



**ORIGINAL RESEARCH PAPER**

**Air Pollution**

**AIR POLLUTION BY BEAUTY SALONS OF CHAPRA TOWN**

**KEY WORDS:**

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**1. INTRODUCTION:**

Air pollution is one of the biggest killers all over the world. In fact, air pollution in Indian caused approximately 1.7 million deaths in 2019 as per a survey published by Lancet Planetary Health Report. [1] There are many contributors towards air pollution such as burning of fossil fuels even today in households especially in developing countries like India, industries etc. road dust etc. Recently indoor air quality has been found to be poorer than the outdoor quality. The word 'salon' originates from the Italian word 'salone' which means a place of gathering where people assemble on the invitation of a host for amusement. Beauty salons are also a place of gathering where people gather to enhance their beauty by cosmetological treatments. At beauty salons, care is taken of hair, skin and nails. Recently beauty salon industry has witnessed a boom. Every man, woman and child want to be beautiful. A good beauty parlour is required in every city, town and other places. In the modern era, life style is changing rapidly and the women have become more conscious about their make-up. The status of women has improved a lot and is improving further. This has resulted in their changing life styles. Their economic independence encourages them to resort to this type of services. In rural areas or urban areas with low population density, the hair is thrown away in nature where it slowly decomposes over several years, ultimately returning to the constituent elements namely carbon, nitrogen, Sulphur and so forth, to their respective natural cycles.

Any substance or mixture of substances intended to be placed in contact with the external parts of the human body, (epidermis, hair system, nails, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odours are called cosmetic product as per EU (European Union) regulation 1223/2009 (article 2.1.a). [2] Cosmetics can be classified into two groups namely 'leave on' and 'rinse off' products. The cosmetic product can be called leave-on if its functions is to stay on the skin for a rather extended period; examples are perfumes, decorative cosmetics, body and face creams and anti-perspirants. On the other hand, a rinse-off cosmetic is a product designed to be rinsed off after a short stay on the skin or mucous membranes such as shampoos, soaps, shower gels or toothpastes. The above mentioned cosmetic products are now a days not confined to beauty salons only but it has entered into every household. Consequently, common masses are exposed to high concentrations of several compounds which cause skin and respiratory disorders. Studies are being done all over the world in order to assess the magnitude of the problem and to find out solutions. The main focus is on hair dressing salons and nail salons with regard to air pollution and water pollution. [3] Concentrations of benzene, toluene, ethyl benzene, xylene, formaldehyde and acetaldehyde in beauty salons were measured and observed. Concentrations were

related to environmental and occupational characteristics of the salons. Hair salons have long been criticized for the pollution they generate. Traditional hair dyes and many shampoos contain harmful synthetic chemicals that are routinely used on customers' scalp – and then washed down the drain where they can accumulate in water ways, soils and even our bloodstreams. [4] Several studies have been done on beauty salons related pollution problems. In one such study, four randomly selected salons in the city of Athens were investigated for several physical and chemical. Salons in heavily polluted city centre were not selected for study in order to avoid the influence of outdoor pollution. [5]

Yet in another study recently, cosmetic ingredients as emerging pollutants of environmental and health concern have been investigated in which effect of UV filters, organic filters, inorganic filters, parabens triclosans, and plastic microbeads have been discussed. [6] Hair dressing and beauty salons use numerous cosmetic chemical products. Chemicals are used in facial cleaning, hydrotherapy of skin, nails and body, antiwrinkle treatments, acne treatments, pigmentation, make up, body and face massage, reflexology, aromatherapy, removal of hair on face and body, hair styling and coloring services. [7] Volatile organic compounds are released from these chemicals which includes methacrylates, phthalates, formaldehyde etc. and pollutants like ozone and carbon monoxide. [8] Beauty salon workers as well as customers are exposed to high concentrations of these pollutants. Such exposures cause skin and respiratory disorders, carcinogenicity, and reproductive and genotoxic effects. [9] In addition to volatile organic chemicals emanating from cosmetics used in salons, ambient particulate matter (PM) is a priority air pollutant. The hazards to human from inhaling PM are considered a serious issue. The PM can be controlled by reducing the emissions of PM and gaseous PM precursors. A recent study has been done in Southern Poland on the effects of external and internal sources of aerosol in beauty salons on indoor ambient particulate matter and on its elemental and organic carbon contents. Four beauty salons differing in the number and types of particulate matter indoor and outdoor sources were chosen for the study. [10] Indoor environmental conditions contribute greatly to human wellbeing, as most people spend around 90% of their time indoors, mainly at home or in the workplace. [11] Hair salon industry in Thailand is a growing business with revenue over 56 million Thai Baht in 2017. Employment increased 85% from 2010 to 2017. There are 121,635 salons in Thailand with one hair dresser for every 300 of the population. There is only one report on exposure levels in hair dressing salons in Thailand. This report has indicated that 19 salons had higher concentration of formaldehyde in comparison to NIOSH standards. (National Institute for Occupational Safety and Health Certification) NIOSH is a part of US centers for Disease Control (CDC) and prevention. The Indian counterpart is NCDC – National Centre for Disease Control. [12]. The concept of carbon pollution is normally associated with the transportation sector. When air pollution is mentioned, we

