

► Ways to improve occupational safety and health in the natural stone industry in India



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► Ways to improve occupational safety and health in the natural stone industry in India



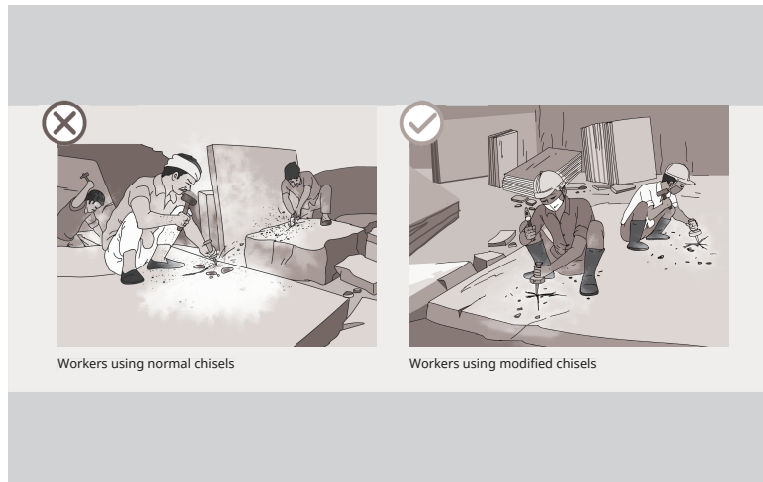
► Using the “Ways to improve occupational safety and health in the natural stone industry in India” flipbook

This pictorial flipbook “Ways to improve occupational health and safety in the natural stone industry in India” has been developed under the ILO initiative ‘Paving the way for sustainable development of natural stone industry in Rajasthan’ funded by the Government of Flanders (Belgium). It aims at promoting good practices on occupational safety and health (OSH) in the workplace of micro and informal enterprises in the natural stone industry. It specifically targets the workers and employers in stone processing units, generally located in peri-urban and rural areas, to build their awareness about the link between productivity and OSH and provide them low-cost solutions to make their workplaces safe and productive. This visual flipbook will be useful for facilitators from trade unions, employers’ organizations, industry associations, non-government organizations (NGOs), safety committee members and workers themselves.

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► 1. Reduction of dust exposure in manual natural stone mining



Dust is a major health hazard in natural stone mining. Harmful dust containing silica and other hazardous substances are released when chisels, hammers or jackhammer drills are used to drill holes in blocks of stone. Regular exposure to silica dust causes silicosis and can also lead to pulmonary tuberculosis. Dust exposure must be minimized to prevent silicosis and other occupational diseases.

Benefits

1. The likelihood of silicosis and other lung diseases is reduced
2. Better health outcomes and reduced expenses on medical treatment
3. The use of modified chisels is well accepted by workers and cost-effective
4. Higher productivity

► 1. Reduction of dust exposure in manual natural stone mining

How to prevent exposure to silica dust and its ill effects

1. Increase awareness about dust diseases and the need to prevent and control emissions
2. Always wet the surface of the stone before making holes
3. Use modified chisels with sponge diaphragms to trap dust
4. Always use approved masks to prevent inhalation of dust
5. Avoid eating, chewing, drinking and smoking in dust-filled areas



Workers using normal chisels

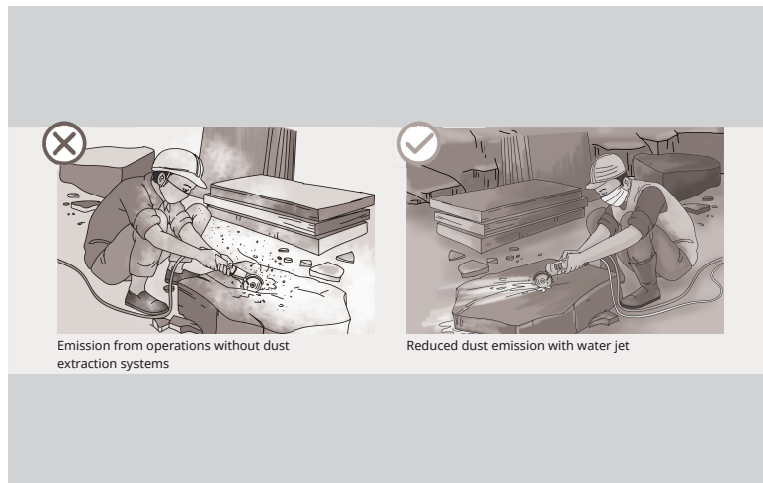


Workers using modified chisels

**Take home
message**

Wetting stone surfaces, using modified chisels and wearing approved masks reduce dust exposure and the risk of silicosis and other lung diseases

► 2. Controlling dust emissions during stone carving operations



Stone carving and sculpting is invariably carried out in small and unorganized units often involving family members. Cutting, grinding and chiselling operations are carried out manually or with handheld stone cutters, grinders and chisels. The processes are extremely dusty and mostly carried out without any dust control measures. A large number of cases of silicosis and other dust-related diseases have been reported among stone carving and sculpting workers.

Benefits

1. The likelihood of silicosis and other lung diseases is reduced
2. Better health outcomes and reduced expenses on medical treatment
3. Higher productivity and product quality

► 2. Controlling dust emissions during stone carving operations

How to reduce dust emission in cutting, grinding and chiselling operations

1. Increase awareness about dust diseases and the need to prevent and control emissions
2. Always wet the stone surface before cutting, grinding and chiselling
3. Never use handheld cutters, grinders and chisels without water jets or another dust extraction system
4. Ensure that you sit in such a way that dust is carried away from you
5. Always use good quality masks to prevent inhalation of dust



Emission from operations without dust extraction systems



Reduced dust emission with water jet

▶ 3. Creating awareness about prevention of silicosis



Silicosis is an occupational lung disease caused by inhalation of airborne silica dust. The disease is most prevalent among persons engaged in mining, quarrying, stone carving, crushing, grinding and sand blasting operations.

