

Gema Lingkungan Kesehatan

Vol. 23, No. 1 (2025), pp 173-181

e-ISSN 2407-8948 p-ISSN 16933761

Doi: <https://doi.org/10.36568/gelinkes.v23i1.255>

Journal Homepage: <https://gelinkes.poltekkesdepkes-sby.ac.id/>

The Relationship Between Nutritional Status, Smoking Habits and Age on the Physical Fitness of Workers in the Tuban Cement Industry

Moh. Sholakhuddin ^{1*}, Indriati Paskarini ²

¹ Master of Occupational Health and Safety, Airlangga University, Surabaya, Indonesia

² Public Health Faculty, Airlangga University, Surabaya, Indonesia

*Correspondence: sholakhuddinmoh@gmail.com

ABSTRACT

Physical fitness is the body's ability to perform diurnal work effectively and efficiently over a long period of time without excessive fatigue. Based on the results of periodic health checks of workers of one of the Cement Companies in 2023, it shows that the physical fitness of workers is mostly at a very low level, namely 34.4%. This study aims to analyze the influence of age, body mass index, and smoking habits on the physical fitness of workers in a cement company in Tuban. The research design uses analytical observational studies with a cross-sectional approach. Data was obtained from routine health checks on 688 workers. The results showed that there was a significant relationship between age and smoking habits on physical fitness ($p < 0.05$), while there was no significant relationship with nutritional status. The majority of workers have very low physical fitness (34.4%) and level I obesity status (52.11%). The study recommends a health promotion program to improve workers' physical fitness.

Keywords: Age, Smoking habit, Body Mass Index (BMI), Physical fitness

INTRODUCTION

Health is a basic need that must be owned by every individual including workers. Based on PP No 88 of 2019 concerning Occupational Health, it is stated that the workforce is part of the health community so it is important for workers to always receive attention and protection in a healthy and productive manner in supporting national development. One of the important health barometers for workers is physical fitness (Purwaningsih, 2022).

Nutritional status is one of the important factors affecting work productivity. As stated by Indonesian Ministry of Health, health and nutrition factors play an important role. Because people will not be able to develop their capacity optimally if they do not have optimal status and nutrition (Ramadhanti, 2020). Nutritional status and good health conditions will influence physical fitness and skillfulness power in doing work, employee who are supported by good nutritional status will support to work more actively, productively and thoroughly at work. While workers with less, poor or indeed inordinate nutritive status will have lower physical capability, demotivation and lack of desire, as well as sluggish and apathetic which will ultimately reduce work productivity (Nugraha, 2021).

Physical fitness is an ability of a worker's body to do daily work efficaciously and efficiently in a fairly long period of time without causing inordinate fatigue, this

aims to increase the productivity of a person in order to realize the degree of health and physical fitness as anticipated (Bryantara, 2017). Physical activity provides significant health benefits (Osrita et al., 2020). There are various elements that can affect physical fitness, including body mass index (BMI), age, gender, genetics, and physical activity (Luh Nopi Andayani et al., 2021). The level of fitness can be measured with various kinds such as fitness tests including the up and down stairs test with the Harvard method and the Astrand method ergocycle test. The purpose of the two fitness checks is to find the physical fitness index and VO₂max value (Salsabila, 2021).

VO₂ max is the maximum volume of oxygen intake. In general, VO₂ max is the volume of oxygen needed when working hard. Oxygen is needed to help the body's metabolic processes. This metabolism produces energy that muscles need for activity (Maharani, 2020).

By having good physical fitness, it is expected that a person will work productively and efficiently, is not susceptible to disease and can perform optimally, both as an employee and a sportsman. With good fitness services, the body will feel healthy. It can be assumed that if the body feels healthy and fit, workers are relatively positive in solving problems so that it will greatly support productivity (Munipiddin, 2018).

Cigarettes have become a habit for life, smoking is a public health problem in the world, about three million people in the world die from smoking. Addictive substances in cigarettes can lead to various health conditions, including heart disease, vascular disorders, stroke, chronic obstructive pulmonary disease (COPD), and lung cancer. They can also cause pathological conditions in the oral cavity. (Prabowo et al., 2020)

According to the World Health Organization (WHO), Indonesia has the third largest number of smokers in the world. The number of smokers in Indonesia is expected to continue to increase because cigarette consumption among male adolescents in 1995 was only 13.7 percent, increasing to 37.3 percent in 2007. (Alfarisi et al., 2013)

Smoking habits are one of the factors that contribute to fatigue, especially due to the adverse effects of nicotine and carbon monoxide on the cardiovascular and respiratory systems. This is related to the physical fitness condition of workers who are getting longer and the advanced the position of smoking habits so that the higher the level of complaints in their muscles (Salsabila, 2021).

