

Effect of dust pollution from construction sites on on-site construction workers.

Efecto de la contaminación por polvo de los sitios de construcción en los trabajadores de la construcción en el sitio.

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ABSTRACT

The concern for air pollution and its associated problems are increasing day by day. Unfortunately, construction industry is among the top contributors to air pollution since most of the activities like excavation, tile cutting etc taking place in construction sites result in the generation of dust. These emissions cause negative impacts on humans as well as on the environment. A lack of awareness among construction workers, contractors etc regarding the ill-effects of dust pollution result in these problems not being considered seriously or tackled properly. The identification of dust sources as well as its health consequences and other aspects in construction sites can help increase awareness and aid in the execution of control measures. This could help to reduce dust pollution in construction sites. Here, the health impacts that construction dust cause on on-site construction workers were studied by interviewing the workers. From the data obtained from questionnaire survey, it was found that workers directly involved with dust generating construction activities like wall polishing and tile cutting experienced more health problems compared to other workers. Majority of workers experienced respiratory problems. From correlation analysis, it was found that experience of workers and their age had a moderate correlation with health problems experienced. Some of the dust control measures suggested include regular site monitoring, implementation of control measures designed specifically to reduce the generation of dust from activities causing highest quantities of dust and regular site cleaning.

Keywords—air pollution, construction industry, health impacts, questionnaire survey, dust control.

RESUMEN

La preocupación por la contaminación del aire y los problemas asociados aumentan día a día. Desafortunadamente, la industria de la construcción se encuentra entre los principales contribuyentes a la contaminación del aire, ya que la mayoría de las actividades como excavación, corte de baldosas, etc. que se llevan a cabo en los sitios de construcción dan como resultado la generación de polvo. Estas emisiones provocan impactos negativos tanto en los seres humanos como en el medio ambiente. La falta de conciencia entre los trabajadores de la construcción, los contratistas, etc. acerca de los efectos nocivos de la contaminación por polvo hace que estos problemas no se consideren seriamente o no se aborden adecuadamente. La identificación de las fuentes de polvo, así como sus consecuencias para la salud y otros aspectos en las obras de construcción, puede ayudar a aumentar la conciencia y ayudar en la ejecución de medidas de control. Esto podría ayudar a reducir la contaminación por polvo en los sitios de construcción. Aquí, los impactos en la salud que causa el polvo de la construcción en los trabajadores de la construcción en el sitio se estudiaron mediante entrevistas a los trabajadores. A partir de los datos obtenidos de la encuesta por cuestionario, se encontró que los trabajadores directamente involucrados con actividades de construcción generadoras de polvo, como el pulido de paredes y el corte de baldosas, experimentaron más problemas de salud en comparación con otros trabajadores. La mayoría de los trabajadores experimentó problemas respiratorios. A partir del análisis de correlación, se encontró que la experiencia de los trabajadores y su edad tenían una correlación moderada con los problemas de salud experimentados. Algunas de las medidas de control de polvo sugeridas incluyen el monitoreo regular del sitio, la implementación de medidas de control diseñadas específicamente para reducir la generación de polvo de las actividades que causan mayores cantidades de polvo y la limpieza regular del sitio.

Palabras clave: contaminación del aire, industria de la construcción, impactos en la salud, encuesta por cuestionario, control del polvo.

INTRODUCTION

Both emerging and developed countries have seen significant increases in air pollution. Vehicle emissions, fossil fuel burning, factory emissions, dust emissions, and other sources of air pollution are all sources of pollution. One of the major sources of dust pollution is the construction industry. The majority of the operations required to complete a project can result in the production of dust. Transportation of raw materials, surplus materials, or waste products to and from the construction site, as well as the operation of construction equipment, are all potential sources of dust [1],[7],[14]. These activities produce dust, which is discharged into the environment and can have a substantial impact on the air quality of the surrounding area

[8]. These dust emissions have an impact on site workers' health as well [3],[11]. All parties involved in the construction industry should have proper awareness regarding the ill effects of construction dust being generated in sites. Such awareness can help promote the search for alternatives with lesser dust generation and can also help in the implementation of dust control measures in sites [6]. These measures can result in a substantial decrease in the contribution of construction industry towards air pollution.

MATERIAL AND METHODS

The study of health impacts on on-site construction workers were done by conducting interviews. A total of 90 on-site construction workers belonging to different age groups and engaged in various occupations from different sites were interviewed for this purpose. The workers were asked about the health problems experienced due to the dust generated in construction sites. The workers were categorised based on their occupations as masons, painters, aluminium fabrication workers, steel and concrete labourers and helpers. 15 workers from each of these 6 occupations were interviewed for this study. The age distribution and experience of workers taken for the interview is given in Fig. 1 and Fig. 2. Workers who get directly involved in dust generating activities like tile cutting, wall polishing, drilling etc are categorised as helpers.