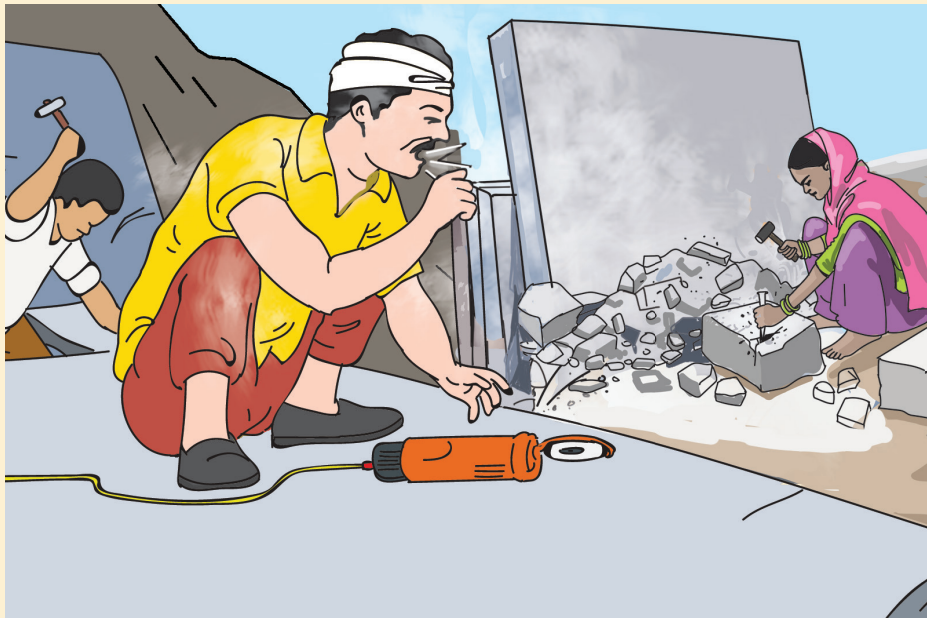
When workers inhale the crystalline silica, the lung tissue reacts by developing fibrotic nodules and scarring around the trapped particles. If these nodules grow too large, breathing becomes difficult and death may result.

Silicosis victims are also at a higher risk of developing active tuberculosis or lung cancer.

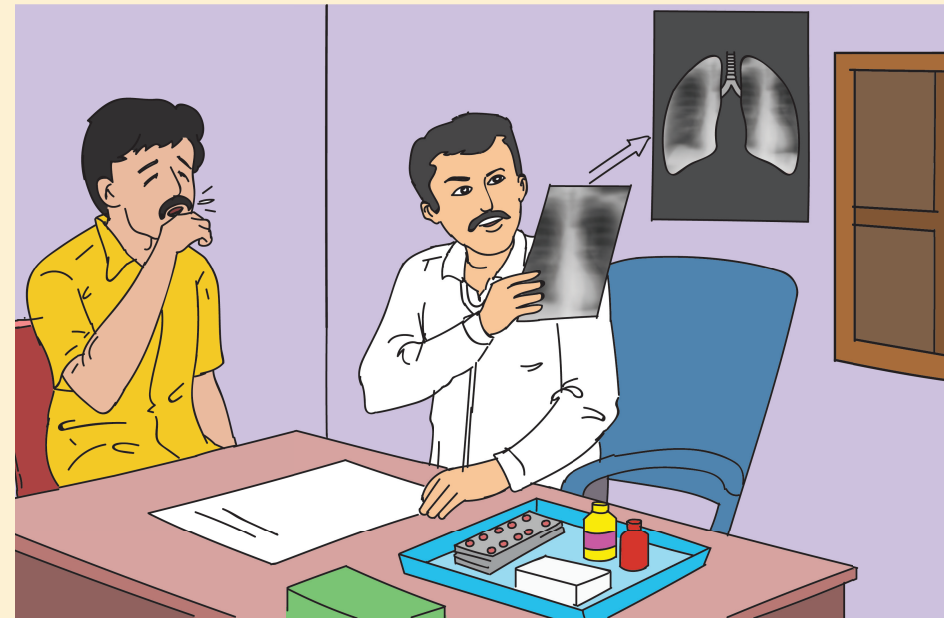
► 3. Creating awareness about prevention of silicosis

How to prevent silicosis

1. Organize awareness programmes about silicosis and its prevention for workers and employers
2. Put up posters and displays in local languages about ways to prevent dust exposure
3. Implement dust control and suppression measures at work to prevent exposure to dust (see section 1 and 2)
4. Use dust masks to reduce inhalation of dust (see section 6)
5. Implement regular medical check-ups of workers to detect silicosis early (see section 13)

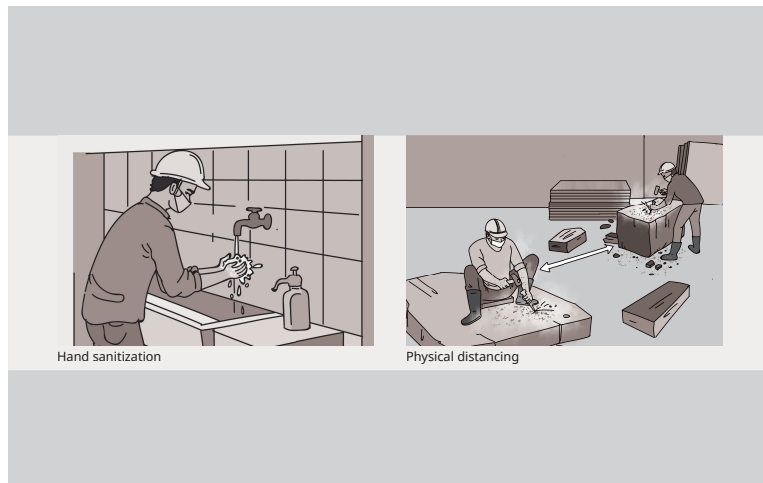


Dust causing silicosis



Occurrence of silicosis

▶ 4. Preventing and mitigating COVID-19 and other highly infectious diseases



The COVID-19 pandemic has severely affected work due to the highly contagious nature of the virus. Hundreds of millions of workers have been infected and millions of lives have been lost to this highly infectious virus and communicable disease.