tend to imagine a large number of vehicles stuck in traffic, releasing emissions into the atmosphere.

However, buildings actually have a higher environmental footprint than transportation although it less evident. Buildings produce pollution both directly and indirectly, representing 39% of Carbon dioxide emissions, occupying first position, according to the US Green Building Council, Transportation in second place with 33% of emissions and industrial activity in third place at 20%. A recent study [13] on non-combustible source indoor air pollutants in beauty salons and its association with self-reported health problems among beauty salon workers of 87 beauty salons of Jimma town was conducted.

Jimma is the largest city in the South western Oromia region in Ethiopia.

The results show that 93.1% of the respondents were females, and 85% were below 30 years old. More than 60% of the respondents were married individuals. 56.3% and 44.8% of the workers worked over 10 hours per day and worked the whole week. 34.6% of the workers reported as worked during pregnancy. About 70% of the workers knew the harmful effects of cosmetics, benefits of ventilation and Personal Protective Equipment (PPE) use, but only 19.4% used face masks. The majority (88.5%) reported health problems after starting work in the beauty salon. The mean volume of the beauty salons was 36.3m<sup>3</sup> with a mean PM 10 Concentration of 0.465mg/m<sup>3</sup> and a mean TVOC concentration of 1034.2 g/m<sup>3</sup> statistical treatment of data indicated significant association with self-reported health problems. More or less, similar situation has been found to prevail in ladies' beauty parlours in India.

The presence of a high concentration of CO<sub>2</sub>, PM and TVOC in the indoor beauty salon affects the comfort, health and productivity of beauty salon workers. [14] The concentration of these pollutants and comfort parameters in the beauty salons is affected by the type, number and frequency of services. The occupational health and indoor air quality problem in the beauty salon is evident because of toxic chemical generation to indoor air that harm workers and customers. Some studies have reported the association of TVOC released in the beauty salon with skin problems, respiratory disorders, carcinogenicity, reproductive and genotoxic effects. Different studies reported eye, nose, throat, lung and skin problems from beauty salon workers. [15] It was also reported that workers in beauty salons are exposed to various physical, chemical, biological hazards and psychosocial stresses that can affect their health. [16]

## 2. Control Approaches:

The strategies and approaches for control and reduction of pollutants concentrations has also been pointed out. Recent trends in efforts to resolve and improve indoor air quality (IAQ) with their respective advantages and potentials has also been summarized. [17-21]

It has been predicted that the development of novel materials for sensors, IAQ – monitoring systems and smart salons is a promising strategy for control and enhancement of IAQ in the future. [22-41] Yet another recent report (2021) deals with working conditions and health risk assessment in four selected salons which were situated close to Prince of Songkla University and Surrathani Rajabhat University in Surat Thani province of Thailand. [42] VOCs were collected by area sampling using charcoal tubes (9 samples per salon). The air samples were analyzed using Gas chromatograph and FID. The noise levels, illumination and temperature were measured by using sound level meter, lux meter and WBGT respectively.

[WBGT (Wet Bulb Globe Temperature) is an index of heat that

comprehensively takes into account the factors of heat that cause heat disorders: temperature, humidity, solar radiation and air flow.

[FIDn27 – ionization detection]

Toluene, Cyclohexanone, Xylene and hexane were the most frequently found across the hair salons. All of the VOCs concentration was highest in the mixing area. All of hair salons had cancer risk exceeding  $1 \times 10^{-6}$  and HI > 1.0, indicating that indoor air pollution may affect hair – dresser's health. The average VOCs concentrations after installation of local exhaust ventilation and open the door for 30 minutes before closing the hair salon, was significantly lower than before and after installation of the local exhaust ventilation.

