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Page: 01-19

AWARENESS OF LIPSTICK-RELATED HEALTH EFFECTS: A REVIEW FOR NURSING AND PUBLIC HEALTH PROFESSIONALS

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STRUCTURED ABSTRACT

Background: Lipstick is one of the most widely used cosmetic products worldwide. Although generally considered safe, repeated exposure to certain ingredients, including heavy metals, preservatives, fragrances, pigments, and endocrine-disrupting chemicals, has raised concerns regarding potential adverse health effects. Nurses and public health professionals play an important role in consumer education and early recognition of cosmetic-related health problems.

Objective: To critically review current evidence on lipstick-related health effects and discuss implications for nursing practice and public health.

Methods: A narrative review of literature published mainly between 2020 and 2026 was undertaken using PubMed, Scopus, Web of Science, and Google Scholar. Evidence from peer-reviewed studies and international regulatory agencies was synthesized.

Results: Current evidence indicates that reputable lipstick brands generally comply with regulatory limits, while counterfeit or poorly regulated products may contain elevated concentrations of heavy metals and other contaminants. Reported health effects include allergic contact cheilitis, mucosal irritation, endocrine disruption, and potential systemic toxicity after long-term exposure.

Conclusion: Awareness regarding safe cosmetic use remains limited. Nursing professionals should incorporate cosmetic safety into health education and public health programmes.

KEYWORDS: Lipstick; Cosmetics; Heavy metals; Cosmetic safety; Nursing; Public health; Toxicology.

INTRODUCTION

Cosmetic products are used daily by billions of individuals, with lipstick representing one of the most frequently applied products. Small quantities may be ingested repeatedly over many years, making ingredient safety an important public health consideration. Recent studies have focused on contaminants such as lead, cadmium, chromium and nickel, as well as preservatives, synthetic dyes and fragrances that may contribute to allergic or systemic effects.¹⁻⁴ Nurses are well positioned to promote awareness, identify adverse reactions and support evidence-based consumer education.

Review Methodology

This review synthesizes evidence identified through searches of PubMed, Scopus, Web of Science and Google Scholar using combinations of the keywords 'lipstick', 'cosmetics', 'heavy metals', 'cosmetic safety', 'public health', and 'nursing'. Priority was given to publications from 2020–2026, systematic reviews, observational studies, toxicological investigations and guidance from WHO, FDA and the European Commission.

Chemical Composition of Lipsticks

Modern lipstick formulations typically contain waxes, oils, emollients, pigments, preservatives, antioxidants, fragrances and specialty additives. While these ingredients improve texture, colour stability and shelf life, impurities introduced during manufacturing may also be present. Heavy metals may occur as contaminants of mineral pigments rather than intentional ingredients.⁵⁻⁷

Heavy Metals in Lipsticks

Lead, cadmium, chromium, nickel and arsenic remain the principal toxicological concerns reported in cosmetic surveillance studies. Although concentrations in regulated products are usually below accepted limits, cumulative exposure from lifelong use, particularly when combined with other environmental sources, warrants continued monitoring. Pregnant women, adolescents and frequent users may represent vulnerable populations.⁸

HEALTH EFFECTS OF LIPSTICK INGREDIENTS

Heavy Metal Toxicity Associated with Lipstick Use

Heavy metals remain among the most extensively investigated contaminants in lip cosmetic products because of their persistence, bioaccumulative properties, and potential to induce chronic adverse health effects following repeated low-dose exposure. Although reputable

cosmetic manufacturers generally comply with international safety standards, trace quantities of metals may be introduced during the manufacture of mineral pigments, fillers, and other raw materials. Continuous daily application of lipstick, together with inadvertent ingestion during eating, drinking, or lip licking, contributes to cumulative exposure over time. Consequently, even low concentrations warrant toxicological evaluation, particularly among frequent users, pregnant women, and adolescents.⁹

