PROCEEDING
5th International Conference of Health Polytechnic of Jambi 2025
icon@poltekkesjambi.ac.id
http://journal.poltekkesjambi.ac.id/index.php/ICoHPJ
doi.org/10.35910/icohpj.v5i0

THE RELATIONSHIP BETWEEN PEANUT CONSUMPTION PATTERNS AND THE PREVALENCE OF HYPERTENSION AND DIABETES MELLITUS (INDONESIAN HEALTH SURVEY 2023 ANALYSIS)

Dera Putri Noprianti[1*], Demsa Simbolon[1], Frantiska Febryanti[1], Amorita Azzah Ramadhan[1], Fenti Nirmalasari[1], Antika Oktianasari[1], Viola Amarnasta Tama A[1]
[1]Department of Nutrition, Bengkulu Ministry of Health Polytechnic, Bengkulu, Indonesia
[*]*Corresponding author: deraputrin@mail.com*

ABSTRACT

Background: *Hypertension and diabetes mellitus are major non-communicable diseases with a globally increasing prevalence, often influenced by dietary patterns. Nuts are known as a high-nutrient food source that can support the prevention and management of degenerative diseases such as hypertension and diabetes mellitus. This study aims to analyze the relationship between peanut consumption patterns and the prevalence of hypertension and diabetes mellitus.*
Method: *The study used a cross-sectional design with data aggregated on the results of the Indonesian Health Survey (IHS) 2023 by involving 38 provinces in Indonesia. Independent variables are the proportion consumption patterns of nuts. Dependent variables are prevalent hypertension and diabetes mellitus.*
Result: *The results obtained the consumption of nuts ≥1 time per day with the prevalence of hypertension based on diagnosis (p-value 0.02), the prevalence of hypertension based on measurement results (p-value 0.01), and the prevalence of diabetes mellitus based on diagnosis (p-value 0.00). There is no significant relationship between the proportion consumption of nuts 1-6 times per week with the prevalence of hypertension and diabetes mellitus. The proportion of bean consumption ≤ 3 per month significant relationship with the prevalence of hypertension based on diagnosis (p-value 0.00), the prevalence of hypertension based on measurement (0.03), and the prevalence of diabetes mellitus (p-value 0.00).*
Conclusion: *the results of the study show that increasing the frequency of consumption of legumes, especially in amounts that are more than three times per month, has the potential to reduce the prevalence of both diseases.*

Keywords: *Diabetes Mellitus, Hypertension, Peanuts*

INTRODUCTION

Human lifestyles due to urbanization, modernization, and globalization are one of the causes of the increase in Non-Communicable Diseases (NCDs)(Nugroho et al., 2019). One of the NCDs that occurs a lot is hypertension and diabetes mellitus; these two diseases are things that need to be considered because they can increase mortality.

Hypertension (high blood pressure) is a condition in which a person's blood pressure is ≥140 mmHg (systolic) and/or ≥ 90 mmHg (diastolic). This is due to various factors. Hypertension can be classified into two types, uncontrollable factors and controllable factors. Risk factors that cannot be controlled include genetics, age, gender, and race. Meanwhile, risk factors that can be controlled such as behavior or lifestyle such as obesity, lack of activity, stress, and food consumption (Insani & Ramadhani, 2022). The World Health Organization (WHO) in 2019 reported that 36% of the population aged 30-79 years was diagnosed with hypertension. The results of the 2023 IHS report show that the results of hypertension measurements reached 29.2% and from doctor's diagnoses, 8% of Indonesians have hypertension (BKPK, 2023).

Diabetes mellitus is a group of NCDs with signs of an increase in blood glucose levels (hyperglycemia) that occur due to abnormal

insulin secretion, insulin action, or both. The diagnosis of diabetes mellitus is clinically established based on a blood glucose test (fasting plasma glucose or FPG ≥126 mg/dl; or a plasma glucose test ≥ 200 mg/dl 2 hours after an oral glucose tolerance test or OGTT with an glucose load of 75 g; or a plasma glucose test or GDS ≥200 mg/dl) with the classic complaint of diabetes mellitus, or HbA1C ≥6.5% examination using methods standardized by the National Glycohaemoglobin Standardization Program or NGSP. According to the World Health Organization (WHO), there is an increase in cases of diabetes mellitus in the world, especially in countries with lower-middle-income (Briawan et al., 2021). In 2022, the World Health Organization (WHO) reported that 14% of adults aged 18 and over were living with diabetes, up from 7% in 1990. More than half (59%) of adults aged 30 and over living with diabetes were not taking medication for their diabetes in 2022. According to the 2023 IHS recording, there are 2.2% of diabetes mellitus cases in Indonesia (BKPK, 2023).

