THE IMPACT OF SOIL POLLUTION ON HUMAN HEALTH AND THE ENVIRONMENT

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ABSTRACT

The study of soil pollution has occupied the attention of a large number of researchers because of its continuity and effect on humans, animals and plants alike. Soil pollution occurs as a result of the entry of elements that change the composition and organism of the soil, and reduce its fertility, making it more vulnerable to drought, and unsuitable for agriculture. This study proposes an index system for evaluating the inherent risk level of polluting factories and introduces an integrated risk assessment method based on human health risk. This study will discuss the scientific and technical issues analysts should consider regarding the use of these methods to estimate the burden of disease attributable to outdoor fine particulate pollution in their own settings. Most of the agricultural lands are irrigated by rivers polluted with factory wastewater. Also, the research discusses the most important sources of pollution represented by pesticides and chemical fertilizers that contain toxic substances and seep into the soil to remain for a long time, and contribute to eliminate soil fertility. The research deals with the impact of logging the desertification of agricultural areas and their transformation into a vast desert that is unsuitable for agriculture, and pollutes the soil with hydrocarbons. Attention was drawn to the problem of existing inequalities in the global burden between economies with different income levels.

Keywords: soil pollution, environmental factors, rivers polluted, factory wastewater, soil fertility, wastewater, human health risk.

INTRODUCTION

Industrial and mining activities have always been leading sources of soil pollution. Moreover, because of irrational planning and rough development in the initial construction stage, types, range and potential risks of the pollutants in soil of industrial and mining gathering areas are intricate and should not be underestimated. In the interests of preventing and controlling soil pollution caused by industrial and mining activities, several studies have conducted ecological and health risk assessments, evaluation criteria grading. In previous studies, the mines and surrounding areas were identified as sources and heavy metals were considered the most serious pollutants. However, the risk assessment of soil pollutants has focused almost exclusively on heavy metal pollution. Organic pollution, especially the organic pollutants generated by the petrochemical industries, is largely ignored, despite its strong presence in the industrial and mining gathering areas and its potential for serious harm. Moreover, although most researchers have analyzed the risk sources, the survey, classification, grading, and management methods of polluting factories (the main sources of pollution in industrial and mining gathering areas) are relatively simple and

not associated with the risk analysis. Air pollution is no longer just an environmental issue. It must also be considered in economic terms, as it causes a large global burden of disease. Although the consequences of poor air quality are particularly evident in the elderly (as a result of long-term exposure), the measurable effects of the burden of this risk factor can also be estimated for the working-age population. In terms of economic (social) costs, years of health and life lost prematurely due to illness or death significantly reduce the human resource potential of an economy and are a source of lost productivity. Although air pollution is commonly associated with areas of high production intensity, data on morbidity and mortality from this risk factor indicate that the burden of disease from air pollution is greatest in low- and middle-income countries.

LITERATURE REVIEW

Philip J Landrigan (2023) Healthy soil is foundational to human health. Healthy soil is needed to grow crops, provides food, and sustains populations. It supports diverse ecosystems and critical ecological services such as pollination. It stores water and prevents floods. It captures carbon and slows global climate change. Soil pollution is a great and growing threat to human health. Soil may be polluted by heavy metals, organic chemicals such as pesticides, biological pathogens, and micro/nanoplastic particles. Pollution reduces soil's ability to yield food. It results in food crop contamination and disease. Soil pollutants wash into rivers causing water pollution. Deforestation causes soil erosion, liberates sequestered pollutants, and generates airborne dust. Pollution of air, water, and soil is

responsible for at least 9 million deaths each year. We are thus required to create a toxic-free environment, respect the concept of a safe operating space for humanity, and sustain the health of our planet for future generations.

Kagbagnan Kone (2023) The Tongon mine generates millions of tons of waste rock and tailings, which are stored in landfills in the vicinity of the mine. These tailings contain arsenic. The risk of soil contamination in this area is evident. This study assesses the arsenic contamination of soils around the mine and the health risks to the local population. Soil samples were taken from plastic bags and other materials used as working tools. Arsenic concentrations were determined by inductively coupled plasma mass spectroscopy, after the soil samples had been concentrated and digested. Metal contamination indices were used to assess the degree of soil contamination. These values highlight severe arsenic soil contamination. These results indicate an ecological risk, requiring environmental monitoring, underpinned by the development of an effective remediation strategy to reduce local pollution and contamination.

Wael S. Al-Rashed (2022) To reduce the impact of the novel SARS-CoV-2 virus, popularly known as the Coronavirus, many public health-related rules have been established around the world. Along with social distancing and lockdowns, most countries have mandatory wearing of face masks in public areas to limit the spread of the virus during the COVID-19 pandemic. However, because people are free to choose any method to make their masks, some are being fabricated from materials that can be toxic to the environment and

human health. This paper discusses how inks and dyes used in face masks are causing major environmental degradation and health issues in industry workers and the general mask-wearing public. The goal fixed for the present study is to raise the alarm with authorities and decision-makers regarding the toxic nature of some colors (dyes and inks) and fabrics in the masks being worn every day.