The company where this research was conducted is the largest cement producer in the city of Tuban, East Java Indonesia, which is owned by a State-Owned Enterprise (BUMN) (Sukindra et al., 2021).

In general, the process of making cement consists of two ways, namely wet process and dry process. The wet process is the process of processing raw materials that are crushed and then added to a certain amount of water and mixed with clay. The slurry obtained with a moisture content of 25-40% is calcined in a rotary kiln. For the dry process, the standard material is crushed in a raw mill with a dry and fine state and grinding is carried out (standard flour) with a moisture content of 0.5-1% and then subjected to calcination in a rotary kiln. per uses the dry process in its production because it is considered more profitable in terms of capacity and lower operating costs (Sukindra et al., 2021).

In regard to the results of periodic health checks executed on workers of this company in 2023, it shows that the physical fitness of workers is mostly at a very low level at 34.4% (RS Semen Gresik, 2023). In regard to the description over, formulation of the problem in this study is about whether there is an influence of each factor (age, Body Mass Index, and smoking habits) on the physical fitness of workers. The objective of this study is to determine the influence of each factor (age, Body Mass Index, and smoking habits) on the physical fitness of workers.

RESEARCH METHODS

The research method used is observational analytic with cross sectional study design. The data of this study were taken from the results of routine health checks of workers of one of the cement companies in Tuban city in 2023. The population in this study is all male workers were 713 workers with inclusion criteria: (1) male, (2)

active worker one of the cement companies in Tuban (3) Conducting routine health check-ups in 2023. exclusion criteria workers with chronic illnesses or respiratory disorders are not included as many as 25 workers so that 688 workers became the object of research. This research use total population. The variables investigated in this study include the physical fitness as a dependent variable while nutritional status, smoking habits and age are independent variables. Data processing mainly involved data collection, editing, coding, classification, and tabulation. The questionnaires and observation sheets were tested for validity and reliability. Nutritional status was measured using the Body Mass Index (BMI) based on WHO classification which is measured based on weight in kilograms divided by height in meters squared. Then the results are categorized into 5 categories 1). Underweight: <18.5, 2). Normal weight: 18.5 - 22.9, 3). Overweight: 23 - 24.9, 4). Obesity level 1: 25-29.9, 5). Obesity level 2: ≥ 30 (Primasoni, 2022).

While the category of smokers is specifically categorized into four, non-smoking, light smokers (consuming 1 - 10 cigarettes per day), moderate smokers (consuming 11 - 20 cigarettes per day), and heavy smokers (consuming further than 20 cigarettes per day) (Primasoni, 2022).

The measurement of physical fitness is carried out with an ergocycle device that will record the average heart rate for the 6 minutes of examination time required and will be converted to the resulting VO₂ Max (RS Semen Gresik, 2023).

The independent variables in this study were age, smoking habits and nutritional status of workers. While the bound variable is the physical fitness status of workers. Data collection uses secondary data, videlicet data attained from the results of periodic health checks carried out on the Company's workers. Where during periodic health checks, weight in Kg and height in cm are weighed which are then converted into measures to calculate the Body Mass Index.

The data was analyzed using SPSS version 25 software which included univariate analysis, namely to explain or describe the characteristics of free variables and bound variables, bivariate analysis, namely to find out the correlation between age, smoking habits and nutritional status with physical fitness status in workers. This study has been reviewed in agreement with the rules of research ethics with the issuance of Ethical Approval from the Health Research Ethics Committee, Faculty of Public Health, Universitas Airlangga Surabaya with Number: 153/EA/KEPK/2024.

RESULTS

Worker Age

Having a healthy and fit body is everyone's wish. However, many factors can affect a person's physical fitness, one of which is age. With age, human organs, including bones and muscles, may weaken. However,

this deterioration can be mitigated through regular physical activity and exercise. Anatomically, the body's organs will experience a decline in organ function, including the function of respiratory organs and cardiovascular function, which are important organs in supporting a person's physical fitness status in addition to the function of motion organs, namely muscles and bones in supporting physical activity. People who have more physical activity will have better physical fitness than those who do less physical activity. By continuing to do sports or physical activity that is measured and regular, it is hoped that a person can maintain his physical fitness well, so that the quality of life will also be maintained as he ages.