Lead

Lead (Pb) is one of the most frequently studied contaminants in lipsticks owing to its well-established neurotoxicity. Although lead is not intentionally added to lipstick formulations, it may occur as an impurity in color pigments and mineral-based ingredients. Chronic lead exposure has been associated with impaired cognitive function, behavioral abnormalities, hypertension, nephrotoxicity, hematological disorders, and reproductive dysfunction. During pregnancy, lead readily crosses the placenta and may adversely affect fetal neurodevelopment. Evidence indicates that repeated exposure from multiple environmental sources, including cosmetics, contributes to the cumulative body burden of lead. Therefore, continuous surveillance of cosmetic products remains an important public health priority.¹⁰

Cadmium

Cadmium (Cd) is another toxic heavy metal occasionally detected in lipstick formulations. Cadmium accumulates primarily in the kidneys and liver, with an estimated biological half-life exceeding two decades. Long-term exposure has been associated with renal tubular dysfunction, decreased bone mineral density, osteoporosis, oxidative stress, cardiovascular disease, and several malignancies. Experimental studies have also demonstrated genotoxic and endocrine-disrupting properties of cadmium, raising concerns regarding prolonged cosmetic exposure. Although concentrations detected in regulated products are generally low, counterfeit or poorly regulated cosmetics may contain substantially higher levels.¹¹

Chromium

Chromium (Cr), particularly hexavalent chromium, has been implicated in allergic reactions and dermatological disorders. Chromium contamination of cosmetic pigments may precipitate allergic contact cheilitis and dermatitis in susceptible individuals. Repeated exposure may also contribute to oxidative stress and cellular injury. While the concentrations present in commercial lipsticks are typically below regulatory thresholds, sensitive

individuals may develop clinically significant hypersensitivity reactions following repeated use.¹²

Arsenic

Arsenic (As) is recognized as a human carcinogen by international regulatory agencies. Trace contamination of cosmetic products may occur through naturally contaminated mineral ingredients. Chronic arsenic exposure has been associated with skin lesions, peripheral neuropathy, cardiovascular disease, diabetes mellitus, and increased risks of cancers involving the skin, lungs, liver, and bladder. Although current regulatory oversight has reduced arsenic concentrations in many commercial products, continued monitoring remains essential to ensure consumer safety.¹²

Table 1. Major Heavy Metals Identified in Lipsticks and Associated Health Effects.

Heavy metal	Primary source in lipstick	Major health effects
Lead	Pigment impurities	Neurotoxicity, nephrotoxicity, developmental toxicity, hypertension
Cadmium	Mineral pigments	Renal dysfunction, osteoporosis, oxidative stress, carcinogenicity
Chromium	Color pigments	Allergic contact cheilitis, dermatitis, oxidative injury
Arsenic	Natural mineral contamination	Carcinogenicity, skin lesions, cardiovascular toxicity
Nickel	Pigment contamination	Contact allergy, hypersensitivity reactions
Mercury	Rare contaminant	Neurotoxicity, renal toxicity, developmental toxicity

Critical Appraisal

Current evidence indicates that exposure to heavy metals from lipstick alone is generally lower than exposure from occupational or environmental sources. Nevertheless, lipstick use is characterized by **chronic, repeated, and lifelong exposure**, making cumulative risk an important consideration. Several biomonitoring studies have highlighted that cosmetic exposure should not be evaluated in isolation but rather as part of the total environmental exposure burden. Future research should emphasize long-term cohort studies, standardized analytical methodologies, and harmonized international regulatory limits to better characterize cumulative risk associated with cosmetic use.

