OCCUPATIONAL HEALTH WITH SPECIAL REFERENCE TO LUNG PROBLEMS

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ABSTRACT: INTRODCUTION: WHO's definition of Physical, social and mental well-being is explained below. A positive mental health state indicates that the individual enjoys his routine; there are no undue conflicts. Health reiteration becomes more imperative than health maintenance, where society's responsibility is paramount. Health economics enables us to examine the burden caused by illness. In India, 620 million people live in rural area; only 9% of every one billion population is covered under health schemes. Only 2% of GDP is spent on health, where the recommended percentage is 5%. In addition to this only 5% of annual family income is spent on curative health care. In the recent past rapid deterioration in the quality of environment has over- burdened the health problem. Occupational Health is one of the environmental health sciences, concerned broadly with the health effects of work and of working conditions. Occupational illnesses and injuries have long been a preventable blight to health. A part from occupational diseases there are some hazards which will impair health of employees in industries. Workers in every Occupation are faced with a multitude of hazards in the work place. Ronald Blake has classified occupational hazards into the following four categories. The most pressing environmental health problems today, in terms of death and illness worldwide are those associated with poor households and communities in the development countries. According to WHO and the World Bank, environmental improvement at the household and community level would make the greatest difference for global health. This Article also focuses on the lung disease mainly occurring due to hazards caused by the patient occupation. A good number of diseases like COAD, asthma and pneumoconiosis afflict the concerned population. Discussion has been made in threadbare about these problems in this article.

KEYWORDS: WHO, Occupational Health, Hazards to Health, Pneumoconiosis.

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INTRODUCTION: WHO's definition of Physical, social and mental well-being is explained below.

- Physical well-being relates to the anatomical, physiological and bio-chemical functioning of the human body. It can be accrued by various modes namely, height, weight, muscle mass, head circumference and serum estimation, etc.
- Social well-being refers to that level of health which enables a person to live in harmony with his surroundings. Man is after all social animals. He both learns from and contributes to society. Health both a product of and a determinant of social values. The cultural and ethnic background, the traditions of masses, the economic and literacy levels, and the needs of perceptions are all important in the consideration of social health. The social health can be measured by attitude scales, socio-economic status, level of literacy, employment status etc.
- Mental well-being is the most abstract component to describe. Recent developments in Psychiatry and Psychology have helped in defining features of mental health in a better fashion.

A positive mental health state indicates that the individual enjoys his routine; there are no undue conflicts, not frequent boats of depression or elevation of mood, he has harmonious relations within the family and community and is not unduly aggressive. The mental health status of individuals can be measures by IQ tests, personality tests, appreciation tests and projective techniques.

Health reiteration becomes more imperative than health maintenance, where society's responsibility is paramount. Health economics enables us to examine the burden caused by illness, chosen between different methods of treatment and help the policy-makers about the best use of limited recourse. Bhore Committee (1946) has stated that the health services should provide all the consultant, laboratory and institutional facilities necessary for proper diagnosis of treatment. Based on this report, Mudaliar Committee of 1962 advocated the adjustment of integrated medical and health service.

In India, 620 million people live in rural area; only 9% of every one billion population is covered under health schemes. Only 2% of GDP is spent on health, where the recommended percentage is 5%. In addition to this only 5% of annual family income is spent on curative health care.

In the direction of examining health motion, belief, scientific knowledge, needs and expectation of the people concerning health and diseases in various geographic and

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cultural regions in a nation, it is importance to study the demographic aspects, morbidity, mortality situation, and nature of courses of ailments, expectation of people about treatment, health trends, economic implications and impact of specialized health services. Such studies are important to build up economic concept of health, state of affairs and in solving operational problem in the sector.

Health status is an important indicator of the level of economic development. A.C Pigou and others treated health as utility. World Development Report (1993) regards good health as an important factor for increasing productivity leading to economic growth. Health economic also has a substantial role in health care decision- makers can utilize to the enhancement of the patient care.