From Table 2, it is known that the most leading age group of employee is employee in the 41-50 year age where at this age has a high risk of low physical fitness compared to those who are younger

Nutritional Status of Workers

According to Almatsier (2005), Nutritive status is the state of the body as a result of food consumption and the use of nutrients in the body, another opinion put forward by Supariasa et al. (2016) that nutritive status is an expression of a state of balance in the form of certain variables or the incarnation of nutrients in the form of specific variables. Nutritional elements are certainly obtained from the food consumed, which will be used to sustain life, to obtain energy for work and daily activities. (Adi et al., 2019)

Nutritive adequacy is an dominant factor in supporting a person's physical fitness. A person's nutritional needs will depend on their daily physical activities, so their nutritional needs can be very individualized. How to measure a person's nutritional status can be done in two ways, namely directly and indirectly.

Direct measurement of nutrition is done in several ways including: measuring nutritional status by anthropometric means by measuring weight, height, upper arm circumference, and Body Mass Index/BMI, nutritional measurement clinically or by conducting clinical examinations. This method is based on clinical changes due to nutritional inadequacy, nutritional measurement by biochemistry or by conducting laboratory examinations, biophysical measurement of nutrition, this method looks at the ability of tissue function and changes in tissue structure which are linked to nutritional adequacy.

Indirect nutrition measurement can be done by: vital statistics are by analyzing several vital statistical data such as mortality rates based on age, morbidity rates and deaths for certain reasons, ecological factors namely environmental factors that can affect a person in consuming food and survey food consumption by looking at the amount and nutrients consumed.

Referring to Table 2, most workers have a nutritional status of Obesity level I as many as 358

workers (52.11%) Where in the obesity category will have a high risk of low physical fitness compared to those who have a normal weight

Smoking habits of workers

The definition of a cigarette is a small cylindrical object of tobacco that is finely cut in a roll in paper or leaves. Cigarettes are processed tobacco products that contain nicotine and tar additives that can cause harm to the health of individuals and the community if used. Smoking activities have a bad impact not only on the smoker himself but also on other people or family around him both in the short and long term

The dangers of smoking to our health are unquestionable. Some diseases that are very dangerous for human health can be caused by this smoking habit. Both as active smokers and passive smokers. Smoking can increase the risk of health problems including: stroke, heart problems, lung problems and will ultimately adversely affect the consumption of oxygen to the brain so that it will have an influence on a person's physical fitness. Pregnant women who are exposed to cigarette smoke, both active smokers and passive smokers, will have a higher risk of miscarriage, premature birth or babies born with low body weight. This is because harmful substances in cigarette smoke such as nicotine and carbon monoxide can be brought in the blood circulation and absorbed by the fetus. In addition, smoking in the workplace can threaten occupational safety and health. Cigarette smoke can reduce indoor air quality, which can cause irritation of the eyes, nose, and throat, as well as symptoms such as headaches and nausea. These factors can interfere with concentration and coordination, increasing the risk of accidents and injuries in the workplace.

Based on Table 2. workers who do not smoke are more than workers who smoke. Workers who do not smoke are 469 workers (68.12%), but some of them still smoke although there has been an appeal not to smoke in the factory environment, some workers still smoke in the factory environment.

Distribution of Workers' physical fitness

Maintaining physical fitness is essential for effectively performing a range of daily routinity (Sayyidah and Nastiti, 2023). In companies with industrial work patterns, workers play an important role in the production system. Workers are expected to be able to work by relying on their skills and knowledge and with high motivation guided by extensive insight and experience. In order for the work pattern to be maintained smoothly and without obstacles, the perpetrators in this case are workers who need to have a fit physical condition and a good psychological condition.

By having good physical fitness owned by workers, it is expected that the productivity of a company will increase. From Table 5. it can be seen that the physical fitness status of workers is mostly in the Very Poor category as many as 237 workers (34.44%)

Table 1

Distribution of age, nutritional status, smoking habits and physical fitness of workers

Distribution	Category	Frequency (n)	Percentage (%)
Age	≤ 30	6	0,87
	31 - 40	226	32.89
	41 - 50	361	52.40
	≥ 51	95	13.82
Nutritional Status	Underweight	6	0,87
	Normal	105	15,14
	Overweight	131	19.07
	Obesity I	358	52.11
	Obesity II	88	12.80
Smoking habit	No smoking	469	68.12
	Light smokers	85	12.37
	Moderate smokers	122	17.76
	Heavy smokers	12	1.76
Physical fitness	Very less	237	34.44
	less	93	13.52
	Simply	72	10.46
	Good	85	12.35
	Very good	201	29,21

Correlation between Age and Physical Fitness

In general, age will be able to affect a person in terms of the ability to do physical activity. Someone with an older age will tend to experience limitations in terms of doing physical activity and vice versa. With age comes

the deterioration of organ function. Movement functions such as muscles will become weak and less flexible. Ofcourse this will reduce a person's strength and endurance in doing physical activities.