P. Sweety (2021) Soil is the material foundation for sustainable economic and social development, both in terms of human health and construction process. To support our ecological advancement and safeguard domestic ecological safety, soil protection is the main element. Degrading the soil is a significant problem and every aspect of the nation suffers from severe soil pollution, which is one of the greatest weaknesses in construction. This article addresses the causes and effects of soil pollution on human, natural pollutants. This also deals with the measure of soil pollution prevention and control. Soil pollution will cause vegetation loss and reduce plant growth and development, eventually resulting in soil erosion and desertification.

Mohammed Fnais (2020) Long-term exposure of humans to air pollution enhances the risk of cardiovascular and respiratory diseases. A novel Global Exposure Mortality Model (GEMM) has been derived from many cohort studies, providing much-improved coverage of the exposure to fine particulate matter (PM2.5). We applied the GEMM to assess excess mortality attributable to ambient air pollution on a global scale and compare to other risk factors. Using this model, we investigated the effects of different pollution sources, distinguishing between

natural (wildfires, aeolian dust) and anthropogenic emissions, including fossil fuel use. Ambient air pollution is one of the main global health risks, causing significant excess mortality and LLE, especially through cardiovascular diseases. It causes an LLE that rivals that of tobacco smoking.

Causes of Soil Pollution

The primary purpose behind soil sullying is because of the nearness of anthropogenic exercises. These waste items are made of synthetic Concoctions that are not initially found in nature and thus lead to soil contamination. Soil contamination is ordinarily brought about by modern action, synthetic compounds utilized in farming and ill-advised transfer of waste. Soil tainting prompts wellbeing dangers because of immediate and back handed contact with sullied soil. Soil contamination causes immense aggravations in the biological equalization and the soundness of the creatures is under hazard. The impacts of contamination on soil are very aggravating and can bring about immense unsettling influences in the biological parity and soundness of living creatures on earth. Regularly harvests can't develop and thrive in a dirtied soil. When the few harvests figure out how to develop, these yields may have retained the lethal synthetic substances in the dirt and might cause genuine medical issues in individuals expending them.

Impacts on Human Health

A subject of specific interest for people in a European context is long-duration, less pollutant exposure to a multitude of contaminants along with each present and inheritance emission. Epidemiologists and toxicologists extensively study cases of low populations with elevated

concentrations of soil contamination in particular places around the globe to determine the health effects of soil-borne chemicals in the atmosphere. It primarily focuses on soil contamination resulting from human activity, such as industrial operations, mining, residential and commercial waste, and human and animal prescription medications. Soil additionally contains an excellent variety of biological contaminants for example pathogens, like tetanus, and that cause several well-documented impacts on human health as well as animals.

Sources of Water Pollution

Water pollution is mainly concentrated in industrialization, agricultural activities, natural factors, and insufficient water supply and sewage treatment facilities. First, industry is the main cause of water pollution; these industries include distillery industry, tannery industry, pulp and paper industry, textile industry, food industry, iron and steel industry, nuclear industry and so on. Various toxic chemicals, organic and inorganic substances, toxic solvents and volatile organic chemicals may be released in industrial production. With the acceleration of urbanization, wastewater from industrial production has gradually increased. In addition, water pollution caused by industrialization is also greatly affected by foreign direct investment. Industrial water pollution in less developed countries is positively correlated with foreign direct investment. Second, water pollution is closely related to agriculture.

Impact of Water Pollution on Human Health

Unsafe water has severe implications for human health. According to UNESCO 2021 World Water Development Report, about 829,000 people die each year from diarrhea caused by unsafe drinking water, sanitation, and hand hygiene, including nearly 300,000 children under the age of five, representing 5.3 percent of all deaths in this age group. Data from Palestine suggest that people who drink municipal water directly are more likely to suffer from diseases such as diarrhea than those who use desalinated and household-filtered drinking water. In a comparative study of tap water, purified water, and bottled water, tap water was an essential source of gastrointestinal disease. Lack of water and sanitation services also increases the incidence of diseases such as cholera, trachoma, schistosomiasis, and helminthiasis. Data from studies in developing countries show a clear relationship between cholera and contaminated water, and household water treatment and storage can reduce cholera.

