Young Scientist- Tomorrow's Science Begins Today
http://eurekajournals.com/Young_Scientist.html
ISSN: 2581-4737

A Quantitative Study to Understand the Perception toward Hazardous Chemicals in the Jamaican Beauty Industry

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Abstract

Introduction: The use of beauty products containing hazardous chemicals is a public health concern and has become a common practice locally and globally, raising concerns about their potential impact on human health and the environment.

Objectives: To gain a broader understanding of the repercussions of current chemical use on the human body in the beauty industry in Jamaica; establish if there is a link between persons who frequently use beauty care products and any current health concerns; and to provide recommendations for policymakers and manufacturers to address consumer concerns and improve product safety.

Methodology: A cross-sectional descriptive research design was used to explore the perceptions of hazardous chemicals in beauty productsin Jamaica. The study focused on urban and suburban beauty salons and retail stores across three central parishes: Mandeville, Montego Bay, and Kingston, St. Andrew. Data were collected between October 1, 2024 and December 17, 2024. To ensure expertise in the subject area, a homogenous sampling technique was used to select 115 participants, all experienced salon managers, beauticians, and employees in the beauty salon. Quantitative data were gathered through structured questionnaires.

The analysis combined descriptive statistics and thematic analysis to identify patterns, trends, and key themes regarding the use and risks of hazardous chemicals in beauty products.

Findings: Most participants were female (n = 97, 84.3%). Among respondents, 69% reported experiencing allergic reactions to beauty products, with 25.8% indicating rashes or blisters. A small fraction (1.7%) reported other allergic responses. More than 30% of individuals reported

using beauty products once per day, while 10% indicated twice daily; 70% of respondents claimed never to have used beauty products containing hazardous chemicals.Asignificant majority (58%) suggested that customers should be encouraged to wear masks in salons and other beauty spaces; 32.96% stated that manufacturers should conduct workshops to educate users; 3.5% noted that daily use of beauty products is harmful, and another 3.5% highlighted the risks posed by toxins to both human health and the environment, underscoring the need for greater awareness and regulatory oversight.

Conclusion: The study highlights the health risks of using beauty products containing hazardous chemicals. With 69% of respondents reporting allergic reactions and over 30% using such products daily, the findings underscore the need for enhanced safety practices and public awareness. Recommendations include promoting protective measures, such as wearing masks, displaying safety tips, and conducting manufacturer-led workshops to educate consumers on proper usage. The study concludes that addressing these risks requires collaborative efforts to mitigate adverse health and environmental impacts while fostering a safer beauty industry in Jamaica.

Keywords: Hazardous chemicals, beauty industry, allergens, allergic reaction**,** consumers.

Introduction

The beauty industry has become a vital economic sector worldwide, offering services that enhance physical appearance and boost self-esteem. However, behind the allure of beauty treatments lies a growing concern about the hazardous chemicals commonly used in beauty products. Globally, reports have linked prolonged exposure to certain chemicals in hair dyes, nail products, and skin treatments to serious health risks, including respiratory issues, skin disorders, and even carcinogenic effects (Singh et al., 2020). Despite the significant risks, there remains a limited understanding of how workers and consumers perceive these hazards, particularly in developing nations such as Jamaica (Ministry of Health and Wellness, 2024). Jamaica's beauty industry, which encompasses salons, barbershops, and spas, is crucial to the local economy and cultural identity. Many beauty practitioners and clients are frequently exposed to products containing substances such as formaldehyde, toluene, and parabens, often without adequate protective measures or regulatory oversight. However, the perceptions of these individuals regarding the health risks and the necessity for safer practices are largely unexplored. The beauty industry is expected to see an annual growth rate of 2.09%, and the market is expected to expand (Statista, 2024). However, a growing body of scientific evidence links the chemicals to long-term health concerns like cancer and reproductive problems (Campaign For Safe Cosmetics, 2024a). Understanding these perceptions is essential for developing targeted interventions, improving occupational safety, and protecting public health.

This study adopts an exploratory quantitative descriptive approach to examine how individuals in Jamaica's beauty industry perceive the risks associated with hazardous chemicals. This research seeks to provide foundational insights that can inform public health initiatives, policy development, and future research by identifying gaps in knowledge, awareness, and safety practices. However, beneath the glossy packaging and appealing fragrances, many beauty

products contain chemicals that can pose significant risks to human health and the environment (Ministry of Labour and Social Security, 2024). Some of these substances are linked to skin irritation, hormone disruption, allergic reactions, and even long-term chronic conditions (Brandt et al., 2018). Furthermore, by shedding light on these critical issues, this research aims to contribute to the broader perception of hazardous chemicals in the Jamaican beauty industry.