Table 2

Correlation between Age and Physical Fitness

Age	Physical fitness										P-value
	Very less		less		Simply		Good		Very good		
	n	%	n	%	n	%	n	%	n	%	
≤ 30	3	0.4	0	0	0	0	1	0,1	2	0.3	0.554
31 – 40	81	11.8	35	5.2	16	2.3	24	3.5	70	10.2	
41 – 50	132	19.2	45	6.5	45	6.5	43	6.2	96	13.9	
≥ 51	21	3	13	1.9	11	1.6	17	2.5	33	4.8	
Total	237	34.4	93	13.5	72	10.5	85	12.3	201	29.2	

The formulation of the study hypothesis is as follows:

H0: There is no correlation between age and physical fitness.

H1: There exists a correlation between age and physical fitness.

According to the data presented in the table, the asymptotic significance value, or P Value derived from the Pearson Chi-Square test is 0.554. Given that the asymptotic significance value of 0.554 exceeds the threshold of 0.05, the decision making process indicates that H1 is accepted while H0 is rejected. Based on the results of this study, there is correlation between the age factor and an individual's physical fitness. This proves that

there is a close correlation between the age factor and a individual's capability to perform physical activities. Thus it can be interpreted that "There is a correlation between age and physical fitness".

The correlation between smoking and physical fitness

Smoking is one habit that has an influence on the quality of one's health. Although most people are aware of the adverse effects that smoking can have, it is still a very difficult habit to leave. The table below shows the correlation between the smoking habits of company workers and the impact on the physical fitness of these workers and the results as follows:

Table 3
 correlation between smoking habits and physical fitness

Smoking status	Physical fitness										P-value
	Very less		not enough		Simply		Good		Very good		
	n	%	n	%	n	%	n	%	n	%	
No smoking	162	23.5	67	9.7	52	7.5	57	8.3	130	18.9	0.432
Light smokers	25	3.6	10	1.4	12	1.7	10	1.4	28	4	
Moderate smokers	43	6.2	15	2,2	6	0,8	18	2.6	40	5.8	
Heavy smokers	6	0.8	2	0.3	2	0.3	0	0	3	0.4	
Total	236	34.3	94	13.6	72	10.4	85	12.3	201	29.2	

Study of hypothesis Formulation

H0 : There is no correlation between physical fitness and smoking habit.

H1: There is a correlation between physical fitness and smoking habit.

It is known that the P value or asymptotic significance in the Pearson Chi-Square test is 0.432 based on the table above. Based on the foregoing decision-making process, it can be inferred that H0 is rejected and H1 is approved because the asymptotic significance value is $0,432 > 0,05$. The association between smoking behaviors and physical fitness can be demonstrated by the study's findings. Individual with smoking with a smoking habits typically have lower levels of physical

fitness. The statement "There is a correlation between Smoking Habits with Physical Fitness" can therefore be understood.

The Correlation between Nutritional Status and Physical Fitness

An individual's nutritional status is one of the many component that can result a individual's physical fitness. By having a good nutritional status, it is expected that a person will have a good physical fitness status as well. The association between workers' physical fitness level and their nutritional status as determined by their body mass index is displayed in the table below. From the result's study, the following results were obtained:

Table 4
 Correlation between Nutritional Status and Physical Fitness

Nutritional status	Physical health										P-value
	Very less		not enough		Simply		Good		Very good		
	n	%	n	%	n	%	n	%	n	%	
Underweight	1	0.1	1	0.1	0	0	3	0,4	1	0.1	0.001
Normal	25	3.6	10	1.4	6	0.9	13	1.9	51	7.4	
Overweight	41	5.9	12	1.7	13	1.8	14	2	51	7.4	
Obesity Grade I	126	18.3	55	8	44	6.4	40	5.8	93	13.5	
Obesity Grade II	44	6.4	15	2.2	9	1.3	15	2.2	5	0.7	
Total	237	34.4	93	13.5	72	10.4	85	12.3	201	29.2	

Study of Hypothesis formulation

H0 : There is no correlation between nutrition and physical fitness.

H1 : There is a correlation between nutrition and physical fitness.

