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A Study on the Solutions of Environment Pollutions and Worker's Health Problems Caused by Textile Manufacturing Operations

Forida Parvin[1], Shariful Islam[2]*, Zakia Urmy[3], Shaharia Ahmed[4] and AKM Saiful Islam[2]

[1]*Department of English, Rajshahi Government Mahila College, Rajshahi, Bangladesh*

[2]*Department of Textile Engineering, Faculty of Science and Engineering, City University, Dhaka, Bangladesh*

[3]*Department of Medicine, University of Dhaka, Bangladesh*

[4]*SGS Bangladesh LTD, Dhaka, Bangladesh*

***Corresponding author:** Shariful Islam, Department of Textile Engineering, Faculty of Science and Engineering, City University, Dhaka, Bangladesh

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ABSTRACT

The aim of this paper is to study the solutions of environment pollutions and worker's health problems caused by textile manufacturing operations like spinning, weaving, knitting, dyeing and printing etc. The findings of this paper established that, textile manufacturing processes have serious impact on worker's health. Textile manufacturing zones like spinning and weaving sections are generating loud noise those are creating hearing problems to the workers. In the same time, these sections are spreading dust to the air those are creating breathing problems to the workers. Employees working in the dyeing sections are coming in touch to the harmful dyes, chemicals and auxiliaries those are creating serious skin problems, even sometimes cancer. Bleaching and dyeing sections are releasing toxic gases to the environment by which men and animals are seriously suffering with safety and health issues. While producing natural fibers, harmful chemicals and insecticides are thrown to the plants to protect them from different insects; those are also creating health problems to the men and animals. Employees working in the weaving sections have to perform the task of drafting and denting before starting a loom, those are creating problems to the eyesight. Besides, these textile manufacturing operations are polluting the environmental drastically. Textile industries are releasing carbon monoxide and carbon dioxide gases to air, those are drastically polluting the environment, increasing global temperature, melting ice of the poles and causing sea level rise. This increased temperature also causes greenhouse effect. Dyeing and printing industries are dumping the toxic chemicals, dyes and oils to water and polluting river, cannel and sea. These industries are also dumping the toxic and solid garbage to soil and polluting the environment. If textile industries can use effluent treatment plant (ETP) to purify the used chemicals and water before dumping down them to river, then the problem of water pollution could be solved. Industries should also use chemical chimney to reduce air pollution. Workers should use ear plugs to be safe from noise pollution. They should use mask to be safe from odor pollution and dust. They also can use glasses to give protection to the eyes. While working in the dyeing sections to prepare recipe, employees should use masks, gloves, aprons to get protections from harmful chemicals and auxiliaries. Employees should follow all the health care and hygiene issues. Industrialists should follow all the safety issues before running the industries. Everyone should come forward from everyone's end to make the world better and greener. This paper is beneficial to the personnel involved in environment science studies who are in charge of working with the environmental issues. This paper opens possible ways for the scholars to further study in this field.

Introduction

There is a great importance of this paper in the field of textile science, environment science and public health studies. This paper works with the environment pollutions those have a deep connection with the textile manufacturing operations. This paper shows the ways to the industrialists to follow some instructions to make the environment better with a greener world. This paper also suggests the employees to use some protective items to get protection from serious health problems [1]. Different scholars worked related to this experiment at different times where literature review exposed different findings. Some of which were similar and some were widely dissimilar. Some scholars reported that, at almost all production points in the textile industry, there is a form of chemical contamination that is released into the environment; from the moment, the base materials were planted and produced, to spinning, weaving, dyeing, and finally transporting the finished products. Each of these stages leaves a potentially devastating carbon footprint in our environment [2]. The chemicals used in the textile industry cause environmental and health problems. Among the many chemicals present in textile wastewater, dyes are considered the worst pollutants. It is noted that the global environmental problems associated with the textile industry are generally the contamination of water caused by the discharge of untreated effluents and the use of toxic chemicals, in particular during processing. The effluent is a critical environmental problem as it drastically reduces the concentration of oxygen due to the presence of hydrosulphide and blocks the passage of light through the water body, which is harmful to the water ecosystem [3]. Textile effluent is the cause of a great deal of environmental degradation and human disease. If the pollutants present in the textile wastewater are removed without proper treatment, they can cause the depleted oxygen dissolved in the receiving bodies, causing septic conditions and this affects the survival of aquatic life. The high TDS present in the wastewater increases salinity and the high alkalinity increases the pH of the receiving water bodies. The colors of the dyes are aesthetically questionable, particularly in recreational waters. In addition, some support chemicals used in dyeing, such as phenol, can add flavor and odors [4].

