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Cosmetics and Pregnancy: A Study of Pregnant Women's Knowledge and Practices

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Dedication

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Dedication

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List of Abbreviations

Abbreviation	Full Form
ANVISA	Agência Nacional de Vigilância Sanitária (Brazilian Health Regulatory Agency)
CNPM	Centre National de Pharmacovigilance et de Matériovigilance
CPR	Cosmetics Product Regulation
CSP	Code de la Santé Publique (Public Health Code)
DF	Degrees of Freedom
EC	European Commission
EU	European Union
FDA	Food and Drug Administration (USA)
ICCR	International Cooperation on Cosmetics Regulation
ISO	International Organization for Standardization
OECD	Organisation for Economic Co-operation and Development
OMC	Office of Medical Cosmetics (or Algerian regulatory body mentioned)
RP	Responsible Person
SLB	Senior Lecturer in Biology
SPSS	Statistical Package for the Social Sciences
UKCR	United Kingdom Cosmetics Regulation
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

Introduction

Introduction

Pregnancy is an essential phenomenon for the continuation of human life. During this period, a woman's body undergoes many physiological adaptations to support both the mother and the developing fetus. These changes ensure the safety and stability of maternal health and fetal development **(Tan and Tan, 2013)**. Pregnancy is a unique physiological state characterized by complex hormonal, immunological, anatomical, and psychological changes **(Shagana *et al.,* 2018)**. Among these, skin manifestations are the most common, which more than 90% of pregnant women experiencing at least one form of skin changes **(Putra *et al.,* 2022)**. These pregnancy-related skin conditions, such as acne, hyperpigmentation, and stretch marks, can cause changes in a woman's body image, which can generate aesthetic concerns and negative feelings that impact her self-perception and self-confidence **(Bjelica *et al.,* 2018)**. Pregnancy-related skin conditions can be categorized into three groups: normal skin changes during pregnancy, pre-existing skin conditions affected by pregnancy, and pregnancy-specific skin diseases **(Snarskaya *et al.,* 2019)**. Most of these disorders are benign and resolve postpartum, however, some may pose a risk to fetal health and require close prenatal monitoring **(Ahmad *et al.,* 2018).**

Due to these changes, many pregnant women turn to beauty products and treatments to maintain and enhance their appearance **(El Shamy and Hassan, 2021; Maluf *et al.,* 2017).** These cosmetic products and treatments play a positive role in improving and supporting the psychological health of pregnant women by boosting their self-confidence during a period of significant physical changes **(Biskanaki *et al.,* 2024).** However, the safety of many cosmetic products and treatments during pregnancy remains poorly studied. The lack of clinical trials on the safety of these substances and the absence of standardized guidelines has led to cautious recommendations for less effective cosmetic treatments **(Califf *et al.,* 2017; Van der Zande *et al.,* 2017).** Nevertheless, the use of cosmetics during pregnancy remains widespread due to a lack of public awareness, the adoption of a personalized routine, and advertising, rather than evidence-based guidelines and adherence to professional recommendations **(Kroumpouzos, 2017).** This presents a critical gap in public health awareness and clinical practice.

Many pregnant women may be unaware of the potential systemic absorption of certain cosmetic ingredients and their possible effects on fetal development, especially during the early embryonic stage-an established vulnerability window in prenatal development **(Bilal and Iqbal, 2019; Davis and Narayan, 2020)**. The prenatal period is a crucial phase for fetal development, divided into the embryonic stage (first 56 days) and the fetal stage (from week 9

to birth). During the embryonic stage, organs and sexual glands rapidly form, making it a highly vulnerable period for malformations. The fetal stage involves the continued growth and maturation of these organs **(Selevan *et al.,* 2000).** There is limited documentation regarding the knowledge, attitudes, and practices of pregnant women concerning cosmetic use, especially across different sociocultural backgrounds. This lack of data underscores the need for further investigation into the safety, prevalence, and influencing factors of cosmetic use during pregnancy **(Flykt *et al.,* 2021; Biskanaki *et al.,* 2024)**.

Due to the lack of clear guidelines, the limited role of healthcare professionals in counselling, lack of clear information, and exposure to conflicting advice on products that are safe to use during pregnancy. Despite the widespread use of cosmetic products among pregnant women, who are unaware of the beast of beauty **(Khan and Alam, 2019)**. This knowledge gap may lead to the unconscious use of harmful substances, which can affect the maternal health and fetal development. Furthermore, there is insufficient data on behavioral patterns of cosmetic use among pregnant women, including product selection, use and sources of information. This lack of data presents a challenge for both clinical counselling and public health communication.

In light of these considerations, this study aims to explore how pregnant women in Algeria choose and use cosmetic products, with a specific focus on maternity center of *Belhocine Rachid* in the state of Bordj Bou Arreridj. The research investigates their consumption habits, awareness of cosmetic ingredients, perceptions of potential health risks, and the influence of medical advice on their choices. Furthermore, it examines the relationship between sociodemographic factors and both the level of knowledge and actual cosmetic use during pregnancy. Ultimately, the study seeks to contribute to the development of public health education strategies and clinical guidelines aimed at raising awareness about cosmetic safety among pregnant women, thereby helping to safeguard the health of both mother and fetus. This work is structured into five chapters:

The first chapter presents a literature review on the risks associated with cosmetic use during pregnancy. It covers:

- Physiological changes during pregnancy, cosmetic product regulations.

✓ Chapter two outlines the study's methodology and sampling. a structured questionnaire was developed comprising three main sections: sociodemographic characteristics, knowledge, and practices. The survey was administered to pregnant women attending maternity center Belhocine Rachid in Bordj Bou Arreridj.

- ✓ Chapter three presents, analyzes, and describes the study's results based on the collected data.
- ✓ Chapter four discusses the results, comparing them with findings of similar studies conducted globally.
- ✓ Finally, chapter five concludes the research, summarizing key insights and offering targeted recommendations for improving awareness and promoting safer cosmetic practices during pregnancy.

Part 1

Bibliographic Summary

1 Literature review

1.1 Physiological Changes during Pregnancy

1.1.1 Understanding Pregnancy

❖ **Pregnancy**

Pregnancy is a vital stage of human reproduction. It is the unique period in which the fetus is formed and lasts about 40 weeks, from fertilisation to birth. It involves significant physiological and psychological changes. These physiological adaptations lead to increased nutritional needs and increased sensitivity to harmful substances. Consequently, pregnancy is a critical period of heightened vulnerability and complex physiological adaptations **(Coutinho *et al.*, 2014).**

❖ **Stages of Pregnancy & Fetal Development**

Pregnancy is divided into three trimesters, each lasting about 12–14 weeks in duration, with a full-term pregnancy lasting approximately 40 weeks from the first day of the last menstrual period. Each trimester of the pregnancy has significant fetal developmental events, and significant physiological and emotional changes for the mother. The Table I in the (Annex I) shows the changes that occur in both the fetus and the mother during each trimester of pregnancy. **(Cleveland Clinic, 2024; Đurđević *et al.*, 2019).**

❖ **The Mother-Fetus Connection**

The placenta is the first and largest fetal organ and is essential in supporting pregnancy and impacting the health of both the mother and child. The placenta develops early with the functions of major organ systems, such as respiratory, renal, gastrointestinal, and endocrine, until the fetal organ systems can begin to operate independently. The placenta is considered a barrier between mother and fetus, or the bio-interface, that facilitates the exchange of nutrients and gases, waste, hormone production, and fetal protection from maternal immune responses and pathogens. It adapts along the pregnancy to fulfil the needs of the fetus. Poor placental function can cause serious complications such as pre-eclampsia, fetal growth restriction, miscarriage, stillbirth, and long-term health risks for the child. **(Turco and Moffett, 2019; Burton and Jauniaux, 2015).**

1.1.2 The Window of Vulnerability in Pregnancy

The prenatal period is a phase of significant development and growth for the unborn baby. Embryonic and fetal life, therefore, represent periods of high vulnerability. These critical periods are known as "windows of vulnerability," as shown in the Figure 1 in (Annex I)

(UNICEF, 2025). The prenatal phase is divided into two stages: the embryonic period and the fetal period **(Flykt *et al.*, 2021).**

The embryonic period lasts 56 days from fertilization, during which most organ systems develop rapidly, and the sex glands differentiate into testes or ovaries. This is when the baby is most vulnerable to malformations. Active movements begin at the end of this phase. The fetal period follows, from the 9th week until birth, during which the organs grow and mature **(Triquet, 2011).** Exposure to harmful substances during these stages can lead to different health outcomes:

- Early exposure (1st trimester): Risk of major malformations in organs or during sexual differentiation.
- Later exposure (2nd & 3rd trimesters): May cause minor malformations, growth restrictions, or neurobehavioral effects **(Brygger Venø *et al.*, 2022).**

During pregnancy, there are five key windows of vulnerability to harmful exposures:

- Pre-embryonic period (Day 0–15): A "all-or-nothing" phase, as harmful exposures during this time typically result in either no effect or pregnancy loss.
- Organogenesis (Day 15 to the end of the 3rd month): During this period, the major organs begin to form, and exposure to harmful substances can lead to major malformations.
- Sexual differentiation (Weeks 6–12): During this period, endocrine disruptors-substances that interfere with hormonal systems-can cause genital or reproductive abnormalities.
- Fetal growth (4th month–birth): Organs grow and mature; exposure can cause growth delays.
- Perinatal period (WHO) (Day 154–7 days after birth): A critical phase for neurological development; harmful exposures may result in behavioral or neurodevelopmental disorders later in life **(Triquet, 2011).**

Some of these windows of vulnerability overlap during pregnancy, as shown in the Figures 2 & 3 in (Annex I) **(Villa *et al.*, 2024; UNICEF, 2025).**

1.1.3 Pregnancy and Maternal Age

Fertility declines naturally with age, particularly after 30 and more significantly after 35, due to reduced oocyte quantity and quality, as well as hormonal and uterine changes that affect conception and pregnancy maintenance. Advanced maternal age is also associated with hormonal imbalances, including altered estrogen and progesterone levels, and a higher risk of endocrine disorders like thyroid dysfunction and gestational diabetes. Additionally, older pregnant women face increased risks of allergic conditions such as eczema, asthma, and allergic

rhinitis, which can be exacerbated by hormonal shifts. Aging also diminishes the body's ability to detoxify harmful substances, increasing susceptibility to environmental toxins and potentially heightening fetal exposure. These age-related changes underscore the need for enhanced monitoring and care during pregnancy in older mothers **(Correa-de-Araujo and Yoon, 2021; Janeczko *et al.,* 2020).**

1.1.4 Physiological Changes

The process of pregnancy stimulates a complicated series of anatomical, physiological, biochemical, and psychological changes that benefit the growing needs of both mother and fetus **(Shagana *et al.,* 2018).** These adaptations, mainly due to increases in progesterone and estrogen, first from the ovaries and later the placenta, can create physiological changes early in the first trimester. The physiological changes serve to provide adequate uteroplacental circulation and to stimulate fetal development. But many physiological changes can appear pathological; for example, normal cardiac adaptations, including sinus tachycardia or systolic murmurs, can be misconstrued for heart disease. Understanding the difference between normal physiological changes and pathological changes, particularly for correctly interpreting lab results, identifying abnormalities, and applying appropriate clinical care **(Gangakhedkar and Kulkarni, 2021).**