Statement of the Problem

While offering products that enhance appearance and wellness, the beauty and personal care industry has increasingly been scrutinised for the use of hazardous chemicals. Research by Brandt et al. (2018) highlights the presence of substances in cosmetics and personal care products that can harm human health and the environment. These chemicals, which include synthetic fragrances, parabens, and phthalates, are linked to adverse effects such as skin irritation, hormonal disruption, and chronic health conditions. Despite the rising demands for safer and more sustainable alternatives, regulatory frameworks often fail to address these concerns, leaving consumers vulnerable to potential risks. This study aims to understand the perception toward hazardous chemicals in the Jamaican beauty industry, their health implications and the industry's progress toward adopting safer formulations. While beauty care products play a significant role in personal grooming and cultural expression in Jamaica, more research must address the perceived health risks associated with these products. Many beauty products contain potentially harmful ingredients, including allergens, toxins, and carcinogens, which may lead to adverse effects such as skin disorders or systemic health issues (Nguyen et al., 2020).

Additionally, the regulatory frameworks governing product safety are inconsistent, which could result in unsafe products entering the market (Brown, 2019). Efforts to mitigate potential harm still need a clear understanding of consumer perceptions and knowledge about these risks. This study aims to fill this gap by exploring Jamaican consumers' perceptions regarding the health risks of beauty care products.

Purpose of Study

The study aimed to understand the perception of hazardous chemicals in the Jamaican beauty industry. Regulations surrounding the beauty industry in Jamaica need to be more robust. Although the Consumer Protection Act and the Food and Drug Act exist, there is an urgent need for stricter guidelines and more stringent enforcement to curb the use of toxic chemicals in cosmetic products (Caribbean Health Journal, 2020). This study will help raise awareness about the dangers of hazardous chemicals and highlight regulatory and enforcement gaps in the industry. Many beauticians, hairdressers and nail technicians may not fully understand the risks of the products that they use daily; by shedding light on hazardous chemicals, this study will help to make more informed choices about the products that are used daily and encourage the use of safer non–hazardous chemicals to prioritise health and safety. This study aims to contribute to developing safer beauty products, better regulations and more awareness in the beauty industry.

The Study addressed Significant Areas in the Beauty Industry

1. To assess the awareness among beauty industry workers and clients about the hazardous chemicals used in beauty products.
2. To explore perceived health risks and concerns associated with chemical exposure.
3. To identify demographic and occupational factors that influence these perceptions.

Significance of Study

The significance of this study is to take an extensive look into the perception of hazardous chemicals in the beauty industry in Jamaica; this is important for several reasons, such as the awareness of safety and health of beauty professionals and consumers who use products that possess a possible danger with the day to day use containing harmful substances, studying the gap as it relates to safety measures, policies and regulations to reduce health risk which could protect consumers and workers in the beauty industry. This research focuses globally and locally on how many countries use stricter regulations. This matter can contribute to a broader understanding of how beauty professionals in first-world countries perceive and handle hazardous chemicals. This study could also identify safe and eco-friendly beauty products that encourage a shift towards sustainability within the industry for both professionals and consumers.

Rationale of Study

This study addresses the gaps by assessing the types of hazardous chemicals used in Jamaica's beauty industry, evaluating the potential health risks, and providing recommendations for improving the safety standards. In recent years, there has been prolonged exposure to certain hazardous chemicals such as formaldehyde, ammonia, and parabens, with severe health conditions such as respiratory issues, skin irritations, and long–term illnesses such as cancer (Lansdown, 2015). Investigating these hazardous chemicals and what precautions have been taken to protect consumers is essential.

Delimitations of the Study

The parameters guided this study:

1. ***Geographical scope***: The research focuses exclusively on Jamaicans in the beauty industry to provide context-specific insights.
2. ***Product range***: The study explored a broad range of beauty care products, including skincare, haircare, and cosmetics, but excludes medical or prescription-based beauty treatments.
3. ***Risk perceptions***: The study concerns perceived risks rather than scientifically validated health outcomes.

Definition of Key Terms

- ***Beauty care products***: Items used for personal grooming, skincare, and aesthetic enhancement, including cosmetics, hair care products, and skincare formulations.

- ***Perceived health risks***: Individuals' beliefs or opinions about the potential harm or adverse effects of using beauty care products.
- ***Allergens***: Substances in beauty care products that can cause allergic reactions in susceptible individuals.
- ***Regulatory oversight***: The process of monitoring and enforcing compliance with safety standards for consumer products.

Study Objectives

1. To gain a broader understanding of the repercussions of current chemical use on the human body in the beauty industry in Jamaica.
2. Establish if there is a link between persons who frequently use beauty care products and any current health concerns.
3. To provide recommendations for policymakers and manufacturers to address consumer concerns and improve product safety.

Related Literature Review

Hazardous Chemicals

Chemicals are widely used in the beauty industry, and many are hazardous to humans and animals (Arshad et al., 2020; Lansdown, 2015). According to the U.S. Department of Labor (n.d.), "Chemical hazards and toxic substances pose a wide range of health hazards (such as irritation, sensitisation, and carcinogenicity) and physical hazards…." The U.S. Department of Labor indicated that many of the chemicals used by people are hazardous to people. Still, the reality is that people are often dependent on these substances to complete their tasks. People in the beauty services industry, such as farmers, builders, and others, must use dangerous chemicals.