The textile industry often releases highly polluted and highly alkaline or acidic and coloring wastewater. They contain toxic substances such as chlorine, chromium, alkaline compounds, zinc, and copper. Various dyes and some of their aromatic biotransformation products are replaced with the surface, in the river, and underground, leads to harmful effects on humans through transportation with the food chain that has been. It has caused negative impacts on public health and compliance with textile environmental regulations. Factories often aim to avoid the problem with a local authority environmental officer. Therefore, economic development and pollution problems are not contradictory concepts [5]. There are things we can do to reform the situation by studying feasibility solutions to prevent contamination in the textile industry. Therefore, the state of the textile industry survey is carried out to study the extent of a combination of both cleaner production approach and end-of-pipe technology to achieve sustainable development in the next few years. The pollution produced by the textile industry has a great impact on the planet and the reasons are quite easy to understand. Garments are probably the most common items that people buy in the world today and the average number of clothes that a person buys each year has increased dramatically in recent years [6]. Three basic needs for human being those a man possesses such as food, clothing, and shelter. The global textile and clothing industry will be huge as it meets the second basic human requirement. It is currently worth $ 480 billion and is expected to reach $700 billion soon. This is because people are becoming more aware of how they dress. It has become a means of creating an impression and representing your personality. Everyone wants to give the impression of different and fashionable clothes [7].

But the sad fact is that human greed for looking attractive and wearing glamorous clothing ended up causing damage to the environment. The textile industry is one of the most polluting release industries in the world. Nearly five percent of all landfill space is consumed by textile waste and 20 percent of all freshwater contamination is produced by textile and dye treatments. Pollutants released by the global textile industry continuously cause unimaginable harm to the environment. It pollutes the earth and renders it useless and sterile in the long run [8]. Surveys show that cotton consumes the most pesticides and harmful fertilizers. Most of them fall to the ground while being sprayed on the crop. Likewise, textile production units release hazardous wastes to nearby soil. The textile industry uses millions of liters of water every day. However, the problem is not in high usage! Wastes are not treated to remove contaminants before they are disposed of in bodies of water. Wastewater generally contains PBDEs, phthalates, organo chlorines, lead, a many other chemicals that cause serious human health and disease problems [9]. Air pollution from the textile industry is also a major concern. Boilers, heat bags, and diesel generators produce pollutants that are released into the air. Contaminants generated include Suspended Particles (SPM), Gaseous Sulfur Dioxide, Nitrogen Oxide, etc. Areas close to the human population are adversely affected due to the release of toxic gases into the atmosphere. Farms that grow raw materials used to make fabrics, including crops such as cotton, linen, and hemp, abundantly water. Indeed, cotton is a particularly thirsty plant. On the other hand, to protect this crop, some farmers have noticed many pesticides and herbicides that end up in the environment. Again, cotton is a big culprit, being one of the world's pesticide-intensive crops [10].

Other types of fabrics also consume many natural resources. Production rayon, an artificial fabric made from wood pulp, has caused the loss of many ancient forests. During the process that transforms it into the fabric, the pulp is treated with dangerous

chemicals that eventually make their way into the environment. Now consider synthetic fabrics or synthetic fabrics such as nylon and polyester. These fabrics are made with petrochemicals and fossil fuels and the production of the parrot requires a lot of water and energy. Nylon production creates a large greenhouse gas that damages the atmosphere we breathe. In addition, they are not biodegradable, which means that the quality of nylon is rich in decomposition [11]. Making fabrics involves an activity such as bleaching, dyeing, and washing that offer a lot of water. Such elaborate processes salts, surfactants, which help the dyes to penetrate into the fabrics and other surfactants, such as detergents, which do not decompose, therefore end up. While fast fashion offers consumers the opportunity to buy more clothing at a lower price, those who work or live near textile production plants bear a disproportionate burden of environmental health risks [12]. Furthermore, increasing consumption patterns have also created millions of tons of textile waste in landfills and unregulated environments. This is particularly applicable to low- and middle-income countries (LMICs), as much of this waste ends up in the second-hand clothing markets. These LMICs often lack the supports and resources necessary to develop and apply environmental and professional safeguards to protect human health [13].

Impact of Textile Production on Environment

The first step in the global textile supply chain is textile production, the process by which natural and synthetic fibers are manufactured. About 90% of clothing is made from cotton or polyester, both of which are associated with significant impacts on the health of production and production processes. Polyester, a synthetic fabric, is derived from petroleum, while cotton requires large amounts of water and pesticides to grow. Fabric dyeing creates supplementary hazards since unprocessed dirt from dyes is often released into local water systems, discharge heavy metals and other toxins that can have a pessimistic impact on animal health, in addition to nearby residents [14].

Air Pollution

According to some studies, the clothing industry accounts for 10% of global carbon emissions and is the second-largest industrial polluter. In particular, air pollutants produced by the textile industry include nitrous oxide and sulphur dioxide produced in the energy production phases; volatile organic components (VOCs) produced in the coating, hardening, drying, treatment of wastewater and storage of chemical products; aniline vapors, carrier Hydrogen sulfide, chlorine, and chlorine dioxide produced in the dyeing and bleaching phases. As fabrics advance through the production process, numerous potentially deadly untreated contaminants can pollute the air [15]. Factory boilers that heat water release nitrous oxide and sulfur dioxide. Carbon monoxide is released from factory sizing operations. Bleaching operations release chlorine dioxide, and printing on fabrics release hydrocarbons and ammonia. Fabric dying procedures can discharge formaldehyde into the air. Without EPA protections, these toxic vapors would remain airborne and carried by the wind to pollute other areas. Air pollution in the textile industry exudes in the form of volatile organic compounds (VOCs) that are released into the atmosphere [16]. These VOCs can be glycolic ether, detergent, combustion gases, reactive components, and volatile molecules, among many other dangerous emissions. Air pollution has many side effects and is probably the worst form of pollution for the environment. It presents serious threats to our environment, contributing to phenomena such as acid rain, eutrophication (algal blooms) and smog/mist and affects the health of plant and animal life, not to mention the destruction of our ozone layer. Global health has also been greatly affected by the start of industrialization [17]. Figure 1 shows air pollution caused by industrial manufacturing operations.