One of the significant risk factors for hypertension and diabetes mellitus is food consumption patterns, including the intake of nuts. Nuts, which are rich in fiber, protein, and minerals, have been shown to play a role in lowering the risk of hypertension and aiding glycemic control in people with diabetes mellitus. Previous studies have shown that consumption of mung beans as a plant-based protein source can improve cardiovascular health and help prevent other degenerative diseases (Ratnasari et al., 2021).

However, although the potential of nuts has been widely discussed in the literature, research related to the relationship between the consumption pattern of nuts and the proportion of hypertension and diabetes mellitus in Indonesia is still limited. Analysis based on the 2023 Indonesian Health Survey (IHS) offers an opportunity to understand public consumption patterns and their relationship with the prevalence of the two NCDs. The purpose of this study is to describe and analyze the relationship between the consumption pattern of nuts and the prevalence of hypertension and diabetes mellitus in the adult population in Indonesia. The results are expected to provide a scientific basis for more effective nutritional interventions in preventing and managing hypertension and diabetes mellitus.

METHODS

This study uses a cross-sectional research method. The data used is the aggregate data on the results of IHS in 2023. This research was conducted from August - October 2023 by involving 877,531 household members in 38 provinces and 514 districts/cities. This research was conducted by health workers with a minimum of D3 health education.

The population in this study is a population aged ≥ 15 years who experience hypertension and diabetes mellitus in the 2023 IHS data. The sample is the result of data from 38 provinces in Indonesia. The inclusion criteria are those who are at the age of ≥ 15 years have Hypertension and Diabetes Mellitus and are involved in interviews and examinations. Meanwhile, the exclusion criteria are those who have incomplete interview and examination data on all variables.

Independent variables were the consumption patterns of nuts diagnosed by doctors in Indonesia, which were taken using questionnaires. For the dependent variables, namely the proportion of hypertension and diabetes mellitus. Data was generated by measuring blood pressure and blood sugar and conducting interviews. Measurements can be made using a sphygmomanometer and point of care testing (POCT). The prevalence of hypertension was calculated by comparing the household members of ≥ age of 15 years who had been diagnosed with hypertension with the household members of ≥ age 15 years who were interviewed multiplied by 100%, the prevalence was categorized as hypertension when the systolic blood pressure was ≥ 140

mmHg and or diastolic blood pressure ≥ 90 mmHg in the population aged ≥ 15 years. The prevalence of diabetes mellitus was calculated by the formula of comparing household members aged ≥ 15 years who had been diagnosed with diabetes mellitus with household members aged ≥ 15 years who were interviewed multiplied by 100%, the prevalence was categorized as diabetes mellitus when fasting blood glucose levels were ≥126 mg/dl; or blood glucose levels 2 hours after loading ≥ 200 mg/dL.

The data analysis used was to first conduct a data normality test using the Kolmogorov-Smirnov test. Then if the data is normal, the meal will be continued using Spearman correlation bivariate analysis. The computer application used to help analyze the data is the SPSS version 22. This research has been approved and has ethics with the number HK.01.07/MENKES/156/2023

RESULTS AND DISCUSSION

Table 1 shows that the highest proportion of consumption of nuts and processed products according to the level of daily consumption is in the Java and Bali regions (50.4%) and the lowest in Sulawesi (4.9%). According to the proportion of consumption per week, Sumatra ranks first at 76.7%, while Kalimantan is the lowest with a proportion of 7.0%. The proportion of monthly consumption shows Papua (37.9) as the highest region while the lowest proportion of 4.2% is occupied by the Java and Bali regions.

The nutritional potential of nuts has made them a popular food choice for many people around the world. Nuts are known to contain a variety of nutraceuticals that are very beneficial in various roles in human and animal metabolism, these nuts are a source of protein, fiber, and minerals, and nuts are low in fat, making them suitable for energy-rich diets that can help meet nutritional needs. Nuts are also a good source of starch and a good candidate for prebiotics for the body (Semwal et al., 2023).