Benefits

1. COVID-19 prevention and control measures reduce the spread of infection and save lives
2. Preventive measures reduce absenteeism due to sickness and quarantine

► 4. Preventing and mitigating COVID-19 and other highly infectious diseases

How to prevent and control COVID-19 and other highly infectious communicable diseases

1. Clearly communicate COVID-19 preventing measures at the workplace through posters, meetings, announcements and other mediums
2. A worker should stay home if they or anyone in family is suffering from suspected COVID-19 infection and there should be no retaliation
3. Workers, employers and every visitor entering the workplace should check their body temperatures at the site entrance and ensure that they have no symptoms
4. Employers should provide support for adequate medical assistance
5. Arrange workplaces to ensure physical distance of at least 2 meters
6. Adopt good personal hygiene practices, such as covering the mouth and nose when coughing or sneezing and regular wiping of work surfaces, equipment and tools with disinfectants
7. Provide adequate handwashing stations and alcohol-based sanitizers at all entry and exit points and promote a culture of handwashing
8. Disinfect workspaces, equipment and frequently touched surfaces more often
9. Good quality masks should be provided to workers at no cost to them and they should wear the masks at all times in all areas
10. Encourage all workers to get vaccinated against COVID-19

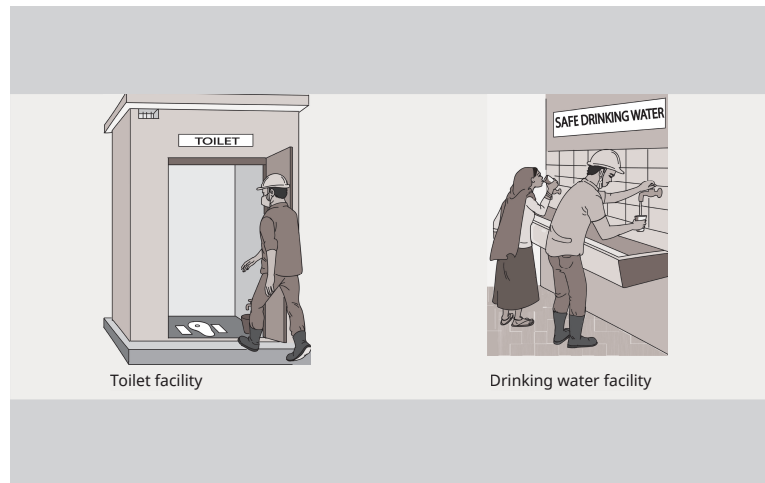


Hand sanitization



Physical distancing

► 5. Toilet and drinking water facilities



Toilets and drinking water are basic amenities that should be provided at every workplace to ensure safe and healthy working conditions. Most safety, health and welfare statutes prescribe standards for these facilities. Failure to drink adequate quantities of potable water causes fatigue, a lack of concentration, decrease in energy levels, stress, headaches and other ailments.

Benefits

1. Adequate and sanitary toilet facilities improve hygiene and health at work
2. Adequate intake of drinking water improves energy levels and reduces fatigue of workers
3. Potable drinking water and handwashing facilities prevent a number of diseases

► 5. Toilet and drinking water facilities

How to encourage the use of toilet and drinking water facilities

1. Ensure toilets and drinking water are conveniently located and separate from each other
2. Use local languages and signage to show location of facilities
3. Install adequate, well-lit and lockable toilets for female and male workers
4. Ensure female toilets have menstrual hygiene facilities
5. Maintain toilets in sanitary and serviceable conditions; install waste bins with lids
6. Install handwashing facilities with soap at or adjacent to each toilet facility
7. Provide potable drinking water to all workers at or within reasonable access of the site
8. Dispense cool potable water through taps or keep in covered, hygienic vessels

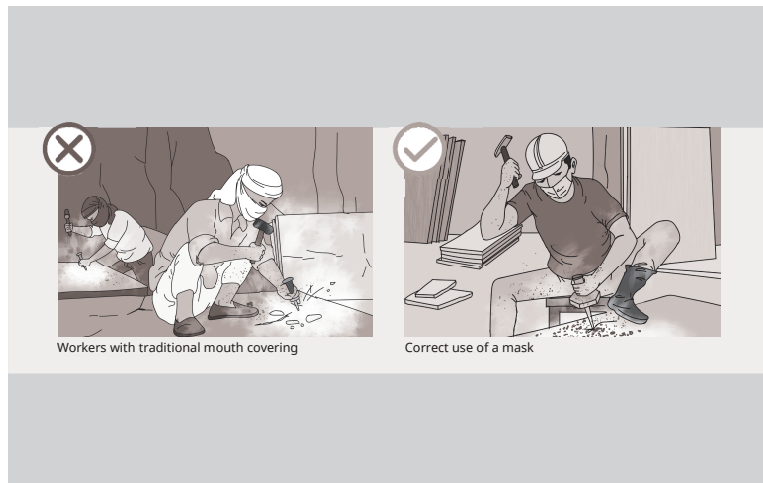


Toilet facility



Drinking water facility

▶ 6. Promoting the correct use of masks to protect workers



Traditional mouth coverings consist of a piece of cloth that workers wrap around their mouth and nose to avoid inhalation of dust. Their effectiveness against dust and airborne infections is not known since it depends on the kind of cloth that is used and how it is worn. Health authorities recommend approved face masks for personal protection against dust, COVID-19 and airborne infections.

