

Research Article



Behavior assessment for non-communicable disease prevention using the health belief model

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ABSTRACT

Background: Germacis is a community-based program educating and facilitating people to adopt a healthy lifestyle in Jogokaryan hamlet, Yogyakarta. It includes doing physical activities with groups, doing health checks, not smoking in the house or at community meetings, and replacing snacks with fruit. This study aims to evaluate whether the program positively impacts community behavior by assessing perceptions and practices of healthy lifestyles based on participation after the program has been implemented for two years.

Methods: This quantitative research with a cross-sectional approach uses the perception assessment of the health behavior model (HBM). The population was 165 people, and the sample was 54 from the Hamlet number 36 at Jogokariyan sub-district, Yogyakarta. This research collected primary data using a 4-Likert scale questionnaire. Data were analyzed using the chi-square test.

Results: There is a relationship between active participation in activities and perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and prevention behavior. There is no relationship between participation and self-efficacy. Our result shows the p-value of the 5 HBM constructs is 0.01; 0.00; 0.00; 0.03; 0.34, and 0.00 for perceived susceptibility, severity, benefits, barriers, self-efficacy, and cues to section; respectively.

Conclusion: Program managers should consider sanctions to encourage self-efficacy in behavior, especially for active smokers; they must not smoke at home or in community meetings.

Keywords: Health Belief Model; non-communicable disease; preventive behavior

INTRODUCTION

Centers for Disease Control and Prevention reported that non-communicable diseases (NCDs) are the leading cause of death and disability worldwide. This disease is the most significant burden in low- and middle-income countries, contributing to 85% of all premature



deaths.¹ In Indonesia, heart disease, cancer, chronic lung disease, and diabetes mellitus are among the top 5 causes of death that impact the quality of life and economic productivity. Every year, the number of these cases continues to increase along with increased risk factors, such as high sugar/salt/fat consumption, smoking, and low physical activity. In 2020, health insurance spent 17.05 trillion rupiahs for the service of the disease.² Based on the data health profile of Yogyakarta City in 2019, non-communicable diseases dominate the causes of death in this city.³ The Integrated Disease Surveillance Report (STP) at Hospitals in Yogyakarta Province in 2020 obtained data on the top 10 diseases, eight non-communicable diseases. Among the diseases in hospitals (outpatient) were hypertension (29,944 cases), type II diabetes (14,090 cases), and heart disease (3,566 cases).⁴

Non-communicable diseases have many risk factors; modifiable behavioral risk factors are tobacco and alcohol consumption, unhealthy diet, lack of physical activity, obesity, high blood pressure, and cholesterol. These risk factors remain a significant public health challenge in all countries, especially in low-income countries where more than three-quarters of deaths from non-communicable diseases occur.⁵ The government of Indonesia developed a movement to change people's healthy lifestyles to control non-communicable diseases aimed to improve the health status of the community through promotive and preventive efforts through physical activity campaigns, consumption of vegetables and fruit, and regular health checks.⁶

A community-based health program in Jogokaryan has adopted the national movement's healthy lifestyle due to the high prevalence of hypertension in the elderly group at Jogokaryan, Yogyakarta. The program is called "Germacis." This program aims to change community behavior to familiar healthy life movements. The activities are smoke-free villages, health education, periodic health checks, physical activities, and advocacy to replace the snack menu at community meetings with fruit and vegetables.⁷

Research using Health Belief Model (HBM) is used to evaluate health behaviors and investigate possible HBM interventions to improve behaviors. HBM explains that individual values and beliefs about an activity drive their behavior.^{8,9} Each person has a unique perception related to a particular object. These differences can be influenced by knowledge, experience, and point of view. Both positive and negative perceptions are like files that have been stored carefully in one's subconscious mind. The file appears when a stimulus triggers it or an event opens it. In such a way, perception determines one's behavioral response.¹⁰ The findings of Jorvand's research (2020), which evaluated the intervention's effects using the HBM model, revealed a decrease in HDL and cholesterol in the group that received exercise intervention while adhering to the same two diet groups.¹¹ Yazdanpanah's (2019) study found that one of the essential aspects when using the health belief model was the application of education on the community-based method, which helped regulate self-care behaviors.¹² While Imtichan (2019) said that people typically only try new things if they can do something. When someone perceives benefits from a new activity but feels unable to carry it through due to perceived barriers, likely, he will not engage in the action.¹³ The participant's experience after two years in this community-based health program should have increased their perception, willingness, and ability to practice a healthy lifestyle. This study aimed to determine the relationship between community participation in community-based programs and the perception or practice of preventing non-communicable diseases using the Health Belief Model (HBM). This research provides material for consideration to develop the activities by program managers.