Farmers

Many factors affect the health of agricultural workers, and improving this population's health will require various approaches. Farmers can experience multiple diseases and chronic diseases similar to the general population. However, they are at higher risk for acute injuries due to work, certainchronic diseases, and pesticide diseases. The agricultural sector has undergone many transformations since the agrarian society, from people planting with hand tools to high–tech tools and chemicals. It has transformed in ways that help to reshape the industry and the global food supply chain. With technological advances, we have moved from traditional, labour–intensive practices to modern, data-driven agriculture in technology. Precision farming has allowed farmers to monitor soil quality, crop health and water levels in real time. Drones, GPS-guided tractors, and AI-driven analytics are now readily available to boost efficiency, and crop yields are now available. Farmers become vulnerable to many illnesses, injuries and disabilities due to exposure to the hazardous chemicals that are now a part of agricultural production. These situations arise from the lack of public education, awareness and social and health protection for farmers. Institutional support for farmers must be available in all developing countries, with the knowledge that farming is society's most essential food production.

Builders

Builders in the construction industry are exposed to a large number of chemical substances that are used in construction materials. Among other things, these substances are found in adhesives, cleaning agents for brickwork and stonework, decorative protective treatments for timber and metals, floor treatments, fungicides, cement and grouts, insulants, sealants, paints and solvents. These products, such as solvents, are commonly used in paint strippers, lacquers, varnishes, surface coatings, thinners and cleaning materials that enter the body through inhalation. These chemicals cause various injuries, whether solid or liquid or airborne dust, vapour, fumes or gas. They enter the body through inhalation, breathing ingestion or swallowing, and absorption through the skin (ILO, 1993, 2021; Davies & Tomasin, 1996).These toxic gases and vapours irritate the nose and throat and give a sign of warning of their presence. Our builders are at risk of developing tuberculosis, cancer and a disease called pneumoconiosis, which is incurable and is caused by the smallest dust particles that enter the lungs. Accumulate. The Toxic vapours used daily also contaminate the drinks, utensils, and meals eaten on the site; handling lead-based chemicals and then eating without washing his/her hands are a significant factor. Awareness and safety precautions need to be implemented to protect our builders.

Hazardous Chemicals Used in the Beauty Industry

Hazardous chemicals are commonly used in cosmetics and beauty products worldwide (Alnuqaydan, 2024; Arshad et al., 2020; Brandt, 2018; Harvard Health, 2024; Lansdown, 2015; Pastor-Nieto &Gatica-Ortega, 2021; Singh Et Al., 2020; Singh et al., 2020; U.S. Department of Labor, n.d.). These dangerous substances include formaldehyde, phthalates, parabens, heavy metals, Synthetic fragrances and other endocrine-disrupting chemicals. The beauty industry has become increasingly popular in recent years, leading to a surge in salon visits for various beauty treatments. However, public concerns about the possible health dangers linked to the widespread use of harmful chemicals in beauty salons are raised. Formaldehyde is present in nail hardeners, hair straighteners, and preservatives, and this product is known to cause severe respiratory and skin problems. The different scents of perfumes, the favourite amongst many of today's male and female, nail polishes that create such beautiful enhancement to nails, hair sprays contain phthalates that can cause reproductive toxicity and development issues; this product is banned in most European Union (European Commission, 2009). However, it remains in some products elsewhere.

Meanwhile, while parabens are widely used in shampoos, moisturisers, and makeup as preservatives, they are also known to disturb estrogen levels potentially. It is linked to the causes of breast cancer and hormonal imbalances (Rylander et al., 2019; U.S. Food and Drug Administration, 2022). Heavy metals found in lipsticks, arsenic in skin-lightening creams, and mercury in anti-ageing products that cause kidney damage (Alam et al., 2019; Mohammed et al., 2017; Witkowska et al., 2021; World Health Organization, 2019). Heavy metal cadmium (Cd) is known to be a widespread environmental contaminant and a potential toxin that may adversely affect human health.

The scents added to our favourite synthetic fragrance products cause allergic reactions, headaches, and respiratory issues. Long-term exposure to these chemicals has been linked to chronic diseases such as cancer, autoimmune disorders, and infertility. Vulnerable populations, including pregnant women and children, are at more significant risk (Campaign for Safe Cosmetics, 2024a, 2024b).

