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Review Article

Risk Factors Associated with Symptoms of Respiratory Disorders in Brick Industry Workers: Literature Review

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Abstract

Making bricks is an informal home industry with a significant dust exposure risk. Numerous risk factors contribute to respiratory symptoms, including dust exposure, duration of exposure, length of work, type of job, usage of Personal Protective Equipment (PPE), and smoking behaviours. This study examined the association between dust exposure and risk variables for respiratory symptoms in employees in the brick sector. Article searches were carried out through PubMed, Scopus, ProQuest, Science Direct, Portal Garuda Indonesia, Sinta, and Google Scholar. The articles were selected with the following criteria: the dependent variable was symptoms of the respiratory disorder of brick industrial workers, the independent variable was the exposure to dust, open access to full text, and the articles selected with a publication date around 2011-2021. Based on 272 relevant articles, 21 main articles fulfil the criteria. The risk factors indicated above are associated with increased respiratory symptoms, such as reduced vital lung capacity, coughing, shortness of breath, asthma, bronchitis, headaches, and body pains. Recommendations that can be given include adopting a healthy lifestyle that includes regular exercise, appropriate relaxation, abstinence from tobacco, frequent health checkups, and personal protective equipment such as masks.

Keywords: Risk factors; symptoms of respiratory disorder; brick industry

1. Introduction

For a long time, air pollution has been a source of health issues, particularly in industrialized nations with a high concentration of industry activity and motorized vehicles. The usage of fuel and incomplete combustion and additional risk factors such as dust exposure, length of exposure, length of work, type of work, personal protective equipment (PPE), and smoking behaviours. All variables contribute to air pollution caused by industrial activity. Dust particles and gases created by burning bricks are pollutants produced by the red brick business. Dust and gases produced during the red brick production process are present in the workplace, exposing employees to varying quantities and sizes (Hafsari et al., 2015).

The brick industry is an area where bricks are manufactured, complete with equipment and a manufacturing method designed by the industrial owner. Workplace factors are described as possible sources of hazards that may arise in the workplace due to a work procedure. Chemical variables are one of the possible occupational risks. Dust is one of the most prevalent and harmful chemical elements at work (Shaikh et al., 2012).

Workers in the brick industry do three things: transportation (moving clay dust and bricks), moulding (shaping wet clay into bricks), and baking (burning formed bricks in furnaces). Industrial employees are exposed to these contaminants yearly). Inhaling these pollutants may induce lung inflammation, resulting in various respiratory disorders, including bronchitis, emphysema, asthma, and impaired lung function or occupational diseases (Siregar, Wahyuni et al., 2020).

The process of making raw bricks may range from 20,000 to 25,000 pieces, and the procedure might take up to 24 hours. Workers must wait at the burn site to load fuel in the form of firewood, maize cobs, husks, or wood saw debris regularly. This process generates combustion smoke, which includes a variety of pollutants such as CO, SO_2, NO_2 gas, and dust with particle sizes of 2.5 micrometres (PM2.5) and 10 micrometres (PM10) that may irritate workers' respiratory systems (Hussan and Sheikh, 2013).

A work environment full of dust, steam, gas, and other contaminants can interfere with health conditions. This often causes respiratory issues or impairs crucial lung capacity Exposure to fuel-derived pollutants received by industrial workers daily can trigger inflammation in the lungs, which causes various respiratory diseases such as bronchitis, emphysema, asthma, and decreased lung function or occupational diseases (Kazi and Bote, 2019).

The maximum dust concentration in the workplace is 3 mg/m^3 according to the Decree of the Minister of Manpower and Transmigration of the Republic of Indonesia No. 13 of 2011 about Threshold Values for Physical and Chemical Factors in the Workplace. Workers exposed to this dust may have health issues such as a reduction in forced expiratory volume in one second and a decrease in vital capacity volume (Menteri Tenaga Kerja dan Transmigrasi, 2011).

Exposure to dust may precipitate the onset of acute and chronic respiratory diseases. Dust particles that may cause acute respiratory issues include coal dust, cement, cotton, asbestos, chemical compounds, poisonous gases, and dust from rice mills (organic dust). Numerous variables impact the incidence of illnesses or respiratory tract ailments caused by dust. These variables include dust parameters such as particle size, shape, concentration, solubility, chemical properties, and exposure time. Individual aspects include the lungs' defensive systems, the respiratory tract's structure, and physiology (Sutiari et al., 2021).

Epidemiological studies indicate that each increment of 10mg/m^3 PM_{10} increases the incidence of persistent cough by 10% to 25%. Even though they experience these symptoms, employees have never sought medical attention since both symptoms are deemed typical, attributed to the worker's age (Soedjono et al., 2003).