Figure 1: Air pollution caused by industrial manufacturing operations.

Air pollution affects our health in many ways, such as worsening respiratory conditions such as asthma, which contributes to damaging the nervous system and can also cause birth defects in pregnant women. These emissions contain many carcinogens, such as benzene-derived compounds, that promote cancer growth. As the demand for textiles increases, it is important to know the cost of a broader sector for our environment, the animals with which we share the Earth, and possibly our own health [18]. Textile factories generally generate nitrogen and sulfur oxides from boilers. Hydrocarbons are emitted from drying ovens and mineral oils during drying/hardening at high temperatures. These processes can emit formaldehyde, acids, softeners, and other volatile compounds. The residues of the fiber preparation sometimes emit pollutants during the heat pick-up processes. Conveyors and solvents can be emitted during dyeing operations, depending on the types of dyeing processes used and the operations of the wastewater treatment plant [19]. Conveyors used in batch staining of dispersed dyes can lead to the volatilization of aqueous chemical emulsions during the heat pick, dry, or harden phases. Acetic acid and formaldehyde are the two main issues of concern in tissues [20].

Water Pollution

Water consumption is a large part of much of this sector, used for purging, bleaching, and dyeing processes. The occurrence of contamination is largely derived from wastewater, which is often contaminated with chemicals from dyeing and finishing processes. If left untreated before being released back into the bodies of water, this sewage can cause a decrease in the concentration of oxygen, as well as a reduction in the passage of light through the water, which can harm aquatic life and the aquatic ecosystem in general. In fact, textile dyeing is the second largest water pollutant worldwide [21]. The production of some fabrics can cause more waste and water pollution than others. Take cotton as an example. When you imagine cotton, you can think naturally of a cool, summery fabric that needs to be sustainable. However, the impact of cotton production on the environment is far from small. About 20,000 liters of water are needed to produce the equivalent of a cotton shirt and a pair of jeans. Conventional cotton production also includes the high use of fertilizers and pesticides, which can contaminate nearby water bodies. In fact, more chemical pesticides are used to grow cotton than for any other crop; when combined with the fact that about half of all fabrics are made from cotton, the impact of this is enormous [22]. Mills discharge millions of liters of this effluent as a hazardous toxic waste, filled with organic chemicals and colored by dyes and finishing salts. The appearance of sulfur, naphthol, vats, nitrates, acetic acid, soaps, chromium compounds, and bulky materials such as copper, arsenic, lead, cadmium, mercury, nickel, and cobalt, and some subsidiary chemicals simultaneously make up all effluents are highly toxic [23]. Other harmful chemicals in water can be formaldehyde-based dye fixing agents, hydrocarbon-based softeners, and non-biodegradable dye chemicals. The mill effluent is often also at high temperature and pH, both extremely damaging. The colloidal matter presents together with the colors and the oily foam increases the turbidity and gives the water a bad appearance and a bad smell. It prevents the penetration of sunlight necessary for the photosynthesis process. This interferes with the oxygen transfer mechanism at the air-water interface. The depletion of dissolved oxygen in water is the most serious effect of textile waste since dissolved oxygen is very essential for marine life. This also hinders the self-purification process of water [24] Figure 2 shows the water pollution caused by industrial release of toxic chemicals.

Figure 2: Water pollution caused by industrial release of toxic chemicals.

Furthermore, when this effluent is allowed to flow in the fields, it clogs the soil pores with the consequent loss of soil productivity. The soil texture hardens and root penetration is prevented. The wastewater flowing into the drains corrodes and encrusts the sewer pipes. If it is allowed to flow into sewers and rivers, it affects the quality of drinking water in hand pumps, making it unsuitable for human consumption [25]. It also leads to draining losses by increasing maintenance costs. Such contaminated water can be a breeding ground for bacteria and viruses. Impurities in water influence fabric processing in many ways. When washing and bleaching, they add a yellow tint to the white fabric. In the staining phase, the metal ions present in the water sometimes combine with the dyes causing opacity in the shadows. Textile effluent is the cause of a significant amount of environmental degradation and human disease. About 40 percent of the dyes used worldwide contain organically bound chlorine, a known carcinogen. All the organic matter present in wastewater from the textile factory is the main concern in water treatment because they react with many disinfectants, especially chlorine [26]. Chemicals evaporate in the air we breathe or are absorbed through our skin and manifest as allergic reactions and can harm babies even before birth [27].

