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IMPLEMENTATION OF HEALTH EXAMINATION IN INTEGRATED HEALTH POST (POSBINDU) AND CHARACTERISTICS OF POSBINDU PARTICIPANTS RELATED HEALTH OUTCOMES: CASE STUDY IN KARANGLO VILLAGE, SLEMAN REGENCY, YOGYAKARTA, INDONESIA

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ABSTRACT

Background: Pos Pembinaan Terpadu (POSBINDU) was an Indonesian government program to promote and prevent NCDs in the community. A high prevalence of non-communicable diseases (NCDs) are found in Yogyakarta, Indonesia. This study analyze factors associated with blood pressure, blood glucose, cholesterol, and uric acid levels in POSBINDU participants.
Method: This study was an observational study with a cross-sectional design that used secondary data from POSBINDU examination results in Karanglo Village, Tempel, Sleman Regency, Yogyakarta during 2023. A total of 145 participants aged above 15 years old were recorded. Participant characteristics included age, gender, frequency of visits, and nutritional status. Health outcomes measured included blood pressure, random blood glucose level, uric acid in blood, and blood cholesterol without fasting. Chi-square analysis was used to determine the association between participant characteristics and health outcomes. This analysis used *software*
Result: We revealed that 41.26% of participants were overweight and 51.26% of participants had central obesity. The results of the analysis showed that there was an association between age and blood pressure (p=0.00), while gender was associated with random blood glucose level (p=0.03). However BMI and weight circumference were not associated with blood pressure and blood glucose level. All participants' characteristics were not associated with uric acid in blood and blood cholesterol (p>0.05).
Conclusion: This study showed the suboptimal implementation of POSBINDU activities. Specifically, the missed opportunity in screening for male and elderly groups. Education in POSBINDU is needed to maintain and improve knowledge related to risk factors of NCDs.

Keywords: Noncommunicable diseases; Hypertension; Diabetes mellitus; POSBINDU; Public health

INTRODUCTION

The government of Indonesia has launched an integrated program that includes a community-based program implemented in an integrated, routine, and periodic approach for the early detection and prevention of NCDs named Pos Pembinaan Terpadu (POSBINDU). It is held by trained volunteers or cadres, and under the supervision of a Primary Health Centre (PHC) health worker to serve communities with minimum age 15 years and above. It involves the prevention and early detection of NCDs, including counseling, health education, physical activities, and screening for NCDs and their risk factors. The main activities in POSBINDU include health screening for NCDs, i.e hypertension, diabetes and the risk factors i.e BMI and waist circumference (MoH of RI, 2019; Putra et al., 2021). POSBINDU could help the Indonesian population's early detection of NCDs (Sujarwoto & Maharani, 2022).

Multimorbidity related to NCDs was linked to increased healthcare utilization, an

increased risk of catastrophic medical expenses, and decreased productivity. Given Indonesia's aging population, the prevalence of multimorbidity among NCDs places a significant financial burden on people, households, the healthcare system, and society at large. Approximately 60% of the insurance program's overall expenditures were attributable to NCDs. Thus, it is important to address NCDs through preventative and promotional programs in order to improve Indonesia's healthcare system and ensure the long-term viability of its health insurance policy (Marthias et al., 2021).

The increasing trends of non-communicable diseases (NCD) in Indonesia require more attention. High prevalence of hypertension in Yogyakarta based on measurement for age >15 years old is 30.4%, higher than national prevalence. Same condition was found in diabetes mellitus (DM), whose prevalence in Yogyakarta is 3.6%, higher than national prevalence of DM (2.2%). Central obesity prevalence in Yogyakarta also showed higher (38.9%) than national prevalence (36.8%). Health examination locations were only 17.3% in POSBINDU (MoH of RI, 2023b).

POSBINDU in Karanglo village is 1 of 10 POSBINDU in Pondokrejo that is located in Tempel Sub-district, Sleman Regency, Yogyakarta. This POSBINDU actively serves 257 people in productive age and 57 elderly.

This study aims to describe residents participation in POSBINDU activities and analyze factors associated with blood pressure, random blood glucose, cholesterol, and uric acid levels in blood in participants of POSBINDU in Karanglo Village, Pondokrejo, Sleman Regency, Yogyakarta.

METHODS

Study setting

This study was conducted in Karanglo Village, Tempel District, Sleman Regency, Yogyakarta in 2023. Participants were local residents, starting from adolescents to elderly. Karanglo Village has approximately a total population 1800 people. Most of the population is working in the agricultural sector and casual laborers. This POSBINDU is under the Tempel PHC supervisor.

