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Environmental Equity and the Cosmetics Industry: The Effect of Class Upon Toxic Exposure

Sean Storr '22
Hamilton College

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Sean Storr

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Dr. Vivyan Adair

Hamilton College

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Abstract

Cosmetic products in the United States are unregulated and oftentimes toxic. It is well established that the threats that cosmetics pose disproportionately harm women and women of color. However, when the hazards of the cosmetic industry have been analyzed, the relationship between toxic exposure and financial means has been largely omitted. In this study I evaluate the link between poverty and toxic burden through cosmetic products through literature review and a data analysis of pre-existing online databases. Through the use of the Campaign for Safe Cosmetics' Red List and the Environmental Working Group's Skin Deep database, I investigate whether cosmetic products that are more expensive are less toxic than less expensive products. Products that are more expensive are less likely to be purchased by poor individuals due to their financial constraints. Products that were categorized as low hazard were found to be, on average, 72.86% more expensive than products that were categorized as high hazard. This price difference presents a clear financial barrier for low-income individuals attempting to purchase less toxic cosmetic products. Further, due to the intersectionality of class, race, and gender affecting toxic exposure through personal care products, poor women of color are at the greatest risk for elevated levels of toxic exposure.

Introduction

Each morning, millions of Americans begin their day with a morning ritual. The daily preparation of oneself is a necessity before leaving the house, from using body wash, shampoo, and conditioner in the shower to applying deodorant to fixing one's hair. This routine requires a vast assortment of cosmetic products. However, these products upon which we depend so heavily often directly undermine our health and wellbeing. Many cosmetics contain well-known toxic ingredients such as lead, phthalates, mercury, and formaldehyde, which can cause cancer and reproductive harm, disrupt the endocrine system, and impair healthy brain development (Zota and Shamsunder, 2017).

All people who use cosmetic products face these risks; however, some communities bear more of the burden than others. Women, especially women of color and potentially poor women, are exposed to disproportionately high levels of toxicity through cosmetics, and thus are at a greater risk of suffering the negative health effects that they pose than the general population is. While the links between race, gender, and higher toxic burden from cosmetics is well established, little is known about the relationship between class and toxic exposure. To further expand our understanding of the intersectionality of this injustice, this study seeks to determine if a relationship between class and toxic burden through cosmetics exists, and to analyze the potential mechanisms that underlie and uphold the relationship.

Background

While the global cosmetic market was valued at approximately $380 billion (Chouhan et al., 2021), the cosmetic market for men, who comprise 50.5% of the global population, only accounted for $71.5 billion of it (Grand View, 2020). The consumer demographics of the industry underscore an essential belief about cosmetics—that it is a feminine domain. The association between femininity and beauty is a long-standing social construction, stemming directly from historic sexist ideals.

Because of the industry's identity as feminine and the historic marginalization of women in society, problems in cosmetics have long been disregarded and regulation has been virtually nonexistent. The Federal Food and Drugs Act of 1906, the precursor to today's cosmetic regulatory system, was the first law enacted to protect consumers from hazardous products. While many commercial products were regulated, cosmetics were excluded from the law "because 'only' women used… cosmetics" and women were not allowed to participate in political discourse (Daum, 2006). Indeed, regulation of the industry was viewed as "so inconsequential that its inclusion would have lowered the tone of the legislation" (Daum, 2006). Women had little political power and, because they were the primary consumers of cosmetic products, were unable to successfully demand safety regulations. The Federal Food and Drugs Act of 1906 left women helpless against the dangers of their cosmetic products.

Over the following 26 years, the unregulated cosmetic industry increasingly promoted unsafe but profitable products and, as a result, became notoriously dangerous. One popular hair removal cream, for example, used rat poison as an active ingredient, leading to paralysis in women; an anti-blemish cream was the source of mercury poisoning, causing consumers to lose their teeth; there was even a mascara product that was responsible for causing blindness, facial ulcers, and, ultimately, the death of one woman (Daum, 2006; Eschner, 2017).

Finally, in 1938, the Food, Drug, and Cosmetic Act was passed, allowing the FDA to regulate the cosmetic industry for the first time. The 1938 Act dictated that companies must correctly label all products and banned cosmetics which were known to be injurious, or otherwise adulterated. However, it did little to ensure that these mandates were actually followed. Under the 1938 Act, "cosmetic products and ingredients do not need FDA approval… neither law nor FDA regulations require specific tests to demonstrate the safety of individual products or ingredients" (FDA, 2021) making it nearly impossible to determine what cosmetics are indeed injurious to consumers. Even if a product is found to be dangerous, the FDA is not authorized to issue any recalls. Instead, companies are responsible for ensuring the safety of their own products. Since 1938, there have been no further laws to regulate cosmetics.