Solid Waste Pollution

The textile industry produces toxic and non-toxic solid waste. Examples of non-toxic solid waste would be all packaging, fabric scraps, parts of the machine to be replaced, spools, etc. These are not immediately dangerous to the environment or us and can be recycled to avoid future ecological damage. However, toxic or hazardous wastes, such as bleach and sludge, cause immediate harm to us and the environment and are anti-life. Most solid waste is emitted during fiber preparation, yarn spinning, trimming/sizing, weaving, knitting, tufting, finishing, and occasionally breaching [28]. All of these except bleaching produce pollutants such as fiber packaging and waste, fabric waste and scrap, and can be treated with innovative recycling. In many countries, this fabric waste is recycled and used to create eco-friendly but modern clothing. Lye, however, is a prime example of the many dangerous pollutants in solid waste produced by the textile industry and how damaging they are to our Earth. It is an incredibly dangerous pollutant that represents a great threat to the future of life on our planet [29]. When poured into the sea, bleach kills a wide variety of plants and marine life, as well as being highly toxic to the human body when in contact with it. Furthermore, the waste produced ends up in water bodies, causing environmental problems. Some of the pollutants that end up in landfills include fluff, fiber debris, trimmings, and packaging waste produced in the preparation of the fibers. Sludge wasted and retained in wastewater treatment including containers for animals, chemicals, and dyes used for dyeing and finishing fabrics [30]. This type of pollution released into the environment by the textile industry is becoming dangerous, both for the planet and for man Figure 3 shows the soil pollution caused by the release of industrial garbage. The primary residual residues generated by the textile industry are not dangerous. These include fabric and yarn waste, off-specification yarn and fabric and packaging waste. Here are also wastes related to the storage and manufacture of yarns and fabrics, such as chemical storage drums, cardboard reels for storing fabrics and cones that are used to clasp yarns for dyeing and weaving [31]. The waste from the cutting room generates a high volume of fabric waste, which can often be reduced by increasing the efficiency of the use of the fabric in cutting and sewing [32].

Figure 3: Soil pollution caused by the release of industrial garbage.

Noise Pollution

Textile operations like spinning, weaving, knitting, dyeing, printing, finishing and sewing sections are full of noise. These sections are releasing toxic chemicals, harmful fluids, dust, dirt and many other things those are directly or indirectly injurious to human health. [33]. Noise levels of 70-100 dB are commonly recorded in the workplace. Studies have shown that one-minute exposure to a sound level above 100dB could cause permanent hearing loss. A large number of textile workers, particularly weavers, were also reported to suffer from professional hearing loss (ITUT, 2003). A study was conducted on 2,652 textile workers in Egypt to find out the relationship between noise exposures and induced hearing loss. Exploration of the consequence exposed neurological and cardiovascular changes among the workers examined in the study (ILO, 1984) [34].

Increase of CO_2

The world is increasingly hungry for energy. Energy consumption produces the release of carbon into the environment. Carbon scattering in the environment is the main oppressiveness of climate change. Any human or natural activity that has some carbon release activity is a threat. Industrial activities have increased carbon dioxide levels in the atmosphere from 280 parts per million to 400 parts per million in the past 150 years. For every gallon (or liter) of gasoline, your car burns, 1,300 times that volume of CO_2 is released (a gallon of gasoline weighs about 6 pounds or 2.8 kilograms, but the CO_2 released would weigh more than 19 pounds or 8.75 kilograms) [35]. For this reason, it is essential to verify all the main activities that release large quantities of carbon to slow down the pace of the current climate change model, if not each one and each action. The burning of fossil fuels such as coal, gas, and oil is the most shocking human activity in the world. Energy production releases 23 billion tons of CO_2 emissions per year, more than 700 tons per second. Coal releases 70% more carbon dioxide than natural gas for each unit of energy produced that seriously damages the environment [36].

Green House Effects

Textile production produces 1.2 billion tons of greenhouse gases every year. Synthetic fibers such as polyesters are known to emit more greenhouse gases than natural fibers, as they have a greater carbon footprint. The consequences of the wet treatment process on fabrics during the process, large quantities of fossil fuels are consumed. This ultimately leads to acidification, depletion of natural resources, and global warming [37]. The carbon track of a garment depends on the fabric. While synthetic fibers like polyester have less impact on water and soil than cultivated materials like cotton, they emit more greenhouse gases per kilogram. A polyester shirt has more than twice the carbon footprint of a cotton shirt (5.5kg versus 2.1kg or 12.1 pounds versus 4.6 pounds). Textile polyester production emitted around 706 billion kg (1.5 trillion pounds) of greenhouse gases, the equivalent of annual emissions from 185 coal-fired power plants. The clothing industry represents 10% of global carbon emissions [38]. The universal clothing industry is producing many greenhouse gases due to the vigor used through its production, and transportation of the millions of garments purchased each year. The synthetic fibers (polyester, acrylic, nylon, etc.), used in most of our garments, are made with fossil fuels, which makes production much more energy-efficient than natural fibers. Most of our clothing is produced in China, Bangladesh, or India, essentially countries that run on coal. This is the grubby type of vigor in conditions of carbon emissions [39].