1.1.5 Pregnancy and Skin Health

Pregnancy leads to significant skin changes in most women, driven by complex hormonal, immune, metabolic, and vascular alterations. These changes can be physiological or affect the course of pre-existing skin conditions, which may either improve or worsen. Additionally, there exists a group of pregnancy-specific dermatoses that occur only during pregnancy or the postpartum period. Most of the dermatoses of pregnancy can be treated conservatively but a few require intervention in the form of termination of pregnancy. While most physicians recognize common physiological changes, awareness of these rarer, pregnancy-specific skin conditions is often limited **(Vora *et al.,* 2014)**. The various cutaneous conditions can be further classified into Physiological and Pathological or Specific changes as illustrated in the Figure 4 in (Annex I) **(Gupta *et al.,* 2024).**

Table I: Skin Changes During Pregnancy **(Vora *et al.,* 2014 ; Biskanaki *et al.,* 2024)**

Skin Conditions	Skin Changes
Pigmentation, Increased melanin production	***Linea Nigra*** (Hyperpigmentation of the midline of the abdomen)
	Melasma (mask of pregnancy)
	Melanocytic Naevi (Darkening of nipples, scars, and moles)
Hair	***Hirsutism*** (Increased hair growth)

	Telogen Effluvium (Shedding of hair)
	Hypertrichosis (increased hair growth in a non-hormonal pattern)
Nails	***Leukonychia***
	Increased Brittleness
	Onychoschizia
Vascular System	***Spider Angiomas***
	Palmar Erythema
	Varicose Veins
	Telangiectasia
Connective Tissue	***Striae Gravidarum*** (Appearance of stretch marks)
	Soft Fibromas (skin tags)
Glandular Function	***Hyperhidrosis*** (Increased sweating)
	Decreased apocrine activity (improves some conditions)
	Increased sebaceous activity
	Acne (Its progression is unpredictable worsen, improve, or unchange)
Immune System	***Psoriasis*** (Eczema commonly occurs in primigravida in 1st & 2nd trimester)
Cellulite	Often exacerbated by elevated estrogen and progesterone levels
Pregnancy-Specific Dermatoses	***Pemphigoid Gestationis***
	Polymorphic eruption of pregnancy
	Prurigo of pregnancy

1.2 Cosmetic Products Regulation

1.2.1 Cosmetic Products

Cosmetics have been used for centuries, not always with safe ingredients. Even in ancient times, when all ingredients were natural, the toxicity of cosmetics was often high, especially when ingredients such as mercury and lead were used. In addition, there was ignorance about their effects. Today, **Regulation (EC) No 1223/2009**, of the European Parliament and of the Council on cosmetic products, for Cosmetics defines a "cosmetic product" as "any substance or mixture intended to come into contact with various external parts of the human body (skin, hair, scalp, nails, lips, and external genital organs) or with the teeth and the mucous membranes of the oral cavity, with the exclusive or main purpose of cleaning them, perfuming them, changing their appearance, and/or correcting body odors and/or protecting them or keeping them in good condition". Cosmetic products contain active substances, preservatives, and also so-called "fragrances" **(Kalofiri *et al.*, 2023).**

- **Cosmetic Product Categories**

There are seven categories of cosmetics and personal care products according to the Figure 5 in (Annex I) **(Dreyfuss, 2018; Cosmetics Europe, 2025).**

- **Types of ingredients in cosmetics**

Cosmetic formulations typically include four main types of ingredients: functional, performance, natural, and synthetic as the Table II in (Annex I) explains **(Sharma *et al.*, 2023).**

- **Composition of Cosmetic Products**

Countless cosmetic products are available, each with a unique combination of components the Table III in (Annex I) contains the most common ingredients used in cosmetics **(Sharma *et al.*, 2023).**

1.2.2 Cosmetics and Pregnancy

Cosmetic products do not require prior marketing authorization, as they are not intended to possess therapeutic or preventive properties against human diseases, nor are they designed to be ingested, inhaled, or implanted into the body-factors that clearly differentiate them from medicinal drugs.

Most importantly, after the *Mohrange* talc scandal of 1972 when 36 infants died from talc products contaminated with high levels of hexachlorophene, cosmetic products became regulated products under the Public Health Code (CSP). One of the regulatory foundations is the requirement that "cosmetic products must not harm human health under normal or reasonably foreseeable conditions of use."

Despite existing regulations, many cosmetic products still contain ingredients that may pose health risks, particularly for vulnerable populations such as pregnant women. The use of cosmetic products during pregnancy warrants thoughtfulness and professional guidance, as several toxic substances can pose risks to the fetus. Intrauterine exposure to certain chemicals can result irreversible effects, especially if exposure occurs during the first eight weeks of gestation.

One has confirmed, through mostly observational studies, that changes through pregnancy make individuals susceptible to increased cosmetic use, such as stretch marks. This concern raised by aestheticians and dermatologists has triggered legislative discussions regarding the real or potential hazards associated with cosmetology. The perception of risk associated with maternal and fetal health regarding cosmetic use during pregnancy has changed due to the critical role that cosmetovigilance plays **(Biskanaki et *al.*, 2024).**

1.2.3 Cosmetovigilance System

Cosmetovigilance is "a system for monitoring and recording adverse reactions associated with the use of cosmetics in humans". It applies to cosmetic products once they are available on the market through its assessments, expertise, and surveillance policies, that those health products available are safe, effective, accessible, and used correctly. Under Article 23 of the European Union (EU) Cosmetics Product Regulation (CPR) and the United Kingdom (UK) Cosmetics Regulation (UKCR), the Responsible Person (RP) and distributors have obligations to review reports and act on undesirable effects and serious undesirable effects. The cosmetovigilance system is very similar between both legislations.

Cosmetovigilance is based on the following principles:

- Reporting adverse effects and collecting all relevant information concerning them.
- Recording, evaluating, and using information related to these effects for prevention purposes.
- Conducting studies and research concerning the safety of cosmetic use.
- Implementing and monitoring corrective actions if necessary.

Cosmetovigilance monitors all adverse reactions to cosmetics, whether from normal use or misuse **(Biskanaki et *al.*, 2024).**

1.2.4 Regulation

❖ **Reviews Safety Guidelines from Global Health Organizations**

The global cosmetic industry is growing rapidly, and is highly innovative, and therefore needs well-thought-out regulation to protect product safety and consumer health and safety. Organizations, such as The International Cooperation on Cosmetics Regulation (ICCR), the Organization for Economic Co-operation and Development (OECD), and the International Organization for Standardization (ISO) are key players in bringing consensus to international standards and establishing safe practices. Regulatory approaches are different across the globe: for example, The European Union (EU) occupies a leading position in terms of having a sophisticated and recently reformed regulatory framework (Regulation EC No. 1223/2009). In contrast, both the U.S. and Canada have not updated their regulations since the mid-20th century. And while Japan and China exposed a lot of recent laws in their systems, Brazil is making regulatory changes through regulatory agencies like, ANVISA. However, there is an international commitment to improve alignment of cosmetic safety with changing products and increasing body of scientific data **(Pandey, 2025; Ferreira *et al.*, 2022).** (Annex I) presents the Table IV of global cosmetic regulatory frameworks **(Ferreira *et al.*, 2022).**

1.2.5 Legislation

❖ **EU legislation**

Main legislations and guidelines references that set the production, transport, and marketing of cosmetic products in the EU in the Table V in the (Annex I) **(Lionetti and Rigano, 2018).**

❖ **Algerian legislation**

🕮 Cosmetic Product Registration

Before marketing any cosmetic or personal hygiene product in Algeria, producers and importers must obtain prior authorization from the Ministry of Commerce. This requirement is established under **Executive Decree No. 10-114 of 18 April 2010**, which amends and supplements **Executive Decree No. 97-37 (République Algérienne Démocratique et Populaire, 2010).** The application process involves submitting a comprehensive dossier that includes:

- Product name and designation
- Usage instructions and precautions
- Qualitative composition and analytical quality of raw materials
- Results of analyses and tests on raw materials and finished products
- Skin and mucosal toxicity test results
- Batch identification methods and labeling drafts
- Details of responsible individuals for manufacturing, packaging, importation, and compliance checks, including their qualifications

The Ministry of Commerce has a 45-day period to grant or deny marketing authorization upon receiving the complete application **(OMC Medical, 2025).**

In Algeria, a prior authorization from the Ministry of Commerce is required for any operator wishing to manufacture, package, or import cosmetic and personal hygiene products. This authorization must be obtained before any such activities begin.

The regulatory framework is defined by:

Executive Decree No. 97-37 (1997) and its amendment, **Decree No. 10-114 (2010)**, which outline the conditions for manufacturing, importing, and marketing these products in the national market **(Ministère du Commerce et de la Promotion des Exportations, 2025).**

☠ Cosmetovigilance

Regarding safety and toxicology, Algerian law mandates:

- A compulsory declaration of product ingredients.
- Submission of the product formula for toxicological analysis.

For imported products, companies must provide proof of testing by a recognized toxicology lab to the relevant Algerian authorities **(ITA, 2023; CNPM, 2025).**

1.2.6 Labelling

❖ **Labelling and Packaging**

Cosmetic product packaging is a versatile medium designed not only to attract the consumer and provide information about the product's content, but also to protect, carry and store the product. Therefore, to prevent misleading and misbranded labels and to ensure the safety of the packaging, each country has implemented a set of regulations **(Ferreira *et al.*, 2022; Lionetti and Rigano, 2018).**

❖ **Information that must be reported on the label**

Cosmetic products must include information that explains what they are for, how to use them safely, and how to obtain the best result. Based on the EU Regulation (EC) No 1223/2009 and similar global standards: Table VI in (Annex I) **(Cosmetics Europe, 2025; Lionetti and Rigano, 2018).**

❖ **Most important symbols in cosmetic labels**

Symbols used on labels and packaging: **(Cosmetics Europe, 2025; Irene Beauty and More, 2020).**

Figure 1 : The most used symbols on labels **(Cosmetics Europe, 2025; Irene Beauty and More, 2020).**

1.2.7 Exposure to Cosmetics

The continuing exposure to environmental pollutants, including those from cosmetics, can be a risk factor for chronic inflammation, potentially impacting the immune system and leading to conditions like allergies or even neoplasms. Fetal development is particularly sensitive to such exposures, yet research on the prenatal effects of cosmetics remains limited. Due to concerns about cosmetic ingredients and procedures during pregnancy, safety guidelines emphasize protecting both the mother and the unborn child. However, the safety of cosmetic use and aesthetic treatments during pregnancy and breastfeeding remains a clinically complex and uncertain issue **(Biskanaki *et al.*, 2024).**

1.3 Impact of Cosmetic Products on Maternal & Fetal Health

Certain substances in cosmetics can pose risks to both pregnant mothers and the developing fetus during pregnancy. The table below summarizes key substances of concern,

including their roles in cosmetics, common sources, mechanisms of action, and potential health effects during pregnancy.

Table II: Potentially Harmful Cosmetic Substances During Pregnancy.

