



The Identification of Non-Communicable Diseases (NCDS) Risk Factors in Yogyakarta, Indonesia

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Abstract. Non-communicable diseases (NCDs) are the leading cause of death and a major contributor to the burden of disease worldwide, including Indonesia. The pattern of diseases in Indonesia has undergone become an epidemiological transition over the last two dekade, mainly hypertension and diabetes. Modifiable behaviours, such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol, all increase the risk of NCDs. An important way to control NCDs is to focus on reducing the risk factors related with these diseases. Objective: The study aimed to analyze the relationship between NCDs and its related factors in Yogyakarta. Research Design: This was descriptive analytic method with a cross-sectional approach involving 415 patients with NCD's enrolled in the Primary Health Center (PHC) of Sleman district Yogyakarta. The sample were 100 patients by using purposive sampling. Data were extracted from medical records of the Primary Health Centers from January-December 2019. The analysis data used the non-parametric Kendall Tautest. Result: The prevalence of NCD's is high and the type of diseases are Diabetes Mellitus 42%, Hypertension 38% and Heart Failure 18%. The results of statistical tests showed that there was a relationship between smoking ($p = 0.021$) and obesity ($p = 0.036$) with the incidence of NCDs. Conclusion: The incidence of NCDs in Sleman Yogyakarta is high where as women above the age more than 40 years are in the highest risk. It is suggested that the Sleman Primary Health Center to focus and improve the control and prevention of NCDs by advocating, promoting, strengthening capacity and strengthening surveillance.

Keywords: NCDs · primary health center · smoking and obesity

1 Introduction

Globally, non-communicable diseases (NCDs) become the number one cause of death each year, namely cardiovascular disease. Cardiovascular disease is a disease caused by impaired heart and blood vessel function, such as coronary heart disease, heart failure, hypertension and stroke [1].

In the United States, the prevalence of NCDs is 89% and has long surpassed infectious diseases as the leading cause of death [2]. India experiences an epidemiological transition

that leads to an increase in the prevalence of NCDs as much as 73% causing death and 60% of the morbidity [3]. In Indonesia, the prevalence of NCDs is increases; as the examples, cancer rose from 1.4% to 1.8%, stroke rose from 7% to 10.9%, chronic kidney disease rose from 2% to 3.8%,; and based on blood sugar tests, diabetes mellitus increased from 6.9% to 8.5%, and the results of blood pressure measurement, hypertension rose from 25.8% to 34.1%. The highest prevalence of NCDs in Indonesia was in the DI Yogyakarta Province [4].

Some of the impacts caused by NCDs are to cause the mortality of 41 million people every year or equivalent to 71% of all global deaths (WHO, 2018). In China, it reached 86.6% of the total deaths from NCDs. If the trend of risk factors continues until 2030, the total premature deaths from NCDs will increase from 3.11 million to 3.52 million and almost 1 million deaths among people aged 30 to 70 years due to NCDs [5].

The emergence of non-communicable diseases is caused by a combination of unmodifiable and modifiable risk factors. The risk factors that cannot be modified include age, gender and genetics. Modifiable risk factors are factors that can be changed through individual awareness and social intervention [6].

In the Special Region of Yogyakarta (DIY) the prevalence of hypertension reached 11.1% higher than the national figure. (8.8%). The prevalence of hypertension in DIY ranks fourth as the province with the highest hypertension cases in Indonesia [4]. From the results of the 2018 Health Center Integrated Disease Survey, hypertension occupies the highest position among ten diseases that appear in DIY (Yogyakarta Health Office, 2018). Hypertension cases are the third highest NCDs cases in Sleman Regency with 138,702 (32.01%) cases [7].

The results of a preliminary study to the Sleman Health Center on March 26 - April 26, 2019 obtained data from July - December that NCDs patient visits decreased from 11 patient visits in July to 9 patients in December. Total NCDs patient visits were 415 people from January 2018 to December 2018 (hypertension 167 people, diabetes mellitus 136 people, stroke 40 people, and heart failure 72 people).