Sixty percent of all clothing is shipped within one year of production, and this contributes to a large amount of climate pollution. It doesn't have to be that way, here's a look at fashion brands and clothing companies looking to change the industry. With global production concentrated on the Asian continent, greenhouse gas emissions caused by these phases can be attributed to dependence on the production of clothing with hard coal and natural gas for the generation of electricity and heat [40]. To stem this bad tide, the global garment industries must use more renewable energy sources than fossil fuels for energy production and adopt the use of eco-sustainable materials for the production of clothing, clothing labels, and labels of clothes. Recently there has been a gradual change in which we see people adopting greener products for their laundry and bathroom uses [41]. This development must be shifted towards the production and use of textiles. People should feel more comfortable wearing clothes, clothing labels, and labels that cost the environment little or nothing [42].

Maritime Pollution

In view of World Environment Day, June 5, with the "Beat Plastic Pollution" theme, it is worth remembering that pollution from synthetic microfiber is accumulating in our oceans at alarming rates. About 100,000 marine animals are killed each year by plastic debris, including microfibers. Every time we wash a synthetic garment (polyester, nylon, etc.), around 1,900 individual microfibers are released into the water, reaching our oceans. Scientists have discovered that small aquatic organisms ingest these microfibers [43]. They are then eaten by small fish, which are then eaten by larger fish, introducing plastic into our food chain. Most of us use synthetic fabrics like polyester every day. Our shirts, yoga pants, fleece, and even underwear are increasingly made of synthetic materials, actually plastic. But these synthetic fabrics, from which 60% of all clothes on earth are made, have a big hidden problem, when they are washed, they release small pieces of plastic, called microfibers, which flow along our drains, through the of water treatment, and in our billions of rivers, lakes, and oceans [44] Figure 4 shows the water pollution caused by the release of dyeing and printing liquids.

Figure 4: Water pollution caused by the release of dyeing and printing liquids.

Freshwater Withdrawal

Withdrawals of water refer to freshwater that is withdrawn permanently or temporarily from the surface or underground water sources and is transported to an area to be used for various processes, such as agriculture, washing, etc. In textile production, large quantities of water are used since the thread must be constantly washed [45]. This involves the extraction of freshwater. During this picking process, the main stages of textile production involved are fiber production, dyeing and finishing, and yarn preparation. Since all usable freshwater supplies are somewhat limited, withdrawing water at a speed greater than that which can be refilled could result in a loss of capacity to meet our current and future water needs [46].

Problems with Natural Fibers

Cotton represents the world's pesticide-intensive crop and pesticides harm people and cause the loss of many lives each year. Besides, it uses much of the agricultural land, many of which are required by the local population to grow their food. Herbicides, along with chemical defoliants occasionally used to promote mechanical cotton harvesting, further harm the environment and human health [47]. Even after finishing, the chemicals often remain on the fabric and are released over the life of the garment. At another level, environmental problems are added to the development of genetically modified cotton. Cotton farming uses 22.5 percent of the total volumes of insecticides used worldwide. To grow enough cotton for just one shirt, you need 257 liters of water. Furthermore, the bleaching and dyeing of the resulting tissue produce harmful substances that flow into our ecosystem [48].

Food Chain Problem

Polyester is the most exoteric fabric used for fashion. But when polyester clothing is washed in household washing machines, they release microfibers that increase the increasing levels of plastic in our oceans. These microfibers are small and can easily pass through our wastewater and sewage treatment plants in our waterways, but since they do not biodegrade, they pose a serious threat to aquatic life. Tiny creatures like plankton eat microfibers, which then make their way along the food chain for man-eaten fish and crustaceans [49].

Impact of Textile Production on Workers Health

The textile industry is made up of several units dedicated to spinning, weaving, dyeing, printing, finishing, and a series of other processes necessary to convert the fiber into a finished fabric or garment. There are huge safety and health problems associated with the textile industry. The main health and safety problems in the textile industry can be indicated as exposure to cotton dust, exposure to chemical products, noise exposure, and ergonomics problems [50].

Hearing Problems from Heavy Noise

High levels of noise and noise pollution are a major problem for textile factories. Long-term noise and loud noise can cause serious damage to the eardrums. Due to which the hearing of the workers gradually decreases. Other problems caused by these loud noises and noise are that the workers feel tired, inattentive, dissatisfied, and anxious. Gradually the efficiency decreases, the pulse rate decreases, and as well as sleep problems occur, which causes high blood pressure. A study conducted among 6 employees of textile

mills found that 7.8 percent of employees are at risk of hearing loss due to noise [51]. Another study found that 21.3 percent of textile unit workers suffer from hearing loss due to loud noises. Figure 5 shows the worker's safety equipment for the protection of eye, ear, head etc.

Figure 5: Worker's safety equipment for the protection of eye, ear, head etc.

