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Perception of the general population in Ciudad Valles, San Luis Potosí regarding waste production in hairdressing salons

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Abstract

Hairdressing salons offer a wide range of services including treatments for hair and skin. However, these activities result in the production of residues that are improperly discharged into drainage, generating a negative impact on the environment. This study provides results of a first stage in a project regarding the analysis of waste disposal in hairdressing salons in the municipality of Ciudad Valles, San Luis Potosí, Mexico. Information gathering was conducted through a field work study by surveys given to workers in hairdressing salons in Ciudad Valles. The information presented in this study indicates that in hairdressing salons in Ciudad Valles there is no management plan for the management of waste that could be severely impacting the environment. The information presented here will be the basis for identifying priority areas for intervention, developing new research projects and setting new environmental policies. In addition, the results presented here can be extrapolated to many rural and urban areas all over Mexico.

Keywords

Waste
Hairdressing salons
Pollution
Legislation

1. Introduction

Over the past century, industrial growth in Mexico has proceeded without regularly considering the effects of chemicals and hazardous waste on human health and the environment. The importance of managing chemicals and waste is only regularly taken into consideration when accidents or spills occur, affecting the population or environment.

Current Mexican legislation regarding environmental protection is the General Law for Ecological Equilibrium and Environmental Protection (LGEEPA, in Spanish). This law defines a contaminant as "all matter and energy that in any of its physical states and forms, when incorporated or acting upon the atmosphere, water, soil, flora or fauna or any natural element, alters or modifies their composition and natural condition" [1]. This legislation defines hazardous waste as "those wastes that in any physical state (corrosive, toxic, poisonous, reactive, explosive, flammable, biological-infectious and irritant) represent a hazard to the ecological or environment balance" [1]. Furthermore, the Mexican Official Norm NOM-052-SEMARNAT-2005 governs the use and management of various contaminants in Mexico. This legislation establishes the processes for identifying and classifying dangerous waste products, as well as their special treatment according to their chemical components. The Mexican federal authorities responsible for implementing the environmental protection legislation (LGEEPA) are the Ministry of the Environment and Natural Resources (SEMARNAT), which is supported by the National Institute of Ecology (INE), the Federal Attorney for Environmental Protection (PROFEPA), the National Water Commission (CNA), and local authorities.

Furthermore, the pollution of water with personal care products (PCPs) is a current topic of concern in Mexico. PCPs, including beauty products used in hairdressing salons, contain a large amount of toxic compounds. For example, titanium oxide, a makeup component, is a genotoxic and neurotoxic agent [2], whereas paraphenylenediamine, which is a component of many hair dyes, is allergenic, mutagenic and highly toxic [3]. However, the categorization of a hazardous waste based on its hazardous characteristics is not covered under Mexican legislation.

To date, PCPs are disposed of in drains without the knowledge of local authorities, because general legislation does not consider the separation of solid waste disposal. NOM-052-SEMARNAT-2005 only regulates the processing of personal care products, including cosmetics and hair dyes, among others, but it lacks information for regulating their proper disposal. In Mexico, waste generated in hairdressing salons is considered to be low risk according to the List of High-Risk Activities issued by SEMARNAT, based on the provisions of article 5 paragraph X, article 146 of the LGEEPA, and articles 27 and 37 paragraph XVI, XVII and XXXII of the Organic Law of the Federal Public Administration. Nevertheless, it has been reported that hairdressers are exposed to many toxic chemical substances that affect their health and cause diseases such as asthma, laryngitis, dermatitis, cancer and others [4].

In particular, in the municipality of Ciudad Valles, San Luis Potosi, SEMARNAT has no statistics regarding the waste generated by hairdressing salons because many of these businesses have rapidly spread throughout the city and many of them do not even have a legal record. This represents a serious problem because many of these products are directly disposed of in drains, without any pretreatments, which could cause a serious risk to human health and the environment as the water supply for the Huasteca Potosina, Mexico comes from wastewater treatment plants.

The management and correct disposal of waste generated in hairdressing salons remains to be studied. Therefore, the aim of this study was to analyze the current situation with regard to the management and disposal of products used in hairdressing salons in Ciudad Valles, San Luis Potosi, Mexico.

2. Materials and Methods

2.1 Study Site

The municipality of Ciudad Valles (San Luis Potosi, Mexico) is part of the region called Huasteca Potosina, located on the coastal plain of the Gulf of Mexico. The municipality of Ciudad Valles is located at latitude 22° 25' north and longitude 99° 18' west in the southeastern portion of the state of San Luis Potosi (Figure 1). The weather is warm with an annual mean temperature of 24.5 °C and an annual mean precipitation of 1619 mm [5]. The main economic activities are agriculture, mining, fishing and animal breeding. Ciudad Valles encompasses an area of 2305.25 km² and has a total population of 167713 inhabitants [5].

