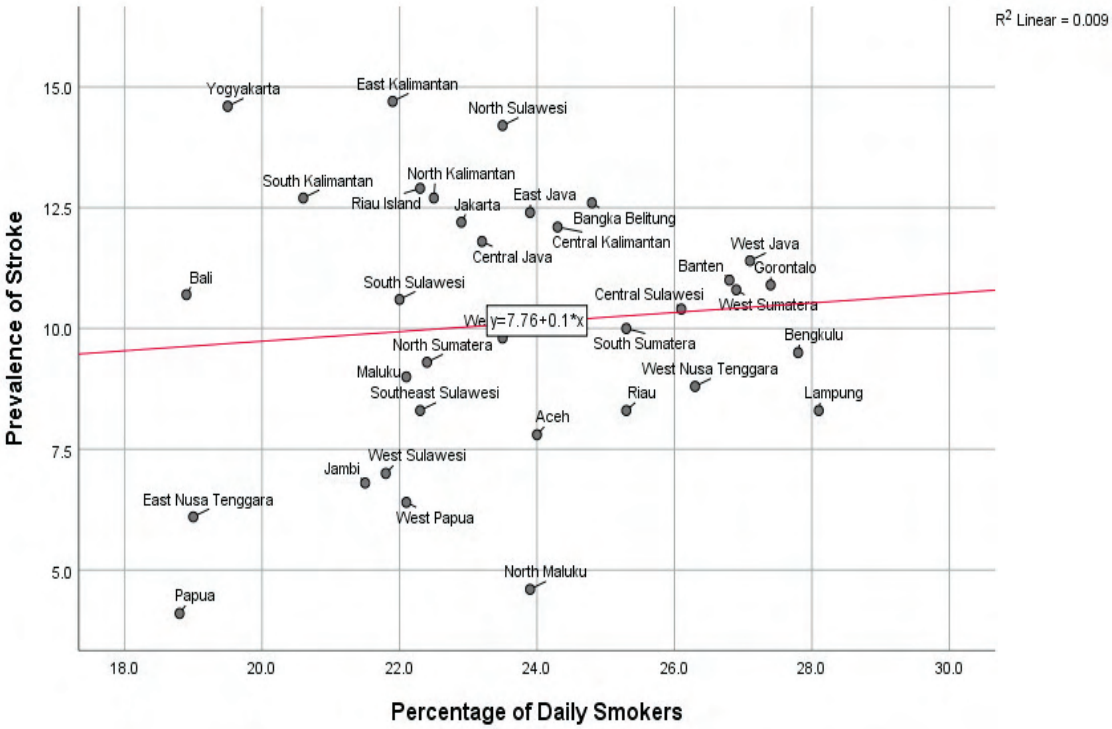

Figure 4. Scatter Plot of Percentage of Population with Fatty/Cholesterol/Fried Food Consumption Habits ≥1 per day and Prevalence of Stroke by Province in Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

Moreover, Figure 4 shows the relationship between the percentage of the population with fatty/ cholesterol/fried food consumption habits ≥1 per day and the prevalence of stroke by Indonesia's province. The result indicates that the two variables' relationship shows a positive trend based on the scatter plot. The situation means that the higher the percentage of the population with fatty/cholesterol/fried food consumption habits ≥1 per day in a province, the higher the prevalence of stroke in that province will be.

The research results from Alchuriyah, most respondents experienced an increase in cholesterol levels in the high and high category borderline due to a diet and lifestyle that consumed a lot of foods with high cholesterol and saturated fat[19]. If the intake of cholesterol in food that enters the body is too high, the blood amount will increase. Cholesterol build-up in the blood can accumulate to form plaque and cause blood clots to form (atherosclerosis),leading to stroke[13].

Respondents with high cholesterol levels were 2.4 times more likely to have a stroke than respondents with low cholesterol levels. The situation may be because cholesterol directly impacts obstruction of blood circulation and can lead to stroke. In contrast, in the Japanese Adult Health Study, higher cholesterol intake was associated with a lower risk of ischemic stroke[11,20].