World Health Organization (WHO, 1970) is a specialized non-political health agency of the United Nations. The main objective is the 'attainment by all the people, the highest level of health 'as declared in the preamble of the constitution.

WHO has formulated a general programme of work to promote, co-ordinate and support the member-states individually and collectively in implementing the global strategy of 'Health for All' by the year 2000 A. D. But this goal met with partial success only. Health for all in 21st century aims to promote the highest attainable leaves of human health as a fundamental right. Global health policy has to be driven by equity, human rights and gender sensitivity in providing vision, developing strategy and ensuring the implementation of Health for All (Leonard Lever, Alan Lopez, Tord Ktellstrom and Derak yach, 1998).The environment is the work place, where many kinds of exposures to hazards are identifiable. Environment health is that aspect of public health, which is concerned with all the factors, circumstances and conditions in the environment or surrounding of a human being, which can influence the human health and wellbeing. It is estimated that the potential health gains from the efforts to tackle environment total to nearly 80 million.

In the recent past, rapid deterioration in the quality of environment has overburdened the health problem. Air, water and noise pollution and hazardous wastes are directly responsible for many of health problems. The depletion of ozone layer in the stratosphere and global warming due to greenhouse gases are expected to cause multi-dimensional health problems, progress in science and technology industrial revolution, spiraling rise in population, widespread deforestation and urbanization have brought to the fore new problems of environmental pollution, endangering life, health and welfare of people, wide use of fluorocarbons in aerosolized sprays have adversely affected the protective ozone layer in the stratosphere. There is a fear of radioactive contamination from nuclear reactors used for power generation and weapon system. Chenoby[1] disaster in CIS was a grim reminder of the danger of nuclear emissions. The Bhopal tragedy where the toxic fumes of methyl isocyanate caused thousands of deaths and large scale morbidity is another glaring example. Most of the environmental contaminates affect the food chain and man suffers directly from its consequences. People living in areas surrounding the industrial belt of Upper Assam are afflicted with various Lung Diseases (Pneumoconiosis) increasingly, which will be discussed in this article. These cases are not too infrequent in chest OPD of JMCH which is headed by the first author of this article.

Occupational Health is one of the environmental health science, concerned broadly with the health effects of work and of working conditions. Physical, Chemical, biological, organizational and social variables associated with occupation may affect the physical or psychological well-being of the worker adversely or positively. Unit recently, the concept of occupational disease denoted a specific clinical and pathological syndrome by a hazard specific to a particular type of work or the work environment.

Occupational illnesses and injuries have long been a preventable blight to health. Observation of the relation between occupational hazards and poor health dates back several centuries but a systematic description of diseases according to occupational course was made only in the final years of the 17th century by Ramazzini, the acknowledged father of Occupational medicine. As the teacher of a university far nearly 32 years he focused his attention on occupational health. He mainly concentrated on the workers in foundries and tanneries. On the one hand, the occurrence of occupational diseases may be affected by non-occupational factors such as nutritional state. On the other, the prevalence and incidence of several common diseases may also be influenced by occupation.

The I.L.O in its recommendation No. 112, envisaged the importance of employee health in these words, "occupational health services should be established in or near a place of employment for the purpose of,

- Protecting the workers against any health hazard arising out of work or conditions in which it is carried on.
- Contributions towards workers physical and mental adjustment.
- Contributing to establishment and maintenance of the highest possible degree of physical and mental well - being of the workers.

A part from occupational diseases there are some hazards which will impair health of employees in industries. Occupational diseases are caused by working conditions prevalent in industries. For example, cable makers, lead pipe -makers, painters, plumbers, full prey to "painter colic" or "wrist drop" disease. This disease causes vomiting, stomach pain, join pains and loss of appetite. Like occupational hazards, occupational diseases also develop with workers frequent exposure to unhealthy working conditions. They developed slowly with accumulated effects over an extended period of time.