To control NCDs, the government of Indonesia focuses on controlling risk factors with health promotion programs and the elderly posyandu (integrated health post) program, Integrated Development Post (POSBINDU) of NCDs. The central government designed the Healthy Living Community Movement (GERMAS) which focuses on improving CERDIK behavior (regular health checks, get rid of smoking cigarettes, exercising regularly, having a balanced diet, getting enough rest, and managing stress) [1]. The general objective of this study is to analyse non-communicable diseases and related factors in Sleman, Yogyakarta.

2 Result and Discussion

This type of research applied a descriptive analytic study with a cross-sectional approach. The research sampling technique used purposive sampling. The independent variables in this study were “age, gender, genetics, education, occupation, smoking, physical activity, coffee consumption, diet, and obesity” while the dependent variable in this study was “non-communicable diseases (NCDs), namely hypertension, diabetes mellitus, stroke, and heart failure”.

The population in this study were NCDs patients (hypertension, diabetes mellitus, stroke, and heart failure) who enrolled the Sleman Primary Health Center of Yogyakarta from January–December 2019 with a total population of 415 people.

The sampling technique in this study used purposive sampling. Determination of the number of samples used the slovin formula, with a sample of 100 people meeting the following inclusion criteria: NCDs patients (hypertension, diabetes mellitus, stroke, and heart failure) at the Sleman Primary Health Center of Yogyakarta, NCDs patients (hypertension, diabetes mellitus, stroke, and heart failure) who smoked, NCDs patients (hypertension, diabetes mellitus, stroke, and heart failure) who were obese. While the exclusion criteria were as follows: NCDs patients (hypertension, diabetes mellitus, stroke, and heart failure) whose medical record data was incomplete.

The tool used for collecting data in this study was secondary data taken from medical record data and entered into the observation sheet according to the data to be studied. The bivariate analysis used a non-parametric statistical test with the Kendall Tau correlation test technique.

3 Result

3.1 Characteristics of Respondents

Based on Table 1, it shows that the age range of the most respondents is 47–50 years as many as 40 people (40.0%), and the least is in the age range of 67–68 years as many as 1 person. The majority of respondents are female respondents as many as 57 people (57.0%), and male respondents are 43 people (43.0%). While the education range of the most respondents is college (university) as many as 36 people (36.0%), elementary school (SD) as many as 31 people (31.0%), and the least was junior high school as many as 8 people (8.0%), and no school 9 people (9.0%). The characteristics of respondents based on occupations in this study shows that the most respondents with labor jobs as many as 39 people (39.0%), and the least respondents with self-employed jobs (11.0%).

The main type of NCDs are Diabetes Mellitus as many as 42 people (42.0%), hypertension as many as 38 people (38.0%), Heart Failure as many as 18 people (18.0%), and Stoke as many as 2 people (2.0%) (Table 2).

Most of the respondents are obese 36 people (36.5%) and an overweight of 30 people (29.7%) (Table 3).

3.2 Statistical Results

Based on the results of the Kendall tau test to determine the relationship between obesity and NCDs in Sleman Yogyakarta, a correlation value of 1,000 was obtained with a significant p of 0.036 ($p < 0.05$), there is a relationship between obesity and NCDs in Sleman Yogyakarta (Tables 4 and 5).

There is relationship between smoking and NCDs in Sleman Yogyakarta, a correlation value of 1,000 was obtained with a significant p of 0.026 (Table 6).

Table 1. CHARACTERISTICS OF RESPONDENT

<i>Characteristics Respondent</i>	<i>F</i>	<i>%</i>
Ages		
39 – 42	8	8,0
43 – 46	2	2,0
47 – 50	40	40,0
51 – 54	5	5,0
55 – 58	16	16,0
59 – 62	11	11,0
63 – 66	17	17,0
67 - 68	1	1,0
Gander		
Male	43	43,0
Female	57	57,0
Education		
No School	9	9,0
Primary School	31	31,0
Junior High School	8	8,0
Senior High School	16	16,0
University Graduated	36	36,0
Occupations		
House Wives	19	19,0
Employee	39	39,0
Self-Employed	11	11,0
Civil Servant	31	31,0
Total	100	100

Table 2. PREVALENCE OF NCDs IN SLEMAN YOGYAKARTA 2019

<i>NCDs</i>	<i>F</i>	<i>%</i>
Hypertension	38	38,0
Diabetes mellitus	42	42,0
Stroke	2	2
Heart Failure	18	18,0
Total	100	100

4 Discussion

4.1 Age

NCDs which are usually experienced by the elderly, are now mostly experienced by the productive age group. The most common NCDs that attack the elderly are hypertension and diabetes mellitus. In several studies, the proportion of cardiovascular disease is more dominant in the elderly group [8].

