Risk factors of non-communicable diseases among productive age in Universitas Pasundan: a cross-sectional study

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ABSTRACT

Introduction: Non-communicable diseases (NCDs) remain the leading cause of death in Indonesia, including in Bandung City, where hypertension, heart disease, and stroke are the highest causes of mortality. Recently, the prevalence of NCDs has increased, frequently ranking among the top ten diseases reported in primary healthcare centers in Bandung. Furthermore, the epidemiological trend for NCDs has shifted from predominantly affecting older adults to increasingly affecting the productive age group. However, Indonesia still lacks research on NCD risk factors specifically within the productive age group, including in higher education populations where many individuals in this age group are present.

Methods: This study aims to describe NCD risk factors in the productive age group (15-59 years), based on NCD risk factor screening data from the total sampling of 333 students and staff at *Universitas Pasundan*.

Results: According to the data, 42.6% of respondents were in the pre-hypertension category and 5.4% already had hypertension, 36.6% had excessive body mass index (BMI), and 26.1% had central obesity. High blood pressure and central obesity were more prevalent in males, while excessive BMI was more prevalent in females. It was also found that 54.4% of respondents were exposed to cigarette smoke, 52.9% had insufficient physical activity, 49.8% consumed excessive sugar, 58.6% consumed excessive salt, 50.5% consumed excessive fat, and 57.4% had insufficient vegetable and fruit intake. Excessive consumption of sugar, salt, and fat was more prevalent in females.

Conclusion: The study found that the productive age population has a high risk of developing NCDs. Immediate interventions are needed, especially for at-risk populations, together with bolstering preventive and promotional efforts for those not yet at risk. The university should schedule regular annual screenings targeting a broader and more representative sample.

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INTRODUCTION

Non-communicable diseases (NCDs) are conditions that cannot be transmitted from one individual to another but are caused by a combination of genetic factors, physiological conditions, environmental factors, and behavioral factors.[1] Besides being responsible for 85% of premature deaths, NCDs have long-term impacts on health and require prolonged treatment and recovery.[1,2] Examples of NCDs include diabetes mellitus (DM), hypertension, stroke, cancer, mental disorders, as well as heart and vascular diseases. According to global data, the three main causes of death in Indonesia are stroke, ischemic heart disease, and diabetes mellitus.[3] This aligns with the 2022 health profile data

of Bandung City, which highlights that primary or essential hypertension, heart disease, and stroke as the leading causes of death. The increasing number of NCDs in Bandung over recent years and their consistent presence among the top ten diseases reported by community health centers calls for urgent attention.[4]

Indonesia is experiencing an epidemiological transition from infectious diseases to NCDs, with a noticeable increase in NCD prevalence among the productive age group.[5] According to the 2018 Basic Health Research (*RISKESDAS*), there is a trend of NCDs shifting from older adults to the productive age group (15-59 years), where hypertension has the highest prevalence. The rise in NCDs corresponds with the increasing prevalence of

unhealthy behaviors and lifestyles, such as poor diet, lack of physical activity, exposure to cigarette smoke, and alcohol consumption.[6] A study indicates that 6% of the productive age group have more than one NCD risk factor and engage in unhealthy behavior.[7] Therefore, NCDs represent a critical public health issue requiring focused attention. The World Health Organization (WHO) attributes NCDs largely to four modifiable unhealthy behaviors: smoking, insufficient physical activity, unhealthy diet, and alcohol consumption. These behaviours lead to four key physiological and metabolic dysfunction conditions: elevated blood pressure, increased body weight, high blood sugar, and elevated total cholesterol. A study conducted in India involving over

12,000 participants aged 18-69 years found that a significant portion of the population is at high risk for NCDs, with only 19% of respondents being free from any NCD risk factors.[8] Systematic reviews indicate that dietary patterns and physical activity are consistent behavioural risk factors for NCDs, followed by smoking behaviour. Moreover, conditions such as depression, high blood pressure, and obesity are also associated with the occurrence of NCDs.[9] In Indonesia, factors like overweight, obesity, lack of physical activity, and smoking contribute to the rise in NCDs cases, increasing treatment costs and decreasing productivity.[10]

Individuals with NCDs often experience a decline in productivity due to a decreased quality of life, as shown by research showing that the quality of life among the productive age group is below expectations, largely due to chronic diseases and unhealthy lifestyles.[11] This can negatively impact the socio-economic conditions, as unproductive individuals impede national development and lead to high national health expenditure.[12] Consequently, Indonesia's goal of achieving a "Golden Generation" by 2045, with a demographic peak by 2050, may be threatened by the burden of NCDs. Hence, productive age group should be the primary target in preventive and promotional efforts to mitigate NCD risk factors, as Indonesia needs to develop a healthy population in anticipation of reaching the demographic dividend peak by 2050. Unfortunately, the coverage of NCD risk factor screenings conducted through *pos binaan terpadu (posbindu)* for NCDs have not met their targets, primarily due to low participation rates, especially among the productive age group. Employment status among this group often makes it difficult for them to participate in such activities. Conducting screenings in locations where the target population is already present, such as workplaces or educational institutions, could be a solution.[13]

Identification and analysis of NCD risk factors are needed to determine effective preventive and promotional measures.[14] Research on NCD risk factors, specifically in the productive age group, remains limited in Indonesia. Given that higher education institutions are among the loci with a significant productive age population. Therefore, the researchers are interested in describing NCD risk factors in the productive age group (15-59 years) within the environment of *Universitas Pasundan*, as a preliminary study to identify risk factors and issues related to NCDs, which can then be developed into participatory and action studies for preventive and promotive efforts within the University environment.