Nuts are one of the proteins that are very useful for the body, especially looking at the nutritional content in nuts, it is very possible to consume nuts to improve the body's digestive system. A legume type plant (leguminosa). Examples of legume crops include green beans, gude beans, kidney beans, tolo beans, soybeans, and peanuts. Almost all types of nuts can be processed from young to old plants. Usually, nuts in the form of seeds are used as ingredients for fresh vegetables, dried or frozen. Meanwhile, old nuts can be used in various kinds of food products, such as flour, milk, protein isolate, canned food, and others (Ratnasari et al., 2021).

Table 1. Distribution of Proportion of Consumption of Nuts and Their Processed Products by Region of Indonesia in 2023

Region	≥1 time per day			1-6 times per week			≤3 times Per month		
	Min	Max	X±SD	Min	Max	X±SD	Min	Max	X±SD
Sumatera	6.8	30.4	11.4±6.9	58.7	76.7	70.3±5.6	10.9	25.9	18.3±4.9
Jawa dan Bali	14.6	50.4	35.6±12.5	43.2	71.7	54.0±9.6	4.2	14.5	10.2±3.7
Nusa Tenggara	6.9	18.5	12.7±8.5	58.5	67.1	62.8±6.1	14.4	34.6	24.5±14.2
Kalimantan	7.0	24.4	12.2±7.0	7.0	74.3	56.6±28.1	13.7	21.6	18.3±3.5
Sulawesi	4.9	13.4	9.2±2.9	57.7	65.6	62.9±2.9	21	35.4	27.8±5.3
Maluku	11.5	15	13.2±2.4	56.3	59.9	58.1±2.5	25.1	32.2	28.6±5.0
Papua	12	18.3	14.4±2.2	46.8	63.6	55.4±6.5	23.2	37.9	30.2±5.5
Indonesia	4.9	50.4	16.5±11.6	7.0	76.7	60.8±12.4	4.2	37.9	20.9±8.5

From the results, it can be seen that the areas with low consumption of nuts come from the eastern region of Indonesia, this proves that there is still a gap in consumption patterns that occur in the Indonesian region. The results of the research show that food diversification significantly affects food insecurity in the eastern region of Indonesia (Baihaqi, 2025).

The results of research in one of the regions in the east also show that the consumption rate of vegetable protein sourced from legumes such as tempe and tahu is also still low, only 1-3 times per week (Muchtar et al., 2024).

The results of many research show that an unbalanced diet is related to the occurrence of diabetes mellitus and hypertension. The inseparability of life from modernization causes a lot of instant food which makes people prefer instant things because it is considered easier. Research shows that the group that has frequent consumption of instant food is 0.78 times more likely to experience hypertension than the group that rarely consumes instant food (Sirait & Ronoatmodjo, 2024). Other research also shows that the current population's diet contains a lot of sugar, which greatly affects the incidence of diabetes mellitus that occurs (Astutisari et al., 2022). The management of hypertension and diabetic mellitus can be divided into two, namely through medical measures such as medications and dietary arrangements with the right diet. Dietary regulation in the form of nutritional therapy is needed, especially in terms of maintaining and/or achieving normal nutritional status and helping to prevent and treat diseases (Halim et al., 2024). This therapy can be in the form of reducing food consumption that can worsen the condition of hypertension and diabetes mellitus such as foods high in salt and high in sugar. Regular and controlled feeding of nuts can be a good solution to help prevent and reduce the risk of hypertension and diabetes mellitus.

From the results of the research in Table 2 that has been carried out, it is found that hypertension based on diagnosis is highest in the Java and Bali regions (12.6%) and the lowest in the Papua region (2.2%), The prevalence of hypertension based on measurement results is highest in the Kalimantan region (38.7%) and the lowest in the Papua region (19.4%). This shows that the region has an influence on the incidence of hypertension related to access and daily life.

Diabetes mellitus is generally more common in developing countries than in developed countries (Astutisari et al., 2022). The incidence of hypertension is influenced by several factors such as physical activity habits, in people who often do sedentary behaviors such as sitting, there will be constriction starting from the main blood vessels in the lower legs, especially under the thighs. This can lead to an increase in peripheral resistance from blood vessels and there will also be fluid accumulation in the lower limbs. If the blood vessels have previously experienced atherosclerosis, then the blood vessels will become more rigid, and inelastic, so that their dilation is limited and there will be an increase in blood pressure (Lamangida et al., 2024).