It is known that the asymptotic of significance for the Pearson Chi-Square test is 0.001 based on the above table output. Based on the aforesaid decision-making process, it can be inferred that H0 is accepted and H1 is denied since the asymptotic significance value of 0.001

< 0.05 . This indicates that the findings of this study indicate no connection between the physical fitness of employees and their nutritional status.

Thus it can be interpreted that "There is no correlation between nutrition and physical fitness". In this study, an influence test was also carried out with other factors including age and smoking habits on physical fitness whose results showed the influence of these two factors on physical fitness.

DISCUSSION

Age of workers

The results of study showed that most workers were in the age range 41-50 years, namely 361 workers (52.4%). With the age range of workers dominated by age above 40 years, it will be a challenge for the company to manage employee health. There are several risks of

degenerative diseases that may occur in workers including: cardiovascular diseases such as hypertension, impaired heart function and blockage of blood vessels. Reduced muscle mass due to increasing age will affect the ability of workers to perform physical activities, especially in carrying out work activities in the workplace.

According to (Setyawati, 2010), workers between 40-50 years old will experience fatigue faster. Compared to a relatively young workforce, because the older a person gets, there will be a decrease in muscle strength. However, according to (Crawford et al., 2016) it must also be recognized that age-related changes are not the only factors that affect physical ability. Whether or not such changes affect job performance also depends on the nature of the job itself or in other words the demands of the job (Lery F., 2017). Workers' physical strength varies with age, hence age has an impact on it. But experience and mental maturity can counteract this. Because with the experience they have, a person can compensate for the burden they have.

Therefore, the company needs to create a health program that supports the fitness of employees to improve their physical fitness such as providing sports facilities in the company, holding regular weekly gymnastics to providing nutritious food according to the needs of each group of workers. (Anggraini, 2021)

Nutritional Status of Workers

The results of the study showed that the nutritional status of workers was dominated by the obesity level I of 358 workers (52.11%). Meanwhile, only a few workers (15.14%) have nutritional status within normal limits. This shows that most workers have an overweight nutritional status using the Body Mass Index measurement method. To improve the nutritional condition of employees, company stakeholders must consider this with a feeding program in accordance with the nutritional needs of each worker, for example.

The level of nutrition, especially for manual laborers, determines the degree of work productivity. The Directorate General of Community Development of the Indonesian Ministry of Health (1997) states that the diet of workers has an influence on work productivity. People who lack energy will affect work ability, extend the time to complete a job which ultimately reduces work productivity. This disparity in nutritional status may arise from the company's failure with not to supply snacks and dining facilities, forcing employees to bring their own meals. This leads to uneven energy intake and needs and the free purchase of the desired food. (Salsabila, 2021).

Efforts that can be made by the company are to conduct health promotion on the need to consume food with balanced nutrition for workers and knowledge for families about providing good food ingredients in terms of quality and quantity in meeting calorie needs for workers, as well as how to process food properly. Providing food in the office with calorie counts that are adjusted to the type of work and nutritional status of each worker is expected to have a good impact on improving the nutritional status of current workers.

Worker's smoking habit

Smoking is a habit that can damage health and cause various types of diseases that result in morbidity and mortality. (Satriawan, 2022) Many diseases are often associated with smoking including high blood pressure,

heart disease, COPD, distal vascular abnormalities and smoking is also very dangerous for pregnancy (Purwaningsih, 2022). Smoking can have a variety of very negative impacts on health (Ogden, 2010). It can be argued that smoking does not cause death, but rather that it can promote the emergence of certain diseases that have the potential to cause death. Smoking is not the cause of any particular disease (Amanati et al., 2022).

The results showed that most workers did not have a smoking habit as many as 469 workers (68.12%). This shows that awareness of the dangers of cigarette smoke is quite well embedded in the workers' environment. However, health promotion efforts still need to be made for workers who still have a smoking habit. Provide more intense knowledge of the dangers of smoking not only for these workers, but also for their family environment. Enforcing a smoking ban in the company environment and implementing rewards and punishments for those who commit violations are expected to foster awareness for workers to abandon their smoking habits.

Physical fitness of workers

Health examination of workers in the context of organizing work safety is a mandate from Permenaker No. Per.02/MEN/1980, where companies are required to conduct pre-employment health examinations, periodic health examinations and special health examinations. In periodic medical check-ups, companies at least conduct a complete physical examination, physical fitness, lung x-ray if possible and routine laboratory and other examinations deemed necessary.