According to the International Labor Organization (ILO) estimation, there are 2.2 million job-related deaths per year, 350,000 of which are fatal accidents and 270 million non-fatal work accidents. Every year, 160 million workers are plagued with occupational diseases. Chronic disease bacteria cause between 30% and 40% of these occupational problems, with 10% resulting in lifelong impairment (International Labour Organization, 2015).

Occupational diseases arise due to a person's job and are unaware of the risk factors present in the workplace. Risky behaviours and environments cause the symptoms of respiratory disorder. Dust exposure might result in acute or persistent respiratory issues. Dust particles that may cause acute respiratory issues include coal dust, cement, cotton, asbestos, chemical compounds, poisonous gases, and dust from rice mills (organic dust) (Sanjel et al., 2016).

Numerous variables impact the incidence of illnesses or respiratory tract ailments caused by dust. These variables include dust parameters such as particle size, shape, concentration, solubility, chemical properties, and exposure time. Individual aspects include the lungs' defensive systems, the respiratory tract's structure, and physiology (Harmanto, 2012).

Symptoms of respiratory disorders develop gradually due to the buildup in the lungs. Aside from environmental exposure, the employees' qualities might impact respiratory tract disorders. Characteristics of workers that affect respiratory disorder symptoms include dust exposure, duration of

exposure, length of work, type of job, usage of Personal Protective Equipment (PPE), and smoking behaviours. Because of the description mentioned earlier, this literature study aims to identify exposure to brick dust and risk factors for employees with respiratory illness symptoms. Furthermore, no one has undertaken a literature review research on the effects of brick industry dust exposure on the symptoms of respiratory illnesses. The advantage of this article is that it may be used as a reading reference or a review article on brick dust exposure and the prevalence of respiratory symptoms in brick industry workers.

2. Methods

This research is based on a review with the type of narrative review. This review aims to synthesize past research findings on the variables linked with respiratory diseases symptoms in brick industry employees. National and international periodicals serve as data sources. The journal search conducted for this study used the keywords' debu bata merah dengan gejala gangguan pernapasan' and 'debu bata merah dengan gangguan fungsi pernapasan' for journals published in the Indonesian language, and the keywords dust exposure symptoms of respiratory disorder in brick craftsmen' and 'respiratory disorder in the brick manufacturing industry' for journals published with the English language. Journals are located using a database such as PubMed, Scopus, ProQuest, Science Direct, Portal Garuda Indonesia, Sinta, and Google Scholar. The publications were chosen based on the observational research design utilized.

Selecting an article starts with a quick scan of the title, followed by a study of the abstract for parallels to the research issue, specifically a link between risk factors and the prevalence of respiratory symptoms. 21 articles matched out of 272 that were discovered. The papers were then chosen for a full-text evaluation based on the inclusion criteria that had been established. The study's inclusion criteria were as follows:

1. Articles published in 2011-2021
2. Articles with the type of observational research
3. Respondents used in the study of red brick industrial workers
4. The dependent variable in the article is symptoms of respiratory disorder
5. The research data in the article is in the form of primary data, which is carried out directly by the researcher