Cosmetic companies are incentivized not to report covertly harmful products. The primary incentive for self-regulation is industry image (Daum, 2006). If the industry's products are known to cause serious health problems, consumers will become wearier of, and less dependent upon, cosmetics. This motivation is only effective when negative health consequences can be proven as the direct result of a product. Thus, cosmetics are often tested for noticeable

short-term problems that are easily attributed to a single source, such as skin irritation, which could cause consumers to change brands or stop using similar products altogether. However, long term health impacts, such as cancer, which are difficult to ascribe to a single definitive cause, go largely untested for (Harvard Women's Health Watch, 2020). Due to the lack of federal oversight of the cosmetic industry, current regulation does little to truly reduce the presence of toxic chemicals in products.

The lack of government has allowed the cosmetic industry to continue including harmful ingredients in their products. To this day, toxicants that are known to cause significant harm to consumers are ubiquitous in products on retail store shelves (Chaudry, 2019). For example, some body washes, nail polishes, and hair gels contain formaldehyde, which is considered a known human carcinogen according to the International Agency for Research on Cancer (CSC, 2021). Coal tar, another known carcinogen and neurotoxic chemical, is used widely in hair dyes. Even Teflon, the chemical responsible for non-stick cookware, can be found in anti-aging products and is linked to cancer and endocrine disruption in women (CSC, 2021). The dearth of product testing also enables contaminated products to be sold. For instance, asbestos has been found in talcum powder (a common ingredient in many cosmetics from baby powder to blush) causing rare lung and ovarian cancers at alarming rates in consumers (Girion, 2018).

Not only are harmful ingredients allowed in cosmetics, but they are also often disguised or altogether undisclosed. Most notably, companies use umbrella terms to conceal chemicals that are in their products. Toxins are frequently hidden under the ingredient names "fragrance" or "parfum"—catch-all terms for the more than 3,000 chemicals that are used to improve product

odor, including known carcinogens (Zanolli, 2016) and phthalates, which have been linked to endocrine disruption (EWG, 2016).

The prevalence of toxicants in cosmetics is so widespread that, in a survey of more than 14,000 products, the Environmental Working Group found that "63.5% of products surveyed contain ingredients with reproductive/developmental toxicity; 34.8% of products surveyed contain cancer hazards, and 78.6% contain ingredients with the potential for harmful impurities" (Daum, 2006). Thus, the 1938 Act, which attempts to ban harmful chemicals and necessitate the disclosure of all ingredients in cosmetics largely fails to accomplish either of its goals.

Toxic Exposure and Gender

These exceptionally high public health risks posed by beauty products disproportionately fall upon women, as the primary consumers of cosmetics. However, the choice to use cosmetic products, as Jean Kilbourne (1987) explained, for many women is often not a choice at all. Societal concepts of femininity and womanhood are entangled with beauty and appearance, and physical appearance is equated with worth (The Representation Project, 2011). Through mainstream public messaging, women are told that their natural state is not acceptable (Kilbourne, 1987). Women are viewed as damaged and deficient individuals whose every feature must be "fixed" in order to be perceived as presentable. Those who deviate from the unachievable ideals of physical flawlessness are viewed with disgust (Kilbourne, 1987). Conforming to the beauty ideals that American society upholds–ideals that are judged according to European beauty standards, which favor features most closely associated with whiteness, such

as lighter skin, straight hair, and a thin nose (Bryant, 2013)–can enable women to be perceived as presentable and professional.

For too many, these rigorous and particular aesthetic demands require the use of innumerable cosmetic products. While attempting to live up to societal beauty ideals, women are simultaneously exposed to more toxins. The average U.S. woman uses between nine and twelve cosmetic products daily (more than double that of the average man) resulting in exposure to approximately 168 chemicals *per day* (Westervelt, 2015). Societal pressures to fulfill the constructed ideal of beauty force women to use cosmetics at much higher rates than men, disproportionately exposing them to harmful toxins.

Women's elevated exposure to hazardous chemicals in cosmetics certainly play a part in alarming recent health trends. Despite cancer rates declining in men across the US, the rates of cancer in women have not changed (Zanolli, 2019). Further, while overall cancer rates are declining, certain types, which are of particular concern with cosmetics such as thyroid, liver, and skin cancers, are increasing in prevalence (Zanolli, 2019). Other health issues associated with chemicals in cosmetics, such as infertility caused by endocrine disruption, are on the rise in women as well (Zanolli, 2019). The chemicals to which women are exposed to through beauty products are unquestionably contributing to these disturbing health trends observed today.

Toxic Exposure and Race

An individual's level of exposure to toxins is not only affected by gender, but by race as well. As the realm of beauty and cosmetics has long been controlled by white European ideals,

women of color have been compelled to use products to conform to values of white beauty—products which are even more toxic than those marketed to white women. In response to beauty disenfranchisement, women of color are faced with two options: either conform to hegemonic ideals or push back against them to define their own concepts of beauty (Lynch and Medvedev, 2019). Both approaches require large expenditure on, and use of, beauty products. Per individual, Black women spend 80% more money on cosmetics (Smith, 2009), and purchase nine times as many cosmetic products as the general population (Zota and Shamasunder, 2017). As a direct response to the societal dismissal of non-white beauty standards, women of color are exposed to more cosmetic products, and, ultimately, more dangerous chemicals.