Substance	Role in Cosmetics	Common Products	Mechanism of Action	Health Effects (During Pregnancy)
Parabens	Preservatives (antibacterial, antifungal) **(FDA)**	Moisturizers, face creams, makeup (foundation, powder), Shampoos, conditioners, hair gels, hair masks, Deodorants, shaving gels, toothpaste, (**Darbre and Harvey, 2008)**	mimic estrogen bind to estrogen receptors in cells cause hormonal imbalance, especially in estrogen, Long exposure affects reproductive health or increases cancer risk (**Liang *et al.*, 2023).**	endocrine disruption, neurological developmental disorders, carcinogenicity (breast cancer), reproductive disorders and increased oxidative stress. (**Alok, 2024)**
Phthalates	Fragrance fixatives, plasticizers **(Wang and Qian, 2021)**	Perfumes, nail polish, hair sprays, lotions **(Wang and Qian, 2021)**	Endocrine disruptors (alter steroid hormone production) **(Wang and Qian, 2021)**	Male fetal genital malformations, reduced fertility, reproductive system toxicity **(Wang and Qian, 2021)**

Salicylic Acid	Exfoliant, anti-inflammatory fragrance preservative anti-acne agent anti-dandruff agent hair and skin conditioning agent **(Drug Bank, 2023)**	sunscreens acne creams oral antacids after-shave creams topical pain relief creams eye makeup moisturizers bath products hair styling products antiperspirants and deodorants hair shampoos and conditioners **(Drug Bank, 2023)**	Keratolytic and anti-inflammatory; systemic absorption possible at high doses **(Drug Bank, 2023)**	Teratogenic risk with excessive use, potential fetal toxicity **(Drug Bank, 2023)**
Retinoid	Anti-aging, anti-acne, promotes cell turnover stimulate collagen production **(Zasada and Budzisz, 2019)**	Anti-wrinkle creams, serums, dermatological treatments **(Zasada and Budzisz, 2019)**	Regulate cell differentiation, highly absorbable anti-inflammatory collagen synthesis **(Zasada and Budzisz, 2019)**	Strongly teratogenic, risk of fetal malformations skin irritation photosensitivity **(Zasada and Budzisz, 2019)**
Essential Oils	Fragrance, antiseptic, soothing or stimulating (plant-based) antimicrobial anti-inflammatory antioxidant **(Rakesh, 2024)**	Natural products, massage oils, shampoos, creams, serums for acne treatments, moisturizing, conditioners **(Sousa *et al.*, 2023)**	Skin penetration, act on the nervous or hormonal systems antioxidant activity anti-inflammatory activity **(Sousa *et al.*,2023)**	Risk of uterine contractions, neurotoxicity, allergic reactions, potential fetal toxicity depending on the oil **(Sousa *et al.*,2023)**

Part 2

Practical Study

2 Methodology

2.1 Objectives

The core objective of this study is to evaluate pregnant women's understanding and awareness regarding the safety of cosmetic products during pregnancy, as well as how this knowledge influences their cosmetic practices.

2.2 Study Design and Target Population

An analytical cross-sectional study aiming to assess the practices and knowledge of pregnant women regarding the use of cosmetic products during pregnancy. was conducted in April 2025 among a sample of 201 pregnant women, who were calculated using the Slovin formula. Participants were selected from the Obstetrics and Childhood Department of ***Belhocine Rachid*** Maternity and Childhood Hospital in Bordj Bou Arreridj province over a defined period. The inclusion criteria were being currently pregnant, and providing informed consent to participate.

2.3 Data Collection

Data was performed through face-to-face questionnaires administered to pregnant women attending prenatal consultations. The questionnaire included both closed and open - ended questions and was pretested to ensure clarity, relevance and reliability.

2.4 Variables Studied

The questionnaire was adapted from previous studies conducted by **(Sabrina, 2021)** and **(Udayanga *et al,* 2024)** The research questions were organized into three sections labeled from '1' to '3'.

- **Section 1:** focused on socio demographic information, including age, education level, occupation, marital status, and residence.
- **Section 2:** assessed knowledge about cosmetics during pregnancy, covering awareness of potential risks, sources of information, and understanding of ingredient safety. Respondents answered "yes," "no," or "not sure" to a total of eleven questions, with one point awarded for "yes" and zero points for "no" and "not sure." Scores between 8 and 11 indicated a high level of knowledge, scores from 5 to 7 indicated a moderate level, and scores from 0 to 4 indicated a poor level of knowledge.
- **Section 3:** examined practices concerning cosmetic use, including types and frequency of products used, changes in habits during pregnancy, and reasons for continuing or discontinuing use. This section contained ten questions rated on a scale of "always," "sometimes," and "never," with two points for "always," one point for "sometimes," and

zero points for "never." Scores between 14 and 20 indicated high practice, scores from 7 to 13 indicated moderate practice, and scores from 0 to 6 indicated poor practice. Additionally, perceptions and attitudes were evaluated, focusing on trust in product labeling, beliefs about natural versus synthetic ingredients, and perceived risks of using cosmetics during pregnancy.

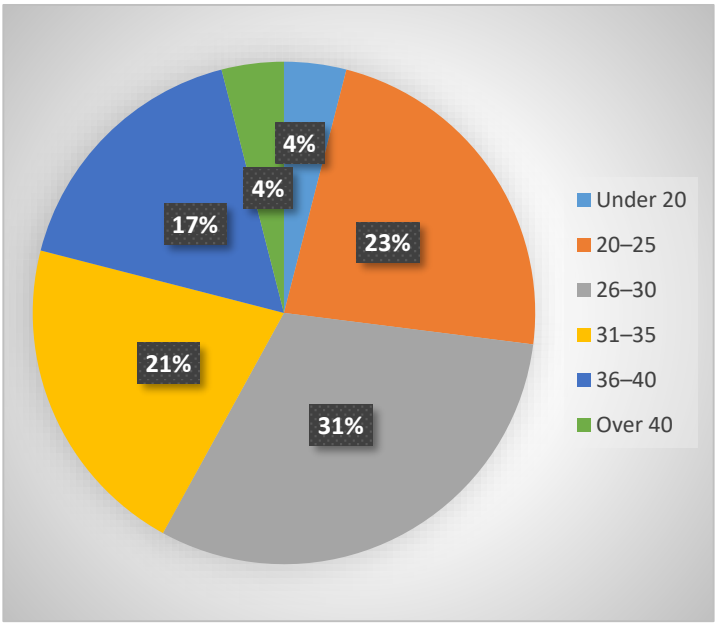
2.5 Data Analysis

Collected data were entered and analyzed using statistical software (SPSS,16). Associations between knowledge/practices and sociodemographic or obstetric variables were examined using appropriate statistical tests (Chi-square test, Pearson's correlation coefficient), A p-value of less than 0.05 was considered statistically significant.

3 Results Analysis

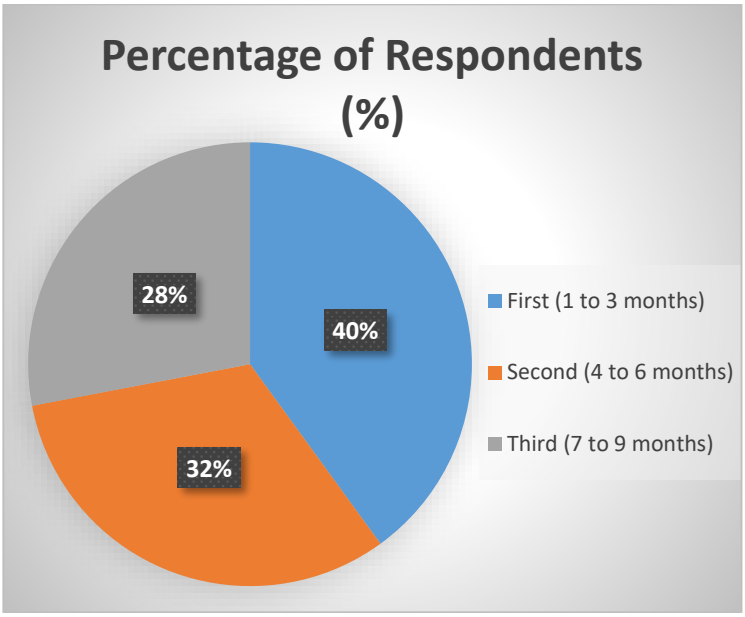
3.1 Section 1: Demographic Information

Table VII: Demographic and Cosmetic Usage Profile of Respondents in (Annex I).



The majority of respondents are between 20 and 30 years of age, with the largest proportion in the 26–30 range (31%), followed by the 20–25 (23%) and 31–35 (21%) groups. Only a small fraction (4%) are under 20 or over 40. This age distribution supports the representativeness of the sample and highlights the interest of young women of reproductive and working age in the subject studied.

Figure 2 : Demographic age distribution among pregnant respondents (%).



Most respondents are in their first trimester of pregnancy (40%), with the second trimester accounting for (32%) and the third trimester for (28%). High participation in the first trimester (a critical period of fetal development) may be significant from a prevention and awareness perspective.

Figure 3 : Distribution of Respondents by Pregnancy Trimester (%).

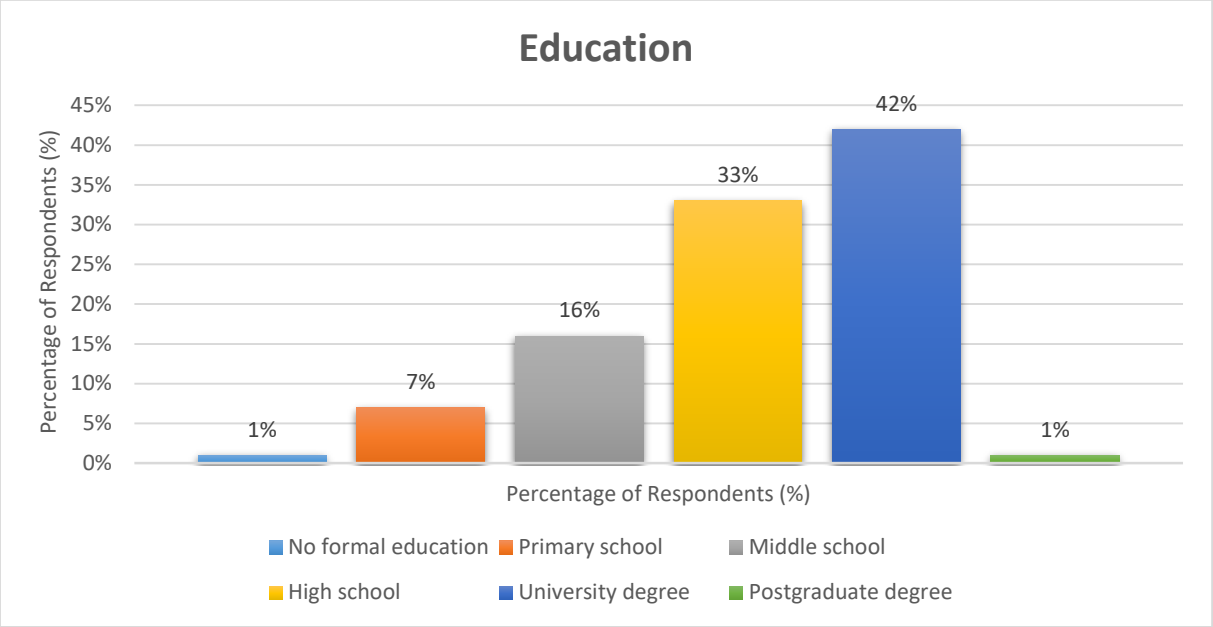
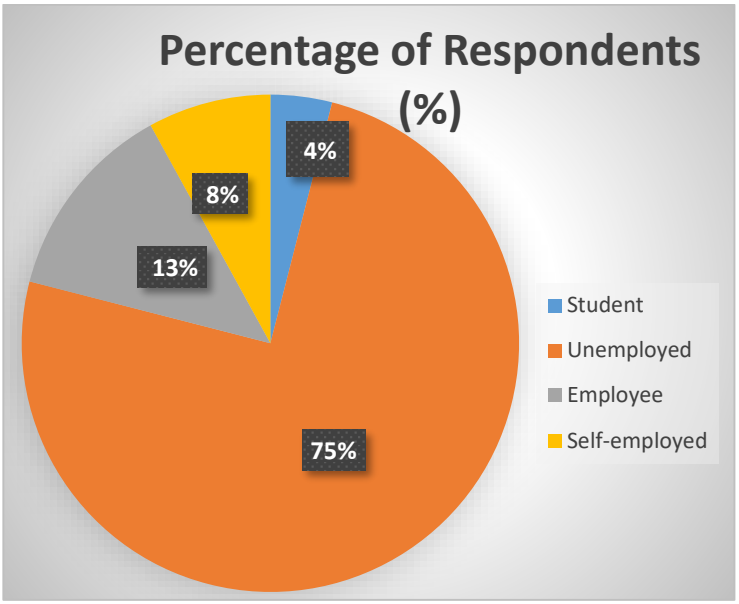