Study design

This study was an observational study with a cross-sectional design that used secondary data from POSBINDU examination results in Karanglo Village, Tempel, Sleman Regency, Yogyakarta from January through December 2023.

Sample size and sampling procedure

Location was selected purposive because of provision of data in 2023. Data about community members using POSBINDU was gathered from POSBINDU users in the PHC community. All of the participants were local residents above 15 years old. In total, 145 participants were recorded.

Measurements of variables

Outcome variables are NCDs (blood pressure, blood glucose, uric acid, and blood cholesterol). Sociodemographic variables which were available on the POSBINDU register, were included: age group (adults = 15-59 years old and elderly = ≥60 years old), gender (male/female), and frequency of visits. Weight and height were calculated to know Body Mass Index (BMI) and categorized into underweight, normal, and overweight. Obese were included in overweight. Cut off point for waist circumference classified by gender, >80 cm for female and >90 cm for male were categorized as high. Meanwhile blood pressure categorized into normal (systolic <120 mmHg and diastolic <80 mmHg) and hypertension (systolic ≥120 mmHg or diastolic ≥80 mmHg) (MoH of RI, 2023a). Random blood glucose without fasting classified into normal (<200 mg/dl) dan diabetes (≥200 mg/dl) (MoH of RI, 2020)

Uric acid in blood was categorized into normal (3.5-7 mg/dl for male and 2.6-6 mg/dl for female) and high (>7 mg/dl for male and

>6 mg/dl for female) (Madyaningrum et al., 2020). Blood Cholesterol classified into desirable (<200 mg/dl) and high (≥200 mg/dl) (MoH of RI, 2018).

Statistical analysis

Characteristics of respondents were presented descriptively. The proportion presented in the analyses. We further conduct chi-square to assess the statistical significance of the differences. STATA 17 version software was used to analyze the data. P-value <0.05 was considered significant.

RESULTS AND DISCUSSION

Participation of community in POSBINDU

Data from 365 POSBINDU visitors (145 participants) in 2023 were analyzed.

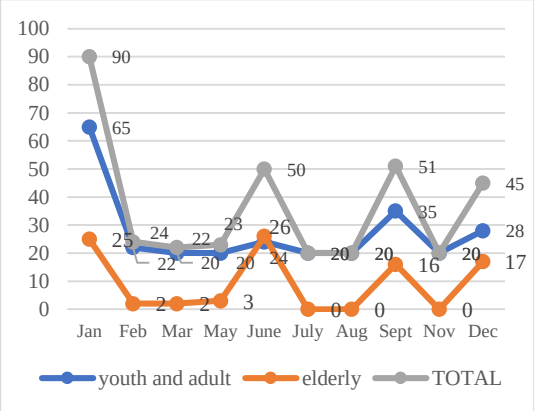


Figure 1. POSBINDU visitor trend in 2023

The findings showed that more female and adult participants. Approximately 74% were female participants. In 2023, total 10 times of POSBINDU activities with 4 times integrated with elderly (held every 3 months, that is in January, June, September, and December). Meanwhile, POSBINDU took a break in April and October. POSBINDU was organized by 10 cadres and assisted by university students who had internships in PHC.

POSBINDU Visitor

Based on picture 1, POSBINDU visitors increased when elderly were invited to come. The peak number of visitors happened in January. It might have been due to PHC's invitation for everyone to attend POSBINDU. Karanglo village Karanglo only has a participant database for middle adult and elderly age groups, so participation rates were only shown for those two age groups. Pre-elderly (45-59 y.o) participation rates were highest in January (30.68%) whereas they were lowest in November (6.82%). On the other hand, elderly participation rate reached its highest in June (45.61%). For those groups, they never surpass 50%. In Yogyakarta, PHC became the highest choice for health examination (22.7%) while the proportion in POSBINDU was 17.3% (MoH of RI, 2023b). This suboptimal coverage was possibly due to lack of priority for NCD screening, lack of awareness and access to POSBINDU. However, because there are a lot of missing data points from the measurements, these results should be regarded with caution.