DERMATOLOGICAL, ORAL, ENDOCRINE, AND REPRODUCTIVE HEALTH EFFECTS OF LIPSTICK USE

DERMATOLOGICAL EFFECTS OF LIPSTICK USE

Lip cosmetics are applied directly to the highly vascularized and delicate vermilion border of the lips, making this tissue particularly susceptible to irritation, sensitization, and allergic reactions. The lips possess a relatively thin stratum corneum and limited protective barrier function compared with other skin surfaces, facilitating greater penetration of cosmetic ingredients. Consequently, repeated application of lipstick may contribute to both irritant and allergic dermatological disorders, particularly among individuals with pre-existing skin sensitivity or atopic conditions.¹³

Allergic Contact Cheilitis

Allergic contact cheilitis is one of the most frequently reported adverse reactions associated with lipstick use. It represents a delayed type IV hypersensitivity reaction resulting from sensitization to cosmetic ingredients such as fragrances, preservatives, dyes, lanolin, propolis, castor oil derivatives, and metallic contaminants. Clinical manifestations include persistent lip dryness, erythema, edema, fissuring, scaling, burning sensation, itching, and pain. Chronic exposure may lead to hyperpigmentation, lichenification, and recurrent inflammation that significantly affects quality of life. Patch testing remains the gold standard for identifying the responsible allergen and guiding long-term management.¹³

Several epidemiological studies indicate that fragrance mixes, balsam of Peru, nickel, chromium, and certain preservatives remain among the most common allergens detected during patch testing of patients with cosmetic-related cheilitis. Prompt identification and discontinuation of the offending product generally result in complete symptom resolution, although persistent inflammation may require topical corticosteroids or calcineurin inhibitors under dermatological supervision.

Irritant Contact Dermatitis

Unlike allergic reactions, irritant contact dermatitis occurs through direct damage to the epithelial barrier without immune sensitization. Frequent lipstick application, excessive use of long-wear formulations, environmental factors such as ultraviolet radiation and low humidity, or habitual lip licking may impair the natural barrier function of the lips. Clinical features include erythema, burning, scaling, cracking, and tenderness. Individuals with eczema, psoriasis, or other chronic dermatological conditions may experience more severe manifestations due to an already compromised skin barrier.¹⁴

Lip Hyperpigmentation

Long-term use of low-quality or counterfeit lipsticks has been associated with acquired lip hyperpigmentation. Potential contributing mechanisms include chronic inflammation, repeated exposure to heavy metals, ultraviolet radiation, and photosensitizing ingredients. Although hyperpigmentation is usually benign, it may have cosmetic and psychological consequences, particularly among young women. Healthcare professionals should differentiate cosmetic-induced pigmentation from systemic disorders such as Addison's disease, nutritional deficiencies, or medication-induced pigmentation.

Oral and Mucosal Health Effects

Because lipstick is continuously transferred into the oral cavity during eating, drinking, and speaking, the oral mucosa represents an important route of exposure. Although most approved cosmetic ingredients demonstrate acceptable safety profiles at recommended concentrations, prolonged exposure to certain contaminants may contribute to localized adverse effects.

Reported oral manifestations include burning mouth sensation, recurrent aphthous-like ulceration, angular cheilitis, mucosal irritation, taste disturbances, xerostomia, and transient swelling. In susceptible individuals, repeated exposure to allergenic compounds may trigger chronic inflammatory changes involving the lips, gingiva, and oral mucosa. While severe oral toxicity attributable solely to lipstick remains uncommon, clinicians should consider cosmetic exposure when evaluating persistent oral lesions of unknown origin.¹⁴

Inadvertent ingestion also contributes to cumulative systemic exposure. Frequent lipstick users may ingest measurable quantities of cosmetic product throughout their lifetime. Although the amount absorbed from individual applications is small, chronic daily exposure over several decades reinforces the importance of rigorous manufacturing quality control and continuous toxicological surveillance.

Endocrine-Disrupting Chemicals in Lipsticks

Growing scientific attention has focused on endocrine-disrupting chemicals (EDCs) present in cosmetic products. EDCs interfere with normal hormonal signalling by mimicking, blocking, or altering endogenous hormone activity. Certain preservatives, plasticizers, ultraviolet filters, and synthetic fragrances used in cosmetics have demonstrated endocrine-disrupting properties in experimental studies.¹⁵

Parabens, historically used as preservatives, exhibit weak estrogenic activity and have therefore been investigated for possible associations with reproductive disorders, hormone-

dependent malignancies, and altered endocrine function. Although regulatory authorities continue to regard approved concentrations as safe for consumer use, scientific debate persists regarding cumulative exposure arising from simultaneous use of multiple personal care products.