The ever increasing mechanization, electrification, chemicalisation, and sophistication have made industrial jobs more and more complex and intricate. This has led to increased dangers to human life in industries through

accidents and injuries. An accident (industrial) is a sudden and unexpected occurrence in the industry which interrupts the orderly progress of the work. According to the Factories Act, 1948, 'it is an occurrence in an industrial which establishment causing bodily injury which makes him unfits to resume his duties in the next 48 hours'. An accident is an unplanned, unexpected and uncontrolled event in which an action or reaction of an object, a substance, a person or a radiation result in personal injury. Self-inflicted injuries are not regarded as accidents.

Occupational health and safety is a discipline with a broad scope involving many specialized fields, in its broad sense, it should aim at,

- The promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations.
- The prevention among workers of adverse effects on health caused by their working condition.
- The promotion among workers in their employment from risks resulting from factors adverse to heath.
- The placing and maintenance of workers in an occupational environment adapted to physical and mental needs.

In other words, occupational health and safety encompasses the social, mental and physical well-being of workers that is the 'whole person'. Successful occupational health and safety practice requires the collaboration and participation of both employer and workers in health and safety programmers and involves the consideration of issues relating to occupational medicine, industrial hygiene, toxicology, education or engineering safety, ergonomics, psychology, etc. Occupational health issues are often given less attention than Occupational safety issue because the former are generally more difficult to confront. By and large, the definition of Occupational health and safety given above encompasses both health and safety in their broadest contexts. Imperfect as is the world in which we live, some accidents are doubtless inevitable, but so many others need not occur.

Workers in every Occupation are faced with a multitude of hazards in the work place. Occupational health and safety addresses the broad range of workplace hazards from accident prevention to the more insidious hazards including toxic fumers, dust, noise, heat, stress, etc. preventing work-related diseases and accidents must be the goal of Occupational health and safety programs, rather than attempting to solve problems after they have developed.

The demographic concept of 'social class' is often based on pooling together occupations considered similar in type, such a grouping of occupations being called as 'social class'. 'Social Class' difference, morbidity is thus often occupational differences, which is customary in traditionally stratified communities. With modern technology, many hazardous exposures at work have been reduced. As a result, manifest occupational diseases are becoming rare, at least in the more economically advanced countries. Accidents are a major cause of health loss in many occupations. The incidence of disease is affected by such factors as organization of work, proper training, ergonomics and safety campaigns.

Occupational health epidemiology often face problems similar to those in environmental health at the community level, air pollution and noise exposure, etc. The interface of man work supplies essential information on health hazards. Many Occupational exposures very from task and task.

Clinical medicine is primarily concerned with sick individuals, but epidemiology deals with communities. The state of health of an individual is described in terms of diagnosis and prognosis. The Work environment is influence by chemical hazards, physical hazards and psychological hazards. Occupational exposure limits, threshold limit values (TLV) and maximum allowable concentration (MAC) offer empirical guidelines for controlling the work environment.

Accidents are a major cause of health loss in many Occupations. The incidence is affected by such factors as organization of work, proper training, ergonomics and safety campaigns. Some studies have shown that lack of work is also a health hazards.

The occupational health service is a link in the work organization. Human life is high in the hierarchy of values for the health professions. Health is a major determinant of the quality of life. Societal values have greater importance in the world of Labour, with its complex informal and formal social structures. Cultural values of both workers and the community at large have to be considered. Present day technology is a valuable asset if its limitations are understood. Computers and their software already provide thoroughly tested system of data recording, processing, retrieval and occupational health services.

The health of workers does not depend only on known occupational hazards. Heredity pass and illnesses, exposures outside work and life habits all include potential determinants. The joint ILO/ WHO committee on occupational health have recently outlined the educational requirements for the task of an occupational health physician. He should be able, among other things,

- To assess the incidence and prevalence of ill-health in relation to work conditions.
- To identify occupational health problems in the light of the general health of the working population.
- To prepare and evaluate statistical records of sickness, absence, to use such records to identify courses and to prepare measures to eliminate those causes.
- To use epidemiological and other methods to investigate occupational risk factors, the possibility of their prevention, the means by which they may be prevented.