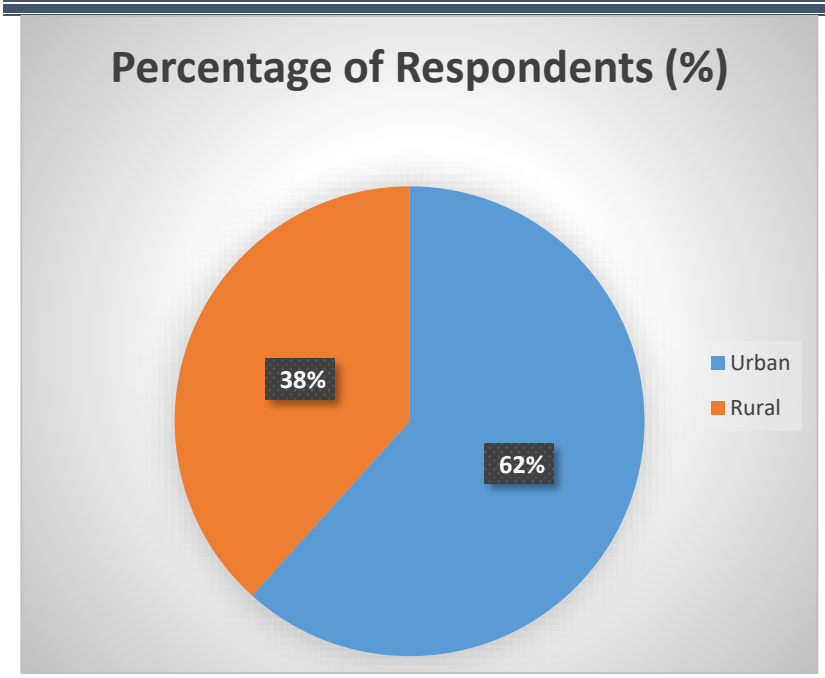
Figure 4 : Distribution of Educational Levels Among Participants (%).

The predominant proportion of respondents possessed a university degree (42%) or had completed high school (33%). It enhances comprehension of the questionnaire and augments the reliability and pertinence of the data gathered. On the other hand, a little fraction had completed middle school (16%), primary school (7%), or had no formal education (1%). Surprisingly, only (1%) of respondents held a higher education degree.



A significant percentage of respondents are unemployed (75%), with (13%) employed and (8%) self-employed; students represent (4 %). This high unemployment rate may influence their buying choices and decisions, especially when it comes to expensive or health-related items during pregnancy.

Figure 5 : Employment Status of Respondents (%).



The majority of participants live in urban regions (62%). while (38%) reside in rural areas. This urban predominance may reflect better access to health services and information.

Figure 6 : Residence Area of Respondents (%).

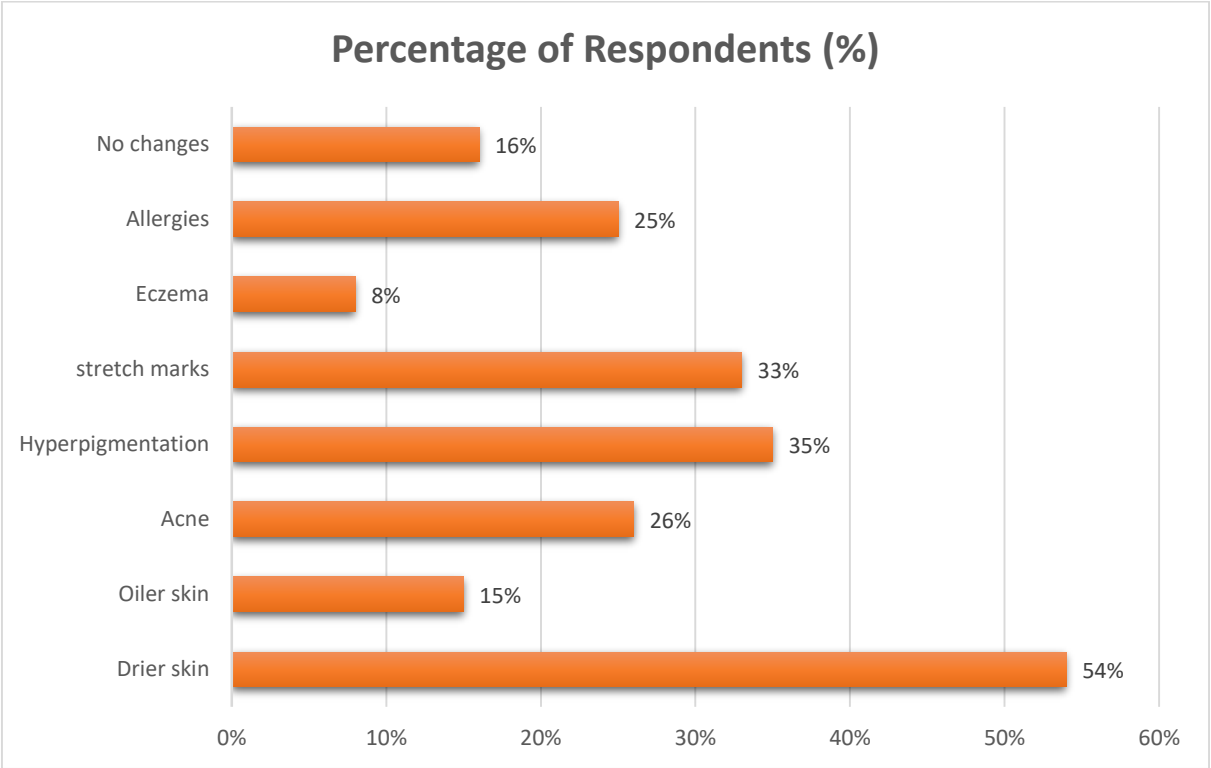


Figure 7 : Reported Skin Changes During Pregnancy (%).

Common skin changes reported include stretch marks (33%), hyperpigmentation (35%), and dryness (54%). Allergies (25%) and acne (26%) were frequent issues as well, while only (16%) experienced no changes. Skin changes trigger concern among pregnant women, and they increase the accuracy of their answers, especially when it comes to skin care.

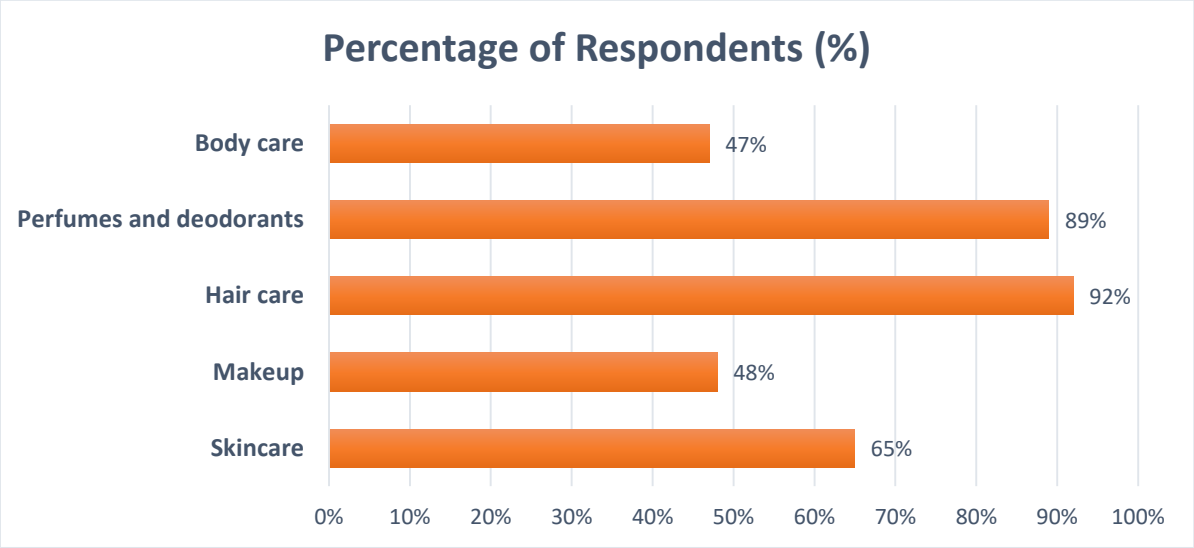


Figure 8 : Types of Cosmetic Products Used (%).

The top categories of cosmetic products purchased are hair care (92%) and perfumes/deodorants (89%), followed by skincare (65%), makeup (48%), and body care (47%). Hair care and perfumes/deodorants are the most purchased cosmetic categories, indicating their high relevance in daily routines during pregnancy.

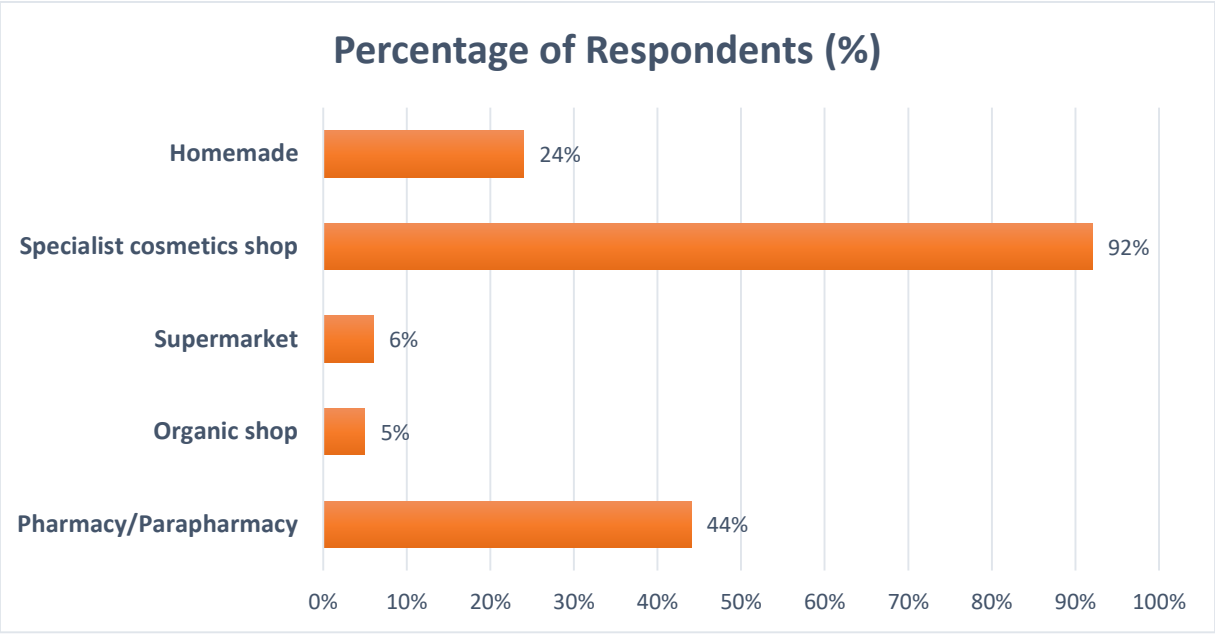


Figure 9 : Cosmetic Product Purchase Locations (%).