Phthalates, although increasingly restricted in cosmetic formulations, have also been implicated in endocrine disruption. Experimental and epidemiological studies suggest possible associations between phthalate exposure and altered reproductive hormone concentrations, impaired fertility, developmental abnormalities, metabolic disorders, and adverse pregnancy outcomes. Nevertheless, current evidence indicates that overall exposure from regulated lipstick products remains relatively low compared with other environmental sources.¹⁵

Healthcare professionals should therefore interpret existing evidence cautiously, balancing toxicological findings with current regulatory safety assessments. Continued biomonitoring studies are needed to better characterize cumulative exposure and long-term endocrine effects among habitual cosmetic users.

Reproductive and Developmental Toxicity

Pregnant women constitute an important population when considering cosmetic safety because several environmental contaminants are capable of crossing the placental barrier. Heavy metals such as lead and cadmium have been associated with impaired fetal growth, neurodevelopmental abnormalities, spontaneous abortion, low birth weight, and preterm birth when maternal exposure is sufficiently elevated.¹⁶

Although exposure from regulated lipstick products alone is unlikely to produce clinically significant toxicity, cumulative exposure from food, drinking water, occupational sources, air pollution, tobacco smoke, and multiple cosmetic products may contribute to the total maternal body burden. Consequently, many experts recommend minimizing unnecessary exposure to products of uncertain quality during pregnancy.

Children may also experience indirect exposure through accidental ingestion of cosmetics or transfer from caregivers. Their developing neurological and endocrine systems are particularly vulnerable to environmental toxicants, highlighting the importance of safe storage of cosmetic products and increased public awareness regarding appropriate cosmetic use within households.

NURSING PERSPECTIVE

Nurses are strategically positioned to identify cosmetic-related adverse reactions during routine clinical assessment. Comprehensive history taking should include questions regarding cosmetic use, frequency of application, recent product changes, onset of symptoms, and use of counterfeit or unregulated products. Patient education should emphasize purchasing products from reputable manufacturers, checking expiry dates, discontinuing products associated with irritation, and seeking medical evaluation for persistent dermatological or oral symptoms.

Community health nurses can further contribute through school health programmes, women's health initiatives, antenatal counselling, and public awareness campaigns addressing safe cosmetic practices. Such interventions may improve consumer knowledge while reducing preventable cosmetic-related adverse events.

CONSUMER AWARENESS, NURSING RESPONSIBILITIES, AND PUBLIC HEALTH IMPLICATIONS

Consumer Awareness Regarding Lipstick-Related Health Effects

Despite increasing public concern regarding cosmetic safety, awareness of the potential health risks associated with lipstick use remains inadequate in many countries. Most consumers select lipsticks primarily based on cosmetic appeal, brand reputation, price, shade availability, product longevity, celebrity endorsements, and social media influence rather than ingredient composition or toxicological safety. Consequently, product labels, manufacturing standards, expiry dates, and regulatory certifications are frequently overlooked during purchasing decisions.¹⁷

Recent studies indicate that although consumers are increasingly aware of the concept of "chemical-free," "organic," "natural," and "vegan" cosmetics, many individuals have limited understanding of ingredient lists or the scientific evidence supporting these marketing claims. The misconception that natural products are inherently safer than synthetic formulations may lead consumers to underestimate potential risks associated with botanical allergens, essential oils, or naturally occurring heavy metal contaminants. Similarly, promotional terms such as "herbal," "dermatologically tested," or "clean beauty" do not necessarily guarantee superior toxicological safety unless supported by rigorous regulatory evaluation.

Digital marketing has substantially influenced consumer behavior. Beauty influencers, online tutorials, and social networking platforms frequently shape purchasing decisions, particularly among adolescents and young adults. While these platforms have improved access to

cosmetic information, they have also facilitated the rapid dissemination of misinformation regarding cosmetic ingredients, unverified health claims, and counterfeit products. Healthcare professionals should therefore encourage consumers to seek information from evidence-based sources rather than relying exclusively on social media recommendations.

