Benefit: Jurnal Manajemen dan Bisnis
Tahun 2025, Volume 10, Nomor 1, Bulan Juni: hlm 73 - 84
ISSN: 1410-4571, E-ISSN: 2541-2604

Analysis of Individual Health Behaviors in Relation to Cardiovascular Disease Prevention among Employees of an Oil and Gas Company

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Abstract**:** *Deaths from heart disease among employees in the upstream oil and gas industry are a serious concern. Companies in these risky and costly environments need to better manage workplace health to meet their goals and follow regulations. This study aims to examine the influence of Health Belief Model variables—including socio-demographics, knowledge, perceived susceptibility, severity, barriers, benefits, self-efficacy, and cues to action—on individual health behaviors in preventing cardiovascular disease. Data was collected through a questionnaire from 129 respondents in an oil and gas company using purposive sampling. Descriptive analysis and SEM-PLS show that knowledge significantly influences perceived susceptibility, severity, benefits, and self-efficacy, while the variables of perceived susceptibility, benefits, and cues to action impact individual health behavior. These results indicate the need for comprehensive education programs and effective communication. Furthermore, the non-significant influence of barriers, severity, and self-efficacy suggests the need for identifying barriers and supportive work environment strategies. A systematic approach involving psychological, environmental, and social factors is also important to improve employee health, productivity, and overall well-being.*

Keywords: *individual health behavior; health belief model; individual perception; occupational health; cardiovascular risk.*

Abstrak: *Kematian karyawan akibat penyakit kardiovaskuler di industri hulu migas menjadi isu serius yang memerlukan perhatian. Perusahaan yang beroperasi dalam lingkungan berisiko tinggi dan biaya tinggi harus mengelola kesehatan kerja dengan baik untuk mencapai tujuan organisasi dan memenuhi regulasi yang ada. Penelitian ini bertujuan untuk mengkaji pengaruh variabel Health Belief Model—termasuk sosio-demografi, pengetahuan, persepsi kerentanan, keparahan, hambatan, manfaat, efikasi diri, dan isyarat untuk bertindak—terhadap perilaku kesehatan individu dalam pencegahan penyakit kardiovaskuler. Data dikumpulkan melalui kuesioner dari 129 responden di sebuah perusahaan minyak dan gas dengan teknik purposive sampling. Analisis deskriptif dan SEM-PLS menunjukkan bahwa pengetahuan berpengaruh signifikan terhadap persepsi kerentanan, keparahan, manfaat, dan efikasi diri, sedangkan variabel persepsi kerentanan, manfaat, dan isyarat untuk bertindak berdampak pada perilaku kesehatan individu. Hasil ini menunjukkan perlunya program edukasi yang komprehensif dan komunikasi efektif. Selain itu, pengaruh yang tidak signifikan dari hambatan, keparahan, dan efikasi diri mengindikasikan perlunya identifikasi hambatan*

dan strategi lingkungan kerja yang mendukung. Pendekatan sistematis yang melibatkan faktor psikologis, lingkungan, dan sosial juga penting untuk meningkatkan kesehatan karyawan, produktivitas, dan kesejahteraan secara keseluruhan.

Kata Kunci: *individual health behavior; health belief model; persepsi individu; occupational health; cardiovascular risk*

INTRODUCTION

Organizational performance is a crucial factor in achieving company goals, especially in the oil and gas industry which has a high level of risk. (Hanoum, 2021, Hanoum & Islam, 2021, Rachmad et-al, 2024). Employee management in the workplace has a significant impact on achieving company goals, therefore employees as strategic resources must be managed properly so that their performance increases, are productive and increase the company's profitability, the management in question includes aspects of occupational safety and health which are important things to manage to minimize the number of work accidents and deaths in the workplace (Dessler, 2018). The incident of employee death in the workplace due to cardiovascular disease is a serious thing that occurs in the upstream oil and gas industry. Companies with high-risk and high-cost operational characteristics require occupational health management that is in line with the goals and cultural values of the organization in order to comply with applicable regulations. Therefore, it is necessary to prevent and control cardiovascular disease risk factors, in this case the government has socialized the implementation of a CERDIK behavioral culture (regular health checks, eliminate cigarette smoke, be diligent in physical activity, have a balanced diet, get enough rest, and manage stress); as well as early detection and early follow-up of risk factors through health care facilities (Saputra & Erwandi, 2023). However, according to Ammouri (Thagizadeh, et al., 2022), the best practice in preventing and reducing the risk of cardiovascular disease is to involve assessing perceptions of risk and a person's involvement in protective behavior. In line with this, Robinson stated that cardiovascular disease prevention traditionally relies on controlling risk factors among individuals as the main element, but the aspect of compliance is a fundamental problem in efforts to modify risk in individuals at risk, therefore individual perceptions of cardiovascular disease are important predictors of how likely a person is to engage in healthy lifestyle habits (Robinson et al., 2019). According to the opinion put forward by Servaes and Malikhao, the successful implementation of occupational health programs in companies needs to be supported by collaboration between policy makers (management) and employees as actors of the policy so that there is a significant change in social or cultural actions in the Company environment (Tjahyadi, Magdalena, & Vina, 2022). The development of an occupational health program will have an optimal behavioral change impact if it successfully targets barriers, benefits, self-efficacy, and