Skin Damage from Chemicals and Dyes

The use of chemicals in the garment and its linkage factories is one of the major health risks. This problem becomes apparent along with other health risks. Chemicals are more likely to cause various diseases. However, it is more common among workers involved in dyeing, printing, and finishing work. Factories usually use a variety of harmful chemicals such as caustic soda, acid, auxiliary, chemical, dyes, and hydros. These chemicals are mainly used in the color and design of garments [52]. However, these are deadly harmful to the skin and other parts of the body.

Cancer Problem from Chemical Effect

Figure 6: Worker's safety equipment for conducting dyeing operation in chemical laboratory.

One study found that formaldehyde can cause a variety of disorders in workers, including cancer of the nose, skin, lungs, and brain. Long-term exposure to these chemicals can lead to brain cancer and leukemia. Formaldehyde can also cause respiratory problems and rectal problems. These chemicals enter the body through inhalation and through the skin and causes serious diseases like cancer, breathing, general health and skin [53]. In addition, colorectal, thyroid, fistula, and nasal cancers can be found in the test. These should be handled very carefully. Various initiatives are visible in the textile industry to reduce and ban the use of these harmful chemicals. Workers should be careful in using all kinds of chemicals [54] Figure 6 shows the worker's safety equipments for conducting dyeing operation in chemical laboratory.

Byssinosis Problems from Weaving and Spinning Mills

Spinning mills are seen on a large scale with other problems, with significant amounts of cotton in the mills. This problem is evident in those who make yarn from cotton in these institutions. These are spread around the inside and outside of the organization. They also disperse pesticides and dust particles. These cotton resins and other particles increase respiratory disease among spinning workers. Especially among the workers, this cotton incense causes a deadly disease called (Byssinosis) known as the brown lung. Excessive cotton dust and chemical emissions are a problem for most workers in the industry [55]. Symptoms include chest tightness, coughing, hysteria, and shortness of breath. Prolonged exposure to cotton smoke significantly reduces the pulmonary function of workers. This is seriously harmful to the patients of asthma.

Eyesight Problem

In addition to the effects of work on the body, lungs and muscle tone, repetitive work, and continuous visual attention to detail also seem to have an impact on workers' eyes. Normal vision, Hypermetropia (farsightedness) and myopia (nearsightedness) could be estimated by eye tests using [56]. In addition, some of the textile workers reported symptoms of watery eyes, cataracts, strains and eye swelling in both categories. Our workplace observations suggest that there is no uniform and adequate lighting in most sheds. Proper lighting and regular work breaks will allow the eye muscles to avoid fatigue and redesign the work tables to allow work to be done within the normal eye range would offer greater relief to workers and improve quality from work [57].

Solutions to Environment Pollutions and Employee's Health Problems

The textile industry is considered to be the most environmentally harmful industry in the world. Environmental problems in the textile industry occur during some manufacturing processes and lead to the right side of the finished product. In manufacturing processes such as bleaching and then dying, the next fabric produces a toxin that swells in our ecosystem. Controlling pollution during the manufacturing process is just as important as creating a product that is free from toxic effects. It affects garment workers as well as the environment. Petroleum-based products are harmful to the environment. To protect our environment from these effects, integrated pollution control methods are needed. Fortunately, there is an availability of more options [58].

Use of Effluent Treatment Plant (ETP) for the Safety of Environment

An effluent treatment plant or ETP is a type of wastewater treatment system that is specifically designed to purify industrial wastewater for its misuse and aims to release environmentally safe water from the harmful effects of wastewater. Industrial wastewater treatment describes the processes used to treat industrial wastewater as unwanted by-products. After treatment, the treated industrial wastewater (or effluents) can be reused or discharged into a sewer or surface water in the area. Most industries produce wastewater. Recent trends include minimizing this production or recycling wastewater treated in the production process [59]. The textile industries, including carpet manufacturers, produce wastewater from a wide range of processes, including cleaning and finishing wool, the production of yarns, and finishing fabrics (such as bleaching, dyeing, resin treatment, waterproofing, flame retardant). Pollutants produced by the textile industry include BOD, stainless steel, oil and grease, sulfur, phenols, and chromium. Stacked insecticide residues represent a particular problem in the treatment of water generated from wool treatment. Animal fats can be present in wastewater which, if not contaminated, can be recovered for the production of sebum or for subsequent performances [60]. Industrial submissions where oil enters the wastewater flow consist of vehicle bathe shops, workshops, fuel storage space, shipping hubs, and power generation. Wastewater is often discharged into local sewers or industrial waste disposal systems and must meet local environmental specifications. Typical contaminants include solvents, detergents, sand, lubricants, and hydrocarbons.

Many industries have to treat water to obtain the highest quality for demanding purposes, such as pure chemical synthesis or boiler feed water [61]. Many water treatments produce organic and mineral sludge through filtration and sedimentation. The ion exchange with natural or synthetic resins removes the calcium, magnesium, and carbonates ions from the water and generally replaces them with sodium, chloride, hydroxyl, and/or other ions. The regeneration of ion exchange columns with bases and strong acids produces hard water which is rich in ions that precipitate rapidly, especially if mixed with other components of the wastewater [62]. Dyers produce wastewater containing synthetic and natural dyes, rubber thickeners (guar), and various humectants, buffers, and pH retardants or color accelerators. Following treatment with flocculants and polymer-based settlers, typical monitoring parameters include BOD, COD, color (ADMI), sulfur, oil and fat, phenol, TSS, and heavy metals (chromium, zinc, lead, copper) [63].