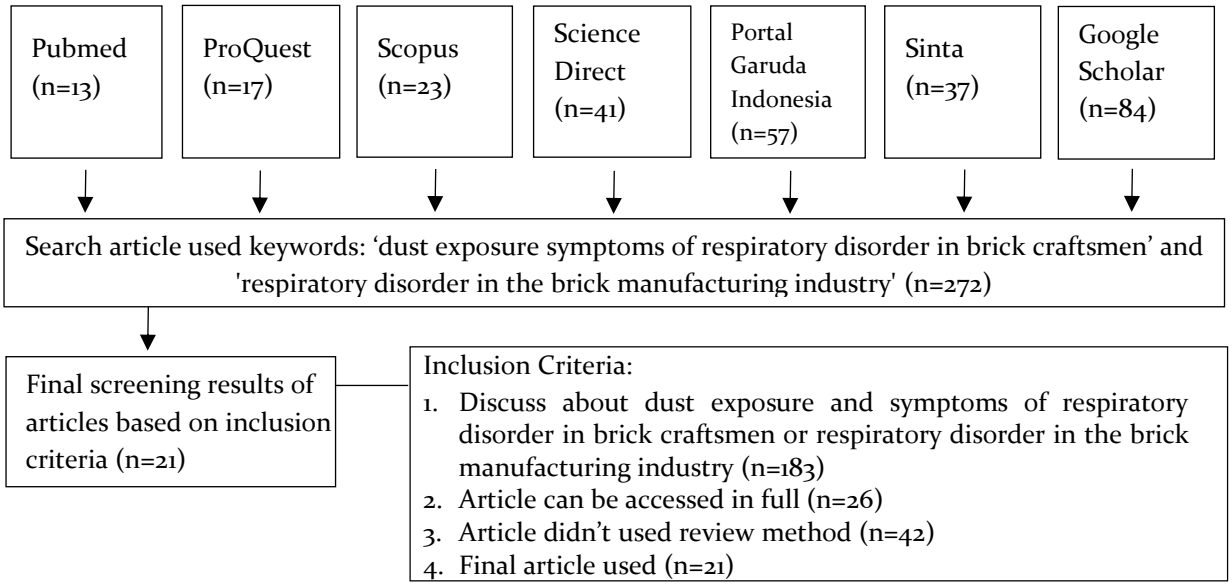

Figure 1. Flow chart screening article

3. Result and Discussion

The papers were researched in developed nations such as Nepal, India, and Indonesia. The type of research in the article being studied is analytic observational. There are cross-sectional twenty-one articles. The research used 21 of 692 samples, based on a review of twenty-one chosen studies.

Not all papers state that the questionnaire was first validated for validity and reliability. Rufiat (2019), Shiraz (2012), Wilda (2020), and Sheta (2015) employed a questionnaire developed from earlier research and tailored to the study site's requirements. The incidence of respiratory symptoms is established using the results of interviews between the researcher and the responder to ensure the validity of the data gathered (Shaikh et al., 2012; Sheta and Laithy, 2015; Siregar, Wahyuni et al., 2020).

According to the findings of a review of ten selected articles, all articles stated that dust from the red brick manufacturing process had a significant relationship with symptoms of respiratory disorders when the p-value of 0.05 or the OR value and the lower and upper limits of the 95 per cent confidence interval (CI) value of more than one was considered. Dust exposure, duration of exposure, length of work, type of work, usage of personal protective equipment, and smoking habit contributes to the causing symptoms of respiratory problems (Gupta et al., 2019).

Table 1. Result synthesis matrix

No	Main Idea	Similarities of Research Findings
1	Dust Exposure (Joshi and Dudani, 2008; Bhat *et al.*, 2014; Das, 2014; Sanjel *et al.*, 2016; Siregar, Wahyuni *et al.*, 2020; Benny Yulianto et al. 2021)	The results of existing research indicate that dust exposure is a risk factor for symptoms of respiratory symptoms in brick industry workers.
2	Exposure Duration (Hour/Day) (Guttikunda, Begum and Wadud, 2013; Bhat *et al.*, 2014; Bijetri and Sen, 2014; Sheta and Laithy, 2015; Navya C J et al., 2017)	The results of existing research indicate that exposure duration is a risk factor for symptoms of respiratory symptoms in brick industry workers.
3	Length of work (Year) (Irjayanti A et al., 2011; Shaikh *et al.*, 2012; Guttikunda, Begum and Wadud, 2013; Sheta and Laithy, 2015; Tandon *et al.*, 2017; Siregar, Wahyuni *et al.*, 2020; Raza and Ali, 2021)	The results of existing research indicate that length of work is a risk factor for symptoms of respiratory symptoms in brick industry workers.
4	Type of Work (Oviera A, Jayanti S and Suroto, 2007; Shaikh *et al.*, 2012; Sheta and Laithy, 2015; Sanjel *et al.*, 2016; Gupta *et al.*, 2019; Ramadhansyah, Dewanti and Setiani, 2020; Siregar, Wahyuni *et al.*, 2020)	The results of existing research indicate that type of work is a risk factor for symptoms of respiratory symptoms in brick industry workers.
5	Usage Of Personal Protective Equipment (PPE) (Pariyar, et al., 2013; Sanjel *et al.*, 2016; Kazi and Bote, 2019; Siregar, Wahyuni *et al.*, 2020; Benny Yulianto et al., 2021; Sutiari *et al.*, 2021)	The results of existing research indicate that usage of personal protective equipment (PPE) is a risk factor for symptoms of respiratory symptoms in brick industry workers.
6	Smoking Habits (Muhammad Ismail *et al.*, 2012; Sheta and Laithy, 2015; Kazi and Bote, 2019; Siregar, Wahyuni *et al.*, 2020; Benny Yulianto et al., 2021; Raza and Ali, 2021)	The results of existing research indicate that smoking habits are a risk factor for symptoms of respiratory symptoms in brick industry workers.

Based on the findings of the article synthesis, symptoms of respiratory diseases were found in the research utilizing a questionnaire to assess whether or not employees had symptoms of respiratory illnesses. The findings of a previous study synthesis identified risk variables that cause the onset of respiratory problems in brick industry employees, such as; dust exposure, duration of exposure, length of work, type of work, usage of personal protective equipment, and smoking habits.