Awareness regarding counterfeit cosmetics remains particularly poor. Counterfeit lipsticks often mimic premium brands but may bypass quality assurance systems and contain excessive concentrations of heavy metals, microbial contaminants, prohibited dyes, or undeclared chemicals. Purchasing cosmetics from unauthorized online vendors or informal retail markets significantly increases this risk. Consumer education programmes should therefore emphasize purchasing products only from reputable manufacturers and authorized distributors.¹⁷

KNOWLEDGE GAPS AMONG HEALTHCARE PROFESSIONALS

Although nurses frequently encounter patients presenting with dermatological or allergic manifestations associated with cosmetic use, cosmetic toxicology receives relatively limited emphasis within undergraduate nursing curricula. Consequently, cosmetic-related adverse events may be under-recognized during routine clinical assessment.

Several studies suggest that healthcare professionals often obtain limited formal education regarding cosmetic ingredients, heavy metal exposure, endocrine-disrupting chemicals, or cosmetic regulations. Continuing professional development programmes addressing cosmetic safety may therefore improve early recognition of adverse reactions and strengthen evidence-based patient counselling.

Integrating cosmetic safety into nursing education aligns with the broader public health objective of promoting preventive healthcare and reducing environmentally related health risks. Educational initiatives should incorporate practical training in cosmetic ingredient interpretation, recognition of allergic reactions, reporting of adverse cosmetic events, and patient counselling regarding safe cosmetic practices.

NURSING RESPONSIBILITIES IN COSMETIC SAFETY

Nurses play a central role in health promotion, disease prevention, patient education, and community outreach. These responsibilities naturally extend to cosmetic safety because cosmetic products are used daily by a large proportion of the population throughout the lifespan.

Health Education

Nurses should educate consumers regarding:

- Appropriate selection of cosmetic products from reputable manufacturers.
- Importance of reading ingredient labels.
- Recognition of expiry dates and batch information.
- Avoidance of counterfeit cosmetics.
- Safe storage of cosmetic products.
- Proper removal of lipstick before sleeping.
- Recognition of early symptoms of allergic reactions.
- Seeking medical evaluation when persistent lip irritation occurs.

Health education may be delivered during outpatient consultations, dermatology clinics, maternal and child health programmes, school health services, occupational health assessments, and community outreach activities.

Clinical Assessment

Routine nursing assessment should include questions regarding:

- Frequency of lipstick application.
- Duration of cosmetic use.
- Recent changes in cosmetic products.
- Previous history of cosmetic allergy.
- Use of counterfeit or imported products.
- Occupational exposure to chemicals.
- Pregnancy or breastfeeding status.
- Concurrent use of other cosmetic products.

Identification of cosmetic exposure may facilitate earlier diagnosis of allergic contact cheilitis, irritant dermatitis, oral mucosal disorders, or hypersensitivity reactions.

Patient Counseling

Evidence-based counseling should emphasize:

- Selecting products compliant with national regulatory standards.
- Avoiding expired cosmetics.
- Performing patch testing when introducing new cosmetic products in individuals with sensitive skin.

- Discontinuing products associated with irritation.
- Reporting adverse cosmetic reactions to healthcare professionals or regulatory authorities.

Nurses should also advise pregnant women and adolescents to minimize unnecessary exposure to products of uncertain quality because these populations may exhibit increased susceptibility to environmental toxicants.

Pharmacovigilance and Cosmetovigilance

Cosmetovigilance refers to the systematic monitoring, reporting, evaluation, and prevention of adverse effects associated with cosmetic products. Nurses contribute significantly by documenting suspected cosmetic-related adverse reactions, educating patients regarding reporting mechanisms, and collaborating with dermatologists, pharmacists, toxicologists, and regulatory agencies.

Strengthening cosmetovigilance systems enables earlier detection of unsafe cosmetic products, improves regulatory oversight, and enhances overall consumer protection.