The data is unambiguous about this relationship. Women of color are at much greater risk of adverse health impacts from the use of cosmetics specifically marketed to them, than their white counterparts. Not only do Black women purchase more cosmetic products than the general population, so too do Latinx women, who are the fastest growing demographic in the cosmetic industry, and Asian women, who spend 70% more on cosmetic products than the national average (Zota and Shamasunder, 2017). Women of color, across all races experience disproportionate exposure to cosmetic products and their hazardous chemicals.

Furthermore, the cosmetics that are marketed to women of color are often more harmful than those sold to white women (Brown-West, 2020). Products such as skin lighteners and hair relaxers are some of the most notoriously toxic products on the market. Indeed, chemical hair straighteners have been found to increase the risk of developing breast cancer by 30% in women (Eberle et al., 2019). In fact, in an analysis of over 1,000 beauty products, less than 25% of the

products marketed to Black women were considered low-risk products, whereas 40% of products for the general population were considered low-risk (EWG, 2016). Products that were marketed solely to women of color, such as skin bleaching products and hair relaxers, were found to be exclusively high-risk.

Although women and women of color are the foundation of the $380 billion cosmetic industry, the political and social marginalization due to their gender and race erodes their ability to successfully demand change from large companies (Lynch and Medvedev 2019). While grassroot movements to reduce the prevalence of harmful toxic cosmetic products are growing, the systemic racism and sexism in the social, cultural, and political spheres of American society enable the cosmetic industry to avoid regulation and continue to steal the health and well-being of women across the country without any meaningful regulation or repercussions.

Toxic Exposure and Class

In the early 1980s, the concept of environmental justice was first brought to the public's attention. As defined by the EPA, environmental justice is "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Unfortunately, the realization of environmental justice remains elusive. One such enduring injustice is the long and troublesome history in the US of poor communities being exposed to inordinately high levels of toxic chemicals in their environment. Over the years, the scientific community has consistently found this relationship to hold true. While the connection has been studied in many traditional environmental hazard pathways, such as air pollution, water

pollution, and hazardous waste, it has not been extended to all toxins. The relationship between income and exposure to hazardous chemicals in cosmetic products remains largely unstudied—a gap that this research aims to fill.

For decades, US environmental policies "have allowed for separate societies differing in the quality of their respective environments" that have left poor individuals vulnerable to environmental hazards (Mohai and Bryant, 1991). While exposure to environmental hazards is intersectional, being influenced by factors such as age, race, and socioeconomic status, income level is inextricable from toxic exposure (Perlin et al., 2001). Across the nation, low-income communities are exposed to much higher levels of environmental toxins.

A 2019 review of the location of large chemical polluters in North Carolina and their correlation to community demographics revealed that 63% of all polluters were sited in a county with a per capita income below $21,000 (Banzhaf et al.). This relationship between elevated chemical exposure and income level is consistent from study to study, and location to location throughout the US. In fact, when examining 10 studies that assessed the social distribution of environmental hazards throughout the nation, Mohai and Bryant (1991) found that "regardless of the environmental hazard and regardless of the scope of the study, in nearly every case, the distribution of pollution [was] found to be inequitable by income." It is indisputable that poor communities are disproportionately exposed to hazardous chemicals.

Most of the existing environmental justice literature focuses on place-based pollution sources, such as factories and waste disposal. However, exposure to hazardous cosmetic products may occur in the same communities that are historically most exposed to place-based pollution

(Zota and Shamsaunder, 2017). In fact, many of the same potential mechanisms that drive the correlation between pollution exposure and income may also be driving the potential relationship between toxic cosmetic exposure and income. These potential mechanisms include access to knowledge about the hazard, disproportionate siting of hazards in low-income communities, and an individual's ability to pay to avoid the hazard (Banzhaf et al., 2019).

The first mechanism that could drive greater toxic exposure through cosmetics in low-income individuals is the difficulty in identifying products with fewer hazardous ingredients (Harley et al., 2016). While most people would likely prefer to use products without harmful chemicals, identifying safe products can be time consuming and confusing (Harley et al., 2016). As many ingredient lists are chock full of obscure sounding chemical names, learning which of the thousands of chemicals in cosmetic products are hazardous, and which are benign, can be an arduous task. Thus, consumers must be well-versed in environmental toxins and health, and the cosmetics industry to successfully navigate the hundreds of beauty products on store shelves (McCormick, 2016). This knowledge barrier directly impacts low-income individuals. Higher educational levels, which lower income individuals are less likely to have attained, have been found to be "significantly related" to understanding cosmetic ingredient labels (Noiesen et al., 2007). In turn, better understanding of ingredients in a product can lead to more informed purchases. Thus, the knowledge barrier may make it difficult to identify hazardous ingredients and assess the safety of cosmetic products, resulting in exposure to more toxic chemicals.