From this study it can be inferred that the physical fitness status of workers is mostly in the Very less category as many as 237 workers (34.44%) and the less category as many as 93 people (13.52%). This means that almost half of the workers have a fitness status of less to very less. This needs attention from the company to conduct a promotive program in an effort to improve the physical fitness of workers. Forming and activating sports groups in the workers' environment by providing attention and support from the company is expected to provide a trigger for workers to routinely be active in sports according to their interests and hobbies. Companies with sufficient financial capacity can provide sports facilities in the company environment that can be utilized by workers during breaks and after they work.

There are many advantages to being physically active, particularly when it comes to daily tasks. A well-conditioned body does not fatigue quickly, allowing tasks to be completed without difficulty and increasing workers' capacity for work. It also strengthens their resilience to illness and lowers the rate of worker absenteeism. (Andayani et al., 2021)

Correlation between Age and Physical Fitness

From the statistical test of the correlation between age and physical fitness obtained a score of 0.554, this score is greater than 0.05. This score indicates that there is a correlation between age and physical fitness. This proves that age is one of the elements that affect a

individual's physical fitness (Ministry of Health 2012) (Sepriadi, 2021).

According to research by (Oktian, 2015), physical fitness and age have a significant correlation. The risk of physical fitness as determined by cardiopulmonary (VO₂ max) at the age of 18 to 35 years old has a 42-fold higher chance of being fitter than at the age of more than 35 to 45 years old, according to the results of the risk study (Andayani et al., 2021). The theory sourced from Ani (2012), states that age reduces a person's physical fitness level by an average of 8-10% per decade for individuals who are not active in their daily lives or do not like to exercise. Heart and lung endurance will peak at the age of 20-30 years and will experience a decrease of 0.1-1% per year after turning 30 years old. Factors such as decreased heart contraction, heart muscle mass, and total lung capacity cause the decline. Children aged up to 20 years have a maximum increase in heart and lung levels until the age of 30 years, then it will decrease with age over 30 years, this is due to a decrease in the function of the transport organs and the physiological utilization of oxygen that occurs due to age (Gantariadha, 2021).

The outcome of a previous study performed by (Salbian et al., 2016) which linked age with work fatigue showed a meaningful correlation between age and work fatigue and also showed a moderate correlation coefficient with a positive correlation direction. From the results of this study, companies need to create programs that aim to do physical activity and exercise regularly, so that the age factor can be minimized as the cause of a decrease in physical fitness.

The correlation between smoking and physical fitness

Statistical test of correlation between smoking habits in workers with physical fitness retrieved a value of 0.432. This value presents that between the factors of smoking habits in workers and physical fitness have their own correlation. The results of research conducted by (Ringgo, 2023) also state the effect of smoking on physical fitness. The real correlation of smoking on physical fitness is caused by the content of substances contained in cigarettes that can reduce pulmonary and cardiovascular function. Nicotine can cause changes in the structure and function of the airway and lung parenchyma can cause disturbances in the process of ventilation and diffusion, thus inhibiting the exchange of oxygen and carbon dioxide (CO₂). Carbon monoxide has a stronger binding power than oxygen, so CO binds to hemoglobin faster.

Hemoglobin functions as an oxygen carrier throughout the body. The binding of CO to hemoglobin will inhibit the transportation of oxygen to body tissues that need it (Alfarisi et al., 2013). The same study results were also found in a research by (Wondal et al. 2015), which found that Manado City firefighters' cardiovascular fitness and smoking behaviors were correlated. The study by (Rahmawati et al., 2016) found an association between porter workers' physical fitness and their smoking behaviors, yielding similar results.

Herdina, et al.'s 2019 investigation, however, yields different findings. This study shows that among softball players, there was no meaningful correlation between smoking and aerobic endurance. The study by (Ismail et al., 2021), which found no connection between groping tendency and physical fitness, also supports this conclusion. The similar conclusion was drawn from research by (Yuisriati et al., 2018), which found no connection between smoking status and cardiorespiratory fitness levels in ASN in the mayor of North Jakarta's workplace. From these findings, companies need to campaign for the dangers of smoking, as well as make internal regulations related to smoking bans within the company.

The correlation between nutritional status of workers and physical fitness

The correlation statistical test between the nutritional status of workers and physical fitness obtained a value of 0.001. This value performs that there is no correlation between the nutritional status of workers assessed by body mass index and physical fitness. This is in line with the results of research conducted by (Suroto et al., 2015) found that there is no correlation between body mass index and physical fitness of conscientious construction workers of the project (Rifki Nurfadli et al., 2015). The same research results were also obtained in the research of (Nurwahyuni 2021) on employees of the Ministry of Health. In their research, Aprianto and Nurwahyuni stated that there was no meaningful correlation between the nutritional status of workers and physical fitness.