PUBLIC HEALTH IMPLICATIONS

Lipstick safety extends beyond individual cosmetic use and represents an important public health issue because exposure occurs across large populations over prolonged periods. Even when individual exposures remain relatively low, widespread daily use may contribute substantially to cumulative environmental chemical exposure.

Public health programmes should prioritize cosmetic safety awareness through school health education, women's health initiatives, occupational health programmes, and digital health campaigns. Educational interventions should particularly target adolescents and young adults, who frequently begin regular lipstick use during early adolescence and may continue throughout adulthood.

Collaboration between public health authorities, nursing organizations, academic institutions, consumer advocacy groups, and cosmetic manufacturers is essential for promoting safer cosmetic practices. Regulatory agencies should continue strengthening surveillance programmes, routine laboratory testing, and market monitoring to identify counterfeit or contaminated cosmetic products before widespread consumer exposure occurs.¹⁸

Future public health strategies should also address environmental sustainability. Cosmetic packaging waste, microplastics, synthetic pigments, and persistent chemical contaminants contribute to environmental pollution and require greater attention within public health policy. Promotion of environmentally responsible manufacturing, biodegradable packaging,

and sustainable cosmetic formulations may reduce ecological impact while maintaining product safety.

EVIDENCE-BASED RECOMMENDATIONS

Based on current evidence, the following recommendations are proposed:

1. Strengthen public awareness regarding cosmetic ingredient safety.
2. Promote evidence-based consumer education through nursing and public health programmes.
3. Encourage purchase of cosmetics only from licensed manufacturers and authorized retailers.
4. Expand cosmetovigilance reporting systems.
5. Increase routine laboratory surveillance for heavy metals and prohibited chemicals.
6. Integrate cosmetic toxicology into undergraduate and postgraduate nursing curricula.
7. Conduct longitudinal epidemiological studies evaluating cumulative cosmetic exposure.
8. Promote interdisciplinary collaboration among nurses, dermatologists, toxicologists, pharmacists, and regulatory authorities.

Current evidence indicates that regulated lipstick products generally demonstrate acceptable safety profiles when used appropriately. However, continued vigilance remains necessary because cumulative exposure, counterfeit cosmetics, and emerging chemical contaminants continue to present evolving public health challenges.^{19–20}

REGULATORY STANDARDS, FUTURE RESEARCH, AND CONCLUSION

Regulatory Standards Governing Lipstick Safety

The safety of lipstick and other cosmetic products is regulated through comprehensive legislative frameworks that aim to protect consumers from exposure to hazardous substances while ensuring product quality and manufacturing consistency. Regulatory agencies establish permissible limits for contaminants, evaluate the safety of cosmetic ingredients, inspect manufacturing facilities, monitor adverse events, and enforce corrective actions when products fail to meet established standards. Despite these regulatory efforts, differences in legislation, surveillance capacity, and enforcement continue to exist among countries, highlighting the need for greater international harmonization.²¹

United States Food and Drug Administration (FDA)

In the United States, cosmetic products are regulated by the **United States Food and Drug Administration (FDA)** under the **Federal Food, Drug, and Cosmetic Act** and the **Modernization of Cosmetics Regulation Act (MoCRA)**. Manufacturers are responsible for ensuring that cosmetic products marketed in the United States are safe under intended conditions of use.

The FDA monitors cosmetic safety through laboratory surveillance, inspection of manufacturing facilities, adverse event reporting, import surveillance, and enforcement actions against adulterated or misbranded products. Although the FDA does not approve most cosmetic products before marketing, color additives used in lipsticks require regulatory approval before commercial distribution. The agency also conducts periodic analytical testing of lipstick samples to evaluate lead and other contaminant levels, demonstrating that most commercially available products comply with established safety expectations. Nevertheless, continued monitoring remains essential because manufacturing practices, raw material quality, and counterfeit products may influence contaminant concentrations.²¹

European Union Cosmetic Regulation

The **European Union Cosmetic Regulation (EC) No. 1223/2009** is widely regarded as one of the most comprehensive cosmetic regulatory frameworks globally. The regulation requires manufacturers to perform rigorous safety assessments before marketing cosmetic products and mandates documentation of product safety through a Cosmetic Product Safety Report.