Table 1. POSBINDU Visitor Characteristics

Characteristics	n	%
Age group (y.o)		
15 - 59	112	77.24
≥ 60	33	22.76
Gender		
Male	38	26.21
Female	107	73.79
Number of visits		
1 time	49	33.79
2-4 times	83	57.24
5-6 times	13	8.97
BMI		
Underweight	12	8.39
Normal	72	50.35
Overweight	59	41.26
Waist Circumference		
Normal	58	48.74
High	61	51.26

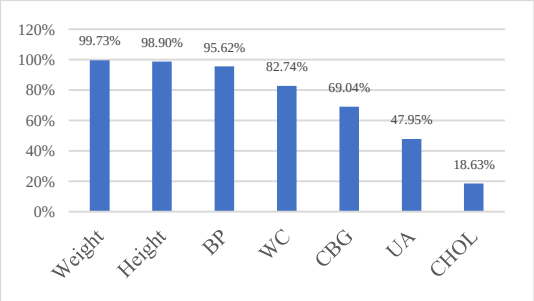
From table 1, we know that 77.24% of POSBINDU visitors were 15-59 y.o. Maybe it was due to the elderly only purposely being invited in 4 times, when Posyandu Lansia, a community-based screening and management for the elderly population was integrated with POSBINDU. Indonesian Health Survey in 2023 also showed that POSBINDU visitors were higher in elderly than any other age group (MoH of RI, 2023b). In addition, we measured the youngest POSBINDU participant was 18 years old.

Out of the 365 visits by 145 participants, most (73.79%) were female. Men pay less attention to their health. Overall percentage of people in Indonesia that had never been checked i.e weight, height, blood pressure, blood glucose and waist circumference, were higher in male. It is similar to Indonesia national data that revealed only 6.3% of male that were examined in POSBINDU (MoH of RI, 2023b). The missed opportunity to screen male in POSBINDU is quite concerning because the majority of them are smokers. The lack of male involvement in POSBINDU is missing one of the the key target populations for NCDs risk factors screening. Analysis of a national survey in 2023 reported 43.8% prevalence of smoking with approximately 40% of males aged 15–55 years old and 14% of male adolescents are current smokers. (MoH of RI, 2023b). Previous study also showed that male were less active in POSBINDU. Lack of awareness, access problems to POSBINDU, and lack of coordination among stakeholders, were one of the causes of lower participation among male (Widyaningsih et al., 2022). Family support is required to make the POSBINDU operate more effectively. Health professionals must actively educate the public about the value of using POSBINDU (Tinambunan & Wibowo, 2019)

Although commonly POSBINDU was held on Saturday, it did not automatically make the target coverage become high. The low coverage of POSBINDU visitors perhaps due to irregular residents' jobs, such as farmers and casual laborers that did not follow the working days. We found that the participants visited POSBINDU only once (33.79%) with the majority (57.24%) being accessed 2-4 times. Communities who access POSBINDU are related with good knowledge but not with a good attitude or practice (Mashuri et al., 2024).

We also found that 41.26% of visitors were overweight and 51.26% of visitors had high waist circumference (central obesity). These findings are consistent with an earlier study about POSBINDU under the supervision of the Yogyakarta City Health Office that reported central obesity prevalence was about 53.03% (Poniasih et al., 2024).

Blood pressure, blood glucose level, uric acid, and blood cholesterol of POSBINDU visitor



Abbreviations: BP = Blood Pressure, WC = Waist Circumference, CBG = Casual Blood Glucose Level, UA = Uric Acid, CHOL = Total Cholesterol

Figure 2. Visitors health examination rate in POSBINDU

Out of 365 visits, approximately 95.62% of visitors got their blood pressure measured. 98.90% and 99.73% had anthropometric measurements, but less than 19% had blood cholesterol examinations. The highest proportion of available data were for weight measurements, followed by height and blood pressure information. Last, our analysis identified higher missing values for blood cholesterol measurements (18.63%). The previous survey in Yogyakarta, found that there were 63.3% residents above 15 years old that had never been checked cholesterol, 72.6 never been measured waist circumference. Majority (61.3%) has measured weight once and the majority (51.6%) never measured height. In blood pressure, there were 30.6% people that had never been checked, and 61.3% no blood glucose (MoH of RI, 2023b). Further explanation for the lower blood measurements data was insufficient measurement or insufficient reporting and recording. In order to improve intervention, it is critical to make sure that key screening data can be tracked down and monitored. It is crucial to provide cadres with training to enhance their proficiency in doing

assessments, obtaining medical histories, and reporting the results. There is a need for a standardized screening procedure with integrated reporting.