RESEARCH METHODOLOGY

This study assesses human health risk and the inherent risk levels of polluting factories. From these results, a comprehensive method for assessing hazardous soil environments in industrial and mining gathering areas is developed. By assessing human health risk, we can characterize the potential health hazards imposed by environmental pollution and elucidate the impacts and damage to human health. The operating conditions, pollutant emission levels, environmental management, and risk prevention levels of polluting factories are all important affecters of soil environmental risks. A sample comprises elements or a subset of the population considered for actual inclusion in the study, or it can be viewed as a subset of measurements drawn from a population in which the researcher is

interested. The latter (including the carcinogenic and non-carcinogenic health risks of soil contamination) are revealed by the land use patterns and exposure pathways. Polluting factories refer to factories engaged in industrial production or other industries, which may directly or indirectly cause large-scale environmental or ecological pollution. As mentioned in the Introduction, mining and industrial activities are major sources of soil contamination in industrial and mining gathering area.

RESULTS AND DISCUSSIONS

Data collected in this survey indicated that the majority of respondents in medak district of Telangana state were elderly, between the age of 40 and 50 years

Table 1: Period of employment on current job

Period of Employment in Years	Number	% age rate
1-5years	2	14.5
6-10years	6	71
11-15years	2	14.5
16-20years	0	0
20+years	0	0

The table above shows that 1(14.5%) each had been employed for a period of 1-5 and 11-15 years, whilst the majority 6 (71%) had spent 6-10 years at their current jobs.

Table 2: Haematological tumours in the last 10 years

Haematological tumours	Number	% age rate
Never	10	68
Occasional	5	32
Often	0	0
Very often	0	0

The data in the table above shows that 10 (68%) of the respondents indicated that they have never suffered from haematological tumours and 5(31%) occasionally suffered from the diseases. Haematological tumours refer to the haematological cancers which are: leukaemia, where abnormal white cells start to grow in an uncontrolled manner and production of normal blood cells is reduced patients experience symptoms of unusual bruising, bleeding and recurrent infections. Lymphoma are cancers of white blood cells developing in the lymphatic system, usually presenting with swollen lymph glands but sometimes affecting other parts of the body. Myeloma is a bone marrow cancer that can cause damage to the bones, often leading to severe back pain and damage to the kidneys. These are cancers arising from abnormal blood or bone marrow cells. They are rare diseases, accounting for less than five percent of all registered cancers.

Table 3: Distance from the mine in the last 10 years

Distance	Number	% age rate
0-5km	15	100
6-10km	0	0
10+km	0	0

Fifteen respondents representing a 100% response rate indicated that they stay within the 0-5km radius within the mining area. This revelation shows that all the respondents are living in an area where they can easily be attacked by the diseases that are as a result of mining activities.

Table 4: How long have you stayed in Sasolburg?

Years	Number	%age rate
0-5years	3	21
6-10years	5	32
10+years	7	47

Three respondents, representing 21%, indicated that they have been staying in Sasolburg between the periods of 0-5 years. The other five, representing 32%, indicated that they have been staying in the area for 6-10 years, while the seven respondents who were the majority of the population representing 47%, indicated that they have been the residents for 10 years and above. This shows that the respondents represented the whole population in terms of the variations of the years they stayed in the area.

Table 5: How often do you encounter the following

	Never	Occasion	Often	Very Often
Noise	0	0	0	15
Dust	0	0	0	15
Dangerous equipment	0	0	0	15

Hundred percent (100%) of the participants reported that they encounter noise, dust and dangerous equipment. This is basically because of their proximity to the mining environment.

Table 6: Do you think the government department responsible is playing its role in mitigating environmental pollution?

Yes	0	0
No	12	79%
Not sure	3	21%

Twelve respondents representing an 79% of the response rate indicated that the government department responsible for mitigating environmental pollution is not doing its duties effectively while 3(21%) were not sure. It can be seen that there was no respondent who indicated that the department is doing its duties effectively. This is a challenge to the National Department of Environmental Affairs review its aim towards environment.

CONCLUSION

Soil pollution can be avoided by using appropriate farming methods, pre-disposal waste recycling, appropriate household and industrial waste disposal methods, community education and knowledge of soil pollution, appropriate sewage system maintenance, use of organic fertilizer rather than chemical fertilizer and pesticides. The department of health normally responds to industrial wastes when they endanger the potable nature of water supplies or interferes with water and sewage treatment processes. The results of the research can sufficiently answer the research question and sub-questions. After a thorough investigation in Sasolburg, it was clear that residents of in medak district who are located in the heart of chemical industries face serious health hazards due to pollution emanating from the industries. To keep the soil from being contaminated, the things should be reused and recycled. Glass and other reusable containers should be used instead of disposable plastic or study containers. To this end, the pollutants and their sources were monitored and investigated. Moreover, the soil environmental risks in a typical industrial and mining gathering area were systematically analyzed. To

assess the impacts and damage to human health by soil environmental pollution, a human health risk of heavy metal contaminants and organic pollutants was conducted. Similar to previous studies, heavy metals were identified as the most serious contaminants in the study area. High and extreme risk was found mainly in industrial and residential areas. The inherent risk level of polluting factories, which pose the main risks in industrial and mining gathering areas, was evaluated.

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