Within the European Union, numerous substances classified as carcinogenic, mutagenic, or toxic to reproduction are prohibited from cosmetic formulations unless specific scientific evidence demonstrates safety under defined conditions. Ingredient labeling requirements, notification procedures, post-marketing surveillance, and Good Manufacturing Practice (GMP) standards contribute to a high level of consumer protection. The **Scientific Committee on Consumer Safety (SCCS)** continuously evaluates emerging toxicological evidence and provides independent scientific opinions regarding cosmetic ingredients. These evaluations have contributed significantly to the restriction of certain preservatives, colorants, ultraviolet filters, and other chemicals that may pose health concerns.²²

World Health Organization and International Initiatives

Although the **World Health Organization (WHO)** does not regulate cosmetic products directly, it plays an important role in chemical safety, environmental health, and risk

communication. WHO publications emphasize minimizing unnecessary exposure to toxic chemicals, strengthening national regulatory capacity, improving laboratory surveillance, and promoting evidence-based public health interventions.

International collaboration among WHO, regulatory agencies, toxicologists, dermatologists, and public health organizations has improved global awareness regarding heavy metal contamination, counterfeit cosmetics, and consumer safety. These initiatives encourage countries to strengthen surveillance systems, harmonize analytical methodologies, and improve reporting of cosmetic-related adverse events.

Cosmetic Regulation in India

In India, cosmetic products are regulated by the **Central Drugs Standard Control Organization (CDSCO)** under the provisions of the **Drugs and Cosmetics Act, 1940**, and the **Cosmetic Rules, 2020**. Quality standards for cosmetic products are supported by the **Bureau of Indian Standards (BIS)**, which specifies requirements for product quality, labeling, permissible contaminants, microbiological safety, and manufacturing practices.

India has strengthened regulatory oversight in recent years through enhanced import surveillance, mandatory licensing requirements, and improved monitoring of counterfeit cosmetic products. However, increasing online marketing and informal retail distribution continue to present regulatory challenges. Strengthening laboratory infrastructure, improving public awareness, and expanding cosmetovigilance systems remain important priorities for ensuring consumer protection.

PUBLIC HEALTH POLICY CONSIDERATIONS

Effective cosmetic safety requires collaboration among policymakers, regulatory authorities, manufacturers, healthcare professionals, academic institutions, and consumers. Regulatory agencies should continue strengthening post-marketing surveillance, random laboratory testing, and adverse event reporting systems. Standardized international guidelines for permissible contaminant levels would facilitate greater consistency across global markets and improve consumer confidence.

Public health campaigns should also emphasize the importance of purchasing cosmetics from authorized retailers, verifying product authenticity, reading ingredient labels, and avoiding expired or counterfeit products. Nurses and other healthcare professionals should actively participate in these initiatives because they frequently serve as trusted sources of health information within communities.

Future Research Directions

Despite considerable advances in cosmetic toxicology, several important knowledge gaps remain.

Longitudinal Cohort Studies

Most available studies evaluate contaminant concentrations or short-term toxicological outcomes. Long-term prospective cohort studies are needed to investigate cumulative exposure associated with decades of regular lipstick use and to determine whether chronic low-dose exposure contributes to clinically significant disease.

Biomonitoring Studies

Future investigations should employ standardized biomonitoring techniques to quantify internal exposure to heavy metals and endocrine-disrupting chemicals among habitual lipstick users. Such studies would improve understanding of real-world exposure patterns and cumulative body burden.

Vulnerable Populations

Additional research should specifically evaluate pregnant women, breastfeeding mothers, adolescents, older adults, and individuals with chronic dermatological disorders because these populations may exhibit greater susceptibility to cosmetic-related adverse effects.