Ronald Blake has classified occupational hazards into the following four categories:

- **Biological Hazards:** These hazards are manifested by diseases caused by bacteria, fungi, viruses, insects, dietary deficiencies, drinking, allergy, brain fever,

imbalances, tetanus, stress and strain, infectious waste and infestations.

- **Environmental hazards or physical hazards:** These include noise pollution, vibration and stocks, unsatisfactory lighting, radiation, extreme temperature, illumination, heat, ventilation, air and water pollution. These hazards cause redness of eyes, genetic disorders, cancer, sterility, hearing, loss never injury, etc, to workers.
- **Psychological hazards:** Industrial/Job stress caused by various stressor, such as and role demands, organizational leadership, lack of group co-herion, inter-group and inter-personal conflicts, life and career changes, etc. Lead to emotional disturbances which in turn lead to fatigue and exhaustion. All these affect health of employees.

Like occupational hazards, occupational diseases also develop with workers frequent exposure to unhealthy working conditions. They developed slowly with accumulated effects over an extended period of time.

The Factories Act, 1948, vides section 89 and 90 have identified the following 22 occupational diseases. As per this act, such diseases when noticed are to be notified to the Government authorities.

1. Lead poisoning.
2. Lead tetraethyl poisoning.
3. Phosphorus poisoning.
4. Mercury poisoning.
5. Poisoning from nitrous fumes.
6. Benzene poisoning.
7. Anthrax.
8. Halogen poisoning.
9. Primary skin cancer 10. Mineral oil poisoning. (Dermatitis)

Occupational Diseases and Hazards Benefit None: Hence there is a need to cure, prevent and protect against them. In most of the industries, there are two types of measures to protect workers' health against occupational hazards;

1) Preventive measures, 2) Curative Measures Preventive measures are based on the philosophy that prevention is better than cure, which includes,

- Pre-employment medical examination.
- Periodic post-employment medical examination.
- Removal of hazardous conditions time the extent possible.
- Surveillance of special classes of workers such as women workers and chid laborers exposed to health hazards.
- Emergency treatment in case of accidents.
- Health and hygiene education for the workers.
- Training in first -aid to workers.
- Proper factory lay -out and illumination.
- Proper effluent disposal treatment plants.
- Proper re-design of job to remove monetary and fatigue.
- Proper scheduling of the work with adequate results.

Curative Measures beings once a worker actually suffers from ill-health or sickness or diseases. They includes, the most pressing environmental health problems today, in terms of death and illness worldwide are; Those associated with poor households and communities in the development countries. According to WHO and the World Bank, environmental improvement at the household and community level would make the greatest difference for global health.

Let us now focus on the lung disease mainly occurring due to hazards caused by the patient occupation.

Occupational lung diseases are occupational diseases affecting the respiratory system, including occupational asthma, black lung disease (Coalworker's pneumoconiosis), chronic obstructive pulmonary disease (COPD), mesothelioma, and silicosis. Infectious lung diseases can also be acquired in an occupational context. Exposure to substances like flock and silica can cause fibrosing lung disease, whereas exposure to carcinogens like asbestos and beryllium can cause lung cancer. Occupational cases of interstitial lung disease may be misdiagnosed as COPD, idiopathic pulmonary fibrosis, or a myriad of other diseases; leading to a delay in identification of the causative agent.[1][2]

1. **Types of Occupational Lung Diseases:** 1. Asbestosis, 2.Asthma, 3. Coal worker's pneumoconiosis (black lung), 4. COPD 5. Indium lung, 6. Mesothelioma, 7. Silicosis, 8. World Trade Center lung.
2. **Occupational Environmental Exposure:** 1. Arsenic, 2. Asbestos, 3. BCME, 4. Beryllium, 5. Cadmium, 6. Chromium, 7. Coal dust 8. Diesel exhaust, 9. Flock, 10. Nanoparticles, 11. Nickel, 12. Polycyclic aromatic hydrocarbons, 13. Silica, 14. Tobacco smoke.
3. **Infectious Exposure:** 1. Influenza, 2. Tuberculosis.