perceived threats (Jones, Jensen, Scherr, Brown, & Weaver, 2015). In line with previous research, Peter (Amraei & Malekshahi, 2020) stated that individuals will take action to prevent cardiovascular disease if they gain sufficient knowledge (knowledge) about the disease, consider themselves susceptible to the disease (perceived susceptibility), if they believe that it will have potentially serious consequences (perceived severity), if they believe that certain actions can be taken to prevent cardiovascular disease (cues to action), if they see few negative attributes associated with health actions (perceived barriers), to lead to other positive outcomes (perceived benefits) and suggestions that the belief that one can successfully complete the desired behavior despite obstacles (self-efficacy) is added. Individuals who perceive themselves as susceptible believe that the condition may have serious health consequences will encourage individuals to change their lifestyle behaviors (individual behaviors) to avoid risk factors and obtain beneficial outcomes (Champion & Skinner, 2008) Based on the above, it is important to know how employees' perceptions and behaviors are in implementing efforts to prevent cardiovascular disease. Perceptions and behaviors related to cardiovascular disease prevention can be studied using the revised version of the health belief model (HBM) theory proposed by Rosenstock in 1977 (Julianti, 2020). HBM is a theory of behavioral change at the individual level. These behavioral changes are divided into 3 (three) parts, the first is individual beliefs / perceptions consisting of perceptions of vulnerability / vulnerability, perceptions of severity / seriousness, perceptions of threats, perceptions of benefits, perceptions of barriers, cues to action and self-efficacy. the second is the modifying factor and the third is the possibility of action. By knowing this, the company can obtain input from aspects of employee perceptions and behaviors, so that it can be used as a consideration and compiler.

LITERATURE REVIEW

Employees are a central element in a company's operations; without them, the continuity of the company's activities will be hampered even though other resources are available. Effective employee management is essential so that company employees can operate their activities even though other resources have been met (Rai, Silmina, Hanoum, et-al, 2021). The development of industry in the era of globalization requires companies to ensure that their workers are healthy to work. Therefore, companies must have policies on occupational health programs, provide guidance to new workers or as a whole, fulfill K3 requirements in the workplace, by following government regulations and international standards (Kamal, 2019). One of the concepts, namely occupational health, has the meaning that companies need to ensure that each individual is fit to work effectively in accordance with their work and work environment without having a risk to their health and safety, and their health condition does not cause health problems to coworkers and their work environment. Therefore,

occupational health and sports efforts need to be implemented by companies by prioritizing promotive and preventive health services, without ignoring curative and rehabilitative aspects (Ministry of Health, 2020). The Health Belief Model (HBM) was developed in the 1950s by social psychologists Hochbaum, Rosenstock and others, who worked in the US Public Health Service to explain the failure of communities to participate in disease prevention and detection programs. The concept of the Health Belief Model provides an overview that individual compliance in implementing health programs given to them (Karen, Barbara, & Viswanath, 2008), is influenced by 6 (six) key variables as follows: socio-demographics, knowledge, perceived susceptibility, severity, barriers, benefits, self-efficacy, cues to action and individual health behaviors. Individual health behaviors in the Health Belief Model explain the importance of health behavior in health education. This is also included in every definition of health education and is an important variable studied in health education programs. The heart is one of the vital organs that plays an important role in the human body. The heart works continuously without rest. Therefore, if its health is not maintained properly, the heart can experience health problems. Cardiovascular diseases (CVD) are diseases caused by impaired heart and blood vessel function (Martiningsih & Haris, 2019). Cardiovascular diseases are the leading cause of premature death of individuals worldwide, detection and knowledge of risk factors for cardiovascular disease are very important in preventing and controlling these risk factors (Mohammadnabizadeh, Najafpoor, Vahedian-Shahroodi, & V, 2022).