The most popular places to buy cosmetics are specialty stores (92%), pharmacies (44%), and homemade sources (23,88%). Organic shops (5%) and supermarkets (6%) are less commonly used. Preference for trusted sources reflects concern for product safety during pregnancy.

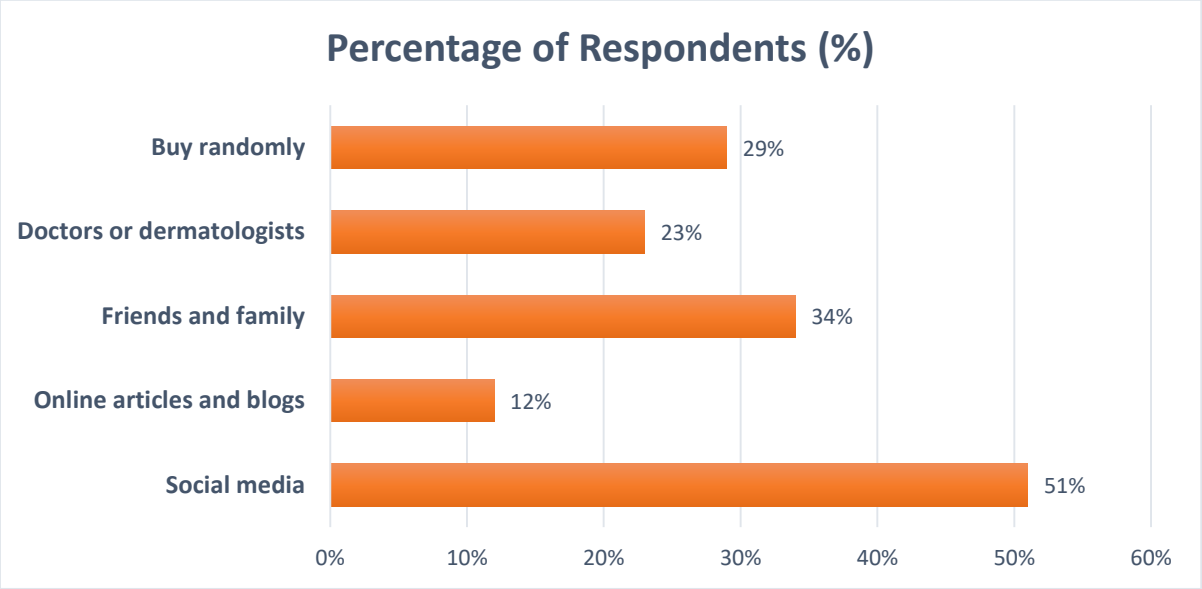


Figure 10 : Sources of Cosmetic Safety Information (%).

Social media is the leading source of information on cosmetics (51%), followed by friends and family (34%) and medical professionals (23%). It is noteworthy that (29%) of buyers make impulse purchases.

3.2 Section 2: Knowledge (Knowledge and Awareness of Cosmetics Use)

Table III: Pregnant Women's Knowledge of Cosmetic Risks (%).

Parameter			Respondents	
			n	%
Reading cosmetic ingredients or pregnancy-related warnings before buying them is important.		Yes	135	**67**
		No	56	**28**
		Not sure	10	**5**
Some cosmetic ingredients may be toxic and unsafe during pregnancy.		Yes	164	**82**
		No	29	**14**
		Not sure	8	**4**
Some cosmetic ingredients can reach the fetus and affect its development.		Yes	140	**70**
		No	40	**20**
		Not sure	21	**10**
Are you familiar with these 'organic' or 'natural' labels on cosmetic products?		Yes	66	**33**
		No	90	**45**
		Not sure	45	**22**
The following cosmetic ingredients are harmful during pregnancy.	Parabens (found in cosmetics like moisturizers, deodorants, shampoos, and makeup)	Yes	51	**25**
		No	132	**66**
		Not sure	18	**9**
	Phthalates (found in perfumes and can be harmful during pregnancy)	Yes	21	**10**
		No	170	**85**
		Not sure	10	**5**
	Retinol/Retinoids (found in anti-aging products, acne treatments, and night creams)	Yes	53	**26**
		No	139	**69**
		Not sure	9	**5**
	Salicylic Acid (found in cosmetic products designed to treat acne and exfoliate the skin)	Yes	88	**44**
		No	103	**51**
		Not sure	10	**5**
	Essential oils	Yes	112	**56**
		No	69	**34**
		Not sure	20	**10**
	Micro- and nano-plastics (Common in cosmetics with exfoliating, film-forming, or	Yes	51	**25**
		No	137	**68**
		Not sure	13	**7**
Some cosmetic ingredients are harmful to your baby's long-term health.		Yes	118	**59**
		No	60	**30**
		Not sure	23	**11**

According to the data presented in the table, we observed that most pregnant women were aware of general cosmetic risks, (67%) of participants agreed that it is essential to review pregnancy warnings and ingredient labels on cosmetics before purchasing. With (70%) are aware that certain ingredients may have an impact on fetal development, and (82 %) are aware that some ingredients can be toxic during pregnancy, However, specific knowledge about harmful substances like phthalates, parabens, or retinoid remains limited just (25%) of pregnant

women surveyed recognized parabens as harmful, while (10%) recognized phthalates, (26%) as retinoid, (44%) as salicylic acid, (56%) essential oils and (25%) micro- and nanoplastics. Only a minority understand the importance of "organic" or "natural" labels, which can mislead their choices.

Also, less than (60%) recognize the long-term health risks for the baby. These findings highlight significant knowledge gaps that may influence safe cosmetic choices during pregnancy.

3.3 Section 3: Practice (Practices During Pregnancy)

Table IV: Practices of Cosmetic Use Among Pregnant Women (%).

Parameter		Respondents	
		N	%
Do you read cosmetic product ingredients before using them during pregnancy?	Always	12	**60**
	Sometimes	35	**17**
	Never	46	**23**
Has your use of cosmetics increased during pregnancy compared to before?	Always	5	**2**
	Sometimes	21	**10**
	Never	17	**88**
Do you avoid some cosmetic products during pregnancy due to risky ingredients?	Always	14	**70**
	Sometimes	35	**17**
	Never	26	**13**
Have you changed your skincare routine during pregnancy using pregnancy-safe products to protect your baby?	Always	81	**40**
	Sometimes	30	**15**
	Never	90	**45**
Do you prefer using organic & natural cosmetics during pregnancy?	Always	13	**65**
	Sometimes	40	**20**
	Never	30	**15**
Do you avoid certain ingredients like parabens, phthalates or retinoids?	Always	96	**48**
	Sometimes	23	**11**
	Never	82	**45**
Have you discussed cosmetic safety with a doctor, dermatologist, or pharmacist?	Always	56	**28**
	Sometimes	31	**15**
	Never	11	**57**
Have you stopped or reduced the use of nail varnish, hair dye, perfume or products containing alcohol during your pregnancy?	Always	14	**71**
	Sometimes	36	**18**
	Never	23	**11**
Do brand recommendations influence your cosmetic choices?	Always	45	**22**
	Sometimes	44	**22**
	Never	11	**56**
Would you pay more for certified organic, pregnancy-safe cosmetics?	Always	99	**49**
	Sometimes	58	**29**
	Never	44	**22**

The data shows that while many pregnant women adopt prudent behaviors, certain high-risk practices remain widespread. It is worth noting that (23%) never read cosmetic ingredient labels, only (48%) still avoid ingredients known to be potentially dangerous (parabens, phthalates, retinoids), and (57%) have never discussed the safety of cosmetics with a healthcare professional, However, certain precautionary practices deserve to be mentioned. The vast majority (88%) did not increase their consumption of cosmetics during pregnancy and (71%) have reduced or stopped using varnishes, hair dyes, perfumes or alcoholic products, and a strong preference for organic and natural products (65%).Although brand recommendations had little influence (22%), (49%) of participants would be willing to pay more for certified organic and pregnancy-safe cosmetics.

3.4 Score System

❖ **Knowledge and Practices Related to Cosmetic Use During Pregnancy**

Table V: Knowledge and Practice Score Distribution.

	Knowledge			Practice		
Score	High	Moderate	Poor	High	Moderate	Poor
%	22	50	28	43	51	6

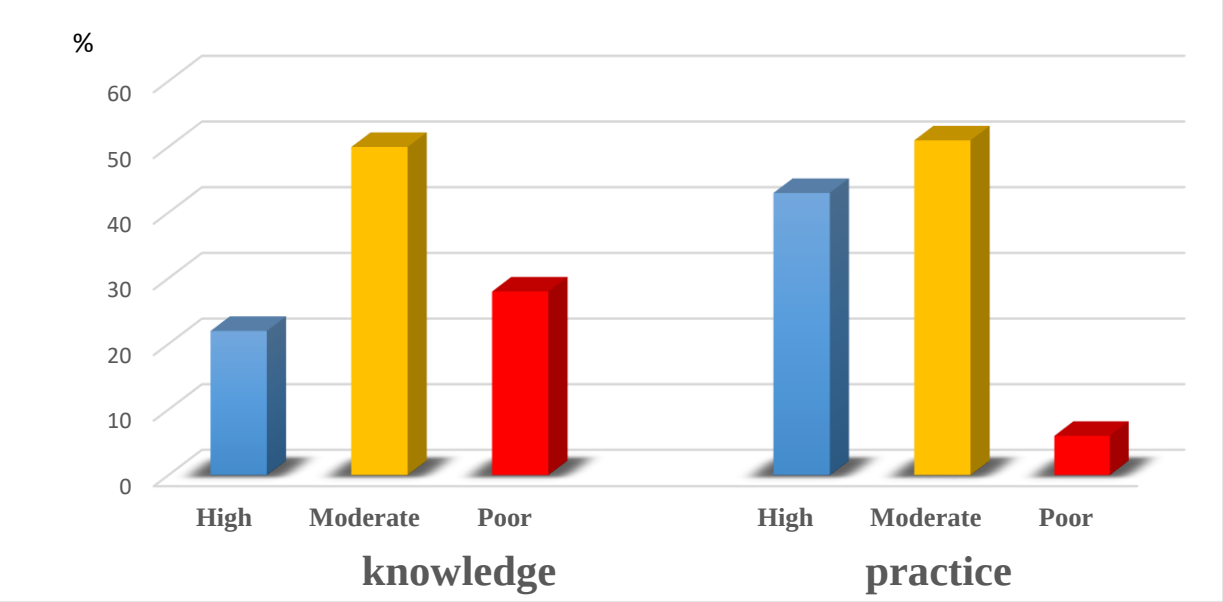


Figure 11 : Knowledge and Practice Score Levels.

The results reveal a discrepancy between knowledge and practice regarding the use of cosmetics during pregnancy. While only (22%) of respondents had a high level of knowledge, the majority (50%) had a moderate level. A further (28%) had a low level of knowledge. Conversely, (43%) of respondents had safe practices (high level), (51%) adopted moderate

practices, and only (6%) had poor practices. this suggests that, this pattern implies that even in the absence of high knowledge levels, most pregnant women adopt generally positive behaviors, probably influenced by medical advice or social awareness rather than in-depth knowledge.