International

Hazardous chemicals have been widely reported in beauty products worldwide. In the beauty industry internationally, a 2022 report by the Campaign for Safe Cosmetics revealed that phthalates are present in over 70% of fragrances in the United States, including dibutyl phthalate (DBP)[Campaign for Safe Cosmetics, n.d.].While over in India, a study reveals that 43% of lips and 36% of eyeliners sold in India contain lead above the permissible limits; the (EU) has strictly regulated the use of these hazardous chemicals, less stringent laws in countries like India and the U.S. still allow their continued presence, Brazil known for its trend in keratin treatment for females hair (Shanker & Rani, 2024). The report highlighted the presence of formaldehyde exceeding safe levels limits in 55% of keratin treatments despite its ban on cosmetics above 0.2% concentration (Pastor-Nieto &Gatica-Ortega, 2021). In Europe and Asia, a comparative study published by EST (2021) found that methylparaben and propylparaben in over 90% of tested products are from Asia and 70% from Europe. (Global) Facial products tested in 11 countries contained over 60% microplastics; in Africa and Asia, over 60% of hydroquinone was found in skin-lightening creams despite being banned in several countries. Finally, a 2021 study flagged over 26 fragrance allergens commonly used in beauty products. With global efforts and gaps, the European Union has banned over 1,300 chemicals, the United States has banned fewer than 30 chemicals, and developing countries need more enforcement in developing nations allowing the sale of hazardous products despite global bans (Pastor-Nieto&Gatica-Ortega, 2021).

Caribbean

In the Caribbean, evidence of hazardous chemicals in beauty products has been documented, raising concerns over consumer safety and initiatives showcasing reports that indicate that beauty products often contain chemicals such as formaldehyde, parabens, phthalates, and heavy metals-known for causing health issues from allergy to hormonal disruptions and carcinogenic effects. Despite international regulations, monitoring the region still needs to be consistent. The improper disposal of these beauty products significantly impacts the environment and contributes to chemical pollution in water systems, harming marine life and ecosystems. This matter has prompted regional projects like ISLANDS, supported by the Global Environment Facility (GEF), to manage hazardous waste and chemicals in the Caribbean sustainably. The Inter-American Development Bank (IDB) has funded programs to improve legal frameworks, enhance sectors capable of managing hazardous chemicals, raise consumer awareness, and promote sustainable practices to mitigate the risks posed by hazardous chemicals in the beauty industry across the Caribbean.

According to Cold Capor Atomic Absorption Spectrophotometry (CV-AAS), over-the-counter skin-lightening creams are available in Trinidad and Tobago**.** Margin of Safety (MoS) and

Hazard Quotient (HQ) calculations were used to analyse nineteen skin-lightening creams to assess the risk to users. The results of the nineteen creams assessed, sixteen contained high concentrations of mercury (0.294-14414.5 µg/g), and only three creams had no mercury detected. 9 of the 19 samples contained levels of mercury that exceeded the Minamata convention's accepted limit of 1µg/g, with three samples exceeding 3800.000 µg/g. Risk assessments using MoS and HQ showed that three samples were unsafe. The research also revealed that many creams contain mercury, even if not a part of the product formulation.

The data infers that some manufacturers add mercury to their formulations while others are the victims of contaminated raw materials. MoS and HQ show that 21% of the samples were unsafe, and 16% can be considered hazardous for human use. It is possible that with such levels of mercury in these products and the popularity of these products within the Caribbean Community and its diaspora, a significant number of members with higher than acceptable mercury levels with undiagnosed clinical symptoms exist.

Locally

The Ministry of Health and Wellness takes the regulation of hazardous chemicals in beauty and cosmetic products seriously to ensure consumer safety. Under Jamaica's Food and Drugs Act, the ministry requires that all cosmetics and related products meet strict safety and quality standards. The beauty industry in Jamaica, like other countries, faces challenges when it comes to using hazardous chemicals in cosmetic products. A typical commercial product used for skin lightening contains mercury, which is known for its toxic effects. Journal Health Population 2021 mentions that mercury is in three forms: organic, inorganic, and elemental. Inorganic mercury can be an added ingredient in skin-lightening products. The Ministry of Health and Wellness takes the regulation of hazardous chemicals in beauty and cosmetic products seriously to ensure consumer safety. Under Jamaica's Food and Drugs Act, the ministry requires that all cosmetics and related products meet safety measures used by those in the beauty service industry.

Methods and Materials

Research Design

A cross-sectional national descriptive research design was used to explore the perceptions of hazardous chemicals in beauty products in Jamaica. Chetty (2016) defines a research approach as a plan and procedure consisting of steps from broad assumptions to a detailed data collection, analysis, and interpretation method. A quantitative method is best suited to investigating the number of employees in Jamaica's beauty industry and farm stores who use hazardous chemical products. The quantitative research method can be defined as a market research method that focuses on obtaining data through open and conversational communication(Bhatit, 2020).

Study Setting

This study was conducted within professional beautycosmetics retail stores and beauty salons across Jamaica in the urban and suburban areas, focusing on three (3) central parishes where these businesses are most highlighted. These areas include Mandeville, Montego Bay, and

Kingston, St. Andrew, with a high density of beauty industry professionals. These are ideal settings due to the significant exposure of workers in these environments to beauty products that may contain hazardous chemicals.