Benefits

1. Approved masks are a cost-effective way of preventing silicosis and the spread of COVID-19 and other airborne infections at work
2. Approved cloth masks are easily available, easy to use, and can be reused after washing
3. Approved cloth and single use masks are increasingly well accepted by workers

► 6. Promoting the correct use of masks to protect workers

How to encourage the use of masks instead of traditional mouth coverings

1. Provide approved masks at no cost to all workers
2. Instruct workers to wear approved masks correctly at the workplace
3. Posters and signs should be displayed to remind workers to wear masks in all risk areas
4. Inform workers about the way different masks protect against dust and airborne infections, respectively
5. Ensure the mask fits well and is worn properly to cover the mouth and nose completely
6. Wash approved cloth masks each day after use
7. Never re-use masks meant for single use

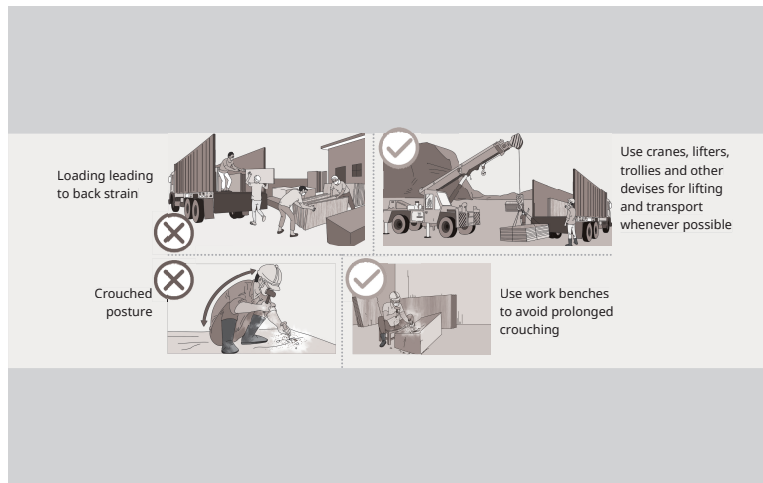


Workers with traditional mouth covering



Correct use of a mask

► 7. Preventing pain and aches



Manual carrying and lifting of large, bulky and heavy objects is common in natural stone mining and can cause backache, joint pain and other musculoskeletal injuries. Prolonged sitting, crouched work postures, repetitive movements and improper work practices are common in stone carving operations and can lead to injuries and chronic pain in the joints, neck, arms, shoulders, knees and back. Heat, humidity, excessive overtime work, vibration, lack of support from managers or co-workers and stress may also contribute to work-related musculoskeletal disorders. Pain and aches are the most common cause of absenteeism.

Benefits

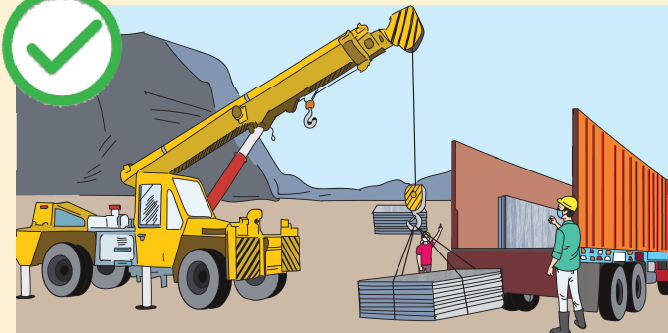
1. Prevention of pain, aches and other musculoskeletal injuries reduces absenteeism
2. These measures also reduce the loss of concentration and the risk of accidents and injuries

► 7. Preventing pain and aches

How to prevent pain and aches

1. Identify operations that involve loading, unloading and heavy weight lifting
2. Avoid placing workers at high risk of pain and aches in tasks that require lifting
3. Use cranes, lifters, trollies and other devices for lifting and transport wherever possible
4. Use work benches to avoid prolonged sitting and crouching
5. Organize work to avoid prolonged sitting, crouched work postures and repetitive movements
6. Use hand tools that damp or isolate vibration and remove worn out technology and tools
7. Raise awareness and train workers in proper lifting, loading and unloading work practices
8. Train workers to keep weights close to the body, the back straight and to avoid bending or twisting while lifting weights or bulky objects
9. Prohibit alcoholic beverages and other allegedly performance-altering products

Loading leading to back strain



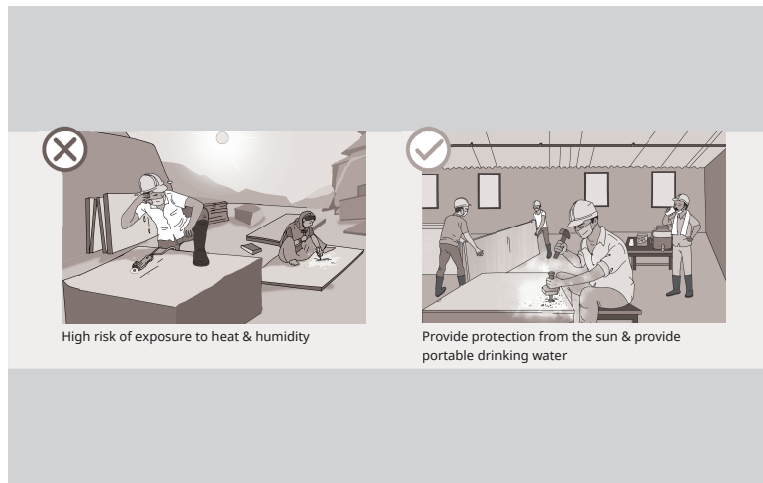
Use cranes, lifters, trollies and other devices for lifting and transport whenever possible

Crouched posture



Use work benches to avoid prolonged crouching

▶ 8. Protecting workers from extreme heat and high humidity



Most of the work in small mines and stone carving units is carried out in open areas where workers are directly exposed to sunlight, heat and humidity. Excessive exposure to extreme heat and high humidity can cause heat stroke, exhaustion, dizziness, fainting, cramps, rashes or death, and it can also exacerbate underlying respiratory and cardiovascular diseases.