However, in recent years, there has been an increasing trend where this deadly disease has begun to spread and attack the productive age population group. As many as 39% of heart patients in Indonesia are under 44 years old, for coronary heart cases, as much as 27% occur in the age group under 35 years with 125 of them experienced in the age group 25 years and under.

Diabetes mellitus tends to attack at the age of 46–65 years at most. This is because at the age of over 40 years there is a decrease in the pancreatic beta cells in producing insulin. In addition, there is a decrease in mitochondrial activity in muscle cells by 35% by triggering an increase in fat levels which causes insulin resistance. Mortality cases caused by NCDs occur entirely in people aged less than 60 years, as many as 29% in developing countries [9].

4.2 Gender

In this study, women most experienced to have NCDs than man, where as 57 women (57.0%) and 43 men (43.0%).

Research at the Haji Health Center, the incidence of hypertension is more common in women. Gender is one of the factors that influence the incidence of hypertension. Women will experience an increased risk of hypertension after menopause over 45 years. Women who have not menopause are protected by the hormone estrogen which plays a role in increasing levels of High Density Lipoprotein (HDL). Low HDL cholesterol levels and high LDL cholesterol (Low Density Lipoprotein) affect the process of atherosclerosis and lead to high blood pressure [10].

4.3 Education

The level of education is an illustration of how high the knowledge possessed. As well as the abilities and skills possessed in accordance with the level of education they follow. The higher the education is directly proportional to the knowledge possessed, especially in preventive actions in the health sector and others[11]. In this study, the characteristics of the most respondents were college (PT) as many as 36 people (36.0%) elementary school (SD) as many as 31 people (31.0) and at least 8 people from junior high school (8.0%), and did not finish school 9 people (9.0%).

Hypertension can occur due to a lack of public knowledge about the dangers and how to cope with the disease. Health knowledge will affect behavior as a medium-term outcome of health education. The risk of developing hypertension is higher at low education. This is because people with low education will have less knowledge about health and of course will have difficulty and be slow in receiving information,

for example counseling about hypertension and the dangers of hypertension and its prevention provided by officers so that it has an impact on healthy behavior / lifestyle [12].

4.4 Occupation

The characteristics of respondents based on occupation shows that the most dominant jobs were respondents with labor jobs as many as 39 people (39.0%) and the least respondent occupations with private jobs as many as 11 people (11.0%).

The type of work affects the pattern of physical activity, in which the job that does not rely on physical activity affects blood pressure; people who work involving physical activity can be protected from hypertension. Long working hours can increase the risk of hypertension in several ways. Shift workers have a higher prevalence of hypertension than non-shift workers [13].

Characteristics of workers that affect hypertension include age, stress, body mass index, gender, physical activity. Workers who are physically, mentally, economically and socially healthy affect the health of families and communities. An effective occupational health program focuses on primary prevention, by identifying and minimizing hazards. The workplace is an ideal area and supporting infrastructure for the promotion of wider public health, although the health of workers is influenced by other factors outside of work [14].

4.5 Smoking Habits

The results of this study indicate that the respondents who have smoking habit is 45 respondents (44.6%). Tobacco use is a serious public health problem in the Southeast Asia Region in which tobacco use and smokeless forms of tobacco are prevalent. The region has nearly a quarter of the global population and about a quarter of all smokers in the world. Smoking among men is high in this region and women usually chew tobacco [15].

Smoking is a risk factor for high blood pressure. Acute effects caused by smoking include increasing heart rate and blood pressure with increased levels of the hormones epinephrine and norepinephrine due to activation of the sympathetic nervous system. Many studies also say that the long-term effect of smoking is an increase in blood pressure due to an increase in inflammatory substances, endothelial dysfunction, plaque formation, and vascular damage. Adaptation of the biochemical or hemodynamic mechanisms and effects of chronic smoking, such as the chronic effect of continue on vascular smooth muscle, or the sympathetic stress effect of nicotine is thought to cause low blood pressure in smokers [16].