General Research Questions

1. What is the awareness among beauty industry workers in Jamaica regarding the potential health risks associated with hazardous chemicals in beauty products?
2. How do beauty industry workers perceive the risks of exposure to hazardous chemicals?
3. What safety measures do beauty professionals take to protect against chemical exposure use?

Participants

The chosen participants were salon managers employed within the small beauty industry for years. These salon managers are either male or female. These participants were appropriate for collecting data on naturally occurring behaviours in their usual contexts and optimal for collecting data on individuals' personal histories, perspectives, and experiences. Mainly when sensitive topics are being explored and effective in eliciting data on a group's cultural norms and generating broad overviews of issues of concern to cultural groups.

Before the questionnaire was issued, the research team ensured that an explanation of what the questionnaires entail and what the respondents were asked for was provided. The researcher also ensured that the identity of the participants and responses from participants were handled with confidentiality and that only my lecturer would have access to the research documents for academic reasons. Tampering with the information presented could not happen. The research team also assured participants that they had the right to withdraw from the research if desired-the respondents' names under all circumstances.

Sample Population

The participants in the research will be beauticians, managers of beauty establishments, operators in the beauty salon industry, and employees of beauty enterprises in Mandeville, Montego Bay Kingston, and St Andrew, Jamaica. The research study was conductedbetween October 1, 2024, and December 17, 2024, in Jamaica's previously mentioned urban and sub-urban areas. Furthermore, the research sample population included managers and other persons within the organisation who use hazardous chemical products. Moreover, the research team used selective sampling, a sampling technique used to determine the risk of hazardous chemicals in the beauty industry.

Sampling Procedure

Homogenous sampling was used to select the sample population for this research. Homogenous sampling brings people from similar backgrounds together about hazardous chemical products. It increases imbalance and simplifies and facilitates groups. This sampling method is used when conducting focus groups. Homogenous sampling will be used to gather participants. The managers, employees and persons working in the beauty industry The danger of the hazardous

chemicals in the industry Various messages will be sent to managers, workers, and prospective participants about the danger of the chemicals in the beauty industry and farm stores.

Data Collection Method

A standardised web-based questionnaire was used to collect the data. Some open-ended questions were used to collect the respondents' views on selected issues. These clear and precise questions led to a conversation that would effectively exchange ideas. As a result, the research team used open-ended items to understand the various hazardous chemicals used in the beauty industry. Though such a method may seem lengthy, the effectiveness of this method depends heavily and solely on the interviewer's written communication skills, as postulated by Clough&Nutbrown (2012) and the ability to structure questions carefully and listen attentively.This method is practical and convenient, as it allows the research team to have a more profound understanding of the problem and allows the respondents to feel comfortable sharing their perspectives. Additionally, this method provides for carefully supervising body gesticulations, emotions, and facial expressions. Most of the items on the standardised questionnaire were close-ended as these provide for a large body of data collection.

Justification of the Methods and Procedures

Questionnaire

The standardised questionnaire was used as it is more efficient in collecting data. It allows people to give feedback regarding the problem they are likely to face with the chemical products face-to-face procedure; people are likely to answer more truthfully. Additionally, a questionnaire is inexpensive and less time-consuming. All respondents were given a questionnaire comprising ten items about the hazards of chemical products in the beauty industry.

Reliability

Reliability was addressedusing focus group interviews, questionnaires, and observations from statisticians, methodologists, and experts in Jamaica's beauty sector. Examining trustworthiness was crucial to ensure reliability in research. Based on the internal and external procedures, the instrument used was reliable because it enhances the dependability of research and the tendency toward consistency found in repeated measurement, which is important.

Validity

Validity was addressed as we ensured that the research questions were the focal point in structuring the questions for the standardised questionnaires. This matter will help the study's success, as each method used to collect data is accessible and precise for understanding hazardous chemicals in the beauty industry. Furthermore, the study will accurately reflect the concepts and ideas that the researchers are determined to evaluate.

Limitation

The limitation is any restrictive weakness or lack of ability that can occur while conducting this research (Simon, 2011). Numerous perceived limitations will appear in the conduct of this research. One of the main drawbacks of this research is that the processing is time-consuming as the data collected will be based on appointment dates fixed with individual respondents. Another limitation will be the need for results verification, as the information gathered from the respondents is not easily verified, and each respondent's perception needs to be more easily measured. Another problem is the need for more clarity in investigating causality between different research phenomena. The quantity of information collected from each respondent can be complex, as each respondent can arrive at a non-consistent conclusion (Barbour 200). This type of research is based on opinion and judgment rather than objective scientific facts.