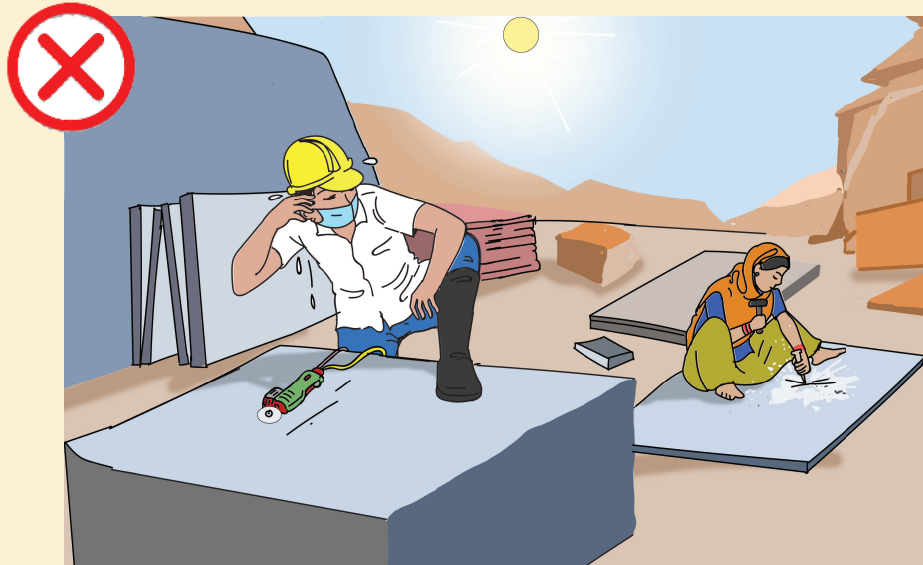
Benefits

1. Prevention reduces the risk of serious health effects like heat stroke and dizziness
2. Measures to avoid exposure to excessive heat and humidity also improve productivity

► 8. Protecting workers from extreme heat and high humidity

How to protect workers from extreme heat and high humidity

1. Identify and map areas and operations with a high risk of exposure to heat and humidity
2. Identify workers at higher risk, with particular attention to older and pregnant workers
3. Use natural shade or provide protection from the sun where possible
4. Ensure operations are ergonomically well designed to minimize physical stress
5. Use mechanical aids to reduce heavy lifting and workloads
6. Arrange work-rest cycles so that workers can rest in shaded, ventilated and cooler spaces
7. Provide potable drinking water to all workers and encourage them to drink it frequently
8. Ensure availability of Oral Rehydration Solutions in case this is needed
9. Raise awareness among workers about the symptoms and ill effects of heat and humidity and the steps to prevent heat stress and emergencies

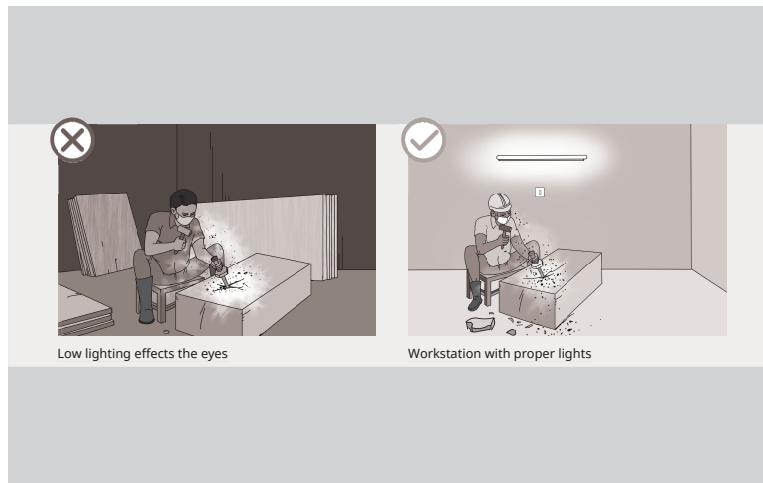


High risk of exposure to heat and humidity



Provide protection from the sun and provide portable drinking water

► 9. Preventing eye strain, fatigue and accidents with good lighting



Most work in small and unorganized sites and units is carried out during the daytime and in natural light. However, in places where a large number of workers are employed, artificial lighting might also become necessary. Good workplace lighting plays an important role in the creation and maintenance of safe and healthy workplaces. Poor lighting or a complete lack of lighting can lead to eye strain, fatigue, headache and stress as well as to slips, trips and other accidents, and too much light can furthermore cause “glare” headaches and stress.

Benefits

1. Good lighting reduces eye strain, fatigue, headache and stress
2. It also reduces slips, trips and other accidents
3. It is also known to improve productivity

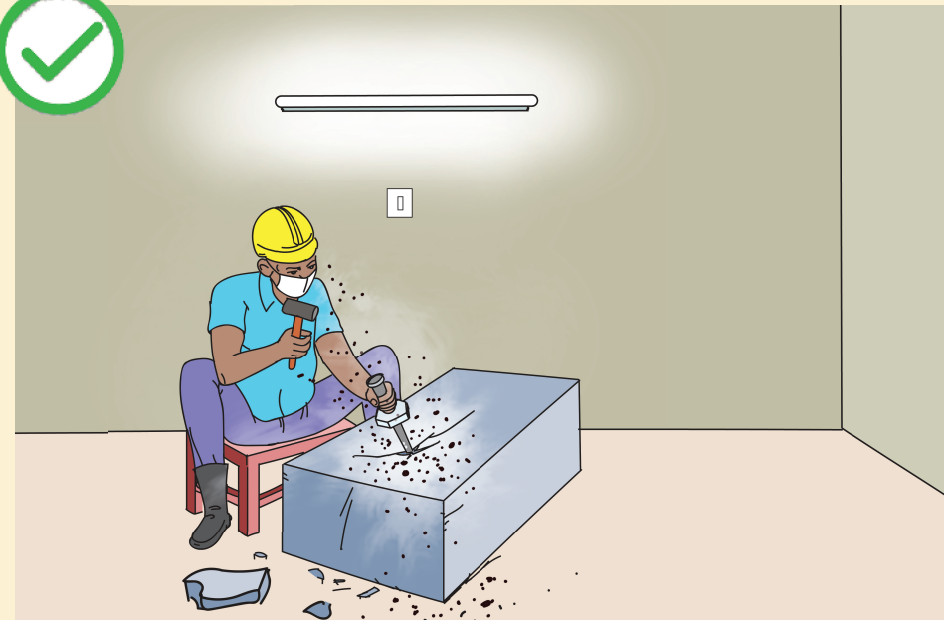
► 9. Preventing eye strain, fatigue and accidents with good lighting

How to implement good lighting

1. Identify work areas, workstations and fine-detail work that require a higher level of lighting
2. Make full use of the natural light available, especially for general lighting
3. Select proper lighting devices and locations for optimal illumination and to avoid shadows
4. Use light colour paints for walls and ceilings
5. Electric lighting should comply with national building codes and regulations, particularly in respect of minimum lighting levels and with regard to emergency lighting requirements
6. Position lights so that they illuminate the hands and not the eyes of workers to avoid glare
7. Clean and maintain lighting fixtures regularly



Low-lighting affects the eyes



Workstation with proper lights

► 10. Preventing noise and hearing loss



Noise is a serious health hazard for those who work in the natural stone industry. Excessive exposure to noise during drilling, cutting, grinding and the use of other tools damages the eardrum. Hearing loss may result from a single intense exposure or from exposure to noise over longer periods. High noise levels also interfere with communication and increase the risk of accidents. Noise moreover increases fatigue and causes irritability and sleep disorders, thus reducing worker performance.