This research found that there is a relationship between smoking habits and NCDs. Smoking habits can affect the thickness of the plasma walls of blood vessels and can cause cardiovascular complications. Smoking habits are associated with an increased prevalence of metabolic syndrome and an increase in body mass index (BMI) [19].

Health effects arising from smoking behavior in teenagers such as high blood pressure and heart work disorders caused by the influence of chemicals such as tar, nicotine, and

carbon monoxide can damage the lining of the artery walls so that the arteries are susceptible to plaque build-up. Nicotine in tobacco also makes the heart work harder because it temporarily constricts blood vessels and increases heart rate and blood pressure [20].

4.6 Obesity

Obesity is an increase in body weight beyond the limits of skeletal and physical needs as a result of excessive fat accumulation in the body. Obesity is one of the causes of the emergence of non-communicable diseases such as type 2 diabetes mellitus, hypertension, respiratory disorders, stroke, sleep apnea syndrome, metabolic syndrome disorders, bone disorders, joint disorders, and social psychological problems [17]. The results of this study indicate the characteristics of respondents based on BMI, the respondents who are obese as many as 36 people (36.5%) and those classified as overweight as many as 30 people (29.7%).

Obesity can cause hypertension from various mechanisms, namely directly or indirectly. Obesity can directly lead to increased cardiac output. This is because the greater the body mass, the greater the amount of blood circulating, and it causes the cardiac output to increase. While indirectly, obesity occurs through stimulation of the activity of the sympathetic nervous system and the Renin Angiotensin Aldosterone System (RAAS) by mediators such as cytokines, hormones and adipokines. Aldosterone hormone is one that is closely related to water and sodium retention which can increase blood volume. Hypertension associated with obesity is generally characterized by plasma volume expansion and increased cardiac output, hyperinsulinemia and insulin resistance, increased sympathetic nervous system activity, sodium retention and dysregulation of self regulating hormones [18].

In this study, there is a relationship between obesity and NCDs. People who is obese has a 2.2 times greater risk of developing non-communicable diseases compared to people who have a normal BMI (21). Someone who is obese has 4.529 times the risk of developing type 2 diabetes mellitus compared to people who have a normal BMI [5]. shows that some of the research respondents are at high risk of developing cardiovascular disease. This condition can be caused by research data stating that those included in the category of central obesity are respondents with an average abdominal circumference of 85.40 cm and are said to be overweight if the average BMI status is 27.70 kg/m² [21].

5 Discussion

The prevalence of Non-Communicable Diseases (NCDs) in Yogyakarta is high and the main type of diseases are Diabetes Mellitus 42%, Hypertension 38% and Heart Failure 18%. The results of statistical tests showed that there is a relationship between smoking ($p = 0.021$) and obesity ($p = 0.036$) and NCDs. It is suggested the control and prevention of NCDs by advocating, promoting, strengthening capacity and strengthening surveillance. To lessen the impact of NCDs on individuals and society, a comprehensive approach is needed requiring all sectors, including health, finance, transport, education, agriculture, planning and others, to collaborate to reduce the risks associated with NCDs, and to promote interventions to prevent and control them.