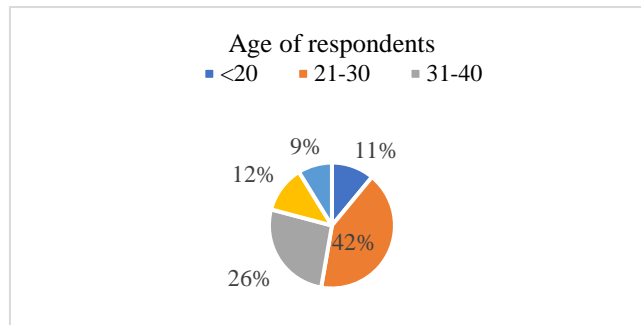


Fig 1; Age distribution of workers interviewed

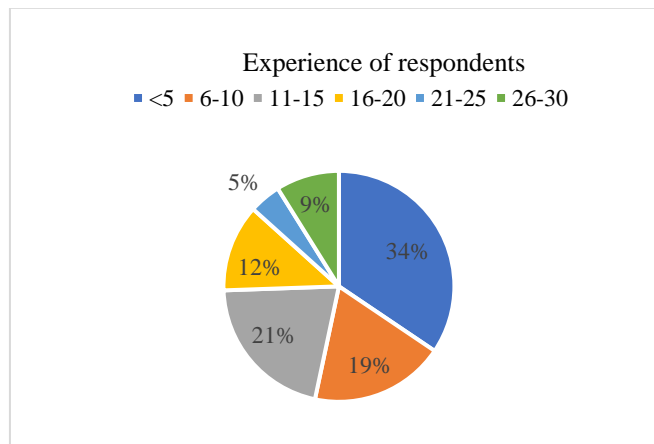


Fig2; Experience of workers interviewed

RESULTS AND DISCUSSIONS

Tile cutting, drilling, wall polishing, loading and unloading of construction materials etc are some of the common sources of dust in construction sites. The problems experienced by on-site construction workers because of this dust were studied through interviews. Out of the total 90 workers who were interviewed, 49 workers experienced health problems. The number and percentage of workers with health problems and corresponding occupation is given in Table 1.

Table 1; Percentage of workers who experienced health problems

Occupation	Percentage of workers who experienced health problems (%)
Mason	18.36
Painters	14.28
Steel labourers	12.24
Concrete labourers	18.36
Aluminium fabrication workers	14.28
Helpers	22.45

It was found that among the workers employed in different occupations who were interviewed, majority of workers employed as helpers experienced health problems due to exposure to dust in construction sites. That is, 11 out of 15 on-site construction workers employed as helpers in sites experienced health problems. Helpers are those site workers who are directly involved in activities that generate dust. This category of workers normally carries out activities like tile cutting, drilling, and material movement in sites etc which are all chief sources of dust in construction sites and therefore are the most affected by the dust generated during these activities. This is followed by masons and concrete labourers with 18.36% of them experiencing health problems. The workers involved in these works are also exposed to small amounts of dust during the execution of concreting and brickworks although not as much as those employed as helpers. Among the respondents, workers employed as steel labourers had the least health problems compared to others. Among the different health problems mentioned by the interviewees like rashes, allergies etc, respiratory problems were the health problem experienced by the majority of respondents. The dust generated from these construction activities are mainly present as particulate matter which may be PM 2.5 (particulate matter whose size is less than 2.5 micrometre) or PM 10 (particulate matter whose size is less than 10

micrometre). Particulate matter, when inhaled, can easily penetrate deep into lungs and cause respiratory problems [15].

A correlation analysis was done using SPSS software so as to analyse the relation between age and experience of respondents and health problems experienced by them. On analysis, the value of correlation between age and health was 0.552 and that for relation between experience and health was 0.602. When asked about their usage of masks and whether Covid 19 pandemic has influenced their mask usage, workers responded that under normal conditions, most of the workers preferred to execute construction activities without masks Covid 19 pandemic affected majority of workers' usage of masks and has helped in reducing the effect of dust from sites.

As conclusions, construction industry is one of the major contributors to air pollution. Most of the activities carried out in sites like material movement, tile cutting, site cleaning etc results in the generation of dust. The dust generated on site can cause many problems to both humans and the surrounding environment. The fine dust particles, if inhaled, can cause serious health problems to the workers. From the study, it can be seen that on-site construction workers, especially, those directly involved in dust generating activities, have experienced health problems, mainly respiratory problems. Making the usage of appropriate respirators while working, especially those directly involved with dust generating activities, strict, regular site cleaning, sprinkling of water, adjusting schedule of the construction project based on physical conditions like wind at site etc are some of the methods that can be implemented for dust control in construction sites.

But, due to the lack of awareness among the workers regarding the seriousness of this health problems and the impact it can have on their lives, the workers do not consider dust and the related problems to be a serious issue. Therefore, creating proper awareness regarding ill effects of dust and the need for dust control in construction sites among the contractors and workers can go a long way in reducing the overall negative impacts of construction industry.

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