Use of Chemical Chimney for the Safety of Environment

A chemical chimney is a structure that provides hot combustion gases to the outside air of smoke from a boiler, stove, stove, or fire. The chimneys are typically vertical, or as close as possible to the vertical, to ensure that the gases flow smoothly, sucking air into the combustion in what is known as the chimney or chimney effect. The space inside a fireplace is called a fireplace. Chimneys can be found in buildings, steam locomotives, and ships [64]. In the United States, the term chimney (colloquially, pile) is also used to indicate the chimneys of locomotives or the chimneys of ships and the term funnel can also be used. Figure 7 shows the chemical chimney to release filtered air to environment. The height

of a chimney influences its ability to transfer combustion gases to the external environment through the accumulation effect. Furthermore, the dispersion of pollutants at higher altitudes can reduce their impact on the surrounding environment. In the case of chemically aggressive production, a sufficiently high chimney can allow partial or complete self-neutralization of the chemicals in the air before they reach ground level [65]. The dispersion of pollutants over a wider area can reduce their concentrations and facilitate compliance with regulatory limits [66].

Figure 7: Chemical chimney to release filtered air to environment.

Use of Functional Finishes to Protect Environment

Instead of using harsh chemicals to soften and finish the fabric, a finish made from beeswax, aloevera and vitamin A is a good alternative. Efforts are underway to find a fire retardant finish that uses chemicals that do not contain hazardous compounds. The use of plasma technology for foam finishing on fabrics is an innovative solution for the development of fabrics with stain, hydrophobic, and moisture control properties [67]. The technique uses foam machines that bend the air in the concentrated chemical solution and then dilute it. The process ensures chemical penetration at an optimal level without using large amounts of water. This is a production method that saves energy and loves nature. Another unique method that supports environmental protection in textile finishing uses enzymes instead of chemical additives to reduce carbon dioxide emissions and ultimately reduce energy consumption. Dyeing fabrics with a special enzyme solution reduces the need for cooking. Besides, especially washing your knitted fabrics with enzymes can also help remove excess dye. Such processes are said to save 1,000 pounds of carbon dioxide emissions per ton of knitting and 70,000 liters of water [68].

Organic Cotton Production to Save the Environment

Fabric cotton is the second most harmful agricultural crop in the world. Twenty-five percent of all pesticides used worldwide are grown on cotton. The solution was found in organic cotton, but it also requires a lot of water to grow. Efforts should be made to use organic cotton (OC) from fields that have sufficient natural rainfall to irrigate crops. It is necessary to promote the use of stem fibers such as hemp, flax, and abaca. The "Bast" fiber is spun in the thread from the stem of the plant and not from the flower. Since insects do not attack the stems, plants can be grown without pesticides [69]. If organic cotton can be produced without using chemicals and insecticides, then the environment pollution can be reduced.

More Use of Air Dyeing Technology

There seems to be a solution in sight with the advent of "Air Dyeing Technology". It is a dyeing system that uses wind instead of water to dye clothes, grant companies to create clothes with light designs and colors, without polluting the water and the environment. It emits 84 percent less greenhouse gas (GHG) and requires 87 percent less energy. It also reduces damage to goods (up to 1 percent of goods are damaged by the air dyeing process compared to 10 percent of traditionally dyed clothing). There are no washing rules. Air-colored fabrics can be washed with or without bleach at any temperature, white or color. The different sides of a single piece of fabric can be dyed in different colors or designs [70]. This exclusive dyeing process is already in use to create vibrant two-sided swimsuits, 100% recycled PET ecological t-shirts, window coverings, designer bags, and catwalk fashion from the New York designer house.

Use of Bio Scouring and Bleaching

Chlorine bleach is known to be extremely toxic to the environment and consumers, however, chlorine-based chemicals are still often used for bleaching textiles. An alternative oxygen-

based bleaching method (hydrogen peroxide) can be used. Some factories have started using ozone, a new bleaching technology [71]. This technology relies on freshwater instead of having to hold the fabric in a water bath for many hours. Ozone breaks down in water and oxygen in waste water. Ecological bleaching with chlorine-free substances such as hydrogen peroxide can bleach fabrics without releasing harmful chemicals in the process. Hydrogen peroxide when it breaks naturally when it comes into contact with oxygen and water makes the fabric white. A popular green bleaching procedure uses natural silicates and phosphates that, when used in conjunction with cow manure and exposed to the sun's rays, whiten natural fabrics. Low-temperature bleaching processes that use peroxide activators control their decomposition and simultaneously begin to develop the required blank [72]. The method does not involve the use of methane gas and therefore reduces carbon dioxide emissions by up to fifty percent. Post-wastewater treatments are adopted by different garments and fabric production units. Reusing dye bath water can help save tons of water without fixing the color of one bath to the fabric of another. Cold dyeing, dry and hot setting and vegetable tanning are other processes that textile manufacturers and dyers use to develop eco-friendly garments and fabrics [73].