While low-income individuals face greater barriers to knowledge about hazardous cosmetic ingredients, it is possible that the knowledge barrier to purchasing safer cosmetics is

decreasing with the prevalence of websites and online databases that make difficult ingredient lists much easier to understand. One such example is the Campaign for Safe Cosmetics' "Red List," which simplifies ingredient lists and easily identifies potentially hazardous chemicals. The notion that "you shouldn't need a Ph.D. in chemistry to choose safe cosmetics" (Safe Cosmetics, 2021) is becoming realizable through growing internet access. Thus, the knowledge barrier to purchasing safer cosmetic products may be diminishing.

The second mechanism that may drive a relationship between income and toxic exposure is access to safer cosmetic products. Anecdotally, it has been remarked that safer products are often difficult to find in poor communities (Harley et al., 2016). Further, stores that are known to carry cosmetic products with more hazardous chemicals, such as dollar stores, are disproportionately located in low-income communities (McCormick, 2016). Thus, should low-income individuals desire safer cosmetics, they may not have access to any such products.

On the other hand, the globalization of the economy may counteract access barriers. Online one-stop shops, such as Amazon, are dominating consumerism. These websites allow individuals to purchase products that may otherwise not be available to them in their own communities. Although there may be fewer safe cosmetic products in low-income communities, individuals can now conveniently purchase previously inaccessible products online. The ease of being able to shop outside of one's local community and receive the product quickly likely reduces the access barrier to safer cosmetic products in low-income communities.

The final potential mechanism driving a relationship between income and toxic exposure is a lack of financial resources for purchasing safer cosmetics. Financial constraint is likely the

largest and most enduring barrier for low-income individuals. To create a safe cosmetic product, companies must substitute toxic ingredients with safe alternatives, which are often more expensive to manufacture or difficult to procure. Additionally, more rigorous testing must be performed to ensure the safety of all ingredients, costing the manufacturer more money. Both costs are likely to be passed on to the consumer, raising the price of the product. Further, reduced toxicity in cosmetics is a benefit that many individuals would likely pay a premium for. Because people are willing to pay to avoid toxic chemicals in their products, the price of safe cosmetics may be higher than more toxic alternatives.

Anecdotally, it has been reported that cosmetic products that have fewer toxicants are more expensive (Bundrage et al., 2021; Harley et al., 2016). If this relationship is true, then safer cosmetic products may be financially unattainable for low-income individuals. Wealthy individuals would be able to purchase safer products at a premium because they have a larger budget overall. Low-income individuals, however, would not have this luxury. According to the Bureau of Labor Statistics, households in the lowest-earning 20% spent the same percent of their income on personal care products as did households in the highest-earning 20% (Morrell, 2017). The lowest earning Americans spend, on average, $142 annually on personal care products, while the highest earning Americans spend $2,134 annually on cosmetics. Thus, should a low-income consumer desire less chemicals in their cosmetics just as much as their wealthy counterparts, they may not be able to afford such products and would subsequently be exposed to more harmful toxicants.

While there is some evidence that prerequisite knowledge and access to products may increase toxic exposure through cosmetic products for low-income individuals (McCormick, 2016; Noiesen et al., 2007), it is probable that they will diminish as reliance upon the internet continues to increase. However, the potentiality of elevated costs for safer products is a barrier that is unlikely to disappear soon. Price is likely to be the most substantial and enduring factor behind a potential relationship between toxic exposure through cosmetics and income level.

The existence of a relationship between product cost and toxicity has yet to be thoroughly examined. Current literature relies solely upon anecdotal evidence that safer products are more expensive than potentially hazardous products (Davis-Bundrage et al., 2018; Harley et al., 2016; McCormick, 2016). To effectively assess if low-income individuals are disproportionately exposed to hazardous cosmetic products, a more in-depth evaluation is required. This study will attempt to quantify this relationship through a data analysis of a multitude of cosmetic product ingredients and their prices to determine if safer cosmetic products are financially inaccessible for poor individuals.

Methods

The cosmetic products chosen for analysis were divided into 6 categories: shampoos, conditioners, body washes, moisturizers, and hair products (such as styling gel and hairspray.) Each product's toxicity score was calculated by adding the EWG Skin Deep toxicity score (0-10) with the number of chemicals of concern in each product as determined by the Campaign for Safe Cosmetics' Red List (1-7.) Product prices were obtained through companies' respective

direct-to-consumer websites. If products were unavailable through company websites, large retailers such as Amazon and Walmart were used to obtain product prices.

General Trends in Cosmetic Product Toxicity and Price

Figures 1 through 6 show the relationship between the toxicity of each cosmetic product and its cost, organized by category of products. Overall, there is a moderately strong, negative, linear correlation between product toxicity in price, most notably for shampoos, conditioners, and deodorants. However, moisturizers, hair products, and body wash showed little to no correlation between toxicity and price.

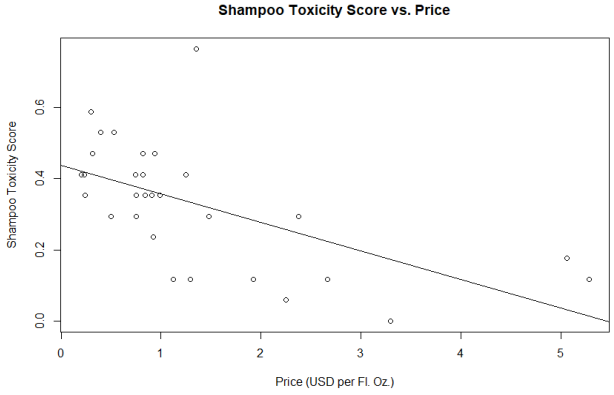


Figure 1. The relationship between shampoo toxicity and the price of the product. The slope is -0.08011 with a correlation of -0.59.