Counterfeit Cosmetic Products

The global expansion of online commerce has increased the availability of counterfeit cosmetics. Comprehensive surveillance studies examining contaminant profiles, microbiological safety, and toxicological risks associated with counterfeit lipstick products remain an important research priority.

Nursing and Public Health Research

There is limited published evidence evaluating the effectiveness of nursing-led cosmetic safety education programmes. Future interventional studies should assess whether educational initiatives improve consumer knowledge, purchasing behavior, early recognition of adverse reactions, and reporting of cosmetic-related health events.

CONCLUSION

Lipstick remains one of the most widely used cosmetic products worldwide and is generally considered safe when manufactured in accordance with established regulatory standards. Nevertheless, increasing scientific evidence indicates that chronic exposure to certain contaminants—including heavy metals, allergenic fragrances, preservatives, synthetic

pigments, and endocrine-active chemicals—may contribute to adverse dermatological, oral, and systemic health effects, particularly when exposure occurs repeatedly over many years.

Current evidence suggests that the overall risk associated with regulated lipstick products is low for the general population. However, cumulative exposure from multiple cosmetic and environmental sources, together with the growing availability of counterfeit products, reinforces the importance of continuous toxicological surveillance and evidence-based consumer education. Healthcare professionals should recognize cosmetic exposure as a potential contributor to unexplained allergic, dermatological, and oral conditions encountered in clinical practice.

Nurses occupy a unique position in promoting cosmetic safety through patient counselling, community education, early identification of cosmetic-related adverse reactions, and participation in cosmetovigilance programmes. Integrating cosmetic toxicology into nursing education and public health practice may strengthen preventive healthcare strategies and improve consumer awareness.

Future advances in analytical toxicology, regulatory science, biomonitoring, and interdisciplinary research will further improve understanding of long-term cosmetic exposure and support the development of safer cosmetic products. Continued collaboration among regulatory authorities, researchers, healthcare professionals, manufacturers, and consumers remains essential to ensuring that cosmetic products are both effective and safe for lifelong use.²³

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Conflict of Interest

The authors declare that there are no conflicts of interest related to this manuscript.

Author Contributions

All authors contributed substantially to the conception and design of the review, literature search, critical appraisal of the evidence, manuscript drafting, revision of intellectual content, and approval of the final version for publication.

Data Availability Statement

No new datasets were generated or analysed during this review. All information presented is derived from published scientific literature cited in the reference list.

Ethical Considerations

Ethical approval was not required because this study is a narrative review based exclusively on previously published literature and publicly available documents.

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CLINICAL IMPLICATIONS FOR NURSING PRACTICE

Based on the available evidence, nursing professionals should incorporate cosmetic safety into routine health promotion activities. Assessment of cosmetic use should form part of history taking in patients presenting with unexplained allergic reactions, lip disorders, oral mucosal lesions, or recurrent dermatitis.

Community health nurses should actively educate adolescents, women of reproductive age, pregnant women, and older adults regarding:

- Appropriate selection of quality-assured cosmetic products.
- Recognition of early adverse reactions associated with lipstick use.
- Avoidance of counterfeit and expired cosmetics.
- Importance of reading ingredient labels.
- Safe storage and disposal of cosmetic products.
- Reporting suspected cosmetic-related adverse events through appropriate regulatory mechanisms.

Integrating cosmetovigilance into nursing practice has the potential to improve patient safety, strengthen public health surveillance, and promote evidence-based consumer awareness.

KEY MESSAGES

- Lipstick is generally safe when manufactured according to internationally accepted regulatory standards.

- Counterfeit and poorly regulated products remain an important source of heavy metal contamination.
- Allergic contact cheilitis and irritant dermatitis are the most commonly reported adverse effects.
- Chronic cumulative exposure to contaminants warrants continued toxicological surveillance.
- Nurses have an important role in consumer education, early identification of cosmetic-related health problems, and cosmetovigilance.
- Public awareness programmes should emphasize safe purchasing practices, ingredient literacy, and regulatory compliance.

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