References

1. Health Ministry, Republik Indonesia. *Germs Guide Book*. 2019;
2. Chen S, Kuhn M, Prettner K, Bloom DE. The Macroeconomic Burden Of Noncommunicable Diseases In The United States: Estimates And Projections. *Plos One*. 2018;13(11):1–14.
3. Srivastav S, Mahajan H, Goel S, Mukherjee S. Prevalence Of Risk Factors Of Noncommunicable Diseases In A Rural Population Of District Gautam-Budh Nagar, Uttar Pradesh Using The World Health Organization STEPS Approach. *J Fam Med Prim Care*. 2017;6(3):491.
4. Riskesdas, 2018, Health Ministry. *Health Research Based*. 2018;
5. Suwinawati E, Ardiani H, Ratnawati R. The Associated Of Obesity With Type 2 Of Diabetes Mellitus At Kendal Primary Health Center Of Districts Ngawi Pendahuluan. *J Heal Sci Prev*. 2020;014:8–13.
6. Sudayasa IP, Rahman MF, Eso A, Jamaluddin J, Parawansah P, Alifariki LO, Et Al. Early detection NCDs at public community in Village at Desa Andepali Kecamatan Sampara Kabupaten Konawe. *J Community Engagem Heal*. 2020;3(1):60–6.
7. Health District, Sleman. *Health Profile of Sleman Regency Tahun 2020*. Sleman Health Office. 2020;(6):1–173.
8. Nuraeni E. The relationship between risk factors and di Klinik X Tangerang City. *J JKFT*. 2019;4(1):1.
9. Purwaningsih NS, Suhartini SM. Early detection of NCDs Posbindu Pelangi Rw 05 –Srengseng Sawah Jagakarsa- Jakarta Selatan. *Pros Senantias*. 2020;1(1):1019–24.
10. Yunus M, I Wayan Ca, Eksa Dr. The relationship between the incidence of hypertension at the Haji Calling Community Health Center, Anak Tuha District, Kab. central Lampung. *Implement Online Quiz Appl Efl Classr*. 2021;15(10):4–10.
11. Muhammad EY. Relationship Of Education Level To Lung Tuberculosis Incidence Artikel Info Artikel History: Literatur Review. *J Ilm Kesehat Sandi Husada [Internet]*. 2019;10(2):288–91. Available From: <https://Akper-Sandikarsa.E-Journal.Id/JIKSH>
12. Khusnah F, Rizal A, Irianty H. Relationship between Education Level, Knowledge and Attitude towards Prevention of Hypertension Disease at Productive Age in the Work Area of Melati Kuala Kapuas Health Center in 2021 Khusnah. 2021;63:1–8.
13. Hardati AT, Ahmad RA. The Effect of Physical Activity on the Incidence of Hypertension in Workers (Riskesdas Data Analysis 2013). *Ber Kedokt Masy*. 2017;33(10):467.
14. Syanindita Y. Age, Education, Occupation, Family History, Abdominal Circumference and Sports Habits of Hypertensive and Non Hypertensive Patients at the Surakarta City Health Center. 2020;22.
15. Rulkiewicz A, Pilchowska I, Lisik W, Pruszczyk P, Domienik-Karłowicz J. Prevalence Of Cigarette Smoking Among Professionally Active Adult Population In Poland And Its Strong Relationship With Cardiovascular Co-Morbidities-POL-O-CARIA 2021 Study. *J Clin Med*. 2022;11(14).
16. Susanto E, Khairunniza, Nugraha A. The Relationship of Smoking Habits to Non-Communicable Diseases. *Pros Semin Nas*. 2019;105–8.
17. Akhter N, Begum K, Nahar P, Cooper G, Vallis D, Kasim A, et al. Risk Factors For Non-Communicable Diseases Related To Obesity Among First- And Second-Generation Bangladeshi Migrants Living In North-East Or South-East England. *Int J Obes [Internet]*. 2021;45(7):1588–98. Available From: <https://doi.org/10.1038/S41366-021-00822-5>
18. Shariq OA, McKenzie TJ. Obesity-Related Hypertension: A Review Of Pathophysiology, Management, And The Role Of Metabolic Surgery. *Gland Surg*. 2020;9(1):80–93.
19. Musniati N, Mardhiati R, Mamdy Z, Hamdan H. Determinants of Smoking Behavior in Adolescent Girls. *J Public Heal Innov*. 2021;2(1):13–21.

20. Letelay AM, Senewe FP, Simanjutak RR. The Association Of Risk Behavior And NCD Diseases In North Moluccas. *J Ekol Kesehat* Vol. 2021;20(3):176–87.
21. Saraswati LD, Udiyono A, Adi MS, Peminatan M, Tropik P. Overview of Blood Pressure and Obesity Indicators for Women of Childbearing Age in the Work Area of Tlogosari Wetan Health Center Semarang City. *J Kesehat Masy*. 2017;5(April):43–7

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