Examples: Asthma is a respiratory disease that can begin or worsen due to exposure at work and is characterized by episodic narrowing of the respiratory tract. Occupational asthma has a variety of causes, including sensitization to a specific substance, causing an allergic response; or a reaction to an irritant that is inhaled in the workplace. Exposure to various substances can also worsen pre-existing asthma. People who work in isocyanate manufacturing, who use latex gloves, or who work in an indoor office environment are at higher risk for occupational asthma than the average US worker. Approximately 2 million people in the US have occupational asthma.[1]

Coalworker's Pneumoconiosis (Black Lung): Coalworker's pneumoconiosis, also called "black lung disease", is an interstitial lung disease caused by long-term exposure (over 10 years) to coal dust. Symptoms include shortness of breath and lowered pulmonary function. It can be fatal when advanced. Between1970-1974, prevalence of CWP among US coal miners who had worked over 25 years

was 32%; the same group saw a prevalence of 9% in 2005-2006.[1]

COPD: Chronic obstructive pulmonary disease is a respiratory disease that can encompass chronic bronchitis and/or emphysema. 15% of the cases of COPD in the United States can be attributed to occupational exposure, including exposure to silica and coal dust. People who work in mining, construction, manufacturing (specifically textiles, rubber, plastic, and leather), building, and utilities are at higher risk for COPD than the average US worker.[1]

Indium Lung: Indium lung is an interstitial lung disease caused by occupational exposure to indium tin oxide.[2]

Mesothelioma: Mesothelioma is a cancer of the mesothelium, part of which is the pleura, the lining of the lungs. Mesothelioma is caused by exposure to asbestos.[1]

Silicosis: Silicosis is a fibrosing interstitial lung disease caused by inhaling fine particles of silica, most commonly in the form of quartz or cristobalite. Short-term exposures of large amounts of silica or long-term (10 years or more) exposure of lower levels of silica can cause silicosis. In 1968, more than 1060 US workers died of silicosis; this number fell to 170 by 2005.[1]

World Trade Center Lung: World Trade Center lung is a cluster of diseases caused by exposure to fallout at Ground Zero of the September 11 attacks in 2001. These diseases include asthma, asthmatic bronchitis, terminal airways disease, sarcoidosis, and acute eosinophilic pneumonia.[2]

Occupational Environmental Exposure: Arsenic: Arsenic is classified as an IARC Group 1 carcinogen and is a cause of lung cancer. Workers can be exposed to arsenic through work with some pesticides or in copper smelting.[1]

Asbestos: Asbestos is a mineral which was extensively used in the United States to fireproof buildings and textiles, among other items, in the 1950s-1980s. Workers are frequently exposed to asbestos during demolition and renovation work, which can cause asbestosis and/or mesothelioma. Asbestos exposure can also cause pleural effusion, diffuse pleural fibrosis, pleural plaques, and non-mesothelioma lung cancer. Smoking greatly increases the lung cancer risk of asbestos exposure.[1]

BCME: BCME (Bischloromethyl) ether) is associated with small cell lung cancer in workers who have been exposed.[1][3] Exposure can occur via direct manufacture of BCME or its presence as a byproduct.[1]

Beryllium: Beryllium is classified as an IARC Group 1 carcinogen and is used in a wide variety of industries. Those who are manufacturing workers, dental technicians, machinists, jewelers, plumbers, electricians, precious metal reclamation workers, and welders are at risk for beryllium exposure.[1]

Cadmium: Cadmium is classified as an IARC Group 1 carcinogen and it is a cause of several cancers, including lung cancer. Workers can be exposed to cadmium through welding, zinc smelting, copper smelting, lead smelting, electroplating, battery manufacture, plastics manufacture, and in alloying.[1]

Chromium: Chromium is classified as an IARC Group 1 carcinogen and is linked to lung cancer. Workers can be exposed to chromium via welding, steel manufacturing, pigment/dye manufacturing, and electroplating.[1]

