

## Conference Paper

# Health Risk Assessment for Prevention of Cardiovascular Disease in Workers at PT. X

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## Abstract

Cardiovascular disease is one of the leading causes of death and disability in the world. Cardiovascular disease in workers can decrease productivity and increase health costs incurred by the company for which they work. Based on the results of a workers' health assessment by an EPC Company in 2016, some of the risk factors that can lead to cardiovascular disease were identified. Primary prevention begins with the assessment of the risks that can trigger cardiovascular disease. The aim of this research was to determine the risk levels and distribution of cardiovascular disease in workers at PT. X. The study used a descriptive cross-sectional design. The data originated from the results of the workers' health assessment in 2016 with 109 samples. Based on the Framingham risk score method, 87.16 percent of workers had a low risk of cardiovascular disease, 11.01 percent had an intermediate risk, and 1.83 percent had a high risk. From these results, it can be concluded that health promotion and surveillance should be developed to prevent cardiovascular disease at the workplace.

**Keywords:** cardiovascular disease, health risk assessment, Framingham risk score method, occupational health

## 1. Introduction

Cardiovascular disease is one of the leading causes of death and disability in the world. Based on the 2011 report from the World Health Organization (WHO), it is estimated that every year 17 million people in the world die from cardiovascular disease, and that 30 percent of these deaths are caused by heart attacks and strokes. The primary cause of death is atherosclerosis. Risk factors for the progression of atherosclerosis include diet, obesity, less exercise, diabetes mellitus, hypertension, and smoking habits [3]. The annual mortality rate from cardiovascular disease is projected to increase to 24 million people by 2030 [1, 2].

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Cardiovascular disease has two types of risk factors—reversible and irreversible. The reversible risk factors consist of diet, smoking habits, hypertension, stress, diabetes mellitus, and alcohol consumption, while the irreversible risk factors consist of age, gender, race, and heredity [4]. Based on these risk factors, cardiovascular disease can occur in anyone, including workers. When workers develop the disease, it causes losses such as decreased productivity and increased hospital costs to be incurred by the company. To reduce the risk of disease, primary prevention is required, beginning with a health risk assessment of workers who have a potential risk of cardiovascular disease. Early detection of cardiovascular disease combined with workplace health programs can reduce 26 percent of hospital costs and 30 percent of workers' compensation and disability claims [5].

PT. X is a company that engages in the engineering, procurement, and construction fields. Within that company, workers are the biggest asset. Therefore, workers are expected to maintain their health to be productive. However, the results of a health assessment found several risk factors for cardiovascular disease (i.e., disorders of fat metabolism and obesity) in the workers. However, no measurements of cardiovascular disease risk were performed on the workers, and PT. X has not had risk prevention and control programs in place.

The aim of this study was to determine the risk levels for and distribution of cardiovascular disease in workers at PT. X, based on the results of the 2016 health assessment.

## 2. Methods

This descriptive research study employed a cross-sectional design, using secondary data from the 2016 workers' health assessment. The total sample population included 109 respondents—105 male (96.33%) and 4 female (3.67%).

The risk level for cardiovascular disease was determined by the Framingham risk score method. The risk factors that were measured included age, cholesterol level, high-density lipoprotein (HDL) level, systolic blood pressure, treatment of hypertension, and smoking habits [6]. The measurements for men and women were calculated separately. From the results, workers were categorized as high-risk if they had more than 20 percent of the risk factors, intermediate-risk with 10–20 percent of the risk factors, and low-risk with fewer than 10 percent of the risk factors.

The results, based on prior health assessments, were mapped according to risk factors in the Framingham risk score method. The risk factors were divided into several categories (Tables 1 & 2).

TABLE 1: Framingham risk score (male).

10 Years Risk Calculation for Male																			
Age Score		Age vs Total Cholesterol																	
Age	Score	Total Cholesterol	20-39	40-49	50-59	60-69	70-79												
20-34	-9	< 160	0	0	0	0	0												
35-39	-4	160-199	4	3	2	1	0												
40-44	0	200-239	7	5	3	1	0												
45-49	3	240-279	9	6	4	2	1												
50-54	6	≥ 280	11	8	5	3	1												
55-59	8	Age vs Smoking Status																	
60-64	10	Age	20-39	40-49	50-59	60-69	70-79												
65-69	11	Do Not Smoke	0	0	0	0	0												
70-74	12	Smoke	8	5	3	1	1												
75-79	13	Blood Pressure vs Treatment Status																	
HDL Score		Blood Pressure				Not Treated			Treated										
HDL	Score	< 120				0			0										
> 60	-1	120-129				0			1										
50-59	0	130-139				1			2										
40-49	1	140-159				1			2										
< 40	2	≥ 160				2			3										
Framingham Total Score (Male)																			
Total Score	< 0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	≥ 17
Risk in 10 Year (%)	< 1	1	1	1	1	1	2	2	3	4	5	6	8	10	12	16	20	25	≥ 30