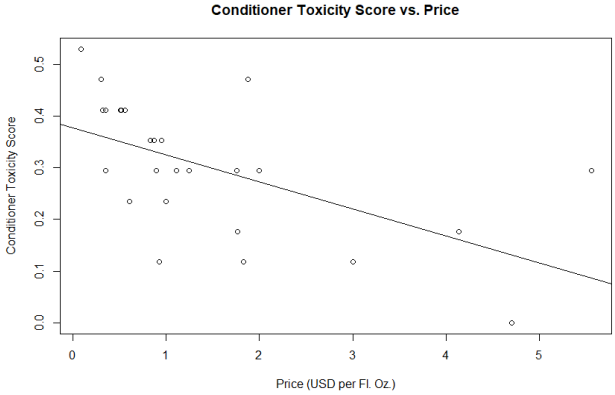
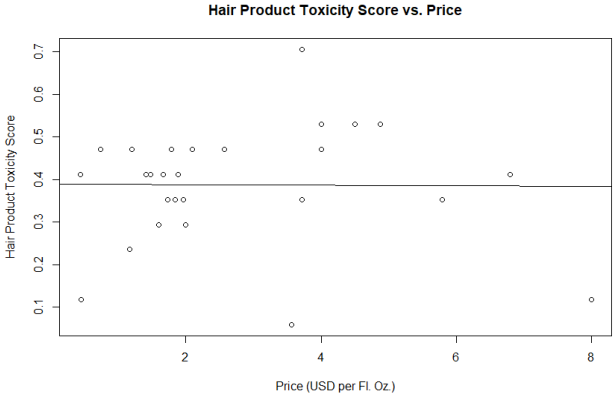


Figure 2. The relationship between conditioner toxicity and the price of the product. The slope is -0.0525 with a correlation of -0.58.



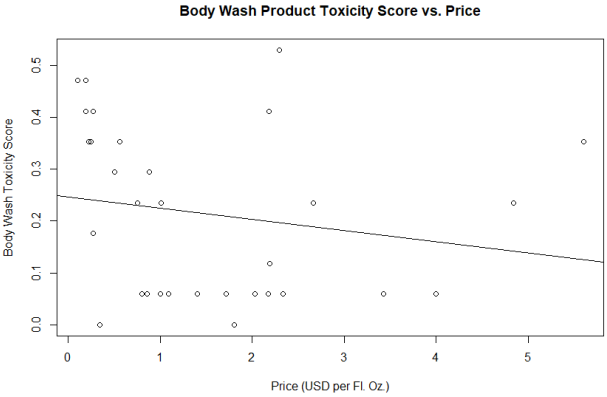
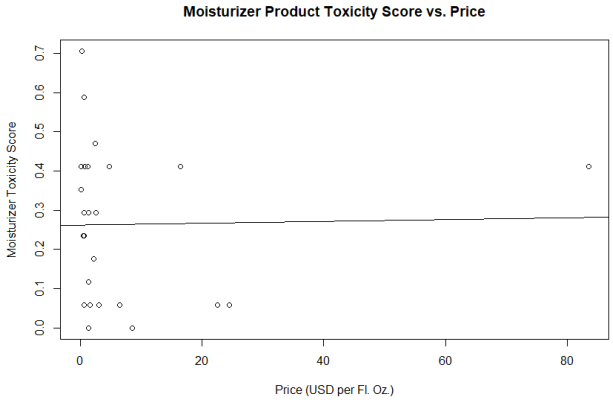


Figure 3. The relationship between hair product toxicity and the price of the product. The slope is -0.0006 with a correlation of -0.009.

Figure 4. The relationship between body wash toxicity and the price of the product. The slope is -0.022 with a correlation of -0.1.



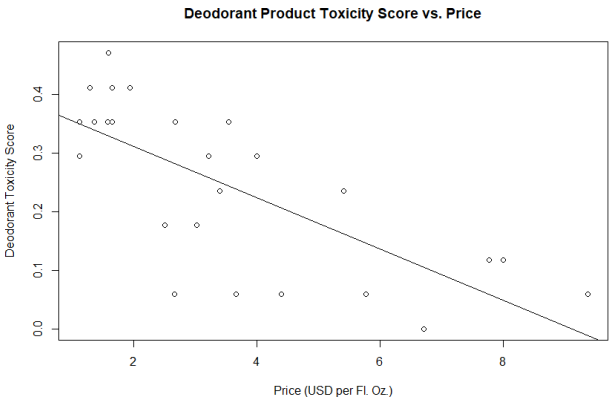


Figure 5. The relationship between moisturizer toxicity and the price of the product. The slope is 0.0002 with a correlation of 0.02.