Different results were obtained in research conducted by (Ringgo, 2012) on medical students at Malahayati University, The results of this study indicated that body mass index, or BMI, had an impact on physical fitness. In a research including female students from SMAN 2 Tabanan, (Miqdaddiati, 2021) also found a correlation between physical fitness and body mass index. Luh Nopi Andayani and colleagues, 2021 Accordingly, (Sarahfatin, 2021) likewise found a connection between workers' physical fitness and their nutritional status as determined by their Body Mass Index. (Sepriadi, 2017) also disclosed the findings of a similar study she conducted on primary school pupils, which found a connection between the students' nutritional quality and physical freshness. The results of this study can be caused by other factors that are not measured in this study, such as physical activity or the type of food consumption that is a food source is also not researched. Therefore, companies need to ensure that what workers consume can support the nutritional status of workers properly. One of them is by providing food according to the nutritional needs of each group of workers.

CONCLUSION

This study was conducted to determine the correlation between each factor: age, body mass index, and smoking habits to the physical fitness of workers of

Sholakhuddin, M., & Paskarini, I. (2025). The Relationship Between Nutritional Status, Smoking Habits and Age on the Physical Fitness of Workers in the Tuban Cement Industry. *Gema Lingkungan Kesehatan*, 23(1), 173–181.
<https://doi.org/10.36568/gelinkes.v23i1.255>

one of the cement companies in the city of Tuban. This research was carried out using secondary data from the results of periodic health checks conducted by the company in 2023.

Based on the results of the research conducted, it can be concluded that workers in this company are dominated by workers in the age range of 41-50 years, while the dominant nutritional status in workers is Obesity Level 1, for the results of the analysis of smoking habits most of the workers do not smoke. Meanwhile, the most dominant physical fitness status of workers is at a very low level. In the statistical test of the correlation between age factor and smoking status of workers on physical fitness of workers, a significant correlation was obtained, while the correlation between nutritional status of workers and physical fitness was obtained in the absence of a significant correlation.

This study is expected to provide input to company management in managing worker health and be an input in developing a promotive work program in the field of occupational health so that increasing company productivity supported by healthy workers can be achieved. This research can be used as material and input for the company in managing health activities in the company, such as the provision of sports equipment in each work unit or officially scheduled sports activities from the company.

REFERENCE

Adi, M., Universitas, P., Malang, N., 2019. Hubungan Status Gizi Dan Aktivitas Fisik Dengan Tingkat Kebugaran Jasmani Pada Siswa SMP 1, 138–142. [[Publisher](#)]

Muhammad Humam Nugraha, S. W. (2021). HUBUNGAN ANTARA STATUS GIZI DENGAN KEBUGARAN JASMANI. *Jurnal Pendidikan Olahraga dan Kesehatan*, 19-27. [[Publisher](#)]

Nourmayansa Vidya Anggraini, S. H. (2021). Peningkatan Kebugaran Tubuh Dalam Upaya Peningkatan Kesejahteraan Kerja Bagi Pekerja Di Masa Pandemi Covid 19. *JURNAL IKRAITH-ABDIMAS*, 47-55. [[Crossref](#)], [[Publisher](#)]

Ramadhanti, A. A. (2020). Status Gizi dan Kelelahan terhadap Produktivitas Kerja. *Jurnal Ilmiah Kesehatan Sandi Husada*, 213-218. [[Crossref](#)], [[Publisher](#)]

Amanati, S., Amin, A.A., Astuti, D.N., Widya, U., Semarang, H., 2022. Pengaruh Merokok Terhadap Cardiorespiratory Fitness Effect Of Smoking On Cardiorespiratory Fitness. *J. Fisioter. dan Rehabil.* 6. [[Crossref](#)], [[Publisher](#)]

Bryantara, O.F., 2017. Factors That are Associated to Physical Fitness (VO₂ Max) of Football Athletes. *J. Berk. Epidemiol.* 4, 237. [[Crossref](#)], [[Publisher](#)]

Galih Maharani, 2020. Hubungan Antara Status Gizi dan Aktivitas Fisik dengan tingkat Kebugaran Jasmani (VO₂ Maks) Siswa Kelas X Di SMAN I Kretek Bantul Tahun 2019/2020. *Satuan Tekad Menuju Indones.*

Sehat. [[Publisher](#)]

Gantariadha, N., 2021. Hubungan Indeks Massa Tubuh Terhadap Ketahanan Kardiorespirasi Dinyatakan Dalam Vo₂Max. *J. Med. Utama* 2, 1162–1168. [[Publisher](#)]