3.5 Correlation

Table VI: Pearson Correlation Between Knowledge and Practice Scores.

	Knowledge Score	**Practice Score**
Pearson Correlation	1	**0.555**
Significance (2-tailed)	—	**0.000**
N	201	201

Note: Correlation is significant at the 0.01 level (2-tailed).

3.6 Chi-2 test

Table VII: Chi-2 Test Results (First Test)

Test Type	**Value**	**df**	**Asymptotic Significance (2-tailed)**
Pearson Chi-2	38.620[a]	10	0.000
Likelihood Ratio	45.001	10	0.000
Valid Cases (N)	201	—	—

8 cells (44.4%) have expected count less than 5. The minimum expected count is 0.44.

Table VIII: Chi-2 Test Results (Second Test)

Test Type	**Value**	**df**	**Asymptotic Significance (2-tailed)**
Pearson Chi-Square	26.998[a]	10	0.003
Likelihood Ratio	25.945	10	0.004
Valid Cases (N)	201	—	—

10 cells (55.6%) have expected count less than 5. The minimum expected count is 0.11.

4 Discussion

This study aimed to explore pregnant women's knowledge regarding cosmetic safety during pregnancy and to examine the relationship between their knowledge and practices. The findings revealed that the majority of pregnant women used more than one type of cosmetic product during pregnancy. This behavior may be attributed to the physiological and dermatological changes caused by hormonal and metabolic fluctuations, which often prompt women to manage these effects using various cosmetic products **(Gangakhedkar and Kulkarni, 2021; Motosko *et al.,* 2017).**

However, only (22%) of participants demonstrated a high level of knowledge concerning the safety of cosmetic ingredients during this critical period. This gap in awareness is concerning, as certain cosmetic products may contain potentially harmful substances—such as retinoids, salicylic acid, and phthalates—that have been associated with adverse pregnancy outcomes **(Putra *et al.,* 2022).** Contributing factors may include insufficient patient education, limited guidance from healthcare providers **(Djarene, 2021),** and misleading marketing strategies employed by cosmetic brands.

These results are consistent with previous studies. For example, **(Ydayang *et al.,* 2024)** reported that (96.4%) of participants used one or more cosmetic products during pregnancy. Similarly, **(Neti *et al.,* 2024)** found that (60–80%) of women continued to use cosmetics while pregnant. In contrast, a study by **(Farah Abduelah Kotby *et al.,* 2020)** indicated that most participants had a good understanding of the potential harmful effects of cosmetic products, and **(Raniyah, 2019)** noted that (70%) of pregnant women were aware of cosmetic safety concerns during pregnancy.

While overall knowledge levels were generally moderate rather than high, behavioral outcomes were more promising. Approximately (43%) of participants reported taking protective measures, such as avoiding products with harmful ingredients and choosing natural or organic alternatives. Furthermore, (71%) stated they had discontinued the use of nail polish, hair dyes, or alcohol-based products. These findings suggest that general risk perception—shaped by cultural norms, informal advice, or intuitive caution—may drive safer cosmetic practices even in the absence of comprehensive knowledge **(Herzog-Petropaki *et al.,* 2022).** Supporting this observation, a significant positive correlation was found between knowledge and practice scores ($r = 0.555$, $p < 0.01$), indicating that greater awareness is associated with safer behavior. This aligns with established health behavior models, which suggest that while

knowledge is a key component of behavior change, it may not be sufficient on its own **(Glanz *et al.*, 2008).**

Sociodemographic trends were also identified. Participants aged (26–30) years exhibited the highest knowledge and practice scores, possibly reflecting increased health consciousness during this life stage **(Glanz *et al.*, 2015).** Statistically significant associations were observed between educational level and both knowledge and practice concerning cosmetic safety, as demonstrated by Chi-square tests (knowledge: $\chi^2 = 38.620$, df = 10, $p < 0.001$; practice: $\chi^2 = 26.998$, df = 10, $p = 0.003$). However, higher education did not consistently correspond with higher levels of knowledge. Many university graduates exhibited only moderate or even poor understanding of cosmetic safety, which may reflect the absence of specific content on cosmeceuticals in conventional educational curricula **(Yang, 2009).**

Moreover, a significant portion of respondents (74.6%) were unemployed, potentially limiting their exposure to workplace health education programs that might enhance awareness **(Adler and Ostrove, 1999).** Urban residents (72%) demonstrated greater engagement in safe cosmetic practices compared to their rural counterparts (38.3%), possibly due to disparities in access to accurate health information **(Hartley, 2004).** Regarding information sources, social media (52%) and friends or family (34.3%) were the most frequently cited, while only (23%) relied on healthcare professionals. This raises concerns about the reliability of the information influencing pregnant women's behaviors **(Dutta-Bergman, 2004).** These findings underscore the importance of incorporating socio-demographic considerations into the development of interventions aimed at enhancing pregnant women's knowledge and practices related to cosmetic safety.

- **Implications**

This study highlights the pressing need to improve pregnant women's knowledge about cosmetic safety. While the use of cosmetic products during pregnancy is common, awareness of potential risks remains limited. Healthcare professionals should proactively provide guidance during prenatal visits, and public health initiatives should promote safe cosmetic use. Educational strategies must be tailored to suit various socio-demographic groups to ensure effective communication and improve maternal and fetal health outcomes.

- **Limitations**

Several limitations should be acknowledged. The study relied on self-reported data, which may be influenced by recall or social desirability bias. Additionally, the relatively small sample size and cross-sectional design limit the generalizability of the findings and hinder the

ability to assess long-term trends. Moreover, external influences—such as media messaging or cultural beliefs—were not systematically explored, which may have affected participants' knowledge and practices.

Conclusion

Conclusion

The study focused on exploring the level of knowledge and practice of pregnant women concerning the use of cosmetic products during pregnancy conducted in the Obstetrics and Pediatrics Department of *Belhocine Rachid* Maternity and Childhood Hospital in Bordj Bou Arreridj. concentrated on evaluating their knowledge of the potential risks associated with certain cosmetic ingredients and how their awareness influences their products choices. The results indicated a frequent use of cosmetics during pregnancy, with over 90% of participants noting regular use, particularly of hair care, deodorants, and skincare products. Although cosmetic use was common, there is a significant gap between what the participants understand and what they actually do in practice, many respondents were not informed about harmful substances in cosmetics such as parabens, phthalates, and retinoids and only a small percentage showed a high level of knowledge regarding the safety of cosmetic products during pregnancy. General misunderstandings were also clear, with many women unsure about risks or not familiar with ingredients labels and safety warnings. However, positive practices were reported: many women reported avoiding certain products, reducing cosmetic use, and choosing natural/organic products, showing a natural concern for baby's health aven with limited knowledge. The use of cosmetic products during pregnancy can cause risks for the mother and fetus health, especially during pregnancy. Sociodemographic factors significantly influenced knowledge and practice, women with higher levels of education or urban residence were generally more careful and better informed from others. This underscore the need for looking for:

- Potentially dangerous substances in cosmetics and teach pregnant women about safe cosmetics.
- Use modern and traditional media to educate future mothers on the safe application of cosmetics.
- Encourage all cosmetics containing substances that could be harmful to pregnant women to have clearer and more consistent labels.
- Watch how pregnant women behaviors and knowledge change to see if advice is working.

- **Perspective and Future Direction**

This study, conducted in the Wilaya of Bordj Bou Arreridj (BBA), shows that pregnant women have limited knowledge and unsafe practices in using cosmetic products. These

results highlight the need for more research across Algeria to better understand how social and economic factors influence cosmetic use during pregnancy. Future studies should be done in different regions and over longer periods. This will help evaluate how cosmetics are used and how their ingredients may affect the health of mothers and babies. Strengthening collaboration between healthcare professionals, public health authorities, and cosmetic regulators is essential to create clear, evidence-based safety guidelines. Public awareness campaigns, better product labeling, and including cosmetic safety in medical and nursing education should also be priorities. These efforts will help close the knowledge gap and encourage safer cosmetic practices for pregnant women throughout the country.

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Annexes

Annex I

Table I: Summary of maternal and fetal changes across the trimesters of pregnancy **(Cleveland Clinic, 2024; Đurđević *et al.*, 2019).**

Trimester	Weeks	Fetal Development Highlights	Common Maternal Symptoms
First Trimester	0–13	Major organs and body systems form; fetus is most vulnerable to toxins	Nausea, fatigue, breast tenderness, frequent urination
Second Trimester	14–26	Gender may be identified; fetal movements (quickening) begin	Increased energy, improved sleep, reduced nausea
Third Trimester	27–40	Rapid fetal growth; organs and bones complete development; baby moves into birth position	Back pain, insomnia, shortness of breath, frequent urination

- Timeline of health impacts from exposure to harmful substances hazards during trimesters **(UNICEF, 2025)**

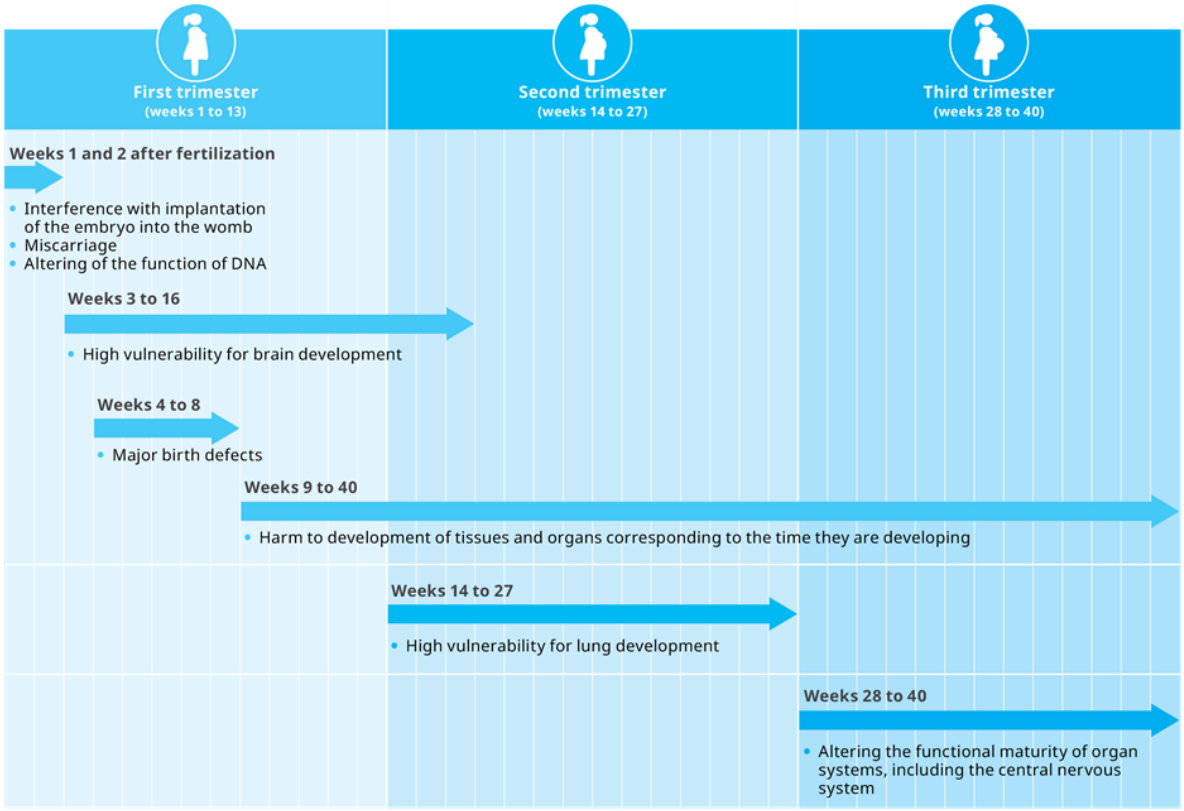

Figure 1: Timeline of health impacts from exposure to harmful substances hazards during trimesters **(UNICEF, 2025).**