Table 2. Distribution of Proportion of Consumption of Nuts and Their Processed Products by Region of Indonesia in 2023

Region	Hypertension based on diagnosis			Hypertension measurement results			Diabetes Mellitus is diagnosed		
	Min	Max	X±SD	Min	Max	X±SD	Min	Max	X±SD
Sumatera	4.3	8.8	6.9±1.2	21.4	28.3	24.2±2.0	1.3	2.8	1.8 ±0.4
Jawa dan Bali	6.9	12.6	9.5 ±2.2	21.7	32.8	29.3±3.9	2.1	3.9	2.7 ±0.7
Nusa Tenggara	6.3	6.8	6.5±0.3	24.5	26.4	25.4±1.3	1.0	1.8	1.4 ±5.7
Kalimantan	7.2	11.1	8.4±1.5	28	38.7	31.8±4.5	1.7	3.1	2.1 ±8.0
Sulawesi	5.3	12.1	7.8±2.3	26.5	29.5	27.7±1.1	1.4	2.7	2.0 ±7.4
Maluku	4.3	4.4	4.3±0.1	20.8	25.6	23.2±3.3	0.9	1.2	1.0 ±0.2
Papua	2.2	7.0	5.0±1.9	19.4	27.5	23.7±2.9	0.2	1.8	1.2 ±0.6
Indonesia	2.2	12.6	7.3±2.2	19.4	38.7	26.7±3.9	0.2	3.9	1.9 ±0.7

In other words, degenerative diseases such as hypertension and diabetes mellitus are influenced by modernization, where this modernization is able to provide easier access and make people want something instant so that there are many activities that make people less productive such as lack of bodily activity and a lot of junk food. The results of the study noted that people who often consume junk food have a greater risk of developing hypertension than people who rarely consume junk food (Insani & Ramadhani, 2022). People with an unbalanced diet are more likely to suffer from diabetes mellitus, whereas if a person with an unbalanced or excessive diet the consumption of staple foods increases the risk of suffering from diabetes mellitus (Zulkarnaini et al., 2023).

The prevalence of diabetes mellitus is highest in Java and Bali (3.9%) and lowest in Papua (0.2%). Prediabetes/diabetes in urban communities is on average caused by obesity and lack of activity. This happens to urban people because they have a sedentary lifestyle that is risky and often consume ready-to-eat foods or high-fat preserved foods, snack and drink ice, and do fewer activities. In rural areas, physical activity is more carried out than urban physical work. From this study, it is known that physical activities carried out by rural communities include hoeing, harvesting rice, lifting rice, planting rice, and others (Noventi et al., 2019). The food intake of rural communities is also better maintained than that of urban communities because many of the food sources of rural communities are still produced by nature. From the difference in physical activities in urban and rural areas, it can be seen that access to areas and habits has a great influence on the condition of the body. Diabetes is a disease that cannot be cured but has the potential to be prevented and controlled.

Table 3 shows a significant relationship between the proportion of bean consumption ≥1 time per day with the prevalence of hypertension based on diagnosis (p-value 0.02) the prevalence of hypertension based on measurement results (p-value 0.01) and the prevalence of diabetes mellitus based on diagnosis (p-value 0.000). Based on the beta coefficient value, it shows that the higher the proportion of bean consumption per day, the higher the prevalence of hypertension and diabetes mellitus. High daily consumption of nuts was weakly related to the prevalence of hypertension based on diagnosis (0.36) and hypertension prevalence based on measurement results (0.39) and moderately (moderate) was associated with the prevalence of diabetes mellitus (0.44).

Table 3. The Relationship of Nuts Consumption Patterns with the Prevalence of Hypertension and Diabetes Mellitus

Consumption Patterns of Nuts	Hypertension based on diagnosis	Hypertension measurement results	Diabetes Mellitus based on diagnosis
≥1 time per day			
Beta	0.07	0.13	0.02
Costan	6.11	24.51	1.42
Correlation Coefficient (r)	0.36	0.39	0.44
p-value	0.02	0.01	0.00
1-6 times per week			
Beta	0.00	-0.06	0
Costan	7.79	30.9	2.05
Correlation Coefficient (r)	-0.04	-0.21	-0.04
p-value	0.79	0.18	0.79
≤ 3 times per month			
Beta	-0.12	-0.16	-0.04
Costan	9.88	30.11	2.81
Correlation Coefficient (r)	-0.46	-0.34	-0.49

p-value	0.00	0.03	0.00

Table 3 shows no relationship between the proportion of bean consumption 1-6 times per week with the prevalence of hypertension based on diagnosis (p-value 0.79) and the prevalence of hypertension based on measurement results (0.18) and the prevalence of diabetes mellitus (p-value 0.79). There is a significant relationship between the proportion of nuts consumption ≤ 3 per month with the prevalence of hypertension based on diagnosis (p-value 0.000), the prevalence of hypertension based on measurement (0.03), and the prevalence of diabetes mellitus (p-value 0.000). Based on the beta coefficient value, it shows that the lower the proportion of bean consumption, the higher the prevalence of hypertension and diabetes mellitus. High consumption of nuts is moderately (moderate) related to the prevalence of hypertension based on diagnosis (-0.46) and is weakly related to the prevalence of diabetes mellitus (-0.49), and the prevalence of hypertension based on measurement results (-0.34) was weakly related.