Coal Dust: Exposure to coal dust is the cause of coalworker's pneumoconiosis. It can also exacerbate or cause COPD.[1]

Diesel Exhaust: Diesel exhaust contains a variety of gaseous and particulate chemicals, including soot, polycyclic aromatic hydrocarbons, and other known carcinogens.[1]

Flock: Flocking is the technique of adding small pieces of nylon or other material to a backing, usually a textile, to create a contrasting texture. Inhalation of flock can cause flock worker's lung.[1]

Nanoparticles: The high surface area to volume ratio of nanoparticles may make them an inhalation hazard for workers exposed to them. This is a topic of ongoing research as of 2015.[1]

Nickel: Nickel is classified by the IARC as a Group 1 carcinogen; nickel compound exposure is associated with nasal cancer as well as lung cancer. Workers may be exposed to nickel in machining/grinding industry, nickel extraction/production, welding, and electroplating.[1]

Polycyclic Aromatic Hydrocarbons: Polycyclic aromatic hydrocarbons (PAHs), fused-ring chemicals formed during the combustion of fossil fuels, are metabolized by the cytochrome P450 complex to highly reactive carbocations, which can mutate DNA and cause cancer. Workers may be exposed to PAHs while working in a foundry, in the roofing industry, or due to environmental tobacco smoke.[1]

Silica: Besides causing silicosis, inhalation of silica can cause or exacerbate COPD. It can also impair lung function in general and cause cancer by oxidation damage. It is classified as a "known human carcinogen" (Group 1 carcinogen) by the IARC. Exposure is common for people working in tunneling, quarrying, construction, sandblasting, roadway repair, mining, and foundry work.[1]

Tobacco Smoke: Tobacco smoke is a known carcinogen. Workers in the hospitality industry may be exposed to tobacco smoke in the workplace, especially in environments like casinos and bars/restaurants.[1]

Infectious Exposure: Influenza: Health care professionals are at risk of occupational influenza exposure; during a pandemic influenza, anyone in a close environment is at risk, including those in an office environment.[1]

Tuberculosis: Tuberculosis is a lung disease endemic in many parts of the world. Health care professionals and prison guards are at high risk for occupational exposure to tuberculosis, since they work with populations with high rates of the disease.[1]

American Lung Association State of Lung Disease in Diverse Communities 2010 63 Occupational Lung Disease Occupational lung diseases are a group of illnesses that are caused by either repeated, extended exposure or a single, severe exposure to irritating or toxic substances that leads to acute or chronic respiratory ailments. Private industry employers reported 14,800 such cases in 2008, while state and local government reported an additional 7,800 cases. The rate of occupational lung conditions was highest for education and health service workers in private industry and local government workers at 3.8 and 5.9 per 10,000 full time workers, respectively.

There are two broad categories of occupational lung diseases:

- Diseases that are not occupation-specific, but are aggravated at work, such as occupational asthma.
- Diseases related to a specific occupation, such as asbestosis, coal worker's pneumoconiosis (black lung), berylliosis (brown lung), and farmer's lung. Common occupational lung diseases include mesothelioma, occupational asthma, silicosis, asbestosis, and sick building syndrome. Adult-onset asthma can be triggered by occupational exposures.

DISCUSSION: COPD (chronic obstructive pulmonary disease) and even lung cancer, though primarily caused by smoking, can also result from workplace exposures.[2,3] Certain occupations are associated with an increased risk of developing occupational lung diseases. They include construction and industry workers who are exposed to asbestos, farmers who are exposed to a variety of dust and mineral particles, miners who are exposed to coal and minerals. Firefighters are also exposed to dust, combustion particles, gases, fumes, and other noxious materials while on the job.[4] The estimated yearly cost of occupational injuries and illnesses is between $128 and $150 billion dollars.[5] Although occupational lung diseases are often incurable, they are always preventable.