- The most sensitive times of a baby's development during the 38 weeks of pregnancy **(Villa *et al.*, 2024).**

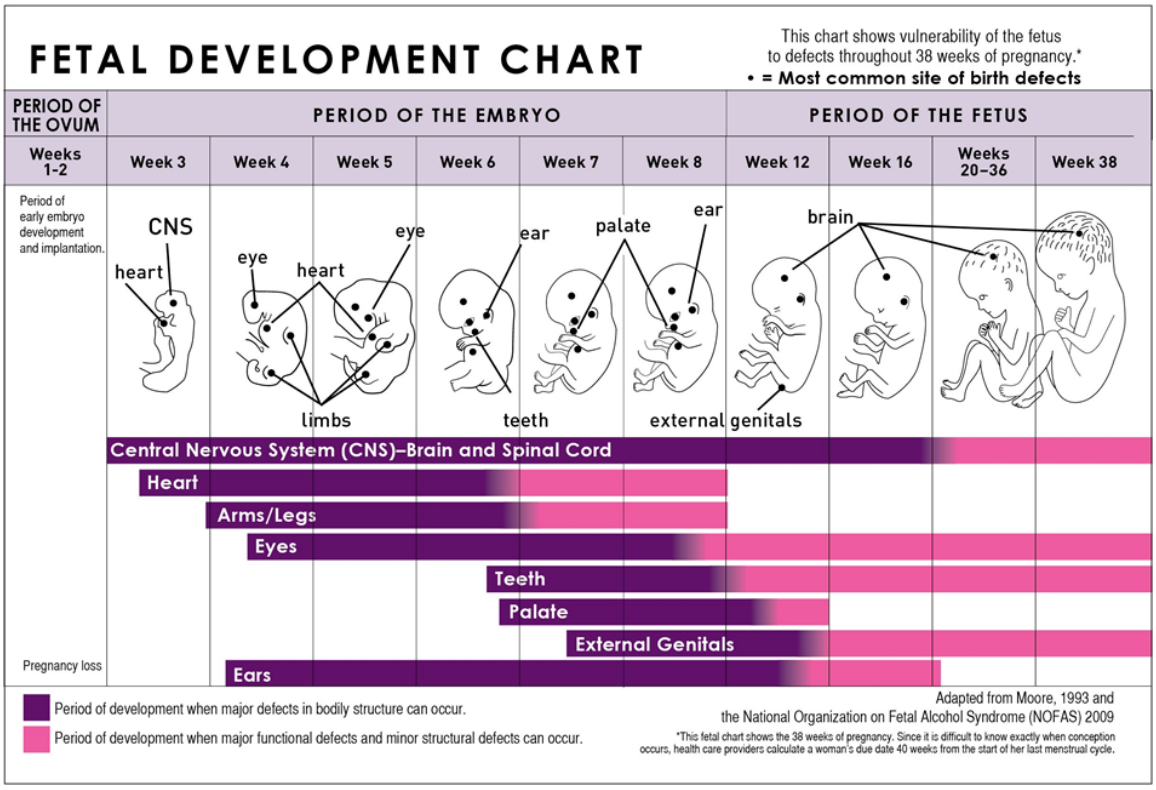

Figure 2: Vulnerability of the fetus to defects throughout 38 weeks of pregnancy **(Villa *et al.*, 2024).**

- Classification of various cutaneous changes in pregnancy **(Gupta *et al.*, 2024).**

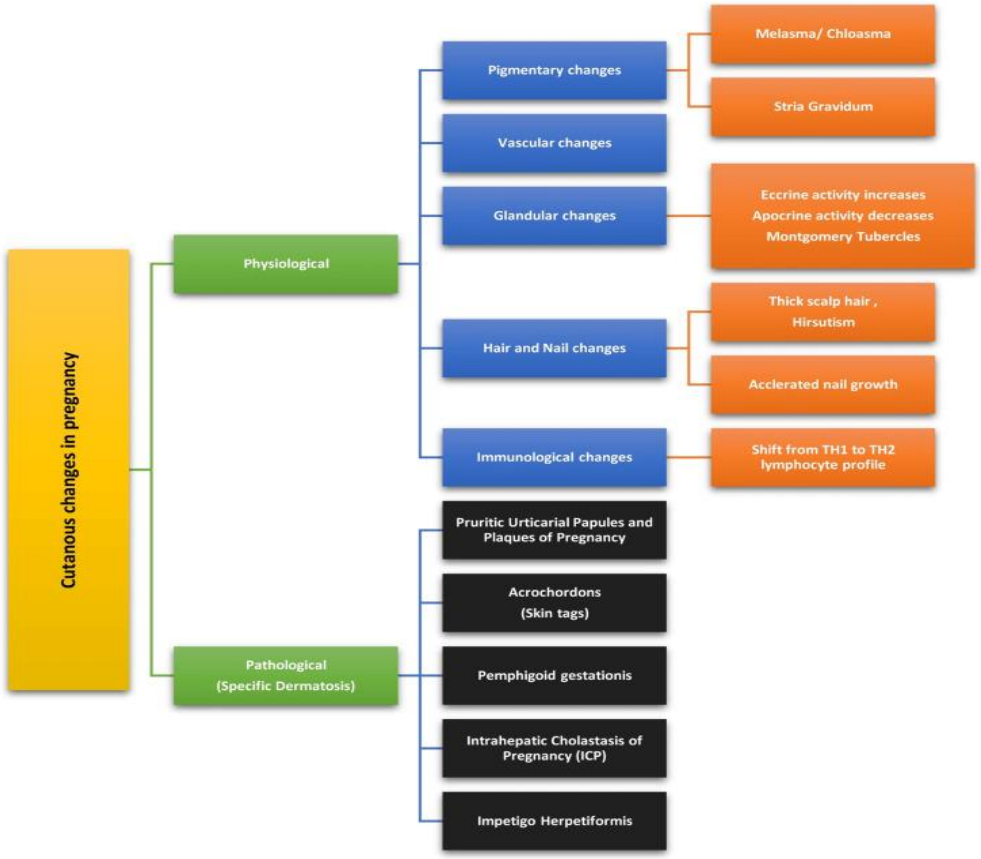

Figure 3: Classification of various changes in pregnancy **(Gupta *et al.*, 2024).**

- Cosmetic Product Categories **(Cosmetics Europe, 2025).**

Figure 4 : Categories of cosmetics and personal care products **(Cosmetics Europe, 2025).**

Table II: Types of ingredients in cosmetics **(Sharma *et al.*, 2023).**

Ingredient Type	Description	Examples / Study Findings	Advantages	Limitations

Functional Ingredients	Necessary for the formulation's structure and preservation	Emulsifiers aid oil-water interface; studies show emulsifiers influence texture and usability; ingredients like palmitoyl peptides, vitamin E improve skin quality	Ensure product stability, texture, and shelf life	Do not directly benefit skin condition
Performance Ingredients	Deliver specific cosmetic benefits (moisturizing, anti-aging, UV protection)	Humectants, occlusives, emollients retain moisture; Bakuchiol offers anti-aging for sensitive skin; UV filters like titanium dioxide and avobenzone protect skin	Targeted skin benefits, widely researched	May cause irritation or allergic reaction in sensitive users
Natural Ingredients	Derived from plants, minerals, or animals	Lignins from nut shells show UV-absorbing properties; grape byproducts investigated for sustainable cosmetic use	Eco-friendly, perceived as safer	Less stable, risk of contamination or allergic reactions
Synthetic Ingredients	Chemically synthesized for consistency and efficiency	Panthenol at 1% improves skin hydration and integrity; widely used for predictable results	Stable, cost-effective, consistent performance	Perceived as less natural; environmental concerns

Table III: Common cosmetic ingredients and their use **(Sharma *et al.*, 2023).**

Category	Ingredients	Use/Comment
Emollients		
Emollients based on source		
Natural Emollient	Shea butter	Skin moisturisation boosting
	Coconut oil	Exhibit Antibacterial properties
	Jojoba oil	Greater moisturisation
Synthetic emollient	Dimethicone	Great co-emulsifier.
	Glyceryl stearate	Emulsion stabiliser
Hydrocarbon emollient	Mineral oil	Greater moisturisation
	Petrolatum	It was found to have excellent permeation in the epidermis
Emollients based on chemical structure		
Fatty acid & Derivatives	Stearic acid	Found to have excellent cleansing properties
	Palmitic acid	
Fatty alcohols	Cetyl alcohol	Good stabilisers
	Stearyl alcohol	Effect the formulation permeation rate
Esters	Retinylpalmitate	They were found to increase the retention time and stability of the formulation
	Tocopheryl acetate	

Silicones	Dimethicone	They have skin smoothing and softening properties were found to improve hair fibres and make hair softer
	Cyclomethicone	
Humectants	Glycerin	Skin-softening properties
	Hyaluronic acid	In a study, Hyaluronic acid nanoparticles were found to have improved moisturising efficacy
Surfactants		
Anionic Surfacant	Sodium lauryl sulfate (SLS)	Low amounts help to maintain skin integrity
	Sodium laurethsulfate (SLES)	Improves skin dryness
Cationic surfactant	Cetrimonium chloride	Improved skin moisturisation
Nonionic surfactant	Polysorbate 20	It helps to stabilise the formulation
	Polysorbate 80	Acts as an emulsifier for blending oils
Amphoteric surfactant	Cocamidopropylhydroxysultaine (CHSB)	It is a foam-boosting agent and viscosity builder
	Disodium cocoamphodiacetate (DSCA)	It has mild cleansing activity and is used in conditioners for hair softening
Preservatives		
Natural preservatives		
Plant-based Essential oil	Rosemary extract	Exhibit excellent antioxidant properties
	Tea tree oil	They have antimicrobial properties
	Lavender oil Clove oil	Effective against gram-positive and gram-negative bacteria
Synthetic Preservatives		
Parabens	Methylparaben	It is an anti-fungal agent often used in various cosmetics and personal care products
	Propylparaben	A non-volatile compound used as an antimicrobial preservative
Formaldehyde-releasing agents	Diazolidinyl urea	Effective preservative against yeast and moulds
	Imidazolidinyl urea	It is an antimicrobial agent used in personal care products
Quaternary ammonium compounds	Benzalkonium chloride	Used in hand sanitiser to reduce ***S. aureus*** contamination
	Cetrimonium chloride	Used as topical antiseptic and preservative

Organic acids	Benzoic acid	It is used as an antimicrobial preservative
	Salicylic acid	It is used as an exfoliator and has antiseptic properties
	Phenoxyethanol	Used as a stabiliser in perfumes and soaps
	Triclosan	Used as an antimicrobial preservative in shampoos
	Chlorhexidine	A study suggested chlorhexidine-containing toothpaste or mouthwashes to improve symptoms and resolution of gingivitis
Others		
Antioxidants	Vitamin E	Increase skin hydration
	Vitamin C	Makes skin shiny and decrease sebum production
	Green tea extract	Antimicrobial properties reduce skin redness and prevent wrinkles
UV filters	Zincoxide Titaniumdioxide	Both of these are UV rays absorber and offer sunscreen transparency when microsized