Benefits

1. Prevention of excessive exposure to noise will reduce noise-induced hearing loss
2. These measures are also known to reduce accidents and improve safety

► 10. Preventing noise and hearing loss

How to prevent excessive exposure to noise and noise related risks

1. Map areas and operations with excessive noise levels and identify sources of noise
2. Evaluate whether noisy process can be carried out differently
3. Enclose or isolate sources of noise
4. Carry out noisy operations that cannot be isolated in open areas for better noise dispersion
5. Choose low-noise tools and machinery and carry out regular maintenance
6. Limit the number of people in noisy areas and the time they spend there
7. Designate specific areas with high noise levels and install appropriate warning signs
8. Provide ear muffs, ear plugs or personal protective equipment and ensure it is used correctly
9. Conduct periodic hearing test for workers exposed to excessive noise
10. Workers should be informed of the results of their tests, symptoms and ill effects of noise

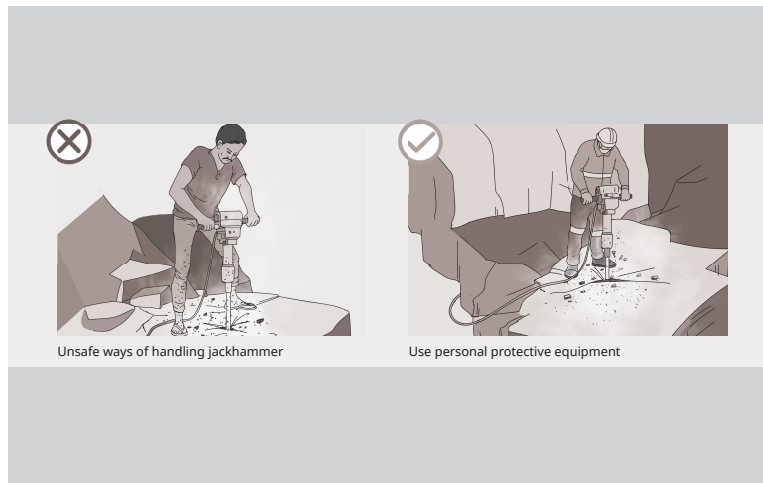


Noise-induced hearing loss



Provide ear muffs and ear plugs for personal protection

▶ 11. Prevention of safety and health risks in jackhammer drilling



Drilling is an important activity in natural stone quarrying. It is mainly carried out for breaking big boulders or as part of blasting. It involves drilling of holes with hand-held jackhammer drills and is considered as one of the most hazardous activities due to the emission of dust, exposure to noise and to vibration, which can cause silicosis, noise-induced hearing loss and to hand-arm vibration syndrome (HAVS). Un-ergonomic work practices can furthermore cause back strain and injuries.

Benefits

1. Healthy workers and reduced absenteeism
2. Investments in better processes and equipment now will reduce medical treatment costs later

▶ 11. Prevention of safety and health risks in jackhammer drilling

How to prevent health risks due jackhammer drilling

1. Redesign work processes to avoid or reduce the need for jackhammer drilling
2. Purchase jackhammers that comply with national limits for vibration exposure
3. Add anti-vibration handles and other vibration-dampening technology to old jackhammers
4. Maintain the jackhammer regularly and ensure it is in good working order
5. Discard any jackhammer with a mushroomed or chipped face or with cracks in the claw
6. Ensure the dust control system is working properly (e.g., water jets or dust extraction)
7. Train workers in the correct handling of jackhammers to avoid HAVS, back strain or injuries
8. Organize work-rest cycles to reduce excessive exposure to jackhammer drilling
9. Inform workers about the risks, symptoms and ill effects of prolonged use of jackhammers
10. Always use personal protective equipment such as gloves, safety boots, ear protection and face protection while using the drill



Unsafe ways of handling jackhammer

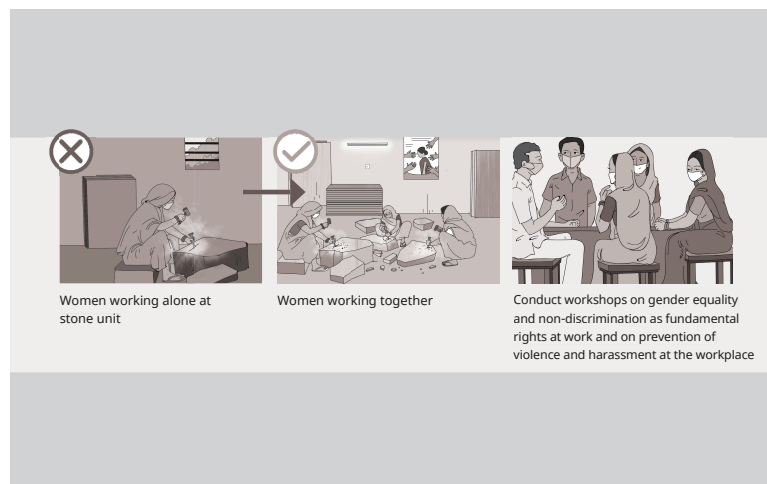


Use personal protective equipment

Take home message

Jackhammer drilling is one of the most hazardous operations in natural stone mining, but the risks can be controlled with better equipment, work organization and work practices

▶ 12. Gender equality, non-discrimination and prevention of violence and harassment at facilities



Gender equality and non-discrimination is critical to providing equal opportunities for safe and decent work to all women and men, irrespective of their gender identity, age, ethnicity, social origin, religion, political opinion, disability and HIV/AIDS status. Violence and harassment undermine gender equality and non-discrimination as well as safety and health at work. It refers to a range of unacceptable behaviours and practices, or threats thereof. It can be a single occurrence or repeated incidents that aim at, result in, or are likely to result in physical, psychological, sexual or economic harm.