Table 1. Research Hypothesis

Item	Hipotesis
H1	Knowledge affects perceived susceptibility in efforts to prevent cardiovascular disease.
H2	Knowledge affects perceived severity in efforts to prevent cardiovascular disease.
H3	Knowledge affects perceived barriers in efforts to prevent cardiovascular disease.
H4	Knowledge affects perceived benefits in efforts to prevent cardiovascular disease.
H5	Knowledge affects self-efficacy in efforts to prevent cardiovascular disease.
H6	Perceived susceptibility affects likelihood behavior in efforts to prevent cardiovascular disease.
H7	Perceived severity affects likelihood behavior in efforts to prevent cardiovascular disease.
H8	Perceived barriers affect likelihood behavior in efforts to prevent cardiovascular disease.
H9	Perceived benefits affect likelihood behavior in efforts to prevent cardiovascular disease.
H10	Self-efficacy affects likelihood behavior in efforts to prevent cardiovascular disease.
H11	Cues to action affect likelihood behavior in efforts to prevent cardiovascular disease.

From this concept, there are several gaps that need to be addressed: First, although HBM has been widely used to understand health behavior, research that specifically

examines the effect of knowledge on perceptions and self-efficacy related to CVD prevention in employees is still limited. This study aims to fill this gap by providing empirical evidence on the relationship between knowledge and other HBM variables in the context of CVD prevention in the workplace. Second, the context in which this study was conducted, namely in the oil and gas industry which has special characteristics with high job risks, which may affect CVD prevention behavior. This study will explore how these contextual factors play a role in moderating or mediating the relationship between HBM variables and CVD prevention behavior. Third, in addition to the variables in HBM, this study will also consider other factors that may be relevant, such as company policies related to occupational health and safety through cues to action variables, to provide a more comprehensive picture of CVD prevention behavior in employees. By addressing these gaps, this study is expected to make a significant contribution to efforts to prevent CVD among employees and provide practical recommendations for the development of effective intervention programs. The hypotheses in this study are as follows table 1.

METHODOLOGY

This study aims to develop research and combine Health Belief Model variables, namely socio-demographics, knowledge, perceived susceptibility, severity, barriers, benefits, self-efficacy, cues to action and individual health behaviors in efforts to prevent cardiovascular disease, using descriptive analysis to understand and explain the characteristics of respondents and SEM-PLS analysis to analyze the causal relationship between constructs in the HBM. Testing is determined through 11 hypotheses as shown in Figure 1.

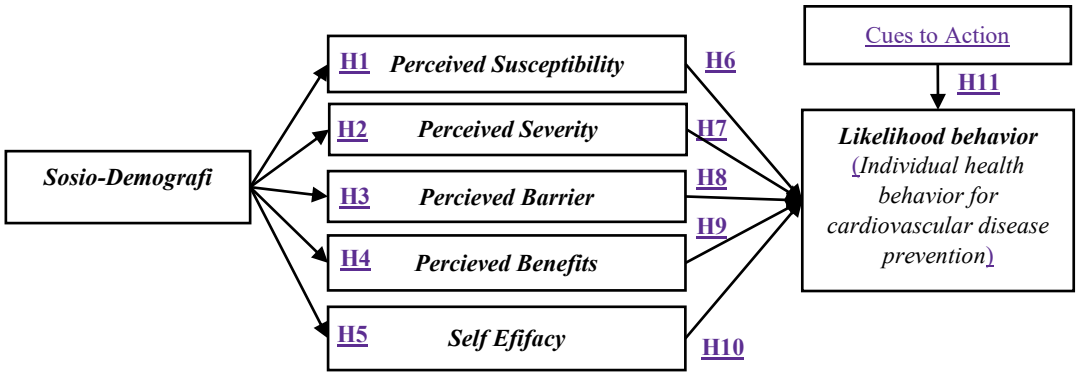

Figure 1. Hypothesis and analysis between HBM constructs

This study uses a quantitative research design using a cross-sectional approach method and was conducted at PT. XYZ which is located in Bekasi and Karawang Regencies. The time of this study is from September 2023 to May 2024 which

includes: preparation of research proposals, preparation of data collection instruments, implementation of data collection, data analysis, preparation of research reports and presentation of research results.

Data collection using questionnaires on 129 respondents with purposive sampling techniques and sample criteria as follows:

a. The sample is a permanent employee of the company (Unspecified Time Worker)
b. Have medical check-up results that have a conclusion of moderate to high cardiovascular risk.
c. Not a person with a medical background, or working in the Health-HSSE department/function.