In research on the consumption of nuts ≥1 time per day with the prevalence of hypertension and diabetes mellitus, it was found that the higher the proportion of nut consumption, the lower the prevalence of hypertension and diabetes mellitus, this can be caused by the processing of the nuts themselves, such as processed soybean products such as tempeh and tofu which are used as fried foods. Fried foods are various types of fried foods that are dipped in flour dough fried in hot oil. Hilma and friends showed that respondents in the study knew and consumed various fried foods such as tempeh and stuffed tofu, this study also showed that stuffed tofu is a fried food that is often consumed (Hilma et al., 2022). The Indonesian population mostly consumes fried foods that contain saturated fat, saturated fats commonly called bad fats that have the risk of clogging blood circulation (Yuningrum et al., 2022). Excess fat consumption is the most dominant or most risky variable for the incidence of hypertension in adolescents (Khikma & Sofwan, 2021). The consumption of fatty and sugary foods provides a significant association with the rate of diabetes mellitus, the addition of oil and coconut milk being a parameter in fatty foods. Oil and coconut milk are foods that have a fairly high fat content (Susilowati & Waskita, 2019).

From the research, it can be seen that the proportion of bean consumption ≥1 time per day with the prevalence of hypertension based on diagnosis and the prevalence of hypertension based on measurement results and the prevalence of diabetes mellitus based on diagnosis are related. The proportion of ≤ consumption of nuts per 3 months with the prevalence of hypertension based on diagnosis and the prevalence of hypertension based on measurements and the prevalence of diabetes mellitus are related. The results of the research also show that the higher the proportion of bean consumption, the lower the prevalence of hypertension and diabetes mellitus.

In terms of hypertension incidence, this study is in line with research by (Triandini et al., 2021) which states that the administration of soy-based products can reduce blood pressure with an average of 10.8/7.6 mmHg and the results of a significant statistical test, namely a p-value of < 0.05. Another study said that respondents' blood pressure after the intervention did not all drop, but some went up and some stayed. This condition is because most of the nutritional status of the respondents is overweight and obese, where the respondents have not been able to achieve the ideal weight and the respondents have sensitivity to salt as a result of this nutritional status (Halim et al., 2024).

In terms of the incidence of diabetes mellitus, this study is also in line with the

research (Gultom & Melati, 2018) which states that there is no significant difference in the decrease but there is a decrease in blood glucose levels This is also strengthened by research (Winarsi et al., 2022) where it was found that the administration of products made from tolo nuts, it is known that the content of tolo beans has phenolic antioxidants which can reduce blood glucose levels.

Nutrition is part of the substance of food and part of the substance of the human body. Nutritional status in the adult age group will affect work productivity. Adulthood is a productive age that requires optimal nutrients for life and activities. For adults, nutrients are needed to achieve optimal health and prevent chronic degenerative diseases with complex causes, especially obesity, cardiovascular disease, cancer, and diabetes mellitus, these degenerative diseases are the main causes of health disorders and premature death in people with an adequate economy (Nuryani et al., 2024).

Dietary consumption patterns are one of the things that can affect the incidence of non-communicable diseases (Nuryani et al., 2024), such as hypertension and diabetes mellitus. Wrong diets such as consuming excessive amounts of food, consumption of foods high in energy, high in fat, high in simple carbohydrates, and low in fiber without being balanced with balanced energy expenditure, one of which is physical activity or exercise is the trigger for cases of overweight (obesity). Obesity is one of the most frequent factors to cause an increase in blood sugar levels (Nugroho et al., 2019). People who are overweight can increase the potential for hypertension compared to respondents who have a normal weight (Lamangida et al., 2024).