Association Between Participant Characteristics And Health Outcomes

The results of the analysis showed that there was an association between age and blood pressure (p=0.00), while gender was associated with random blood glucose level (p=0.03). However BMI and weight circumference were not associated with blood pressure and blood glucose and blood glucose level. All participants' characteristics were not associated with uric acid in blood and blood cholesterol (p>0.05) **(Table 2).**

Table 2. Participant characteristics by classification of blood pressure, blood glucose, urid acid, and blood cholesterol

Characteristics	Blood Pressure			Random Blood Glucose Level			Uric acid in blood			Blood cholesterol		
	Normal	Hyper-tension	*p*	Normal	Diabetes	*p*	Normal	High	*p*	Desirable	High	*p*
Age group (y.o)												
15 - 59	43	67	**0.004**	76	6	0.749	44	23	0.988	18	15	0.445
≥ 60	4	29		30	3		19	10		5	7	
Sex												
Male	9	29	0.160	17	4	**0.034**	13	4	0.299	2	0	0.157
Female	38	67		89	5		50	29		21	22	
Number of visits												
1 time	13	36	0.498	23	2	0.528	15	5	0.169	5	5	0.603
2-4 times	29	52		70	7		38	26		15	16	
5-6 times	5	8		13	0		10	2		3	1	
BMI												
underweight	2	10	0.252	9	1	0.943	5	3	0.143	1	3	0.418
normal	28	45		52	4		33	11		9	6	
overweight	17	41		44	4		23	19		11	13	
Waist Circumference												
Normal	20	37	0.842	48	4	0.913	32	12	0.204	7	6	0.899
High	20	40		52	4		27	18		15	14	

Growing older is commonly correlated with a rise in blood pressure. Blood pressure can be significantly impacted by microscopic and macroscopic alterations to the heart, vascular system, and autonomic nervous system that may arise with advanced age. There are many different and complex reasons contributing to this rise in blood pressure, including specific environmental and lifestyle factors in addition to age-related ones (Singh et al., 2024). Meanwhile, in this study hypertension was more prevalent among adult (15-59 y.o). This finding due to higher number of adults than elderly participants. Awareness, treatment, and control of hypertension were poorer among adults compared to elderly and were lower among male compare to female (Geevar et al., 2022). Other study revealed that adult were more frequent to consume caffeine and had higher stress level. Both factors were significantly correlated with hypertension (Sutarjana, 2021).

In Indonesians, females were more likely to have NCDs multimorbidity than male (Marthias et al., 2021). The sex differences in diabetes may be primarily explained by gender differences in body anthropometry and patterns of adipose tissue accumulation. Women may be more susceptible to diabetes-related vascular disease than males are because of physiological differences between the sexes, such as those related to hormones or genetics (de Ritter et al., 2020). Psychosocial stress may be a more significant factor in women's diabetes risk. Women are more susceptible than males to changes in their bodies and hormones throughout their lives as a result of reproductive circumstances (Kautzky-Willer et al., 2023).

In a previous study, increasing BMI and waist circumference, both male and female, was associated with a significant rise in the

risk of high blood pressure in older adults (Zhang et al., 2021; Putra et al., 2022). Both increasing waist circumference and BMI provided a comparative performance for the prediction of diabetes and were positively associated with the possibility of developing the disease (Abe et al., 2021). Another study showed that high waist circumference increased the risks of developing hypertension, type 2 diabetes mellitus, and hypercholesterolemia (Darsini et al., 2020). Meanwhile the findings from this study revealed that BMI and weight circumference were not associated with blood pressure, blood glucose level, and blood cholesterol.

As people aged, hyperuricemia increased more common. Women had a higher prevalence of hyperuricemia than men over the age of 65, as determined by sex-specific cut-off points (Zitt et al., 2020). Increased BMI and waist circumference, and abdominal obesity, may be important risk factors for hyperuricemia (Bae et al., 2023). On the other hand, based on this study, BMI and waist circumference were not associated with uric acid in blood. Maybe this result was due to insufficient samples.

This study has some limitations. First, our study is only included in one location; therefore the generalizability to a broader environment should be considered. Second, we conducted a cross-sectional study or only visited once that does not determine the causality or temporal relationship. Third, the missed reporting and consistency of reporting the POSBINDU participants

CONCLUSION

This study revealed the ineffective use of POSBINDU activities, especially the missing chance to screening for elderly and male groups. Education in POSBINDU is required to preserve and advance understanding of NCDs risk factors.

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CONFLICT OF INTEREST

All author declared that there was no conflict of interest

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