Table IV: Global cosmetic regulatory frameworks **(Ferreira *et al.*, 2022).**

Region / Country	Main Regulatory Framework	Key Authorities	Year of Major Reform / Introduction	Key Notes
European Union (EU)	Regulation (EC) No. 1223/2009	European Commission; Member State Authorities	2009 (replaced 1976 Directive)	Harmonized regulation across all EU states; technical modernization
United States (USA)	FD&C Act (1938), FPLA (1966)	FDA	Minimal amendments since introduction	Outdated; lacks comprehensive modernization
Canada	Cosmetic Regulations (1977), Food and Drugs Act (1985)	Health Canada	Minor amendments	Limited updates since initial implementation
Japan	Pharmaceutical and Medical Devices Law (PMDL)	Ministry of Health, Labour and Welfare	2014 (replaced 1960 PAL)	Updated to reflect current practices and safety standards
China	Cosmetic Supervision and Administration	SAMR, NMPA, GAC	2021 (replaced 1990 CHSR)	Extensive reforms; several new supporting

	Regulation (CSAR)			regulations introduced
Brazil	Various Resolutions	Ministry of Health, ANVISA, GHCOS	Ongoing amendments	Multi-authority system; evolving regulatory environment

Table V: Main legislations and guidelines references that set the production, transport, and marketing of cosmetic products in the EU **(Lionetti and Rigano, 2018).**

Field of Application	Regulation/Guideline
Cosmetic Products	REGULATION n. 1223/2009/EC
Claims	REGULATION n. 655/2013/EC
Classification, labeling, and packaging of substances and mixtures	REGULATION n. 1272/2008/EC
Borderline cosmetic product	Manual on the scope of application of the Cosmetic Regulation 1223/2009, VERSION 1.0 (November 2013)
Differences between cosmetics and medicinal products	Guidance document on the demarcation between the cosmetic products DIRECTIVE 76/768 and the medicinal products DIRECTIVE 2001/83, as agreed between the commission services and the competent authorities of member states
Differences between cosmetics and biocides	Guidance document agreed between the Commission services and the competent authorities of Member States for the biocidal products Directive 98/8/EC and for the cosmetic products Directive 76/768/EEC (2004)

Table VI: Cosmetic Product Labeling **(Cosmetics Europe, 2015; Lionetti and Rigano, 2018).**

Labeling Element	Description	Notes
Responsible Person (RP)	Name or registered name and address of the Responsible Person.	Highlight the address where the Product Information File (PIF) is available.
Country of Origin	Indication of the country where the product is manufactured.	Required **only for imported products**.
Nominal Content	Net quantity of product (e.g., 50 ml, 100 g).	Shown in volume or weight.
Date of Minimum Durability (DoMD)	Indicates the date until which the product remains stable (e.g., "Best before end of [MM/YYYY]").	Required **if shelf life < 30 months**.
Period After Opening (PAO)	Duration of product usability after first opening, shown as an open-jar symbol with a number and "M" (e.g., "12M").	Required **if shelf life > 30 months**.
Batch Number / Reference	A code for product identification and traceability.	Typically printed or embossed on the packaging.
Function of the Product	Description of the product's purpose (e.g., cleanser, conditioner).	Required **only if not obvious from presentation**.
Precautions for Use / Warnings	Special instructions to ensure safe usage (e.g., avoid contact with eyes, flammable).	Mandatory **if necessary** for safety.
Ingredients List	Full list of ingredients using **INCI (International Nomenclature of Cosmetic Ingredients)** names, in decreasing order by weight.	May appear only on **external packaging**. Ingredients <1% can be listed in any order.
Allergen Information	Covered under the ingredients list. Allows individuals with allergies to identify and avoid certain ingredients.	Standardized INCI naming used across EU and many other countries.

Table VII: Demographic and Cosmetic Usage Profile of Respondents (%).

Parameter		Respondents	
		n	%
Age (years)	Under 20	9	**4**
	20–25	46	**23**
	26–30	60	**30**
	31–35	42	**21**
	36–40	35	**17**
	Over 40	9	**4**
Trimester of pregnancy	First (1 to 3 months)	81	**40**
	Second (4 to 6 months)	64	**32**
	Third (7 to 9 months)	56	**28**
Education level	No formal education	2	**1**
	Primary school	14	**7**
	Middle school	31	**15**
	High school	67	**33**
	University degree	85	**42**
	Postgraduate degree	2	**1**
Occupation	Student	8	**4**
	Unemployed	150	**75**
	Employee	27	**13**
	Self-employed	16	**8**
Residence area	Urban	124	**62**
	Rural	77	**38**
Skin changes during pregnancy	Drier skin	108	**54**
	Oiler skin	29	**14**
	Acne	52	**26**
	Hyperpigmentation	70	**35**
	stretch marks	66	**33**
	Eczema	16	**8**
	Allergies	51	**25**
	No changes	33	**16**
Types of cosmetic products used	Skincare	129	**64**
	Makeup	96	**48**
	Hair care	184	**92**
	Perfumes and deodorants	178	**89**
	Body care	95	**47**
Cosmetic product purchase location	Pharmacy/Para-pharmacy	89	**44**
	Organic shop	10	**5**
	Supermarket	12	**6**
	Specialist cosmetics shop	184	**92**
	Homemade	48	**24**
Cosmetic product information source	Social media	103	**51**
	Online articles and blogs	24	**12**
	Friends and family	69	**34**
	Doctors or dermatologists	47	**23**
	Buy randomly	58	**29**

Abstract

This study, conducted in the wilaya of ***Bordj Bou Arreridj***, examines the knowledge, attitudes, and practices of pregnant women regarding the use of cosmetic products during pregnancy. It focuses on their awareness of the potential risks associated with certain ingredients. The research involved 201 women attending the maternity and pediatrics department of ***Belhocine Rachid*** Hospital. Data were collected through a structured questionnaire and analyzed using SPSS software (version 16). The results revealed that 22% of participants had a high level of knowledge, 50% had a moderate level, and 28% had a low level. Additionally, 43% reported engaging in safe practices.

The Chi-square test showed a significant relationship between education level and both knowledge ($\chi^2 = 38.620$; $p < 0.001$) and practices ($\chi^2 = 26.998$; $p = 0.003$), indicating that the more educated a woman was, the more likely she was to adopt appropriate behaviors regarding cosmetic use during pregnancy. Residence was also a determining factor: women living in urban areas demonstrated better practices than those in rural areas.

Although many participants were unaware of toxic ingredients such as parabens, phthalates, and retinoids, they often exhibited cautious behavior, influenced primarily by social media (51%) and their social circle (34%), while only (23%) received advice from healthcare professionals. These findings highlight the need for targeted awareness campaigns, improved cosmetic labeling, and increased involvement of healthcare professionals to promote safer choices for both maternal and fetal health.

Keywords: Pregnant women, cosmetic products, knowledge, practices, potential risks.

Résumé

Cette étude, menée dans la wilaya de ***Bordj Bou Arréridj***, porte sur les connaissances, attitudes et pratiques des femmes enceintes concernant l'utilisation des produits cosmétiques pendant la grossesse. Elle met l'accent sur leur niveau de conscience des risques potentiels liés à certains ingrédients. Réalisée auprès de 201 femmes fréquentant le service de maternité et de pédiatrie de l'hôpital ***Belhocine Rachid***, l'enquête s'est appuyée sur un questionnaire structuré et une analyse statistique à l'aide du logiciel SPSS (version 16).

Les résultats montrent que (22%) des participantes avaient un niveau de connaissance élevé, (50%) un niveau moyen et (28%) un faible niveau, tandis que (43%) déclaraient adopter des pratiques sûres. Par ailleurs, le test du Chi² a révélé un lien significatif entre le niveau d'éducation et les connaissances ($\chi^2 = 38,620$; $p < 0,001$), ainsi qu'avec les pratiques ($\chi^2 =$

26,998 ; p = 0,003), ce qui signifie que plus une femme est éduquée, plus elle adopte des comportements appropriés concernant l'usage des cosmétiques pendant la grossesse.

Des facteurs comme le lieu de résidence ont également joué un rôle : les femmes vivant en milieu urbain adoptaient de meilleures pratiques que celles des zones rurales. Même si beaucoup ignoraient la toxicité de certains ingrédients tels que les parabènes, phtalates ou rétinoïdes, elles adoptaient souvent des comportements prudents, influencées par les réseaux sociaux (51%) et leur entourage (34%), tandis que seulement (23%) recevaient des conseils de professionnels de santé.

Ces résultats soulignent la nécessité de mettre en place des campagnes d'information ciblées, d'améliorer l'étiquetage des produits cosmétiques et de renforcer l'implication des professionnels de santé afin de garantir des choix plus sûrs pour la santé maternelle et fœtale.

Mots-clés : femmes enceintes, produits cosmétiques, connaissance, pratique, risque potentiel.

ملخص

أُجريت هذه الدراسة في ولاية برج بوعريريج وتركز على معرفة النساء الحوامل ومواقفهن وممارساتهن فيما يتعلق باستخدام مستحضرات التجميل أثناء الحمل. ويركز على مستوى وعيهن بالمخاطر المحتملة المرتبطة بمكونات معينة. أُجريت الدراسة على 201 امرأة من المترددات على قسم الأمومة وطب الأطفال في مستشفى بلحسين رشيد، واستندت الدراسة على استبيان منظم وتحليل إحصائي باستخدام برنامج SPSS (الإصدار 16). أظهرت النتائج أن 22% من المشاركات كان لديهن مستوى عالٍ من المعرفة، و50% منهن بمستوى متوسط، و28% بمستوى منخفض، بينما قالت 43% منهن أنهن يتبنين ممارسات آمنة. علاوة على ذلك، أظهر اختبار Chi^2 أن هناك صلة كبيرة بين مستوى التعليم والمعرفة ($\chi^2 = 38.620$؛ $p < 0.001$)، وكذلك مع الممارسات ($\chi^2 = 26.998$؛ $p = 0.003$)، مما يعني أنه كلما كانت المرأة أكثر تعليماً كلما تبنت سلوكيات مناسبة فيما يتعلق باستخدام مستحضرات التجميل أثناء الحمل، كما لعبت عوامل مثل مكان الإقامة دوراً: كان لدى النساء في المناطق الحضرية ممارسات أفضل من تلك التي تعيش في المناطق الريفية. وعلى الرغم من أن العديد منهن لم يكن على دراية بالمكونات السامة مثل البارابين أو الفثالات أو الرتينوئيدات، إلا أنهن غالباً ما اتبعن سلوكاً حذراً مسترشدات بشبكات التواصل الاجتماعي (51%) وأصدقائهن وعائلاتهن (34%)، بينما لم يتلقَّ 23% منهن فقط المشورة من المهنيين الصحيين. تسلط هذه النتائج الضوء على الحاجة إلى حملات إعلامية هادفة، ووضع علامات أفضل على مستحضرات التجميل وزيادة مشاركة أخصائيي الرعاية الصحية لضمان خيارات أكثر أماناً لصحة الأم والجنين.

الكلمات المفتاحية: النساء الحوامل; مستحضرات التجميل; المعرفة; الممارسات; المخاطر المحتملة.