Improving Source: BLS 2009 Occupational Respiratory Illness Rates for Selected Industry Sectors, 2008 Incidence Rate Industry Sector per 10,000 workers Overall 2.1 State and Local Governments 5.2 Local Governments 5.9 State Governments 3.7 Private Industry 1.6 Education and Health Services 3.8 64 www.lungusa.org 1-800-LUNG-USA ventilation, wearing protective equipment, changing work procedures, and educating workers are key factors for prevention. Occupation-Specific Lung Diseases Occupational Asthma Occupational asthma is the most common form of occupational lung disease. Occupational asthma (also known as work-related asthma) is asthma that is caused or made worse by exposures in the workplace. Estimates suggest that 15 to 23 percent of new asthma cases in adults are work related.[6] Four states (California, New Jersey, Massachusetts, and Michigan) tracked cases of occupational asthma over a seven-year period. During this time, the occupations with the highest percentage of asthma cases were operators, fabricators, and laborers (32.9%); managerial and professional specialty (20.2%), and technical, sales, and administrative support jobs (19.2%). The four most common agents associated with occupational asthma were miscellaneous chemicals (19.7%), cleaning materials (11.6%), mineral and inorganic dust (11.1%), and indoor air pollutants (9.9%). Mesothelioma Malignant mesothelioma is a fatal type of cancer caused by exposure to asbestos. Millions of construction and general industry workers have been exposed to asbestos while on the job. Occupations associated with significantly higher mesothelioma deaths include plumbers, pipefitters, and steamfitters; mechanical engineers; electricians; and elementary school teachers.[7] Throughout much of the twentieth century, many different construction and manufacturing applications involved the use of asbestos. In the U.S., asbestos use peaked in 1973 and but had declined by 99.8 percent in 2007. Because mesothelioma usually does not show up until 20 to 40 years after exposure, most of the deaths from the disease are the result of exposures that occurred decades ago. This long lag time means that mesothelioma deaths are expected to peak around 2010, despite the much lower current use of asbestos. From 1999 to 2005, 18,068 malignant mesothelioma deaths were reported in the U.S. Men (81%) and Caucasians (95%) accounted for the majority of these cases. Silicosis Silicosis is a disabling, dust-related disease and is one of the oldest occupational lung diseases in the world. Silicosis is caused by exposure to and inhalation of airborne crystalline silica. Silica (SiO_2) is the name of a group of minerals that are found in mines, foundries, blasting operations, stone, clay, and glass manufacturing. Dust particles from silica can penetrate the respiratory system and land on alveoli (airsacs). This causes scar tissue to develop in the lungs and impair the exchange of oxygen and carbon dioxide in the blood.[8] Occupational Lung Disease American Lung Association State of Lung Disease in Diverse Communities 2010 65 More than one million workers are exposed to silica each year.[9] Though symptoms of silicosis rarely develop in less than five years, progression of the disease can lead to extreme shortness of breath, loss of appetite, chest pains, and respiratory failure, which can cause death. Silicosis also makes a person more susceptible to infectious diseases of the lungs, such as tuberculosis.[10] The silicosis death rate is generally low, but still too high considering that every one of these deaths could have been prevented.