2.2 Description of the Method

This study followed a qualitative methodology considering a linear relationship between the elements of the research problem and the nature of the problem. Consequently, it was necessary to define, limit and know exactly where the problem starts, its direction and the correlation among its variables and observation units [6].

The municipality of Ciudad Valles, San Luis Potosi, was selected as the study area (Figure 1) because it represents the most urbanized city in Huasteca Potosina. The city has a large number of hairdressing salons (approximately 150). A total of 60 questionnaires were individually administered to stylists, hairdressers and hairdresser trainees from September to October 2012 in 30 neighborhoods in Ciudad Valles. The sample size was determined using a standard normal distribution. Before beginning the interviews, consent was obtained to collect the information. Interviews were conducted using a semi-structured questionnaire. The questions addressed the products that were most used and knowledge regarding the side effects caused by beauty products, proper disposal and hazardous waste generated by beauty products.

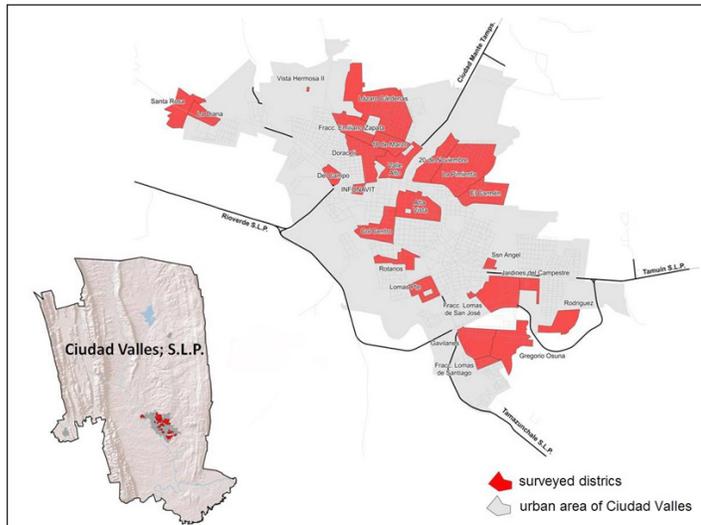


Figure 1: Map of the study area “Ciudad Valles, S.L.P., México” indicating the survey districts

3. Results and Discussion

Many chemical substances used in hairdressing salons are harmful to human health [7], [8], [9], [10] and [11]. Nevertheless, the management and correct disposal of waste generated in hairdressing salons are not considered by local authorities. To avoid mixing and disposal of wastes with non-hazardous waste, there is a need to design appropriate management strategies for residential and non-residential wastes in Mexico [12]. According to our literature review, this is the first report addressing the correct disposal and management of waste generated in hairdressing salons in Mexico.

Hairdressing salons are considered an informal activity by the Mexican government. In addition, many hairdressing salons are not registered with the municipal government. Therefore, there is no information regarding the exact number of hairdressing salons in Ciudad Valles. In addition, the municipal legislation lacks environmental management plans for the proper disposal of waste or environmental monitoring programs for hairdressing salons. The majority of hair salons and hairdressers operate in residential homes. During the fieldwork, through surveys one of the situations that we encountered was a lack of cooperation from the management or owners of the hairdressing salons. Some people refused to be interviewed because they were concerned that providing information in the survey might lead to legal issues that would cause the closure of their business. Another situation encountered during the survey was a lack of knowledge regarding the side effects caused by beauty products, the proper disposal of these products and the hazardous waste generated by beauty products. Some of the interviewees stated that they had never received training for the proper management of the waste generated.

The results indicate that the most frequently used products in

hairdressing salons in Ciudad Valles are those used for facial and hair care (Figure 2). These products include hair dyes, peroxides and hairsprays (Figure 2). However, the chemical compositions of some personal care products are unknown to the workers in these places. Furthermore, hair dyes are disposed of in the drain without prior treatment.