Ethic Consideration

Ethical considerations are paramount in ensuring research integrity and protecting participants involved in this study. This research adhered to established ethical guidelines, including those set forth by the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). These principles-respect for persons, beneficence, and justice-form the foundation for the ethical standards applied throughout the study. Informed consent is a critical component of ethical research. Respondents will receive detailed information regarding the study's purpose, objectives, and procedures. Consent formswere outlined to the voluntary nature of participation, emphasising the right to withdraw at any time without consequences (Wiles, 2012). Written consent was obtained to ensure participants fully understand the implications of their involvement.

Confidentiality and anonymity will be maintained rigorously. Respondents' data was coded to remove identifying details, and findings will be presented in aggregate form to prevent the identification of individual responses (Saunders et al., 2015). Data storage will comply with General Data Protection Regulation (GDPR) standards and local ethical policies to safeguard participant information.

The principle of beneficence requires minimising potential harm to participants. To ensure this, the study will focus solely on perceptions of hazardous chemicals and will not include invasive or distressing questions. Respondents were informedto skip any question they found uncomfortable without penalty (Bryman, 2016). Ethical approval was obtainedbefore the commencement of the study. This matter aligns with the guidelines provided by the Declaration of Helsinki (World Medical Association, 2013).

Additionally, permission from salon owners or managers will be sought, mainly if surveys are conducted in workplace settings-cultural sensitivity guided interactions with participants, recognizing Jamaica's unique social and cultural dynamics. Survey instruments (questionnaires) and consent forms were reviewed to ensure they were clear, accessible, and culturally appropriate (Creswell & Creswell, 2017). Lastly, respondents were assured their autonomy and freedom to participate without coercion. Transparency about the research aims and potential benefits will

foster trust and engagement, ensuring ethical integrity in exploring perceptions of hazardous chemicals in Jamaica's beauty industry.

Findings and Interpretation of Data

Socio-demographic Characteristics

Table 1 presents frequencies and percentages for selected socio-demographic characteristics of the sampled respondents. Of the sampled respondents (n=116), most were females (84.3%, n=97), had internet availability (96.5%, n=111), had a working Smartphone (98.3%, n=113), used a Data Plan (75.7%, n=87), and did not use social media (57.4%, n=66).

Table 1: Socio-demographic Characteristics of the Sampled Respondents, n=116

Details	**% (n)**
Gender	
Male	15.7% (18)
Female	84.3% (97)
Binary	0%
Internet Availability	
No	3.5% (4)
Yes	96.5% (111)
Own Working Smartphone	
No	1.7% (2)
Yes	98.3% (113)
Own Smart TV	
No	18.3% (21)
Yes	82.6% (95)
Used Social Media	
No	57.4% (66)
Yes	44.3% (51)
Using Data Plan	
No	24.3% (28)
Yes	75.7% (87)

Research Objective 1

To gain a broader understanding of the repercussions of current chemical use on the human body in the beauty industry in Jamaica

Table 2 presents frequencies and percentages for selected issues. Most of the sampled respondents indicated that they do not use skin-lightening creams (77.2%, n=78), prioritise using products labelled as organic, natural, or chemical-free (60.3%, n=70), and are unaware of the ingredients in the beauty products they use (52.5%, 53).

Table 2: Usage of Beauty Chemicals, n=101

Details	% (n)
Skin Lightening Creams	
No	77.2 (78)
Yes	22.8 (23)
Prioritise using products labelled as organic, natural or chemical-free	
No	30.7 (31)
Yes	69.3 (70)
Familiar with the ingredients listed on beauty products used	
No	52.5 (53)
Yes	47.7 (48)
Consider switching to chemical-free or less toxic alternatives if they are available	
No	11.3 (11)
Yes	88.7 (86)

Reactions to Beauty Products

Among respondents, 69% reported experiencing allergic reactions to beauty products, with 25.8% indicating they had developed rashes or blisters. A small fraction (1.7%) reported other allergic responses (Figure 1). These findings suggest that many individuals are experiencing adverse effects from beauty products, likely due to hazardous chemicals.Figure 1 shows no allergic reaction; all have allergic reactions, rashes and blisters.

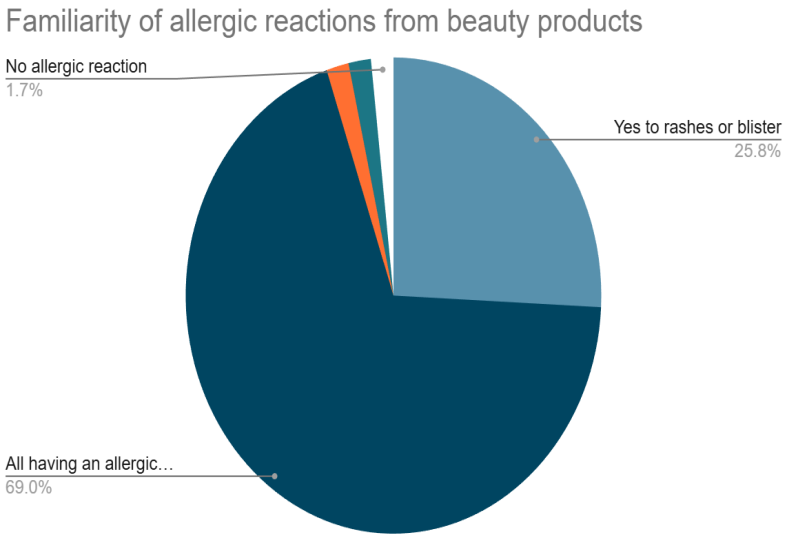

Figure 1: The pie chart *shows no Allergic Reactions; all have Allergic Reactions, Rashes, Blisters*

Research Objective 2

Establish if there is a link between persons who frequently use beauty care products and any current health concerns.