Because of the low number of overall deaths due to silicosis, multiple years of data are combined to provide a more accurate estimate of the burden of this disease. Between 1996 and 2005, the age-adjusted death rate due to silicosis was 0.8 per million population. Rates were much higher among men. Two occupations are most commonly listed in association with silicosis deaths; mining machine operators (15.7%) and non-construction laborers (9.5%).[11] Asbestosis is a progressive disease that results from breathing in microscopic fibers of asbestos. These small fibers build up over time and can cause scarring, or fibrosis, in the lungs. This scarring causes the lungs to stiffen and makes it hard to breathe or get enough oxygen into the blood.[12] Asbestosis may not show up until 10 to 40 years after exposure to asbestos fibers. Approximately 1.3 million construction and industry employees are currently exposed to asbestos on the job. From 1970 to 2000, the asbestosis age-adjusted death rate in the U.S. increased from 0.6 per million population over 15 years of age) 6.9 per million population over 15 years of age. The age-adjusted death rate in 2004 was slightly lower at 6.03 per million. Sick Building Syndrome Sick building syndrome (SBS) results when a large number of people in a building experience symptoms that do not fit the pattern of any particular illness, subside when not in the building, and are difficult to trace to a specific source.[13] This condition is often temporary, but some buildings have long term problems. Causes of sick building syndrome include inadequate ventilation, chemical contaminants from indoor sources (such as adhesives, pesticide, cleaning agents etc.), chemical contaminants from outdoor sources (such as vehicle exhaust and plumbing vents), and biological contaminants (such as bacteria, mold, and pollen). Certain racial and ethnic groups are traditionally employed in lower-wage sectors of the workforce where they are overexposed to occupational respiratory hazards. They are more likely to be employed in industries such as agriculture, mining (coal, silica), textiles, demolition, manufacturing (asbestos), and service maintenance (cleaning supplies)—all of which have been associated with lung disease. Occupational Lung Disease 66 www.lungusa.org 1-800-LUNG-USA Occupational Lung Disease African Americans Occupational lung diseases can affect African Americans and Caucasians differently. For example, African Americans are known to have higher mortality rates due silicosis than Caucasians, but have a lower rate of malignant mesothelioma. The age-adjusted death rate for silicosis was 1.8 times higher among African American men (3.35 per million) than among Caucasian men (1.82 per million) for the combined years of 1996 through 2005. This trend was consistent throughout this period.[14] However, African Americans have had a consistently lower age adjusted death rate due to malignant mesothelioma than Caucasians. Between 1999 and 2005, the death rate due to mesothelioma was 24.0 per million among Caucasian men, compared to 10.3 per million among African American men. The age-adjusted rates for Caucasian (4.2) and African American (1.7) showed a similar pattern. Hispanics Data on occupational respiratory illness among Hispanics is limited, partially because this population has only recently begun to be independently identified in data collection. However, Hispanics are disproportionately at risk due to their high employment in certain occupations. Currently, Hispanics represent 15.4 percent of the total population,[15] but account for 28.2 percent of building cleaners, 59.3 percent of agricultural graders and sorters, 29.9 percent of brick and stonemasons, and 57.7 percent of cement workers.[16] Asian Americans and Native Hawaiians/ Pacific Islanders Data on occupational illness among the Asian American/Pacific Islander Racial/ Ethnic Differences Source: NIOSH WORLD Report, 2008 Race and Sex Age-adjusted death rate per million 10.3 1.7 4.2[17] Age-Adjusted Death Rates Due to Mesothelioma by Race and Sex, 1999-2005 Caucasian Women Caucasian Men African American Women African American Men 0 5 10 15 20 25 Source: Census Bureau and BLS, 2008 Percentage of the Population and Selected Occupations that is Hispanic, 2008 Cement Workers 57.7 Brick and Stonemasons 29.9 Agricultural Graders and Sorters 59.3 Building Cleaners 28.2 Population 15.4 0 10 20 30 40 50 60 American Lung Association State of Lung Disease in Diverse Communities 2010 67 populations are limited.

CONCLUSIONS: Occupational lung diseases may not be a serious problem for these populations as they are less likely to be employed in occupations with a high risk for these conditions. However, anyone is potentially at risk for occupational lung diseases if preventative measures are not taken. American Indians/ Alaska Natives in Colorado and New Mexico, a high percentage of Native Americans have historically been employed in uranium mines. This employment trend has been associated with high rates of lung cancer among Native Americans in these states, due to exposure to radon byproducts. Radon results from radioactive decay of radium, which is in turn a decay product of uranium. A study that looked at Navajo uranium miners from 1969 to 1993 found that they were 28 times more likely to develop lung cancer than Navajos not exposed to uranium.[17] Another study concluded that Native Americans working in uranium mines also have a higher risk for getting certain occupational lung diseases, in addition to lung cancer, than any racial or ethnic groups. To confound the problem, they are also less likely to receive compensation for mining-related diseases.[18]

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