3.1 Dust Exposure

Air pollution is of particular importance since it directly impacts the respiratory system. Air pollution is one of the many manufactured environmental disasters occurring across the planet (Joshi and Dudani, 2008). Pollution is increasing considerably faster in emerging nations than in developed ones. Automobile exhaust, construction emissions, industrial manufacturing emissions, hospital wastes, and other types of pollution are all examples (Sanjel et al., 2016). Depending on the kind of fuel used, brick kilns mainly generate PM, CO, SO2, volatile organic compounds, nitrogen oxides (NO_X), and heavy metals. As public awareness of environmental pollution has grown, government authorities regularly monitor brick kiln emissions (Das, 2014; M Ismail et al., 2012).

Dust is defined as solid particles emitted by biological and inorganic objects due to natural or mechanical processes such as packing, softening, processing, blasting, quick destruction, etc. According to another definition, Dust is a microscopic particle with a solid shape measuring 0.1 to 100 microns that results from mechanical operations such as rubbing, blasting, and crushing a material (Siregar, Wahyuni et al., 2020).

Dust is a substance or particle size of 1 - 500 microns that is suspended in the air (Suspended Particulate Matter). Dust is often used as an indication of indoor and outdoor air pollution. Furthermore, dust is used to assess the amount of risk to the environment and human health (Benny Yulianto et al., 2021).

Air is filtered, warmed, and humidified as it enters the nasal cavity. Dust is breathed as solid particles or a mixture of dust particles and smoke. The hair in the nose filters dust with big and coarse particles size. (Bhat et al., 2014) While this is occurring, fine particles will penetrate the mucosal layer. Dust that enters the lungs produces pulmonary fibrosis, which impairs the flexibility of the lung tissue and results in lung development issues, as well as breathing difficulties such as coughing, coughing up phlegm, shortness of breath, and chest discomfort (Arif, 2008; Jan, 1999).

3.2 Exposure Duration

The length of exposure shows a strong correlation with respiratory illness symptoms. The duration of exposure is when an individual is exposed to dust or contaminants in the environment while doing labour (International Labour Organization, 2014). Theoretically, exposure for seven hours per day increases the likelihood of respiratory disorder symptoms since these employees are exposed for more extended periods, particularly those who do dangerous labour, resulting in an increased risk of exposure (Guttikunda et al., 2013).

This study is in line with research conducted by Bijetri (2014), who concluded from his research that long exposure with a duration of > 7 hours per day had a greater risk of exposure than < 7 hours per day (Bijetri and Sen, 2014). Another study that showed the same results was also found in Wilda (2020), which showed that the length of exposure had a significant value so that the length of exposure was a risk factor for the occurrence of respiratory symptoms ($p = 0.04$). Research conducted by Sheta (2015) showed that the length of exposure was related to the incidence of respiratory disorders ($p = 0.03$) (Sheta and Laithy, 2015; Siregar, Wahyuni et al., 2020).

The longer a worker works, the more dust he is exposed to, and the likelihood of having impaired lung function increases (Yulaekah S and Adi MS, 2007). However, this also depends on the concentration of dust present and the clearance mechanism of each individual, the chemical nature of the dust, dust size, dust particle content, and individual susceptibility (Navya C J et al.,2017).

3.3 Length of Work

According to the research findings, the length of employment has a tangible link with symptoms of respiratory illnesses (Guttikunda et al., 2013). The period of work that has a higher risk of experiencing symptoms of respiratory disorders is a period of work with a period of 5 years because it has a longer risk of exposure than people who work < 5 years, especially if the workplace has a high risk of pollution levels (Irjayanti A et al.,2012).

This study is in line with research conducted by Supriya (2017), which showed that tenure had a significant relationship with the incidence of respiratory symptoms in red brick industrial workers (p <0.05) (Tandon et al., 2017). Another study that showed the same results was also found in the study of Shiraz (2012) with test results (p <0.05) which showed that there was a relationship between a work period and symptoms of respiratory disorders (Shaikh et al., 2012). Likewise, research conducted by Sheta (2015) shows that there is a very significant relationship between a work period and symptoms of respiratory disorders (p = 0.000) (Sheta and Laithy, 2015).

Workers with a working duration of more than 5 years are more likely to have respiratory symptoms because the longer a person works in a dusty work environment, the greater the likelihood of lung damage, and a working period of 5 years will result in respiratory symptoms (Irjayanti et al., 2012), (Raza and Ali, 2021; Siregar, Wahyuni et al., 2020).