Frequency of Use of Beauty Products Containing Hazardous Chemicals

The frequency of use of beauty products containing hazardous chemicals varied among respondents. More than 25% of individuals reported using such products once per day, while approximately 10% indicated using them twice daily. Notably, 70% of respondents claimed never to have used beauty products containing hazardous chemicals. Figure 2shows the frequency of beauty products used per day.

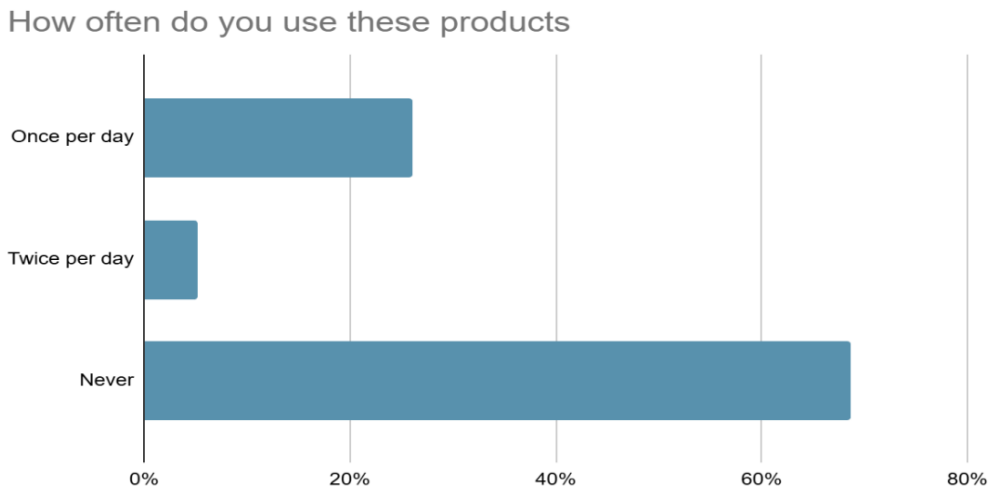

Figure 2.Bar Chart *Representing the Frequency of Beauty Products Used per day*

Research Objective 3

To provide recommendations for policymakers and manufacturers to address consumer concerns and improve product safety.

Recommendations for Safety Practices

Respondents provided several recommendations to enhance safety in the use of beauty products. Table 3 presents frequencies and percentages for consumer concerns, manufacturers' safety, and toxins in using beauty chemicals. A significant majority (58%) suggested that customers should be encouraged to wear masks in salons and beauty stores. They also recommended displaying safety tips and posters to raise awareness. Additionally, 32.96% of respondentsadvocatedthat manufacturers conduct workshops to educate users on the safe and correct handling of hazardous chemicals. Table 3 represents consumer concerns, manufacturer safety, and toxins.Participants emphasised the potential dangers of using beauty products containing dangerous chemicals daily. A small percentage (3.5%) noted that the daily use of such products is hazardous and should be done cautiously. Furthermore, another 3.5% of respondents highlighted the risks posed by toxins to human health and the environment, underscoring the need for greater awareness and regulatory oversight.

Table 3: Represents Consumer Concerns, Manufacturers Safety & Toxins

Details	%(*n*)
Customers could be encouraged to wear masks in the space, and safety tips and posters could be displayed.	58.3% (67)
Manufacturers can do workshops to ensure the safe and correct use of hazardous chemicals.	32.96% (38)
Daily use of beauty chemicals is hazardous and should be done cautiously.	3.5% (4)
Toxins are dangerous to the health of individuals and the environment	3.5%(4)
Not currently	1.74%(2)