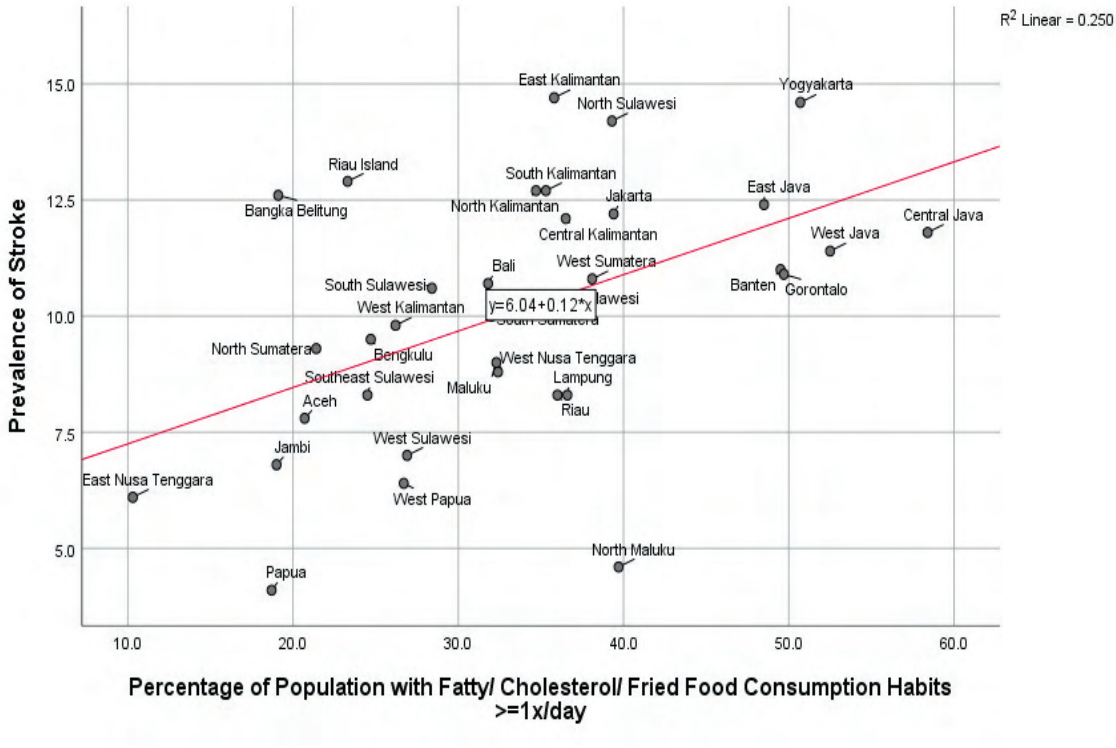

Figure 5. Scatter Plot of Percentage of Population of Daily Smokers and Prevalence of Stroke by Province in Indonesia, 2018

Source: The 2018 Indonesia Basic Health Survey

Meanwhile, Figure 5 is the scatter plot of daily smokers' percentage and stroke prevalence by the province in Indonesia. The figure shows that the two variables' relationship shows a positive trend based on the scatter plot. The result means that the higher the percentage of daily smokers in a province, the higher the prevalence of hypertension.

Nicotine and carbon monoxide in cigarette smoke damage the cardiovascular system[16,21]. Free radicals produced by smoking can increase the risk

of atherosclerosis. Smoking doubles the risk of stroke associated with a dose-response relationship between pack-years[11,22]. If the initial age of tobacco before or when the age of 20 years increases the risk of atherosclerotic disease, it will also increase the risk of stroke[21]. Smoking contributes to 15% of all stroke deaths per year. A previous study said stroke risk would decrease if it is 2 to 4 years after quitting smoking[11].

Conclusions

Based on the results, the study concluded that there is a positive relationship between obesity, population with less physical activity, population with fatty/cholesterol/ fried food consumption habits ≥1 per day, and daily smoker with the prevalence of stroke in Indonesia.

Acknowledgments: The author would like to thank the Ministry of Health of the Republic of Indonesia. The institution was providing the report, which was the source of the data in this study.

Source of Funding: Self-funding

Ethical Clearance: The study conducted using secondary data from published reports. Ethical clearance is therefore not required in the conduct of this study.

Conflicting Interests: The authors declared no potential conflicts of interest concerning the research, authorship, and publication of this article.

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