METHOD

This cross-sectional study analyses secondary data from NCD risk factor screenings conducted within the campus of *Universitas Pasundan*, involving 360 participants. The screening program was a collaboration between the Faculty of Medicine and the local primary community healthcare centre (*Puskesmas*). The target population included all university members, such as students and staff. However, due to time constraints related to the academic calendar and the healthcare center's schedule, as well as limited event promotion, the screening was limited to two days during working hours, preventing full university participation. Data were collected using a total sampling technique and were quantitatively analyzed after excluding incomplete responses. Basic data were processed using Microsoft Excel, and univariate analysis was performed using the Statistical Package for Social Sciences (SPSS) version 22 to describe NCD risk factors related to behavior and metabolic risks.

We collected data using a total sampling technique, and then quantitatively analyzed the data from participants who filled out the forms, excluding any incomplete data. Basic data were processed using Microsoft Excel, and univariate analysis was performed using the Statistical Package for Social Sciences (SPSS) version 22 to describe NCD risk factors related to behavior and metabolic risks.

The screenings included an assessment of NCD risk behaviors based on the NCD screening form used by *posbindu* for NCDs at *Puskesmas*. Behavioral risk factors assessed included insufficient consumption of vegetables and fruits, excessive intake of sugar, salt, and fat, lack of physical activity, exposure to cigarette smoke, and alcohol consumption. Metabolic risk factors were assessed using a sphygmomanometer (Onemed and ABN brands), digital weight scales (GEA brand), measuring tape (GEA brand), microtoise (GEA brand), rapid glucose meters (Accucheck and Easytouch brands), and rapid cholesterol meters (Accucheck and Easytouch brands) to measure random blood glucose levels, body mass index (BMI), waist circumference, and blood pressure. The operational definitions of these variables are based on the guidelines for monitoring non-communicable disease risk factors from the Indonesian Ministry of Health, as outlined in Table 1.[15]

RESULT

Out of 360 respondents aged 17-59 years, 333 data sets met the inclusion criteria for analysis (complete data). Respondents were categorized into students and non-students (employees and staff). The majority of respondents were male, comprising 208 individuals (62.5%), while 125 respondents were female (37.5%). The average age of respondents was 23.8 years, with 18 years old being the most common age group. Most of the respondents who participated in the screening activities were students (Table 2).

The analysis of non-communicable disease (NCD) risk behaviors among respondents revealed alarmingly high percentages, with nearly 50% of respondents exhibiting risky behaviors (Table 3). The most prevalent risk behavior was excessive salt consumption (58.6%), followed closely by insufficient consumption of vegetables and fruits (57.4%). Additionally, excessive fat and sugar consumption were notably high at 50.5% and 49.8%, respectively. Excessive intake of sugar, salt, and fat was more common among females. The data also showed that 54.4% of respondents were exposed to cigarette smoke, and 52.9% engaged in insufficient physical activity.

The examination of metabolic risk factors (Table 4) indicated that 42.6% of respondents were in the pre-hypertension category, and 5.4% had hypertension.

Table 1. Definitions of variables

Variable	Definition	Measuring Scale (Nominal)
Behavioural risk factor		
Low intake of vegetables and fruits	≤ 5 portion/day	Yes/No
High sugar intake	>4 table spoon/day	Yes/No
High salt intake	>1 tea spoon/day	Yes/No
High fat intake	>5 table spoon/day	Yes/No
Low physical activity	Physical activity <150 minute/week	Yes/No
Cigarette smoke exposure	Both active or passive smoker	Yes/No
Metabolic risk factor		
High Body Mass Index (BMI)	≥23 kg/m²	Normal/High
High waist circumference	• Male ≥ 90 cm • Female ≥ 80 cm	Normal/High
High blood pressure	• Normal: <120/<80 mmHg • Pre-hypertension: 120-139/80-89 mmHg • Hypertension: ≥140/90 mmHg	Normal/ Pre-hypertension/ Hypertension
High Random blood glucose	Normal: <200 mg/dL High: ≥200 mg/dL	Normal/High

Table 2. Respondents Characteristics

Category	Mean	Mode
Age	23,8	18
Gender	**(n)**	**%**
Male	125	37,5
Female	208	62,5
Member status	**(n)**	**%**
Non-student	133	39,9
Student	200	60,1

Additionally, 36.6% of respondents had an elevated BMI, and 26.1% experienced central obesity. High blood pressure and central obesity were more prevalent among male respondents, while high BMI was more common among females.