3.4 Type of Work

The sort of labour discussed here is one in which the degree of exposure is similar to that obtained by employees while doing their duties (Guttikunda et al., 2013). There are three jobs involved in manufacturing bricks: transportation, moulding, and baking (Sanjel et al., 2016). Moulding is a procedure that transforms the material into a rectangular shape. Baking is the technique of burning at medium heat to burn the bricks gently (Siregar, Wahyuni et al., 2020). Following moulding and baking, the bricks are positioned using a torch. (Myson, 2018) used on these three vocations, they may be classified as dangerous occupations, such as moulding and styling, or non-risky professions, such as baking. In principle, those who do dangerous labour have a more significant chance of developing respiratory symptoms because they encounter more contaminants than people who do not perform dangerous work (Ramadhansyah et al., 2020).

This study is in line with research conducted by Shiraz (2012) which shows that the type of work influences respiratory symptoms, both in the moulding and baking processes, with a p-value of <0.0. (Shaikh et al., 2012). Another study showed the same results were also found in the Wilda study (2020), which said that the type of work had a relationship with symptoms of respiratory problems because the majority of workers with this type of baking work experienced more coughing and shortness of breath than those who were moulding (Siregar, Wahyuni et al., 2020). Likewise, research conducted by Sheta (2015) shows that there is a very significant relationship that the type of work has a strong relationship with the incidence of respiratory symptoms (p = 0.000) (Sheta and Laithy, 2015).

According to this idea, persons who work in high-risk jobs have a greater chance of acquiring respiratory symptoms because those in high-risk occupations have a greater danger of exposure to pollutants. Risky behaviours and working environments bring about occupational illnesses (Oviera A et al., 2007).

3.5 Usage of Personal Protective Equipment (PPE)

The use of Personal Protective Equipment (PPE) in the form of masks is one of the risk factors for respiratory symptoms. The use of masks is one of the efforts that can be made to reduce the number of dust pollutants inhaled by each worker (Pariyar et al., 2013). On average, workers who do work do not use personal protective equipment in the form of masks, which indirectly increases the risk of developing respiratory symptoms because workers make direct contact with polluters, especially workers who do risky work with higher pollutant levels (Wahyuni et al., 2016).

This study is in line with research conducted by Wilda (2020), which says that the usage of personal protective equipment has a relationship with symptoms of respiratory disorders (Siregar et al., 2020). Another study showing the same results were also found in Beny's (2021) study, which found that 58 out of 70 respondents did not use personal protective equipment when working (Benny et al., 2021) and research conducted by I Gusti (2021) found that the use of personal protective equipment influenced the incidence of respiratory symptoms (p = 0.04) (Sutiari et al., 2021).

According to theory, compliance with the use of personal protective equipment is a risk factor that can cause problems if workers do not use it, mainly when working in a hazardous environment because it allows direct contact with dust levels, allowing the dust to be inhaled and settle in the respiratory organs and respiratory tract (Pariyar et al., 2013; Sanjel et al., 2016).

Most workers lack the initiative to use masks independently due to the area's location and the type of work that generates a lot of dust. However, using masks made of cloth/clothes has not been effective in containing dust that enters due to the size variation of the dust particles (Kazi and Bote, 2019).

3.6 Smoking Habits

According to the study's findings examined, smoking habits have a significant association with the symptoms of respiratory illnesses (Ismail et al., 2012). Cigarettes are unhealthy products since they contain hazardous and irritating compounds such as nicotine, carbon monoxide, and tar. Nicotine constricts the pulmonary terminal bronchioles, increasing resistance to airflow (Kazi and Bote, 2019). Moreover, irritation from cigarette smoke increases fluid secretion in the bronchi; and nicotine may paralyze the cilia that transport excess fluid, resulting in fluid buildup and difficulty breathing (Benny Yulianto et al., 2021).

Theoretically, smoking has a fourfold probability of producing blockage compared to non-smokers. Smoking may alter the structural and functional characteristics of the respiratory system and lung tissue. Tobacco use will hasten the loss of lung function. The annual decrease in forced expiratory volume is 28.7 mL for active smokers (Wahyuni and Ekawati, 2020).

This finding is in line with the research conducted by Rufiat (2019), which showed that smoking was a risk factor in the incidence of respiratory symptoms in red brick industrial project workers with a percentage of 24.5% of 420 workers (Kazi and Bote, 2019). Another study that showed the same results was also found by Ali Raza (2021), which showed that workers with smoking habits experienced a decrease in FVC and FEV1 compared to non-smokers on measurements using spirometry (Raza and Ali, 2021). Another study conducted by Sheta (2015) showed that there was a significant relationship between smoking habits and symptoms of respiratory disorders (p = 0.01) (Sheta and Laithy, 2015). Smokers' mucosal cells and mucus glands may expand. While in the small respiratory tract, mucus might accumulate due to channel constriction caused by cigarette smoke and dust from the work environment (Brinkman and Coates, 1963; International Labour Organization, 2014).