Figure 6. The relationship between deodorant toxicity and the price of the product. The slope is -0.04 with a correlation of -0.72.

Trends in Product Toxicity and Price When Sorted by Product Hazard Level

To further assess the relationship between product toxicity and price, cosmetic products were then sorted by hazard level. Twenty-five of the most hazardous and least hazardous products, as defined by each product's EWG Skin Deep rating, were compared within their respective category of cosmetic product. The Skin Deep score was then combined with the Campaign for Safe Cosmetics' chemicals of concern score to determine the overall toxicity score.

There is a moderately strong, negative correlation between toxicity score and price. In all cases, there was a cluster of highly hazardous cheap products, whereas more expensive products tended to be low hazard. The disparity in price between low hazard and high hazard products is further evident when all product types are analyzed in unison. The 165 low hazard products analyzed (M = 3.42, SD = 3.31), when compared to the 158 high hazard products (M = 1.99, SD = 1.85) were significantly more expensive, t (259.17) = 4.81, p = 2.562e-06. Thus, there is a

statistically significant difference in prices between high and low hazard cosmetic products. Further, I am 95% confident that the difference in price between high hazard and low hazard products is between 0.84 and 2.01 USD per Fl. Oz. The average low hazard cosmetic product analyzed in this study cost 72.86% more than the average high hazard cosmetic product analyzed.

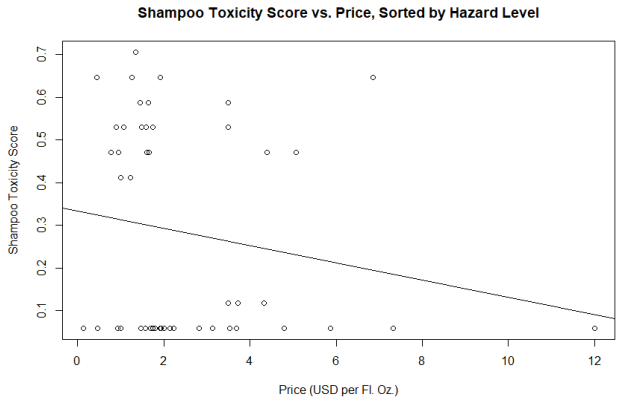


Figure 7. The relationship between shampoo toxicity and the price of the product, when sorted by most and least hazardous products. The slope is -0.02 with a correlation of -0.14. The mean high hazard shampoo cost $2.05 per fl. oz., whereas the mean low hazard body wash cost $2.89 per fl. oz.

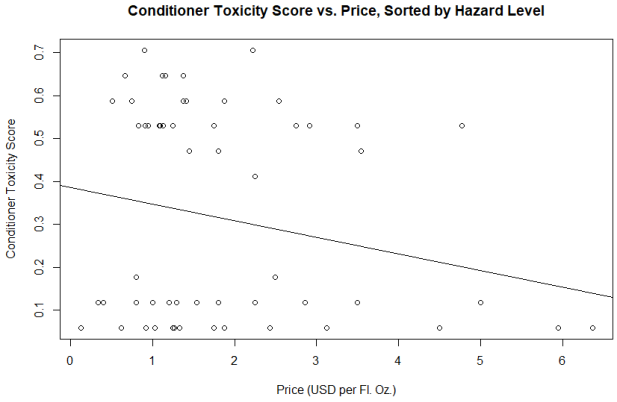


Figure 8. The relationship between conditioner toxicity and the price of the product, when sorted by most and least hazardous products. The slope is -0.029 with a correlation of -0.12. The mean high hazard conditioner cost $1.71 per fl. oz., whereas the mean low hazard body wash cost $2.04 per fl. oz.

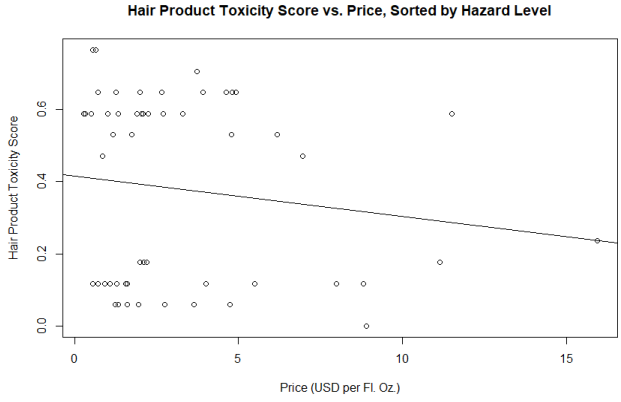


Figure 9. The relationship between hair product toxicity and the price of the product, when sorted by most and least hazardous products. The slope is -0.011 with a correlation of -0.14. The mean high hazard conditioner cost $2.75 per fl. oz., whereas the mean low hazard body wash cost $3.76 per fl. oz.