DISCUSSION

Most respondents displayed high salt and fat intake in their daily diets. Conducting a 24-hour food recall would be beneficial to assess the quality and quantity of meals consumed, along with further qualitative studies on the factors influencing certain behaviors. Fast food, being quick and convenient, is commonly consumed, yet it often contains preservatives and is usually prepared through deep frying. High sodium and fat intake from ultra-processed foods have been shown to contribute to cardiovascular diseases.[16] Exposure to cigarette smoke and lack of physical activity, both prominent in the studied sample, also warrant attention as these behaviors compromise cardiovascular health and are linked to the future incidence of NCDs.[17]

A study at a university showed their result on screening with a similar average age population also showed that 40% of its respondents had NCD risk factors.[18] Comparable findings were reported in another study, where all behavioral risk factors for NCDs exceeded 50%, and 74% of respondents demonstrated low awareness of NCDs and their associated risk factors.[19] This is particularly concerning, as the population studied in our study is relatively young, yet they already exhibit high levels of risky behaviors. Therefore, further research is needed to explore respondents' awareness of their behaviors.

A study on a population of 319,355 young adults revealed that 6% of the respondents had one or more NCDs. The study also showed that young adults with abnormal waist circumference and BMI were 1.58 times and 1.14 times more likely to develop NCDs, respectively, especially those with smoking and alcohol consumption behaviors.[20] The incidence rates of hypertension and diabetes are higher among individuals with central

obesity or those exhibiting insufficient physical activity.[21] High blood pressure in young adulthood, however, increases the risk of cardiovascular diseases later in life.[22]

Unfortunately, not all individuals with NCDs are aware that they are at risk or have associated risk factors. One study found that among respondents who underwent NCD screening, only 7% were aware that they had risky behaviors. Moreover, not all individuals with risky behaviors recognize their tendency to develop NCDs.[23] A study conducted at a university in Saudi Arabia found that 56.2% of respondents had low knowledge and awareness about NCDs.[24] This suggests that health problems identified at the primary prevention level may stem from low knowledge and awareness of NCDs.

CONCLUSION

The working-age population in this study is at high risk of developing non-communicable diseases (NCDs). Immediate interventions are essential, focusing on high-risk groups while continuously implementing preventive and promotional measures for those not yet at risk. To control the future prevalence of NCDs, early detection, education, and proper management must be conducted by university stakeholders in an integrated manner across multiple health sectors. In this context, the university must strengthen its NCD risk prevention program and achieve its goals as a health-promoting

Table 3. Behavioural risk factors based on gender

Behavioural Risk Factor	Male (n= 125)		Female (n=208)	
	Yes (n)/%	No (n)/%	Yes (n)/%	No (n)/%
Low intake of vegetables and fruits	68 (54,4%)	57 (45,6)	123 (59,1)	85 (40,9)
High sugar intake	55 (44%)	70 (56%)	111 (53,4%)	97 (46,6%)
High salt intake	62 (49,6%)	63 (50,4%)	133 (63,9%)	75 (36,1%)
High fat intake	53 (42,4%)	72 (57,6%)	115 (55,3%)	93 (44,7%)
Low physical activity	71 (56,8%)	54 (43,2%)	105 (50,5%)	103 (49,5%)
Cigarette smoke exposure	70 (56%)	55 (44%)	111 (53,4%)	97 (46,6%)

Table 4. Metabolic risk factors based on gender

Metabolic risk factors	Male		Female	
	Normal (n)/%	High (n)/%	Normal (n)/%	High (n)/%
Body Mass Index (BMI)	65 (52%)	60 (48%)	146 (70,7%)	62 (29,8%)
Waist circumference	85 (68%)	40 (32%)	161 (77,4%)	47 (22,6)
Random blood glucose	121 (96,8%)	4 (3,2%)	202 (97,2%)	6 (2,8%)

	Normal	Pre-Hypertension	Hypertension	Normal	Pre-Hypertension	Hypertension
Blood Pressure	42 (33,6%)	69 (55,2%)	14 (11,2%)	131 (63%)	73 (35,1%)	4 (1,9%)

university. Given that respondents' answers regarding behavioral risk factors during anamnesis rely on honesty and good memory, there is significant potential for bias. Therefore, future research using more precise methods to gather quantitative and qualitative data on each behavioral risk factor with a broader target population is necessary to ensure the study reflects the overall university community.

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CONFLICT OF INTERESTS

We declare that all the information in this study is free from any conflict of interest, and we designed and conducted it with a commitment to transparency and objectivity.

RESEARCH FUNDING

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AUTHOR CONTRIBUTION

	Contributor 1	Contributor 2	Contributor 3
Concepts	V	X	X
Design	V	X	X
Definition of intellectual content	V	V	X
Literature search	V	V	X
Clinical studies	X	X	X
Experimental studies	X	X	X
Data acquisition	V	V	V
Data analysis	V	V	V
Statistical analysis	V	V	V
Manuscript preparation	V	X	V
Manuscript editing	V	V	V
Manuscript review	V	V	X
Guarantor	V	V	X