The incidence of hypertension and diabetes mellitus is largely caused by food, this is related to unhealthy eating patterns causing an imbalance between carbohydrates and other nutrients needed by the body. As a result, the sugar in the body exceeds the working capacity of the pancreas, resulting in the occurrence of diabetes mellitus (Hariawan et al., 2019). Other research also shows that an irregular diet is a factor that plays a major role in the incidence of diabetes mellitus, because the more irregular the diet, the more likely it is for people to experience diabetes. An imbalance between energy intake and output results in weight gain, obesity appears in adolescence and tends to continue into adulthood, and the elderly (Sibagariang & Lumban Gaol, 2022). The results of the study by (Insani & Ramadhani, 2022) show that salt consumption, junk food consumption, salted food consumption, and burnt food consumption are risk factors that are significantly related to the incidence of hypertension. This change in diet leaves the concept of a balanced diet so that it has a negative impact on health. Eating habits that are high in saturated fat and sugar, and low in fiber cause obesity or overnutrition problems, and increase free radicals that trigger the emergence of various degenerative diseases (Zulkarnaini et al., 2023). Other studies have explained that hypertension and diabetes mellitus are not only caused by unhealthy eating patterns but also by various factors. According to (Lamangida et al., 2024) factors of age, gender, family history, obesity, and physical activity play a major role in the occurrence of hypertension. The risk factors for prediabetes/diabetes in the community are hereditary history and cholesterol. Hereditary factors, lifestyle, and environmental factors are factors that cause the high morbidity rate of diabetes mellitus over time. From the problems caused by this consumption pattern, looking for food alternatives that have the potential to be good is sought to overcome the incidence of hypertension and diabetes mellitus, one of which is by consuming types of nuts.

Nuts are known to lower the risk of developing cardiovascular diseases such as hypertension and diabetes mellitus, this can be seen through the positive impact on intermediate cardiovascular risk factors,

including blood lipids, blood pressure, inflammation, and glycemic control markers. Nuts are rich in unsaturated fatty acids, vegetable proteins, phytosterols, fiber, several minerals (including potassium, calcium, and magnesium), vitamins (vitamins E and B6), and phenolic and bioactive compounds, all of which can contribute to health-enhancing benefits for the body (Glenn et al., 2023). Legumes have good nutrients for a healthier lifestyle, legumes are an inexpensive and long-term source of protein, micronutrients, complex carbohydrates, and essential phytochemicals, and the composition is suitable for patients who reduce glucose. The variety and versatility of nuts can also be utilized in a variety of dishes, including soups, stews, curries, and salads.

Nuts are especially beneficial for people with hypertension and diabetes mellitus. As an example of pea consumption, a study (Kumar & Pandey, 2020). Whole pea flour and fractionated pea flour reduced fasting insulin levels by 13.5% and 9.8%, respectively, Consumption of bread with 17% pea peel fiber may reduce the glycemic response. Peanut fiber-enriched bread increases the duration of satiety. Fiber-rich foods are known to lower blood pressure levels, and inflammation and improve serum lipid levels and cardiovascular health (Kumar & Pandey, 2020). The results of other studies also show that nuts are high in fiber, antioxidant vitamins and minerals, phytonutrients, and Omega-3 fatty acids and that the combined blades have the effect of forming the Mediterranean Diet, and other plant-based diets, are highly effective in the prevention and modulation of obesity-related chronic diseases including cardiovascular disease. For example, the phytochemicals found in nuts are highly beneficial in improving blood cholesterol levels, and glycemic status, providing vascular protection and reducing markers of chronic inflammation.

CONCLUSION

The conclusion of this article shows that the consumption pattern of legumes has a significant relationship with the prevalence of hypertension and diabetes mellitus in Indonesia. Based on the beta coefficient value, it shows that the higher the proportion of bean consumption per day, the higher the prevalence of hypertension and diabetes mellitus. For further research, it is recommended to conduct a more in-depth longitudinal study with control for other lifestyle factors, such as salt intake, fat, physical activity, and body mass index. In addition, interventional clinical trials with the administration of specific amounts and types of nuts (e.g. soybeans, green beans, or almonds) can help understand the direct impact on blood pressure and blood sugar levels, to provide more targeted dietary recommendations for the prevention of hypertension and diabetes mellitus

ACKNOWLEDGMENT

Thank you to BKPK for providing facilities for the preparation of the 2023 Indonesian Health Survey report. The author also expresses his gratitude to both parents for the financial support that has been provided, as well as thank you to various parties who helped and guided the author in this writing.

CONFLICT OF INTEREST

All authors declared that there was no conflict of interest.