Benefits

1. Gender equality and non-discrimination leads to better opportunities for decent work for all
2. Prevention of violence and harassment is critical to improving safety and health for all at work

► 12. Gender equality, non-discrimination and prevention of violence and harassment at facilities

How to promote gender equality and non-discrimination and prevent violence and harassment at work

1. Inform all workers that gender equality and non-discrimination are fundamental rights at work
2. Ensure equal pay for work of equal value and equal opportunities for all
3. Encourage equal participation for all in the workforce and remove barriers for this to happen
4. Identify groups of workers that are vulnerable to violence and harassment
5. Consult workers to find out if violence and harassment is occurring
6. Use posters and other means to educate workers about zero-tolerance towards violence and harassment, and how to prevent and report it
7. Organize work so that women or vulnerable workers do not work in isolation or at night
8. Inform workers that they have a right to remove themselves from dangerous situations
9. Hold perpetrators to account and provide counselling and other measures where appropriate



Women working alone at stone unit

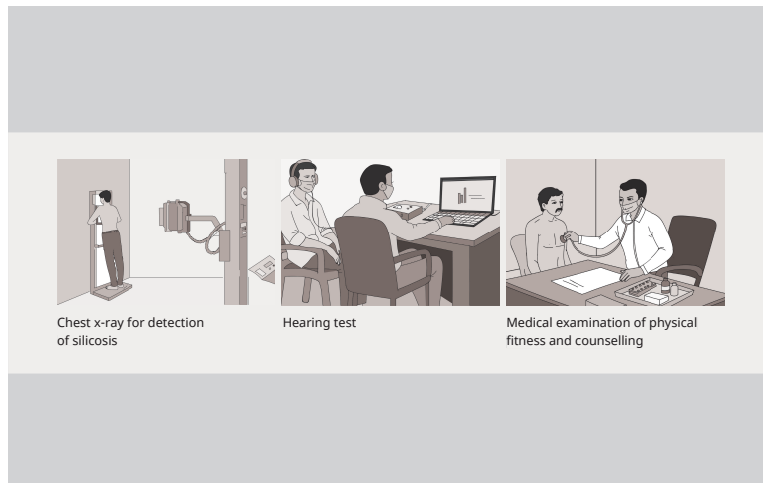


Women working together



Conduct workshops on gender equality and non-discrimination as fundamental rights at work and on prevention of violence and harassment at the workplace

▶ 13. Regular health check-ups of workers



Regular and periodic health check-ups are necessary for effective monitoring of the health of workers and for early detection of silicosis and other occupational diseases. Every worker exposed to high levels of dust should undergo regular and periodic health check-ups. Medical examinations of persons employed in hazardous operations, which includes natural stone quarrying, carving and sculpting, are mandatory under the Mines Act, 1952, the Factory Act, 1948, and the Building and Other Construction Workers Act, 1996.

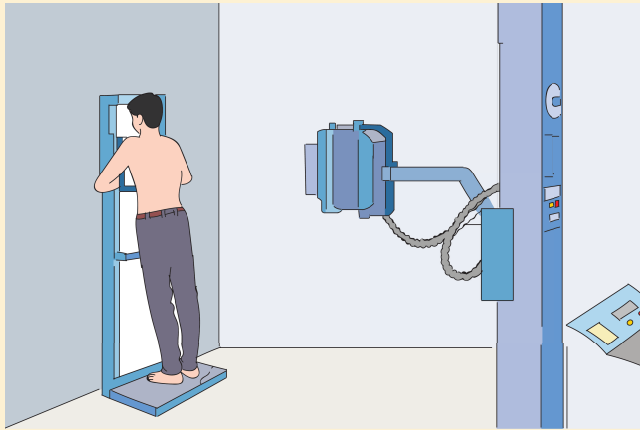
Benefits

1. Pre-employment check-ups are helpful in determining suitability for employment and detection of diseases which may get aggravated by hazardous operations in stone mining
2. Periodic medical examinations are helpful in early detection and management of occupational diseases and verifying the effectiveness of control measures
3. This reduces the cost of treatment and management of diseases for workers, the employer and for the local community

► 13. Regular health check-ups of workers

How to implement regular health check-ups for workers

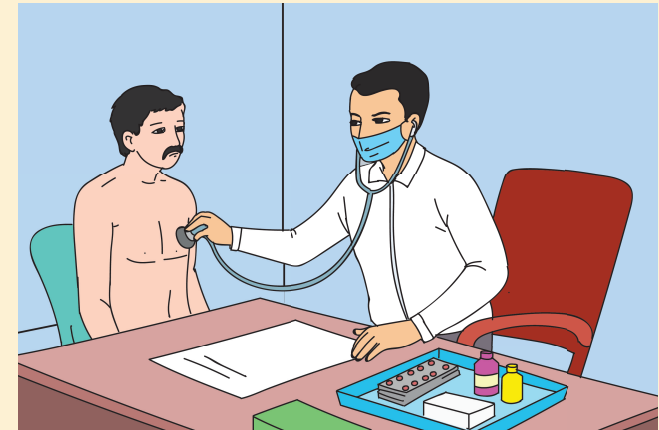
1. The health check should be conducted by a qualified medical officer
2. The first, pre-employment check should be conducted before employment begins
3. It should include a detailed general physical examination, chest X-ray, a hearing test and a lung function test
4. Periodic health check-ups should also include a detailed general physical examination, a hearing test and a lung function test
5. These should be conducted once every year and a chest X-ray should be done every three years
6. The purpose and findings of the health check should be communicated to each worker
7. The data should be kept confidential and not be used to discriminate against the worker