### 3. Results

Mapping of the health assessment results were as follows:

#### 1. Workers' ages

Respondents' ages were predominantly in the range of 20-34 years old. None of the respondents was over 60 years old (Table 3).

TABLE 2: Framingham risk score (female).

10 Years Risk Calculation for Female																		
Age Score		Age vs Total Cholesterol																
Age	Score	Total Cholesterol	20-39	40-49	50-59	60-69	70-79											
20-34	-7	< 160	0	0	0	0	0											
35-39	-3	160-199	4	3	2	1	1											
40-44	0	200-239	8	6	4	2	1											
45-49	3	240-279	11	8	5	3	2											
50-54	6	≥ 280	13	10	7	4	2											
55-59	8	Age vs Smoking Status																
60-64	10	Age	20-39	40-49	50-59	60-69	70-79											
65-69	12	Do Not Smoke	0	0	0	0	0											
70-74	14	Smoke	9	7	4	2	1											
75-79	16	Blood Pressure vs Treatment Status																
HDL Score		Blood Pressure			Not Treated		Treated											
HDL	Score	< 120			0		0											
> 60	-1	120-129			1		3											
50-59	0	130-139			2		4											
40-49	1	140-159			3		5											
< 40	2	≥ 160			4		6											
Framingham Total Score (Female)																		
Total Score	< 9	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	≥ 25
Risk in 10 Year (%)	< 1	1	1	1	1	2	2	3	4	5	6	8	11	14	17	22	27	≥ 30

2. Cholesterol level

The highest number of respondents (45.87%) had cholesterol levels in the range of 160-199 mg/dl, 36.7 percent of respondents had cholesterol levels in the range of 200-239 mg/dl, 13.76 percent of respondents had cholesterol levels in the range of < 160 mg/dl, and 3.67 percent of respondents had cholesterol levels in the range of (Table 4).

3. HDL level

Respondents most commonly had HDL levels in the range of 40-49 mg/dl (44.04% of respondents), followed by 37.61 percent with HDL levels in the range of < 40 mg/dl (Table 5). The normal of HDL levels in the range ≥ 40 mg/dl.

4. Systolic blood pressure

The systolic blood pressure for 45.87 percent of respondents was in the range of < 120 mmHg, and for 40.37 percent of respondents was in the range of 120–129 mmHg, 9.17 percent of respondents was in the range of 130–139 mmHg, and 4.59 percent of respondents was in the range of 140–159 mmHg (Table 6).

5. Hypertension treatment

In this study, reported no respondents who are currently in the treatment of (Table 7).

6. Smoking habits

The percentage of respondents who had smoking habits was 33.94 percent (Table 8).

The distribution of the six risk factors based on the Framingham risk score are shown in Table 9. The risk categories of cardiovascular disease are shown in Table 10.

TABLE 3: Frequency distribution of respondent by age.

Age (Year)	Frequency (n)	Percentage (%)
20-34	47	43.12
35-39	19	17.43
40-44	11	10.09
45-49	15	13.76
50-54	14	12.84
55-59	3	2.75
60-64	0	0.00
65-69	0	0.00
70-74	0	0.00
75-79	0	0.00
<b>Total</b>	<b>109</b>	<b>100.00</b>

## 4. Discussion

Most of the respondents were male, most likely because PT. X is a project-based company. Workers were also mostly in the young age range of 20–34 years, which is consistent with project work that prioritizes physique. Sex and age are irreversible risk factors for cardiovascular disease [4]. Based on the results of this study, the risk

TABLE 4: Frequency distribution of respondent by cholesterol level.

Cholesterol Level (mg/dl)	Frequency (n)	Percentage (%)
< 160	15	13.76
160-199	50	45.87
200-239	40	36.70
240-279	4	3.67
≥ 280	0	0.00
Total	109	100.00

TABLE 5: Frequency distribution of respondent by HDL level.