3.7 How to Prevent Symptoms of Respiratory Disorder?

a. Healthy Lifestyle (Regular Exercise and Getting Enough Rest)

According to Apsari's 2018 research, the causes of respiratory symptoms in workers with a history of lung disease include a lack of maintaining a healthy lifestyle such as exercise and having time to rest and smoking habits because it will worsen lung conditions that have previously experienced problems (Apsari et al., 2018).

People who live a healthy lifestyle, such as avoiding smoking, getting enough rest, and exercising regularly, impact their lungs' critical capacity (Putra, 2015). According to Chandra's 2019 research, regular exercise, including mild and vigorous activities, causes the respiratory tract to grow slower and deeper because physical activity causes the respiratory muscles to become more elastic and vigorous (Chendra and Lontoh, 2019).

Physical activity affects the organs so that the organ's function is more efficient, and the maximal working capacity obtained is larger. People who engage in physical activities breathe more slowly and deeply. Rest is required to allow bodily organs, especially the respiratory organs, to relax (Siregar et al., 2020). Physical exercise can strengthen the respiratory muscles because physical activity causes adaptation to the lungs to breathe deeply and slowly, reducing the oxygen required for muscle work in the ventilation process so that the trained muscles can work more effectively with the same amount of oxygen (Atan et al., 2012).

b. Quit Smoking

People who smoke inadvertently harm the structural organs of the body, including the respiratory organs, owing to a buildup of chemicals in the lungs and respiratory tract. If they do not quit, the person is likely to have respiratory symptoms (Darmanto, 2007). According to a 2014 study done by Putra, the behaviour of smoking continually can cause deadly harm to organs, including the lungs, if not halted because the chemicals in cigarettes will settle, creating constriction of the respiratory tract (Putra, 2015).

The smoking habit variable in this study did not associate with respiratory symptoms. However, it was related in theory, so things that can be done to reduce the risk of respiratory symptoms include quitting smoking, getting regular health checks, and maintaining a healthy lifestyle that includes exercise and adequate rest (Suharto, 1978).

Quitting smoking reduces the number of hazardous chemicals that enter the body, preventing organs such as the lungs from suffering more severe damage and, if done early, reducing the chance of respiratory problems. various strategies to lessen the harms of smoking, such as outlining the downsides and rewards of smoking and avoiding hanging out with smokers (Putra, 2015).

c. Obedience in Using Personal Protective Equipment (PPE) and Regular Health Checks

According to the findings of Putra's 2014 research, alternative solutions to reduce the risk of recurrence or the emergence of respiratory disease include workers wearing personal protective equipment, performing routine health checks on workers, particularly those with a history of lung disease, and exercising regularly to get the lung muscles used to pumping air when workers do heavy work (Putra, 2015).

Furthermore, utilizing personal protection equipment like masks will protect you from exposure to pollutants such as dust, preventing dust from being breathed into the respiratory system and accumulating there, causing blockage of the respiratory tract and respiratory difficulties (Yulaekah and Adi, 2007).

According to Ipmawati research completed in 2018, alternate solutions to difficulties include medical check-ups performed at the beginning of work acceptance to determine employees' health state and providing Personal Protective Equipment to lower inhaled dust levels (Ipmawati, 2018).

Preventive measures such as personal protective equipment in the form of masks may be taken to lower the degree of risk of respiratory disorder symptoms for employees, and the quantity of dust breathed can be reduced so that the probability of symptom occurrences can be reduced. Respiratory problems may be reduced (Yulaekah and Adi, 2007).

Moreover, the management can facilitate periodic health checks with the assistance of company doctors or call local health workers to determine whether the worker performing project work has lung disease or not. Measures can be taken against workers who already have respiratory symptoms.

4. Conclusions

Dust exposure in the brick industry is one of the factors of respiratory symptoms, and there are still many examples where dust exposure is associated with respiratory symptoms. There is very little community knowledge of respiratory symptom prevention. In addition to a lack of education for

employees, workers pay less attention to themselves to the point where they believe these workers need medical treatment because they have respiratory difficulties. Few studies have rigorously analyzed this issue, and fewer have measured the emissions factors and/or modelled their contribution to the ambient particulate pollution levels.