Luh Nopi Andayani, N., Dewa Ayu Dwi Primayanti, I., Made Indah Sri Handari Adiputra, L., Studi Sarjana Fisioterapi dan Profesi Fisioterapi, P., 2021. Hubungan Antara Indeks Massa Tubuh (IMT) Dengan Kebugaran Jasmani pada Siswi SMA Negri 2 Tabanan. *Maj. Ilmia Fisioter. Indones.* 9. [[Crossref](#)], [[Publisher](#)]

Munipiddin, Muhammad Husni Tamim, R.N., 2018. Hubungan Status Gizi dengan tingkat kebugaran siswa putri kelas X MA NW Kalijaga Tahun 2018. *Creat. Product. Upcom. Sport Educ. Prof. Hmzanwadi Univ.* 1, 52–61. [[Crossref](#)], [[Publisher](#)]

Ari Purwaningsih, N., Ketut Sutiari, N., 2022. Hubungan Status Gizi dan Kebiasaan Merokok dengan Kebugaran Jasmani Petugas Pemadam Kebakaran BPBD Kota Denpasar. *Arc. Com. Heal.* 9, 451–463. [[Crossref](#)], [[Publisher](#)]

<https://jurnal.harianregional.com/ach/full-95748>

Osrita, G., Welis, W., Rasyid, W., Zarya, F., Ichsan, M., 2020. Pengaruh Status Gizi, Kebugaran Jasmani, Motivasi Belajar Terhadap Hasil Belajar PJOK SD. *J. Pendidik. Jasm. Indones.* 16, 224–239. [[Crossref](#)], [[Publisher](#)]

B., Rosida, T., Ahmad, H., 2020. Hubungan Klasifikasi Perokok dengan Kesehatan Jaringan Periodontal Masyarakat yang Merokok di Pulau Harapan diukur dengan Skor CIPTN. *J. Ris. Hesti Medan Akper Kesdam I/BB Medan* 5, 91. [[Crossref](#)], [[Publisher](#)]

Primasoni, N., 2022. Hubungan antara Indeks Massa Tubuh (IMT) dengan fleksibilitas otot hamstring atlet sepak bola junior Daerah Istimewa Yogyakarta. *JORPRES (Jurnal Olahraga Prestasi)* 18, 66–72. [[Crossref](#)], [[Publisher](#)]

Nurfadli, R., Jayanti, S., Bagian Keselamatan dan Kesehatan Kerja, S., Kesehatan Masyarakat, F., 2015. Hubungan Indeks Massa Tubuh dan Frekuensi Olahraga Terhadap Kebugaran Jasmani Pekerja Konstruksi di PT. PP (persero) Tbk. *Proyek Apartemen Pinnacle Semarang. J. Kesehat. Masy.* 3, 2356–3346. [[Crossref](#)], [[Publisher](#)]

RS Semen Gresik, 2023. Evaluasi Hasil Medical Check Up PT. Semen Indonesia Tahun 2023. Gresik. [[Publisher](#)]

Salsabila, T., Mulyono, 2021. Correlation of Age, Nutritional Status, and Smoking Habits with Work Fatigue in Dome Installation Workers. *Indones. J. Occup. Saf. Heal.* 10, 161–169. [[Crossref](#)], [[Publisher](#)]

Sayyidah, Y., Nastiti, T., 2023. Hubungan antara Status Gizi dan Persen Lemak Tubuh dengan Kebugaran Jasmani pada Atlet Bola Basket Universitas Muhammadiyah Surakarta. *Heal. Inf.* 15, 1–9. [[Publisher](#)]

Sepriadi, A.A., 2021. Manajemen Kebugaran, ke tiga. ed. Padang. [[Publisher](#)]

Suoth, L.F., Pinontoan, O.R., Doda, D. V, 2017. Hubungan

Sholakhuddin, M., & Paskarini, I. (2025). The Relationship Between Nutritional Status, Smoking Habits and Age on the Physical Fitness of Workers in the Tuban Cement Industry . *Gema Lingkungan Kesehatan*, 23(1), 173–181.
<https://doi.org/10.36568/gelinkes.v23i1.255>

Antara Umur, Status Gizi Dan Beban Kerja Fisik Dengan Kejadian Kelelahan Kerja Pada Pekerja Di Pt. Nichindo Manado Suisan. ex Kesmas 6, 1–15.
[Publisher]

Teguh Sukindra, RR Widya Arista, S., 2021. Laporan Kerja Praktik PT. Semen Indonesia (Persero) Tbk. SURABAYA. [Publisher]