METHOD

This was a quantitative study used the health belief model framework to evaluate the perception and practice of healthy living in individuals based on the level of participation during community-based health programs. Data were collected from February to March 2021 at Mantrijeron sub-district, Yogyakarta, Indonesia. The total population was 165 participants, and the sample was 54 respondents at Hamlet number 36, Jogokariyan, Mantrirejon sub-district, Yogyakarta. Variable and indicator were summarized in Table 1.

Table 1. Variables and indicators used in the research questionnaire

Variables	Indicators
Perceived susceptibility Median = 15	- NCD risk factor
Perceived severity Median = 20	- NCD's danger - NCD's impact
Perceived benefits Median = 29	- Regular exercise - No smoking - Consume nutrient food - Healthy lifestyle - Routine health check - Manage weight
Perceived barriers Median = 29	- Time barriers - Economic barriers - Environment barriers - Psychology barriers
Self-efficacy Median =24	- Capability to manage a healthy lifestyle
Cues to action Median =35	- Social support - Mass media
Health behavior scores of 4-6	- Health check (blood pressure, blood sugar, cholesterol) - Do not smoke - Exercise - Consume nutritious food - Manage stress
Membership status Coding = 0 (inactive) 1 (active)	- Community participation in the program

We used the following criteria to recruit the participants: 1) only for participants of the program (active and non-active participants), 2) aged 45-75 years, and 3) suffering from hypertension and diabetes mellitus. While the exclusion criteria for the sample were 1) had moved from Jogokariyan village, 2) not willing to be interviewed. The study used primary data obtained from questionnaires. A four-Likert scale measures the variables since it is suitable to measure a person's perception or attitude. The answer scale was 1-4 (1 to disagree to 4 to agree) for favorable questions and vice versa for unfavorable questions. Due to the small number of samples, the variables were categorized into two groups to avoid empty cells in the crosstable analysis. The scores for each variable was added and then grouped based on the: if the total

score on one variable was more than the median, then it was grouped to be positive or vice versa.

The validity test results of community participation in community-based health programs were to be valid with an R-value of 1.00. The results of the validity test of the questionnaire on the perception of susceptibility perception, severity, benefits, obstacles, self-efficacy, and stimulus to act, it was known that there were two questionnaire items on the statement of susceptibility perception that were not valid with r values of 0.210 and 0.283. Invalid questionnaire items were subsequently deleted from this research. The results of the reliability test using Cronbach's Alpha. For reliability results: for participation in the program with a value = 1; perceived susceptibility value = 0.613; perceived severity value = 0.635; perceived benefit value = 0.725; perceived obstacle value = 0.787. Self-efficacy value = 0.709; the cues to action value = 0.756 and the implementation of behavior in the community value = 0.732, indicating the reliability of the questionnaire reliability test results. Analysis was performed using the chi-square test.

RESULT

Respondent characteristic

Table 2 describes the distribution of the frequency and percentage of the characteristic of respondents. Respondent's ages are divided into three groups, represented most age groups were 55 – 65 years (48.1%), women (53.7%), and education level; high school or equivalent (35.2%).

Respondents with a positive susceptibility perception of 57.4% agreed that smoking could increase the risk of hypertension and diabetes mellitus by 75.9% and that unhealthy eating habits cause hypertension and diabetes mellitus by 81.5%. As much as 76% of respondents agree that routine health checks can help early detection of hypertension and diabetes mellitus. However, respondents agreed that there was no health impact if they reduced sugar, salt, and fat consumption by 25.9%. This data shows that their knowledge about managing hypertension and diabetes is still low.