REFERENCES

Astutisari, I. D. A. E. C., AAA Yuliati Darmini, A. Y. D., & Ida Ayu Putri Wulandari, I. A. P. W. (2022). Hubungan Pola Makan Dan Aktivitas Fisik Dengan Kadar Gula Darah Pada Pasien Diabetes Melitus Tipe 2 Di Puskesmas Manggis I. *Jurnal*

Riset Kesehatan Nasional, *6*(2), 79–87. https://doi.org/10.37294/jrkn.v6i2.350

Baihaqi, M. . S. (2025). Dampak Produksi Beras, Indeks Kemahalan Kontruksi, Dan Diversifikasi Pangan Terhadap Prevalensi Ketidakcukupan Pangan Di Kawasan Indonesia Timur. *Jurnal Ilmiah Indonesia*, *10*(1), 959–970.

BKPK. (2023). Survei Kesehatan Indonesia (SKI). In *Kementerian kesehatan RI*.

Briawan, D., Heryanda, M. F., & Sudikno, S. (2021). Kualitas diet dan kontrol glikemik pada orang dewasa dengan diabetes melitus tipe dua. *Jurnal Gizi Klinik Indonesia*, *18*(1), 8. https://doi.org/10.22146/ijcn.62815

Glenn, A. J., Aune, D., Freisling, H., Mohammadifard, N., Kendall, C. W. C., Salas-Salvado, J., Jenkins, D. J. A., B.Hu, F., & L.Sievenpiper, J. (2023). *Nuts and Cardiovascular Disease Outcomes : A Review of the Evidence and Future Directions*. 1–16. https://doi.org/15, 91https://doi.org/10.3390/ nu15040911

Gultom, Y. D., & Melati, N. (2018). Efektifitas Pemberian Kacang merah dan Kacang hijau Terhadap Kadar Glukosa Darah pada Pasien DM tipe 2. *Jurnal Kesehatan*, *11*(1), 19–30.

Halim, N. R. abdul, Sulistyowati, E., Kaswari, S. R. T., & Annasari, M. (2024). *Pengaruh Pemberian Edamame Rebus (Glycine Max (L) Merrill) sebagai Camilan Sehat terhadap Penurunan Tekanan Darah Penderita Hipertensi*. *8*(2), 147–157.

Hariawan, H., Fathoni, A., & Purnamawati, D. (2019). Hubungan Gaya Hidup (Pola Makan dan Aktivitas Fisik) Dengan Kejadian Diabetes Melitus di Rumah Sakit Umum Provinsi NTB. *Jurnal Keperawatan Terpadu (Integrated Nursing Journal)*, *1*(1), 1. https://doi.org/10.32807/jkt.v1i1.16

Hilma, S. R., Mubaiyanah, I., Zahro, K., Firdaus, A., Dinar, Y., Setiyawan, H., Qomariyah, W., Maulana, B., Qulby, N. W., Arta, D., Sihombing, M., Sleman, A., & Yogyakarya, D. I. (2022). *Perspektif Mahasiswa terhadap Perilaku Mengkonsumsi Gorengan*. *11*(1), 55–66.

Insani, A., & Ramadhani, H. A. (2022). Determinan Kejadian Hipertensi Berdasarkan Pola Konsumsi: Model Prediksi Dengan Sistem Skoring. *Quality : Jurnal Kesehatan*, *16*(1), 9–20. https://doi.org/10.36082/qjk.v16i1.399

Khikma, F. F., & Sofwan, I. (2021). HDeterminan Kejadian Hipertensi pada Remaja (13-18 Tahun). *Higeia Journal of Public Health Research and Development*, *5*(3), 227–238.

Kumar, S., & Pandey, G. (2020). Biofortification of pulses and legumes to enhance nutrition. *Kumar, Shishir Pandey, Geetanjali*, *6*, 1–6. https://doi.org/10.1016/j.heliyon.2020.e03682

Lamangida, Y., Masi, N. M., Renteng, S., Studi, P., & Keperawatan, I. (2024). Gambaran Faktor Resiko Terjadinya Hipertensi Di Wilayah Kota Gorontalo. *Jurnal Keperawatan*, *12*(2), 171–178.

Muchtar, F., Wahyuni, S., & Dahlan, A. (2024). Pola Konsumsi Pangan Rumah Tangga di Wilayah Pesisir Kabupaten Kolaka. *J.Sains Dan Teknologi Pangan*, *9*(4), 7569–7587.