Data will be collected using a structured questionnaire and confirmed to ensure its validity and reliability. Questions on the questionnaire were adopted from various studies conducted using the Health Belief Model concept as follows: (1) Socio-demographic. (2) Knowledge: is the respondent's knowledge of the types of cardiovascular disease, risk factors and prevention of cardiovascular disease. (3) Individual health behavior: is the individual's health behavior related to risk factors and prevention of cardiovascular disease. (4) Health belief model constructs: are respondents' perceptions of cardiovascular disease will be assessed using the HBM constructs including, perceived susceptibility consisting of 3 questions, perceived severity 3 questions, 5) Perceived benefits consisting of 4 questions, perceived barriers consisting of 6 questions, cues to action consisting of 4 questions, and self-efficacy consisting of 5 questions.

Each item is measured using a Likert scale with five alternative answers, namely: Strongly Agree (SS) is given a score of 5, Agree (S) is given a score of 4, Undecided (RG) is given a score of 3, Disagree (TS) is given a score of 2, Strongly disagree (STS) is given a score of 1.

RESULT AND DISCUSSION

Of the 129 employee respondents who participated, 126 (98%) were men and 3 (2%) were women. The majority of respondents were in the age range of > 40 to 50 years, as many as 69 (53%) people, followed by the age group of > 50 years 28 (22%) people, and > 30 to 40 years as many as 27 (21%) people. The majority of respondents (93%) did not have a history of cardiovascular disease from the family, and (95%) did not have a history of cardiovascular disease in themselves. Gender, age, history of cardiovascular disease are some of the factors considered in determining a person's cardiovascular risk (P2PTM Kemenkes, 2021), the characteristics of respondents based on this are presented in table 2.

Table 2. Respondent Characteristics

Characteristics		Frequency	%
Gender	Male	126	98%
	Female	3	2%
Age	20 - 30 years	5	4%
	>30 - 40 years	27	21%
	>40 s.d 50 years	69	53%
	> 50 years	28	22%
Length of service in the company	< 10 years	21	16%
	10 - 20 years	101	78%
	>20 - 30 years	5	4%
	> 30 years	2	2%
Last education	High School / equivalent	62	48%
	Diploma	28	22%
	Bachelor	35	27%
	Master / postgraduate	4	3%
Level	Staff / equivalent	96	74%
	Supervisor / equivalent	31	24%
	Assistant manager / equivalent	1	1%
	Manager / Sr. Manager	1	1%
Married status	Married	126	98%
	Not / not yet	3	2%
Family cardiovascular history	Yes	9	7%
	No	120	93%
Personal cardiovascular history	Yes	6	5%
	No	123	95%
Smoking habit	Yes	51	40%
	No	78	60%
Exercise habits	Yes	99	77%
	No	30	23%
Exercise frequency	> 3 times / week	18	14%
	1 to 3 times a week	65	50%
	Rarely /Once a week	42	33%
	Never	4	3%
Alcohol Consumption	Yes	0	0%
	No	129	100%
Consumption of fruits and vegetables	Yes	99	77%
	No	30	23%
Consumption of fatty foods	Yes	67	52%
	No	62	48%

The results showed good construct validity and reliability. Convergent and discriminant validity were met, with all loading factors above 0.5, AVE above 0.5,

and HTMT below 0.9. Construct reliability was also good, with composite reliability and Cronbach's alpha values above 0.6.

Table 3. Frequency Distribution

Variabel	Indikator (Mean)				
	STS	TS	RG	S	SS
Knowledge	17.6%	26.1%	48.1%	7.5%	0.8%
Perceived Susceptibility	7.0%	25.6%	38.5%	24.3%	4.7%
Perceived Severity	0.4%	5.8%	13.2%	48.1%	32.6%
Perceived Barrier	0.6%	12.0%	30.2%	42.9%	14.2%
Perceived Benefit	0.4%	1.6%	3.5%	33.1%	61.4%
Self Efifacy	0.2%	1.6%	12.2%	50.7%	35.3%
Cues to Action	0.0%	0.2%	11.8%	50.0%	38.0%
Individual Health Behaviors	0.3%	0.6%	8.2%	45.3%	45.6%

Respondents showed variation in knowledge of cardiovascular disease risk factors, with the majority (48%) choosing the undecided answer. On average, respondents agreed with cues to action (50%) and showed positive individual health behaviors (the majority agreed and strongly agreed). Perceived barriers varied, with answers agreeing (43%) and undecided (30%). Perceived benefits were very high (61% strongly agreed), while perceived severity was mostly agreed (48%). Perceived susceptibility varies, with the majority being undecided (39%), and self-efficacy being mostly agreed (51%).