As many as 77.8% of respondents perceived that hypertension and diabetes mellitus could cause damage to internal organs to believe that this disease would change their view of a healthy life. However, 44.5% of respondents agree that hypertension and diabetes mellitus will not change their daily life. As many as 37% of respondents believe that having hypertension and diabetes mellitus will not have a significant impact on their lives and that of their families. More than forty percent (42%) believe hypertension and diabetes mellitus will not significantly affect their careers and believe this disease will change their view of a healthy life 54.8%. From the statement about perceived benefits, 66.7% of respondents who answered believed the behavior offered in the program was beneficial for preventing hypertension and diabetes mellitus. Most 88.8% of respondents agree that practicing healthy living can improve their quality of life. Respondents agree that managing body weight can prevent hypertension and diabetes mellitus, believing that avoiding smoking, limiting consumption of sugar and salt, and consuming lots of vegetables and fruit can reduce the risk of hypertension and diabetes mellitus.

Table 2. Distribution of respondent characteristics age, gender, and education level in Jogokariyan Village

Variable	Category	n	%
Age	45 – 54 years old	15	27.8
	55 – 65 years old	26	48.1
	66 – 74 years old	13	24.1
Sex	Male	25	46.3
	Female	29	53.7
Level of education	Elementary school	12	22.2
	First, middle school	14	25.9
	High middle school	19	35.2
	University	9	16.7

More than half, 64.8% of the respondents, feel confident that there are no barriers to healthy behavior. The study found that 46.3% of respondents agreed that losing weight is a new habit challenging, and 55.7% of respondents agree that being busy at work is an obstacle to regular physical activity. 42.5% of respondents think it is too troublesome to make their food. From this study, 53.7% of respondents were unsure they could manage a healthy lifestyle to avoid the risk of disease, and 57.4% did not avoid consuming foods containing lots of salt and caffeine.

This study found that the family has an essential role as a support system for healthy behavior, but 24.1% of family members will not reprimand if the respondent smokes. More than half (59.3%) of respondents think posters and banners do not provide enough information about hypertension and diabetes mellitus. The results show that the respondents who have good behavior are 61.1%. The respondents carried out health checks at least once when the program (59.3%); respondents do not smoke (61.1%) and avoid exposure to secondhand smoke. As many as 57.4% of respondents do not routinely do physical activity for at least 30 minutes daily. Furthermore, and 44.4% of respondents have not been able to manage stress well. Table 3 shows the variables that have been categorized.

Table 3. Frequency Distribution of variables based on category

Variable	Category	n	%
Perceived susceptibility	Negative	23	42.6
	Positive	31	57.4
Perceived severity	Negative	27	50.0
	Positive	27	50.0
Perception of benefits	Negative	18	33.3
	Positive	36	66.7
Perception of barriers	Negative	19	35.2
	Positive	35	64.8
Self-Efficacy	Negative	25	46.3
	Positive	29	53.7
Cues to action	Negative	23	42.6
	Positive	31	57.4
Membership status	Active	38	70.4
	Non-active	16	29.6
NCD's Prevention Behavior	Bad	21	38.9
	Good	33	61.1

Using a simple randomized technique, from 54 respondents, we found 38 active and 16 inactive participants. The activeness of the respondents was interpreted by participating in healthy gymnastics, participating in health checks held by the programmer team, or participating in declarations of commitment not to smoke at community meetings, in the house, and near mothers and children. The relationship between the involvement in community-based health activities and the perception can be seen in Table 4.

Table 4. Relationship of participation in program community-based health with perceptions and behaviors of NCD prevention

Perception and Behaviors of NCD prevention								
Participation	Negative		Positive		Total		P-Value	PR (95% CI)
	n	%	n	%	N	%		
Perceived Susceptibility								
Inactive	11	68.7	5	31.3	16	100	0.012	2.177 (1.228-3.861)
Active	12	31.6	26	68.4	38	100		
Perceived severity								
Inactive	14	87.5	2	12.5	16	100	0.000	2.558 (1.585-4.126)
Active	13	34.2	25	65.8	38	100		
Perceived Benefit								
Inactive	10	62.5	6	37.5	16	100	0.003	2.969 (1.440-6.119)
Active	8	21.1	30	55.6	38	100		
Perceived Barriers								
Inactive	9	56.3	7	43.7	16	100	0.035	2.138 (1.077-4.242))
Active	10	26.3	28	73.7	38	100		
Self Efficacy								
Inactive	9	56.3	7	43.7	16	100	0.341	1.336 (0.755-2.364)
Active	16	42.1	22	57.9	38	100		
Cues to action								
Inactive	14	87.5	2	12.5	16	100	0.000	3.698 (2.027-6.732)
Active	9	23.7	29	76.3	38	100		
NCD prevention behavior								
Inactive	12	75.0	4	25.0	16	100	0.000	3.167 (1.675-5.988)
Active	9	23.7	29	76.3	38	100		