A respiratory disorder may be discovered by indications of interview results utilizing a questionnaire with numerous criteria such as cough (ordinary or with phlegm), shortness of breath, and chest discomfort, and if left untreated, can develop into severe issues such as asthma and bronchitis caused by smoking behaviours, kind of job, duration of exposure, working time, and the usage of personal protection equipment in the form of masks. Additionally, you may employ a reduction in the value of lung capacity to get more detailed findings. Based on theory, recommendations include adopting a healthy lifestyle that includes regular exercise, appropriate relaxation, abstinence from tobacco, frequent health checkups, and personal protective equipment such as masks.

References

Apsari, L., Budiyono, Setiani O. 2018. Hubungan paparan debu terhirup dengan gangguan fungsi paru pada pekerja pertambangan pasir dan batu perusahaan x rowosari Kota Semarang. Jurnal Kesehatan Masyarakat. 6.

Arif, M. 2008. Asuhan keperawatan klien dengan gangguan sistem pernapasan. Salmeka Medika, Jakarta.

Atan, T., Akyol, P., Cebi, M. 2012. Comparison of respiratory function of athletes engaged in different sports branches. Turkish Journal of Sport and Exercise. 14, 76–81.

Benny, Y., Nadhiya, S., Zhaky W. 2021. Gangguan pernapasan, kadar debu di pembuatan batu bata di kecamatan tenayan raya. PREPOTIF : Jurnal Kesehatan Masyarakat. 5.

Bhat, M.S., Afeefa, Q.S., Ashok, K.P., Bashir, A.G., 2014. Brick kiln emissions and its environmental impact: A Review. Journal of Ecology and The Natural Environment. 6, 1–11.

Bijetri, B., Sen, D., 2014. Occupational stress among women moulders : a study in manual brick manufacturing industry of west bengal. International Journal of Scientific and Research Publications. 4, 1–7.

Brinkman, G.L., Coates, E.O. Jr., 1963. The effect of bronchitis, smoking, and occupation on ventilation. The American Review of Respiratory Disease. 87, 684–693.

Chendra, S., Lontoh, SO., 2019. Hubungan olahraga terhadap kapasitas paru. Tarumanagara Medical Journal. 2, 176–179.

Darmanto, D. 2007. Respirologi. Jakarta : Penerbit EGC.

Das, B., 2014. Assessment of occupational health problems and physiological stress among the brickfield workers of West Bengal, India. International Journal of Occupational Medicine and Environmental Health. 27, 413–425.

Gupta, R., Gupta, R., Jan, R., Langer, B., Gupta, R.K., Singh, P. 2019. Prevalence of respiratory morbidity among brick kiln workers: a cross-sectional study from rural north India. International Journal of Research in Medical Sciences. 7, 1506.

Guttikunda, S.K., Begum, B.A., Wadud, Z. 2013. Particulate pollution from brick kiln clusters in the Greater Dhaka region, Bangladesh. Air Quality, Atmosphere & Health. 6, 357–365.

Hafsari, D., Ramadhian, M.R., Saftarina, F. 2015. Debu batu bara dan kejadian infeksi saluran pernafasan akut pada pekerja pertambangan batu bara. Majority. 4, 35–41.

Harmanto, A., 2012. Pengaruh paparan debu terhadap kapasitas fungsi paru pekerja pembakaran batubata di Kecamatan Kebakramat Karanganyar. Kedokteran. 34.

Hussan, A., Sheikh, M.A. 2013. Impact of brick kiln and vehicular emissions on lichen diversity in khanabal area of anantnag district (J&K). International research journal of environmental sciences. 2, 30–33.

International Labour Organization. 2014. Occupational health and safety an assessment of child workers in Nepal's brick industry.

International Labour Organization. 2015. Preventing lung occupational diseases in Indonesia.

Ipmawati, P.A. 2018. Analisis Faktor risiko gangguan fungsi paru pada pekerja proyek pembangunan beton bendung sabo dam kali putih Kecamatan Salam Kabupaten Magelang. Universitas Diponegoro.

Irjayanti, A., Nurjazuli., Suwondo, A., 2011. Hubungan kadar debu terhirup (respirable) dengan kapasitas vital paksa paru pada pekerja mebel kayu di Kota Jayapura. Jurnal Kesehatan Lingkungan Indonesia. 11, 182–186.

Ismail, M., Muhammad, D., Khan, F.U., Munsif, F., Ahmad, T., Ali, S. 2012. Effect of brick kilns emissions on heavy metal (Cd and Cr) content of contiguous soil and plants. Sarhad Journal of Agriculture. 28, 165–170.

Jan T. 1999. Patofisiologi untuk Keperawatan. Jakarta : Penerbit EGC.

Joshi, S.K., Dudani, I. 2008. Environmental health effects of brick kilns in Kathmandu valley. Kathmandu University Medical Journal (KUMJ). 6, 3–11.