The WBGT indoors varied within 22 to 28°C, sound pressure levels within 71 to 76 dBA and illumination with 70 to 400 lux. The noise levels and temperature in the hair salons were satisfactory on the scales of the Ministry of Labor (Thailand). Following recommendations were made:-

- 1) Installing and using proper ventilation in hair salons to eliminate health effects.
- 2) Hair dresser worked in poor lighting. That should be improved to appropriate levels (>1000 lux).

The report finds that the top 10% contributing between 36 and 45% of emissions, which is 10 times as much as the poorest 10%, who are responsible for only about 3 to 5%. The consumption patterns of higher income consumers are associated with large carbon footprints. Top emitters dominate emissions in key sectors for example the top 1% account for 50% of emissions from aviation, the summary says.

The report underlines the life style changes that will be necessary, particularly in rich countries and wealthy globally. Refraining from overheating or over cooling homes, walking and cycling, cutting air travel and using energy consuming appliances less can all contribute significantly to the reductions in emissions needed, the report finds.

Eating patterns in many parts of the rich world will also need to change. "A shift to diets with higher share of plant based protein in regions with excess consumption of calories and animal source food can lead to substantial reduction in emissions" while also producing health benefits. Plant based diets can reduce emissions by up to 50% compared to the average emission intensive western diets", the report says.

As per leaked UN report greenhouse gas emissions must peak within four years. Group of scientists' release draft IPCC report as they fear it will be watered down by the governments.

In order to stop the change taking place in the climate, inter-governmental panel on climate change (IPCC), is going to take significant actions to stop climate crisis. Intended for later release as the third part of the IPCC report, the leaked report shows that greenhouse gas emissions must peak within next four years and coal-powered plants must shut down in the next decade to avoid a complete environmental breakdown. The policy to shift over from coal-based thermal power plant to solar power plant is a good possibility.

According to the report, the world's rich are the most responsible for climate change. Practices such as driving fuel geizzlers and eating meat are also noted in the report as areas for change. To this end, life style changes such as embracing walking or cycling and avoiding animal products are encouraged. A shift to diets with higher share of plant based protein in regions with excess consumption of calories and animal source food can lead to substantial reduction in emissions. [68-76] Rich people in every country are overwhelmingly more responsible for global heating that the

poor with SUVs and meat eating singled out for the blame, and the high carbon basis for future economic growth is also questioned in the leaked report. The leak is from the forthcoming third part of the landmark report by the inter-governmental Panel on climate change (IPCC), the first part of which was published on Monday (August 23, 2021), warning of unprecedented changes to the climate, some of them irreversible. The document called the sixth assessment report, is divided into three parts; the physical sciences of climate change, the impacts and ways of reducing human influence on climate. Part three was not scheduled to be released before next March (2022) but a small group of scientists decided to leak the draft via the Spanish branch of Scientists Rebellion, an offshoot of the Extinction Rebellion movements. It was first published by the journalist Juan Bordera in the Spanish online magazine CTXT. Bordera told the Guardian that the leak reflected the concern of some of those involved in drawing up the document that their conclusions could be watered down before publication in 2022. Governments have the right to make changes to the "Summary for policy makers".

**3. CONCLUSION:**

Following health and safety measures can be taken: - Salon staffs must be provided with appropriate safety equipment if dealing with chemicals. While using the safety equipments, manufacturers instructions and manual must be followed. The beauty salon's business has played a significant role in creating employment for a good number of people all over the world, and in India. For remaining profitable and successful, this booming business sector needs to meet and maintain high standards of hygiene, health and safety, so that no risk is posed to the customers and workers. Parlour workers, a population dominated by women are exposed to a myriad of chemicals of concern every day in their workplace. Hair sprays, hair colours, bleaches, permanent waves, acrylic nail application and numerous other parlour products contain ingredients associated with asthma, dermatitis neurological symptoms and even cancer cosmetologists may be exposed to high concentrations of a mixture of volatile organic compounds. These levels of VOCs could be decreased significantly by following good practices such as appropriate ventilation of the areas, closing the packages of the beauty products when not in use and finally selecting safer beauty products without strong odours. According to safety guides, TVOC should not exceed 200 gm-3 in order to maintain human comfort. So, the chemical ingredients present in the products used for various beauty and hair treatments may toxicate the parlour environment.

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