The relationship between participation in community-based health and the perception

The chi-square test results show that participation is significantly related to the perception of five components of the health belief model (HBM) in preventing hypertension and diabetes mellitus. For example, based on the results of the analysis of the relationship between participation in community-based health activities and the perception of susceptibility, there is a significant difference in the percentage of negative susceptibility perceptions (68.8%) of respondents who did not participate compared to respondents who participated (31.6%). The statistical test results obtained a p-value = 0.01, which means statistically, there is a relationship between active activity participation and perceptions of susceptibility. Likewise,

with the results of the analysis of the relationship between the involvement and perceived severity, the results of the statistical test obtained a p-value = of 0.00; perceived benefit p value = 0.00; perceived barrier 0.03; cues to action p-value = 0.00 which means that statistically there is a relationship between participation and perceptions.

The relationship between participation and the NCD prevention behavior

The results show a relationship between community participation in community-based health activities and NCD prevention behavior. We found a significant percentage difference between respondents who participated and did not participate in the behavior to prevent NCD. The statistical test results obtained a p-value of 0.000 which means that statistically, there is a relationship between activity participation and NCD prevention behavior. The bivariate analysis describes the relationship between involvement in community-based health programs and NCD prevention behavior.

DISCUSSION

This study observed the association between community participation in community-based programs and the perception or practice of preventing non-communicable diseases. From the characteristic of participants, it was found that women were more than men. Generally, Indonesian women have autonomy in making decisions to practice healthy living. The findings of this study differ from Habib's research, which states that women in Pakistan experience significant barriers to accessing TB health because of the lack of autonomy in making family decisions, problems with travel time, and lack of priority in health spending, and the lack of female health workers.¹⁴

The majority of our respondent was elderly, aged 55-65 years. Increasing age will lead to the perception and awareness that aging affects their physical and psychological well-being. It makes the elderly susceptible to disease. Perceived disease susceptibility can refer to individual judgments that encourage and motivate healthy behavior. The increasing age of the elderly makes their experience more mature to obtain information about health for themselves. The level of education also influences information and knowledge about the dangers of disease so that awareness grows to make efforts to prevent disease.¹⁵

The chi-square statistical test results show a relationship between participation in this community-based program and all HBM constructs. This study is in line with previous studies that show a relationship between the effect of the construct health belief model and prevention behavior.¹⁶⁻¹⁹ The perception of severity felt by respondents was influenced by the perceived threat perception. Individual perceptions influence health behavior. If the individual feels vulnerable and thinks that the disease can threaten him, then the individual will take action to protect himself or seek treatment.²⁰

The elderly, susceptible to hypertension and diabetes mellitus, will perceive the disease as threatening their lives. Perceptions of susceptibility and severity are related to disease prevention behavior, and respondents think that they are vulnerable and think that hypertension and diabetes mellitus are severe diseases and can threaten their lives. Some respondents actively participate in community-based health to carry out preventive practices through routine physical activities and health checks, are willing to replace cake snacks at community meetings by consuming fruit, and support residents not to smoke. Efforts to form a positive susceptibility perception so that residents practice healthy living to prevent

hypertension and diabetes mellitus, one of which is by strengthening communication strategies.²¹ Healthy living practices need to be carried out by all people. Therefore it is necessary to have the cooperation of all parties to play a role in conducting socialization and habituation of healthy living practices to prevent disease. The health education strategy must touch vulnerable groups at high risk of developing hypertension and diabetes.