Modification of the Faulty Machineries

Modification of existing equipment will certainly help to reduce air pollution and reduce water needs. In addition, waste products will also decrease. Insulation of hot pipes, optimization of tank volumes is some of the cases in which branded companies have to start. In addition, the introduction of advanced equipment will also speed up the production process and lead to the elimination of defective machines [74]. In short, faulty machineries can be replaced with new machineries to protect both environment and workers health.

Use of Potato and Cellulose Based Sizing Technique to Protect Both Environment and Workers Health

In the sizing function, the starch is used in the form of a sticky stick paste near the yarn to increase the stiffness and abrasion resistance. The starch paste contains preservatives to protect it from microbial attack. Some preservatives, such as pentachlorophenol, obtained from phenolic and/or chlorinated compounds, have a toxic effect on human skin. Therefore, such national reservations should be avoided [75]. The use of a synthetic starch reduces the use of such preservatives, thus reducing health risks due to phenolic and/or chlorinated preservatives. Instead of using polyvinyl alcohol (PVA) for sizing, you can use potato starch or carboxy-methyl cellulose (CMC), which is cellulose dissolved in acid to become a liquid. It is used in the food and is chemically inert, non-toxic, and is allowed by the global standard for organic tissues [76].

Use of Earplug for the Safety of Worker's Health

There are other intrinsic health risks for workers that employers in the clothing sector must consider, one of which is the impact of noise caused by the huge quantities of machinery that are workers nearby. This is one of the most common health risks in the textile industry. In the worst case, it can cause irreversible hearing damage [77]. The noise mainly depends on the speed of the spindle, the poor condition of the machine, the design of the room, the installation of the machine, etc. Although complete prevention is not possible, both hazardous areas (noise and dust generation) can be prevented by proper humidification, machine maintenance, donor placement, proper cleaning, donning of a mask, and caps for ears or earplug. It is difficult for workers in sectors such as the textile industry to completely avoid being in areas where noise levels are high [78]. Keeping in mind that personal protective equipment must always be the last in the control hierarchy, adequate hearing protection can be really beneficial for employees. Again, training can be provided on the reasons behind protection and the best ways to adapt it. Again, this need not be the case, as controls can be established that minimize risks. These controls include minimizing worker exposure to noisy machinery. Another dangerous parameter in Blow Room to Ring boxes is high temperature. Create due to the location where the factory, station, machine status, machine allocation, machine type, etc. is located, improving the surrounding environment by placing trees around the complex walls [79].

Use of Masks for the Safety of Worker's Health

Use of a mask by the operators, correct humidification inside the salon, operation of all exhaust fans, adequate cleaning and cleaning, prevention of the flight of cotton powder outdoors, correct maintenance of the machines will help maintain the dust level. Exposure to textile dust is the safest way to prevent by ssinosis. The use of fume hoods, improved ventilation and the use of wetting procedures are very effective methods of controlling dust levels to prevent by ssinosis. The protective equipment required during certain procedures also prevents exposure to contamination levels that exceed the current U.S. standard for exposure to cotton dust.

Conclusion

It has been seen from the paper that, several environmental pollutions were discussed those were associated with textile manufacturing operations and their possible solutions were suggested. Textile manufacturing operations caused employees health problems, which could be solved with possible protective cares. Industrialists, scholars, experts and employees should work together to get rid of all these mentioned difficulties. Therefore, it is important to note that textile effluents could be a serious and significant source of environmental contamination due to the lack of adequate monitoring and surveillance and the lack of strict regulations on offenders. Health and safety measures play an important role in any sector. Workers must be aware of the various occupational hazards in the sector. At the same time, management must take the necessary steps to protect workers from potentially dangerous situations. The use of industrial effluents for secondary use as irrigation water is not recommended

as it can lead to a significant level of soil contamination in the case of long term applications. In light of the above, tissue processing can be determined to have the ability to pollute the environment and cause harmful effects on human life. Therefore, it is necessary to use energy-efficient process technologies, which produce less waste, require fewer resources such as chemicals, water, and, finally, must be easy to manage. In the two decades since the fast fashion business model has become the norm for renowned fashion brands, the growing demand for large quantities of cheap clothing has resulted in environmental and social degradation throughout every step of the supply chain. The environmental and human health consequences of fast fashion have been largely absent from scientific literature, research, and discussions on environmental justice. The breadth and depth of social and environmental abuse quickly justify its classification as a global issue of environmental justice. Environmental health scientists play a vital role in upholding evidence-based public health. Similar to historical cases of environmental injustice in the United States, the uneven distribution of environmental exposures have a disproportionate impact on communities in low-consumption countries. There is an emerging need for research to examine the negative health outcomes associated with rapid fashion at each stage of the supply chain and post-consumer process. Progress in this area will inform the translation of research results into public health policies and practices that lead to sustainable ethical production and consumption.

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