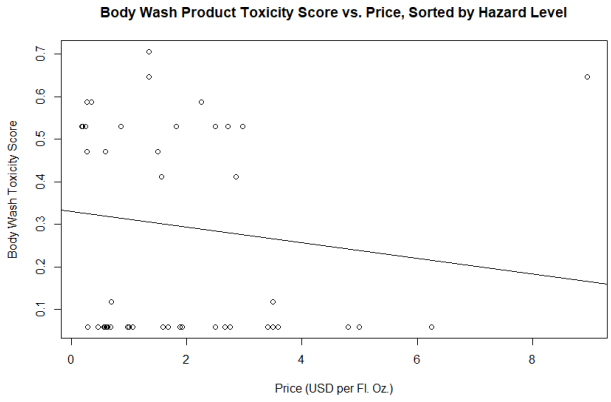


Figure 10. The relationship between body wash toxicity and the price of the product, when sorted by most and least hazardous products. The slope is -0.018 with a correlation of -0.12. The mean high hazard body wash cost $1.55 per fl. oz., whereas the mean low hazard body wash cost $2.07 per fl. oz.

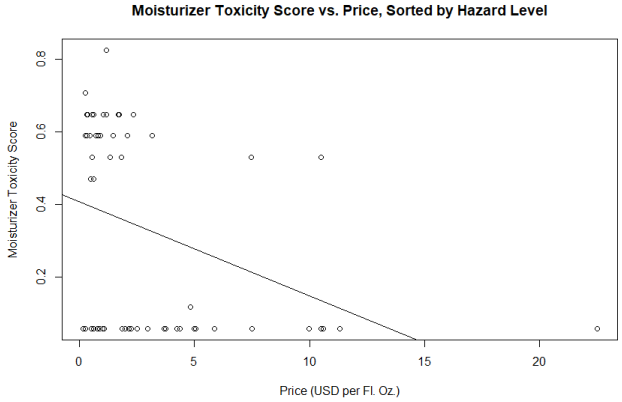


Figure 11. The relationship between moisturizer toxicity and the price of the product, when sorted by most and least hazardous products. The slope is -0.026 with a correlation of -0.14. The mean high hazard body wash cost $1.64 per fl. oz., whereas the mean low hazard body wash cost $4.58 per fl. oz.

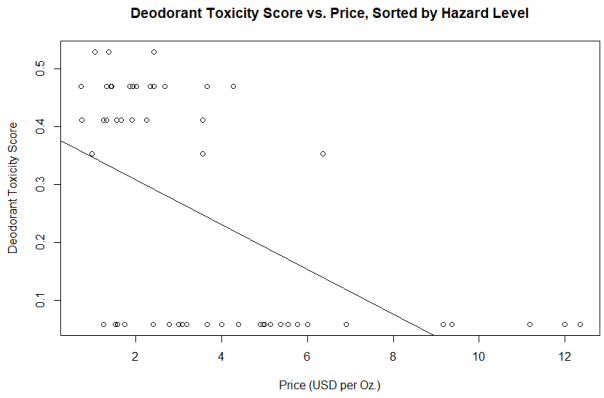


Figure 12. The relationship between deodorant toxicity and the price of the product, when sorted by most and least hazardous products. The slope is -0.039 with a correlation of -0.55. The mean high hazard deodorant cost $2.15 per oz., whereas the mean low hazard body wash cost $5.15 per oz.

Discussion

The existing body of literature makes clear the relationship between gender, race, and toxic exposure through cosmetic products. This study has expanded the intersectionality of the issue of hazardous cosmetic products by clearly demonstrating a correlation between lower product prices and higher toxicity, most notably in deodorants, shampoos, and conditioners. Indeed, across all categories of cosmetics that were analyzed, products that were categorized as low hazard cost, on average, approximately 73% more than products that were categorized as high hazard. Cosmetic products that are less toxic are generally more expensive, thus introducing a financial barrier for consumers to purchase safer products.

It is estimated that high and low-income individuals spend the same percentage of their yearly earnings on personal care products (Morrell, 2017). Thus, the financial premium that is required to purchase safe cosmetics is likely to impact low-income individuals the most. However, elevated exposure to hazardous cosmetic products is not limited to this demographic.

Indeed, it is well documented that toxic exposure in cosmetics is a deeply intersectional issue; women are more likely to be exposed to toxins than men, women of color are more likely to be exposed than white women, and low-income women of color are more likely to be exposed than wealthy or middle-class women of color. These socially marginalized positions work in combination where, at the intersection of all three, exposure to hazardous cosmetic products is the greatest, resulting in a hierarchy of toxic exposure:

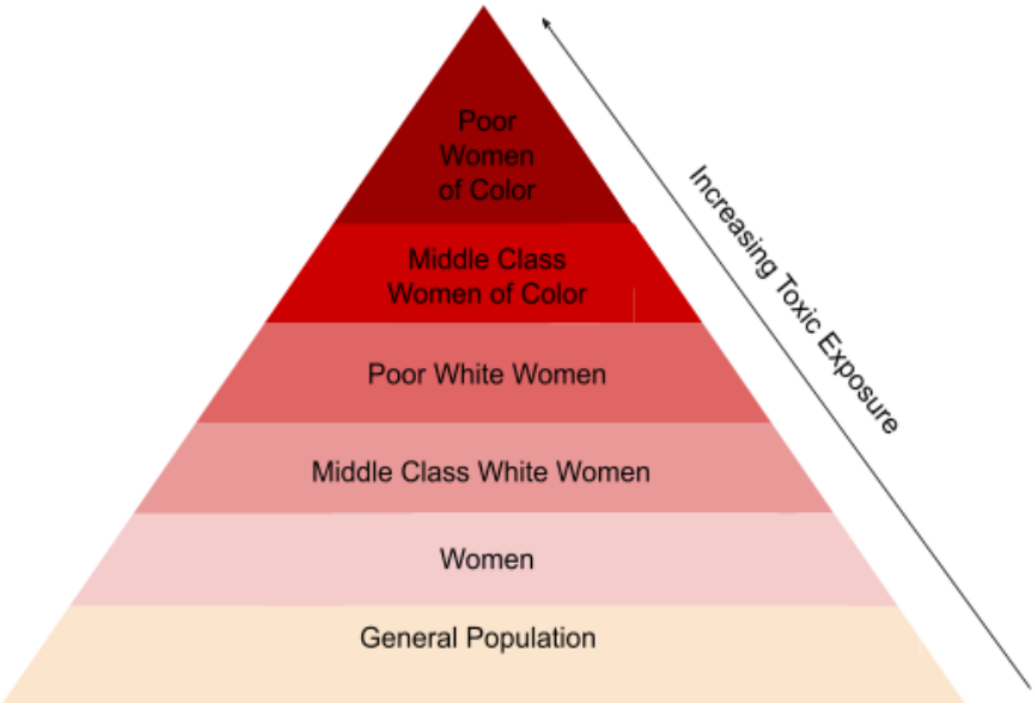


Figure 13. The hierarchy of toxic exposure. All individuals are exposed to hazardous chemicals through cosmetics. However, with each socially marginalized position, the risk of experiencing more and greater hazards increases. Increased exposure occurs at the intersection of marginalized gender, race, and class.

With each increase in level of the hierarchy an individual is exposed to more toxicants. Women use over twice as many cosmetic products daily as men (Westervelt, 2015); Black women spend 80% more per individual on (often more hazardous) cosmetic products than the

general population (Smith, 2009); and low-income women spend the same proportion of their annual income on personal care products (Morrell, 2017), of which the safest options cost 73% more on average. While individually, race, gender, and income all increase toxic exposure, when positioned in combination they are more likely to result in the highest toxic burden.

On top of elevated beauty product toxicity exposure, low-income individuals and people of color also experience disproportionate exposure to place-based pollution. Just as exposure to toxicants in personal care products is unequal, so too is exposure to environmental pollution (Mohai and Bryant, 1991). Thus, these marginalized populations must bear the burden of multiple environmental hazards in combination. As exposure to environmental hazards, from air pollution to cosmetics, are concentrated in marginalized communities, the adverse health conditions that they cause are additive. This co-occurrence further underscores the importance of recognizing and combating these environmental injustices.

Although the average low hazard product costs more than the average high hazard product, this study cannot say that all low-income individuals certainly experience higher levels of toxicity from cosmetic products. For example, it is possible that high-income individuals do not purchase the most expensive products and are exposed to elevated levels of toxicity as well. This study did not assess consumer purchasing behaviors. Further, As evidenced in Figures 1-12, there are many products that are not expensive and not hazardous. However, the proportion of such products is much lower than expensive products that are not hazardous. The prevalence of hazardous products at low price points makes it more difficult for consumers that cannot afford the most expensive products to avoid toxicants. The elevated average toxicity at lower prices

forces consumers who wish to avoid hazardous products to dedicate much more of their time to researching safe cosmetics and studying product labels, which many may not be able to, through time constraints or otherwise. This barrier, which affects low-income individuals as they likely cannot afford safer, more expensive products, is likely to greatly increase toxic exposure.

For future studies, the implementation of an in-depth survey is recommended. This study was confined to data that was readily and publicly available, such as the Environmental Working Group Skin Deep database. In advancing knowledge of the impact of hazardous cosmetic products upon marginalized individuals, future studies may consider an alternative toxicity scoring metric, survey data regarding how much money low-income individuals spend on cosmetics compared to high-income individuals, and how many beauty products low-income individuals use.

Less toxic cosmetic products are, on average, more expensive than safer alternatives. For many Americans, paying a premium to avoid toxic exposure may not be feasible due to financial constraints. However, the option to not use cosmetics, or greatly reduce their usage, is often not an option at all. Individuals are forced to keep up with societal beauty standards that rely upon the use of personal care products. For those who cannot afford to purchase expensive products, this societal pressure directly results in the jeopardization of their health. The disproportionate exposure of low-income individuals to toxic cosmetic products is yet another source of inequitable environmental health conditions in this country. More research into toxic exposure through cosmetics is necessary to spur stricter regulation of cosmetic ingredients in the US and reduce this environmental injustice, fostering equitable health outcomes for all.

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