Rosenstock explains that a person's beliefs about perceived susceptibility will encourage him to take action to prevent and support healthy behavior change. Change depends on the individual's belief in the effectiveness of actions to reduce the threat of disease or perceived benefits. Individuals aware of the benefits of healthy living practices will continue to take health actions.²² One effort to increase the perception of the benefits of practicing healthy living is to align this health-based program with integrated health posts.

This study's results indicate a relationship between perceived barriers and non-communicable disease prevention behavior. Most respondents have a positive perception of the obstacles to healthy living practices. In line with the theory, that respondents feel that obstacles can affect the practice of healthy living. The more the individual feels obstacles in practicing healthy living, the less success he will have in practice. In line with Obirikorang, research states that Ghana's high perceived barrier is a significant predictor of non-adherence to hypertension therapy.²³ The obstacles respondents feel to practicing healthy living are generally caused by personal barriers. The elderly face obstacles in practicing healthy living and need support, assistance, and supervision from their families or health workers to overcome the barriers so that they elderly can practice healthy living. These efforts can provide motivation and confidence for the elderly to face obstacles in practicing healthy living. Another effort to reduce cigarette consumption is to have strict sanctions for active smokers who smoke in public places or at home. Sanctions that are applied need to be regulated jointly, regulated openly, and designed to create fear of violations and provide a deterrent effect for violators.

The results of the study show statistically result that there is no relationship between self-efficacy and disease prevention behavior. Based on the data obtained from the respondents' answers, the number of lousy prevention behaviors with positive self-efficacy. This research is in line with Imtichan's research, which explains a relationship ($b = 1.51; 95\%$ dan $p = 0.015$) between self-efficacy and clean behavior among the elderly with hypertension. Sometimes individuals already feel confident about their ability to behave healthily, but the obstacles they face affect their efforts to behave healthily. Due to the challenges faced, individuals with positive self-efficacy only sometimes have good healthy behavior.¹³

Bandura explains that self-efficacy is always related and impacts the selection of one's behavior, motivation, and determination when facing problems. Self-efficacy can affect stress and anxiety levels through behavior that can solve problems. Individuals will feel anxious when faced with something beyond their control because of the threat that affects them. In line with research that there is a relationship between obstacles and healthy behavior, it affects individual self-efficacy. Respondents think the obstacles encountered affect their efforts to behave healthily even though they have positive self-confidence.²⁴

This study was in line with the research of Larki (2021), which states that there is a stimulus relationship to act with self-care for hypertension sufferers. Respondents with low literacy have low self-confidence. Therefore they need to get stimulation from outside to practice healthy living in a supportive environment and health information through health education, mass and

electronic media, and medical regulations from health workers who provide motivation and support for practicing healthy.²⁵

In line with the research findings, self-efficacy can be achieved by increasing Germacis participants' knowledge, participating in some program activities, and ensuring the sustainability of healthy living practices through supervision and empowerment. Germacis' programmer can act as a mentor, supporter, and motivator for participants, fostering self-confidence and the ability to practice healthy living while overcoming obstacles. Respondents received stimulation from outside through community-based health programs, health education through counseling and print media (posters and wall clocks), motivation, support, and reprimand from family and closest people to carry out healthy living practices to maintain their health. It is necessary to strengthen the cues to action by improving health services for the elderly. Health services need to be provided early on at the pre-elderly age. Home visits to the elderly can help them obtain regular health checks. Strengthening support for the elderly is also needed; Support has a significant role in the efforts of the elderly to maintain their health status by practicing healthy living.

CONCLUSION

There is a relationship between the level of participation and perception (perceived susceptibility, perceived severity, perceived benefit, perceived barriers, and cues to action) and prevention behavior). There is no relationship between participation and self-efficacy. Health empowerment must touch at-risk community groups regularly. For the program's sustainability, it is necessary to involve the cooperation of all parties to take on the habituation of healthy living practices and create sanctions for active smokers at community gatherings and homes. There is a need for regular monitoring, support, and assistance from health workers so that the elderly can optimally participate in activities and can encourage the community to be more active in practicing healthy living and maintaining the sustainability of the program.

Declarations

Authors' contribution

HA contributed to the research design, analysis, and manuscript. AY contributed to data collection and analysis. EA and HB contributed to the manuscript editing.

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Conflict of interest

There is no conflict of interest in this research.

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