Kazi, R.N., Bote, M.M. 2019. A cross-sectional study to determine the health profile of brick kiln workers. International Journal Of Community Medicine And Public Health. 6, 5135.

Menteri Tenaga Kerja dan Transmigrasi. 2011. Peraturan Menteri Tenaga Kerja dan Transmigrasi Nomor 13 Tahun 2011 tentang Nilai Ambang Batas Faktor Fisika dan Faktor Kimia di Wilayah Kerja.

Myson, M. 2018. Peluang efisiensi tungku pembakaran bata merah di Daerah Setiti Kabupaten Muaro. Jurnal Civronlit Unbari. 3, 89.

Navya, C.J., Deepthi, S., Naveen, R., Swathi, S., Laviena, M, K.T. 2017. Morbidity Profile of workers in brick kilns under a gram panchayat, South India. National Journal of Community Medicine. 8, 104–108.

Oviera, A., Jayanti, S., Suroto. 2007. Faktor-faktor yang berhubungan dengan kapasitas vital paru pada pekerja industri pengolahan kayu di PT.X Jepara. Jurnal Kesehatan Masyarakat. 5, 24–32.

Pariyar, S.K., Das, T., Ferdous, T., 2013. Environment and health impact for brick kilns in Kathmandu Valley. International Journal of Scientific & Technology Research. 2, 184–187.

Putra, N.D. 2015. Faktor-faktor yang berhubungan dengan kapasitas vital paru pada pekerja bengkel las di Kelurahan Cirendeu Tahun 2014. Jurnal Fakultas Kedokteran dan Ilmu Kesehatan Masyarakat UIN Syarif Hidayatullah Jakata. 4, 30–8.

Ramadhansyah, M. F., Astorina Y.D.N., Onny, S. 2020. Dust exposure and symptomps of respiratory disorder on worker of Sikatak Bridge Development Project. In E3S Web of Conferences. 202, p. 12002.

Raza, A., Ali, Z. 2021. Impact of air pollution generated by brick kilns on the pulmonary health of workers. Journal of Health and Pollution. 11.

Sanjel, S., Thygerson, S.M., Khanal, S.N., Joshi, S.K. 2016. Environmental and occupational pollutants and their effects on health among Brick Kiln Workers. Open Journal of Safety Science and Technology. 06, 81–98.

Shaikh, S., Nafees, A.A., Khetpal, V., Jamali, A.A., Arain, A.M., Yousuf, A. 2012. Respiratory symptoms and illnesses among brick kiln workers: a cross-sectional study from rural districts of Pakistan. BMC Public Health 12, 999.

Sheta, L.E. 2015. Brick kiln industry and workers' chronic respiratory health problems in Mit Ghamr District, Dakahlia Governorate. Egyptian Journal of Occupational Medicine. 39, 37–51.

Siregar, W.W., Sihotang, Hidayat. S., Octavariny. R., Perangin- Angin, Wirandana. M. 2020. Hubungan paparan debu dengan gangguan pernafasan pada pekerja pembuatan batu bata di Jati Baru. Jurnal Kesehatan Masyarakat dan Gizi. 3. 81–90.

Soedjono, S. O., Wahyuningsih, N.E. 2003. Pengaruh kualitas udara terminal terhadap gangguan fungsi paru pada pedagang tetap terminal bus Induk Jawa Tengah. Jurnal Kesehatan Lingkungan Indonesia. 2, 27–31.

Suharto, 1978. Peningkatan kondisi fisik. Cermin Dunia Kedokteran.

Pramesti, I. G. A. A. V.,Sutiari, N. K. 2021. Determinan gangguan kapasitas fungsi paru-paru pada perajin batu bata merah di Kabupaten Badung. Health, 16.

Tandon, S., Gupta, S., Singh, S., Kumar, A. 2017. Respiratory abnormalities among occupationally exposed, non-smoking brick kiln workers from Punjab. Indian Journal of Occupational and Environmental Medicine. 8, 166–173.

Wahyuni, I., Ekawati, E. 2016. Analisis bahaya dan penilaian kebutuhan APD pada pekerja pembuat batu bata di Demak, Jawa Tengah. Jurnal Fakultas Kesehatan Masyarakat Universitas Ahmad Daulan, 10(1), 29-36.

Yulaekah, S., Adi, M.S. 2007. Pajanan debu terhirup dan gangguan fungsi paru pada pekerja industri batu kapur (studi di Desa Mrisi Kecamatan Tanggungharjo Kabupaten Grobogan). Jurnal Kesehatan Lingkungan Indonesia. 5, 24–32.