The structural test shows that perceived barrier, perceived benefit, perceived severity, perceived susceptibility, and self-efficacy have a weak influence on individual health behaviors. However, individual health behaviors have an R square value of 0.672, which means that 67.2% of the variability can be explained by exogenous variables in the model. The R square test shows a weak influence of perceived barrier, perceived benefit, perceived severity, and perceived susceptibility on individual health behaviors. Self-efficacy has a weak influence, while individual health behaviors are significantly influenced by other exogenous variables.

Table 4. Coefficient Result

	Path Coefficient	T values	P Values
Cues to action -> Individual Health Behavior	0.578	5.706	0.000
Knowledge -> Perceived Barrier	0.080	0.505	0.614
Knowledge -> Perceived Benefit	0.416	6.262	0.000
Knowledge -> Perceived Severity	0.305	3.709	0.000
Knowledge -> Perceived Susceptibility	0.208	2.279	0.023
Knowledge -> Self Efifacy	0.438	6.636	0.000
Perceived Barrier -> Individual Health Behavior	0.007	0.083	0.934
Perceived Benefit -> Individual Health Behavior	0.190	2.721	0.007
Perceived Severity -> Individual Health Behavior	0.071	1.086	0.278
Perceived Susceptibility -> Individual Health Behavior	0.159	2.614	0.009
Self Efifacy -> Individual Health Behavior	0.098	0.914	0.361

The Q-square test shows a strong predictive relevance for individual health behaviors and small for other endogenous variables. The F-square test shows a small effect for the knowledge variable on perceived barrier and perceived susceptibility, a medium effect for perceived benefit, perceived severity, and self-efficacy, and a large effect for cues to action on individual health behaviors.

The bootstrapping method with 500 samples showed that the knowledge variable had a significant effect on perceived susceptibility, perceived severity, perceived benefit, and self-efficacy. Perceived susceptibility, perceived benefit, and cues to action also had a significant effect on individual health behavior. However, knowledge on perceived barrier, perceived severity on individual health behavior, perceived barrier on individual health behavior, and self-efficacy on individual health behavior were not significant. Based on the t-test on the bootstrapping method, several hypotheses were significantly supported. H1 (knowledge affects perceived susceptibility), H2 (knowledge affects perceived severity), H4 (knowledge affects perceived benefit), H5 (knowledge affects self-efficacy), H6 (perceived susceptibility affects individual health behavior), H9 (perceived benefit affects individual health behavior), and H11 (cues to action affects individual health behavior) were accepted. Other hypotheses, H3, H7, H8, and H10 were not significantly supported.

CONCLUSSION

This study confirms the significant influence of variables perceived benefit, perceived severity, perceived susceptibility, and self-efficacy on employees' cardiovascular disease prevention behavior. The better or stronger employees' self-confidence in understanding the benefits of carrying out disease prevention, the higher employees'

perception of the risks that arise, the greater their belief that everyone is susceptible to cardiovascular disease, and the higher employees' belief in their ability to make behavioral changes, the greater the possibility that employees will make efforts to prevent cardiovascular disease. Significant cues to action on prevention behavior emphasize the importance of the role of communication and health education in the workplace in encouraging changes in employee behavior. This study also reveals the influence of knowledge on individual belief / perception variables such as perceived benefit, perceived severity, perceived susceptibility, and self-efficacy, this shows the importance of efforts to increase employee knowledge as an initial step in encouraging preventive behavior. Other things that need to be considered by the company are aspects of perceived barriers, severity and self-efficacy. Companies need to identify other factors such as psychological, environmental and social factors in considering more effective strategies in encouraging healthy behavior for their employees, especially by optimizing other factors that are more effective in achieving these goals. In this case, environmental factors such as social support, policies in place in the company, and facilities available in the workplace are likely to be more dominant, this is because things like the need for autonomy, competence, and social relationships also play an important role in motivation to change. By understanding the complexity of factors that influence health behavior, companies can develop more effective programs to improve employee well-being. Further studies can be conducted to test and deepen this in different populations, for example in different companies and in diverse contexts to identify best practices in health promotion. In addition, other aspects of the research also need to be explored, such as environmental factors such as social support, policies in place in the company, and facilities available in the workplace which are likely to also play an important role in motivation to change.

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