HDL Level (mg/dl)	Frequency (n)	Percentage (%)
> 60	0	0.00
50-59	20	18.35
40-49	48	44.04
< 40	41	37.61
Total	109	100.00

TABLE 6: Frequency distribution of respondent by blood pressure.

Blood Pressure (mmHg)	Frequency (n)	Percentage (%)
< 120	50	45.87
120-129	44	40.37
130-139	10	9.17
140-159	5	4.59
≥ 160	0	0.00
Total	109	100.00

TABLE 7: Frequency distribution of respondent by hypertension treatment.

Hypertension Treatment	Frequency (n)	Percentage (%)
Not Treated	109	100.00
Treated	0	0.00
Total	109	100.00

of cardiovascular disease due to age was relatively low for these workers, because they were predominantly young. But population growth, in addition to the increasing prevalence of obesity and diabetes, especially among ethnic minorities, is an important factor driving the prevalence of cardiovascular disease [7].

TABLE 8: Frequency distribution of respondent by smoking habits.

Smoking Habits	Frequency (n)	Percentage (%)
Not Smoke	72	66.06
Smoke	37	33.94
Total	109	100.00

TABLE 9: Frequency distribution of respondent by cardiovascular risk.

Risk (%)	Frequency (n)	Percentage (%)
< 1	27	24.77
1	31	28.44
2	3	2.75
3	3	2.75
4	6	5.50
5	5	4.59
6	8	7.34
7	0	0.00
8	12	11.01
9	0	0.00
10	3	2.75
11	0	0.00
12	6	5.50
13	0	0.00
14	0	0.00
15	0	0.00
16	3	2.75
17	0	0.00
18	0	0.00
19	0	0.00
20	1	0.92
21	0	0.00
22	0	0.00
23	0	0.00
24	0	0.00
25	1	0.92
Total	109	100.00

TABLE 10: Frequency distribution of respondent by risk category.

Risk Category	Frequency (n)	Percentage (%)
High Risk	2	1.83
Intermediate Risk	12	11.01
Low Risk	95	87.16
Total	109	100.00

About 36.7 percent of respondents had cholesterol levels in the range of 200–239 mg/dl, it is above average for a normal cholesterol ( $> 200$  mg/dl). This is likely due to the diet of the workers. PT. X does not regulate the food consumed by workers or provide catering for workers. Dietary habits, especially related to cholesterol and fatty acid intake, clearly affect blood cholesterol levels [3]. The more low-density lipoprotein (LDL) in the diet, the higher the risk of cardiovascular disease [8].

About 37.61 percent with HDL levels in the range of  $< 40$  mg/dl, it is under average for normal HDL ( $\geq 40$  mg/dl). HDL is a compound that has the ability to keep excess cholesterol from accumulating in the arteries—the higher the HDL level, the more protected a person is from the risk of cardiovascular disease [8]. Thus, the low levels of the workers' HDL indicate an increased risk of cardiovascular disease in the workers.

Most of the respondents had systolic blood pressure in the healthy range. However, a few respondents had blood pressure in the range of 140–159 mmHg. These workers should be monitored, so that their systolic blood pressure does not increase. Hypertension is a 'silent killer' that is not felt by the sufferer until there have been complications to other organs, such as heart failure, myocardial infarction, stroke, or kidney failure (9). Because no respondent had a blood pressure  $\geq 160$  mmHg, none of them is currently taking medication to lower blood pressure.

The number of respondents who have smoking habits was quite large, although smaller than the number of respondents who do not smoke. Consumption of cigarettes greatly affects the mortality and morbidity of coronary heart disease [3]. Smoking also plays a role in cardiovascular disease [10].

Based on the results of the Framingham risk score analysis for the risk factors of cardiovascular disease, most of the respondents were in the category of low-risk, and only a small proportion of respondents were in the category of medium-risk or high-risk. However, over the next ten years the risk may increase, if the risk factors are not monitored and corrected. Therefore, companies need to develop health promotion programs for workers, implement regular health surveillance procedures, and identify



the risk levels of all workers, to improve workers' health and productivity, and to reduce costs to be incurred by the company.

## 5. Conclusions

This health risk assessment showed that workers at PT. X were mostly at low risk of cardiovascular disease. Some workers had risk factors that could increase the occurrence of cardiovascular disease, which could lead to the company having losses due to decreased productivity and increased hospital costs. Therefore, companies need to establish preventive programs to control the cardiovascular disease risks, such as health promotion programs for workers, implementation of regular health surveillance procedures, and identification of risks for all workers.

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