Chest X-ray for detection of silicosis

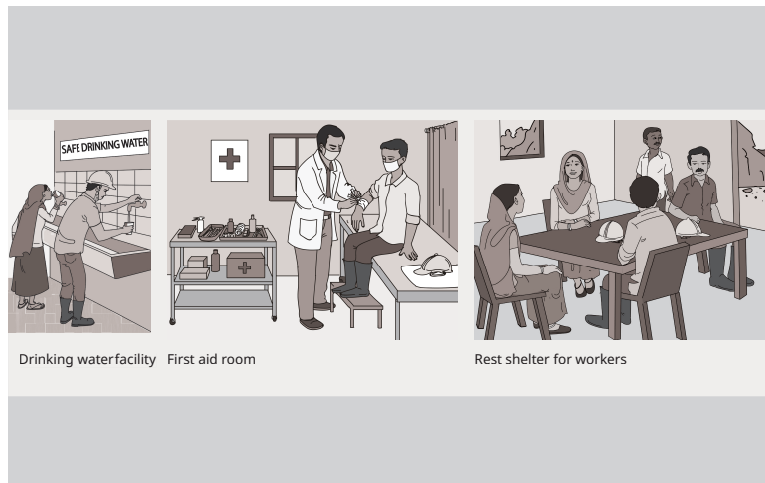


Hearing test



Medical examination of physical fitness and counselling

► 14. Improving worker wellbeing and welfare through common facilities



The provision of basic facilities for workers is key to their wellbeing and welfare and to improving safety and health at work. In the informal sector it is often not possible for individual employers to provide such facilities. In this case, common facilities can be created for a cluster of quarries or a group of natural stone processing units. Such common facilities may include potable drinking water, toilets, handwashing facilities, first-aid, cooking facilities, canteens, waste bins, rest shelters, among others. Common facilities may be created by an employer association, trade union or a government agency.

Benefits

1. Improved welfare amenities boost morale and decrease turnover of workers
2. Common facilities for worker wellbeing and welfare are cost-effective
3. Easily accessible wellbeing and welfare facilities improve productivity by reducing down time

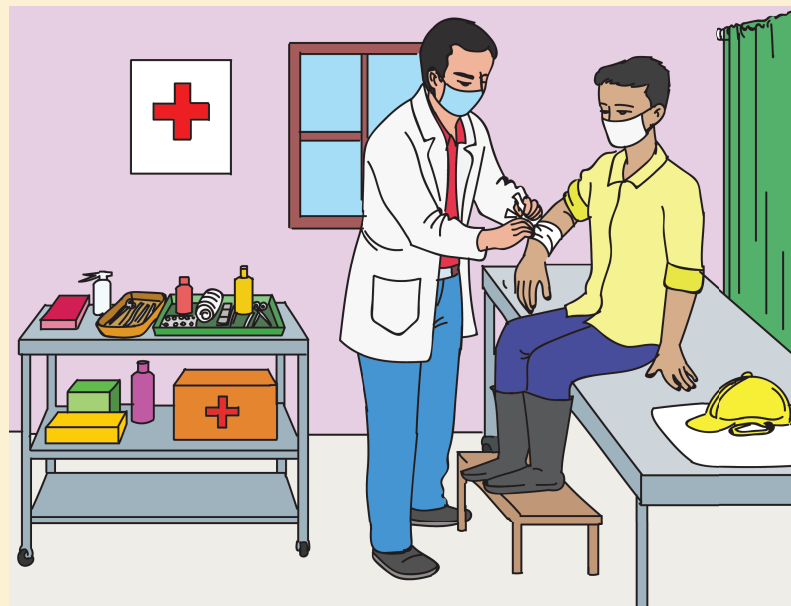
► 14. Improving worker wellbeing and welfare through common facilities

How to implement common wellbeing and welfare facilities

1. Identify an easily accessible common areas at a reasonable distance
2. Provide potable drinking water, toilets, handwashing facilities, first-aid, cooking facilities, canteens, waste bins, rest shelters, among others
3. Organize regular cleaning and sanitation of these facilities



Drinking water facility

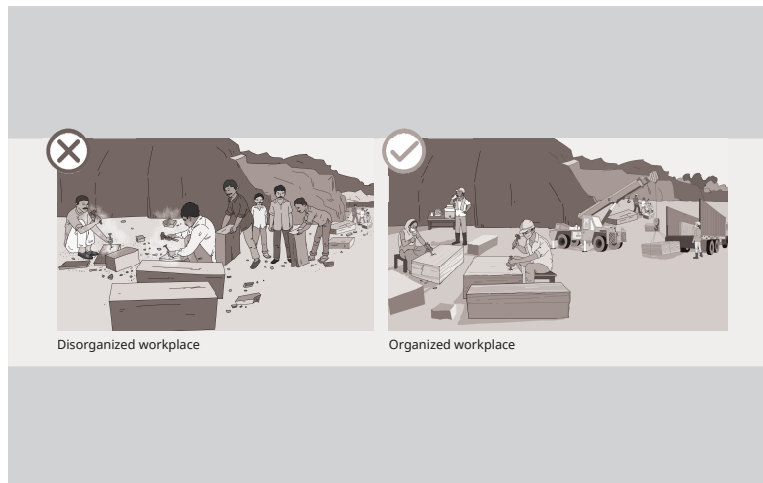


First aid room



Rest shelter for workers

▶ 15. Improving safety and health through better housekeeping and the 5S system



5S is a system for housekeeping and for organizing workplaces so that work can be performed efficiently, effectively and safely. The system focuses on putting everything where it belongs and on keeping the workplace clean. This makes it easier for workers to do their jobs without wasting time or risking injury. The system involves sorting, setting things in order, shining, standardizing, and sustaining.

Benefits

1. The 5S system reduces accidents at work and improves safety
2. It reduces the cost of production and improves productivity
3. It improves the quality of work and provides greater worker satisfaction

► 15. Improving safety and health through better housekeeping and the 5S system

How to implement 5S system

1. Sort all tools, equipment, materials and other things at the quarry or in the work area which is not in use and put these in a safe place
2. Set and store tools, equipment and material in order of priority and frequency of use for easy access
3. Emphasize and implement regular sanitizing and housekeeping, cleaning of work areas, maintenance of tools and equipment and removal of dirt and debris
4. Standardize methods and operating procedures and assign responsibility for regular housekeeping to maintain a clean workplace
5. Sustain and inculcate habits to make 5S part of the organizational work culture



Disorganized workplace



Organized workplace

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