Discussion

Beauty is associated with physical appearance. This fact accounts for body enhancements and the purchase and use of beauty products. These beauty products are made of chemicals, and some of the chemicals are hazardous to the human body. U.S. Department of Labor (n.d.), "Chemical hazards and toxic substances pose a wide range of health hazards (such as irritation, sensitisation, and carcinogenicity) and physical hazards…." The U.S. Department of Labor indicated that many of the chemicals used by people are hazardous to people. The current study found that 1) 69% reported experiencing allergic reactions to beauty products, 2) 25.8% indicated they had developed rashes or blisters, and 3) the majority (58%) suggested that customers should be encouraged to wear masks in salons and beauty stores. Despite the knowledge of beauticians, workers in the beauty industry, and others related to this sector, they continue to purchase and use beauty products for their customers. The reality is that Cold Capor Atomic Absorption Spectrophotometry (CV-AAS), an over-the-counter skin-lightening cream, is available in Trinidad and Tobago**.** Margin of Safety (MoS) and Hazard Quotient (HQ) calculations were used to analyse nineteen skin-lightening creams to assess the risk to users. The results of the nineteen creams assessed, sixteen contained high concentrations of mercury (0.294-14414.5 µg/g), and only three creams had no mercury detected 9 of the 19 samples contained levels of mercury that exceeded the Minamata convention's accepted limit of 1µg/g, with three samples exceeding 3800.000 µg/g. Risk assessments using MoS and HQ showed that three samples were unsafe. In Jamaica, the study found that at least one in every four sampled respondents indicated using beauty products at least once daily.

There is a high opportunity cost of beauty, including health risks and death. Society must answer, 'What is the real cost of beauty?' Almost 70% of Jamaicans sampled for this study indicated that they experienced allergic reactions to beauty products, yet nearly 40% used them twice daily. The allergic reactions to the used beauty products suggest that their components are hazardous to the human body, yet this is not a deterrent to usage. Although current respondents in this study are not chemists, medical technologists, or medical doctors, they know the possible harm of using beauty products. Hence, this study provides chemical information to users of beauty products. In Europe and Asia, a comparative study published by EST (2021) found that methylparaben and propylparaben in over 90% of tested products are from Asia and 70% from Europe. (Global) Facial products tested in 11 countries contained over 60% microplastics; in Africa and Asia, over 60% of hydroquinone was found in skin-lightening creams despite being

banned in several countries. Finally, a 2021 study flagged over 26 fragrance allergens commonly used in beauty products. With global efforts and gaps, the European Union has banned over 1,300 chemicals, the United States has banned fewer than 30 chemicals, and developing countries need more enforcement in developing nations allowing the sale of hazardous products despite global bans (Pastor-Nieto & Gatica-Ortega, 2021). The World Health Organization (2019) has documented mercury in some skin-lightening creams.

Beauty enhancement and products are the reality of toxic beauty (Brandt, 2018; Harvard Health, 2024), which will become a serious public health problem in the next decade. There can be no denying that beauty has a dark side (Alnuqaydan, 2024; Arshad et al., 2020; Lansdown, 2015; Pastor-Nieto & Gatica-Ortega, 2021; Singh Et Al., 2020; Singh et al., 2020; U.S. Department of Labor, n.d.), including the risk of skin and breast cancers (Rylander et al., 2019); yet knowledgeable people are willing to take the risk and use these items.

Based on the current study, those in the beauty industry are unaware of the ingredients in the products they use (52.5%). However, they prioritise examining the labels for organic, natural or chemical-free (69.3%). There is evidence from this study that those in the beauty industry recognise the hazardous effect of beauty chemicals on the human body, which is why many expressed a desire to substitute the toxic for the less toxic alternatives (88.7%). The expressed desire to use alternative toxic-free chemicals is a good plan, but many of the chemicals are still toxic and pose a health risk to humans. In reality, 70% of fragrances in the United States included butyl phthalate (DBP)[Campaign for Safe Cosmetics, n.d.]. In India, a study reveals that 43% of lips and 36% of eyeliners sold in India contain lead above the permissible limits. The European Union (EU) has strictly regulated the use of these hazardous chemicals, with less stringent laws in countries like India and the U.S.

Conclusion

This quantitative study on the perception of hazardous chemicals in beauty products among Jamaican consumers provides valuable insights into the health and safety challenges associated with their use. The findings reveal a high prevalence of adverse reactions, with 69% of respondents reporting allergic reactions and 25.8% experiencing rashes and blisters. These results highlight the potential risks of hazardous chemicals in beauty products. The frequency of use further underscores the issue, as more than 30% of respondents reported daily use of these products despite the associated health concerns. This consistent exposure increases the likelihood of cumulative adverse effects on individual health and the environment.

Recommendations

Recommendations from participants point to practical interventions that could mitigate these risks. Encouraging the use of protective equipment, such as masks in beauty spaces, and displaying safety tips could foster safer practices. The suggestion for manufacturers to conduct workshops highlights the need for industry-level initiatives to educate users about proper handling and usage. This study also emphasises the critical need for increased public awareness and regulatory oversight in the beauty industry. While most respondents recognised the potential

dangers of hazardous chemicals, only a tiny percentage acknowledged the broader implications for environmental health. The daily use of beauty products containing hazardous chemicals presents significant health and safety risks. Addressing these issues requires a collaborative effort between consumers, manufacturers, and policymakers. Implementing safety measures, promoting education, and enforcing stricter regulations are essential in reducing the adverse effects of these products and fostering a safer beauty industry in Jamaica.

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