Noventi, I., Rusdianingseh, R., & Khafid, M. (2019). Prevalensi, Karakteristik dan Faktor Resiko Prediabetes di Wilayah Pesisir, Pegunungan dan Perkotaan. *Jurnal Ners Dan Kebidanan (Journal of Ners and Midwifery)*, *6*(3), 371–381. https://doi.org/10.26699/jnk.v6i3.art.p371-381

Nugroho, K. P. A., Kurniasari, R. R. M. D., & Noviani, T. (2019). Gambaran Pola Makan Sebagai Penyebab Kejadian Penyakit Tidak Menular (Diabetes

Mellitus, Obesitas, Dan Hipertensi) Di Wilayah Kerja Puskesmas Cebongan, Kota Salatiga. *Jurnal Kesehatan Kusuma Husada*, 15–23. https://doi.org/10.34035/jk.v10i1.324

Nuryani, Amalia, M. R., Kamaruddin, M., Nur, A., Paramita, I. S., & Hariati, N. W. (2024). *Description of Food Consumption and the Incidence of Non-communicable Diseases in Adult*. *5*(2), 215–222.

Ratnasari, D., Dewi Rahmawati, Y., Fajarini, H., & Nafisyah, D. (2021). Potensi Kacang Hijau Sebagai Makanan Alternatif Penyakit Degenaratif. *JAMU: Jurnal Abdi Masyarakat UMUS*, *1*(02), 90–96. https://doi.org/10.46772/jamu.v1i02.365

Semwal, P., Painuli, S., J.P, B. S., & Dkk. (2023). Exploring the nutritional and health benefits of pulses from the Indian Himalayan region: A glimpse into the region's rich agricultural heritage. *Food Chemistry*, 1–16. https://doi.org/https://doi.org/10.1016/j.foodchem.2023.136259

Sibagariang, E. E., & Lumban Gaol, Y. C. (2022). Hubungan Pola Makan Dan Aktivitas Fisik Dengan Kejadian Diabetes Melitus Pada Saat Pandemi Covid-19. *Jurnal Kedokteran STM (Sains Dan Teknologi Medik)*, *5*(1), 43–49. https://doi.org/10.30743/stm.v5i1.234

Sirait, R. I., & Ronoatmodjo, S. (2024). Hubungan Frekuensi Konsumsi Makanan Instan Dengan Kejadian Hipertensi Pada Penduduk Berusia ≥ 18 Tahun Di Indonesia (Analisis Data Riskesdas 2018). *Jurnal Kesehatan Masyarakat*, *12*(1), 91–98. https://doi.org/10.14710/jkm.v12i1.38576

Susilowati, A. A., & Waskita, K. N. (2019). Pengaruh Pola Makan Terhadap Potensi Resiko Penyakit Diabetes Melitus. *Jurnal Mandala Pharmacon Indonesia*, *5*(01), 43–47. https://doi.org/10.35311/jmpi.v5i01.43

Triandini, G. E., Suhaema, Wahyuningsih, R., & Luthfiyah, F. (2021). Pengaruh Pemberian Produk Berbahan Kacang kedelai (glycine max) Terhadap Penurunan Tekanan Darah. *Jurnal Gizi Prima (Prime Nutrition Journal)*, *6*(2), 118–124. https://doi.org/10.32807/jgp.v6i2.301

Winarsi, H., Ramadhan, G. R., Dewi, I. A., & Hernayanti, H. (2022). Penurunan Kadar Gula Darah dan Lingkar Perut Penderita Diabetes Melitus tipe-2 Menggunakan Yogurt Kecambah Kacang Tolo (Vigna unguiculata). *Jurnal Gizi Dan Pangan Soedirman*, *6*(2), 86. https://doi.org/10.20884/1.jgipas.2022.6.2.6976

Yuningrum, H., Rahmuniyati, M. E., & Lende, T. D. P. (2022). Konsumsi Gorengan Dan Asupan Kolesterol Berhubungan Dengan Kejadian Hiperkolesterolemia Pada Mahasiswa. *Jurnal Kesmas (Kesehatan Masyarakat) Khatulistiwa*, *9*(2), 98. https://doi.org/10.29406/jkmk.v9i2.3911

Zulkarnaini, A., Mahatma, G., Puspita, D., Vani, A. T., & Abdullah, D. (2023). Aktivitas Fisik, Pola Makan, dan Konsumsi Makanan Glikemik Tinggi Meningkatkan Risiko Kejadian Diabetes Mellitus Tipe 2. *Jurnal Kesehatan Metro Sai Wawai*, *15*(2), 155–163. https://doi.org/10.26630/jkmsaw.v15i2.3585.