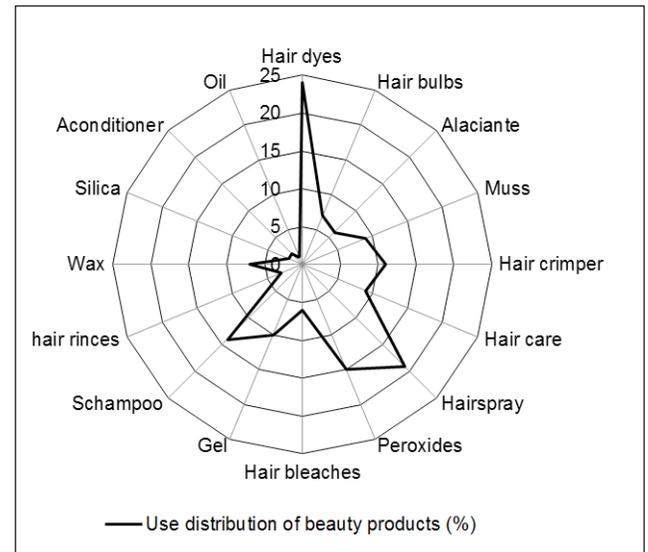


Figure 2: Use distribution of beauty products used in hairdressing salons in Ciudad Valles, San Luis Potosi, Mexico

According to the Mexican Official Norm NOM-052-SEMARNAT-2005, some of the products found in this survey contain hazardous components such as titanium oxide (present in makeup) and paraphenylenediamine (present in many hair dyes), which are of concern for human health due to their toxicity [3] and [2]. Additionally, hair dyes contain flammable and explosive materials, such as isopropyl alcohol, formaldehyde, propylene glycol and glycerin. These flammable materials contained in beauty products are disposed of in the drain without prior treatment and may cause an explosion when combined in large amounts. Moreover, the combination of products used in hairdressing salons with wastewater may produce substances with more damaging effects for human health [13]. For example, persulfate salts (widely used in bleaching hair products) [14] are capable of causing immunological sensitization and subsequently allergic diseases such as contact dermatitis and occupational asthma amongst hairdressing professionals [15][16] [17][18][19]. Organic solvents in different mixtures may be present in different permanent waving products and sprays. These may induce alterations at a reproductive level [20]. Some substances in hair dyes such as para-chloroaniline or dimethylaniline may be carcinogenic [21]. Several constituents of hair care products are airway irritants and may induce respiratory disorders, including impairment of the pulmonary function and chronic bronchitis [18] [19] [22]. Hairdressing is described as an occupational risk factor of asthma [23] [24][25].

According to the present survey, 86% of the respondents have discarded the waste as household garbage, 10% of the interviewees have used temporary containers to store the waste, and 4% of them have discarded the waste directly in drains. In general, the waste generated in hairdressing salons results in damage to the environment, including a) the depletion of natural resources through the use of excessive amounts of water, b) air pollution through the use of aerosols containing flammable substances [26], [27], and c) water pollution by disposing of non-biodegradable cosmetics in drains [28]. Table 1 summarizes the problems found with respect to the pollution caused by hairdressing salons. We present the problems, causes, objectives, activities and indicators that should be taken into account to decrease water and air pollution from hairdressing salons in Ciudad Valles, San Luis Potosi. The main problems are focused on the use of toxic and hazardous components in beauty products, combining solid and chemical wastes, waste discharge sewage and water pollution.

There are some aspects that need to be analyzed in more detail in the future with regard to hairdressing salons, such as: i) the high rate of spread in urban and rural areas, ii) the use of some potentially dangerous products with uncharacterized toxicities, and iii) the discharge of personal care products directly into drains because wastewater from these beauty salons are considered household waste. Although this study was conducted in one municipality from Mexico, the environmental pollution caused by hairdressing salons may be a recurring problem throughout the country and may lead to serious public health problems as has been shown in recent studies in vivo, ammonium persulfate-induced occupational persistent asthmatic response [29] [30] [31].

Table 1. Causes of environmental pollution in hairdressing salons in Ciudad Valles, San Luis Potosi, México

Problem	Cause	Objective	Activity	Indicator
Use of toxic and hazardous components in beauty products	Lack of knowledge	To give Training for hairdressers, training hairdressers regarding proper disposal of waste generated in hairdressing salons	To organize workshops to provide information regarding the proper disposal of waste generated in hairdressing salons	Number of participants
Waste discharge sewage	Lack of legislation	To establish laws that regulate Waste discharge sewage in hairdressing salons	Monitoring of the water in the Waste discharge sewage in hairdressing salons	Water quality parameters
Combining solid and chemical wastes	Lack of capacitation	Manage waste	To provide technical training for the proper disposal of solid and chemical wastes	Number of workshops Number of participants
Pollution of water	Lack of sewage treatment	Local government should provide a Wastewater treatment plant	To provide education programs about pollution of water	Monitoring Water quality parameters

4. Conclusion

This study shows that there are no management plans for the disposal of waste generated in hairdressing salons in the municipality of Ciudad Valles, San Luis Potosi. This work highlights the need for public waste management policies to prevent environmental pollution. This study can be extrapolated to rural and urban areas throughout Mexico. Therefore, proper legislation and provision of environmental education should be a priority concern for local and national authorities to decrease environmental pollution in Mexico.

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